ECONOMIC GROWTH CENTER

YALE UNIVERSITY

Box 1987, Yale Station
New Haven, Connecticut

CENTER DISCUSSION PAPER NO. 323

MONETARIST MODELS OF EXCHANGE RATE DETERMINATION: EVIDENCE FROM PORTUGAL 1973-78

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October 1979

Monetarist Models Of Exchange Rate Determination:

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This paper analyzes the Portuguese experience during the recent period of generalized floating exchange rates in light of a monetarist model. Even though the Portuguese exchange rate was not freely floating, due to tight exchange controls imposed by the Central Bank, the implications of the monetarist approach are of interest because of the attempt of the monetary authorities to control a real effective exchange rate.

Furthermore, since 1978, the influence of monetarist thinking in the stabilization programs followed by Portugal has been significant. Even though the assessment of such programs is outside the scope of this paper, the rejection of the monetarist hypothesis during the period 1973-77 provides some useful information about the initial conditions of the stabilization program.

The paper begins by an interpretation of the recent experience in terms of trends in the real effective exchange rate of the escudo, together with the relative price of non traded goods and the terms of trade (section I). Regression and causality tests of PPP using both effective and bilateral variables are performed in section II. Section III estimates money demand functions and the monetarist approach to the Portuguese exchange rate, and concludes by a rejection of the latter.

I. The Monetarist Hypotheses and the Portuguese Experience

1. The fundamental building blocks of the monetarist approach to flexible exchange rates are two time honored hypotheses, purchasing power parity (PPP) and the quantity equation.[1]

PPP is based on the idea that the relative equilibrium price levels of two countries determine the equilibrium exchange rate between the two currencies. Given equilibrium terms of trade, or an equilibrium real exchange rate A, then there is a tendency for the nominal exchange rate S to adjust to the relative price level P/P^* so that

$$S = AP/P^*$$

The quantity eqution, given real income and some specification of velocity V, relates the money stock to the price level

$$MV = PY$$

$$V = Y^{\lambda+1} e^{\lambda r}$$

where M is the money stock

P is the price level

Y is real income

r is the nominal interest rate

If the money demands in the two countries have the same income and interest elasticities and if the two real rates of interest are equal then, under rational expectations, the nominal interest rate differential will be equal to the expected change in the exchange rate, which is assumed to be equal to the forward premium,[2] and, upon substitution from the PPP equation, setting A = 1 and taking logs, we have

$$s = m-m^* + \lambda(y-y^*) + \gamma f$$

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[1] On the monetarist approach to flexible exchange rates see Myhrman (1976), Frenkel-Johnson, eds. (1978) and Dornbusch (1978b).

[2] See Bilson (1978a p. 83).

where $f = r - r^*$

and lower case s,m,m*,y and y* denote the log of the variable.

If the home country is small, the foreign price p* is exogenous and we have instead

$$s = m - p^* + \lambda y + \gamma r$$

There is some tendency to test equations like this one, rather than going through the various building blocks.[1] We will test the PPP hypothesis first and then the domestic price determination equation and a partial adjustment money demand function, since tests for the third building block, efficiency of the forward market, are performed elsewhere.[2]

2. Before we do that, however, we will interpret the recent Portuguese currency experience not only relative to the U.S. dollar but also relative to the other three main trading partners of Portugal, the U.K., France and Germany. To do so we construct a weighted average of these bilateral rates, where the weights, relecting shares in trade, tourism and remittances are discussed at length in Appendix 1.[3]

The monthly values of this index, based on the first month of "generalized float", April 1973, are reported in Figure 1 using consumer prices and wholesale prices. During these five years, the escudo lost close to 70 percent of its initial value, whereas a basket of eight major currencies, representing "world money", lost about 36 percent and the

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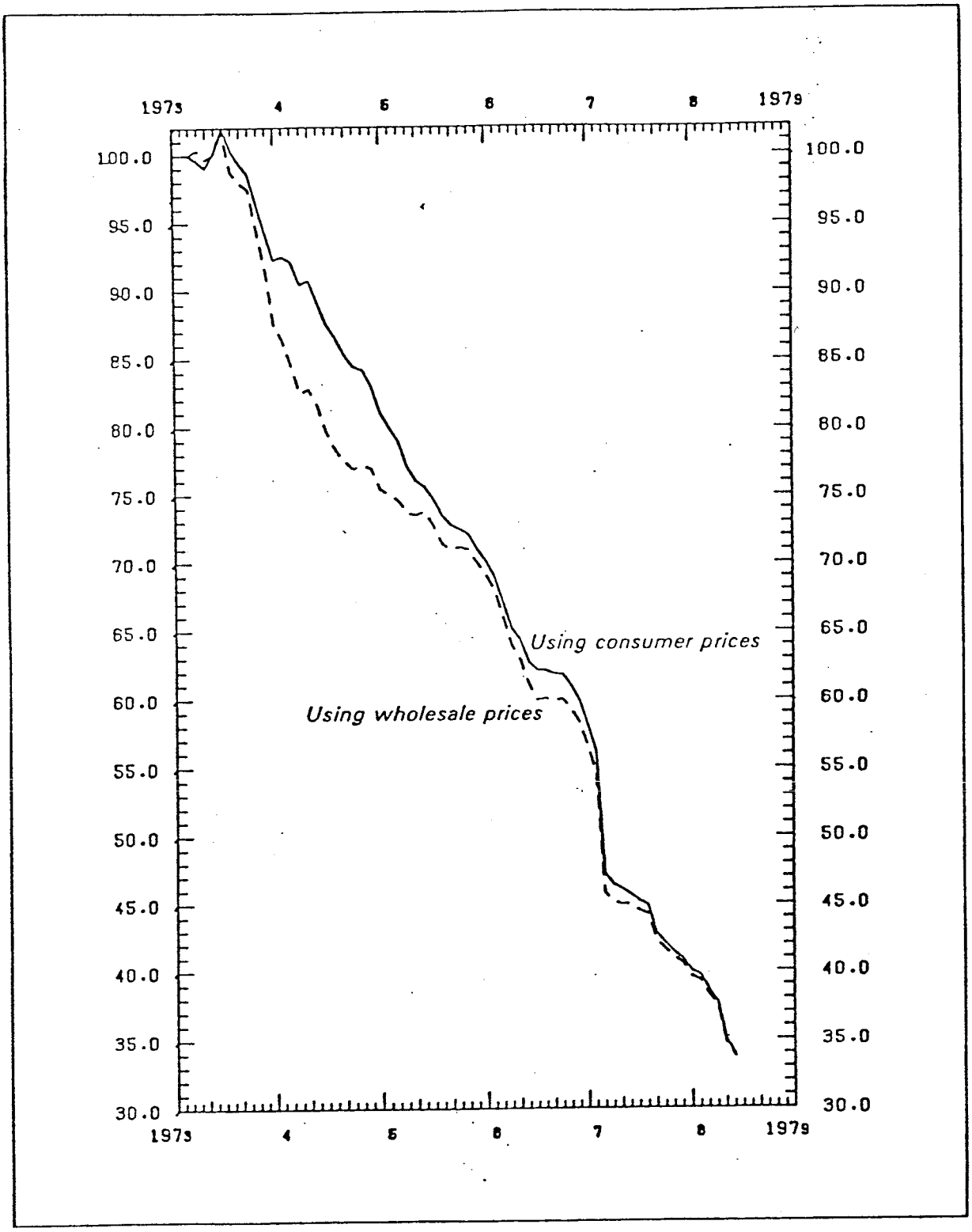
[1] See Bilson (1978b) and the criticism of Dornbusch (1978a). In his first analysis of the German hyperinflation, Frenkel (1976b) tested the various building blocks.

[2] See Macedo (1979e).

[3] The construction of a multilateral index is derived in Macedo (1979b). Here the index is baed on bilateral trade and the weight of the home country is therefore zero. A system of such bilateral indices can, however, be aggregated with a multilateral weighting criterion as shown ibid., Appendix 3.

FIGURE 1

The purchasing power of the portuguese escudo



Source:Series (1) and (2) in Appendix 2

Italian lira and the British pound lost 58 percent and 55 percent respectively.[1] During the same period, the loss in purchasing power against the dollar was a littler over 60 percent.

Consumer and wholesale prices are used in order to check for the difference between purchasing power over traded and nontraded goods. In an open economy which takes foreign prices as given, domestic inflation changes the price of nontraded goods in terms of traded goods, so that international competitiveness implies that traded goods prices increase slower than nontraded goods prices. This in fact occurred in the four main trading partners in 1974. Not surprisingly, the recession of 1975 brought the two rates of inflation closer together.

This distinction is of course most relevant in a small open economy like Portugal. There, after a slight downturn in late 1973 and early 1974 consumer price inflation relative to wholesale price inflation - or increases in the relative price of non traded goods - went on until 1977, where the effects of the devaluation together with the freezing of prices of the consumer basket reversed the process. We will return to this below but it can be seen from Figure 2 ,where the purchasing power indices are transformed into real effective exchange rates by multiplication by the appropriate domestic price index.[2] The pattern of an appreciation followed by a depreciation is obscured by sharp--and partly erratic

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[1] See Macedo (1979b) for the data.

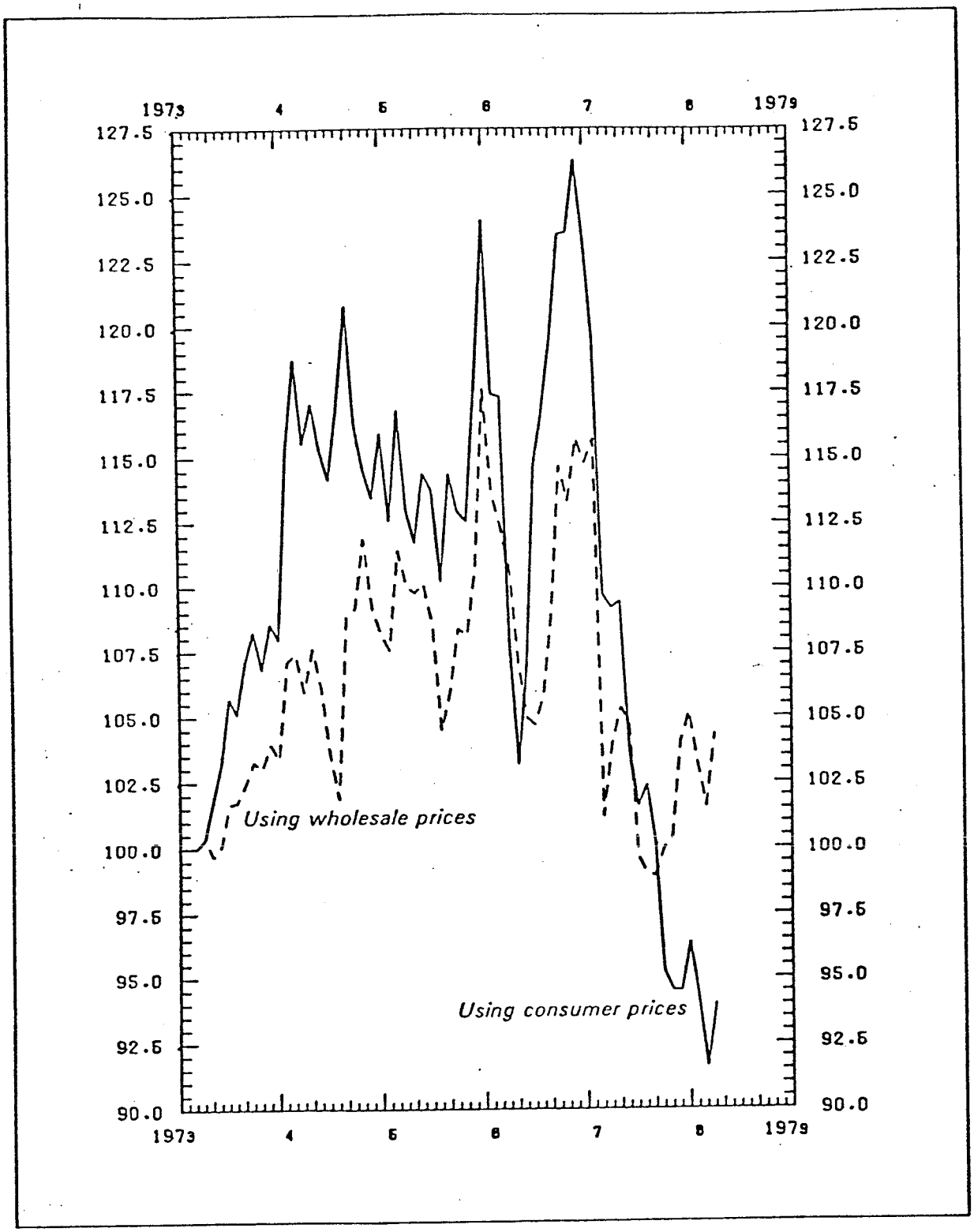
[2] The real effective exchange rate of small country i can be written as

$$\tilde{S}_i^e = \frac{P_i}{S_i} \prod_{j=1}^{N} (P_j/S_j)^{-\alpha_j} \qquad \sum_j^N c_j = 1 \qquad \alpha_i = 0.$$

If the country is large, its weight is $1 - \alpha_i$ rahter than one. See Macedo (1979b).

FIGURE 2

Real Effective Exchange Rates



Source:Series ($_3$) and ($_4$) in Appendix 2.

--changes in the domestic CPI, namely in the first quarter 1976.[1] It is noteworthy that the pattern is less clear for traded goods prices. In fact, whereas the rate using the CPI was 6 percent below the base period in April 1978 (and 11 percent in May) the rate using wholesale prices was 4 percent above. No matter how desirable, however, a real effective depreciation of the rate based on traded goods prices is largely beyond the control of the Portuguese monetary authorities.

A further check is provided by the ratio of the consumer price index to the wholesale price index, since the weights of traded and non traded goods prices in these indices are sufficiently different, with roughly 2/3 of the movements in Figure 3 being attributable to changes in the relative prices of non traded goods (rather than changes in the consumer

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[1] In fact, before the dramatic decline of early 1976, the Lisbon CPI used declined in April 1974, as mentioned earlier in the text, in September-October, in February, in April, in August and in October-November 1975. During all these months there were significant political events, namely coups attempted or successful, and price control measures were mostly directed toward food and housing, as pointed out in footnote 21 above. The episodes of 1976 and 1977 are of interest because they occurred in a politically more stable period, when price controls were being relaxed. Thus in 1976; 2 and 1976; 5 food declined by 3.5% and 3.7% and housing by 11.1% and 10.2%, so that the index excluding housing declined by 2.2% and 2.1% respectively, rather than 3.7% and 3.0% of the index used in the Figure. From May to September 1977 food declined by 9%, in June housing declined by 14% and remained constant until October and from June to September clothing and footwear declined by 26%, so that the average for the index excluding housing is -5.5% and for the index in the Figure -6.8%. To compound the difficulties, the revisions of the indices are often dramatic as well: in September 1977 there was an initial estimate of an increase of 4.6% in food, and then a revised estimate of a decline of 2.3%. The declines in the indices for the other cities are, on the whole, smaller but the new continental CPI of the INE with base 1976 shows an increase of 1.1% from May to September 1977 excluding housing, which increased by 7% in July, and stayed constant in June!

price relative to the wholesale price of traded goods).[1] In any case, the effect of the 1977 devaluation in decreasing the relative price of non traded goods is clear from the Figure (the index dropped from 105 in February 1977 to 90 in April 1978). As the yearly averages in the Figure suggest, erratic swings in the Lisbon CPI, already noted with respect to Figure 2, are probably the only reason for the drops of 1974; 10 and 1976; 4 and for the increase of 1977; 8.

Emphasis on the relative price of non traded goods, based as it is on the aggregation of import and export goods, should not obscure the fact, referred to above, that the terms of trade fell sharply after 1973, and were in 1978 24 percent below their 1973 value, even though they had been improving since 1976.[2] This pattern can be seen in Figure 4 which divides monthly import and export unit values but, as the yearly averages in the figure suggest, it is mild compared to the noise of the monthly interaction between prices and quantities. This makes our use of a monthly relative price of traded goods less biased, but also less exact, than if the trend change in the terms of trade would have been more clearly discernible from the ratio in unit values in the Figure.[3]

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[1] Thus if $P_c = P_{NT}^{\alpha} P_T^{1-\alpha}$ and $P_w = P_{NT}^{\beta} P_T^{1-\beta}$, $P_{NT}/P_T = (\alpha - \beta) P_c/P_w$ and if α is much larger than β the distortion is not too serious. For the wholesale price index currently in use $\beta = 0$ (See INE, Boletim Mensal, April 1953, p. 11 and October 1975, p. 87). Using the Lisbon CPI. Beleza (1979, p. 109) constructed indices for P_{NT} and P_T explicitly by considering that, food, clothing, footwear and fuel were traded and electricity, water and hygiene, and services except were non traded. The weight of the nontraded goods part, which is over .67 of the index excluding rent, is .59 of the CPI including rent (See INE, Estudos no. 23 and Boletim Mensal 1977, no. 3 p. 29).

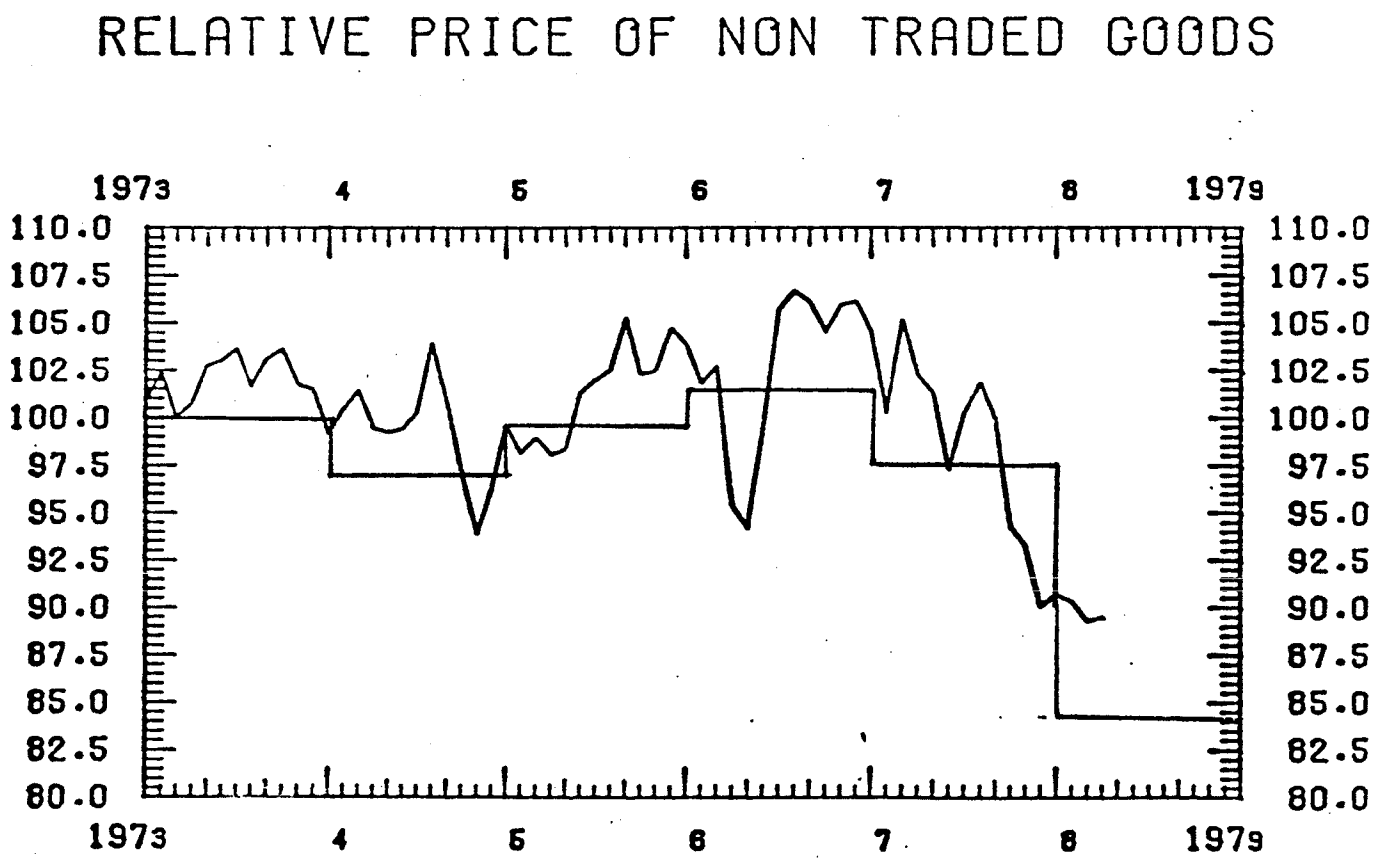
[2] See Also Krugman-Macedo (1979), p. 26 and Banco de Portugal (1978) p. 113.

[3] The two peaks of 1973; 2 and 1978; 1 are due to sharp variations in volume, as follows in million escudos.

	1973			1977	1978	
	1	2	3	12	1	2
X	300	263	297	85	186	301
M	1297	1770	1244	150	609	784

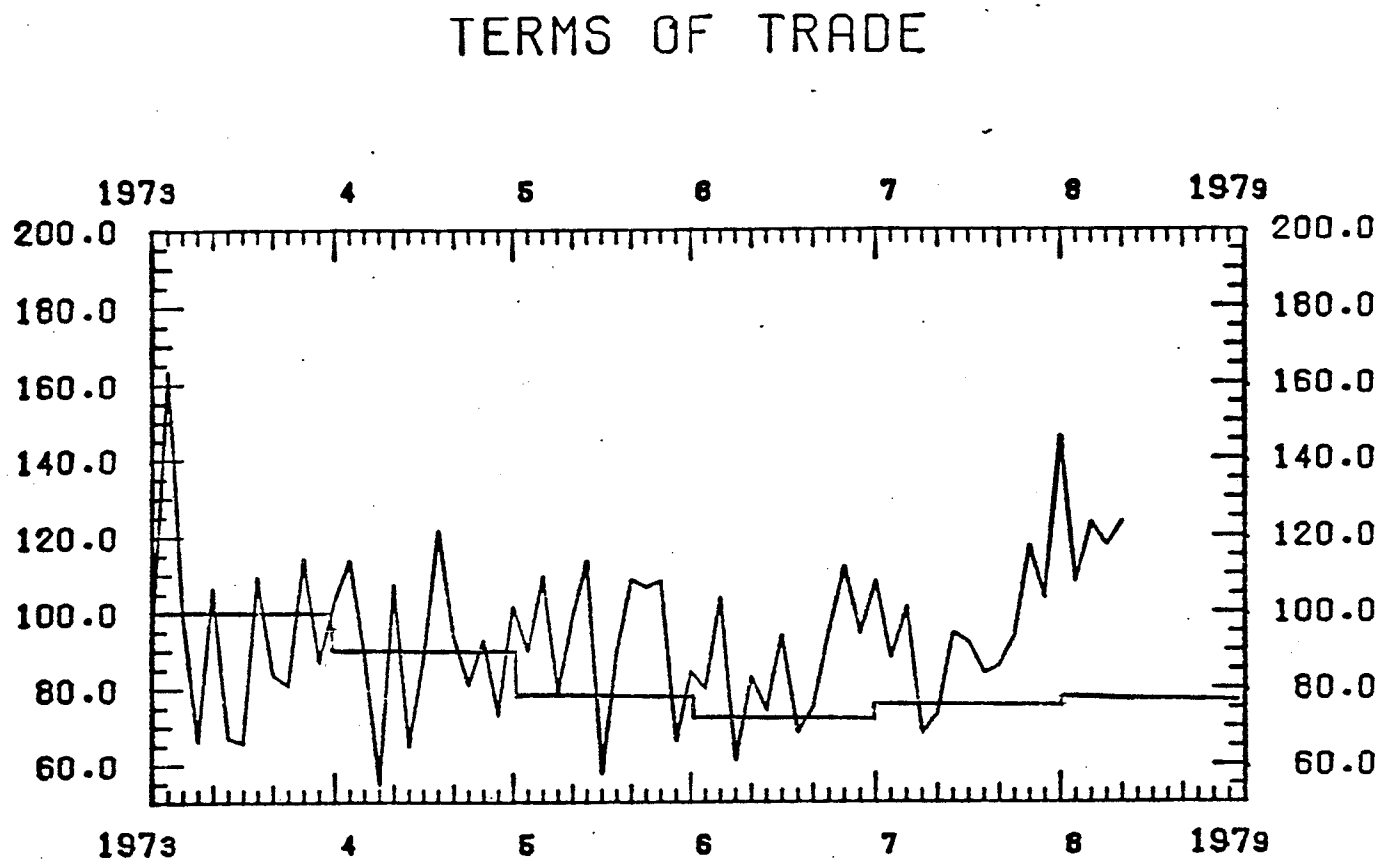
The numbers are from INE, Estatisticas Mensais do Comercio Externo.

Figure 3



Source:Series (7) in Appendix 2

Figure 4



Source:Series (11) in Appendix 2.

II. Purchasing Power Parity

1. Tests of the PPP hypothesis involve two types of difficulties. One is the choice of the appropriate price level and the other is the likely effect of S on P/P* which introduces a simultaneity bias in the estimation of the above equation.

The first problem raises several issues. If PPP is a statement about commodity arbitrage in international trade, then P and P* would be transactions prices, rather than price indices of traded goods computed with some lag.[1] It is not clear, however, that traded goods arbitrage has to determine therelative price of two moneys, so that even if PPP holds for traded goods the exchange rate may not be the one at which the stocks of domestic and foreign money are willingly held. Thus the Casselian argument is that the cost of living indices should be used.[2]

We will use wholesale and consumer price indices in testing PPP even though they do not represent adequately the prices of traded and non-traded goods and may even be systematically different from corresponding transactions prices. These tests have to be interpreted with caution, but they are nevertheless useful in explaining the interaction between exchange rates and prices during the recent portuguese experience.

The problem of simultaneity becomes particularly serious when the exchange rate is set every day by the central bank rather than by "market forces", as has been the case in Portugal. But since inflation differentials have been

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[1] In fact Magee (1978) has shown that PPP could hold for transactions prices when the use of prices indices would lead to reject it. Some evidence of individual traded goods prices is used in Isard (1977).

[2] See Cassel (1921). Useful references on PPP and its revival are Officer (1976), Dornbusch and Krugman (1976), Frenkel (1978) and Papaefstratiu (1979).

considered since September 1977 as the main determinant of the programmed devaluation of the escudo, it is useful to check whether the changes in the portuguese exchange rate are compatible with an hypothesis of purchasing power parity, in particular when effective rather than bilateral variables are used.

The tests of PPP will be conducted by standard regression techniques[1] and also by tests for causal ordering of time series[2]. The use of alternative techniques is justified first by the importance of the assumption of exogeneity, which causality analysis addresses explicitly, and second by the fact that causality results can be too dependent on the particular specification of the filters, namely when monthly data is used.[3]

Table 1 collects regression results from the entire floating rate period using consumer and wholesale prices and various estimation methods. In general, the hypothesis that $a = 0$ and $b = 1$ cannot be rejected using OLS or INST, whereas it is rejected when the substantial first order autocorrelation

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1 For a similar approach see Krugman (1978) and Frenkel (1976).

2 For a similar approach see Brillembourg (1976). This approach, due to Granger (1969) and Sims (1972), has been used for series on money and pices namely by Ciccolo (1975) and Brillembourg-Khan (1977). See a survey in Pierce-Haugh (1977).

3 Sims (1977) warns that in weekly, monthly or quarterly data "noise" can have a much higher variance than the systematic movements in the time series and thus obscure the basic relationship.

Table 1

PPP Regressions 1973;3 - 1978;4

	a	b	c	R^2	D.W.	s.e.r.	ρ_1	ρ_2
1. OLS								
CPI	-.895	.028	1.169	.78	.19	.082	--	--
t	(1.98)	(.69)	12.39					
WPI	-.398	.051	1.074	.94	.38	.044	--	--
t	(2.07)	(2.49)	(26.49)					
2. INST								
CPI	1.306	.123	.709	.69	.09	.098	--	--
t	(1.25)	(1.99)	(3.25)					
WPI	.942	.108	.791	.89	.17	.059	--	--
t	(1.35)	(2.77)	(5.40)					
3. MLEIT 1								
CPI	3.573	.054	.257	.96	1.28	.022	.98 (s.e. = .0006)	
t	(7.92)	(3.43)	(2.79)					
WPI	2.677	.064	.440	.97	1.68	.026	.97 (s.e. = .0009)	
t	(5.06)	(4.23)	(4.03)					
4. MLEIT 2								
CPI	3.495	.054	.269	.96	1.49	.021	1.10 (s.e. = .016)	-.13
t	(8.03)	(3.45)	(3.01)					
WPI	2.71	.065	.431	.97	1.84	.026	1.07 (s.e. = .016)	-.10
t	(5.13)	(4.26)	(3.95)					

Notes: The equation is $s = a + b\ DEV + c(p-p^*)$ where s is the log of the average effective exchange rate index, DEV a devaluation on dummy taking the value of one from 1977;3 to 1977;8, and $p(p^*)$ the log of the domestic (effective foreign) price index. Results are reported for consumer (CPI) and wholesale price (WPI) indices. All indices are 100 in 1973;3. Estimation methods are: 1. ordinary least squares (OLS), 2. instrumental variables (INST), where the instruments are the constant, DEV and time, 3. and 4. maximum likelihood iterative estimator for first and second order autocorrelation (MLEIT1 and 2 respectively);

Table 2

TESTS OF PPP

	a	b	c	R^2	h	ρ_1	ρ_2	F
1973;3-1978;4 (N=62)								
WPI	-.477	.073	1.090	.99	-.15	.89	-.10	4.98
s.e.	(.439	(.019)	(.092)			(.016)		
CPI	-1.841	.052	1.369	.96	.09	1.03	-.18	3.38
s.e.	(1.22)	(.030)	(.254)			(.016)		
1974;5-1978;4 (N=48)								
WPI	-1.02	.072	1.20	.98	-.4	.84	-.18	13.04
s.e.	(.40)	(.022)	(.085)			(.020)		
CPI	-4.06	.041	1.82	.95	-.20	.98	-.19	5.72
s.e.	(1.69)	(.041)	(.35)			(.020)		
1973;3-1977;2 (N=48)					χ^2			
WPI	1.02		.771	.99	25.1	.89	-.19	32.8
s.e.	(.430)		(.091)		(20)	(.020)		
CPI	1.27		.709	.99	27.7	.94	-.21	
s.e.	(.60)		(.13)		(20)	(.020)		
1974;5-1977;2 (N=34)								
WPI	.335		.913	.99	13.95	.84	-.29	45.98
s.e.	(.535)		(.113)		(10)	(.027)		
CPI	.290		.912	.99	18.96	.88		75.12
s.e.	(.770)		(.160)		(10)	(.026)		

Notes: Variables defined as in Table 1 Estimation by instrumental variables iterative procedure for simultaneous equations with second order autocorrelation correction (IVAUTOIT2) where the instruments are the constant, (p-p*)-1, (p-p)-2, s-1, s-2 and DEV when appropriate. When Durbin h has a negative denominater, the Box-Pierce χ^2 of the residuals is computed for the number of lags indicated.

is removed. The same occurs when a second order process is introduced.[1]

The estimation method used in Table 2 corrects both for simultaneity and for second order serial correlation.[2] Three other sample periods are included. The revolutionary period, the period before the devaluation and the revolutionary period before the devaluation.

During the entire sample period, the two restrictions are on the borderline of acceptance since the 95% confidence level for F with (2,59) degrees of freedom is 3.15. The regression using consumer prices can reject the null hypothesis that the restrictions are true at a 95% confidence level, whereas

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1 The stability conditions for the second order autoregressive process are $\rho_1 + \rho_2 < 1$; $\rho_1 - \rho_2 < 1$ and $-1 < \rho_2 < 1$ and they are met in the cases of Table 1. See Box-Jenkins (1970) p. 58.

2 See Fair (1970). Denoting $p-p^*$ by π we have

$$s_t = a + b\ DEV_t + c\ \pi_t + \varepsilon_t$$

$$\varepsilon_t = \rho_1\ \varepsilon_{t-1} + \rho_2\ \varepsilon_{t-2} + \eta_t$$

where $E(\eta) = 0$ and $E(\eta\eta') = \sigma^2 I$

we estimate $\pi_t = \alpha_0 + \alpha_1\ DEV_t + \alpha_2\ \pi_{t-1} + \alpha_3\ \pi_{t-2} + \alpha_4\ s_{t-1} + \alpha_5\ s_{t-2} + v_t$

and form $s_t - \hat{\rho}_1\ s_{t-1} - \hat{\rho}_2\ s_{t-2} = (1 - \hat{\rho}_1 - \hat{\rho}_2)\ (a + b\ DEV_t) + \pi_t - \hat{\rho}_1\ \pi_{t-1} - \hat{\rho}_2\ \pi_{t-2} + \eta_t$

which is estimated iteratively as in the maximum likelihood estimators described above.

using wholesale prices the rejection can be made at a 99% level of confidence.[1]

If we interpret the constant as the equilibrium terms of trade, then we can see that the coefficient on the price variable is within two standard deviations of the restricted value.[2]

Shortening of the sample period, in particular, the exclusion of the period after the devaluation, involves a clear rejection of PPP. At the same time there is no clear test for the absence of autocorrelation since the Durbin h statistic has a negative denominator.[3] In that case we computed the Box-Pierce χ^2 of the residuals the 95% level of which for 18 and 8 degrees of freedom is 28.87 and 15.51 respectively.[4] The residuals are only white noise for the third sample period when wholesale prices are used. In the other three cases they are not.

It can thus be said that over the entire "floating rate" period, PPP has approximately held in terms of the effective rate, with a slightly higher confidence when wholesale prices are used. We can recall Figures 13 and 16 in the text to see that between April 1973 and the February 1977, the early 1976 dip aside, the real rate has a clear upward trend. Thus the inclusion of the latter period tends to offset the trend and thus lead to an approximate acceptance of a rate of nominal depreciation compatible with PPP. When bilateral rates and price ratios

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1 Since we are not using OLS these tests are not strictly appropriate. See Theil (1971), ch. 3.7.

2 Using consumer prices this would imply $.26<A<3.88$.

3 There is a clear acceptance in the other two periods since the 95% cut-off point is 1.645 See Durbin (1970).

4 See Box-Pierce (1970). $\chi^2(m-k) = N \sum_{i}^{m} \rho_i^2$ where k is the order of the autoregressive process in the equation and m is the order of the autocorrelation coefficient $\hat{\rho}i$.

are used, weaker results are obtained, except for the U.S.[1/]

2. We now perform explicit causality tests on exchange rates and prices. We will use effective and bilateral average exchange rates and relative wholesale and consumer prices. Some tests of the relationship between exchange rates and domestic price indices will also be performed, on the grounds that the exogeneity of the foreign price level for the exchange rate of a small country can be safely established on a priori grounds.

In Table 3 tests for randomness of the series for effective and bilateral exchange rate and wholesale price ratios are performed. With the possible exception of the effective wholesale price ratio, the tests are favorable to the hypothesis that the series are white noise.[2]

We thus use the logarithmic first difference of the rate and the price ratios[1] regress both on past values of the other, and check the significance of future values of the exogenous variable by means of both an F-test and a likelihood ratio test. The summary of these regressions for 4 and 12 lags

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1 Thus the coefficients (standard error) on the wholesale price ratio would be for France=.803(.070), Germany=1.163(.104), U.K.=1.929(.477) and U.S.=1.08 (.078) where the Fair estimator with first order autocorrelation correction was used.

2 In fact, we can accept the hypothesis that the series are white noise at the 95 per cent confidence level for values χ^2 smaller than 22.36, or for values of the significance level indicated in the tables larger than .05. In so doing, however, we are allowing for a larger type II error. Thus, in the case of the first difference of the log of the effective wholesale price ratio (variable D W), we may well be accepting the null hypothesis when it is not in fact true. Furthermore, the autocorrelation and partial autocorrelation functions for D W suggest that an autoregressive process of order 5 with a constant may be present. When such correction is made the test for randomness of the residuals is $\chi^2(6)=4.75$ with a significance level of .58 whereas the differenced series has $\chi^2(12)=12.42$ with a significance level of .41. But there is no easy way to rationalize this further filtering which may, in fact, involve overfitting.

Table 3 Exchange Rates and Wholesale Prices
Jan.1973 - Apr.1978

		χ^2	Sig.level
Log of Effective	W	14.09	.37
	S	6.48	.93
Log of Wholesale Prices	FR	11.85	.54
	GE	11.96	.53
	UK	11.21	.59
	US	9.56	.73
Log of Exchange Rates	FR	7.97	.84
	GE	6.33	.93
	UK	9.71	.72
	US	7.58	.87

Test that the series detrended by regular differencing of degrees one is white noise with 13 degrees of freedom.

are in Tables 4 and 5. "Prob" columns give the significance of the result at a .90 confidence level. A lower value implies the acceptance of causality in the direction indicated.

It appears that the prior effect of the exchange rate (DEFA) on the prices is limited to wholesale prices (DRW, DW) with a 4 month lag. When relative consumer prices (DRC) are used there is independence with 4 lags. When a 12 month lag is used, the causality runs both ways. The effect of the assumed exogeneity of the foreign price does not determine the result since the same pattern occurs between the exchange rate and the domestic price level (DW and DC). On the other hand, it does not reverse it.

The results for the dollar rate (DOLA) and consumer price (DC) are the same as for the effective rate, namely, independence with 4 lags and feedback with 12 lags.

Finally the causality between bilateral rates and wholesale prices is in Table 5, which is to be read across rows for the direction of causality. As far as causation between rates, independence cannot be rejected; prices are also contemporaneous except for France, where they are caused by the other three. The conclusion from this analysis is that the regressions of exchange rates on consumer prices are acceptable for short lags, whereas the simultaneity problem occurs with 12 lags. As far as the regressions of exchange rates on wholesale prices are concerned, they have the same simultaneity bias when longer lags are postulated whereas for short lags there is an obvious misspecification, since the exchange rate is the exogenous variable.

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1 The Box-Pierce χ^2 with 12 degrees of freedom is 13.95 (significance level = .304) for variable DRW and 4.97 (s.l. = .959) for variable DEFA. Variable DRC has a χ^2 (13 degrees of freedom) = 18.33 with s.l. = .145.

Table 4 Significance of Regressions and Direction of Causality

Original Variables		N	Lags	R^2	Fprob.	Coeff.	RSS
a. DEFA	DRW	51	4	.11	.65		7,398.16
b.				.27	.89	-3,+4	6,014.02
a. DRW	DEFA			.19	.92	-4	5,380.12
b.				.24	.80	0	5,031.40
DEFA→DRW							
a. DEFA	DRW	35	12	.28	.19		521.86
b.				.76	.56		173.16
a. DRW	DEFA			.27	.18		3,686.8
b.				.81	.74		966.2
DEFA↔DRW							
a. DEFA	DRC	55	4	.11	.71	0	7,689.1
b.				.17	.56	0	7,218.3
a. DRC	DEFA			.14	.81	0	12,196.2
b.				.19	.68	0	11,376.8
DEFA 0 DRC							
a. DEFA	DRC	39	12	.59	.99*	-4,-8	3,190.6
b.				.80	.92*	-8,-10	1,569.0
a. DRC	DEFA			.30	.36		8,483.1
b.				.71	.66	+5	3,514.7
DEFA↔DRC							

Note: Regression of the left hand variable on a constant and lagged values of the right hand variable on lines a and on a constant and lagged and led values of the right hand variable on line b. Coefficients with t>2 are indicated on the "coeff" column when the number refers to the lag. Arrows indicate the direction of causation (0 indicates that the series are contemporaneous) from a F test computed as $F(c, h-k) = (RSSa - RSSb)/c\ RSSb$ where c is the number of lags and n-k the degrees of freedom in the unconstrained case.

Table 5. Causality tests with effective variables

	F		χ^2		Prob	
	4	12	4	12	4	12
DRW DEFA	.710	1.510	10.56	38.61	.97	.99
DEFA DRW (55;39)	2.359	2.112	3.42	46.87	.51	.99
DW DEFA	1.867	.838	8.44	22.35	.92	.97
DEFA DW (id.)	.425	1.943	2.04	40.06	.27	.99
DRC DEFA	.73	1.12	3.47	27.08	.52	.99
DEFA DRC (id.)	.81	1.53	3.82	34.36	.57	.94
DC DEFA	.92	1.239	4.40	34.14	.64	.99
DC DEFA (id.)	.76	1.348	3.66	36.01	.54	.99
DC DOLA	.67	.59	3.23	20.42	.48	.94
DOLA DC	.73	.64	3.50	21.52	.52	.96

Table 6. Direction of Causality for bilateral variables

		Wholesale prices of			
escudo exchange rate		FR	GE	UK	US
	FR	→	→	→	↔
	GE	↔	↔	←	↔
	UK	→	→	→	→
	US	↔	↔	↔	↔

III. The Quantity Equation

3. The quantity equation can be tested as a demand for money function or as a price determination equation. The test is that the coefficient of the price level in the demand for money function or the coefficient of the money stock in the price determination equation be unity.

In the monetarist model, money is non traded so that the opportunity cost of holding nominal money is a vector of domestic nominal rates of interest. We will include the own rate r_1, the bond rate, r_2, and the expected inflation rate, π^*, the latter as a proxy for the return on physical assets. We thus write

$$P = m - \lambda y - \gamma_1 r_1 + \gamma_2 r_2 + \gamma_3 \pi^*$$

where the coefficients are defined to be positive.

Monetary statistics in Portugal are mostly elaborated at the central bank. In 1977 a substantial revision took place and the balance sheet of the economy was divided into external and domestic sectors, whilst the latter was divided into financial and non-financial sectors.

The monetary base (MOB) is computed as the sum of currency in circulation (C) and reserves of monetary institutions (R^L required reserves and R^E excess reserves), where savings and investment banks as well as commercial banks are included. The monetary base plus non monetary liabilities (NML) plus profits and losses is equal to net foreign assets (NFA, also net of changes in valuation which are included in K) plus domestic credit of the central bank (DMB). In other words the balance sheet is

$$C+R^L+R^E+NML+K = eNFA+DMB$$

where $C+R^L+R^E$ = MOB

The definitions of money used are

M1=C+SD

M2=C+TD

where SD are sight deposits of the private sector in monetary institutions and ST are total deposits.

Monthly data on the monetary aggregates M1 and M2 is not available before 1977 even though there are series for the period before 1971;8 in IFS and OCDE, in Main Economic Indicators, reports a monthly series without interruption. The latter series is not considered very reliable, however, and in fact it differs considerably from the Bank's figures, even before the 1977 revision. Therefore, the OECD series was only used to interpolate the quarterly series of the Bank from 1968;6 to 1976;11. A time trend was added to correct for the systematic over prediction of the dependent variable when we use the OECD series alone. The regression includes all the sample period but actual end of quarter data were preserved in the interpolated series.[1] This introduces some erratic variations between quarters, and a three-month-moving average was performed on the M2 series, which will be systematically used because of the great substitution that takes place between sight and time deposits.[2]

As a measure of real income, we used the monthly index of industrial production scaled by real output, even though the measure is also

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[1] The results of the regression $M_i = a + bM_i(OECD) + eTIME$; where i = 1,2 are as follows:

	a	b	c	R^2	SER	DW
M1	1,431.72	.88		.98	748.66	1.12
	(190.09)	(.013)				
	1,699.69	.74	29.62	.98	692.05	1.12
	(186.71)	(.036)	(7.00)			
M2	1,315.72	.915		.99	759.61	1.43
	(188.00)	(.007)				
	1,709.61	.81	40.37	.99	729.28	1.40
	(221.19)	(.035)	(13.11)			

[2] The annual money demand estimates of Fry (1976) and Abel et al. (1977) also use M2, even though the former reports results on M1 and C.

very approximate.[1]

For a short term rate we used the 3 month commercial paper rate rather than the time deposit rate, because the latter shows little monthly variability. The interruption of the IFS series of government bond yields from May 1974 to January 1976 and from August 1976 to June 1977 led us to use the rate on private loans of maturity 7 year or longer as the long term rate. The expected rate of inflation was taken to be a twelve-month moving average of past changes in the Lisbon CPI.[2]

Summary statistics for the variables used can be found in Table 7.

Table 8 reports the estimates of the price equation. When OLS is used (equation 1), the coefficients have the right signs, but the income measure is insignificant and there is substantial autocorrelation. Using instrumental variables (equation 3) makes y almost significant (t=1.82) whilst the significance of the long term interest rate drops (t = 1.85) and autocorrelation remains severe. A simple autocorrelation correction (equation 2) changes the signs of a_3 and a_4, only money and expected inflation are significant, but the coefficient on money becomes significantly lower than one, namely between .54 and .94. When autocorrelation and simultaneity are corrected for (equation 4) homogeneity of money cannot be rejected but the income and interest rate variables continue to be insignificant.

Estimates of money demand functions are usually based on a partial adjustment mechanism. Consider that the quantity equation above applies to

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1 See Chaves-Leite (1962) for the construction of the industrial production index. Real GDP was taken from IFS. Given the weights used in the seasonal adjustment of the IP index (Chaves-Leite p. 126) there were sharp drops in August during the sample period and a three-month moving average was therefore applied to the series. On caveats about the Portuguese industrial production index see the 1977 Annual Report of the Bank of Portugal, p. 57, note 1. The index was revised in INE, Boletin Mensal, 1976, no. 1.

2 Strictly speaking the wholesale price index should have been used. See McKinnon (1973). Since we will use this variable in the exchange rate equation, it seems preferable to use the consumer price index for inflation.

Table 7 Summary statistics 1973;4-1977;12

	Mean	Standard Deviations
p	5.06	.26
y	4.81	.15
m	10.52	.22
r_1	8.05	2.46
r_2	11.02	2.94
π^*	17.81	7.18

Sources: **Respectively, log of series (5),(16), (14), in Appendix 2**
Series 17 in Appendix 2
Series (9) and (13) in the Appendix of Macedo (1979e)

Table 8 Price determination 1973;4-1977;12

		a_1	a_2	a_3	a_4	a_5	a_6	R^2	D.W.	ρ
1.	OLS	-6.53	1.12	-.074	-.017	.018	.005	.99	1.16	
		(.57)	(.07)	(.07)	(.008)	(.008)	(.007)			
2.	MLEIT	-3.54	.74	.12	.008	.007	.006	.99	2.16	.85
	s.e.	(.87)	(.10)	(.10)	(.009)	(.006)	(.0009)			(.005)
3.	INST	-7.31	1.23	-.14	-.018	.00014	.004	.99	1.23	
	s.e.	(.61)	(.078)	(.078)	(.008)	(.00008)	(.0007)			
4.	$IVAU_TOIT_1$	-6.676	1.146	-.092	-.009	.0001	.005	.99	1.9*	.42
	s.e.	(.71)	(.09)	(.097)	(.009)	(.00007)	(.0008)			(.014)

Notes: Equation $p = a_1+a_2m+a_3y+a_4r_1+a_5r_2+a_6\pi^*$. Instruments in INST includes all RHS variables, except p, and TIME. Instruments in IVAUTOIT1 includes all RHS variables, except M and all RHS variables and p lagged once.
* Durbin h not defined $\chi^2(19)$ of residuals is 27.09, significance level = .10.

m_t^*, log of desired nominal money stock, and that

$$m_t - m_{t-1} = (m_t^* - m_{t-1})$$

Then the equation to be estimated is

$$m_t = a_1 m_{t-1} + a_2 + a_3 p_t + a_4 y + a_5 r_{1t} - a_6 r_{2t} - a_7 \pi_t^* + \varepsilon_t$$

The results in Table 9 show that even though all variables have the right sign, homogeneity of degree one in prices has to be rejected and the measure of real income is not significant. Furthermore, when instrumental variables are used for P (equation 2), the (short and long run) coefficient on P increases and the residuals are uncorrelated at the 90 percent confidence level, by a χ^2 test, but income and the long run interest rate are again not significant

Table 10 performs causality tests on money and consumer prices. Using both the original series and the residuals from an autoregressive system of order 1 for money and an ARMA of order 6 for prices, it is established that money and prices are independent with 4 lags and show feedback with one year lag.[1]

This shows that the simultaneity problem was not crucial, even though the price equation corrected for autocorrelation alone was disappointing.

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1 The short interval may account for these results. Brillembourg-Khan (1977) for instance use over 100 annual observations and a 5 year lag. Cross correlations were computed on the two series for up to 12 lags and they confirm independence, except for the two series for up to 12 lags and they confirm independence, except for the one period lag of the original series where S* = .53 and s.1 = .09.

Table 9 Money demand 1973;4-1977;12

		a_1	a_2	a_3	a_4	a_5	a_6	a_7	R^2	D.W.
1.	OLS	.707	1.110	.223	.058	..009	-.00007	-.001	.99	2.3 (h)
	s.e.	(.67)	(.10)	(.08)	(.04)	(.005)	(.00004)	(.0006)		
2.	INST	.376	3.668	.511	.076	.011	-.0001	-.002	.99	1.7*
	s.e.	(.16)	(.99)	(.136)	(.05)	(.005)	(.00005)	(.0008)		

Equation $m = a_1 r_{-1} + a_2 + a_3 p + a_4 y + a_5 r_1 + a_6 r_2 + a_7 \pi$ * instruments in INST includes the RHS variables (except p) and time. * Durbin is not defined. χ^2 (19) on residuals = 27.36 significance level = .10.

Table 10 Money and Prices

				χ^2	s.e.
Prices } 12 d.f. Money }				17.56 22.13	.1296 .0361
Money (9 d.f.)	C 7.346 (.52)	AR1 .545 (.116)		4.94	.8393
Prices (8 d.f.)	C 4.50 (3.50)	AR6 .374 (.410)	MA6 .042 (.44)	9.71	.2857
P causes M2 } 4 d.f. M2 causes P }				5.59 7.14	.232 .129
P causes M2 } 12 d.f. M2 causes P }				26.21 38.96	.001 .001
P→M2 M2→P	residuals 4 d.f.			4.36 3.27	.359 .513
P→M2 M2→P	residuals 12 d.f.			22.48 41.51	.033 .000

3. Using the specification of the price determination equation, we now test the small country exchange rate equation using the average monthly values of the effective rate and the dollar rate from 1973;3 to 1977;12.

The results in Table 11 show that the dollar rate regression estimated by OLS (line 3) does display the homogeneity in the foreign wholesale price level and the domestic money stock. However, when the substantial autocorrelation is removed, the homogeneity breaks down and, indeed, the only significant variable is the domestic interest rate, whilst there is still evidence of autocorrelation ($d_L > 1.30$). For the effective rate the homogeneity hypothesis is rejected even before the correction for autocorrelation.

The substantial multicollinearity, together with the measurement problems in crucial variables like m,y and π^* account, at least in part, for these insatisfactory results. More important, however, is the theoretical inadequacy of the monetarist-PPP hypothesis and its inability to track down the policy and structural changes in the Portuguese economy during the sample period. Indeed, the use of the "free" rate in the regressions would destroy the arbitrage rationale for PPP whereas the portfolio approach can be tested with such a rate without great concern for the size of the black market, as suggested elsewhere.[1]

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[1] See Macedo (1979g).

Table 11

The Monetary Explanation of the Exchange Rate
(Monthly Data 1973;3 - 1977;12)

		a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	R^2	D.W.	ρ	F
Effective rate													
1.	OLS	2.27	.12	.43	.12	.04	-.001	.001	-.61	.97	.40	-	226.1
	standard error	.63	.02	.12	.07	.01	.01	.001	.14				
	significance Level %	0	0	0	5	0	100	15	0				0
	aux R^2	1	.48	.98	.90	.97	.98	.58	.97				
2.	CO	2.99	.10	.09	.07	.03	.004	-.0004	.05	.98	1.72	.99	394.3
	s.e.	.77	.01	.08	.05	.005	.003	-.0005	.17			.0004	
	s.1.%	0	0	15	7.5	0	6	20	>40				0
Dollar rate													
3.	OLS	-.33	.10	.98	.018	.010	.010	.012	.002	-1.10	.94	.66	118.4
	s.e.	.89	.03	.16	.12	.014	.013	.001	.19				
	s.1. %	35	0	0	>40	26	26	6	0				0
	Aux R^2	.99	.20	.99	.87	.52	.53	.08	.99				
4.	CO	2.53	.10	.013	.075	.026	.005	-	.30	.97	1.23	1.23	233.1
	s.e.	1.35	.02	.15	.098	.009	.005	.001	.26				
	s.1.%	15	0	100	20	0	15	100	15				0

Note: Equation $e = a_0 + a_1 DEV + a_2 m + a_3 y + a_4 r_1 + a_5 r_2 + a_6 \pi^* + a_7 P^*$

Sources as in Table 7.

Conclusion

The interpretation of the recent Portuguese experience in terms of trends in the real effective exchange rate, the relative price of non-traded goods and the terms of trade seems more insightful than the exclusive reliance on a monetarist--PPP explanation of the determination of an effective exchange rate that is constructed in view of the one that the monetary authorities have attempted to control.

Indeed regressions of the effective exchange rate on (effective) price ratios, involve a borderline acceptance of purchasing power parity, in particular for wholesale prices, when the substantial autocorrelation and the endogeneity of prices are corrected for. However, explicit causality tests between the changes in effective wholesale prices (or price ratios) and the changes in the effective exchange rate imply that the mechanism at work is the opposite of the one postulated by the monetarist--PPP hypothesis. In effect, with a four month lag structure the exchange rate causes wholesale prices, whereas there is mutual causation with a twelve month lag. Furthermore, the causality tests for consumer prices yield independence with a four month lag, thus suggesting that short run changes in price of non traded goods in terms of traded good were in fact relevant in the recent Portuguese experience.

The estimation of the monetarist price determination equation led to the acceptance of the homogeneity of the money stock (M2) when autocorrelation and simultaneity were corrected for. However, a partial adjustment money demand function led to the rejectionof homogeneity and in both cases the income and interest rate variables were insignificant.

The monetarist explanation of the exchange rate is rejected by the data both using the effective exchange rate and the bilateral rate against the dollar. The presence of substantial autocorrelation in the OLS estimation suggests misspecification or errors in variables, the latter hypothesis being associated with measurement problems in some of the variables.

In sum, the rejection of the monetarist explanation of the Portuguese exchange rate stems from the fact this hypothesis is not sufficiently robust to explain changes in exchange rates controlled by the monetary authorities, even when they claim to follow a PPP reaction function, and indeed regression techniques are unable to reject such hypothesis over the whole sample period.

This rejection becomes even more troublesome for the moentarist approach when a simple portfolio approach is able to explain the black market premium in terms of the domestic money stock and the stock of foreign assets held by the private sector.

APPENDIX 1

The Construction of an Effective Exchange Rate

1. There have been a few attempts at constructing an effective exchange rate for the Portuguese escudo since the concept was introduced.[1] Thus Pitta e Cunha has computed the effective devaluation of the escudo following the Smithsonian agreement[2] and the Bank of Portugal introduced such an index in its Annual Report of 1975[3] . Despite the impossibility of finding an index appropriate for all purposes, it is worth investigating briefly the structure of the Portuguese balance of payments in recent years in order to find guidance for a compromise in terms of currencies covered and their respective weights. This investigation will also help comparing different indices.

In 1977 the Portuguese basic balance in escudos had the structure shown in Table 1, which also shows the Escudo Area and the Portuguese basic balances in 1972.

The peculiarity of the Portuguese basic balance is the limited importance of long term capital and, as we pointed out in the text, the great relevance of the invisible account on the credit side[4/] which makes the trade deficit more sustainable.

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1 See Hirsch-Higgins (1970).

2 See Cunha (1971)

3 Vol. I, p. 112. The weights were the average shares of total trade (exports plus imports) in 1973 and 1974 of the 17 countries the escudo exchange rates of which are quoted by the Bank of Portugal. Germany, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, Norway, Spain, Sweden, Switzerland, U.K. and U.S. . In the 1976 Report, Vol. I, p. 192 the weights were derived from trade shares in 1975.

4 Note that transport and interest payments have increased their share of the debits on the service account in recent years (154% in 1977) and the two main credit items are travel and migrants remittances (76,4% in 1977).

This contrasts sharply with other small European countries[1] During the last few years large "political risk" premia could largely explain the pattern, whereas controls could be one cause for limited capital account transactions before 1974.

With respect to private remittances, Portugal has now a pattern similar to the less developed Southern European countries, whereas it had the highest level of remittances per capita in the early 70's.[2] Even though remittances do not directly affect the competitiveness of portuguese goods and services relative to its trading patterns, they increase the capacity to import above what it would otherwise have been and the great import content of investment and exports provides for a strong indirect effect.[3] Furthermore, if remittances are mostly dependent on the emigrants' savings they will be fixed in foreign currency, and thus increase in escudo terms when the currency depreciates improving the current account denoted in domestic currency.[4] Finally, it also seems preferable to include the remittance account because the effective rate used by the central bank since March 1977 is based on trade, tourism and remittances.[5]

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1 In 1976 net long term capital flows were 2.3% of the current account balance in dollars in Portugal, 33.6% in Spain, 50% in Greece, 17.3% in Turkey and 67.4% in Finland. On the other hand, the direct investment share was about 5% in Portugal, Spain and Finland but only about 1% in Greece and Turkey. See 1977 Report of the Bank of Portugal, Table II- 28, p. 131.

2 Thus in 1976 remittances were 42.3% of the current account deficit in dollars in Portugal, 42.4% in Greece and 36.7% in Turkey. The shares in Spain and Turkey were 21% and 27% respectively. See 1977 Report of the Bank of Portugal, Table II.23 p. 123. On the comparison of mediterranean countries in the early 70's see Macedo (1972b).

3 These were estimated as .450 and .335 from the 1970 input output table normalized so as to match the actual figure for total imports in 1975. See Abel et al (1977).

4 As Machlup (1940), p. 123 indicates, the alternative that remittances are determined mostly by beneficiaries needs would make them fixed in domestic currency. Given that remittances seem to be partly saved by the beneficiaries, the alternative in the text is more plausible. Whether remittances are consumed or saved turns out to be important for steady-state growth of some economies with endogenous migration. See Macedo (1977a) and M. Barbosa (1977a).

5 See Annual Report 1977, table 50, p. 290 and 1976, p. 172, footnote (1).

Table 1. The structure of the portuguese basic balance (%)

	PORTUGAL						ESCUDO AREA		
	1977			1972			1972		
	Debit	Credit	Total	Debit	Credit	Total	Debit	Credit	Total
Merchandise	73.6	42.7	60.1	61.6	38.4	49.4	73.8	43.3	57.5
Invisible and U. transfers	17.7	44.8	29.5	24.1	52.3	38.9	18.1	48.4	34.2
Long term capital	8.7	12.5	10.3	14.3	9.3	11.7	8.1	8.4	8.2
Total (Esc.bil.)	237.2	182.2		87.4	96.5		88.0	100.5	

Source: RBP 1972, 1977.

Table 2. Three Main Items in current account (%)

	PORTUGAL						ESCUDO AREA		
	1977			1972			1972		
	-	+	Total	-	+	Total	-	+	Total
Merch.	95.3	55.5	78.0	91.5	50.9	61.8	92.7	56.0	73.4
Travel	2.8	11.1	6.4	7.1	15.5	10.5	6.3	14.1	10.4
Transf.	1.9	33.5	15.6	1.2	33.6	27.7	.9	29.8	16.1
Total in esc. billion	183.2	140.2		58.7	72.9				

Source: RBP.

In Table 2 the three items are compared for the balances and dates of Table 1.

The main trading partners of Portugal both with respect to merchandise trade, tourism and migrants' remittances have been France, Germany, the United Kingdom and the United States. In 1977 these countries accounted for 42.2 per cent of total portuguese trade (and 62 per cent of trade with industrial countries), 92 per cent of remittances and half of the number of nights spent by foreigners in portuguese hotels. The calculation of an effective exchange rate based on these four countries has, aside from its simplicity, the advantage of including the major currencies except the Japanese yen. The once important trade with the portuguese overseas territories was carried out in escudos and its share has decreased substantially after 1974. Despite a strong increase in 1977, the share in total trade was less than 3 per cent .[1]

There are, however, data problems in calculating the shares of these four countries in the three main items selected. In fact, regional balance of payments involve serious statistical difficulties and have not been reported since 1972.[2] The alternative is therefore to compute the country shares with respect to trade, travel and transfers and they weight these by some measure of their average relative importance. Data on the merchandise trade of Portugal in dollars are displayed in Table 3. The shares of total trade are also included.

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1 In 1971 it was about 30 per cent. See Macedo (1977b).

2 See Balance of Payments Yearbook, Vol. 25, 1974 and Balance of Payments Manual, 1977 edition, Appendix A.

Table 3. Direction of Trade

	1975			1976			1977		
	Exports	Imports	Share % of X+M	X	M	X+M	X	M	X+M
France	127.6	291.7	19.0	151.7	364.6	21.2	160.0	396.7	17.4
Germany	197.4	436.6	29.0	195.0	492.9	28.3	237.8	612.4	26.3
U.K.	410.9	334.1	30.3	331.5	393.2	29.8	367.6	517.9	32.1
U.S.	140.2	475.4	21.6	122.2	380.6	20.7	135.1	498.3	25.5
Total X+M($mil)			2431.9			2431.7			2925.8

Source: DOT.

Table 4. Tourist trade (receipts and exp. in $ million)

	1975	1976	1977
Europe (1)	.783	.753	.717
U.S. and Ca(2)	.217	.247	.283
Share in nights			%
U.S./FR+GE+UK+US(3)	14.5	13.2	16.8
GR/FR+GE+UK(4)	14.0	16.5	17.1
GE (5)	41.9	46.3	43.3
UK (6)	44.1	37.2	39.6

*/ (2)/(3) for 1975 and 1976 multiplied by (3) for 1977.
Source: (1) and (2) OECD Tourist Policy; (3) to (6) Bank of Portugal

Table 5. Private transfers (receipts) on $ million

	1975	1976	1977
FR	594	551	710
GE	158	154	168
Other OECD	85	85	106
Europe of which			
U,K. (est)	70.36	66.36	82.66
US+CA	85	149	166

Source: RBP 1977 except U.K., from BPYB Vol. 25.

Tourist trade data is less adequate since only data on number of nights spent in hotels by country of residence is available for the whole period.[1] Using the distribution of tourist receipts and expenditures between Europe and North America, however, we can at least control for the difference in average expenditure of American and European tourists, and then use number of nights to compute the relative shares of the European tourists. Since there is no data on expenditures for 1977, the relative share of the U.S. in terms of number of nights spent by American tourists in Portuguese hotels is used adjusted for the average share in receipts and expenditures in 1975 and 1977. In Table 4 the available data on tourist trade are used to compute the shares in Table 6.

Existing data on receipts in the balance of private unrequited transfers for the whole period do not single out the U.K. and, like in the case of tourist receipts and expenditures, lump together the U.S. and Canada. While the latter aggregation does not seem serious, despite the probable large share of Canada, the U.K. share has been estimated by using the share in 1972, which is available.[2] The data are in Table 5 and the shares in Table 7.

We now need to weight the three shares indicated in Tables 3, 6 and 7. To do so we use the structure of the total balance in 1975-77. The data on the 1972 balance of the Escudo Area with the North America, the U.K. and the EEC are in Table 8, together with the implied shares.

Using the ratio of the shares on 1975-77 balances to the 1972 Escudo Area balance to adjust the share in Table 8 we obtain the approximate shares of Table 9. The resulting shares of the four countries are in Table 10.

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1 The monthly Situação Socio-Económica has monthly receipts from tourism and remittances by country from 1976 on.

2 The breakdown of BPYB is US, UK and EEC, a total of 583 million SDR with U.S. million for the U.K. this gives a share of 8.4 per cent of the OECD total published by the Bank of Portugal.

Table 6. Adjusted Shares of Tourist Trade (%)

	1975	1976	1977
FR	11.0	12.4	12.3
GE	32.8	34.9	31.0
UK	34.5	28.0	28.4
US	21.7	24.7	28.3

Source: Table 4

Table 7. Shares of Transfer Receipts

	1975	1976	1977
FR	.655	.599	.630
GE	.174	.167	.149
UK	.078	.072	.073
US	.094	.162	.147

Source: Table 5.

Table 8. Structure of the 1972 Current Account (million SDR)

	US+CA	UK	EEC	TOTAL	SHARE (%)
Trade	540	603	1101	2244	66.6
Travel	154	70	167	391	11.6
Transfers	165	53	516	734	21.8
	859	726	1784	3369	

Source: BPYB, Vol. 25

Table 9. Approximate Shares of the Main Items (%)

	1975	1976	1977
Trade	68.66	67.20	20.77
Travel	8.40	6.80	7.14
Transfers	21.38	26.67	21.12

Source: RBP and Table 8.

Table 10.

	Total Shares (%)			
	1975	1976	1977	Weighted average *
FR	28.5	30.7	26.4	28
GE	26.8	25.7	24.0	25
UK	25.8	23.8	26.3	26
US	18.9	19.8	23.2	21

*/ Average is .25 for 1975 and 1976 and .5 for 1977.

2. These shares are very close to each other,despite the fact that the shares in the different accounts are quite different, U.K. being most relevant for exports, Germany for imports, France for remittances and U.S. for tourism. At the same time, the measures are sensitive to the assumptions made.[1]

This can be seen by contrasting the weights of Table 10, namely the ones in the 1977 column, with the weights obtained when trade with countries other than France, Germany and the U.K. is assumed to be denominated dollars.[2] Using then the relative shares of the three items in Table 2 for 1977, we obtain the following shares, denoted as SU,[3]

U.S.	56 %
FR	17 %
GE	14 %
UK	13 %

The index reported by the Bank of Portugal has been used in order to stabilize the effective exchange rate which makes it especially interesting as a benchmark. Since the weights are kept confidential, one can only give at the relative importance of the 17 partners included in terms of the current account. It is however, noteworthy, how close it is to the effective exchange rate computed by the European Department at the IMF, based on export and import shares of 27 countries in 1975, even though the former index is reported with mid month rather than monthly average exchange rates (See Table 11).

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1 Note that ignoring the regional balance of 1972 altogether would lead to U.K. = .291, GE = .287, FR = .212, US = .210 because the global weight on trade is much larger.

2 Cunha (1971) also followed this approach. He computed trade shares in 1971 for 14 countries, representing about 85 per cent of Portuguese foreign trade, and confronted the effective devaluation of 3.5 per cent computed in that way with the devaluation of 2.2 per cent computed by including the remaining 15 per cent in the U.S. share, thus bringing it from 12 to 25 per cent.

3 A somewhat more arbitrary assumption would rely on the three shares of 1972 given in Table 8, in an attempt to compensate for the possibly excessive weight of the U.S. dollar and obtain US 51%, FR 21%, GE 15%, UK 13%.

Given the difficulty in computing mid month exchange rates, Table 12 displays not only the current effective exchange of the Bank of Portugal (SB),[1] based in March 1977, and indices with weights as in Table 10 (SA) and the ones indicated above (SU) but also the trade weights used by the European department recomputed for the 4 countries in question and end of period exchange rates (SF).

A graph of SU, SA and SB can be found in Figure 1. Finally Table 13 and Figure 2 indicate the effect of only including the 4 countries in question in the SF index (denoted as SF2) for monthly averages.

In the text, we use the weights from Table 10 (the SA index), in the belief that it is more reasonable to overestimate than to underestimate the depreciation of the escudo. In fact, even the SU index is not below the SB one for 1977, therefore a weighted average of SA and SU does not improve substantially on any one of the indices, even for the sample period, which makes it futile to attempt to capture exactly the official index with only the four main trading partners.[2]

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1 I am indebted to A. Cavaco Silva for making these data available.

2 A regression of SB on SU and SA, yields an insignificant constant. Forcing the regression through the origin leads to a coefficient (standard error) of .554 (.076) for SU that is to say almost a weighted average. Constraining the sum the coefficients to be one leads to the weight of .307 (.062) and a worse fit: The R^2 drops from 1 to .62.

Table 11. "Official" Effective Exchange Rates

	BP	IMF
1977 Jan	100.00	100.00
1977 FEB	101.34	102.47
1977 Mar	120.88	121.08
1977 Apr	120.88	121.19
1977 May	120.88	121.17
1977 June	120.88	121.20
1977 July	120.88	121.20
1977 Aug	120.88	121.42
1977 Sept	125.77	126.12
1977 Oct	127.44	127.85
1977 Nov	128.90	129.09
1977 Dec	130.09	130.68
1978 Jan	131.81	132.79
1978 Feb	132.64	133.80
1978 Mar	135.04	136.14
1978 Apr		137.89
1978 May		147.56
1978 June		151.26
1978 July		153.67

Source: BP mid month from Annual Report, 1977. IMF period average rebased in Jan 1977=100 from European Department.

Table 12.

Alternative Effective Exchange Rates

	SA	SU	SB	SF
1977 Mar	100.00	100.00	100.00	100.00
Apr	100.29	100.14	100.00	100.28
May	100.40	100.22	100.00	100.36
June	100.53	100.18	100.00	100.45
July	101.26	100.45	100.00	101.17
Aug	104.36	103.71	102.44	104.32
Sept	107.07	106.30	105.04	107.05
Oct	108.56	106.70	106.04	108.70
Nov	109.38	107.53	107.04	109.51
Dec	110.85	107.24	108.04	110.97
1978 Jan	112.00	108.13	109.04	112.31
Feb	112.60	108.46	110.04	112.98
Mar	115.30	111.12	112.74	115.02
Apr	116.67	112.99	114.24	116.35
May	126.48	122.77	123.94	126.07
June	128.22	123.67	125.46	127.66
July	130.28	124.46	126.98	129.60
Aug			128.52	

Figure 1

EFFECTIVE EXCHANGE RATES FOR THE ESCUDO
USING ALTERNATIVE WEIGHTS

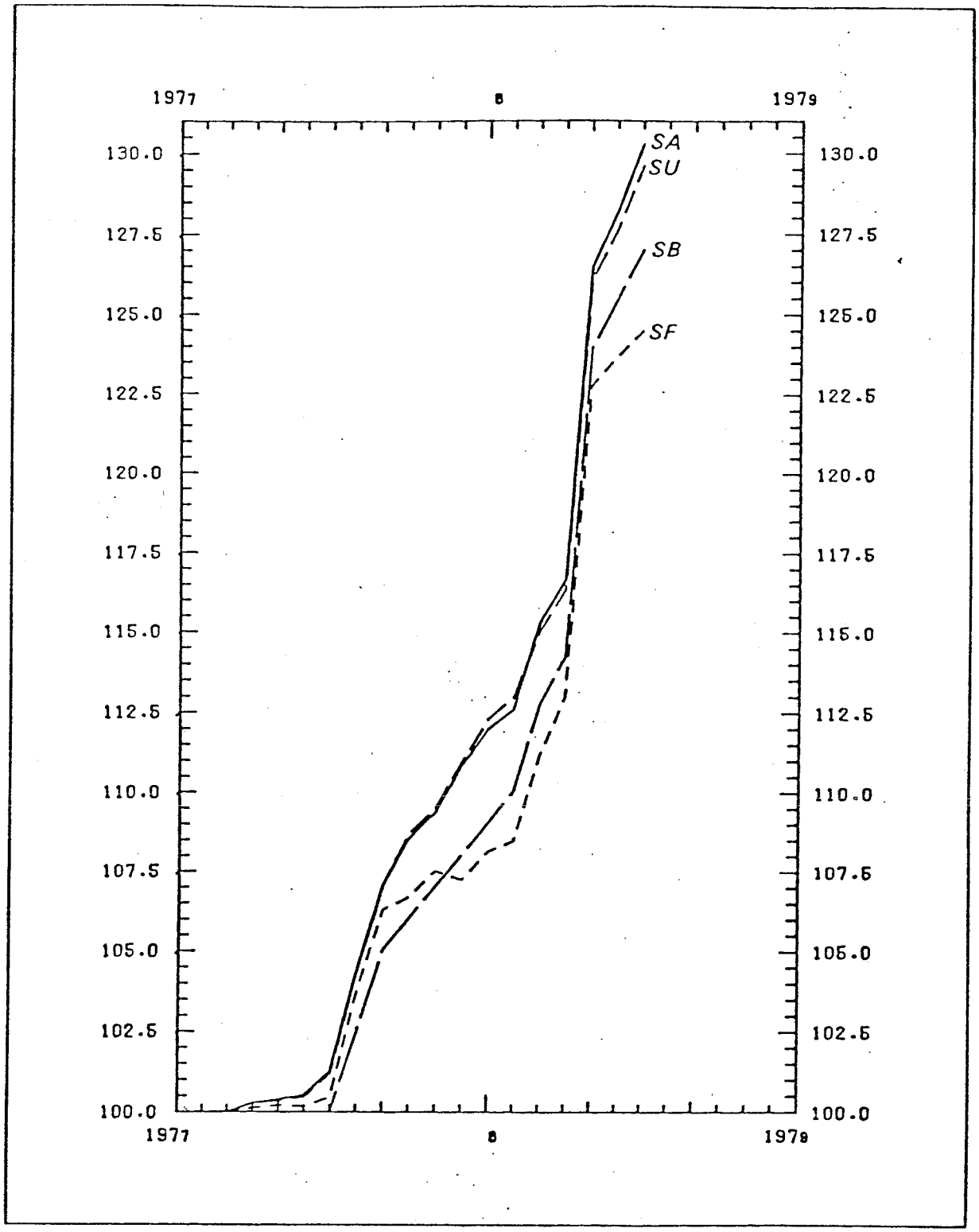
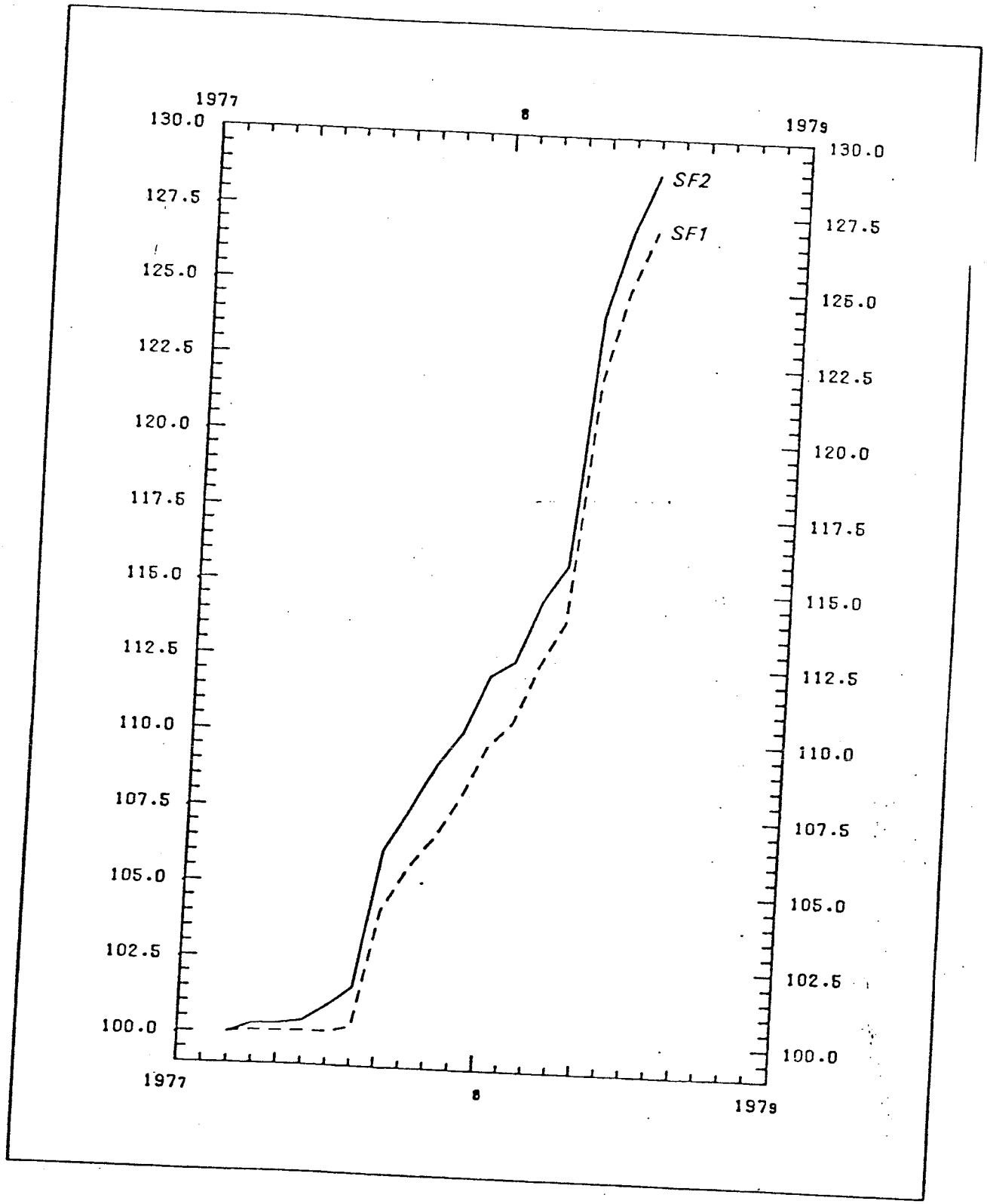


Table 13. Trade weighted rates

		SF1	SF2
1977	Mar	100.00	100.00
	Apr	100.08	100.30
	May	100.07	100.32
	June	100.10	100.44
	July	100.10	100.96
	Aug	100.27	101.59
	Sept	104.16	106.15
	Oct	105.59	107.55
	Nov	106.61	109.02
	Dec	107.92	110.10
1978	Jan	109.66	112.03
	Feb	110.50	112.52
	Mar	112.44	114.55
	Apr	113.88	115.79
	May	121.86	124.08
	June	124.92	126.82
	July	126.91	128.80

Figure 2

TRADE WEIGHTED EXCHANGE RATES FOR THE ESCUDO



APPENDIX 2

DATA

1. PPESCCA = Average purchasing power index of the escudo in terms of dollars, D. marks, pounds and French francs using consumer prices base 1973;3 = 100 defined in footnote 53 in the text average exchange rates against the dollar and consumer price indices are form IFS, lines rf and 54 respectively, weights from Appendix 2, Table 10 (data to 1978;6).
2. PPESCWA = Same as (9), using wholesale prices from IFS, line 63.
3. REXA = Average real effective exchange rate index of the escudo, base 1973; 3 = 100 obtained by multiplying (9) by (13) below (data to 1978;5).
4. REXWA = Same as (11), using (14) below (data to 1978;4).
5. POCPI = Lisbon consumer price index including housing from INE as reported in IFS, line 64, rebased 1973; 3 = 100 (data to 1978; 5).
6. POHIG = Lisbon wholesale price index including home and import goods from INE as reported in IFS, line 63, rebased 1973; 3 = 100 (data to 1974;4).
7. RPNT = Relative price of nontraded goods. Ratio of (13) and (14), base 1973; 3 = 100.
8. POX = Value of exports fob in billion escudos from INE, Boletim Mensal de Estatisticas do Comercio Externo. The 1977-78 value differ from IFS, line 70 (data to 1978;5).
9. POM = Value of imports cif in billion escudos, same source divergence from IFS, line771 (data to 1978;5).
10. XVOL = Volume of exports in thousand tons, same source (data to 1978;5).

11. MVOL = Volume of exports, same source (data to 1978;5).

12. TOT = Terms of trade. Ratio of unit values (16) (18) and (17) (19)

13. M2OD = Portuguese money stock including time deposits end of period, from MEI, in billion contos (data to 1976;11).

14. M2LMS = Money including time deposits from Banco de Portugal since 1976; 12. Before, interpolated from quarterly figures of the same source as explained in Appendix 3.

15. POIPI = Portuguese industrial production index, from INE as reported by IFS, seasonally adjusted, rebased 1973; 3 = 100.

16. IPAS = Three month moving average of (23) scaled by real GDP from IFS, line 99b.p as explained in Appendix 3.

17. RLTS = Portuguese interest rate on commercial paper of 7 years or more in % from INE, Estatisticas Monetarias e Financeiras.

	PPESCCA	PPESCWA	REXA	REXWA
1973. 1.	102.26	103.60	100.10	100.51
1973. 2.	97.607	98.166	98.491	96.701
1973. 3.	100.00	100.00	100.00	100.00
1973. 4.	99.579	100.36	100.33	100.36
1973. 5.	99.042	99.684	101.73	99.684
1973. 6.	100.14	100.10	103.17	100.10
1973. 7.	102.00	101.64	105.69	101.64
1973. 8.	100.40	98.772	105.10	101.72
1973. 9.	99.391	98.011	107.05	102.40
1973.10.	98.571	97.465	108.25	103.28
1973.11.	96.344	94.512	106.82	102.98
1973.12.	94.297	91.632	108.54	103.94
1974. 1.	92.329	87.663	107.95	103.36
1974. 2.	92.571	86.463	115.22	107.11
1974. 3.	92.231	84.681	118.70	107.43
1974. 4.	90.521	82.547	115.54	105.96
1974. 5.	90.834	82.868	117.04	107.61
1974. 6.	89.245	81.692	115.26	106.08
1974. 7.	87.669	79.756	114.16	103.56
1974. 8.	86.675	78.452	116.92	101.87
1974. 9.	85.405	77.601	120.75	108.87
1974.10.	84.515	76.974	116.30	109.14
1974.11.	84.279	77.274	114.58	111.87
1974.12.	83.082	77.013	113.45	109.20
1975. 1.	81.202	75.492	115.92	108.17
1975. 2.	80.049	75.064	112.58	107.56
1975. 3.	79.055	74.656	116.79	111.43
1975. 4.	77.174	73.725	112.96	110.04
1975. 5.	76.110	73.536	111.75	109.75
1975. 6.	75.650	73.798	114.39	110.15
1975. 7.	74.704	72.741	113.75	108.57
1975. 8.	73.491	71.417	110.24	104.46
1975. 9.	72.809	70.989	114.38	105.95
1975.10.	72.523	71.193	112.95	108.38
1975.11.	72.136	70.996	112.56	108.08
1975.12.	71.037	69.994	117.72	110.74

	PPESCCA	PPESCWA	REXA	REXWA
1976. 1.	70.167	69.124	124.01	117.61
1976. 2.	68.970	67.955	117.42	113.60
1976. 3.	67.131	66.004	117.33	112.30
1976. 4.	65.222	63.973	107.68	110.76
1976. 5.	64.385	62.909	103.19	107.04
1976. 6.	62.748	61.152	107.01	104.96
1976. 7.	62.156	59.945	114.73	104.68
1976. 8.	62.131	60.066	116.75	105.79
1976. 9.	61.867	59.877	119.53	109.03
1976.10.	61.827	60.024	123.47	114.67
1976.11.	61.026	59.301	123.53	113.29
1976.12.	59.915	58.290	126.26	115.71
1977. 1.	58.104	56.533	123.32	114.75
1977. 2.	56.188	54.577	119.42	115.67
1977. 3.	47.205	45.799	109.67	101.17
1977. 4.	46.441	45.202	109.16	103.90
1977. 5.	46.108	44.948	109.42	105.33
1977. 6.	45.702	44.964	103.55	104.69
1977. 7.	45.250	44.509	101.57	99.647
1977. 8.	44.977	44.229	102.36	99.020
1977. 9.	42.789	42.214	100.19	98.919
1977.10.	42.029	41.599	95.232	99.963
1977.11.	41.399	41.028	94.493	100.43
1977.12.	40.857	40.531	94.490	104.05
1978. 1.	39.987	39.585	96.343	105.17
1978. 2.	39.680	39.271	94.165	103.16
1978. 3.	38.611	38.223	91.628	101.55
1978. 4.	37.676	37.429	93.962	104.30
1978. 5.	34.906	34.693	88.952	.
1978. 6.	33.889	33.756	.	.

	POCPI	POHIG	RPNT
1973. 1.	97.885	97.015	100.90
1973. 2.	100.91	98.507	102.44
1973. 3.	100.00	100.00	100.00
1973. 4.	100.76	100.00	100.76
1973. 5.	102.72	100.00	102.72
1973. 6.	103.02	100.00	103.02
1973. 7.	103.63	100.00	103.63
1973. 8.	104.68	102.99	101.65
1973. 9.	107.70	104.48	103.09
1973.10.	109.82	105.97	103.63
1973.11.	110.88	108.96	101.76
1973.12.	115.11	113.43	101.47
1974. 1.	116.92	117.91	99.159
1974. 2.	124.47	123.88	100.48
1974. 3.	128.70	126.87	101.45
1974. 4.	127.64	128.36	99.443
1974. 5.	128.85	129.85	99.231
1974. 6.	129.15	129.85	99.463
1974. 7.	130.21	129.85	100.28
1974. 8.	134.39	129.85	103.88
1974. 9.	141.39	140.30	100.78
1974.10.	137.61	141.79	97.054
1974.11.	135.95	144.78	93.905
1974.12.	136.56	141.79	96.308
1975. 1.	142.75	143.28	99.627
1975. 2.	140.63	143.28	98.151
1975. 3.	147.73	149.25	98.982
1975. 4.	146.37	149.25	98.071
1975. 5.	146.83	149.25	98.374
1975. 6.	151.21	149.25	101.31
1975. 7.	152.27	149.25	102.02
1975. 8.	150.00	146.27	102.55
1975. 9.	157.10	149.25	105.26
1975.10.	155.74	152.24	102.30
1975.11.	156.04	152.24	102.50
1975.12.	165.71	158.21	104.74

	.POCPI	0 POHIG	0 RPNT
1976. 1.	176.74	170.15	103.87
1976. 2.	170.24	167.16	101.84
1976. 3.	174.77	170.15	102.72
1976. 4.	165.11	173.13	95.363
1976. 5.	160.27	170.15	94.195
1976. 6.	170.54	171.64	99.360
1976. 7.	184.59	174.63	105.71
1976. 8.	187.92	176.12	106.70
1976. 9.	193.20	182.09	106.10
1976.10.	199.70	191.04	104.53
1976.11.	202.42	191.04	105.95
1976.12.	210.73	198.51	106.15
1977. 1.	212.24	202.99	104.56
1977. 2.	212.54	211.94	100.28
1977. 3.	232.33	220.90	105.17
1977. 4.	235.05	229.85	102.26
1977. 5.	237.31	234.33	101.27
1977. 6.	226.59	232.84	97.316
1977. 7.	224.47	223.88	100.26
1977. 8.	228.10	223.88	101.88
1977. 9.	234.14	234.33	99.919
1977.10.	226.59	240.30	94.294
1977.11.	228.25	244.78	93.247
1977.12.	231.27	256.72	90.087
1978. 1.	240.94	265.67	90.690
1978. 2.	237.31	262.69	90.340
1978. 3.	237.31	265.67	89.325
1978. 4.	249.40	278.66	89.500

	POX	PCM	XVOL	MVOL	TOT
1973. 1.	1035.0	1125.0	85.000	150.00	92.834
1973. 2.	2145.0	2457.0	186.00	609.00	163.44
1973. 3.	3002.0	4471.0	301.00	784.00	100.00
1973. 4.	3523.0	5708.0	403.00	757.00	66.293
1973. 5.	3681.0	5377.0	421.00	1146.0	106.55
1973. 6.	4496.0	5431.0	463.00	656.00	67.068
1973. 7.	3955.0	7389.0	425.00	913.00	65.749
1973. 8.	2875.0	5897.0	259.00	1016.0	109.36
1973. 9.	4748.0	6057.0	425.00	794.00	83.730
1973.10.	3393.0	6418.0	409.00	1094.0	80.858
1973.11.	4178.0	7160.0	383.00	1310.0	114.12
1973.12.	7734.0	15693.	677.00	2089.0	86.955
1974. 1.	1489.0	1369.0	135.00	174.00	103.06
1974. 2.	3611.0	5581.0	231.00	710.00	113.71
1974. 3.	5280.0	8308.0	373.00	914.00	89.047
1974. 4.	4076.0	7540.0	499.00	881.00	54.574
1974. 5.	5128.0	9280.0	351.00	1191.0	107.42
1974. 6.	3937.0	9334.0	473.00	1135.0	64.817
1974. 7.	4460.0	8505.0	390.00	876.00	87.557
1974. 8.	3818.0	8466.0	262.00	1235.0	121.55
1974. 9.	3914.0	8465.0	349.00	1231.0	93.255
1974.10.	6282.0	12348.	483.00	1345.0	81.007
1974.11.	5542.0	9819.0	372.00	1071.0	92.916
1974.12.	9919.0	25298.	820.00	2669.0	72.973
1975. 1.	4498.0	9736.0	264.00	1021.0	101.64
1975. 2.	4411.0	9559.0	296.00	1008.0	89.854
1975. 3.	4250.0	9029.0	267.00	1061.0	109.47
1975. 4.	4314.0	9377.0	291.00	873.00	78.919
1975. 5.	3902.0	8432.0	275.00	1028.0	98.903
1975. 6.	4181.0	6755.0	312.00	1001.0	113.55
1975. 7.	4553.0	6264.0	332.00	461.00	57.710
1975. 8.	3048.0	7289.0	246.00	921.00	89.519
1975. 9.	3638.0	8339.0	312.00	1359.0	108.66
1975.10.	4649.0	10134.	326.00	1324.0	106.54
1975.11.	3924.0	7252.0	312.00	1093.0	108.39
1975.12.	3867.0	5332.0	294.00	471.00	66.436

	PCX	PCM	XVOL	MVOL	TCT
1976. 1.	4647.0	8855.0	369.00	1040.0	84.574
1976. 2.	4050.0	9119.0	327.00	1028.0	79.836
1976. 3.	4387.0	10762.	323.00	1437.0	103.94
1976. 4.	4675.0	8510.0	351.00	683.00	61.124
1976. 5.	4177.0	11262.	341.00	1336.0	83.090
1976. 6.	4420.0	9765.0	287.00	822.00	74.128
1976. 7.	5225.0	11604.	322.00	1175.0	93.952
1976. 8.	3799.0	10866.	296.00	1012.0	68.349
1976. 9.	4207.0	10172.	299.00	948.00	74.981
1976.10.	4746.0	11298.	316.00	1247.0	94.787
1976.11.	5106.0	13967.	284.00	1519.0	111.81
1976.12.	5233.0	11642.	308.00	1129.0	94.213
1977. 1.	5087.0	12825.	267.00	1273.0	108.13
1977. 2.	4991.0	10203.	235.00	738.00	87.840
1977. 3.	7003.0	15980.	309.00	1251.0	101.45
1977. 4.	6031.0	14772.	366.00	1067.0	68.058
1977. 5.	6446.0	16646.	348.00	1155.0	73.490
1977. 6.	6704.0	17626.	329.00	1432.0	94.661
1977. 7.	7267.0	16584.	300.00	1102.0	92.039
1977. 8.	4640.0	16916.	267.00	1427.0	83.826
1977. 9.	6347.0	17848.	376.00	1589.0	85.933
1977.10.	7177.0	15327.	320.00	1119.0	93.629
1977.11.	8351.0	17807.	358.00	1567.0	117.38
1977.12.	7166.0	17102.	300.00	1297.0	103.58
1978. 1.	7176.0	18924.	263.00	1770.0	145.93
1978. 2.	7142.0	15356.	297.00	1244.0	107.88
1978. 3.	8171.0	18272.	306.00	1477.0	123.42
1978. 4.	7457.0	18141.	297.00	1484.0	117.44
1978. 5.	8932.0	20478.	331.00	1640.0	123.57

	M2OD	M2IMS	POIPI	IPAS	RLTS
1973. 1.	246.76	241.11	98.795	.	7.5700
1973. 2.	253.30	246.80	98.795	.	7.8300
1973. 3.	267.03	243.51	100.00	99.197	7.6800
1973. 4.	261.06	253.88	89.157	95.984	7.1400
1973. 5.	264.69	257.22	89.157	92.771	7.5600
1973. 6.	269.38	255.68	92.771	90.361	7.6900
1973. 7.	272.24	264.13	97.590	93.173	7.6600
1973. 8.	280.30	271.04	103.61	97.992	7.9300
1973. 9.	283.52	272.23	108.43	103.21	7.7500
1973.10.	287.97	278.05	110.84	107.63	6.9400
1973.11.	295.60	284.62	102.41	107.23	7.8700
1973.12.	319.63	301.32	119.28	110.84	7.2800
1974. 1.	307.33	294.90	122.89	115.16	7.9900
1974. 2.	311.30	298.51	115.66	119.87	7.9000
1974. 3.	320.49	300.93	119.28	120.16	7.9300
1974. 4.	314.91	302.24	100.00	112.48	8.0500
1974. 5.	320.08	306.82	100.00	107.22	7.9600
1974. 6.	326.57	307.48	103.61	101.96	7.8600
1974. 7.	333.58	318.54	101.20	102.36	7.7400
1974. 8.	336.54	321.33	103.61	103.58	9.9800
1974. 9.	325.76	319.56	109.20	105.45	9.9400
1974.10.	342.06	326.60	114.80	110.02	7.9600
1974.11.	343.66	328.30	120.48	115.68	10.020
1974.12.	325.86	342.30	125.30	121.09	10.450
1975. 1.	358.88	341.40	125.30	123.56	10.210
1975. 2.	359.86	342.60	127.71	124.92	11.250
1975. 3.	366.36	341.60	120.48	122.29	11.150
1975. 4.	355.48	339.87	119.28	120.31	10.900
1975. 5.	370.81	352.66	124.10	119.13	11.120
1975. 6.	373.23	351.03	122.89	119.92	11.080
1975. 7.	382.54	362.94	124.10	121.50	10.190
1975. 8.	387.36	367.24	102.41	114.40	11.160
1975. 9.	389.03	364.56	118.07	112.82	11.120
1975.10.	393.02	372.62	122.89	112.42	11.080
1975.11.	398.98	377.84	122.89	119.13	11.110
1975.12.	418.02	385.50	119.28	119.52	11.500

	M2OD	M2IMS	POIPI	IPAS	RLTS
1976. 1.	420.26	395.84	120.48	121.93	11.500
1976. 2.	413.38	390.69	122.89	125.19	11.500
1976. 3.	425.68	389.95	124.10	130.06	12.000
1976. 4.	429.39	404.43	126.51	132.19	11.500
1976. 5.	431.53	406.57	127.71	133.90	11.500
1976. 6.	438.45	399.76	125.30	134.32	11.510
1976. 7.	448.18	420.83	122.89	133.04	11.530
1976. 8.	457.27	428.58	100.00	123.24	11.520
1976. 9.	462.98	420.56	126.51	123.66	11.920
1976.10.	468.72	438.63	126.51	124.94	12.310
1976.11.	473.01	442.50	137.35	138.16	11.730
1976.12.	.	460.72	134.94	141.15	13.080
1977. 1.	.	462.59	137.35	147.33	12.910
1977. 2.	.	469.85	140.96	151.01	13.110
1977. 3.	.	474.29	137.35	154.21	14.280
1977. 4.	.	479.12	140.96	155.55	14.250
1977. 5.	.	488.07	140.96	155.55	13.870
1977. 6.	.	501.23	143.37	157.79	13.720
1977. 7.	.	512.00	140.96	157.79	13.740
1977. 8.	.	519.14	118.07	149.30	13.490
1977. 9.	.	525.88	149.40	151.53	18.300
1977.10.	.	527.41	140.96	151.53	18.560
1977.11.	.	536.30	151.81	164.05	18.620
1977.12.	.	566.19	148.19	163.60	18.460

References

Abel, A., L.M. Beleza, J. Frankel, R. Hill and P. Krugman (1977), "A economia Portuguesa: evolucao recente e situacao actual" in Gulbenkian (1977) pp. 31-91.

Barbosa, M. (1977b), "Emigration Without Remittances: A Comment," E. Vol. 1, No. 3, October.

Beleza, L.M. (1979), Credit, Wages and Prices in a Small, Open Economy: Portugal, unpublished Ph.D. thesis, MIT.

Bilson, J. (1978a), "Rational Expectations and the Exchange Rate" in J. Frenkel and H. Johnson (1978).

_____ (1978b), "The Current Experience with Floating Exchange Rates: An Appraisal of the Monetary Approach," AER, May.

Box, G. and G. Jenkins (1970), Time Series Analysis, San Franciso: Holden Day.

_____ and D. Pierce (1970), "Distribution of Residual Autocorrelations in Auto-regressive-Integrated-Moving Average Time Series Models," JASA, 65, December.

Brillembourg, A. (1976), "Purchasing Power Parity Tests of Causality and Equilibrium," IMFDM, December.

_____ and M. Khan (1977), The RElationship Between Money, Income and Prices: Has Money Altered Historically?, unpublished IMF.

Cassel, G. (1921), The World's Monetary Problems, London: Constable.

Chaves, and Leite (1962), Indice da Producao Industrial, Lisbon: AIP.

Ciccolo, J. (1975), Four Essays on Monetary Policy, unpublished Ph.D. thesis, Yale University.

Cunha, P. Pitta (1971), "A desvalorizacao efectiva do escudo", RB, No. 26.

Dornbusch, R. (1978a), "Comment," AER, May.

_____ (1978b), Monetary Policy Under Exchange Rate Flexibility, unpublished, MIT, August.

_____ and P. Krugman (1976), "Flexible Exchange Rates in the Short Run," BPEA, 3.

Durbin, J. (1970), "An Alternative to the Bounds Test for Testing for Serial Correlation in Least-Squares Regression," Etr, Vol. 38, pp. 422-429.

Fair, R. (1970), "The Estimation of Simultaneous Equation Models with Lagged Endogenous VAriables and First Order Serially Correlated Errors, Etr, May.

Frankel, J. (1977), All About Flexible Exchange Rates, unpublished, MIT, February.

_____ (1976b), "A Monetary Approach to the Exchange Rate: Doctrinal Aspects and Empirical Evidence," SJE, Vol. 78, No. 2, May, pp. 200-224.

_____ (1978), "Purchasing Power Parity, Doctrinal Perspective and Evidence from the 1920's," JIE, Vol.8, No. 2, May, pp. 169-191.

_____ and H. Johnson, eds. (1978), The Economics of Exchange Rates, Reading (Mass.): Addison-Wesley.

Fry, M. (1976), Portuguese Monetary Problems, processed, Lisbon: BP, October.

Granger, T. (1969), "Investigating Causal Relations by Econometric Methods and Cross-Spectral Methods," Etr., Vol. 37, July.

Hirsch, F. and I, Higgins (1970), "An Indicator of Effective Exchange Rates," IMFSP, Vol. 17, No. 3, November.

Isard, P. (1977), "How Far Can We Push the 'Law of One Price'?", AER, Vol. 67, September, pp. 942-948.

Krugman, P. (1977), Essays on Flexible Exchange Rates, unpublished Ph.D. Thesis, MIT.

_____ and J. Macedo (1979), The Economic Consequences of the April 25th Revolution, unpublished, Yale, June.

Macedo, J. (1972), Unrequited Transfers in an Open Economy, unpublished, Yale, May.

_____ (1977a), "Emigration and Remittances in Neoclassical Steady State, E, Vol. 1, No. 1, January.

_____ (1977b), Interdependencia Economica, Sistema Monetario Internacional e Integracao Portuguesa, Lisbon: BFM.

_____ (1979b), Portfolio Diversification Across Currencies, unpublished, Yale, August.

_____ (1979d), Portuguese Currency Experience: an Historical Perspective, Unpublished, Yale, September.

_____ (1979e), Foreign Exchange Market Efficiency: The Case of the Portuguese Escudo Against the U.S. Dollar, unpublished, Yale, Sept.

_____ (1979g), Exchange Rates in Portugal: a Portfolio Model of an Inconvertible Currency, September.

Machlup, F. (1940), "The Theory of Foreign Exchanges," Ea, February.

Magee, S. (1978), "Contracting and Spurious Deviations from Purchasing Power Parity," in J. Frenkel and H. Johnson, eds. (1978), pp. 68-74.

McKinnon, I. (1973), Money and Capital in Economic Development, Washington: Brookings.

Myhrman, J. (1976), "Experiences of Flexible Exchange Rates in Earlier Periods: Theories, Evidence and a New View," SJE, Vol. 78, No. 2, pp. 169-195.

Officer, L. (1976), "The Purchasing-P ower-Parity Theory of Exchange Rates: A Review Article", IMFSP, Vo. 23, 1, March , pp. 1-61.

Papaefstratiou, L. (1979), "The Re-Emergence of the Purchasing Power Parity Doctrine in the 1970's," EGCDP, No. 312, May.

Pierce, D. and L. Haugh (1977), "Causality in Temporal Systems, Characterizations and a Survey," JE, 5, pp. 265-293.

Sims, C. (1972), "Money, Income and Causality," AER, Vol. 72, September.

_____ (1977), "Comment," JASA, Vol. 72, March.

Thell, H. (1971), Principles of Econometrics, New York: Wiley.