Inflationary Finance and the Demand for Money in Greece

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This paper estimates the effects of adaptive and rational-price expectations on money demand in Greece. Stability tests are performed which show that regressions with both price expectations variables are stable over the estimation period. The results of causality tests indicate a feedback relation between money creation and inflation. The regression results are used to determine the upper limit on the amount of seigniorage. The determination of maximizing seigniorage suggests that had the government not recently taken measures to curb money-supply growth, Greece was headed into a situation of accelerating inflation.

I. Introduction

Recent work on the demand for money in Greece has investigated the influence of inflationary expectations on money balances with inconclusive results. The emphasis on inflationary expectations is due to both the nature of the capital market in that country – where interest rates are administered rather than determined by market forces – and to the post-1972 acceleration of the inflation rate.[1] Studies dealing with the impact of inflationary expectations on money-demand include papers by *Brissimis* and *Leventakis* (1981), *Himarios* (1983;1984), *Panayotopoulos* (1984) und *Prodromidis* (1984). These studies have examined the relationship under a wide range of equation specifications: money balances have been defined in real as well as in nominal terms; both narrow and broad definitions of money have been used; an assortment of explanatory variables, including current income and permanent income, have been employed as additional explanatory vari-

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* I am grateful to *Martin J. Bailey* for many helpful comments. This paper was written while *George S. Tavlas* was Senior Economist, U.S. Department of State. The views expressed are the author's own and are not to be interpreted as those of the U.S. Department of State or the International Monetary Fund.

[1] Consumer-price inflation averaged about 3 percent annually in the ten years ending in 1972. In 1973, the inflation rate accelerated to 15.5 percent, from 4.3 percent in 1972. In recent years inflation has averaged over 20 percent a year, reaching 25 percent in both 1980 and 1981.

ables; partial-adjustment as well as long-run models of money demand have been estimated; and, annual and quarterly data have been used over a variety of estimation periods.[2]

Given the importance of establishing a link between the monetary and the real sectors of an economy, it is unfortunate that the results of the prior studies have been inconclusive.[3] In particular, *Brissimis* and *Leventakis* (1981), *Himarios* (1984) and *Panayotopoulos* (1984) find that in equations with $M1$ (defined in either real or nominal terms) as the dependent variable, the coefficient on inflationary expectations is either positive, or negative and insignificant. On the other hand, they find in some regressions negative and significant coefficients of inflationary expectations with respect to broad money balances (either $M2$ or $M3$). Nevertheless, the estimated semi-elasticities of inflationary expectations are small (in all cases the absolute values are less than one and in many instances less than .5) in comparison with the results of previous empirical work dealing with other countries during periods of accelerating inflation.[4]

Although several definitions of inflation have been incorporated in the studies on money demand in Greece, including changes in the GNP deflator, the GDP deflator, and the CPI, one key characteristic is shared: inflationary expectations are defined as the change in prices in the current period.[5] Yet, as *Cagen* (1956) demonstrated, inflationary expectations in an inflationary environment are formulated on the basis of past as well as current experience. Additionally, recent work on rational expectations suggests that changes in future inflation can in part be anticipated, and so might also affect money demand.

The purpose of this paper is to test for the effects of adaptively-formulated and rational price expectations on narrowly defined money-balances

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[2] Quarterly data on GNP are not available before 1975. However, *Panayotopoulos* (1984) and *Prodromidis* (1984) have constructed quarterly GNP series which begin prior to 1975. Most of the studies on money demand in Greece use estimation periods which end in the late 1970s, although Panayotopoulos includes data through 1981.

[3] As *Judd* and *Scadding* note: "A stable demand function for money means that the quantity of money is predictably related to a small set of key variables linking money to the real sector of economy" (1982, p. 993). *Laidler* (1985) surveys the empirical evidence on the demand for money in the larger industrial countries. See *Tavlas* (1981) for a doctrinal perspective on money demand.

[4] *Khan* and *Ramirez-Rojas* (1984, p. 2) summarize the existing evidence as follows: "available estimates of the inflation semi-elasticity of money demand ... range between 0.5 and 3.0".

[5] The exception is *Himarios* (1984), who uses an instrumental-variables procedure to estimate rational price expectations in some of his regressions.

in Greece. The paper is divided into six sections including this introduction. The next section describes the model and the data which are used.

Section III presents the regression results. Section IV provides results of causality tests between money creation and inflation. In Section V, the money-demand regressions are used to determine the "optimal" rate of inflation, defined as the rate that maximizes the flow of real resources that the creators of money could command by printing money. Section VI contains concluding remarks.

II. The Model and Data

The demand for real money balances in an inflationary environment is generally specified as a negative function of the expected inflation rate and a positive function of real income. The function can be written in log-linear form as follows:

$$\log(m_t) = a_0 + a_1 \dot{p}^e_t + a_2 \log(y_t) + \log e_t \tag{1}$$

where, m is the real money stock, $\dot{p}^e$ is the expected rate of change of the price level, y is real income, and e is a random error term with *Gauss-Markov* properties. In his classic study of hyperinflation, *Cagan* (1956) assumed that $\dot{p}^e$ was formed adaptively:

$$\dot{p}^e{}_t = \frac{l - \lambda}{l - \lambda L} (\log p_t - \log p_{t-l}) \tag{2}$$

where L is the lag operator, λ is the adjustment coefficient, and p is the price level.

Cagan's hypothesis of adaptive price expectations involves generating an expected inflation-rate series on the basis of an exponentially weighted average of past values of the actual inflation rate. As is well known, however, expectations formed in this manner can, in certain circumstances, lead to systematic forecasting errors. One way of dealing with this problem is to allow a more flexible lag structure. As *Laidler* has recently observed: "As in the context of measuring permanent income, so the practice of letting the data find the weights to be attached to current and past rates of inflation, instead of imposing exponentially declining weights ... goes some way to meeting these difficulties" (1985, p. 95).

This study estimates the demand for money in Greece on the basis of annual data over the period 1960 through 1982. The data used are as follows:

(1) Real money balances are measured as the narrow measure of money ($M1$) divided by the consumer price index; (2) Expected inflation is determined by regressing the actual inflation rate on a second degree, five-period polynominal distributed lag of its past values beginning with period t-1. (This value was chosen in a brief iteration as approximately the least-squares estimate.) The resulting series based on the predictions generated by the regression is used as the expected inflation variable; (3) Both current real income and permanent real income are used in the following regressions. The permanent income series was generated in precisely the same manner as the expected inflation series.

In order to test for the impact of rational price expectations, a weighted average of the actual inflation rate during periods t through $t + 1$ was used – on the assumption that the public correctly anticipates some changes in the rate of inflation not predicted by the modified *Cagan* variable.

In April 1967, a military coup-d'etat took place in Greece. Subsequently, in 1974, the military dictatorship fell from power. Each of these events could be expected to lead to a one-time shift into holdings of narrowly-defined money balances. Previous studies on money-demand in Greece have produced mixed results on the effects of these two shocks. A straight-forward manner to test for the influence of these events is to include shift-dummy variables in the money-demand equations – denoted as "1967 shift" and "1974 shift", respectively, in the following regressions.

III. Empirical Findings

The regression results are reported in Table 1. Equations (1) through (5) incorporate current real GDP as the scale variable while equations (6) through (11) include permanent income. All the equations show that income – whether specified in current-period form or in permanent form – affects real money balances with a coefficient that is greater than unity. In addition, the coefficients on the income variables are all highly significant and are robust; the coefficients range from a low of 1.38 in equation (1) to a high of 1.56 in equation (8).

The empirical findings also confirm that adaptively-formed expectations are an important influence on money-demand. In this regard, equation (1) shows the impact of adaptive expectations along with real income on the demand for money. The coefficient is negative (in accord with theoretical considerations) and significant. The magnitude of the coefficient is 1.38. This result is in line with previous work on the impact of inflationary expec-

Table 1: **Regression Results: The Demand For Money in Greece (Annual data, 1960 - 82) (All Continuous Variables are in Logarithms)**

Equations	Dependent Variable	Constant	Real GDP	Permanent GDP	Expected Inflation	Future Inflation	1967 Shift Dummy	1974 Shift Dummy	Rho	$\bar{R}^2$	DW	SER	Chow-Stat
(1)	Ml/CPI	−8.78	1.38		−1.38					.981	1.12	.0669	3.33 (3.20)
		(23.6)	(24.2)		(4.3)								
(2)	Ml/CPI	−8.94	1.40			−1.21				.974	0.63	.0773	6.03 (3.20)
		(16.6)	(17.1)			(2.9)							
(3)	Ml/CPI	−9.20	1.44		−1.11	−0.58				.982	1.00	.0652	2.32 (3.06)
		(19.9)	(20.4)		(3.0)	(1.4)							
(4)	Ml/CPI	−8.82	1.38		−1.38		0.14	0.08		.984	1.55	.0598	1.45 (3.03)
		(26.4)	(27.3)		(4.7)		(2.3)	(1.4)					
(5)	Ml/CPI	−9.28	1.45		−1.08	−0.68	0.12	0.12		.986	1.52	.0568	0.85 (3.10)
		(22.4)	(22.9)		(3.3)	(1.7)	(1.9)	(2.0)					
(6)	Ml/CPI	−9.24		1.45	−1.89					.978	1.28	.0714	3.93 (3.20)
		(22.1)		(22.8)	(5.2)								
(7)	Ml/CPI	−9.48		1.48		−1.69				.967	0.73	.0869	7.70 (3.20)
		(14.6)		(15.1)		(3.4)							
(8)	Ml/CPI	−9.96		1.56	−1.51	−0.93				.982	1.15	.0690	2.31 (3.06)
		(19.9)		(20.4)	(4.1)	(2.2)							
(9)	Ml/CPI	−9.24		1.45	−1.86		0.11			.973	1.33	.0690	3.06 (3.06)
		(22.1)		(23.6)	(5.3)		(1.6)						
(10)	Ml/CPI	−9.88		1.55	−1.55	−0.81	0.08			.982	1.17	.0649	2.12 (3.03)
		(19.7)		(20.1)	(4.2)	(1.9)	(1.1)						
(11)	Ml/CPI	−9.66		1.51	−1.14	−0.92	0.06		0.52	.984	1.81	.0605	1.32 (3.10)
		(13.2)		(13.2)	(2.7)	(2.0)	(1.1)		(2.3)				

Notes: (1) Ml = Narrow money stock. (2) Expected Inflation is a second-degree five-period polynominal distributed lag on previous inflation rates beginning with $t - 1$. (3) Future Inflation is a weighted average of inflation rates in periods t and $t + 1$. (4) Numbers in parentheses under coefficients are t-ratios. (5) Numbers in parentheses after Chow statistics are the critical values of 95% significance.

Source: IMF International Financial Statistics.

tations on money demand in an inflationary environment, which find coefficients in the range from $-.5$ to -3 (e.g., *Bailey* and *Tavlas* (1985); *Kahn* (1980); *Kahn* and *Knight* (1982); and *Sargent* (1977)). The incorporation of rational expectations – "Future Inflation" in Table 1 – in lieu of adaptive expectations again produces a negative and significant coefficient (equation (2)). However, the statistical properties of the equation deteriorate markedly (compare equation (2) with equation (1).) Equation (3) reports the inclusion of both adaptive and rational expectations in the same regression equation along with real income. The adaptive term is dominant and significant while the rational expectations variable is only marginally significant. While equation (3) produces a slight improvement in the explained variance ($\bar{R}^2$) and standard error of the regression (SER) compared to equation (1), the *Durbin-Watson* (DW) statistic falls off.

Equations (4) and (5) relate the effects of the 1967 and 1974 shift-dummy variables on money-demand equations which include real income and price expectations as explanatory variables. Equation (4) adds the two dummy variables to the specification of equation (1), which included real income and adaptive price expectations. Both dummy variables have positive coefficients, and both are significant (although marginally significant in the case of the 1974 shift-dummy). Note that the values of the coefficients on both real income and adaptive expectations in equation (4) are identical to their respective values in equation (1). Nevertheless, equation (4) performs better in terms of the statistical criteria, with a particularly noticeable improvement in the DW statistic. Also, while the coefficients on real income and adaptive expectations in equation (4) are equal to their respective values in equation (1), the t-ratios in the former equation are higher. The implication of this result is that omitted-variable-bias exists in equation (1). This inference is reinforced by the higher DW statistic in (4). Finally, equation (5) adds the two dummy intercept variables to the specification in equation (3), which included both price expectations variables. Once again, equation (5) shows higher t-ratios on the previously included explanatory variables and a marked improvement in the DW statistic.

The same observations largely apply to equations (6) through (10) which include permanent income as the scale variable. However, the coefficients on both price-expectations terms were somewhat higher in the second set of regressions. This result holds in those equations which include only one of the price-expectations terms (compare equation (6) with equation (1), and equation (7) with equation (2)) as well as when both expectation variables appear together (e.g. equation (8) versus (3)). Additionally, the 1974 shift-dummy variable was insignificant in the equations with permanent income and so was not retained. (Indeed, the 1967 shift-dummy was only marginally significant.) The inclusion of both price-expectations terms along with the shift-dummy – equation (10) – produces a high explained variance but a low DW statistic (compare with equation (5)). Accordingly, a first-order autocorrelation correction was performed on the specification given in equation (10). The resultant regression is given as equation (11) in Table 1.

An important result is that equations which include both adaptive and rational price expectations as explanatory variables perfom quite satisfactorily. Adaptive price expectations outperform rational expectations, but the latter generally improve the explanatory power of regressions which already include adaptive expectations. The sum of the coefficients of the regressions which include both price expectations variables ranges from -1.69 (equation (3)) to -2.44 (equation (8)).

Previous studies which have dealt with the question of stability of the Greek demand for money have found that it is unstable.[6] These studies have split their estimation periods between a period of relative price stability – i.e., up to 1972 – and one of relatively high inflation – i.e., 1973 and after.

In order to address the question of stability, the *Chow* test was applied to the regressions reported in this paper. In line with the spirit of previous studies, the observation period was split into the following sub-intervals: 1960 - 72 and 1973 - 82. The results are contained in Table 1. The results indicate instability at the 5 percent level in those equations which include only one of the price-expectation terms – in addition to the scale variable – as regressors (equations (1), (2), (6), and (7)). In all of the other equations, the Chow technique indicates that the demand for money in Greece has been stable. Indeed, the stability results confirm that both adaptive and rational price expectations should be included as explanatory variables in the money-demand equations.

IV. Money and Prices: Results of Causality Tests

One implication of a stable demand function for money is that excessive money-creation "causes" inflation. Nevertheless, in evaluating the relationship between money-creation and inflation, it may be that money-creation reacts endogenously to inflation. Accordingly, it is important to investigate

[6] *Brissimis* and *Leventakis* (1981) use *Chow's* method to test for stability while *Prodromidis* (1984) uses a procedure due to *Goldberger* (described in *Kmenta* (1971, pp. 370 - 371)). *Panayotopoulos* (1984) reaches the conclusion of instability based on casual observation of regression coefficients in different sub-periods.

whether the series on money-creation is econometrically exogenous to the series on inflation.

Both *Granger* (1969) and *Sims* (1972) have described the statistical theory that can be used to construct tests of causal patterns within a bivariate system. Granger defines "simple causality" such that "x causes y" if knowledge of past x reduces the variance of the errors in forecasting y beyond the variance of the errors which would be made from knowledge of past y alone. If y is related to lagged x, x is "exogenous" to y. If x causes y and y causes x, then there is feedback between the variables. If y does not cause x and x does not cause y, the two series are said to be unrelated.

Sims proposed an alternative method of testing for causality. According to Sims x causes y if, in the two-sided distributed-lag regression of x on y, the leading values of y have regression coefficients significantly different from zero as a group. Likewise, y causes x if in the two-sided distributed-lag regression of y on x, the leading values of x have regression coefficients significantly different from zero. Since the Sims test requires estimating two-sided lag distributions between two variables, and then running F-tests on the group significance of leading values of the independent variables, it is necessary to pay attention to generating an uncorrelated error structure. This requirement exists because F-tests in general are highly sensitive to the presence of autocorrelated residuals. In addition, the *Granger* and *Sims* tests require a priori specification on the length of the lag distribution on the lagging values of the independent variables (in case of Granger) and of the leading and lagging values of the independent variables (in the case of Sims).

The results of the *Granger* and *Sims* tests of the relationship between money-creation, $\dot{m}$, and inflation, $\dot{p}$, are reported in Table 2. The tests were performed with quarterly data over the interval 1960 - 82. Quarterly data were used since the validity of these procedures increases with the addition of more degrees of freedom. For the Granger test, six own-lagged terms and six lagged terms of the alternative variable were chosen. For the Sims procedure, the number of past lags used was six while the number of future lags used was four. In addition, for the Sims test a second-order autoregressive correction for the residuals was performed in order to attain stationarity.

The critical value of the F-statistic with 6 and 78 degrees of freedom for the *Granger* test is 2.217 (at the 99 percent confidence interval). The F-statistic for the hypothesis that money creation causes inflation in 2.957 (Table 2). The corresponding F-statistic for the hypothesis that inflation causes money creation in 2.907. Hence, the results of the Granger procedure

Table 2: **Money Creation and Inflation in Greece: Causality Results**

Granger Causality

Dependent Variable	Constant	$\dot{p}_{-1}$	$\dot{p}_{-2}$	$\dot{p}_{-3}$	$\dot{p}_{-4}$	$\dot{p}_{-5}$	$\dot{p}_{-6}$	Time	$\dot{m}_{-1}$	$\dot{m}_{-2}$	$\dot{m}_{-3}$	$\dot{m}_{-4}$	$\dot{m}_{-5}$	$\dot{m}_{-6}$	R^2	DW	SER
$\dot{p}$	−0.004	0.32	0.11	−0.20	0.59	−0.36	−0.07	0.0004							.637	1.97	.0163
	(1.2)	(3.0)	(1.0)	(2.2)	(6.6)	(3.3)	(0.6)	(3.2)									
$\dot{p}$	−0.229	0.24	0.13	−0.15	0.33	−0.26	−0.07	0.0004	0.04	0.11	0.09	0.12	0.11	0.10	.681	1.87	.0153
	(3.2)	(2.1)	(1.1)	(1.3)	(2.8)	(2.2)	(0.6)	(3.5)	(0.9)	(2.3)	(1.6)	(2.3)	(2.3)	(2.4)			
$\dot{m}$	0.054							0.0003	−0.70	−0.37	−0.33	0.45	0.23	−0.02	.638	2.02	.0475
	(2.9)							(1.5)	(6.5)	(2.8)	(2.5)	(3.4)	(1.7)	(0.1)			
$\dot{m}$	0.052	−0.99	0.81	0.02	0.31	0.13	0.01	0.0001	−0.59	−0.34	−0.16	0.32	0.23	−0.07	.681	2.01	.0446
	(2.5)	(3.0)	(2.3)	(0.4)	(0.9)	(0.4)	(0.00)	(0.4)	(5.2)	(2.5)	(1.1)	(2.1)	(1.7)	(0.6)			

Critical F value with 6 and 78 degrees of freedom = 2.217. F value for $\dot{m} \rightarrow \dot{p}$ = 2.957. F value for $\dot{p} \rightarrow \dot{m}$ = 2.907.

Sims Causality

Dependent Variable	Constant	$\dot{p}$	$\dot{p}_{-1}$	$\dot{p}_{-2}$	$\dot{p}_{-3}$	$\dot{p}_{-4}$	$\dot{p}_{-5}$	$\dot{p}_{-6}$	Time	$\dot{p}_{+1}$	$\dot{p}_{+2}$	$\dot{p}_{+3}$	$\dot{p}_{+4}$	R^2	DW	SER
$\dot{m}$	0.057	0.56	−1.95	1.96	0.17	−0.83	0.10	0.23	0.0002					.502	2.28	.0482
	(4.6)	(1.7)	(4.5)	(5.2)	(0.5)	(2.1)	(0.8)	(0.7)	(0.4)							
$\dot{m}$	0.067	0.49	1.08	1.42	0.32	−0.44	−0.35	0.33	−0.0004	0.18	0.85	−0.42	0.30	.583	2.30	.0410
	(5.9)	(1.1)	(2.4)	(3.2)	(0.8)	(1.1)	(0.8)	(1.0)	(0.9)	(0.4)	(2.2)	(1.0)	(1.0)			

Dependent Variable	Constant	$\dot{m}$	$\dot{m}_{-1}$	$\dot{m}_{-2}$	$\dot{m}_{-3}$	$\dot{m}_{-4}$	$\dot{m}_{-5}$	$\dot{m}_{-6}$	Time	$\dot{m}_{+1}$	$\dot{m}_{+2}$	$\dot{m}_{+3}$	$\dot{m}_{+4}$	R^2	DW	SER
$\dot{p}$	−0.020	0.08	0.08	0.17	0.10	0.11	0.10	1.56	0.0003					.610	2.03	.0155
	(3.5)	(2.2)	(1.5)	(2.7)	(1.6)	(1.9)	(2.0)	(3.9)	(4.3)							
$\dot{p}$	−0.021	−0.01	0.04	0.14	0.13	0.16	0.11	0.11	0.0004	0.03	0.03	0.08	−0.04	.651	2.08	.0146
	(3.1)	(0.1)	(0.5)	(2.1)	(2.0)	(2.7)	(2.0)	(2.7)	(4.5)	(0.9)	(0.6)	(1.3)	(0.7)			

Critical F value with 4 and 77 degrees of freedom = 2.490. F value for $\dot{m} \rightarrow \dot{p}$ = 10.38. F value for $\dot{p} \rightarrow \dot{m}$ = 4.839.

Notes: (1) $\dot{p}$ = *inflation rate as measured by the change in the CPI;* $\dot{p} = \log(p) - \log(p_{-1})$. (2) $\dot{m} = \log(m) - \log(m_{-1})$. (3) Sample period: 1960: 1 − 1982: 4. (4) Numbers in parantheses are t-ratios.

indicate that, in Greece, over the period 1960 - 82, the causal relation between money creation and inflation has run in both directions.

The results of the *Sims* procedure (Table 2) confirm this result. The critical value of the F-statistic with 4 and 77 degrees of freedom is 2.490. The F-statistic for the hypothesis that money creation causes inflation is 10.38. The F-statistic for the hypothesis that inflation causes money creation is 4.839. While the results of the Sims procedure indicate a feedback relation between the two series under investigation, the Sims results also suggest that causality has run more reliably from money creation to prices.

V. Implicationf for Inflationary Finance

As is well known, money creation is a source of revenue to the government (*Bailey* (1956); *Friedman* (1971)). In the steady-state, the revenue from inflation is equal to the stock of real money balances (the tax base) times the rate of growth of the nominal money stock (the tax rate). As in the case of other taxes, there is a revenue-maximizing equilibrium rate of monetary expansion, and attempts to inflate at higher rates will lead to a decline in total revenues.

The revenue-maximizing amount of seigniorage in a steady-state is determined by the demand function for money. If government revenue exceeds this amount, it creates a dynamically unstable relationship between actual and expected inflation. Inflation will accelerate without limit until the monetary system breaks down. Taking into account the non-inflationary seigniorage possible due to the normal growth of real income, the ratio of total seigniorage, S, to GDP can be written

$$S/Y = (\dot{p} + \dot{y}) \frac{M}{Y} \tag{3}$$

where $\dot{y}$ is the rate of growth of real GDP, $\dot{p}$ is the inflation rate, and Y is nominal GDP. When the demand for money is of the form of equation (1), maximizing S/Y implies the rate of inflation (steady-state) $\dot{p}^*$ of

$$\dot{p}^* = \frac{1}{a_1} - y \tag{4}$$

with corresponding money growth $\dot{M}^*$ of $\dot{p}^* + \dot{y} = \dfrac{1}{a_1}$. The resulting maximum seigniorage $(S/Y)^*$ works out as $\dot{M}^*$ $(M/Y)^*$, with the latter term evaluated at $\dot{p}^*$. With an estimated value of a_1 of approximately 2 in Table 1, and with the income elasticity of real money balances of about 1.5, the implied M/Y turns out to be .10, and we have:[7]

$$(S/Y)^* = \frac{.10}{2} = .050 \,. \tag{5}$$

That is, the revenue-maximizing seigniorage (including the part taken by the banking system) is about 5 percent of nominal GDP.

Actual seigniorage in Greece increased throughout the 1970s and reached a peak of 3.4 percent of nominal GDP in 1981. The government has subsequently taken measures to decelerate money-supply growth in Greece. As a result, seigniorage fell to 3.2 percent of nominal GDP in 1982 and to 2.2 percent of nominal GDP in 1983. Had the government not introduced restrictive measures, the inference drawn from the money-demand regressions is that Greece was headed into a situation of accelerating inflation.

VI. Concluding Remarks

This paper has presented results on the determinants of the demand for narrowly-defined money balances in Greece. In contrast to the findings of previous studies, which define adaptive-price expectations as equal to the current rate of inflation, a modified-*Cagan* formulation of adaptive-price expectations has been found to be an important determinant of money demand. Rational-price expectations do not perform so satisfactorily although they improve the statistical performances of regressions which already include adaptive-price expectations. Further, regressions which include both adaptive and rational-price expectations have been found to be stable over a time interval which includes periods of both low and stable inflation, and high and accelerating inflation.

Causality testing indicates a feedback relationship between money-creation and inflation in Greece. The money-demand equations were used to determine the upper limit on the amount of seigniorage. The determination of maximizing seigniorage suggests that had the government not taken measures to curb money-supply growth, Greece was headed into a situation of accelerating inflation.

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[7] The derivation of the implied M/Y and of the foregoing equations is contained in *Bailey* and *Tavlas* (1984). This paper is available upon request.

DOI https://doi.org/10.3790/ccm.20.2.245 | Generated on 2025-12-18 13:37:16

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Zusammenfassung

Inflationsfinanzierung und Geldnachfrage in Griechenland

In diesem Aufsatz werden die Auswirkungen adaptiver und rationaler Preiserwartungen auf die Geldnachfrage in Griechenland geschätzt. Im Gegensatz zu den Ergebnissen früherer Untersuchungen, in denen adaptive Preiserwartungen der laufenden Inflationsrate gleichgesetzt werden, wurde hier eine modifizierte *Cagan*-Formulierung adaptiver Preiserwartungen herausgefunden, die eine wichtige Determinante der Geldnachfrage darstellt. Die durchgeführten Stabilitätstests zeigen, daß Regressionen mit beiden Preiserwartungsvariablen über die Schätzperiode stabil sind. Die Resultate von *Granger*- und *Sims*-Kausalitätstests deuten auf eine Rückkoppelungsbeziehung zwischen Geldschöpfung und Inflation hin. Jedoch weisen die Ergebnisse nach dem Sims-Test darauf hin, daß die Kausalität verläßlicher von der Geldschöpfung in Richtung auf die Preise wirkt. Die Regressionsresultate werden benutzt, um eine obere Grenze für die Einnahmen aus Inflationsfinanzierung festzulegen. Die Feststellung der Obergrenze für die maximalen Einnahmen aus Inflationsfinanzierung legt nahe, daß Griechenland 1982 und 1983 in eine akzelerierende Inflation geraten wäre, hätte die Regierung keine Maßnahmen ergriffen, um das Geldmengenwachstum zu drosseln.

Summary

Inflationary Finance and the Demand for Money in Greece

This paper estimates the effects of adaptive and rational-price expectations on money demand in Greece. In contrast to the findings of previous studies, which define adaptive price expectations as equal to the current rate of inflation, a modified-*Cagan* formulation of adaptive-price expectations has been found to be an important determinant of money demand. Stability tests are performed which show that regressions with both price-expectations variables are stable over the estimation period. The results of *Granger* and *Sims* causality tests indicate a feedback relation between money creation and inflation. However, the Sims results suggest that causality has run more reliably from money creation to prices. The regression results are used to determine the upper limit on the amount of seigniorage. The determination of maximizing seigniorage suggests that, had the Government not taken measures in 1982 and 1983 to curb money supply growth, Greece was headed into a situation of accelerating inflation.

Résumé

Finance inflationniste et la demande de monnaie en Grèce

L'auteur estime les impacts d'attentes de prix adaptables et rationnelles sur la demande de monnaie en Grèce. A l'encontre des résultats d'études précédentes, qui définissent les attentes de prix adaptables égales au taux d'inflation courant, une formulation modifiée de *Cagan* des attentes de prix adaptables a été considérée comme déterminant important de la demande de monnaie. Les résultats de tests de stabilité montrent que les régressions avec les deux attentes de prix sont stables au cours de la période estimée. Les tests de causalité de *Granger* et *Sims* indiquent qu'il y a une relation rétroactive entre création de monnaie et inflation. D'après les résultats de Sims, cependant, on peut davantage se fier à la causalité allant de la création de monnaie vers les prix. Les résultats de la régression sont utilisés pour déterminer la limite supérieure du montant de droit de frappe. Si le gouvernement n'avait pas pris des mesures en 1982 et 1983 pour freiner la croissance de l'offre monétaire, l'inflation en Grèce se serait accélérée fortement.