CHAPTER 7

CAUSAL RELATIONSHIPS BETWEEN MONEY AND INCOME
IN THE SPANISH ECONOMY

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1. INTRODUCTION

An important issue in empirical macroeconomics is to determine whether or not changes in the money supply affect the real sector variables. Different models have been proposed, based on alternative sets of assumptions, and in which the absence or presence of money illusion plays an important role in determining the type of relationships between nominal and real variables.

We find a first class model in which, assuming perfect information and market clearing assumptions, there is no sign of money illusion, and in which the variations in some nominal variables only affect other nominal variables but have no effect on real variables.

A second class of model assumes market clearing and rationally formed expectations. An important implication in these models is that only unanticipated movements in the money supply affect the level of economic activity. Predicted movements in the money supply will produce no movement in real output, since they do not affect the typical supplier's view of his relative price. The unanticipated changes in money supply, by their very nature, are random and therefore the authorities cannot use monetary policy to reduce the fluctuations in output. There is a non-controllable money illusion and no monetary policy can have any systematic impact upon the level of real output.

Finally, there is a third class of model in which an assumption of sticky prices is incorporated with rational or other types of expectation schemes and in which money illusion appears. In these models both anticipated, as well as unanticipated, money changes affect real output and a monetary policy can be...
drawn in order to control the fluctuations in output.

What is more relevant from our point of view is that all these alternatives formulate different empirical relationships between real and nominal variables, in particular between real National Income and Money Supply.

In a series of papers, Barro (1977, 1978), Barro and Rush (1980), Leiderman (1980) and Rush (1986) presented empirical evidence supporting the hypothesis that derivations of output from its natural rate are affected only by unanticipated monetary changes, these being defined as the residuals of the relation which account for the money supply behaviour.

Following an alternative procedure, Mishkin (1982a, 1982b) and Gordon (1982), find support for the alternative proposition that there is some short term influence of anticipated money growth on output.

In this paper, following an alternative approach outlined in McGee and Stasiak (1985), we consider a bivariate vector autoregressive model for real output and money supply. Then, using some concepts from what we might call the "causality literature", we design a new test procedure and we apply it to quarterly data from the Spanish economy.

The paper is organised as follows: in Section 2 we present the model and the definition and tests of causality, making reference to some works in which the relation between income and money supply is analysed using causality concepts. Section 3 summarises the econometric model selection process used. Section 4 presents the empirical results for the Spanish economy. The last section highlights some of the results and conclusions and also presents some suggestions for future research.

2. MODEL AND DEFINITION OF CAUSALITY
Granger (1969) has proposed a definition of "causality" in econometric systems which has frequently been applied in empirical work. Briefly, a time series \( \{x_t\} \) is said to "cause" another time series \( \{y_t\} \) if past values of \( x \) are useful for predicting \( y_t \) when the past values of \( y \) have been taken into account. The definition is symmetric for \( y \) causing \( x \), and feedback is said to exist if causality is present in both directions. In what follows, we shall assume that the domain of relevant information is restricted to past values of \( x \) and \( y \), \( x \) and \( y \) are jointly covariance stationary time series with autoregressive representation, and the set of predictors is constrained to be linear in past \( x \) and \( y \).

Consider the following bivariate vector autoregressive model: