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Discrete Devaluation as a Signal to Price Setters: Suggested Evidence from Greece

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ABSTRACT

The central hypothesis of this paper is that both the extent and speed of adjustment of the real exchange rate is affected by the way the central bank manages the nominal exchange rate specifically, a large discrete devaluation is more likely to result in fast adjustment of prices as opposed to a policy of smooth and continuous crawling peg. In the context of a monopolistic price adjustment framework, it is shown that a discrete and unexpected devaluation of the exchange rate shortens implicit price contracts and increases the rate of price adjustment in the non-traded goods sector, because firms tend to strengthen their expectations about an overall increase in costs and about an aggregate as opposed to a local shift in the demand curve for the firm's output. A discrete change in the exchange rate acts as an "information signal" that leads to fast overall adjustment of non-traded goods prices. The hypothesis is tested and not rejected at the macro, sectoral and firm level using macro and micro data on Greek prices prior to and after the January 1983 discrete devaluation.

Introduction [1]

The origin of this paper can be traced back to early February 1983, following a visit to a small shoe-repair shop in a suburb of Athens. The owner of the shop angrily protested the decision of the firm which supplied him shoe-polish to issue a new price list which effectively raised the prices of almost all of its main products by a range of 20-34%. His anger was focused not so much on the extent of the price change but on the fact that contrary to expectations, the new price list was issued shortly after the last list in October. He maintained that this was a clear violation of client-supplier relationships since in the past the implicit price contract set between them maintained prices unchanged for a period of 6 to 9 months. The justification provided by the firm to this "breach"of contract was the "unprecedented"devaluation of the drachma during the preceding month. To this the shoe-maker replied that the price-surveillance department of the Ministry of Commerce should intervene since the firm used only domestically produced inputs and thus used the pretext of the devaluation to raise profits. In Okun's terms ".... customers appear willing to accept fair an increase in price based on a permanent increase in cost" (Okun, 1975). For the Athenian shoe-maker the January devaluation did not entail a permanent increase in cost to the shoe-polish firm. This attitude however, was not shared by the firm itself.

On January 9, 1983 the drachma was devalued against the dollar by 15.5% raising the price of the dollar from 71 to 84 drs/$. On a monthly average basis, the devaluation of the drachma between December 1982 and January 1983 was 14.14% against the dollar and 14.77% in effective

terms. As can be seen in Diagrams 1 and 2, this was the largest discrete change both in the Drch/$ rate (BIE) and the effective rate (EFE) since the introduction of the crawling peg system in March 1975. It was at that time that the drachma ceased to be pegged to the US dollar and that a currency basket consisting of 12 currencies became the basis for the conduct of exchange-rate policy. Thus over a ten-year period of managed float, the January 1983 devaluation of the drachma was one of the few incidents of discrete and large adjustment of the exchange rate as opposed to daily smooth crawling.

The objective of this paper is to investigate the effects of exchange-rate management on price behavior and thus on the real exchange-rate in a small semi-industrialized country like Greece.

Traditionally the main policy objective behind a nominal devaluation is to promote competitiveness in third markets and to improve the balance of payments. Setting aside J-curve considerations, the balance-payments effects following a nominal devaluation depend (a) on the extent by which the real exchange rate is depreciated, and (b) on the effects of the real exchange rate adjustment on net export receipts.

Regarding the first factor there is already an extensive literature on the subject that focuses on the potential adjustment of the relative price of home to traded goods following a devaluation.[2]

The increase in the price of traded goods relative to non-traded goods as a result of a devaluation shifts demand towards the non-traded

Diagram 1

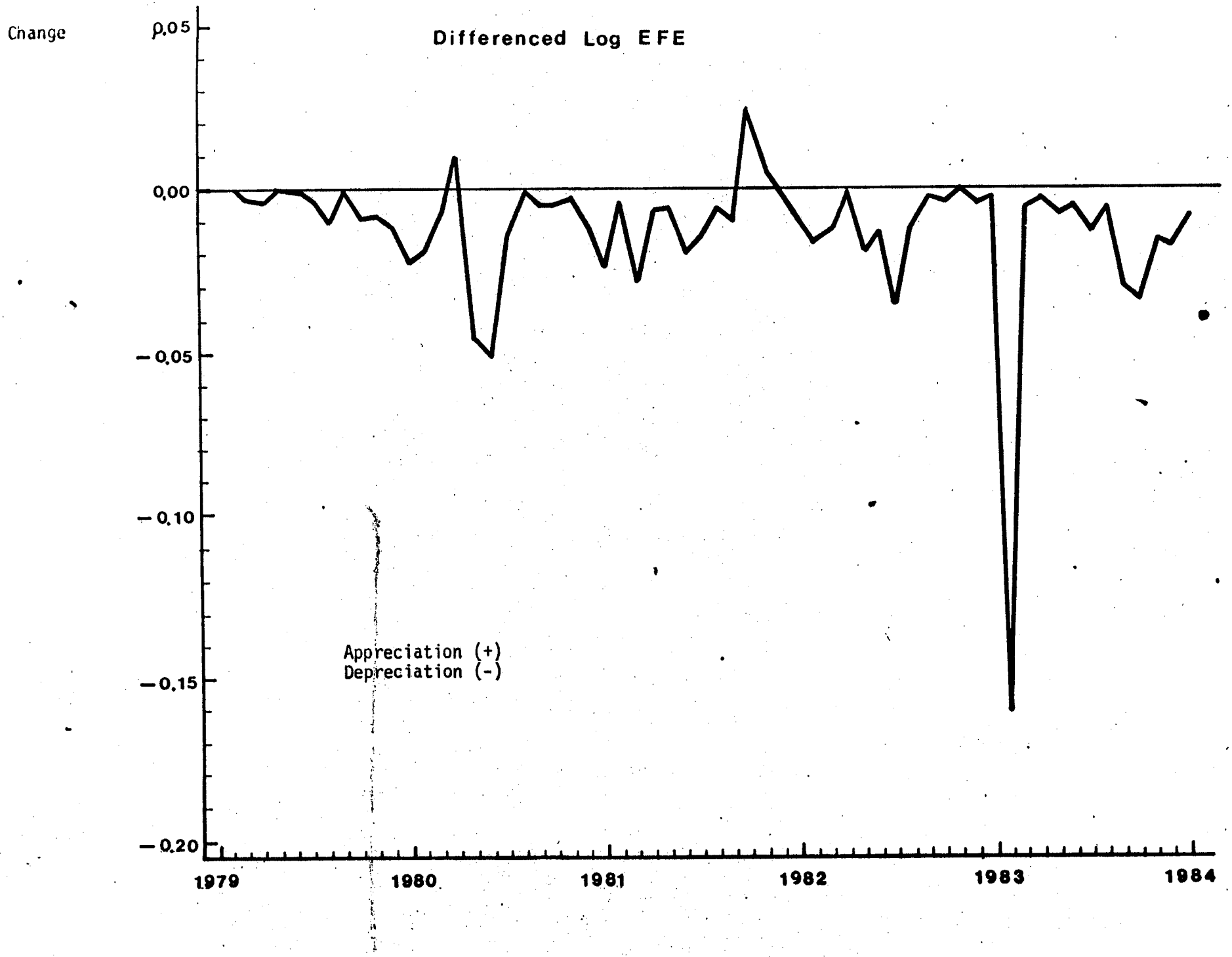
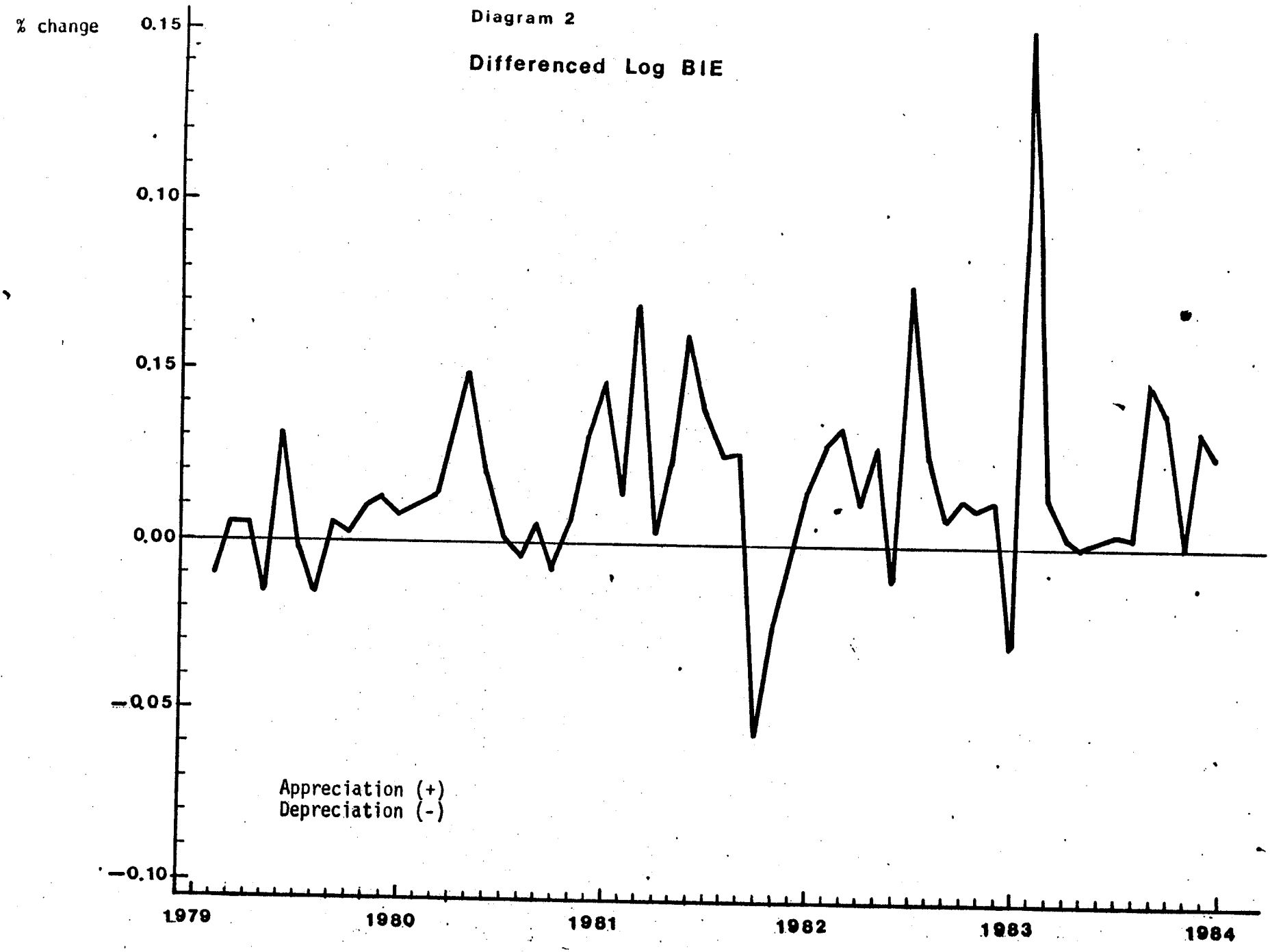

Change
Differenced Log EFE
0.05
0.00
-0.05
-0.10
-0.15
-0.20
Appreciation (+)
Depreciation (-)
1979
1980
1981
1982
1983
1984

Diagram 2


% change
Differenced Log BIE
0.15
0.10
0.15
0.00
−0.05
−0.10
Appreciation (+)
Depreciation (-)
1979
1980
1981
1982
1983
1984

goods sector giving rise to a current account surplus that increases reserves and the money supply. The degree of balance-of-payments improvement depends on elasticities, income and absorption effects, conditions in asset markets and finally expectations. Eventually the price of non-traded goods will rise to its steady state level. In the mean-time employment and output in the non-traded good sector will increase (Katseli, 1980).

As has been shown elsewhere (Katseli, 1980) these results are sensitive to the underlying assumptions regarding the structural characteristics of the economy and more specifically to the degree of wage indexation and the presence of imported intermediate goods. In both these cases the demand shift is coupled with a cost shift making the effects on the real exchange rate, the output response and the balance-of-payments at best ambiguous.

In the absence of real-exchange rate adjustment, a devaluation can work solely through a real balance effect. The increase in the price of foreign exchange then reduces real balances. If the demand for money is exogenously determined[3], the excess demand for money is translated into a reduction in absorption and a balance of payments surplus which is the vehicle by which money balances are replenished (Katseli, 1983). In this case as absorption is reduced, the improvement in the balance-of-payments is achieved at the expense of output and employment creation in the non-traded good sector.

Thus the aggregate output and employment response to a devaluation critically depends on the responsiveness of the real-exchange rate

to the nominal devaluation. Given these considerations, it is important to look at the implications of exchange rate management for real exchange rate developments.

The central hypothesis of this paper is that both the extent and speed of adjustment of the real exchange rate is affected by the way the Central Bank manages the nominal exchange rate. Specifically, a large discrete adjustment of the nominal exchange rate is more likely to result in fast adjustment of prices as opposed to a policy of smooth and continuous crawling peg. To use R. Cooper's terminology, whether exchange rate policy occupies the "high"or "low-politics realm" does in fact matter for a country's competitiveness and the output and employment effects in the adjustment period.

If domestic prices instantaneously adjust to their steady - state level,then the improvement in the balance of payments can come about only through a natural or policy-induced squeeze in absorption. In both cases, the effects of the devaluation tend to be stagflationary at least in the non-traded good sector.

The channel through which management of the nominal exchange rate influences real-exchange rate developments is the process of price adjustment. As it will be shown in Section 2 of the paper, this process has at least two important features, namely the magnitude and frequency of price changes. The existing finance literature on exchange rate policy has focused largely on the first aspect only, that is on the responsiveness of domestic prices to a nominal devaluation. The industrial organisation and macroeconomic literature on the other hand has increasingly focused on sluggishness. As Barro has noticed,

> ... The firm's elastic demand curve must be discarded in disequilibrium if the firm is ever to change price. In this sense the response of prices to disequilibrium is essentially a monopolistic phenomenon even if the individual units perform as perfect competitors in equilibrium. Therefore, it seems clear that a theory of monopolistic price adjustment is a prerequisite to a general theory of price adjustment. (Barro, 1972, p. 17).

Monopolistic price adjustment implies joint determination of two pricing features on the part of the firm: (a) length of the implicit or explicit "price contract" and (b) magnitude of adjustment at the end of the contract period. As Gray has shown (1976), analogous modelling can be applied to the workings of a labor market which is characterized by the existence of a strong union. In that case it is the contract length and the indexing parameter that become the important contract characteristics.

In merging these two trends in literature, this paper argues that exchange rate management can affect both the length of the price-contract between firms and clients as well as the magnitude of price adjustment. This hypothesis can be tested directly only through the use of micro or firm-level data since the path of price adjustment varies across firms. Such data are in fact available for Greek firms. As will be shown in Section 3 of the paper, prices set by Greek firms for specific products exhibit properties of a step function. The contract length and the magnitude of the price adjustment can be thus investigated in relation to exchange rate management.

The econometric analysis of price behaviour by firms is complicated however, by the existence of special institutional factors under which trading occurs. This is the case in most developing countries where there is apt to be some institutional mechanism for price surveillance or direct price controls.

In the Greek case price controls have existed since the mid 30s. After World War II, they covered only a small number of products and were intended to curb excessive profits earned from the sale of goods in short supply. Over time, controls have been extended to cover numerous products via specification of price ceilings or of maximum allowable mark-ups over costs. The type of control that is used varies across goods and business operations and can be applied to the industry, the wholesaler or the retailer, that is to any stage within the production and/or distribution system. (Lalonde and Papandreou, 1984).

The complexity of the system thus seriously hinders an extensive analysis c price behavior by firms unless one investigates thoroughly the underlying institutional arrangements that affect each specific product and or enterprise. In the presence of differentiated product controls, profit maximizing behavior on the part of firms implies that pricing of non-controlled items also departs from expected pricing under free-market conditions. It has been noticed for example that firms tend to price overall production in such a way as to ensure large enough profits in some lines of production and thus cover losses generated in the production of price-controlled products. It follows that an increase in expected or actual costs affects not only the overall price level but also relative prices between commodities.

In view of these complexities, the central hypotheses of this paper can be formulated as follows: in Section 2 it is argued that discrete adjustment of the exchange rate tends to shorten the implicit price contract

between sellers and buyers and to augment the rate of price adjustment. This is so because firms tend to strengthen their expectations about an overall increase in costs and about an aggregate shift in the demand curve for the firms' output. A discrete change in the exchange rate thus acts as an "information signal" in the market that leads to relatively fast overall price adjustment of traded and non-traded goods alike. Given the presence of controls, one would tend to observe faster adjustment of prices for non-controlled items even though sooner or later the regulatory agency itself is apt to allow price increases in the controlled part of the market. The output response to these effects depends not only on the expected increase in demand for the firm's output relative to costs but also on the ability of each firm to diversify production across commodities that are exempt from price controls.

The econometric analysis provided in Section 3 should be interpreted with caution. Given the existing institutional complexities, it has to be conducted at the macro, sectoral and product level. Even though the existing evidence is not conclusive, the data do not seem to reject the central hypotheses making this line of research both interesting and promising.

2. On the Magnitude and Frequency of Price Adjustment Following a Discrete Adjustment of the Exchange Rate

In the international finance literature exchange rate management has been analysed in the context of the benefits and costs of alternative exchange rate regimes. As early as 1970, R. Cooper and other authors argued for greater exchange rate flexibility on three separate grounds: (a) to provide smoother adjustment to changing fundamentals, (b) to avoid speculative runs on the national currency and (c) to reestablish the effectiveness of monetary policy (Cooper, 1973).

As concensus on the advisability of flexible exchange rates grew, the focus of attention shifted to the manner in which the "gliding parity" should be managed. It was demonstrated for example that exchange rate adjustment could be unstable if the rate of change of the nominal exchange rate followed the rate of change of foreign exchange reserves as opposed to developments in the current account or the basic balance (Rodriguez, 1981). The so called "shock-treatment", namely an unexpected sudden devaluation or revaluation of the nominal exchange rate, was judged inferior to the "gradualist solution" since it was considered highly unlikely that central authorities would possess the necessary information to arrive at an equilibrium real exchange rate through discrete action (Rodriguez, 1981).

Despite the advantages of continuous exchange rate adjustment to correct underlying fundamental disequilibria, a number of countries during recent years chose to pursue a discrete - adjustment policy. Sweden, Spain and Greece are the most recent examples.

Discrete adjustment of the nominal exchange rate has been usually associated either with political transitions or interruptions in the normal conduct of exchange-rate policy. It is thus undertaken at the beginning of a new government's term in office with a view towards slowing down the necessary rate of devaluation in the following year and attributing the need for such adjustment to past government policy. This was probably the pertinent scenario in both Sweden and Spain. Discrete adjustment is also initiated during periods when for various economic or institutional reasons,the real exchange rate becomes overvalued giving rise to speculative runs on the currency. In both cases the discrete adjustment of the nominal exchange rate is a response to growing disequilibria in the economy. Lastly, discrete adjustment is

used by policy makers to influence expectations about the future rate of devaluation and thus the rate of inflation. It is often a signal for a reversal in policy stance and is usually accompanied by other measures in the fiscal or monetary domain. This is the most likely explanation in the Greek case. Such adjustment, if credible, could in fact have negative real effects on output and employment.

As Calvo (1981) has shown, an unanticipated devaluation always improves the balance of payments of a small and open economy, while below a certain critical deficit level, an increase in the rate of devaluation could bring about a deterioration. In the presence of non-traded goods, these results will continue to hold especially if the relative price of traded to non-traded goods is altered. A devaluation of the real exchange rate[4] thus strengthens the case for balance-of-payments improvement (Katseli, 1983). If as a response to an unanticipated devaluation, prices of non-traded goods "jump" to their steady-state value, then, even the transitory improvement in the balance-of-payments could be questioned. This is especially true in developing countries where the decrease in absorption might be limited by inflationary expectations that lead to an increase in consumption and imports of durables or an accumulation of inventories. Furthermore, inflationary expectations and a decrease in output might reduce money demand offsetting the excess demand for money that is necessary for balance-of-payments improvement. It could thus be argued that a devaluation of the real exchange rate becomes increasingly necessary for balance-of-payments improvement when conditions for the smooth working of the real-balance effect are weak.

Can the process of price adjustment differ depending on the way the exchange rate is managed? The answer would be positive if one analyses price-behavior in price-setting markets as opposed to simple auction markets. As Gordon (1981) has noted the assumption of "pervasive heterogeneity" in types and quality of products and in the location and timing of transactions is crucial for such theory of price adjustment. This approach thus "undermines the new classical macroeconomic models based on a one-good economy postulated by identical price-taking yeoman farmers" (Gordon, 1981), or Calvo's world of a one-family, one-good economy, where "the price level is the exchange rate (i.e. the relative price) of domestic currency in terms of some other given currency" (Calvo, 1981).

There is already a fairly substantive literature on the micro-economic foundations of price-adjustment. Apart from issues that are related to the existence of a "non-Walrasian" or "conjectural" equilibrium, as early as the 1960s another set of contributions attributed partial price adjustment to adjustment costs and incomplete information. In that tradition one could cite the work by Alchian (1969), Phelps and Winter (1970), Okun (1975) and more recently Blinder (1982) and others[5].

From that view point and in sharp contrast to the prototype firm of traditional short-run market analysis, pervasive heterogeneity and the cost of information makes each firm behave in the short and medium run as a monopolist. In that role it acts as a quantity taker and price maker. As Okun has noticed, "even firms with minuscule market shares put price tags on their commodities; in the short run, they are never surprised by the price, and always subject to surprise about the quantities they sell" (Okun, 1975, p. 360).

Following this line of thought, Gordon (1981) has argued that the fundamental reason for gradual price adjustment is the "large local component of actual changes in demand and costs, together with the independence of those costs and demand changes" (Gordon, 1981, p. 522). Combining price-

setting behavior by a typical monopolist with Lucas' analysis of expectation formation he has reached the following conclusions: (a) that price adjustment will be complete if perceived marginal cost responds fully to an aggregate shock but not otherwise; (b) that expected cost "mimics" expected aggregate demand if the aggregate variance of a shock dominates the local variance and (c) that only in the extreme case when the aggregate component of the variance of both demand and cost shifts is very large relative to the local component, as during wartime or a hyperinflation, price adjustment captures fully the aggregate demand shift.

In this view therefore heterogeneity of products make firms behave as monopolists that purchase their inputs and sell their output from/to other firms. The extent to which a particular shock that affects cost and demand is perceived as "local" or "global" critically affects pricing decisions. The adjustment of price will be larger if a shock in demand is expected to affect other firms as well and thus at the end give rise to an increase in the firm's input costs.

How can this framework be applied to exchange rate management? In the case of a discrete devaluation which is typically large, there is "an announcement effect". A high-level official usually announces to all market participants that effective immediately, prices of all traded goods will be increased. Such announcement thus firms expectations even in the non-traded good sector that demand for output and the cost of inputs will increase. The increase in production cost is expected to take the form not only of an increase in the cost of imported inputs but also in the cost of intermediate or capital goods purchased from other domestic firms. In the absence of labour contracts, labor costs are expected to rise concomitantly while in the unionized sector, wages are expected to be adjusted at the end

of the contract period and/or contracts to be renegotiated. Discrete adjustment of the exchange rate thus induces an expected increase in the overall cost of production, that is in both its local and aggregate components. On the demand side, the larger the discrete devaluation, the greater the likelihood of an overall demand shift in the economy and thus the smaller the perceived cost to the specific firm from raising its own price.

A discrete adjustment of the exchange rate thus strengthens expectations regarding inflationary pressures in the economy that will produce both an increase in demand and marginal costs.

The trade-off between price and output adjustment depends on firm specifics. However, the expected increase in marginal costs is more likely to mirror the expected increase in demand in the case of a discrete change in the exchange rate as opposed to a crawling peg. Hence, in comparing these two regimes one would expect price rather than output adjustment to be dominant in the former case.

Discrete adjustment of the exchange rate induces not only an increase in the average expected cost of production but also in the variance of the aggregate component as opposed to the local component. As the local component of actual changes in demand and costs becomes small, price adjustment in the specific firm tends to approximate the rate of devaluation.

Using a simple cost-push model that is similar to that developed by Gordon (1981), it is easy to show that the percentage change in price (P_{it}) will be positively related to a discrete change of the exchange rate defined as the ratio of the unexpected change in the exchange rate relative to its variance $\left(\frac{R_t - E_{-1}(R_t)}{\text{Var } R}\right)$.

For the monopolist, P_i is a weighted average of the actual change in nominal revenue (α_{it}) and of expected changes in time t of marginal costs in time t + 1, ($E_t(C_{it+1})$). Thus,

(1) $P_{it} = \psi\alpha_{it} + (1-\psi)E_t(C_{it+1})$ where

i refers to the specific firm and E is the expectations operator.

Expected changes in marginal costs for the individual firm i is a weighted average of the actual cost increase of imported inputs and expected costs of other inputs that are determined by a different set of agents including labour and/or other firms (W). Assuming that the change in the price of imported inputs at time t equals R_t and that the mean of the local component of W is zero, it follows that,

(2) $E_t(C_{it+1}) = zR_t + (1-z)(1-\phi)E_t(W_{t+1})$ where

ϕ is the ratio of the variance of the local component of the cost shift to the sum of the variance of the local and aggregate component.

Apart from a known component ($\bar{W}$) that captures information about existing contracts, past pricing behaviour and known institutional factors, expectations about non firm-specific costs $E_t(W_{t+1})$ are assumed to be positively related to the unexpected component of the exchange rate change, this being defined as the difference between the actual change in time t and that expected during the previous period ($E_{-1}(R_t)$) over the historical variance of exchange rate changes. Thus,

(3) $E_t(W_{t+1}) = \bar{W}_{t+1} + \beta\left(\frac{R_t - E_{-1}(R_t)}{\text{Var } R}\right)$ where β is an indexation parameter.

Making all appropriate substitutions, it follows that,

(4) $P_{it} = \psi\alpha_{it} + (1-\psi)\,z\,R_t + (1-\psi)(1-z)(1-\phi)\,\bar{W}_{t+1} + \beta\left(\frac{R_t - E_{-1}(R_t)}{\text{Var } R}\right)$

Given equation (4) it is easy to see that P_{it} is positively related to $\frac{R_t - E_{-1}(R_t)}{\text{Var } R}$. More specifically if we assume that $E_{-1}(R_t) = 0$

$$(5) \quad \partial P_{it} / \partial (R_t / \text{Var } R) = (1-\psi) z \text{ Var } R + (1-\psi)(1-z)(1-\phi)\beta > 0$$

From (5) it follows that for any given unexpected change in the exchange rate, P_i becomes larger as the aggregate component of the variance of costs becomes larger in relation to the local component or $\phi \to 0$. This is probably the case when there is a switch in regimes from a smooth crawling peg, to that of discrete exchange rate adjustment. If this is so, then not only $E(W_{t+1})$ but also $(1-\phi)$ are positively related to $\frac{R_t - E_{-1}(R_t)}{\text{Var } R}$.

Finally it should be noted that the increase in price will be even larger if $E(W_{t+1})$ is made to represent the expected aggregate change in income. In that case, as in Gordon, equation (3) could be replaced by,

$$(3') \quad E(W_{t+1}) = \theta(\bar{W}_{t+1} + I + \beta \left(\frac{R_t - E_{-1}(R_t)}{\text{Var } R}\right)) + (1-\theta)\, \alpha_{it}$$

Where the demand shift is assumed to consist of a local component and an aggregate component. In (3'), θ like ϕ is the ratio of the local component of the demand shift to the sum of the local and aggregate variance. The replacement of (3) by (3') does not change the qualitative nature of the results.

The analysis so far limits itself to the magnitude of the price response to a discrete devaluation. One would expect however, that implicit price contracts will also be arbitrarily shortened or renegotiated.

In analysing labor-market contracts, Gray argues that the "optimal contract length is inversely related to the variance of the industry-specific shock" (Gray, 1978, p.11). Firms are assumed to determine the degree of indexation and the length of the labor contract by minimizing a loss function (z) of the form,

$$(6) \qquad z = 1/l \left(\lambda \int_0^l E\left[\left(\ln Y_t - \ln Y_t^o\right)^2\right] dt + C\right)$$

where l is the contract length and λ is a relative price which converts losses expressed as squared output deviations into losses expressed in the units of the contracting cost.

Intuitively the optimal contract length in Gray's analysis is determined by a condition that at the margin "balances the per period savings on transactions costs that could be achieved by lengthening the contract against the concomitant increased losses in the form of larger expected output and employment deviations". Thus while "increased uncertainty brings about a shortening of contract length, increased contracting costs leads to a lengthening of contracts"(Gray, 1978, p.7).

In the case of the monopolist who determines both price and output, it is the cost of information that includes costs of prediction and of establishing reliability and permanence that leads to implicitly long-term

contractual relationships. These considerations have to be weighed against the profit losses that would be occured if underpricing occurs for too long. A large discrete adjustment of the exchange rate both reduces the cost of information as defined above and establishes, as we have seen, firm expectations about the perspective increase in costs. Since cost-oriented pricing with a mark-up offers the "most typical standard of fairness in buyer-seller relationships," (Okun, 1975) a discrete devaluation allows sellers to pursue cost-oriented price increases. Thus a discrete devaluation as opposed to a crawling peg reduces the cost that the firm bears in explaining to its customers the reason for the price increase leading to a renegotiation of existing contracts.

The length of the new contracts is probably indeterminate as firms attempt to guess the intentions of the Central Bank. This is especially true if the discrete adjustment is a break from past exchange rate management practices. If firms after some initial period believe that the policy marks a switch in regimes from a crawling peg towards a regime of discretly adjustable exchange rates and that the established rate is in fact tenable, then implicit price contracts will be again renegotiated for corresponding periods of time.

Uncertainty as to the Central Bank's intentions calls on the other hand for short-period lags. Finally the length of the renegotiated contracts will probably be the same as before if after the discrete adjustment the exchange rate continues to crawl. In all cases the contract length will also be affected by expectations about economic fundamentals and the ability of policy to correct existing disequilibria.

In summary what can be said unambiguously is that a discrete exchange rate adjustment will give rise to recontracting and, in the absence of a clear signal on the part of the government as to its intentions, an increased tendency for shorter-period contracts. This conclusion is similar to that of Aizenmann(1982) who in a different context argues that "the optimal frequency of wage re-contracting depends on measures of aggregate volatility".

3. Econometric Analysis

The objective of this section is to investigate empirically whether the responsiveness of non-traded good prices to exchange rates was faster in the period following the January, 1983 devaluation. For this reason the analysis is conducted at the aggregate, sectoral and product level using monthly data for two distinct periods namely the whole period 1979.1 - 1983.12 (long period) and the period 1979.1 - 1982.12 (short period).

Table 1 presents a summary of exchange-rate statistics. The abbreviated notation for all variables is given in Table 2. It can be readily seen that both the standard deviation and the coefficient of variation of the effective and bilateral exchange rate increased as we move from the short to the long period. This is largely attributed to the January 1983 devaluation (Diagrams 1 and 2)which was the largest discrete adjustment of the exchange rate since the beginning of the crawling-peg period.

Table 1

Exchange Rate Statistics

		Exchange Rates (Levels)	
		1979.1-1982.12	1979.1-1983.12
EFE	Mean	52.875	49.415
	St.Deviation	7.501	9.687
	Coef. V.	0.142	0.196
		1978.6-1982.12	1978.6-1983.12
BIE	Mean	48.702	55.754
	St.Deviation	12.227	18.949
	Coef.V.	0.251	0.340
		Percentage Change in Exchange Rates	
		1979.2-1982.12	1979.2-1983.12
DDEFE	Mean	-0.009	-0.011
	St. Deviation	0.013	0.023
	Coef.V.	-1.444	-2.091
		1978.7-1982.12	1978.7-1983.12
DDBIE	Mean	0.012	0.015
	St. Deviation	0.025	0.030
	Coef.V.	2.083	2.000

Table 2

List of Notation

EFE - Effective exchange rate, 12-currency basket as defined by the Bank of Greece; an increase in the index represents a nominal appreciation of the exchange rate.
Source: Bank of Greece.

BIE - Bilateral drachma/$ exchange rate. an increase in the index represents a nominal depreciation of the exchange rate.
Source: Bank of Greece, Monthly Statistical Bulletin, various issues.

L - Natural logarithm of a variable.

ΔL - Differenced natural logarithm of a variable

DD - Percentage change of a variable.

PM - Wholesale price index of finished products of foreign origin (1970 = 1.000)
Source: National Statistical Service of Greece, Statistical Yearbook of Greece, various issues.

PE - Wholesale price index of exported products of local primary and industrial production (1970 = 1.000)
Source: ibid.

NT - Wholesale price index of finished products of domestic industrial production for home consumption (1970 = 1.000).
Source: ibid.

GI - Wholesale price index of finished products of local and foreign origin for home consumption (1970 = 1.000).
Source: ibid.

K20 - Wholesale price index of domestically produced foodstuffs for home consumption (1970 = 1.000).
Source: ibid.

CPI - Consumer price index (1970 = 1.000)
Source: ibid.

RCPI - Consumer price index of Greece relative to the weighed CPI of twelve trading partners, adjusted for exchange rate changes. (1970 = 1.000).
Source: Bank of Greece.

RWPI - Wholesale price index of Greece relative to the weighted WPI of twenty one competitor countries. Both indices are expressed in dollars. (1980 = 1.000)

The nominal devaluation of the exchange rate in January produced a real exchange rate devaluation during the first quarter of the year of the order of 7-12% depending on the index used to calculate the real effective exchange rate (Table 3). By the second quarter of 1983 however, the real effective exchange rate returned roughly to its 1980 level as relative prices deteriorated thus dissipating some of the effects of the nominal adjustment.

Looking more closely at the time series properties of exchange rates prior and after the discrete adjustment of January 1983, Tables 4 and 5 present the autoregressive structure of the relevant series for both periods. Each variable is regressed against past values of itself going back roughly to two quarters. As was expected, the exchange rate series can be described as an AR1 or random walk process where the first lag coefficient is close to unity in both periods. This implies that only the constant term is significant in the autoregressive structure of first differences. The identification of the Greek exchange rate with an AR1 process is consistent with similar results obtained for most other European countries. In almost all cases, the current period's exchange rate proves to be the best predictor of next period's rate (Katseli, 1982). As was to be expected, the coefficient of the constant term increases in the long as opposed to the short period when the change in exchange rates is shown to be more sluggish (Table 5).

Contrary to the experience of most European countries, wholesale prices also tend to exhibit properties of an AR1 process (Tables 6 and 7). In Katseli (1982) this finding also characterized price

Table 3

Nominal and Real Effective Exchange Rates

(Quarterly Data)

1980=100

Year		EFE[1]	% ΔEFE	RCPI[2]	% ΔRCPI	RWPI[3]	% ΔRWPI
1980	I.	107.54		103.13			
	II.	99.11	-7.84	98.77	-4.2	100.0	
	III.	96.95	-2.18	96.45	-2.4		
	IV.	96.40	-0.57	101.03	4.8		
1981	I.	92.16	-4.40	101.06	0.0	104.2	
	II.	88.63	-3.83	99.85	-1.2	102.6	-1.5
	III.	86.70	-2.18	97.33	-2.5	102.6	0.0
	IV.	87.87	1.35	103.86	6.7	105.8	3.1
1982	I.	85.06	-3.20	103.02	-0.8	105.0	-0.8
	II.	81.46	-4.23	103.48	0.5	104.5	-0.5
	III.	77.95	-4.31	98.79	-4.5	103.1	-1.3
	IV.	77.32	-0.81	102.16	3.4	104.4	1.3
1983	I.	65.50	-15.29	90.30	-11.6	96.7	-7.4
	II.	66.56	1.61	96.56	6.9	100.6	4.0
	III.	65.54	-1.53	94.52	-2.1	99.9	-0.7
	IV.	61.33	-6.42	92.33	-2.3	98.1	-1.8
1984	I.	58.08	-5.30	89.80	-2.7	98.2	0.1

1. As calculated by the Bank of Greece.
2. Consumer price index (CPI) of Greece relative to the weighted CPI of twelve trading partners, adjusted for exchange rate changes; Appreciation (+).
3. Wholesale price index of Greece relative to the weighted WPI of twenty-one competitor countries. Both indices are expressed in dollars; Appreciation (+).

Table 4

Time-series Properties of Exchange Rates (Levels)[1]

DEP	C	LER_{-1}	LER_{-2}	R^2	$\bar{R}^2$	DW	SEE
1. LEFE (1979.8-1983.12)	-.0246 (0.05)	.9411 (5.65)	-.0072 (0.03)	.99	.98	2.06	.02
2. LBIE (1979.1-1983.12)	.0660 (0.85)	.7971 (5.25)	.0898 (0.46)	.99	.99	1.98	.04
3. LEFE (1979.8-1982.12)	1.5944 (1.49)	1.0188 (4.84)	-.4536 (1.52)	.99	.99	1.87	.003
4. LBIE (1979.1-1982.12)	.1735 (1.67)	.9575 (4.88)	-.0217 (0.08)				

1. Estimated equation of the form: $LEFE = C + \alpha_1 LEFE_{-1} + \ldots \alpha_6 LEFE_{-6} + Lt + dummies$. Only the estimated coefficients C, α_1 and α_2 are reported here.

Table 5

Time Series Properties of Exchange Rate Changes[1]

DEP	C	$DLER_{-1}$	$DLER_{-2}$	R^2	$\bar{R}^2$	DW	SEE
1. DLEFE (1979.8-1983.12)	-.0226 (3.78)	-.0405 (0.28)	-.1574 (1.10)	.13	.01	1.97	.03
2. DLBIE (1979.1-1983.12)	.0185 (2.86)	-.0113 (0.08)	.0368 (0.27)	.03	-.08	2.00	.05
3. DLEFE (1979.8-1982.12)	-.0109 (2.44)	.3033 (1.76)	-.1636 (0.91)	.14	-.01	1.99	.01
4. DLBIE (1979.1-1982.12)	.0102 (1.85)	.1749 (1.10)	.1568 (0.98)	.11	-.02	1.85	.02

1. Estimated equation of the form: $DLEFE = C + \alpha_1 DLEFE_{-1} + \ldots + \alpha_6 DLEFE_{-6} + v_t$. Only the coefficients C, α_1 and α_2 are reported here.

Table 6

Time Series Properties of Prices (Levels)[1]

Dependent	Constant	LP_{t-1}	LP_{t-2}	LP_{t-3}	R^2	$\bar{R}^2$	DW	SEE
1. LPM (1979.7-1983.12)	.0671 (3.24)	1.2855 (6.93)	-.3965 (-1.35)	.1190 (0.40)	.997	.996	1.80	.017
2. LPE (1979.7-1983.12)	.0374 (1.13)	1.3886 (7.70)	-.5953 (-2.05)	.4937 (1.67)	.995	.993	1.64	.019
3. LNT (1979.7-1983.12)	.0837 (4.93)	.8250 (5.24)	.0232 (0.11)	-.1166 (-0.56)	.999	.998	1.80	.012
4. LGI (1979.7-1983.12)	.0675 (4.05)	1.1260 (6.39)	-.2557 (-0.99)	-.0527 (-0.20)	.999	.998	1.89	.011
5. LPM (1979.7-1982.12)	.0727 (3.06)	1.2691 (5.70)	-.4113 (-1.25)	.1942 (0.64)	.999	.997	2.06	.012
6. LPE (1979.7-1982.12)	.1448 (3.16)	.9453 (4.64)	-.2001 (-0.72)	.4393 (1.63)	.996	.993	1.54	.015
7. LNT (1979.7-1982.12)	.1210 (3.81)	.6704 (3.48)	-.0065 (-0.03)	-.0710 (-0.31)	.998	.997	1.83	.012
8. LGI (1979.7-1982.12)	.0912 (3.46)	.8765 (4.47)	-.1218 (-0.48)	.1182 (0.47)	.999	.998	2.05	.008

1. Estimated equation of the form: $LP = C + \alpha_1 LP_{-1} + \ldots + \alpha_6 LP_{-6} + Lt + \text{dummies}$. Only the estimated coefficients of C, α_1, α_2 and α_3 are reported here.

Table 7

Time Series Properties of Price Changes[1]

DEP	C	DLP_{-1}	DLP_{-2}	DLP_{-3}	R^2	$\bar{R}^2$	DW	SEE
1. DLPM (1979.8-1983.12)	.0183 (3.09)	.3883 (2.56)	-.1645 (1.03)	.0274 (0.17)	.22	.11	1.91	.018
2. DLPE (1979.8-1983.12)	.0149 (2.83)	.2568 (1.81)	-.1306 (0.94)	.2251 (1.61)	.14	.03	1.83	.015
3. DLNT (1979.8-1983.12)	.0187 (2.62)	.0542 (0.39)	-.0879 (0.63)	-.2492 (1.76)	.10	-.02	1.91	.009
4. DLGI (1979.8-1983.12)	.0200 (3.39)	.1940 (1.31)	-.0624 (0.42)	-.1320 (0.87)	.09	-.03	1.91	.008
5. DLPM (1979.8-1982.12)	.0115 (2.12)	.6364 (3.65)	-.1823 (0.91)	.1315 (0.70)	.36	.25	1.93	.014
6. DLPE (1979.8-1982.12)	.0085 (1.73)	.2446 (1.56)	.0668 (0.45)	.4022 (2.69)	.25	.12	1.82	.008
7. DLNT (1979.8-1982.12)	.0166 (1.96)	.0480 (0.30)	-.0990 (0.61)	-.1890 (1.15)	.10	-.06	1.94	.007
8. DLGI (1979.8-1982.12)	.012 (1.80)	.2237 (1.29)	-.0201 (0.11)	-.0354 (0.20)	.06	-.11	1.91	.005

1. Estimated equation of the form: $DLP = C + \alpha_1 DLP_{-1} + \ldots\ldots \alpha_6 DLP_{-6} + u_t$. Only the estimated coefficients, C, α_1, α_2 and α_3 are reported here

adjustment in Italy, both high-inflation countries in the period under consideration. Only the price index of exported products (PE) exhibits higher order autoregressive properties probably as a result of conscious pricing policy. The coefficient of the first-month lag of non-traded goods (LNT) is typically smaller than that of traded goods but rises considerably between the two periods under consideration. The same is true for all price indices implying that the adjustment of prices is on the average faster when 1983 is included in the sample period. This is also reflected in the fact that the coefficient of the constant term in Table 7 increases in all cases in the long as opposed to the short period. In the case of the NT index, the average monthly rate of change increases from 1.7 to 1.9 precent across periods implying an even larger rate of increase in 1983 alone. In both DLPM and DLPE autoregressions, inclusion of 1983 raises the coefficient of the constant terms and reduces the coefficients of the significant lagged terms.

These results seem to support the hypothesis that the adjustment of prices of both traded and non-traded goods is faster in 1983 as opposed to previous years. The relationship of this development to exchange rate behaviour strengthens the evidence that the discrete devaluation of 1983 produced an almost instantaneous reaction of prices of both traded and non-traded goods alike.

When DLGI is regressed against lagged values of itself and against current and lagged values of the exchange rate (effective and bilateral), the coefficient of the current exchange rate change term becomes large and significant only in the period that includes 1983 (Table 8).

Table 8

Aggregate Price and Exchange Rate Adjustment

DEP.	C	$DLGI_{-1}$	$DLGI_{-2}$	DLBIE	$DLBIE_{-1}$	DLEFE	$DLEFE_{-1}$	R^2	$\bar{R}^2$	DW	SEE
1. DLGI	.0103	.0748	.0314			-.2622	-.1368	.39	.34	2.0	.010
(1979.4-1983.12)	(3.64)	(0.55)	(0.27)			(4.76)	(2.06)				
2. DLGI	.0107	.1546	-.0274	.1792	.0433			.24	.18	2.0	.011
(1979.4-1983.12)	(3.41)	(1.10)	(0.22)	(3.57)	(0.78)						
3. DLGI	.0117	.0870	-.0573			-.1421	-.3141	.24	.17	2.0	.010
(1979.4-1982.12)	(3.33)	(0.59)	(0.40)			(1.2)	(2.56)				
4. DLGI	.0128	.1684	-.0631	.0665	.0622			.09	.00	1.97	.011
(1979.4-1982.12)	(3.38)	(1.05)	(0.40)	(0.95)	(0.86)						

The same holds true in the case of DLNT where the current effective exchange rate change (DLEFE) seems to influence the current change of non-traded good prices only in the long period. The results are more mixed when the bilateral exchange rate is used instead (Table 9.I). What these results seem to indicate is that adjustment of non-traded good prices and exchange rates become contemporaneous when 1983 is included. This can be seen clearly in Diagrams 3 and 4 where the exchange rate and price adjustment in January 1983 is completely synchronized.

Two additional points concerning price adjustment of non-traded goods are also worth noting. The evidence presented in Diagrams 3 and 4 is also confirmed by the relatively low explanatory power of equations 1 and 2 in Table 9. Over the whole period, the exchange rate is only partially responsible for the observed variation in non-traded-good prices as other factors such as imported inflation, wage rate adjustment, monetary developments and the position of the economy over the business cycle become more important. It is only in January 1983 that the devaluation of the currency becomes the dominant factor that explains most of the variation in LNT. Lack of consistent monthly data prevent a disaggregated analysis along these lines. Using quarterly data however it can be shown that for the whole period 1979.II - 1983.IV, the home-currency price of imported goods is the most important explanatory variable of DLNT. This variable reflects changes both in foreign prices and exchange rates and thus picks up the significant terms-of-trade shocks of the period such as the second oil-price increase. As one would expect the explanatory power of the estimated equation is raised considerably (equation 5 in Table 9.II) when this variable is included.

Table 9

I. Non-Traded Good Price and Exchange Rate Adjustment

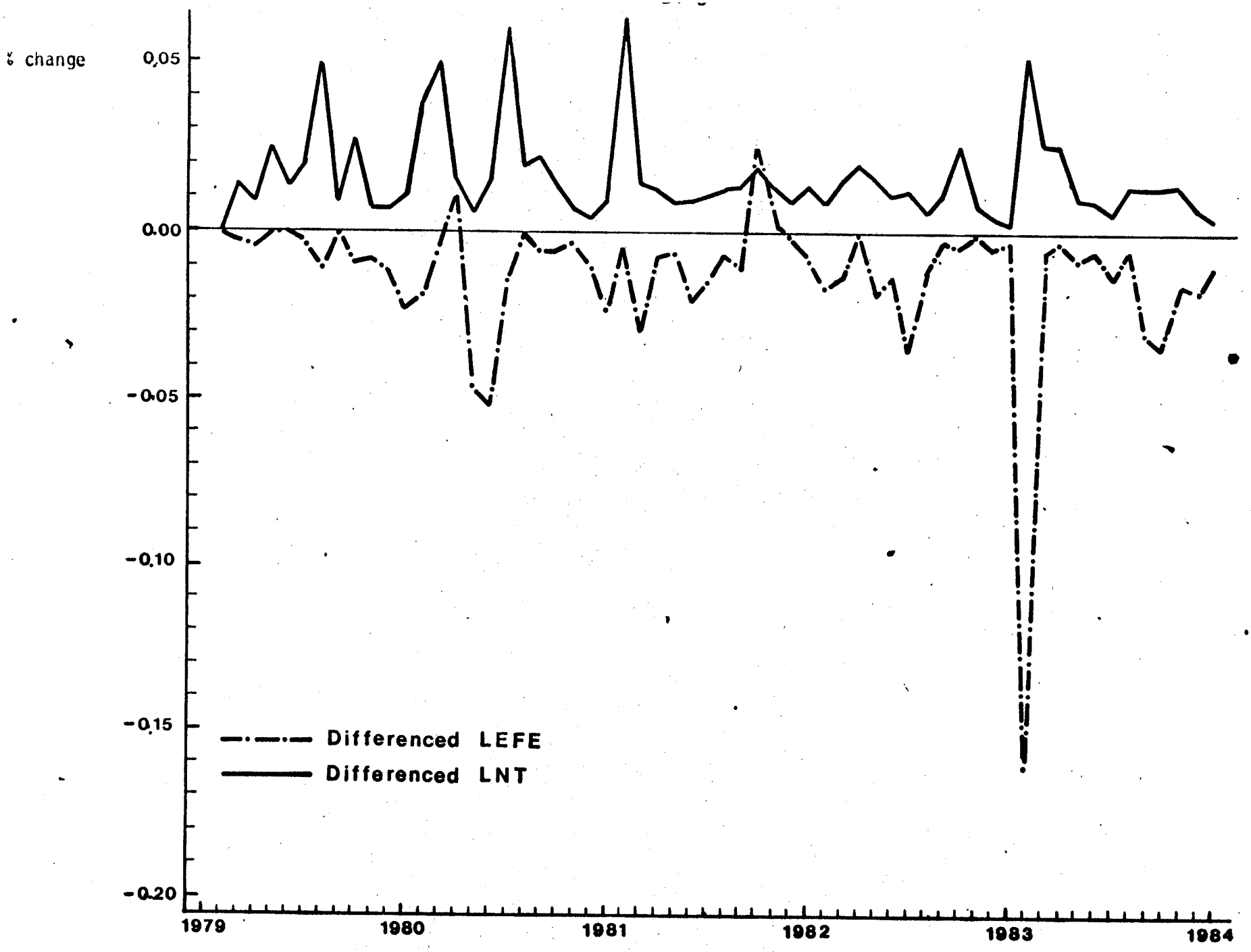
(Monthly Data)

	C	$DLNT_{-1}$	$DLNT_{-2}$	$DLNT_{-3}$	DLBIE	$DLBIE_{-1}$	$DLBIE_{-2}$	DLEFE	$DLEFE_{-1}$	$DLEFE_{-2}$	R^2	$\bar{R}^2$	DW	SEE
NT 5-1983.12)	.0169 (3.54)	.0311 (0.22)	-.1043 (0.75)	-.1635 (1.21)				-.1427 (1.88)	-.0814 (1.04)	-.1157 (1.47)	.19	.09	1.95	.013
NT 5-1983.12)	.0206 (3.90)	.0541 (0.39)	-.1266 (0.92)	-.2263 (1.60)	.0096 (0.52)	-.0096 (0.15)	.0788 (1.24)				.10	.01	1.93	.014
NT -1982.12)	.0163 (2.91)	-.0210 (0.13)	-.0647 (0.44)	-.1127 (0.74)				.1255 (0.77)	-.3326 (1.96)	-.2427 (1.4)	.24	.12	1.90	.014
NT -1982.12)	.0163 (3.45)	.0704 (0.43)	-.0924 (0.57)	-.2005 (1.27)	-.1457 (1.64)	.0237 (0.24)	.1339 (1.41)				.15	.02	1.86	.014

II. Non-Traded Good Price Adjustment

(Quarterly Data)

	C	$DLNT_{-1}$	DLW	DLPM	$DLEFE_{-1}$	R_2	$\bar{R}^2$	DW	SEE
NT I-1983IV)	:0497 (2.67)	-.3354 (1.29)	-.0544 (0.35)	.3465 (2.40)	-.1176 (0.83)	.34	.13	1.5	.0207


% change
0,05
0.00
-0.05
-0.10
-0.15
-0.20
Differenced LEFE
Differenced LNT
1979
1980
1981
1982
1983
1984

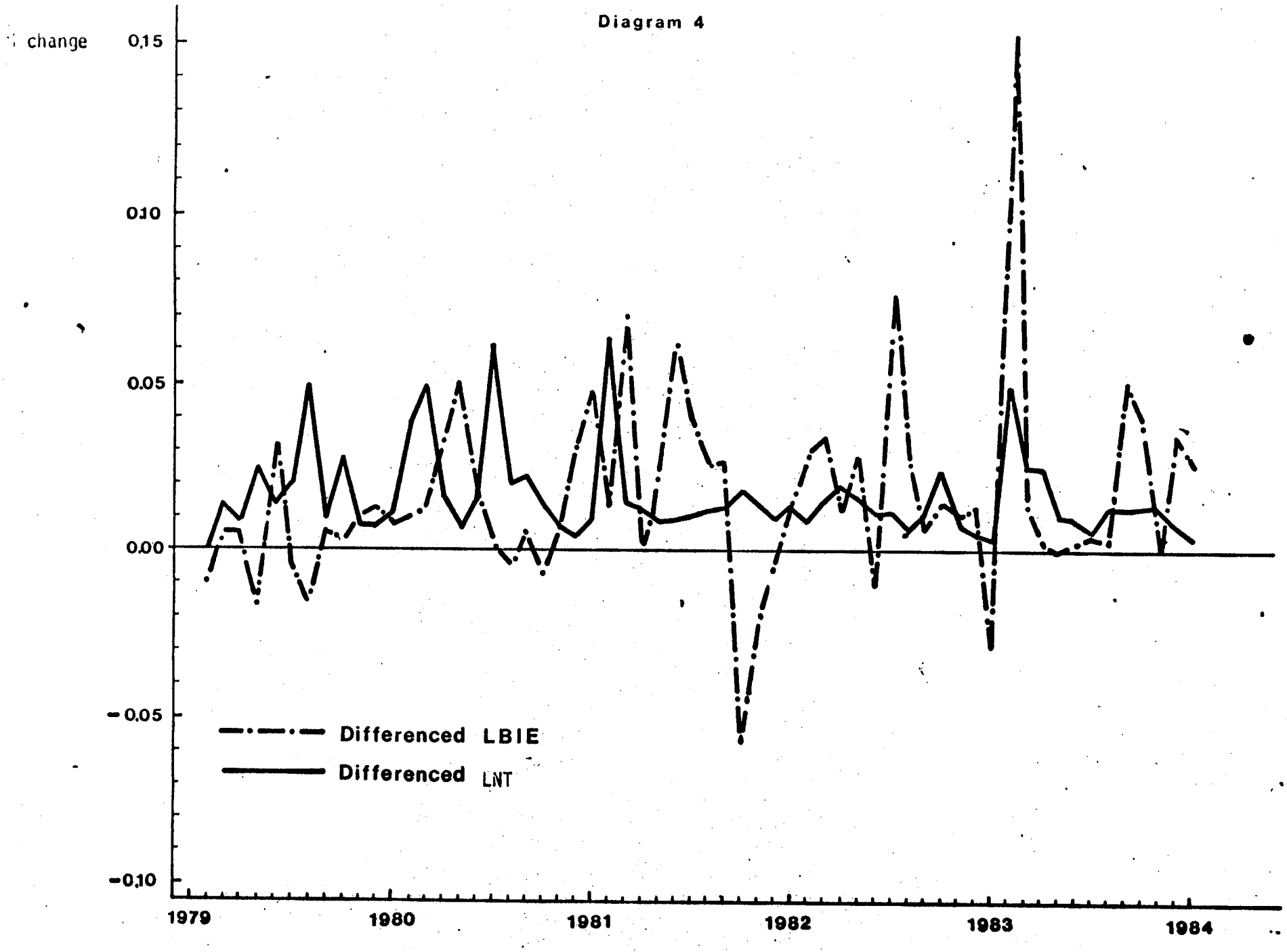


Diagram 4
change
0.15
0.10
0.05
0.00
-0.05
-0.10
Differenced LBIE
Differenced LNT
1979
1980
1981
1982
1983
1984

Lack of sufficient disaggregation in the provision of data also unables us to analyse effectively the relationship of pricing behavior to expectations regarding exchange rate adjustment. According to the evidence pre presented in Table 9, a 10% devaluation of the effective exchange rate is expected to raise the prices of non-traded goods by 1.4% during the same month. The unexpected component of the price change between two consecutive months is picked up by the residual in the estimated equation. The vector of estimated residuals from the estimated price equation can thus be correlated or regressed against the current and lagged value of residuals obtained from an exchange rate adjustment equation. Such exercise permits an analysis of the responsiveness of prices to exchange rate "news". When monthly and quarterly data were used however, the results were totally uninformative. The correlation coefficient of residuals was positive but low (never exceeding .12). Similarly, the coefficient of the current and lagged unexpected change in the exchange rate never proved to be significantly different from zero.

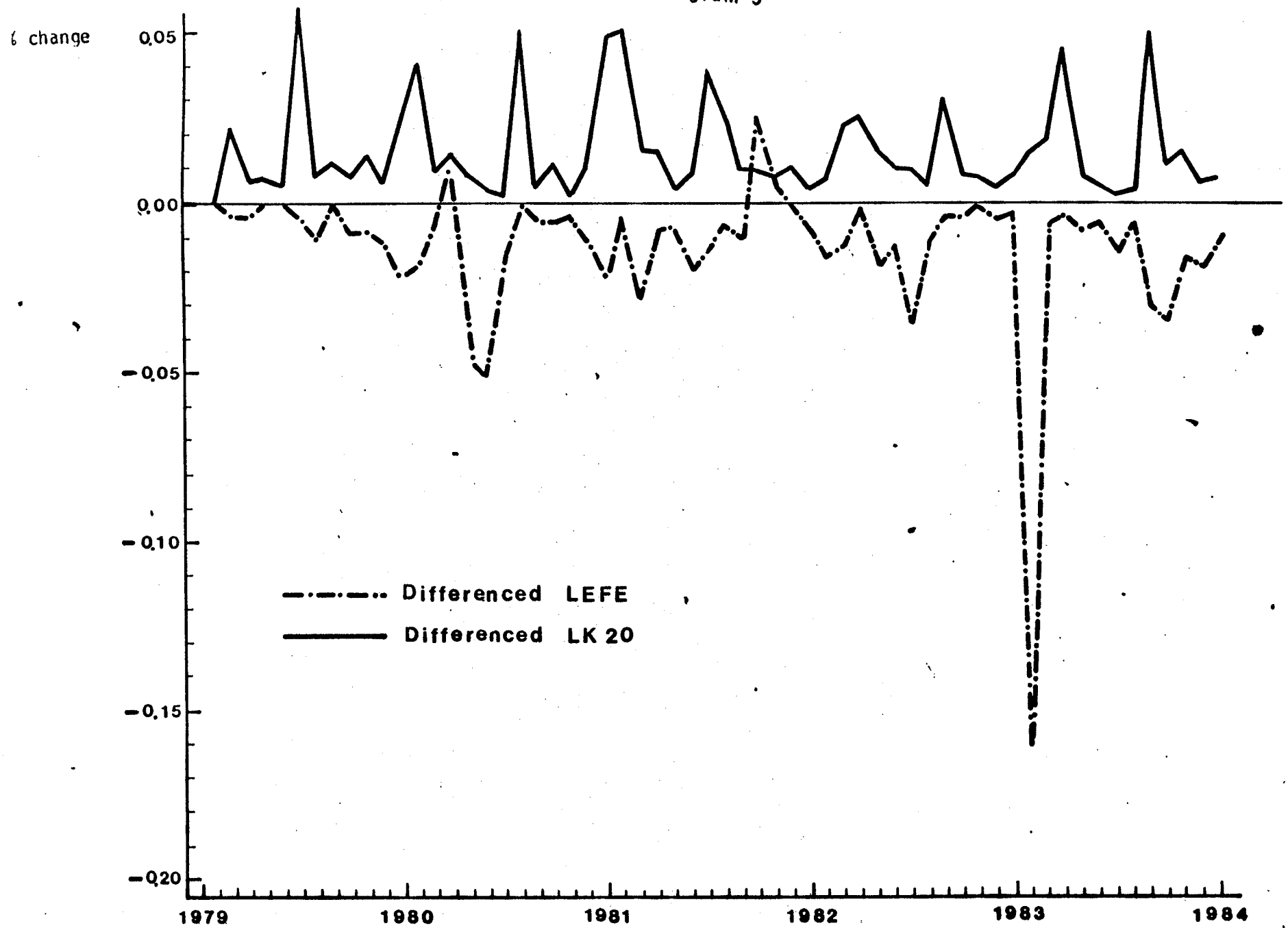
These results probably reflect the structure of expectations regarding exchange rate developments. Since exchange rates are announced daily, expectations are formed or revised in a daily basis as well. What would have been interesting in that case is to proceed with the above analysis using daily data. Unfortunately only anecdotal evidence of price adjustment following the Janauary 9th devaluation exists precluding an econometric analysis of the second-order autoregressive system. Furthermore, since most of the price adjustment was completed within a few days following the devaluation, the adjustment of prices can be adequately explained by the expected component of the exchange rate change when monthly data are used.

The wholesale price index for non-traded goods is a weighted average of sectoral indices. The food-industry sector excluding beverages (K20) pocesses the largest weighting coefficient (18.1%). In 1980 only 6.6% of the total consumption of processed food was imported, while 90% of the total production originating in 51 local firms was directed towards the home market. Furthermore, the ratio of imported intermediate and capital goods to total production costs was 19.2%, one of the lowest ratios in all industrial sectors.[6] The food industry could then be classified on all grounds as a non-traded good sector.

Diagrams 5 and 6 present the monthly variation of the price index (DLK 20) against that of the effective and bilateral exchange rate. It is relatively easy to see that the change in the exchange rate almost systematically precedes price adjustment by two-months. This is confirmed by the econometric evidence presented in Table 10 where DLK 20 is regressed against past values of itself and current and lagged values of the exchange rate. In both time periods (1979.5 - 1982.12; 1979.5 - 1983.12) price adjustment appears relatively sluggish with the own first and second-month lag generally significant and the second lag on the drachma-dollar exchange rate significant in both time periods.

There is no clear evidence however that the responsiveness of the price to an exchange rate change is significantly altered in the long period even though the coefficient of the constant term and the overall explanatory power of the regression increases when 1983 is included.

Diagram 5


% change
0.05
0.00
-0.05
-0.10
-0.15
-0.20
Differenced LEFE
Differenced LK 20
1979
1980
1981
1982
1983
1984

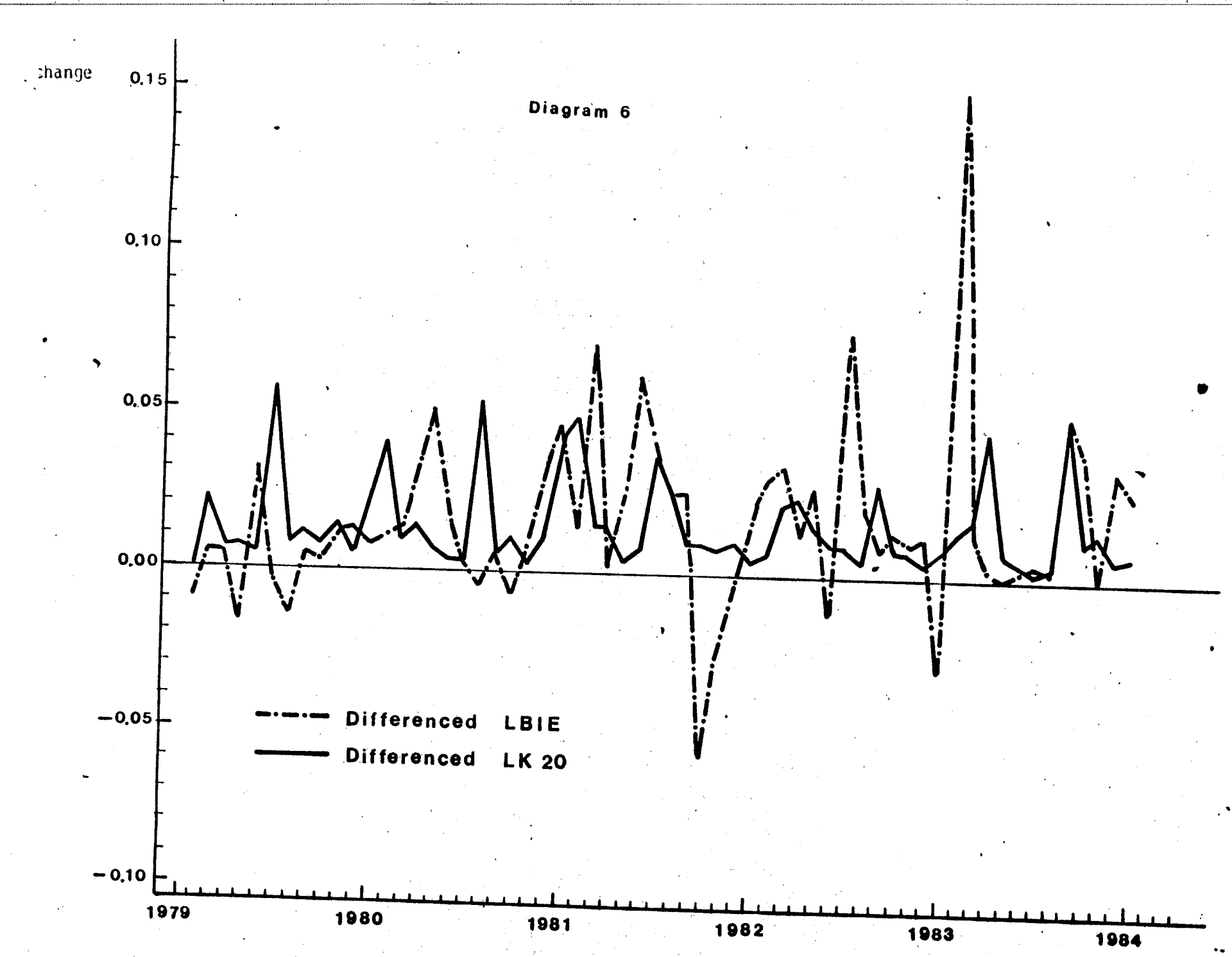

change
0.15
0.10
0.05
0.00
−0.05
−0.10
Diagram 6
Differenced LBIE
Differenced LK 20
1979
1980
1981
1982
1983
1984

Table 10

Food Price and Exchange Rate Adjustment

DEP	C	DLK_{-1}	DLK_{-2}	DLK_{-3}	DLBIE	$DLBIE_{-1}$	$DLBIE_{-2}$	DLEFE	$DLEFE_{-1}$	$DLEFE_{-2}$	R^2	$\bar{R}^2$	DW	SEE
1. DLK20	.0254	-.3455	-.2604	-.2041				-.0083	-.0315	-.1987	.19	.06	2.2	.021
(1979.5-1983.12)	(4.24)	(2.54)	(1.86)	(1.49)				(0.72)	(0.28)	(1.74)				
2. DLK20	.0247	-.3463	-.2696	-.2469	-.0154	.0231	.2510				.25	.16	2.1	.020
(1979.5-1983.12)	(4.29)	(2.67)	(2.02)	(1.89)	(0.17)	(0.26)	(2.80)							
3. DLK20	.0244	-.3646	-.2520	-.1725				.0045	-.1164	-.2423	.16	.03	2.1	.023
(1979.5-1982.12)	(3.28)	(2.27)	(1.53)	(1.08)				(0.02)	(0.42)	(0.90)				
4. DLK20	.0244	-.3533	-.2434	-.2227	-.0375	-.0168	.3007				.22	.10	2.1	.022
(1979.5-1982.12)	(3.64)	(2.29)	(1.54)	(1.44)	(0.27)	(0.12)	(2.14)							

The ambiguity in the results as one moves from the aggregate to the sectoral data has to do with the composition of the index-and institutional factors affecting price behavior.

The sectoral index itself is a weighted average of price of products that might or might not be exempt from price controls.

The legal basis for price controls is provided in the "Market-Law Code" that essentially classifies products into three categories:

a) essential and in short supply

b) essential and not in short supply

c) non-essential.

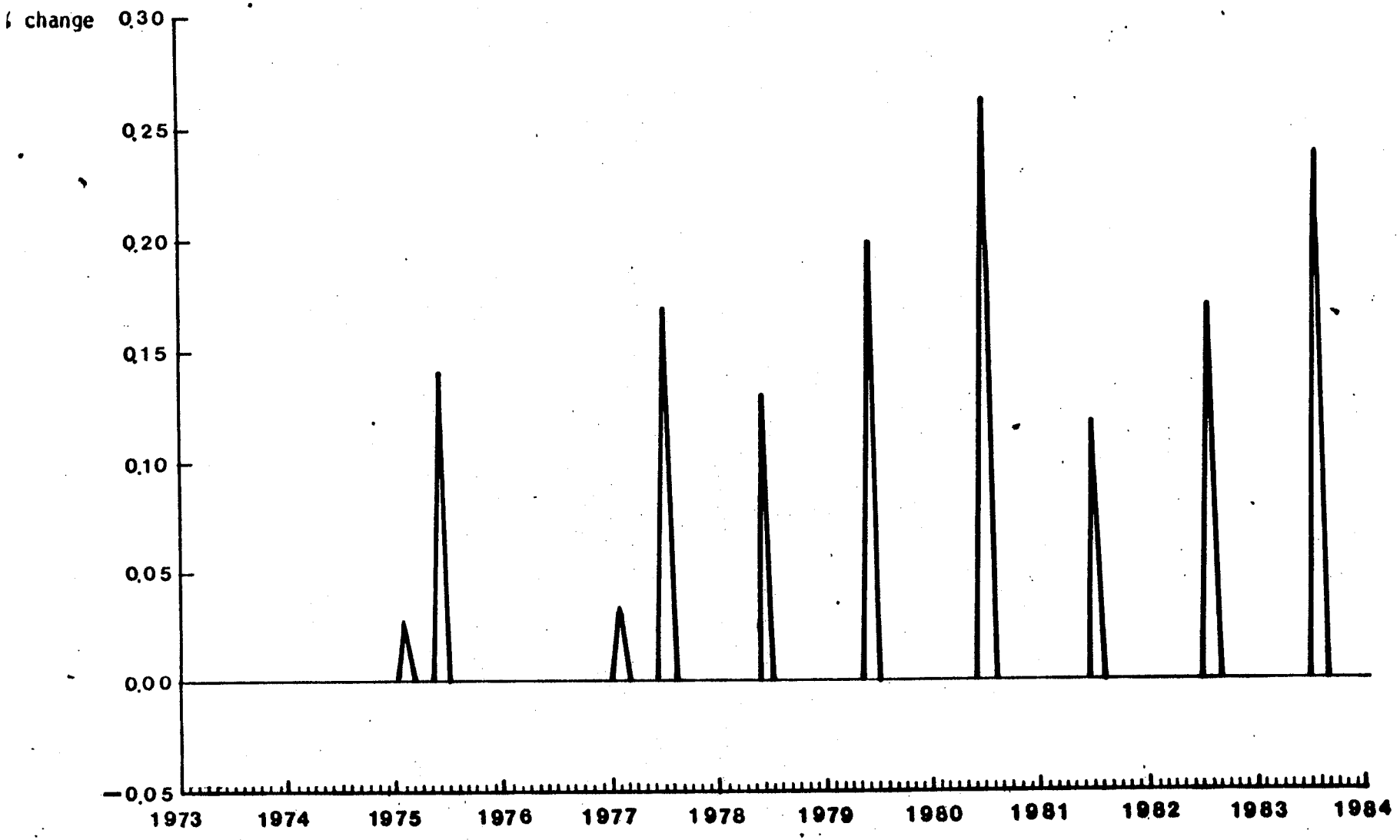
The first category includes basic consumer goods for which in most cases,a maximum price is set. For some goods in this category and for all goods in the second category which are considered essential but not key consumer goods, the Ministry of Commerce sets a maximum allowable mark-up over average unit costs. The third category includes goods which are essentially exempt from controls (Lalonde and Papandreou, 1984).

The behaviour of product prices and hence of the aggregate sectoral index is thus affected by the Ministry's actions in adjusting the price ceiling as a result of firm pressure. This is especially true in the food sector where a large number of products fall in the first category.

Diagram 7 exhibits as an example the rate of change of flour prices over a ten-year period. Since flour is considered an essential commodity a price ceiling is set by the Ministry. Effective prices are

Diagram 7

Differenced Log of Flour Prices



almost always set at the price ceiling. As can be seen in the diagram, the price has been typically adjusted once a year during the summer months. The 1983 price adjustment that occured in August was the largest one in three years that is 18.7%. Firms producing flour have limited possibilities to diversify their production.[7] Hence, the increase in perceived costs implied by the devaluation gives rise to a fall in profits and a reduction in output or quality. As can be seen in Table 12 average production of grain mill products during the first six months of 1983 decreased by 4.5% relative to the corresponding average in 1982.

A different type of response is evidenced by firms which diversify their production across control categories, such as dairy-product firms. These usually produce milk, butter, cheese and yoghurt, all items under price controls, as well as ice-cream which is not subject to controls. While firms still exercise pressure to adjust the price ceiling, losses in profits and output are mitigated by rapid price adjustment in the non-controlled items. As can be seen in Table 11, while the prices of all controlled dairy products increased between 12-14% within the first quarter of 1983, ice-cream prices were adjusted by almost 10% between December 1982 and January 1983 and by 33% between December 1982 and March 1983. (Diagram 8). As there is no reason to expect that relative costs for ice-cream production increased during that period due to any other factor, it is reasonable to argue that the perceived increase in costs due to the devaluation was met by price overshooting in the non-controlled items. Output of dairy products stayed roughly constant between the two periods.

Finally within the same sector, there exist firms which produce commodities in categories (b) and (c) of the Market Code. Such firms for example produce tomato juice, tomato pulp, canned fruits and fruit juices.

Diagram 8

Differenced Log of Ice-Cream Prices

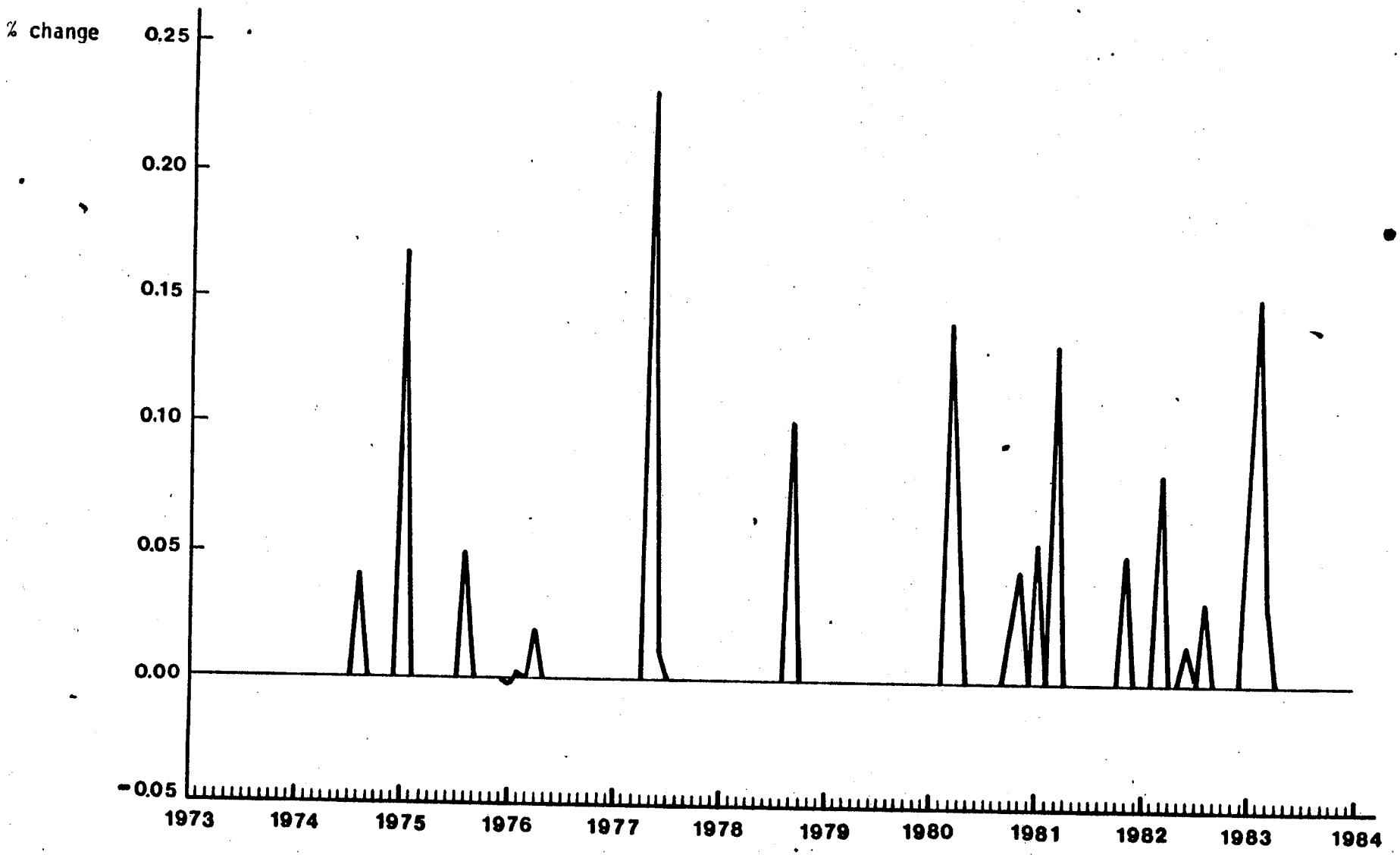


Table 11

Price Adjustment of Specific Products in the Food Sector

Food Stuffs	1982.12-1983.1	1982.12-1983.2	1982.12-1983.3
I. Price Control			
1. Yoghurt	0.00	0.0	14.3
2. Milk	0.00	1.7	13.0
3. Soft cheese	0.07	3.5	13.8
4. Butter, creams	0.13	3.6	12.7
5. Flour	0.00	0.0	0.00
6. Farina	0.00	0.0	0.00
II. Mark-up Regulations			
1. Chicken	-0.74	0.24	0.59
2. Tomato juice	0.00	0.00	8.70
3. Tomato pulp	0.00	2.90	2.90
III. No Controls			
1. Ice-cream	9.82	28.21	32.41
2. Fruit juices	0.00	1.31	7.36
3. Canned fruits	5.09	6.10	2.00

Table 12

Monthly indices of industrial production of Specific Products

	Grain mill products	Dairy products	Fruit juices	Canning and preserving of fruits and vegetables
1982.1	148.8	154.7	176.3	11.2
2	142.3	198.2	247.4	14.6
3	154.0	233.1	207.2	15.6
4	149.2	238.6	50.3	29.9
5	141.0	288.8	22.1	30.4
6	145.6	325.0	5.1	75.7
7	142.6	314.1	17.0	119.8
8	85.5	248.3	0.0	1118.5
9	115.2	202.4	45.9	1043.8
10	103.9	158.7	46.2	403.3
11	113.0	155.3	40.4	54.8
12	106.5	145.2	106.0	32.2
1983.1	114.9	158.2	255.6	22.3
2	143.8	199.9	258.4	21.4
3	159.0	220.3	115.7	21.9
4	152.5	274.3	37.6	29.2
5	130.6	286.5	156.7	54.4
6	140.6	288.6	11.3	81.0
7	132.2	257.8	24.0	452.5
8	138.7	235.3	56.9	1494.3
9	142.1	193.4	109.8	515.3
10	126.6	171.5	0.0	68.6
11	126.7	162.4	9.5	30.3
12	117.8	151.4	30.4	23.5

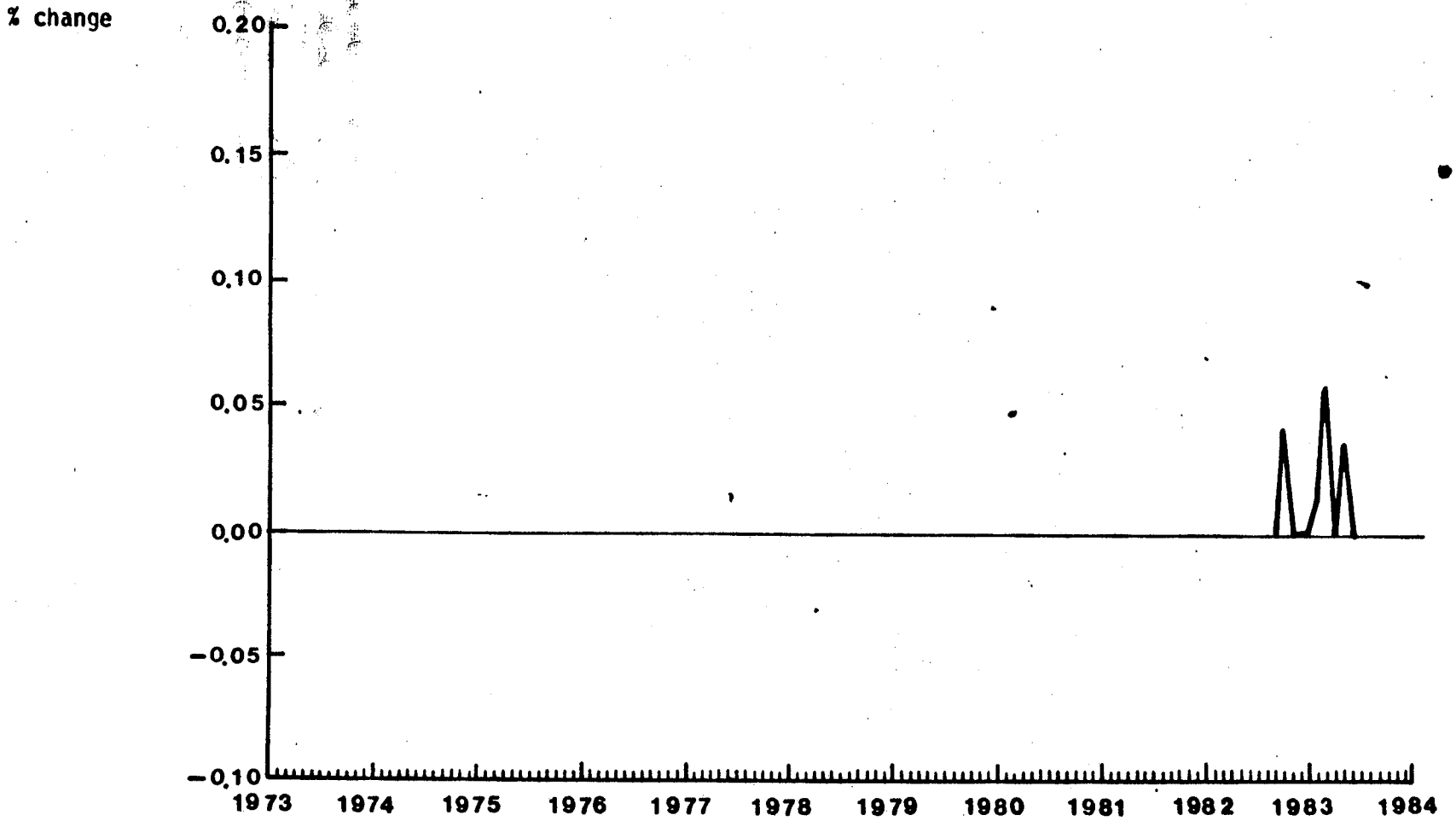
In that case, price adjustment is distributed more evently across goods. As can be seen in Tables 11 and 12 whereas the price of tomato juice and tomato pulp increased by 8.70% and 2.90% in March and February respectively, prices of canned fruits rose sharply in January and February and fell in March, that is when the prices of the controlled items were allowed to increase. Production of canned fruits and vegetables rose by 30% in the first semester of 1983 relative to 1982 as firms were able to capture a larger share of the domestic market relative to imports.

The analysis so far suggests that firms responded to the discrete devaluation in an expected fashion. If prices are not allowed to change due to institutional or other factors then the expected increase in costs implied by the devaluation brings about a decrease in profits and a decrease in output. The drop in output could be mitigated by the expected increase in demand depending on the cross elasticity of substitution across domestic and imported final goods. In diversified firms, on the other hand, the loss in profits is cushioned by selective increases in the price of particular items and output expansion for those goods for which demand increases.

The analysis also confirms the hypothesis that, regardless of control-classification, price adjustment is generally sluggish so that a monopolistic price adjustment model is a suitable one for the pricing behaviour of firms. "Price contracts" are evidenced in all product cases. Even though their length depends on institutional factors, a cursory look at pricing behavior suggests that at least in the non-controlled sector contracts have in fact been shortened as aggregate exchange rate variability rose (Diagrams 8 and 9). The evidence also suggests that recontracting occured almost instantly at

Diagram 9

Differenced Log of Fruit Juice Prices



the non-controlled sector and organised pressure by firms to relax price ceilings was successful within a few months especially in the category (b) classification.

Overall the arbitrary control in prices by central authorities did not seem to mitigate in the medium-run the inflationary consequences of the devaluation. In the presence of a large and discrete adjustment of the exchange rate, the price level was adjusted earlier than expected mitigating the increase in demand for non-traded goods and thus exacerbating the stagflationary effects of the devaluation.

Footnotes

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2. For a review of this literature see Katseli (1983).

3. This is usually guaranteed by perfect substitutability of all goods and assets in a small open economy and perfect flexibility of wages and prices.

4. Defined as the ratio of traded to non-traded good's prices.

5. For an excellent review see Gordon, (1981).

6. Data obtained from 51 firms out of a sample of 423 firms gathered annually by the Bank of Greece.

7. Flour mills usually produce flour and farina, which is also included in the first category.

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ADDENDUM

p. 4, Diagram 2; it should read: Appreciation (-), Depreciation (+), not the opposite.

p. 5, It should read: "In this case as absorption is reduced, the improvement in the balance-of-payments is achieved at the expense of real consumption in the economy and output and employment in the non-traded good sector"

p. 5, Delete last §: "Thus the aggregate output and employment...to the nominal devaluation."

p. 15, eq. 4: Brackets are missing, i.e.:

$$P_{it} = \Psi\alpha_{it} + (1-\Psi)\ zR_t + (1-\Psi)(1-z)(1-\phi)[\bar{w}_{t+1} + c(\frac{R_t - E_{-1}(R_t)}{VarR})].$$

p. 16, last , after (eq. 3'): "where the demand shift..." i.e. small "w".

p. 17, middle , after eq. 6: "... expressed in the units of the contracting cost (C)."