The demand for money in a controlled developing economy: the case of Algeria

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THE DEMAND FOR MONEY IN A CONTROLLED DEVELOPING ECONOMY: THE CASE OF ALGERIA

by

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Submitted in partial fulfilment of the requirements for the award of a Master of Philosophy of the Loughborough University of Technology

April 1988

Supervisor: Professor J R Presley

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To my mother who has sacrificed
a lot in life for our happiness
This study has given me the privilege to meet and to learn from people who are experts in their fields and to whom I am very grateful.

In this context I would like to express my sincere gratitude to Professor J.R. Presley for his patience, encouragement and skilful guidance throughout the course of this research. I am indebted to him for giving me the opportunity to learn more about Economics and about my own country. I also wish to thank L. Drake of Loughborough University Banking Centre for his valuable comments and advice on the econometric chapter.

I would like to thank the Institute of Economics of Algiers University (Algeria) for recommending me for the national scholarship and the Ministry of Higher Education as well as the National Commission in Algeria for selecting me.

To complete my work, I had to travel several times to Algeria to interview many economists, bankers, managers and administrators at different levels of the hierarchy. I am very grateful to them for their cooperation, help and advice.

Finally I would like to thank Janet Smith for her dexterous typing.
This thesis is a study of the demand for money in an environment where both the economic control of the state and the economic development process have an important impact on the behaviour of the economic agents. This work seeks, by defining the determinants of the monetary demand function, to determine a demand relationship which would reflect the impact of these two elements on the monetary behaviour of individuals. This study, which is sustained by an econometric investigation, focuses attention on the Algerian economic environment.
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1.1 THE PROBLEM

To overturn the economic structure inherited from French colonization, the Algerian government had adopted from 1967 to 1977 an ambitious development programme which sought to industrialise rapidly the Algerian economy. This strategy was based on the principle of giving priority to investment over consumption, and heavy industry and hydrocarbons over light industry and agriculture. To realise such a programme, the state had been committed to play a central role in the economy. To achieve this, it used both a central planning system to define the economic targets to be reached and its strict control over the whole economy to induce the economic agents to follow the development pattern desired. This development process had to be financed mainly by the incomes derived from hydrocarbons and monetary creation, although foreign borrowing has played a substantial role.

However the rigid, highly-centralised, bureaucratic organisation of the economy generated various inefficiencies, evident in bottlenecks, shortages, huge enterprise deficits etc, which began to be a burden for the blossoming of the Algerian economy. The importance of these inefficiencies led the government to undertake from 1980 a major programme of adjustments. These adjustment policies seek to introduce more efficiency, autonomy and competition into the system.

In the monetary sector, it is thought that this development strategy, the structure of the economy and the inefficiencies have exerted a considerable influence on the demand for money. Therefore the problem treated in this thesis is the determination of the nature of the demand relationship for real cash balances in this
controlled developing economy through the definition of the determinants of this relationship.

Algeria, like many developing economies, has no stock exchange and her money markets are rather underdeveloped. Moreover, the range of financial assets available is very limited and interest rates are strictly controlled. Under these conditions, the quantity theory appears a more appropriate theoretical approach to analyse money demand than the liquidity preference approach in which the interest rate has a central role. Hence the econometric study of the demand for money in Algeria, which takes into consideration the effect of expectations on money holdings, does not include the interest rate.

1.2 ORGANISATION OF THE THESIS

Besides the introduction (Chapter I), this thesis has been organised into four (4) chapters. Chapter II, which deals with the literature survey, has been divided into two parts. Part One is an outline of the conventional approach to the quantity theory through the works of Fisher, Marshall, Pigou and Friedman. Part Two is a survey of more sophisticated approaches to the demand for money. The chosen works concern mainly the developing economies. The purpose of this chapter is to lay down the theoretical underpinnings upon which this thesis is based and to derive a guideline to follow in studying the demand for money in the Algerian economic environment. Chapters III and IV deal with the Algerian economy. Chapter III is an analysis of the real sector, with the objective of pinpointing the economic factors that might influence money holdings in this country. The study of the real sector is conducted through a brief review of the socio-economic situation during the colonization era, a study of the development strategy and the adjustment policies adopted since 1980. The monetary sector is examined in Chapter IV. This examines the repercussions of the financial reforms of 1971 on the financial operators (Central Bank, commercial banks and savers). It tries also to point out the difficulties encountered by Algerian individuals in escaping the rigid financial structures within which
they have to operate in the organised monetary market and the foreign sector. Finally, Chapter V is devoted to an econometric study of the demand for money and the economic interpretation of the statistical results.
CHAPTER II

THE CONVENTIONAL, MODERN AND EMPIRICAL APPROACH TO THE
DEMAND FOR MONEY

In this chapter the theoretical and empirical base upon which the study of the monetary sector of Algeria can proceed is established. In the first part the conventional approach to the demand for money is outlined; this embraces the early work of Fisher, the quantity theory approach, the focus of the Cambridge approach upon the demand for money and the modern version of the quantity theory found in the work of Milton Friedman.

However in order to present an empirical approach to the Algerian economy, the second part of this chapter focuses upon the increasing sophisticated empirical means of investigation, particularly insofar as it has been applied in the developing economies.

A. THE CONVENTIONAL APPROACH

2A.1 THE FISHER APPROACH

The quantity theory of money has its origins in the Fisher Equation of exchange. This approach is based on the role of money as a vehicle used in the transactions process and thus on its function as a means of exchange. This version of the quantity theory, which is known as the transactions approach, expresses a relationship within which the goods side and the monetary side of a given economy are brought together. This relationship asserts that, since each commercial transaction involves a buyer and a seller, the aggregate value of sales must be equal to the aggregate value of purchase at the end of the exchange process (ex post). The aggregate value of sales has been defined as the volume of transactions conducted during a given period of time multiplied by the average price at which they are settled. The aggregate value of purchase is assumed
to be represented by the amount of money in circulation multiplied by the average number of times a unit of money changes hands over the same period.

The mathematical interpretation of this concept yields the following identity:

\[ M \cdot V = P \cdot T \]

where \( M \) stands for the amount of money supplied, \( V \) stands for the transaction velocity, which is defined as the number of times a unit of money changes hands during the period examined, \( P \) represents the price level and \( T \) the transaction volume. In the perspective of this approach, the right hand side of this identity represents a perpetual process that generates a flow of destructible goods and services. In the left hand side, money is conceived as a stock, for it is assumed that each unit of money is able to preserve its identity.

To determine the factors that affect the amount of money needed to settle a given volume of transactions, Fisher studied the elements which influence the behaviour of the transactions velocity.

According to this theorist, elements such as the level of sophistication of business practices, the use of monetary facilities and the state of communications have a great influence on money holdings of individuals and thus on the velocity of circulation.

However this institutional effect on the velocity of circulation is dependent on the length of the period considered. It is agreed that such institutional effects are only visible in the long term. Thus, in a short period of time, the transactions velocity might be considered as constant. Moreover, the analysis of Fisher of the determinants of the transactions volume has shown that this variable might be, as well, assumed to be constant over a short time period.
The determination of the factors which influence both the transactions velocity and the transactions volume has allowed quantity theorists to neutralize the effect of the variations of the amount of money supplied on these two elements \((V, T)\) of the identity when the period studied is relatively short.

This neutralization has allowed quantity theorists to derive the relationship between the terms of this identity and through it the role of money. It is the variations of the stock of money that generate changes in the left hand side of the identity and, in turn, provokes proportional changes in the price level, to induce an adjustment in the right hand side to keep the identity undisrupted.

2A.2 THE CAMBRIDGE EQUATION

The Cambridge equation, which has been refined by Marshall and his disciples, is another version of the quantity theory. In this alternative approach, the problem does not concern the study of the causes of the amount of money that is needed by an economic agent to conduct and settle a given volume of transactions, but an analysis of the factors which determine the amount of money he or she would desire to hold.

With the development of this perspective, the transactions velocity approach has yielded ground to the cash balances approach and consequently to the concept of demand for money.

Since the concept of demand for money has been involved, the notion of preferences has been put at the heart of the matter and the theoretical framework has been built upon factors such as the wealth constraint, opportunity cost and the tastes of individuals. The tastes of individuals are involved because money is an asset that provides its holder with some conveniences, such as means of exchange, store of value and unit of account, that other assets do not provide. Consequently, the more transactions a person has to conduct the greater the desire to hold money. This desire to hold
money has no limit. However its fulfilment is subject to the wealth of the holder. That is liquid balances cannot exceed his or her wealth. Moreover, the existence of other assets, which provide other advantages that money cannot provide, induces the economic unit to limit money holdings to the required volume within a combination of cash balances and alternative assets, that constitute its portfolio, to avoid future income losses by not holding alternative assets.

Therefore, the demand for money, according to this alternative approach to the quantity theory of money, is dependent on the total wealth of the individual and the opportunity cost of holding money; the opportunity cost is the income foregone by not holding other assets, in addition to the volume of transactions that a person is going to settle.

The mathematical formulation of the Cambridge approach to the theory of money is a reduced expression derived from a system of three equations. The first one, which is a function of nominal cash balances, is represented by \( M^d = kpy \). The second equation is a function representing the supply of money: \( M^s = M^s \), which is considered to be exogeneous to the system. Finally, the third equation, which expresses the condition of equilibrium, states that in equilibrium the demand for money must be equal to its supply: \( M^s = M^d \).

The substitution of the demand function (function of nominal cash balances) and that of the supply of money in the equilibrium conditions yields the following mathematical expression of the Cambridge approach:

\[
M^s = kpy
\]

where \( (M^s) \) is the quantity of money exogoneously supplied, \((P)\) is the price level, \((y)\) is the real resources variables (national
income, stock of wealth, etc) and (k) is a fixed proportion of (y), which depends, according to this version of the quantity theory, on the tastes and preferences of the individuals.

Although the cash balances hypothesis appears to be different from the transaction velocity approach, these theories have a common denominator, which might be derived by manipulation of the above equation.

Indeed, if the Cambridge equation is divided through by the price level variable (P) the following equation is obtained:

\[ \frac{\overline{M^s}}{P} = kY \]

which indicates that the value of money or the purchasing power of money is a proportion (k) of real resources (y). This proportion represents the amount of total resources held in the form of money (ky) that the individuals wish to hold in the form of purchasing power (\( \frac{\overline{M^s}}{P} \)).

Moreover, if it is assumed that real resources (y) are at full employment and that (k) is given, it might be seen, from the above equation of purchasing power of money, that when the quantity of money supplied changes the price level changes in the same proportion to keep the amount of desired real resources (ky) at the same level. In other words, it is the change in the stock of money which provokes, like in the transactions approach to the quantity theory, a proportional change of the price level. Furthermore, the manipulation of the mathematical expressions of both approaches shows that (k) is not more than the inverse of the income velocity (V).
2A.3 THE REAL CASH BALANCE EFFECT OR THE PIGOU EFFECT

Concerned by the Keynesian thesis of equilibrium with unemployment, Neo classical theorists developed a theory in which consumption is treated as a function of real wealth. The elaboration of this hypothesis, which is known as the Pigou effect or the real cash balance effect, has contributed to the revival of the quantity theory and the spread of monetarism after the Keynesian revolution.

This theory, which establishes a direct relationship between net financial wealth of the economic agents and aggregate consumption, shows that "saving varies inversely (and therefore consumption varies directly) with the current net real value of financial wealth held by individuals" [1]. Indeed in an economy, which is assumed to be at full employment, an augmentation of the stock of money induces a rise in the nominal value of the cash balances which generates an increase of the real value of these money balances which in turn provokes an increase of the demand for commodities and through it a rise of the price level. The rise of the price level reduces the real values of both past savings and money balances. This will lead to a change in the consumption pattern to provoke an increase of savings. Moreover, if it is assumed that the prices and wages are completely flexible, the increase of the price level will be equiproportionate to the augmentation of the nominal stock of money.

Therefore the development of such an hypothesis has permitted not only the confirmation of the conclusions of the quantity theory, which advocate the neutrality of money and which state that the price level varies positively and proportionately with the stock of money, but also it has allowed the demonstration that the only equilibrium solution for a model in which the real cash balance effect is fully operative is the full employment position.
The modern version of the quantity theory is a sophisticated theoretical framework within which the demand for money is studied. That is within which the factors that affect the volume of money which people wish to hold at any time are determined and analysed.

The newness of this approach is that this hypothesis goes beyond the theoretical principles of the crude quantity theory not only by treating the demand for money "... as part of capital or wealth theory..." but also by giving "... an explicit role to anticipations about economic magnitudes." [2]

The adoption of such a perspective has allowed Milton Friedman to refine the concept of wealth, introduced by the Cambridge school, by working out a method to measure it and to analyse in depth other variables that are considered to influence the money holdings.

According to Friedman, the demand function for real money might be composed of the following:

1. Total wealth which is considered as the equivalent of the budget constraint in the theory of consumer choice. Since total wealth is a non-observable variable, Friedman has used permanent income, which is a weighted measure of current and past income values as a proxy to it.


3. "The expected rates of return on money and others assets" [4]. This variable is, according to the author, the "analogue of the prices of a commodity and its substitutes and complements" [5]. The rate of return on money, which is dependent on the type of money used (currency, demand deposits etc), might be zero,
negative or positive. The rate of return on other assets is composed of: first any income or cost paid on financial assets and/or physical assets and second, changes occurring in their nominal prices.

4. "... Other variables determining the utility attached to the services rendered by money relative to those rendered by other assets" \[6\]. This fourth factor is composed, according to Friedman, of several variables such as: the real wealth or income, the expected degree of economic stability and the "... volume of capital transfers relative to income of trading in existing capital goods ..." \[7\].

To summarise these factors in a mathematical form the demand function for money in real terms, might be, according to this sophisticated approach of the quantity theory, written as follows:

$$\frac{M}{P} = f(y, w; r_m, r_b, r_e, \frac{1}{P} \frac{dp}{dt}; u)$$

where \(M\) is the stock of money, \(P\) the price index implicit in estimating national income at constant prices, \(y\) national income in constant prices; \(w\) is the fraction of wealth generated by non-human assets; \(r_m\), \(r_b\) and \(r_e\) are respectively the expected nominal rate of return on money, the expected nominal rate of return on fixed value securities with expected variations in their prices included and finally, expected nominal rate of return on equities including the expected variations in their prices; \(\frac{1}{P} \frac{dp}{dt}\) represents the expected rate of variations of prices of goods and finally \(u\) is a term which accounts for all possible variables that may affect the utility attached to money, except for \(y\).

The main criticism of this modern approach of the quantity theory is that it does not give any indication of how strongly the dependent variables are related to the independent ones.
Because Algeria is a developing country, this part now focuses on the empirical studies that concern the less developed economies. This places the topic of this thesis within the relevant theoretical debate and helps in the derivation of suitable guidelines to follow during the investigation process.

All the works that are reviewed in this survey, have sought either to explain the monetary behaviour of the economic agents through the study of the variability of the income velocity or to define a stable demand function which takes into consideration the economic environment. It is by bringing together the findings of these empirical investigations that a framework of analysis is drawn and through it a research guideline is determined.

The reviewed works are those of Adekunle [8], Yung Chul Park [9], Hanson and Vogel [10], Chorng-Huey Wong [11], Crockett and Evans [12], Presley and Westaway [13] and finally Darrat [14]. The choice of these authors has been based upon the variety of the works, the richness of the debate and the period of publication.

Prior to the review of these works, the econometric techniques, which are used in these articles and the following chapters, have been defined to free the remaining part of this thesis from any ambiguity.

2B.1 DEFINITIONS

In this section the econometric techniques relevant to concepts such as the Koyck-lag process and Almon-lag generating mechanism are surveyed.
i) Koyck transformations and adaptive expectations

On the basis of the survey conducted by Zvi Griliches [15] on distributed lags, the Koyck transformation or reduction might be defined as a technique or method used to reduce or solve an equation that contains a lag distribution which is declining geometrically.

Assuming that the equation in question has the following form:

\[ y_t = a \sum_{i=0}^{\infty} (1-\lambda)^i x_{t-i} + u_t \]

The technique proposed by Koyck [16] to solve the above expression consists of lagging the equation one time period, multiplying through by \( \lambda \) and subtracting the obtained equation from the original equation. Mathematically, this gives:

\[ y_t - \lambda y_{t-1} = a(1-\lambda) \lambda^i x_{t-i} - a(1-\lambda) \lambda^i x_{t-1} + u_t - \lambda u_{t-1} \]

which is equal to \( a(1-\lambda)x_t + \lambda y_{t-1} + u_t - \lambda u_{t-1} \).

The main problem with this method is that, if the original disturbance term \( u_t \) is serially independent, the one in the reduced equation is not.

Since the direct observation of the formation of expectation is rather a difficult experiment, Cagan [17] has developed a method to generate such a process. In Cagan's model, where the expected variable has a geometrically declining distributed lag form, the expectations \( (p^*) \) are assumed to be "revised in proportion to the error associated with the previous level of expectations" [18]. That is the expectations are generated by the following process:
\[ p_{t+1}^* - p_t^* = \beta (p_t - p_t^*) \quad \text{with} \quad 0 < \beta < 1 \]

and the expected variable has the following form:

\[ p_{t+1} = \sum_{i=0}^{\infty} \gamma^i (1-\gamma)^i p_{t-i} \]

Cagan has used this expectation process in an equation of the form:

\[ y_t = a p_t^* + u_t \]

and his technique to solve it has consisted of trying out different \( \beta \)'s and choosing the \( \beta \) which allows the generation of the highest coefficient of determination.

ii) The partial adjustment process and the Almon-technique

The partial adjustment process has been formulated by Nerlove [19]. In this specification "current values of the independent variable determine the 'desired' value of the dependent variables" [20]. That is:

\[ y_t^* = a x_t + u_t \]

However in the process it is considered that "only some (fixed) fraction of the desired adjustment is accomplished within any particular time period" [21]. That is:

\[ y_t - y_{t-1} = \gamma (y_t^* - y_{t-1}) \]

or

\[ y_t = a \gamma x_t + (1-\gamma) y_{t-1} + u_t \]
Although this model leads to the same* transformed equation as the adaptive expectations specification, they are "conceptually" different as has been shown by Griliches [22]. Indeed, according to this author, the adaptive expectation model attributes the existence of the lags to "uncertainty and discounting of current information", while the partial adjustment process attributes it to "technological inertia and the rising cost of rapid change." [23]

Shirley Almon [24], taking into consideration the problem of multicollinearity which is generated by some data, has elaborated a different technique to estimate an equation in which the dependent variable is a function of a weighted sum of past values of the independent variable; that is

\[ Y_t = \sum_{i=0}^{n-1} w(i) X_{t-i} \]

Her technique has consisted of assuming that the weights, ws in the above equation, lie on a constrained polynomial of degree \((q+1)\) with \(q<n\) and where \(n\) represents the number of periods over which the distributed lag extends.

By using the Lagrangian interpolation formula, she derives the weights from the following linear function:

\[ w(i) = \sum_{j=0}^{q+1} \psi(i) b_j \]

where the \(\psi(i)\) are the values at \(x = i\) of the Lagrangian interpolation polynomials and the \(b_j\) are the values at point \(x_j\)

* Though it is important to note that the former will give rise to a serially correlated error term, whereas the latter will not.
The substitution of the weights function into the original equation gives:

\[
Y_t = \sum_{i=0}^{n-1} \left( \sum_{j=1}^{q} \phi_j(i) b_j \right) X_{t-i}
\]

or after some rearrangement:

\[
Y_t = \sum_{j=1}^{q} b_j \sum_{i=0}^{n} \phi_j(i) X_{t-i}
\]

Then by setting \( Z_{tj} = \sum_{i} \phi_j(i) X_{t-i} \) for \( j = 1, \ldots, q \), she estimates the \( b_j \)s by regressing the \( Y_t \) on the \( q \) variables \( Z_{tj} \).

Moreover, the polynomial on which the weights are supposed to lie has been constrained by the author to obtain a distribution of weights which rise, then decline. The constraint is defined by supposing zero weights before time zero and after time \( n-1 \) so that \( w(-1) = w(n) = 0 \).

To choose the degree of the polynomial and the length of the distributed lags, she estimates a number of lags of different lengths and different degrees for the polynomial and picks up the best ones, that is those which generate the highest coefficient of determination.

2B.2 THE THEORETICAL FOUNDATIONS OF THE ADAPTIVE EXPECTATIONS AND PARTIAL ADJUSTMENT MECHANISMS

The use of the adaptive expectations and partial adjustment techniques in the monetary analysis is based, as it has been indicated by Feige [25], upon an interpretation of monetary assets according to capital theory.

Indeed in this perspective, money is viewed as "the financial analogue of a consumer durable good which is held for the flow of services yielded by the durable" [26]. Such an approach has
allowed Friedman to extend his hypothesis of permanent income to the demand for money to generate a proxy for the expected yield on wealth which is considered by Friedman as the predominant argument in the demand relationship.

An alternative approach considers the adaptive expectations mechanism as a process which is able to generate a forecast of measured income. Indeed, according to Feige [27], Muth has demonstrated "that if the process generating measured income is such that the change in measured income is a first order moving average of random deviates, then the expectations generating function provides an optimal forecast of measured income" [28].

The rationalization for the partial adjustment process might be derived, according to Feige, from the combined effect, for an individual, of choosing "a long-run desired level of cash balances \(m_t^*\)"; given his expected income, and his desire to consider the "cost associated with a particular cash balance position \(m_t\)" [29]. This cost, according to this author, is comprised of two elements: the cost of being out of long-run equilibrium and "the direct cost of portfolio change".

The first cost is assumed to be dependent upon the "gap between the individual's current cash position and his long-run desired position" [30]. This cost gives an indication about the losses encountered by the individual if his cash position is out of equilibrium, that is if his cash actual position does not match his desired position, in terms of income (when current cash position is superior to desired position) or in terms of conveniences and risks (when current position falls short of desired position). Feige represents this cost by the following equation:

\[
C_1 = \alpha (m_t - m_t^*)^2
\]
The second cost "represents the brokerage charges and other transactions costs associated with changes in the portfolio" [31]. According to Feige, this cost is dependent on the changes in the actual cash position of the individuals, that is:

\[ C_2 = \delta (m_t - m_{t-1})^2 \]

Given this information, the partial adjustment process might be derived according to this author, from the optimization problem that the individual has to face and which consists of choosing "that cash position \((m_t)\), which, given the long-run desired position \((m_t^*)\) and the previous cash position \((m_{t-1})\), minimizes total cost", that is:

\[ C = C_1 + C_2 = \alpha (m_t - m_t^*)^2 + \delta (m_t - m_{t-1})^2 \]

The technique used by Feige to solve the problem has consisted of differentiating the above function with respect to the current cash position and setting the derivatives equal to zero so that the following expression is obtained:

\[ m_t = \frac{\alpha}{\alpha + \delta} m_t^* - \frac{\delta}{\alpha + \delta} m_{t-1} \]

Then by defining \( \gamma = \frac{\alpha}{\alpha + \delta} \) and rearranging terms, he obtains another expression in which the current cash position is a function of the long-run desired position and the previous cash position, that is:

\[ m_t = m_{t-1} + \gamma (m_t^* - m_{t-1}) \]
which is equivalent to the formula of the partial adjustment mechanism.

With these definitions and theoretical underpinnings of some econometric techniques, it is now possible to review the chosen empirical works.

2B.3 ADEKUNLE AND THE INSTITUTIONAL CHARACTERISTICS OF THE DEVELOPING ECONOMIES

Using a demand function for money which allows the observations of the role of expectations in the economic system, J O Adekunle has tried to study several aspects of the behaviour of the demand for money in developed and less developed economies [32]. He has sought to examine firstly the differences in the forms of the demand function for money for the less developed and developed countries. Secondly, his study has consisted of seeking out whether "the theoretical relationships developed to explain monetary behaviour as well as the conclusions and opinions which are based on the interpretation of monetary experience in the industrial countries are applicable to the less developed" [33]. Finally, he has attempted to verify whether and to what extent the structural characteristics associated with the terms developed and less developed economies influence the type and behaviour of the variables which constitute the demand function.

In his model the demand for money relationship relates desired real balances to expected income, to expected rates of change in prices and to the current rate of interest.

All the expectations are assumed by the author to be generated by an adaptive expectations mechanism and all the variables are in logarithmic values except the rate of change in prices. The mathematical expression of this function is:
where \( M_t^* \) is the desired real balances; \( Y_t^e \) is the expected real income; \( \frac{dP}{dt}^e \) represents the expected rate of change in prices; \( r_t \) stands for the interest rate and finally \( u_t \) is the disturbance terms.

Besides these objectives and this mathematical specification of the demand relationship for money, Adekunle has based his work on four assumptions. The first is that the desired real balances adjust to "current effective demand during the period of analysis that is the calendar year" [34]. That is:

\[
M^d = M_t^*
\]

where \( M_t^d \) represents the current demand for real balances and \( M_t^* \) is the desired real balances. Secondly, the expected values of real income and rate of change in prices, which are assumed to be generated by a similar process, are supposed to have different expectation elasticities respectively. Thirdly, the expectations with respect to the interest rates are assumed to be static, that is "\( r_t^e = r_t \)" where \( r_t^e \) represents the expected interest rates and \( r_t \) the actual interest rate. This assumption has been based upon his belief that the influence of the financial substitution effect would be less important in the less developed countries than in the developed ones. This assumption has allowed Adekunle to focus his attention on the substitution effect of real assets rather than that of financial assets in comparing monetary behaviour in these two different environments.
In his fourth and last assumption, Adekunle supposes that the supply of real balances is determined by both the nominal supply of cash balances and the price level through the following equation

\[ M_t^S = Z_t - P_t \]

where \( M_t^S \) is the supply of real balances, \( Z_t \) is the predetermined nominal money supply and \( P_t \) represents the price level.

The supply of money, in this case, is supposed to have no effect on the demand for real balances and it is dependent on commercial bank reserve ratios, Central Bank credits and the gold and foreign exchange reserves of the country. Moreover, he assumes that the supply and demand are in equilibrium, that is:

\[ M_t^d = M_t^S = M_t \]

Given these assumptions, his econometric technique has consisted of using the Koyck transformations to reduce the demand function when the adaptive expectation process is introduced into the model.

The coefficients of expectations have been expected by the author to range between zero and unity with a positive sign for the income elasticities and a negative one for the interest rates and the rates of change in prices.

Adekunle’s methodology has consisted of concentrating the attention on the analysis of the coefficient of expectation, on the impact of income and, last but not least, on the substitution effect.
The first aspect is studied because it gives, according to the author, an indication on the state of the economic environment through the lengths of the economic horizon. Because of the relatively high risks and uncertainties which characterise the developing economies, he expects the economic horizon to be shorter in this type of country than that in the advanced economies.

The second aspect, that is the influence of income, is analysed to see how the aggregate demand for services provided by money vary between the developing and the developed economies. According to Adekunle, although there is a general agreement that the demand for the services provided by this asset grows with increases in income, there is no indication that a given rise in real income would lead to the same proportionate increase in desired money balances in both environments. Therefore, he argues, it is necessary to determine the behaviour of the demand relationship with respect to this variable in these two types of economies.

Finally the third point, which concerns the substitution effect, is studied; through this the role of real assets as a hedge against inflation in the less developed countries, instead of financial assets, can be determined.

Adekunle has elaborated three models. In the first one both income and inflation expectations are assumed to be static. In other words all the explanatory variables in the demand function are observed (or actual) variables. In the second model, only the price level variable is allowed to be non-static. That is, price expectations are taken into consideration whilst the remaining variables are measured variables. In the third model, both income and price level variables are assumed to be non-static to allow the analysis of their respective coefficients of expectations.
The comparison between both environments (developed and developing economies) has been conducted through three groups of economies:

- the group of industrial countries which includes Canada, Denmark, France, Germany, Netherlands, Norway, Sweden, Switzerland and USA

- the second group, which represents the other industrial countries, is composed of Australia, New Zealand, South Africa and Turkey

- finally, the group representing the developing economies is composed of Ceylon, Republic of China, Costa Rica, India and Mexico.

The results obtained from the first model have shown that the observed income, and consequently the related transactions motive, explain part of the variation in the holdings of money for the three groups of countries.

In parallel, Adekunle has concluded that, although the interest rate and the price level changes have substantial influence on the demand for money in the case of the other industrial economies, it appears that they have no effect on real money balances for the advanced group of countries.

Finally it appears from this first model that the real substitution effect seems to be of little influence, compared to the financial substitution effect, in determining the behaviour of the demand for real balances.

In his second model, Adekunle has introduced more flexibility by allowing price expectations to be non-static. The results obtained show the important role played by price expectations in explaining the movement of the demand function for money in the developing economies and the explanatory power of the financial substitution effect for the developed group of countries.
In the third model, all the restrictions are lifted so that the desired real balances are related to the expected income, to the expected rate of change in prices and to current rates of interest.

The estimates obtained for the advanced industrial group of countries show that both real income and interest rate changes are significantly related to desired money holdings. In addition they show that the respective signs of the elasticities are positive and negative as expected for the correspondent variables. Current price movements, however, given the results obtained, do not seem to play a significant role in explaining the behaviour of real balances. Furthermore, Adekunle has argued, on the basis of the large coefficients of expectation of income which have been obtained, that the expected income is more appropriate than current income as a scale variable of the demand function for money in these types of economies.

For the other developed economies, income, interest rates and the price level coefficients have been found to have the expected signs in the estimated equations. Moreover, the coefficients of expectations with respect to both income and price level have been found larger than those obtained for the industrial countries. This implies that the economies of the second group are relatively more uncertain politically and economically than those of the first group and therefore their long-term economic horizon is relatively riskier.

For the less developed countries, real income, interest rate and price changes have all been found to be significantly related to desired balances and all the coefficients have been found to have the expected signs. In addition, the expectations elasticities with respect to income have been found close to unity.

Meanwhile, the estimates of the price elasticity have suggested to the author that the expected price, not the current price level, should be included as an explanatory variable in the demand
relationship for the developed economies. According to Adekunle in a less developed economic environment, current movements in prices constitute the major part of the influence on the formation of the price expectations. Although the results indicate a limited impact of the price movements on real balances for the industrial countries, they do not stop him from believing that this influence manifests itself indirectly through the market interest rates.

On the basis of this investigation Adekunle has shown how important the role of the institutional characteristics is in elaborating the demand for money relationship which is able to reflect the monetary behaviour of individuals. Therefore the author recommends for the industrial group of economies a demand function that would relate real balances to expected income and to actual interest rates. For the less developed countries as well as the other developed economies, he suggests a demand relationship which has real income as the scale variable and the expected rate of change in prices and the rate of interest as the opportunity cost.

2B.4 YUNG CHUL PARK AND THE VARIABILITY OF THE VELOCITY

Using an adjusted coefficient of variation which is defined as: "the standard error of estimates as a percentage of the mean of the dependent variable" Yung Chul Park [35] examines the fluctuations of the velocity of income. He tries, in addition, to identify the major factors that may induce the existing differences in the fluctuations of the velocity between industrial and less developed economies.

Yung Chul Park studies three different measures of income velocity which are considered to be "a measure of the frequency with which money is received as (or paid of) income" [36]: $V_1$, $V_2$ and $V_3$. These three measures represent respectively the income velocity of currency outside banks, the income velocity of the currency outside banks plus demand deposits and finally the income velocity of money that includes quasi-money in addition to demand deposits and currency outside banks.
These income velocities are derived using the nominal value of GNP and the quarterly average of the money data. The variability of $V_1$, $V_2$ and $V_3$ is calculated in terms of the degree of dispersion of the observations of each velocity around its trend.

The computations have shown that all the three definitions of income velocity have been subject to important year to year variations in the case of developing economies. To explain the phenomenon, this author, like Adekunle, has focused his attention on the institutional characteristics of the economies studied.

Indeed, according to Yung Chul Park, these variations and differences are due to the instability in the developing countries, to the degree of monetarization of their economies and finally to the length of the lagged adjustment and type of transmission mechanism operating in these economies.

The instability that characterises the economic, social and political systems might explain part of these variations. Because uncertainties, which are reflected in the variations of the rate of inflation and the rate of growth of national income, influence, to a certain extent, the decisions and preferences of individuals with respect to money holdings. Moreover, the social and political disturbances add to these uncertainties and increase the weight of the liquid balances in the structure of the individual's wealth in the developing countries. Whereas in the developed economies, in addition to the existence of a range of economic stabilization weapons, the social and political spheres are more stable.

The non-monetarized sectors, in many developed economies, form a significant part of the national income. Its major component is agricultural income. Because of the nature of the output of this activity, this component is subject to wide fluctuations (since it is dependent on weather conditions). Therefore, according to Yung Chul Park, the variations in velocity in the less developed
economies might be provoked, among other reasons, by the important changes of the non-monetary income.

Finally, he believes that the lag adjustment process in the monetary sector is shorter in a less developed economic environment than in a developed one, for the economic horizon is shorter in the former than in the latter. Like Adekunle, Yung Chul Park attributes this phenomenon to the relatively high risks and uncertainties that characterise this type of economy.

This uncertain and risky environment is not only generated by social, political and economic instabilities, as it has been indicated by Adekunle, but is provoked as well by the lack of knowledge of the economic agents, by the absence of information and the existence of market imperfection that characterise the economy. Thus in a risky and uncertain economy the rational time pattern is likely to be a short one, with more emphasis on current rather than future events.

In addition to the degree of uncertainty and riskiness that characterise these economies, the transmission process has a role in explaining the behaviour of the velocity as well. Indeed, since the monetary impulses work their way to GNP through a chain of portfolio substitution relationships, the portfolio adjustment theory states that the lag involved in the transmission process depends on the length of the chain of transactions involving non-financial assets; these lengths depend, in turn, on the range of available financial assets in which wealth may be held. Therefore, the broader the range of alternative assets (financial assets) is, the longer is the length of the chain and hence the longer is the time lag in the transmission process.

However since the variety of available financial assets in the less developed economies is extremely limited and the proportion of these assets held as part of wealth is relatively low, the impact of change in the quantity of money will not be diffused among the
various money substitutes (financial assets), but it will be, according to Yung Chul Park, transmitted directly to the markets for real assets.

Whereas Adekunle and Yung Chul Park have laid stress on various institutional factors to explain the monetary behaviour of the individuals in the developing countries, Hanson and Vogel [36], like many other economists, have focused their attention on one particular aspect: the rate of inflation, to explain the fluctuations of the income velocity among sixteen Latin American countries.

2B.5 HANSON-VOGEL AND THE IMPACT OF INFLATION

The problem treated by these two economists consists of examining the influence of inflation on the income velocity under the conditions of imperfect anticipation and adjustment which prevail in this part of the world where the rates of inflation are not only high but also tend to be highly variable. According to these authors such a study not only indicates the sensitivity of the demand for real cash balances to changes in the price level, but also it reflects the extent to which economic agents can anticipate inflation and hence react to it by hedging against it under the conditions which are prevailing in these economies.

Inflation is measured by the annual percentages of change in CPI. The velocity is derived by dividing the data of GNP in local currency by the money supply of the country using three definitions to measure it: currency, currency plus demand deposits and finally currency plus demand deposits plus quasi-money. Interest rates have not been included in their study because of the non-availability of the data. In addition, they do not include in their analysis variables to account for the financial structure, the degree of monetarization and the level of development, because according to them, these concepts "lack unambiguous theoretical justification". Instead they use dummy variables in their function to take into
consideration "any specific attributes of individual countries or years" [37]. By pooling both time series and cross-section observations to exploit the data fully, they have tested whether the response of velocity to inflation is homogeneous among this sample of countries.

The computations of the simple regressions with and without dummy variables have given completely different results. Indeed the latter type of regression, that is without the dummy variable, in which money holdings have been related to inflation only, have implied that this kind of relationship has no explanatory power at all. Even the introduction of the dummy variables for individual years in the pooled regressions has not improved the situation.

The use of a dummy variable for individual countries, however, has not only improved the coefficients of determination by increasing them from zero to 0.7 for each definition of money, but also it has improved the magnitude and significance of the inflation coefficients.

On the basis of these results and the significance of the F-statistic test, these authors conclude that the effect of inflation on velocity does not vary significantly among the countries studied, despite the difference in their velocities and their rate of inflation.

After the determination of the role of inflation in explaining the behaviour of the velocity, Hanson and Vogel introduce more complexity in their model by adding two more variables: the ratio of currency to currency plus demand deposits and the real per capita GDP.

The purpose of this is to measure the impact of these variables on the fluctuations of the velocities. The results have been very conclusive. However the addition, alongside these variables, of the dummy variables for both the years and the individual countries has
not been very satisfactory. Indeed, the combination of the above variables (inflation, ratio of currency, and real per capita GDP) with the year dummy variables not only has not improved the explanatory power of the regressions but has generated a lower significance level for the currency ratios and per capita income. Moreover, when the country dummy variables are substituted for the year dummy variables in the demand relationship, per capita real income and currency ratios lose completely their explanatory power.

In the simple pooled regressions, the authors have noticed that the per capita real income and the currency ratios variables perform better than the inflation variable in explaining the behaviour of the velocity. However when the country dummy variables are included in these functions, the situation is inversed and the rate of inflation becomes the most important regressor.

Such a result, argue these two authors, does sustain their hypothesis, which states that the response of velocity to inflation is homogeneous among the countries studied, despite the diversity in their velocities and their rates of inflation.

The derivation of the elasticities of velocity with respect to inflation has given unexpected low figures. Hanson and Vogel explain this by the imperfect data used in the computations and the difficulties in measuring the expectations of inflation. Despite this result, Hanson and Vogel believe strongly that the problem of adjustment to inflation in these countries is very important because of the government controls and the lack of adequate hedges against inflation. This situation implies, according to them, that inflation can operate effectively as a tax on money holdings in these countries; high rates of inflation tax away the real value of money since the economic agents as individuals cannot escape it by substituting hedges against inflation for money.

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2B.6 CHORNG-HUEY WONG AND THE CREDIT RESTRAINT

Chorng-Huey Wong [38], in addition to the explanatory variables developed in the above models, has included in his demand function the credit restraint variable to explain the monetary behaviour of the economic agents in the less developed economic environment.

For this author indeed, the monetary markets which characterise the developing economies, that is the organised and non-organised monetary markets, are connected to each other. This link is represented by the observable interest rates applied in the non-organised market which reflect according to Chorng-Huey Wong, the degree of restraint in the organised one.

Therefore, if the degree of credit restraint is adequately measured, it could be a proxy for the non-organised market interest rates and hence could be used as an explanatory variable in a demand function for money which would take into consideration the impact of the unorganised monetary market on the monetary behaviour of individuals in the less developed countries.

The short-term demand function, has been derived from the following system:

\[ MO_t^d = g(Y_t^e, CR_t^e, (\Delta P_t)^e, u_t) \]

\[ MO_t = h(RM_t, MO_{t-1}, w_t) \]

\[ MO_t = MO_{t-1} + \delta(MO_t^d - MO_{t-1}) + v_t \]

where \( MO_t \) is the average stock of money; that is currency in circulation plus demand deposits in period \( t \); \( MO_t^d \) represents the long run demand for money at time \( t \); \( Y_t \) stands for the nominal GNP.
during period $t$; $CR_t$ represents the index of the degree of credit restraint in period $t$; $\frac{\Delta P}{P_{t-1}}$ is the percentage change in the index of prices in period $t$; $RM_t$ stands for the reserve of money; that is currency outside banks plus reserves of commercial banks at time $t$; $u_t$, $v_t$, $w_t$ represent disturbance terms; $\delta$ is a parameter which stands for the lagged response of actual money balances to the long run demand for money. Finally the 'e' indicates the anticipated value of the corresponding variables.

$MO_t$ and $CR_t$ are assumed by the author to be endogeneous variables. $Y_t$ is supposed to reflect the transactions motive of holding money and its coefficient is expected to have a positive sign. The variable $\frac{\Delta P}{P_{t-1}}$ is supposed to represent the cost of holding money and the sign of its coefficient is expected to be negative. Finally, $CR_t$, which will account in the model for the interest rate in the unorganised market, is expected to be negative as well.

The tested short term demand function, which he has derived from the long-term demand relationship for money is dependent on the expected income, the expected degree of credit restraint, the expected rate of inflation and the lagged money balances, that is

$$MO_t = f(Y_t^e, CR_t^e, \frac{\Delta P}{P_{t-1}}^e, MO_{t-1}, t)$$

The expected values of the explanatory variables are approximated by their current and past values with geometrically declining weight. To reduce the expression he uses the Koyck transformations.

Money supply, which is considered to be determined exogeneously, is incorporated in the system to account not only for the distributed lags induced by the credits and money expansion, but also to point out the endogeneity of the degree of credit restraint variable.
Several definitions of the degree of credit restraint have been examined and tested by Chorng Huey Wong. These are:

\[ CR_{1t} = d_t \]
\[ CR_{2t} = D_t^*/D_t \]
\[ CR_{3t} = -DC_t/Y_t \]
\[ CR_{4t} = 1-DC_t/Y_t \]
\[ CR_{5t} = -\Delta DC_t/DC_{t-1} \]
\[ CR_{6t} = \Delta Y/Y_{t-1} - \Delta DC_t/DC_{t-1} \]
\[ CR_{7t} = RM_t/DCB_t \]
\[ CR_{8t} = \Delta RM_t/RM_{t-1} - \Delta DCB_t/DCB_{t-1} \]
\[ CR_{9t} = \Delta DE_t/DE_{t-1} \]
\[ CR_{10t} = DE_t/Y_t \]

where \( (d) \) represents the discount rate of the Central Bank; \( (D) \) is the total deposits of banks; \( (D^*) \) expected deposits of banks; \( (DC) \) stands for net domestic credit of the banking system; \( (DCB) \) represents net domestic credits of banks; \( (RM) \) is the reserve money and finally \( (DE) \) is the debits of banks.

On the basis of the results obtained from the computations, it appears, according to the author, that the negative of domestic credit to income ratio \( (CR_{3t}) \) and one less the ratio of domestic credit to income \( (CR_{4t}) \) are the appropriate proxies for the credit restraint variables.
These results allow him to conclude that in a developing economy where interest rates are controlled, and therefore do not reflect the state of the market, a proxy variable, which should represent appropriately the degree of restraint, should be included to account for the financial substitution effect that operates in such an environment.

Moreover, further investigations have shown, according to Chorng Huey Wong, that the inflation rate yields ground to the appropriately chosen proxy for the degree of credit restraint as an explanatory variable when a lagged money variable is not taken into consideration in the demand relationship.

2B.7 CROCKETT-EVANS AND THE RANGE OF ELASTICITIES

Crockett and Evans [39] have tried to estimate different demand functions for all the countries listed in the Middle Eastern Department of the IMF and for which the data are available.

Their estimated demand functions have the following basic form:

\[
\ln \left( \frac{M}{P} \right) = a_0 + a_1 \ln \left( \frac{P}{P(-1)} \right) + a_2 \ln \left( \frac{Y}{P} \right)
\]

in which \(M\) stands for money stock, \(P\) for the price level, \(P(-1)\) for the price level lagged one time period and \(Y\) for the income.

The estimation of these demand functions has shown to them that non-oil GDP performs better than total GDP for the oil-exporting countries and real GNP, which includes remittances, performs better than real GDP in those countries where remittances play an important role. In addition, they noticed that the equations for broad money are better determined than those for the narrow definition of it. This result is due to the rising substitution from demand deposits to time and savings deposits.
Moreover, they found, except for one country, that the equations have relatively high explanatory powers, relatively small standards of errors and only limited evidence of serial correlation. The regressions of this demand relationship have given coefficients of income variable that are highly significant in most of the countries, except for Pakistan, and derive income elasticities that range between 1.0 and 2.0 with an important concentration within the interval 1.0 and 1.50 for both narrow and broad money. When the derived income elasticities do not fall within the obtained range, the authors attribute this failure to the quality of data used in the calculations.

To evaluate the impact of the lag structures on the demand function for money, Crockett and Evans have conducted three experiments on real cash balances. The first one has consisted of including current and lagged real GDP (or non-oil GDP or GNP) as determinants. The results obtained have been found to be relatively close to those obtained previously. However the coefficients of determination of the regressions have been found less significant than the previous ones.

In the second approach, the authors used the Koyck transformations to introduce the lagged dependent variables in the model. The use of this technique has given satisfactory results. However, the derived long-run income elasticities have been found more volatile than the previous ones.

Finally, their third approach has been based on the use of nominal balances rather than real balances. The results have been found satisfactory, although the derivation of the income elasticities presented the same handicap as in the second experiment.

If the task has been easier for Crockett and Evans to determine the impact of income on the money holdings, the determination of the role of inflation has been more difficult. Indeed the regressions have given for certain countries positive coefficients of inflation,
when a negative one was expected, and for other countries negative coefficients have occurred but with values too large in absolute terms. These difficulties led to the rejection of inflation as a potential explanatory variable. Among all the countries studied, only three have given satisfactory results for the opportunity cost of money which has been represented by inflation.

After this unsuccessful determination of the influence of inflation on money holdings, Evans and Crockett have substituted the inflation variable by the London Eurodollar rate of interest to represent the opportunity cost of holding money. This substitution has been based upon the idea that the Eurodollar deposits might be a relevant alternative to holding real-balances.

However, the results were unsatisfactory. The sign of the Eurodollar interest rates has been more often positive than negative and never both negative and statistically significant for any country for narrow and broad money. Such a result is due to the absence of liquid, alternative assets to holding money in many of these countries for the population.

Because all the previous results have been obtained from short time series, Crockett and Evans have attempted to improve them by pooling the data across countries to augment the number of observations. 

However, the use of such a technique requires a set of data which represents a homogeneous population.

To respond to this requirement, the authors have converted the monetary and income data into constant dollar terms to eliminate the differences in the units of account. They then deflated individual country variables by the corresponding population to eliminate income differences that are generated by the country size. Finally they separated the major oil exporting countries from the others.
The results obtained by the authors have been found to be rather poor. Indeed, the coefficients of the inflation variables have positive signs and therefore they must be annulled from the demand relationship. Moreover, although the coefficients of the scale variables are highly significant and have the correct sign, the income elasticities have been found to be lower than the previous level.

2B.8 PRESLEY AND WESTAWAY AND THE ISLAMIC MONETARY SYSTEM

In this work, which concerns the definition of an appropriate demand function for money in Saudi Arabia from 1962 to 1982, Presley and Westaway [40] attempt not only to analyse this topic using the traditional variables like the scale variable and the opportunity cost of holding money but also they try to reflect in their demand relationship the nature of the economy (oil producer), to incorporate the influence of Islamic teachings on the monetary behaviour of the Saudi Individuals and to point out the effect of the development policies adopted by the authorities on the money holdings.

In this approach, which conceives money as a medium of exchange as well as a store of value, the scale variable, which represents the volume of transactions, is the Gross Non Oil Domestic Product (GNODP). This choice has been made by the authors to eliminate the effects of the variations of the production of oil as well as the fluctuations of its price on the demand for money relationship.

In addition to this scale variable, these two authors have included an opportunity cost which embodies not only the role of domestic price changes in the monetary sector but also the role of Islam in this society as well as the excess of liquidity which has resulted from the ambitious plans of development.
The influence of price expectations is analysed by means of inflation expectations through an adaptive expectation process of the form:

\[ \log \text{Inf}_{t+1}^E - \log \text{Inf}_t^E = \theta (\log \text{Inf}_t - \log \text{Inf}_t^E) \]

The teachings of Islam which forbid hoarding as well as the use of interest rates in financial transactions between Muslims are approached by the use of the three-months interest rates on Eurodollar markets.

To point out the repercussions of a reduced opportunity cost of foregoing money on the holdings of real cash balances, these authors introduce in their demand for real balances the excess liquidity variable which is "measured by the inverse of the percentage of claims of the private sector to total assets" [41].

The basic equation to be tested therefore is as follows:

\[ \log M_t = \alpha + \beta_1 \log Y_t + \beta_2 \log \text{Inf}_{t+1}^E + \beta_3 \log \text{EDR}_t + \beta_4 \log \text{XLiq} \]

where \( Y_t \) is the GNP, \( \text{Inf}_{t+1}^E \) represents the expected inflation, EDR is the three months interest rate on Eurodollar markets and finally XLiq stands for the excess liquidity variable. The \( \beta_i \)'s are the elasticities and are expected to take the following signs:

\[ \beta_1 > 0, \beta_2 < 0, \beta_3 < 0 \text{ and } \beta_4 > 0 \]

The above equation is reduced using the Koyck transformations.

The short term demand function is assumed to be derived from the long term function using a partial adjustment process of the form:
The whole model has been based on a certain number of assumptions. Firstly, it is assumed that the elasticities of demand are constant and therefore express the equation in Log-Log. Secondly, it is assumed that there is no money illusion which allows the expression of the variables in real terms. Finally, they consider a hypothesis in which the income elasticity is assumed to be equal to unity so that changes in the demand for money will reflect changes in income and changes in the opportunity cost variable are reflected in the velocity of circulation.

The results obtained have sustained the hypothesis that the demand function in this economy has been dependent, for the period considered, on the scale variable (GNDCP) and the opportunity cost developed. However not all the components of the latter have been found statistically significant. Indeed, while inflation expectations and excess liquidity variables do explain money holdings in this economy, the foreign interest rate has been found statistically unsatisfactory.

According to Presley and Westaway, the failure of the interest rate to explain variations in real cash balances in Saudi Arabia is attributed to the influence of Islam's teachings in this society and to the strategy adopted by the Saudi Monetary authorities in investing in financial markets and which consists of selecting a portfolio of financial assets as a "habitat".

2B.9 A F DARRAT AND THE FOREIGN INTEREST RATES

Though Crockett, Evans, Presley and Westaway have failed to establish a relationship between holdings of money and foreign interest rates, Darrat [42], in his study of three major OPEC members (Saudi Arabia, Libya and Nigeria), has proven that this link
does exist in the absence of a sophisticated domestic monetary market.

Darrat's study has consisted of defining a demand function for money in these economies over quarterly periods 1963-79 and to analyse the stability of this function.

Since there is no consensus among researchers about the appropriate measure of foreign interest rates, he has used an arithmetic average of the short-term interest rates of major OECD countries as a proxy to the foreign interest rate variable. Three definitions of money have been used in his computations: currency in the hands of non-bank public (M₀), (M₀) plus demand deposits (M₁) and M₁ plus time and savings deposits (M₂).

His basic money demand function which has the following form:

$$\left(\frac{M}{P}\right)^d = f(X^e, \pi^e, r^e)$$

relates real cash balances ($\frac{M}{P}$) to real expected income ($X^e$), to expected rate of inflation ($\pi^e$) and to the expected short-term foreign interest rates ($r^e$) which accounts for the yields on financial assets.

The use of the Koyck-technique in his model has yielded very unsatisfactory results. Indeed, in many regressions wrong signs have appeared for some explanatory variables and their corresponding coefficients have been found statistically insignificant; they have, in addition to the theoretical criticism formulated to this model, induced the author to look for another alternative to introduce expectations.

The solution to his problem has consisted of substituting the Almon-lag mechanism to the process previously used. However, Darrat,
contrarily to Shirley Almon, has used the polynomial lag without the endpoint constraint and without imposing any sign on the lag-weights.

With the lag generating process substitution, the regressive demand function has been given the following form:

$$
\log \left( \frac{M}{P} \right)_t = a_0 + a_1 \sum_{i=0}^{n_1} \phi \log X_{t-1} + a_2 \sum_{i=0}^{n_2} \psi t-1-i + a_3 \sum_{i=0}^{n_3} \omega_i \log r^f_{t-1-i} + \epsilon_t
$$

where the variables are defined as before, $r^f$ is the short-term interest rates; $(\phi, \psi, \omega)$ are the unconstrained Almon-lag weights $n_j (1, 2, 3)$ are the lengths of the Almon-lags and $\epsilon$ is the disturbance term. The coefficients have been expected to have the following signs:

$$a_1 > 0; \quad a_2, a_3 < 0; \quad \omega_i \phi_i, \quad i > 0; \quad \omega_i = \phi_i = \psi_i = 0$$

and finally

$$a_1 \sum_{i=0}^{n_1} \phi_i > 0, \quad a_2 \sum_{i=0}^{n_2} \psi_i < 0 \quad \text{and} \quad a_3 \sum_{i=0}^{n_3} \omega_i < 0$$

To test the temporal stability of the demand function for money, he has used four stability tests: the Chow test, the predictive power procedure, the Gupta test and finally the Fairley-Hinich test. The estimated equations have been found satisfactory and consistent with the findings of the theory. All the coefficients have been found to have the correct signs, which implies that the Almon process has considerably improved the results.
These results have sustained the important role of expected income in explaining the behaviour of money holdings in these economies. They also have verified the importance of inflationary expectations in determining real money demand. However the most interesting result has been the significance of the foreign interest rate which reflects the international opportunity cost of holding money balances in these countries. Moreover, it has been noticed that the foreign interest rates variable exerts a stronger impact on real money demand than expected inflation. Finally the use of the different stability tests has shown that the demand function for real cash balances, in these three countries, is temporarily stable.

**2B.10 CONCLUSION**

The analysis of the above works, as well as the study of the empirical researches of P Cagan [43], J Deaver [44], D Gujariti [45], M Fry [46] and A Hynes [47], have allowed the derivation of three points which are considered to be an investigation guideline in answering the question raised in this thesis.

Firstly, the investigations studied agree on the fact that the economic structures and the socio-political system, which characterise the less developed countries, influence considerably the monetary behaviour of the individuals and thus the money holdings in this environment.

Secondly, although there is a general consensus among theorists that the formulation of the demand function for money should include two arguments: the scale variable and the opportunity cost of holding money, they do not agree about the variables which should represent them.

However, it appears from the variety of the empirical works included in this literature survey that the definitions of the variables of the demand function for money are dependent on how the institutional characteristics of the country under study are approached. In other
words, they depend on which characteristics(s) of the country is (are) given priority. Finally, it seems from these works that the type of process used to generate expectations in the model has an important effect on the estimates.

Therefore, given these points, the elaboration of a model which would represent the behaviour of the demand relationship for money necessitates an analysis of the Algerian economic environment to pinpoint the factors which might affect this demand and requires an appropriate choice of the lag generating process to specify the formation of expectations in this country.


CHAPTER III

THE ALGERIAN ECONOMY: THE REAL SECTOR

In this and the following chapter, the Algerian economy is analysed to determine the institutional factors which might affect the money holdings of the Algerian population and through them to derive the determinants of the demand for money function.

This chapter, which concerns only the real sector of the Algerian economy, examines the development strategy adopted by the Algerian authorities, the implications of this development programme on the major economic indicators and finally the policies of adjustment which have been implemented by the Algerian government after more than a decade of intense industrialisation.

Since her independence in July 1962, Algeria has made major economic progress through different but successive and gradual stages which might be grouped into two distinct periods. The first one, 1967-1979, is characterised principally by the weight and importance given to the construction of a large industrial base which would firstly be able to ensure a complete modernization of the Algerian society and secondly be able to be a perpetual source of employment for the rapidly growing population. The second period, which started in 1980 after two years of assessment 1978-1979, is a phase of adjustments and improvements in the efficiency of the system so that the economic and institutional gaps which have resulted from the previous stage could be filled in.

To understand the chosen development strategy and to evaluate the progress made, it is necessary not only to examine the economic and social structures of Algeria in the pre-independence era but also to give a brief picture of Algeria just after independence, that is the period between 1962 and 1965.
3.1 THE PRE-INDEPENDENCE SITUATION

One hundred and thirty two years of French colonization had changed Algeria completely from an autonomous and prosperous Moslem part of the Ottoman Empire to a backward and dependent society. Indeed by the end of French colonization, Algeria was identified as being a country where the underprivileged autochthon population was extremely retarded in its development and where the dual economy was strongly dependent on the French economy, as might be seen through the study of the population, the education given to the endogenous people and finally the structure of the economy.

The analysis of the available demographic statistics shows that the colonialism process had confined the autochthon population, called by the colonial administration the Moslem population, to live in the rural areas, while the settlers, who came from France, Spain and Italy and who constituted about 10% of the whole population, occupied the urban centres.

This process had been accompanied by a labour division which had obliged the Moslem population to work in a majority only in the activities where a high level of education and technical skills were not necessary. According to Y A Sayigh [48], over 98% of the active population in the agricultural sector were Moslem, while over 70% of the civil service employment and over 40% of the salaried employment were taken by the settlers. Such a division had induced the Algerian people to gain only basic technical skills.

In addition to this, the native population had been deprived of education. Indeed in 1954, 30% of the total pupils in primary schools were settlers' children, although by 1959-1960 this ratio had fallen to 19%.
This colonial discriminatory policy in education had always prevailed in that era. In 1944 the Moslem boys and girls in the primary schools constituted a mere 8% of the indigenous children of school age against 90% for the settlers' children. In 1954, they represented only 22% and on the eve of the independence this ratio reached 37%.

This discrimination was even greater in primary technical education in secondary schools and at the higher education level.

Young Moslems in the secondary schools were very few. By 1950 these were an estimated 4000 Moslem pupils compared to 22,000 non-Moslems. This pattern continued until independence. By 1954 there were 7000 autochthons against 29,000 non-Moslems and by 1959 11,000 and 34,000 respectively. Technical education was hardly possible for the native people and higher education was again dominated by Europeans. Shortly before independence, Moslem students accounted for only about 10% of the whole higher education students with only two Algerian students following courses in engineering.

The lack of a highly educated native people and the small participation of the indigenous population in industrial and non-agricultural activities, proved to be a major handicap for independent Algeria. The colonialism process had also modelled the Algerian economy in such a way that it became an integrated part of the French economy; it had been dominated by agricultural activity in which two distinct sectors co-existed: the traditional and modern agricultural sectors.

The modern agricultural sector comprised the best and most fertile lands in the country which were principally situated along the Mediterranean coast, receiving the highest rainfall. These lands, which represented a proportion of 28% of the cultivatable lands, produced about 60% of agricultural production with a production structure of mainly marketable products such as wines, fruits, vegetables and cereals which were destined for the French markets.
Because of the large size of the land holdings of the settlers*, the production process, in this sector, had been highly mechanised and the most modern techniques of production had been used.

The traditional sector was, on the other hand, comprised mainly of the small size lands owned by the Moslem population which were situated principally in the less fertile Inland and Southern areas of Algeria. Because of the size of the land holdings**, the nature of the lands and the climate of these areas, the production of this sector was mainly oriented towards cereal crops.

Industrial production constituted a small part of the GDP; heavy industry was almost absent and light industry was mainly oriented to primary product processing. In addition, the economic integration between the different sectors was very weak.

Finally the income distribution, in that era, between autochthons and settlers was very unequal in both the agricultural and non-agricultural sectors. According to Y A Sayigh [49] annual income per capita in the agricultural sector was about £20.5 ($57.40) for Moslems and £735 ($2058) for the Europeans. In the non-agricultural activities the income per head was estimated at about £47 ($131.60) for the autochthons and £330 ($934) for the Europeans.

With the start of the struggle for independence in November 1954 and the intensification of the political pressures from the settlers, the French government, under the leadership of General de Gaulle,

* it is estimated that the largest concentration of the Europeans' holdings were in the bracket of 100 hectares and over
** it is estimated that more than half of the Moslems holdings were between 1 and 10 hectares

47
had initiated an economic programme, called the Plan of Constantine* 1959-1964 to set up the social situation of the indigenous population. However this plan was aborted because of the intensification of the war between the Moslem population and the French army, the deepening of the crisis and the negative actions of the settlers terrorist organisation called the OAS (Organisation Armée Secrète).

Consequently by the end of the colonialism era, Algeria was characterised by an unskilled labour force, a poor population and an economy which was dependent on the French market and where industry was absent.

3.2 THE PERIOD BETWEEN 1962-1965

Algeria gained her independence in July 1962 after seven years of bloody war and long and difficult negotiations with the French government. However with this new era, the Algerian authorities had to face new problems generated by a chaotic social and economic situation. Indeed by the end of the war Algeria numbered 1.5 million Algerian deaths, about 500,000 refugees in Morocco and Tunisia, over 2 million people uprooted from their homes and resettled in regroupment villages by the French army; many more people left the countryside and migrated to the towns and cities.

In addition, the massive exodus of the non-Moslem population** had caused the closing down of most of the factories, farms, shops, schools and the paralysis of the administrative apparatus; this was accompanied by a massive flight of private capital.

* Constantine is an Eastern city in Algeria
** The 6 month period before independence had seen about nine-tenths of this population leaving the country
The consequence of such a situation had been an almost total paralysis of the economy and a significant decline in production. Indeed, according to Lawless [50], the real value of production had dropped by 30% between 1960 and 1963. This fall was particularly important in the agriculture, mining, building and public works sectors.

3.3 THE DEVELOPMENT PROGRAMME

To bring about economic recovery, the government* had sought, as immediate action, to stabilise political life by ending political rivalries, to stimulate the economy in the short run by encouraging private capital investment and to gain control over the strategic branches of the economy by building up a large public sector.

Indeed, since the economy had been almost paralysed by the war, the exodus of the European skilled labour force and the massive flight of private capital, the authorities sought, while a long term development strategy was in study, to spur on the revival of the economy through private capital investment.

To reach this short-term target, two actions had been decided on. The first one had consisted of returning to private ownership certain small scale businesses (small factories, restaurants, shops, etc) which had been nationalised by Ben Bella's government. The second action had been the publication of the first Investment Act in 1966.

The apparent objectives of this act were to stimulate the economy by giving certain concessions to private capital and to ensure the protection of the private operator by giving them certain guarantees. However, the fundamental aim was to limit the field of action of the private sector, by defining and determining the size

* led by Houari Boumediene who took over the leadership by discharging Ahmed Ben Bella from the presidency in June 1965
of its activities and methods of intervention, so that the state could retain control over the whole economic system in the long term.

To launch its long-term development programme, the government needed to have a direct control over the productive activities of the country and its financial resources. To satisfy this requirement, a huge programme of building up a large public sector had been implemented through the reinforcement of the nationalisation policy of foreign companies; this had been initiated a few months after the independence. These state owned enterprises, which had been provided with a complete monopoly over the economic sectors in which they would have to operate, had been conceived to be an economic instrument at the disposal of the state, to put into execution the social and economic policies of the government.

Provided with this instrument, the government launched a very ambitious development programme which aimed to transform and restructure completely the inherited economic system. "Rapid industrialization, integration and introversion" [51] were the targets of Houari Boumediene's economic policy, which was, according to R I Lawless, "quickly recognised internationally as one of the most powerful attempts to break with the classic forms of economic dependence" [52].

The fundamental principles behind this strategy were firstly "to ensure that national resources are utilised within the country" to "... reduce progressively the extroversion of the economy" and secondly "... to construct a 'complete' productive sector capable of satisfying the needs of consumption and at the same time the full utilisation of local resources, in particular manpower" [53].
Because of the structure of the economy, the government in his
development strategy had given priority to the industrialization of
the country over the development of the agricultural sector (see
Table 3.1 below).

This process of industrialization had been based on the so-called
"industrializing industries" (industries industrialisantes), a
concept that had been developed by the French economist G Destanne
de Bernis. This concept is based on the hypothesis that some
industrial branches, because of the nature of their outputs, are
able to give rise to an industrial effect upstream and downstream so
that the entire economy is stimulated. Not all industrial
activities are able to spread this industrializing boost over the
whole economy by generating the push and pull effect, only some of
them, according to de Bernis have this faculty. In the case of
Algeria these industries are those of hydrocarbons, electricity and
derivatives, mechanical and electrical construction and finally iron
and steel; this explains the importance given to these sectors in
Boumediene's development programme.

This strategy of development had been put into execution through
three development plans; the experimental plan known as the three
year plan 1967-1969, which was mostly a revival of the plan of
Constantine; the first four year plan 1970-1973 and finally the
second four year plan 1974-1977.

The total provisional cost of these plans was estimated to be about
AD (Algerian Dinar) 147 billion [54]. However, their total actual
cost had been much higher. The Ministry of Planning gave the figure
of AD 402.5 billion [55].
This gap between the provisional and total cost is thought to be the effect of the combination of several factors such as: the impact of imported inflation on the final cost of the different plants; the slow implementation of these plans due to a lack of skilled, technical and managerial labour force; the long bureaucratic procedures which delayed the realisation of the investments and finally the oil-price boom of 1973-74 which had increased the financial resources of Algeria and her financial capacity of investing.

By adopting this strategy, the government had deliberately based the whole economic process of development on the principle of giving priority to investment over consumption; this can be seen not only through the allocation of investment between sectors (Table 3.1) but also through a study of gross fixed capital formation, private consumption and government expenditure in nominal terms from 1964 to 1983 (graph 1).

TABLE 3.1: PLANNED AND ACTUAL INVESTMENT 1967-1977

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<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Planned</td>
<td>Actual</td>
<td>Planned</td>
<td>Actual</td>
<td>Planned</td>
<td>Actual</td>
</tr>
<tr>
<td>Hydrocarbons</td>
<td>41.9</td>
<td>50.9</td>
<td>36.9</td>
<td>47.1</td>
<td>40.6</td>
<td>48.6</td>
</tr>
<tr>
<td>Capital and intermediate goods</td>
<td>47.0</td>
<td>40.6</td>
<td>48.9</td>
<td>46.2</td>
<td>47.6</td>
<td>44.5</td>
</tr>
<tr>
<td>Consumption goods</td>
<td>11.1</td>
<td>8.5</td>
<td>14.2</td>
<td>6.7</td>
<td>11.8</td>
<td>6.9</td>
</tr>
<tr>
<td>Total industry</td>
<td>48.7</td>
<td>55.3</td>
<td>44.7</td>
<td>57.0</td>
<td>43.6</td>
<td>62.0</td>
</tr>
<tr>
<td>Agriculture</td>
<td>16.9</td>
<td>16.4</td>
<td>14.9</td>
<td>13.0</td>
<td>13.2</td>
<td>4.7</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>34.4</td>
<td>28.3</td>
<td>40.4</td>
<td>30.0</td>
<td>43.2</td>
<td>33.3</td>
</tr>
</tbody>
</table>

Indeed, although the industrial sector had been the central preoccupation of the Algerian planner, the study of the investment distribution between industrial branches given in Table 3.1, shows a discriminatory allocation of the financial resources to the detriment of the production of consumption goods.

Moreover, the analysis of Graph 1 (see below), which shows that the three curves representing gross fixed capital formation, private consumption and government consumption have an ascending trend, indicates that the growth pattern of investment is much stronger than that of the other expenditures.

Indeed, as it might be noticed from the shape of the curve of gross fixed capital formation (GFCF), investment had known two distinct phases: a phase of stagnation from 1964 to 1966, and a phase of exponential increase from 1967 to 1978. During the stagnation phase, GFCF represented 15.6% of the GDP on average per annum and its average value was about AD 2.3 billion. In the second sub-period 1967-1978 this aggregate had been multiplied by nearly 19 times (AD 50.9 billion in 1978 against AD 2.7 billion in 1967) and the derived ratio of capital accumulation to GDP (GFCF/GDP) had shown a permanent increase from 17% in 1967 to 49% in 1979 with a peak of 52% in 1968.

Private consumption on the other hand, which might be examined through three sub-periods: 1964-1967, 1968-1972 and 1973-1977, had known a much slower growth compared to that of GFCF. During the first sub-period, aggregate consumption remained relatively constant at approximately AD 9 billion per annum, but in the second sub-period (1968-1972) the consumption pattern changed and consumption grew at an average of 9.2% per annum. Despite this rise, the consumption increase had not been as important as that of investment. Indeed during this second sub-period private consumption in nominal terms was multiplied only by 1.37 times, while GFCF was multiplied by 2.5 times. This process of increase had continued during the last stage (1973-1977). By 1977, it
Graph 1: Investment and Consumption

Legend
- G.F.C.F
- P.CON
- G.CON

AD billion

years

54
(consumption) had reached a value which represented 2.25 times that of 1973, its average rate of growth had been approximately equal to 23% per annum.

Although private consumption had known some changes between 1964 to 1974, government expenditure had been stagnant during the entire period. That is it had been maintained practically constant in nominal terms for eleven years. However, this pattern had changed and government expenditure in current prices had known a fairly permanent rise of approximately 21.4% per annum after 1974 stimulated by a rise in the oil tax receipts which represented more than 50% of the total tax revenue.

It is estimated that the government had spent about AD9 billion for working expenses during the three year plan, around AD19 billion during the first four year development plan and approximately AD51 billion during the second four year plan. The close control of the working expenses had allowed their financing through mostly 'ordinary taxes' (excluding oil taxes). Indeed 85% of the working expenses had been financed without using oil taxes during the three year plan, about 95% during the first four year plan and around 87% during the second four year plan. This policy and the rising receipts from oil taxes had allowed the release of budget surpluses which are estimated to amount to AD40 billion for the whole period 1970-1973 and AD36 billion from 1974 to 1977.

The slow increase of consumption had been provoked by the government through the application of a series of restrictive measures to control consumption and thus to increase public savings to finance the development programme. These measures had consisted of restricting the nominal augmentation of wages and salaries, applying "quantitative restrictions and/or high duties on imports of non-essential consumer goods" [56] and finally applying "an almost 100% marginal income tax ... above specified levels of income" [57].
3.4 IMPLICATIONS OF THE DEVELOPMENT PROGRAMME

The impact of this development strategy has been felt on the structure of the economy, on the employment situation and the Gross Domestic Product. The most important effect of this programme of development had been the restructuring of the economy. Indeed, the policy of industrialization adopted had completely transformed the economic structure inherited from the pre-independence era (see Table 3.2).

The analysis of Table 3.2 shows that, over a period of sixteen years (1963-1978), the Algerian economy had gone through two major changes. The first one had been a major decline in agricultural activity and the emergence of hydrocarbons and industry (commerce is not taken into consideration) as the main activity in the economy; the second characteristic was the boost given to the construction and public works sectors, whilst hydrocarbons consolidated their position as the main component of the GDP.

Indeed in 1963 the agricultural sector, which was the most important activity in the country after commerce, represented 19.8% of the GDP in nominal terms. By the end of the first four year plan, that is by the end of 1973, this sector represented a mere 8%, well behind hydrocarbons, manufacturing industries and finally construction and public works which constituted respectively about 19%, 12.2% and 10.9% of the GDP.

By the end of the second four year plan, 1977, this structure had seen another transformation; this was represented by the rise of hydrocarbons production (25.2% of the GDP) because of the boom in prices in the oil market, the boost to construction and public works which constituted 13.1% of the GDP and finally the difficulty of the manufacturing industries in maintaining their position among the major activities in Algeria with a production representing only 10.8% of the GDP (branches of commerce are not take into consideration).
<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>2,680</td>
<td>2,560</td>
<td>2,477</td>
<td>6,750</td>
</tr>
<tr>
<td>Hydrocarbons</td>
<td>1,550</td>
<td>3,340</td>
<td>5,926</td>
<td>24,700</td>
</tr>
<tr>
<td>Other extractive industries</td>
<td>70</td>
<td>90</td>
<td>177</td>
<td>370</td>
</tr>
<tr>
<td>Energy, water</td>
<td>250</td>
<td>270</td>
<td>392</td>
<td>1,250</td>
</tr>
<tr>
<td>Manufacturing industries</td>
<td>1,230</td>
<td>2,650</td>
<td>3,819</td>
<td>10,530</td>
</tr>
<tr>
<td>Construction &amp; public works</td>
<td>600</td>
<td>1,160</td>
<td>3,422</td>
<td>12,800</td>
</tr>
<tr>
<td>Transport</td>
<td>440</td>
<td>740</td>
<td>1,075</td>
<td>3.4</td>
</tr>
<tr>
<td>Commerce</td>
<td>2,960</td>
<td>4,850</td>
<td>6,910</td>
<td>30,450</td>
</tr>
<tr>
<td>Other non-governmental services</td>
<td>1,540</td>
<td>2,220</td>
<td>3,963</td>
<td>12.7</td>
</tr>
<tr>
<td>Public services</td>
<td>1,910</td>
<td>2,540</td>
<td>3,000</td>
<td>10,950</td>
</tr>
<tr>
<td><strong>TOTAL GDP</strong></td>
<td><strong>13,130</strong></td>
<td><strong>20,529</strong></td>
<td><strong>31,163</strong></td>
<td><strong>97,800</strong></td>
</tr>
</tbody>
</table>

* The percentages for 1978 are calculated by A Chenini.

Source: M E Benissad, L'Economie Algerienne Contemporaine, in R I Lawless, op cit.
By dint of this strategy of development, the government, according to the Algerian monthly journal 'Actualité-Economie' [58], had been able to create about 2,323,000 jobs from 1967 to 1986 and about 1,082,000 jobs (excluding agriculture) between 1967 and 1978.

However to be able to appreciate the employment policy of the government, it is necessary to point out the characteristics of the Algerian population (Tables 3.3 and 3.4).

**TABLE 3.3: POPULATION AND EMPLOYMENT IN ALGERIA - 1967-1986**

<table>
<thead>
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<tbody>
<tr>
<td>Total resident population</td>
<td>12,567</td>
<td>17,626</td>
<td>20,487</td>
<td>21,084</td>
<td>21,759</td>
<td>22,436</td>
</tr>
<tr>
<td>Active population*</td>
<td>2,273</td>
<td>3,500</td>
<td>4,284</td>
<td>4,455</td>
<td>4,621</td>
<td>4,794</td>
</tr>
<tr>
<td>Employed population</td>
<td>1,746</td>
<td>2,859</td>
<td>3,576</td>
<td>3,715</td>
<td>3,840</td>
<td>3,956</td>
</tr>
<tr>
<td>Unemployed population</td>
<td>527</td>
<td>641</td>
<td>708</td>
<td>740</td>
<td>781</td>
<td>838</td>
</tr>
</tbody>
</table>

* Active population is the portion of the population which is legally at the working age (16 to 64). This portion includes people who are employed and those who are unemployed, but they are looking for jobs through the job centres (bureaux de main d'œuvre).


**TABLE 3.4: ACTIVE AND UNEMPLOYED POPULATIONS RATIOS**

<table>
<thead>
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</thead>
<tbody>
<tr>
<td>Active population</td>
<td>18.08</td>
<td>19.86</td>
<td>20.91</td>
<td>21.12</td>
<td>21.23</td>
<td>21.36</td>
</tr>
<tr>
<td>Total resident population</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed population</td>
<td>23.18</td>
<td>18.31</td>
<td>16.52</td>
<td>16.62</td>
<td>16.90</td>
<td>17.48</td>
</tr>
<tr>
<td>Active population</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Actualité-Economie No 23, December 1987
The study of the above tables shows that the Algerian population which has been one of the highest rates of growth in the world (3.2% per annum), is characterised by a small proportion of active population and a satisfactory level of unemployment taking into consideration the situation at the beginning of the implementation of the development programme. Several factors have contributed to this. The first factor is that the biggest portion of the population is very young and therefore is not yet able to apply for jobs given the labour legislation. It is estimated that about 46% of the total population is under 15 and the legal minimum age to apply for a job is 16.

In addition to the young age of the population, a great deal of the population is in the education system which implies that an important part of the whole population living in Algeria is kept out of the labour market for educational reasons. For instance it is estimated that in 1986 about 6 million pupils were in the secondary schools (59), about 226,700 students in the universities and about 95,000 people in the professional training centres (60).

Finally, most of the female population do not apply for jobs because of the traditions which prevail in the Algerian society, although in recent years an improvement has been observed. Women's participation is estimated to be about 9% of the total employed population which is relatively low by international standards.

It is the combination of all these features which has allowed the authorities to provide jobs at a yearly rate of 4.5% between 1967-1986. This employment rate is higher than the average rate of growth of the active population for the same period which is estimated to be about 4%.
Until 1983-1984, industry and construction and public works had provided about 50% of the total jobs created and administration had provided about 30%. The remaining branches (excluding agriculture) had been very slow in their recruitment process. Finally, employment in the agricultural sector had been stagnant according to the employment survey of the 'Actualité-Economie' [61].

Besides the remodelling of the structure of the economy and the job creation, the effect of this development strategy had been felt as well on GDP and national income (Graph 2).

Indeed, the analysis of the curve of GDP in nominal terms indicates three distinct segments. The first one represents the sub-period 1965-1970, the second one the sub-period 1970-1975 and finally the third segment is given by the remaining part of the GDP curve (1975-1982).

The first segment indicates a period of very slow increase of the GDP in which Algeria had seen the initiation of the development policy. With the implementation of the first four year plan (1970-1973) an important boost had been given to the GDP, which reached AD 50 billion by the end of this sub-period.

Besides the impact of the investment policy reflected in the three year plan and the first four year plan, the increase of GDP had been stimulated by two other factors. The first one was the nationalization of the French interests in the hydrocarbons industry in 1971. The second was the oil price rise of 1973-1974. The two elements had contributed to the increase of production in the hydrocarbon sector which in turn had boosted GDP.

Finally, in the third segment it might be noticed that the GDP had risen very sharply (in nominal terms). This rise was the result of an important augmentation of production in industry, construction and public works and in hydrocarbons. These three sectors produced,
by the end of 1982, about 77% of the whole Gross Domestic Product.

National income, meanwhile, had increased from 1965 to 1982 by 12.7 times with an average rate of growth per year of 16.8% (graph 2). This ascending trend might be analysed in two periods: 1965-1973 and 1974-1982. During the first period, national income rose at an annual average rate of growth of approximately 10.6%. This growth rate had enabled this aggregate to more than double its size (2.20 times). In the second period (1974-1982), because of a higher growth rate which is estimated to be about 22.73%, nominal national income had been more than tripled (3.71 times). This important augmentation had been induced by the aggressive employment policy adopted during the second four year plan and the policies of adjustment adopted by Chadli Bendjedid's government since 1980, which had permitted the creation of about 140,000 new jobs every year.

In real terms GDP, which might be studied by dividing its curve (graph 3) into two sub-periods, had increased considerably from 1964 to 1982, despite the rise of the GDP deflator. Indeed after a slight decline between 1964 to 1966 due to the after-war circumstances, real GDP had increased between 1964 and 1975 at an average rate of 5.8% per annum. In the second sub-period (1976-1981), the rise had been slightly higher than in the first one with an average rate of 8.8%. By the end of this period, this growth had slowed and even reversed between 1981-1982 under the pressure of a higher rise in the price level.

The study of real national income (using a GDP deflator to compute it) shows that this aggregate performs in the same manner as real GDP. Indeed except for the fall in the years 1981 and 1982 due to a higher rise of the price level using GDP deflator as a proxy to it, real national income had augmented steadily for the whole period considered.
Graph 2: National Income and GDP in current prices

Legend
- GDP
- Nat Inc
Graph 3: Real GDP and real National Income, 1980 base year

Legend
- [ ] Real GDP
- [ ] Real Nat Inc
To give a precise picture of inflation in the Algerian economy is rather a difficult task. Indeed, although prices in Algeria had moved upwards during the seventies and the eighties, the estimation of the price level does not fully capture the inflationary pressures on the economy. Besides the non-availability of a long time series of the Consumer Price Index, the inflation level is distorted by the prices used in the computations, the pricing policy adopted by the authorities and the policy of subsidizing a certain number of commodities which were considered to be essential such as cereals, cooking oil, sugar, coffee, pharmaceutical products and so on.

Inflation in Algeria is determined using the Consumer Price Index. This index, however, is computed using the prices prevailing in the Great Algiers* market which do not reflect the general price level in the Algerian economy. Moreover the prices used in the calculation do not reflect the market prices since they are administratively fixed by the Ministry of Commerce. Finally, because of the impact of subsidized commodities, the price level had been kept artificially low. Given the frequent shortages of some durable and non-durable goods, the price level should be adjusted upward to reflect a more realistic level of inflation in the Algerian economy.

3.5 THE ADJUSTMENT POLICIES

In the process of executing the programme of development, various distortions, which would be prejudicial to the evolution of the economy in the long term, have emerged.

These distortions, which have manifested themselves in the form of economic inefficiencies (bottlenecks, shortages, deficits of the public enterprises, under-utilization of the productive capacity, low productivity etc) are thought to be mainly generated by the

* Algiers is the capital of Algeria
structural discrepancies which have led to the unbalanced composition of the gross domestic product in which hydrocarbons and intermediate goods are the principal components.

The programme adopted by Chadli Bendjedid's government* to overcome these distortions seeks to stabilise fixed capital formation around an appropriate level, to stimulate both consumption goods and agricultural production which were quantitatively insufficient and finally to introduce more efficiency and freedom in the economic system by initiating an economic and administrative decentralization process.

To reach its goals the government had defined a two steps adjustment strategy which encompasses several measures. The first step, which was implemented during the period 1980-1987, has sought to reorganise the agricultural sector, industrial activities and the regional administrative structures. The second phase, which was initiated in January 1988, aims to introduce more freedom and economic liberalization into the system by giving more autonomy to the public enterprises and to implement more competition between the private and public sectors.

The reorganization of the industrial sector, which aimed to stimulate the production of consumption goods, has been conducted through the application of several policies. The first one consisted of correcting the arbitrariness in the allocation of the financial resources between hydrocarbons, and heavy and light industrial branches to allow the industries producing consumption goods to catch up with the other industries. The second policy has consisted of diversifying the production of hydrocarbons by encouraging the production of natural gas, condensates and refined products. Indeed

* Chadli Bendjedid had been elected President after the death of Houari Boumediene in 1979
by 1980 crude oil represented 73% of the total sales of hydrocarbons, while natural gas and condensates accounted for only 18.8% and 6.6% respectively. By 1986, the structure of sales of this sector had been transformed in the sense that crude oil accounted for only 26%, refined products represented 22%, liquidifed petroleum gas 4% and natural gas and condensates 24% each. The third policy consisted of reorganising the state owned enterprises to facilitate the management of these companies which, exploiting their statutory monopoly situation, had grown to large scale operations.

The management difficulties, the lack of efficiency and the relatively low level of utilization of the productive capacities of these enterprises have given rise to major bottlenecks which have intensified the shortages of consumption goods which, in turn, have increased the existing pressures on the consumption goods market.

The reorganization of the industrial sector had consisted of breaking up these giant enterprises into medium scale businesses so that it would be easier for the management teams to find the most efficient way of increasing the volume of their outputs, the productivity of their capital and labour force and hence the overall rate of return available from the enterprises.

The agricultural sector, which had been practically neglected in the previous development plans, has seen the implementation of a development programme which seeks to stimulate production in order to reduce food imports; the latter accounted for 60% of the domestic demand and represented 25% of total visible imports in the beginning of 1980 [62]. This programme had consisted of reorganising the state owned farms in a more manageable way, developing water supplies and extending the cultivatable land by exploiting the Inland and Southern part (Sahara) of the country.

In the civil service, a process of decentralization has been initiated to shorten the bureaucratic length of the administrative procedures to decrease their costs in money and time and to diminish
the institutional rigidities which thwart the blossoming of the entrepreneurial capability of the Algerian economic agent. This decentralization sought to give the regional and local authorities the legal and administrative means to be decision making centres, taking over the decision making process from the central bodies.

Finally, a new status has been given to domestic private capital [63] which allows private capital to be integrated in the economic policies of the government. The integration of private capital in governmental policies has been induced by two necessities. The first one is the necessity of mobilising all the domestic resources so that the entire economy would respond more efficiently to the difficulties generated by the internal economic pressures and the uncertain evolution of the oil and gas market upon which Algeria is too dependent. The second necessity, which is rather a consequence of the first, is to take into consideration the important potentialities and expertise of the private sector, which had grown in the shadow of the public sector, to diminish the important waste of domestic resources.

The second step of the strategy, which has been initiated since January 1988, seeks to introduce more freedom and competition in the Algerian economic system through reforms in both the agricultural and the industrial sectors.

In the agricultural sector, deeply affected by the agrarian reform of Boumediene's government which sought to introduce more social justice by redistributing the lands among the agricultural labour force and by giving to this sector a socialist organisation, two measures have been adopted. The first one consists of splitting the state owned farms into small cooperatives of 4 or 5 individuals on average who will improve land utilisation. The second measure, which is part of the important programme of development of new cultivatable lands, consists of giving the lands developed (mise en valeur) to private ownership.
In the industrial sector, the policy adopted seeks to give more freedom and autonomy to public enterprises by cutting the 'umbilical cord' tying them to their supervisory ministries; by so doing they could now act as profit making centres away from any state interference. This reform, which is embodied in the Public Enterprise Autonomy Act [64] introduces a new concept for the public company. Indeed, the change of the status of the public enterprises permits the state to restrain itself from intervening directly in the management process and to become mainly an investor among other investors holding a proportion of the capital of these enterprises in the form of shares. The other investors, which should have the status of public companies, might come from the financial, industrial and commercial sectors.

Through this concept of shareholding the authorities have introduced a process of autonomy which is materialised in the endowment of the public companies with a Board of Directors. Indeed, these institutions, instead of having their Director General appointed by the supervisory ministry, are provided with a Board of Directors, representing the shareholders, which elects the Chairman and which defines the strategy of the company taking into consideration the interests of the enterprise. The Chairman is accountable to the Board of Directors and the enterprise is governed by the regulations stated in the Commercial Act. It is worth noting that this reform does not induce, at least at this stage, the creation of a stock exchange nor the participation of private capital in public companies.

3.6 CONCLUSION

This analysis of the real sector, leads to the conclusion that the economic environment in Algeria, which has been strictly controlled by the state, is characterised by important structural imbalances which are expected to influence considerably the demand for real balances. More precisely it is expected that the restrictive
measures to control consumption and the insufficient production of consumption goods would have a strong impact on the individuals' money holdings in this controlled developing economy.
CHAPTER IV

THE ALGERIAN MONETARY SECTOR

This chapter seeks, by focussing the attention mainly on the so-called organised monetary market, to point out the monetary factors which may affect the demand for money in Algeria.

The Algerian monetary sector is examined through the banking reform of 1971, the repercussions of this reform on the financial operators, the black monetary market, the monetary aggregates and the foreign financial flows.

4.1 STRUCTURE OF THE ALGERIAN MONETARY SECTOR

The present monetary system had been introduced in Algeria by the French as a support to the process of colonization by providing the settlers and newcomers with financial services. By the end of that era (1960), one hundred and forty (140) towns and cities were provided with financial services and four hundred and fifty (450) bank branches were registered [64]. These were mainly at the service of the settlers. The whole banking system was under the supervision and control of the Banque d'Algerie which had been created in 1851 (Loi du 4 aout 1851).

After the official proclamation of independence on the 5 July 1962, the Algerian authorities initiated a progressive process of nationalization and take over so that Algeria could recover her financial sovereignty.

This process had begun by the taking over of the Banque d'Algérie* in December 1962 and by the setting up of the Caisse Algérienne du Développement in 1963 (Development Fund); this had the task of

* which became Banque Centrale d'Algérie (BCA)
financing development projects of both the public and private sectors which needed medium and long term financial resources.

In 1966 and 1967, three state owned commercial banks - Banque Nationale d'Algerie (BNA), Credit Populaire d'Algerie (CPA) and Banque Exterieure d'Algerie (BPA) - emerged from the nationalisation and take over of the local and foreign banks. These banks had previously specialised in short and medium term financing.

With the banking reform of 1971, the Caisse Algerienne du Developpement became the Banque Algerienne du Developpement (BAD); the commercial banks saw the relationships with their customers changing from a contractual to a uniform obligation relationship; this was to the detriment of the client and the big customers, in particular the public enterprises who lost their freedom to choose their bank.

In 1982 following the reorganization of the financial and banking institutions, two new state owned banks were created: the Banque du Developpement Local (BDL) and the Banque de l'Agriculture et du Developpement Rural (BADR). In January 1988 with the adoption of the Public Enterprise Autonomy Act, the government re-introduced both the contractual relationship between the bank and its customers and the freedom for public companies to choose their bank or banks on the basis of the most attractive banking services.

Finally and alongside these banking establishments several financial institutions had been created in the 1960s such as the Saving Fund (Caisse Nationale d'Epargne et de Prevoyance - CNEP) and different insurance companies.
4.2 THE FINANCIAL REFORM OF 1971

Until the launch of the development programme financial problems were simple and easy to solve. Working expenses and non-productive investments were covered by the budget, while productive investments, which at that time were not substantial, were financed by the commercial banks.

The launch of the development strategy and the refusal of the banking institutions to finance easily and automatically all the governmental projects had obliged the government to increase its financial support to the public enterprises through the budget: in their manner the public companies could handle the ambitious investment policy. However, the intensification and expansion of the financial needs of the public enterprises had compelled, in 1971, the authorities to reform the system.

Far from overturning the financial structure which existed at the beginning of the 1970s, this reform restricted itself to bringing about a 'better' utilization of the system by securing a strict control over the financial flows and by imposing a strict discipline upon the financial and banking institutions so that the whole system would be at the service of the development strategy.

The basic principles of this reform were: firstly, that the productive investment of the public sector must be financed by temporary inputs (loans) rather than definitive inputs from the budget as they had been for several years; secondly, the financial resources should be centralized to permit a redistribution in accordance with the objectives of the different development plans; thirdly resources which were collected through the Treasury channel and which were composed of savings attracted by the Savings Fund, insurance companies, pension funds and social security organisations should be put at the disposal of the Banque Algérienne du Developpement (BAD) which would cover the long term investments. The medium term loans would be provided by the commercial banks to the
public enterprises in addition to the short term credits granted in the context of working capital. The remaining needs should be met, according to this reform, by external loans; fourthly the Algerian Development Bank (BAD) which would grant loans, should be conceived as a purely technical body and a coordinating centre which should seek to induce a financial coherence of the investment decisions in accordance with the guidelines and instructions of both the Ministry of Planning and the Ministry of Finance.

This reform, as it might be expected, had had important repercussions on the financial operators, in particular the Central Bank, the commercial banks and the savers.

4.3 THE REPERCUSSIONS OF THE REFORM ON THE CENTRAL BANK, THE COMMERCIAL BANKS AND THE SAVERS

The major effect of this reform had been the dilution of the power of control of the Central Bank over the monetary system. Nowadays, its role consists of only managing the foreign reserves of the state and providing the economy with the 'adequate' volume of liquidity either by rediscounting and taking in short-term papers or by granting advances to the Treasury and to the commercial banks. This lack of autonomy and power of the Central Bank had been substituted by the absolute control of the Minister of Finance over the whole system.

The monetary policies were elaborated by the Ministry of Finance and issued by the Minister of Finance using directives and moral suasion through the heads of the commercial banks (Director Generals) who were appointed by him largely on the basis of their political allegiance and skills [65].

* The Ministry of Planning was dissolved in December 1987 and replaced by a National Planning Council
The weakness of the Banque Central d'Algérie had been induced by the neutralization of its instruments of intervention. This process of neutralization had been initiated in fact in 1965 by lifting any restraint in granting advances to the Treasury. Indeed, until 1965 the advances to this institution had been regulated by the status of the Central Bank which fixed their volume up to 5% of the amount of the tax receipts, excluding oil-tax, and the terms of the credit lines up to two hundred and forty (240) days per year. However these regulations had been abolished by the budget of 1965. This measure had been followed in 1972 by a decision of the Minister of Finance to fix the discount rate of the Central Bank at 2.5%. This rate had been kept unchanged from February 1972 until it was increased to 5% in August 1987.

Such a policy had allowed the government to return frequently and increasingly to the Central Bank to meet its financial requirements inducing a rise of the claims of the issuing institution on the government. Indeed the claims of the Central Bank on the government had been multiplied by approximately 23 times over the period 1964-1984 (graph 4). This ascending trend might be studied through three stages: 1965-1971; 1972-1974 and 1975-1985.

In the first sub-period, because of the increasing intervention of the government to back up its enterprises, these claims had nearly been tripled (2.76 times). In the second period (1972-1974), the active government policy of running down its debt had allowed these claims to fall, to represent by the end of 1974 only 15% of the volume of 1972. This fall of the government debt had been induced by two factors: the implementation of the financial reform and the increase in oil prices in 1973-1974 which augmented the tax receipts of the government. Finally in the third period the claims had known another increase which was sharper than that in the first sub-period. During this third sub-period the debt of the government had been multiplied by 68.3 times with, however, a small break earlier in 1979 following another rise in the price of oil.
Graph 4: Claims on the Economy

Legend
- BCA claims on GOV
- Banks claims on entrep
The second effect had been the rapid rise of the claims of the commercial banks on the public enterprise which are their main and predominant borrowers*. Indeed, though these claims had grown between 1965 and 1970 by four times, they had increased so quickly between 1971 and 1984 that they reached a volume which was 20 times bigger than that of 1971 (graph 4) with an average rate of growth of nearly 30% per annum.

To match this increasing demand for funds, the three state owned banks (BNA, BEA and CPA) had to use most of their resources, especially their sight deposits which constituted more than 75% of their liabilities. Such a phenomenon might be perceived through the analysis of the available figures of the liquidity ratio from 1967 to 1978 [68]** (graph 5). Indeed, the banking regulations used to impose on the banking institutions a strict discipline so that they would maintain on a day to day basis a minimum of 60% of short-term or realisable assets to short-term liabilities. However, the available data indicate that the level of this ratio for the whole banking system had been falling progressively from an average of 60.4% in 1967 to a level of 39.7% in 1978.

Finally the third repercussion of this financial reform, which concerns the Algerian saver, has been the inability of the financial institutions to provide the saver with attractive savings opportunities. Indeed, the Algerian commercial banks have been offering only three types of savings facilities. The first one is the time deposit. Their terms vary from two months up to two years with a minimum deposit of AD 100,000 and their level of interest obviously linked to the length of the term of the deposit. The second type is the special housing account, and the third the 'Bon de Caisse' which might be considered as a sort of certificate

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* Private enterprises and individuals (or personal sector) were excluded from the lending process
** The liquidity ratio discipline had been considerably affected by the reform of 1971 in the sense that it had been rendered ineffective
Graph 5: Liquidity ratio of the commercial banks 1967, 1978
of deposit. The main trait, however, of these savings services is that they are not only financially unattractive but also they are a bad hedge against inflation since their real returns have been negative from 1972 to 1981. This loss of purchasing power had increased from year to year because of the rising rate of inflation and the unchanged set of interest rates.

Except for these thin facilities, Algerian individuals have no other alternative to invest or to hedge* against inflation. Neither a stock exchange exists, nor is there the possibility to invest in foreign markets because of the restrictions imposed on capital flows and the rate of exchange. The only possibility might be the parallel market. However there is little or no information available to confirm it.

Indeed to finance the programme of development, the government imposed a very strict control on foreign financial flows. Every foreign financial transaction must have the agreement of the Central Bank, every business plan must specify to the authorities the amount of foreign currencies needed and all the foreign contracts are checked by agents of the Ministry of Finance. Moreover individuals are not permitted to buy foreign currencies from the domestic financial institutions, except the small travel allowances; although since July 1986 they have been allowed to hold foreign currency accounts with the domestic commercial banks.

Such a strict control on foreign currency movement does not allow the Algerian individual to invest in foreign markets and consequently prevents them escaping from the lack of investment opportunities in the domestic financial market.

* Except may be the Savings Fund, the Treasury Bonds and the 'bons d'equipements'
Like many other developing economies, Algeria has two monetary markets: the organised market and the unorganised or 'informal' monetary market. The black or parallel market [69], which has neither a supervisory body nor well defined rules, is comprised of individuals and private businesses to whom access to the facilities of the Algerian banking institutions is impossible.

Indeed, to put a maximum of the domestic resources at the disposal of the state owned enterprises, the Algerian monetary authorities had obliged the commercial banks to tighten to its extreme their credit policies vis a vis domestic private capital. To survive, the private capital has been forced to create its own financial network which is now beyond any control and which is apparently very efficient judging by the proliferation of small privately owned businesses.

The borrowing-lending operations are made, in most of the cases, through a network of alliances of families, relatives and friends and the lending operations are made in the form of advances for an agreed length of time or in the form of commercial credits when industrial relationships are involved. Neither an interest rate is paid, because of the teachings of Islam, nor are collaterals required. The only requirements are a promissory note to repay the loan in due time or, in certain circumstances, an oral promise in front of two witnesses. When profits and losses are involved, the returns of the lender are determined by various arrangements between the parties concerned.
4.5 THE MONETARY AGGREGATES

The effect of this monetary policy has been an exponential increase of the stock of money between 1965 and 1985 (graph 6), especially after 1972. Indeed, in the sub-period 1972-1985 M1, M2 and M3* had expanded respectively by 12.02 times, 12.34 times and 13.34 times. Whereas they multiplied between 1965 and 1971 only by 2.76 times, 2.92 and 3.04 times respectively.

Their average rates of increase, during the first sub-period (1965-1971) were 16%, 16.85% and 13.57% respectively. During the second sub-period (1972-1985) they increased respectively on average by 21.78%, 22% and 22.35% per annum. The major boost had been given between 1972 and 1978 with the implementation of the first and second four year plans. During this stage of development the average increase per annum had been of 25.14% for M1, 25.42% for M2 and finally 25.28% for M3.

The disaggregation of the stock of money (graph 7) shows that although money in hand and sight deposits are far bigger in volume than time and savings deposits, the speed of increase of the near monies is much greater than that of money in both sub-periods (1965-1971 and 1972-1985). Indeed, money outside banks and current deposits had grown from 1964 to 1971 by respectively 2.2 times and 3.82 times, time deposits had been multiplied by 17 times between 1964 and 1971 and finally savings accounts had expanded from 1966 to 1971 by approximately 16.6 times.

In the second sub-period, 1972-1985, it might be noticed as well that although the creation of money had grown, the volume of the savings had grown faster than currency in hand or sight deposits. Indeed, while time deposits and savings accounts were growing respectively by 15.5 times and nearly 30 times at an average rate of

* M1 is defined as currency outside banks plus sight deposits, M2 as currency outside banks plus sight deposits plus time deposits and bonds, and finally M3 as M2 plus savings accounts held with the Saving Fund - CNEP.
Graph 6: Stock of money

Legend
- M1
- M2
- M3


AD million: 0, 50000, 100000, 150000, 200000, 250000
Graph 7: Disaggregation of stock of money

Legend
- □ currency in hands
- □ sight deposits
- ● time deposits
- ○ savings

Year

Million
growth per year of 26% and 30%, currency in hand and current accounts had been multiplied only by nearly 11 times and 12.5 times respectively with an average annual rate of growth of 21% for money outside banks and 22.78% for current accounts.

Finally the comparative study of the annual rates of growth of the stock of money and those of the national income shows that the authorities had left both the stock of money and the national income to grow independently and free from any restrictions or relationship that might link their growth during this process of development and industrialisation.

Indeed, graph 8, which represents the difference of the annual rates of increase of these aggregates (stock of money minus national income) shows very wide fluctuations from year to year between 1966 and 1982, sometimes positive and sometimes negative. During this period, not less than nine (09) years out of seventeen (all three types of money combined) have a positive difference between annual rate of growth of the stock of money and the annual rate of increase of the national income. Out of these nine years not more than three (03) years have a difference which is lower than 5%. All the remaining positive differences are well above this level. The highest difference had been reached in 1975 with a figure of 25%. The creation of money and its injection in the economy had been an important element in the programme of development of the Algerian government.

4.6 BALANCE OF PAYMENT, EXTERNAL DEBT AND EXTERNAL ASSETS OF ALGERIA

The study of the trade balance shows that the foreign commercial transactions of Algeria have been growing from a small surplus of US$57 millions in 1964, to US $3557 million in 1984 with a peak of US $4056 million in 1980. This growth of the trade balance, however, has not always been positive. It has gone through phases where the balance of trade was in deficit (see Table 4.1, Appendix I).
Graph 8: Money growth rate minus Income growth rate
The analysis of the trade surpluses and deficits in relation to the development of exports and imports shows that the trade balance has been considerably influenced by two factors: hydrocarbons and the development plans. Indeed, the period of trade deficit (1969-1978) is a phase of rapid industrialization which had seen the implementation of the first four year development plan (1970-1973) and the second four year plan (1974-1977) and which had required the acquisition of capital goods from abroad to build up the industrial base. During the implementation of the first four year plan, imports had been multiplied by 1.98 times (US $1078 million in 1970 - US $2141 million in 1973). The realisation of the second four year plan had induced an increase of imports of about 1.70 times (US $3667 million in 1974 - US $6198 million in 1977). During this entire period of deficits (1969-1979), imports had grown by 7.66 times.

The post-1980 period (1980-1984) had seen a stabilization of imports within the range US $10,000 million and US $9000 million. This was the result of the implementation of the adjustment policies and the improvement in the planning and control of imports through a better control over both the general programme for imports (Programme General d’Importation - PGI) which reflects the requirements of the entire economy and the global import authorisations (Autorisations Globales d’Importation - AGI) which reflects the needs of each public enterprise.

The trade surplus, especially between 1980 and 1984, has resulted from an improvement in the terms of trade of Algeria. In addition to the better control of imports, this improvement had been induced by an increase of the receipts of the hydrocarbon sector* due to a rise in the oil price and the policy of diversifying the products yielded by this sector.

* Hydrocarbons represent about 98% of exported products
Moreover the study of the current account balance shows that private and official transfers have a minor role within the structure of this balance. This might be perceived through both the small amount transferred in and out of the country and the descending trends of the transfers. This phenomenon is particularly important for private transfers, which implies a lack of possibilities for the Algerian individuals to move their capital from Algeria to foreign economies. The analysis of the private transfers, which comprise mainly remittances from Algerians working in Europe (particularly in France), shows that they had gone through two phases: a first phase during which they had been rising (US $97 million in 1964 - US $386 million in 1976) and a second phase in which they decreased to reach US $186 million by 1984. This descending trend might be explained by the fact that the Algerians working in Europe prefer to import physical goods, principally cars and luxury goods, and to sell them on the black market at high prices reflecting the high demand of Algerian consumers rather than to transfer cash to their relatives in Algeria at an exchange rate which penalises them*. The analysis of the external debt of Algeria shows that with the implementation of the adjustment policies in 1980, the government had been running down the external debt of the country. Indeed, in December 1979 the external debt amounted to US $23,376.6 million, by the end of 1983 this amount had been halved (US $12,942.5 million). This policy has permitted an improvement of the debt service ratio which is estimated to be over 55%. Whereas during the implementation of the development strategy, the Algerian government had been borrowing heavily from the foreign commercial banks which were, in addition to the credit suppliers, the main foreign sources of funds (Table 4.2, Appendix I).

Finally, the analysis of the structure of external assets of Algeria (Table 4.3, Appendix I), shows that the Algerian commercial banks had been very dynamic in acquiring foreign assets between 1964 and

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* The Algerian Dinar is quoted at an artificially high exchange rate
1982. Indeed in 1964 commercial banks' foreign assets represented a total of US $191 million, by 1973 they increased to US $702 million and by 1982 they reached US $3009 million, although by 1983-1984 this trend had been reversed. Their foreign assets represent the participation of the Algerian banks in the capital of foreign holding companies and overseas banks, such as the European Arab Holding SA-Luxembourg and the Union Mediterraneene de Banques - Paris, for their own interests as state owned institutions.

4.7 CONCLUSION

The analysis of the monetary sector of Algeria shows that a strict control had been imposed upon the financial institutions which had been used as an instrument to fulfil the needs of the development strategy. Moreover the Algerian conception of the financial system did not allow either the creation and emergence of a stock exchange nor the possibility for Algerian individuals to invest their savings in foreign financial markets, despite the unattractive savings facilities which are dictated by the unchanged and unvarying set of interest rates domestically. Finally, the study of the monetary aggregates indicates that the money injection in the economy, which had been used as an important pillar of the strategy of development, had been accompanied by a rapid rise in the volume of savings.
CHAPTER V

THE DEMAND FOR MONEY IN ALGERIA

The study of the real and monetary sectors of Algeria has shown that the strategy of development adopted and its corollary, the organization of the domestic economic system, have induced the emergence of several features, such as the restrictions on consumption and the exponential rise of the stock of money, the augmentation of the national income while the productive apparatus is inefficient and an underdeveloped monetary market despite the increasing volume of savings. These features are expected to have an important impact on the monetary behaviour of Algerian individuals and consequently on the demand relationship for money. The aim of this chapter is to determine the nature of this relationship by defining its appropriate determinants.

To reach this objective, several regressions have been estimated in which different potential variables have been tested. The difficulties encountered (multicollinearity and the problem of the sign for the price level) during the computations have induced the use of two alternative lag generating mechanisms. The first mechanism is the Koyck lag technique and the second one is the Almon polynomial lag distribution process. The most appropriate determinants of the demand function for real money are selected on the basis of their statistical results and the appropriate function or relationship is chosen on the basis of the highest coefficient of determination.

The Koyck technique, which has been used to determine the roles of expected income and expected price level in the relationship, did not perform as was expected. To overcome the difficulties which have appeared in the first model, a second model has been elaborated using the Almon-lag technique as a substitute to the Koyck process. These two models are presented in this chapter, their results are
analysed statistically and the estimates are given a logical, economic interpretation.

5.1 DEFINITIONS, ASSUMPTIONS AND SOURCES OF DATA

It has been seen through the empirical works in Chapter II that, although there is a consensus among investigators that the formulation of the demand function for money should include as determinants both a scale variable and variables representing the opportunity cost of holding money, there are divergences among them about the definitions of the independent variables and about the dependent one.

In this study the stock of money is tested using three definitions of money: M1 which is composed of currency in hand of the general public, sight deposits, checking accounts held with the post office and current deposits of various public institutions held with the Treasury; M2 is M1 to which bonds and time deposits have been added and, finally, M3 which is composed of M2 plus savings accounts held with the savings fund (CNEP). This choice has been induced by the desire to take into consideration both the transactions and the asset motives of holding money.

Theoretically the opportunity cost of holding money should be composed of expected returns on physical goods and on financial assets. However in this study the expected return on financial assets is not taken into consideration because of both the characteristic of domestic interest rates and the difficulty of using foreign interest rates. Indeed, the static nature of the interest rates in the domestic monetary market thwarts the appearance of an empirical relationship between real cash balances and this variable and therefore implies the non-utilization of the interest rate in the model. Moreover the strict control exerted on the foreign capital flows, through the strict control and management of the exchange reserves of the country, makes the use of foreign
interest rates, as a substitute for domestic rates, rather ineffective and unrealistic.

In these conditions the opportunity cost will be approached only by the expected return on physical assets, which will account for the real substitution effect, through the expected price level; the GDP deflator is used as a proxy to it. The scale variable, finally, is determined empirically, though real national income (GNP) is expected to be the appropriate scale variable.

The demand for real cash balances, which is based on the quantity theory, has been given the following form:

\[ M^d = f(P, Y) \]

where \( M^d \) stands for the demand for money or real cash balances, \( P \) for the price level and \( Y \) the scale variable to be determined. In addition, this function has been surrounded by three assumptions. The first one assumes that the supply of money is exogeneous to the system. The second one supposes that the demand for money is equal to its supply i.e. that the monetary market is in equilibrium and finally, the third assumption assumes that individuals adjust their cash balances to the desired level within one period of time, that is the calendar year. The technique used to compute the estimates is the Cochrane-Orcutt method* which is incorporated in the TSP package [70]. The period studied is 1965-1982. It encompasses the three year plan (1967-1969), the first four year plan (1970-1973), the second four year plan (1974-1977) and the first three years of the first five year development plan (1980-1984).

In Algeria, the main source of information was the Ministry of Planning. However the time series available are not long enough to be used in the regressions, therefore to get around this difficulty

* This method is used to avoid the problem of autocorrelation.
different sources have been combined to provide adequate, continuous observations. Indeed the data on the stock of money, GDP, the GDP deflator and the population are taken from the 'International Financial Statistical Yearbook' for the year 1985 published by the IMF. Data on the national income are derived from two sources. The first one is the 'Annuaire Statistiques de l'Algerie' of 1979 and 1982 which used to be published by the Ministry of Planning and the second source is the 'African Statistical Yearbook' of 1974 published by the United Nations.

5.2 THE FIRST MODEL*

Given this information, the first step in the empirical investigation consisted of determining the scale variable by choosing the most appropriate variable among two potential determinants: real national income (real actual GNP) and expected income. To eliminate the inappropriate determinant, a two stage comparative statistical study has been conducted between these two potential variables. In the first stage both real GDP and real national income have been tested and their statistical results have been analysed. In the second stage, a third regressive equation, in which expected income has been used as the scale variable, has been estimated and the statistical results have been compared with those of the equation in which real national income is the scale variable. The chosen scale variable of the demand function for real cash balances will be the aggregate which has the most satisfactory statistical result.

In the first stage of this comparative study the demand function for money has been given the following form:

\[
\log_{10} \frac{M_t}{P_t} = \alpha_0 + \alpha_1 \log_{10} Y_t + U_t
\]

* The statistical results of the regressions of the first model are given in Appendix IIA.
where $\log \frac{M_t}{P_t}$ stands for the logarithmic value of real cash balances, $\log Y_t$ is the logarithm of the scale variable (real GDP/real national income) and $U_t$ is the disturbance term. $\alpha_1$, which is the scale variable elasticity, is expected to be positive.

The computations, in this first stage, have shown that there are significant differences between the use of real national income and the use of real GDP as scale variables. Indeed, the adjusted coefficient of determination has been, except for M3, higher when real national income has been used as a scale variable than when real GDP was used. These coefficients are equal to 0.888, 0.909 and 0.927 for M1, M2 and M3 respectively when real national income is used as a scale variable, while they are equal to 0.439 for M1, 0.815 for M2 and 0.972 for M3 when real GDP is the scale variable. In addition, the F-statistics are higher when real income is used in the regressive equation than when real GDP is used. The null hypothesis that $\alpha_1 = 0$ is rejected in both cases at a 99% level of confidence. Since the data on the real GDP and the real national income are taken from two different sources*, the differences in the results are attributed to the quality of the information used to compute them.**

The elasticities for the three definitions of money with respect to real income are positive, as expected, and, like in many investigations relative to the less developed economy, above unity and within the range of elasticities defined by Crockett and Evans. These income elasticities, which are highly significant (1% level of significance) are equal to 1.18, 1.20 and 1.32 for M1, M2 and M3 respectively.

* The IMF for the GDP and the Algerian Ministry of Planning for the national income
** It was expected that the use of both real GDP and real national income would lead to the same statistical results since real GDP is equivalent to real national income less property income from broad.
When these regressive equations have been deflated by the number of people, the coefficients of determination for the demand relationships using real per capita income have fallen to range within the interval 0.59-0.68 which indicates a weaker relationship between per capita real cash balances and real per capita income.

The next step consisted of determining how the expected income would perform as a scale variable. In this perspective the demand function for real cash balances becomes:

$$\log \frac{M}{P} = a_0 + a_1 \log Y_t^e + U_t$$

in which $\log Y_t^e$ represents expected income in logarithmic terms at time $t$.

The expected income, which is thought to be a proxy to expected yields on wealth, is assumed to be generated by an adaptive expectation mechanism of the following type:

$$\log Y_t^e - \log Y_{t-1}^e = \lambda (\log Y_t - \log Y_{t-1}^e)$$

with the coefficient of expectations $\lambda$ lying between zero and unity ($0 < \lambda < 1$). It is supposed, through such a process, that the economic units revise their expectations "in proportion to the error associated with the previous level of expectations" [71].

The substitution of $\log Y_t^e$ by its expression into the demand function and the use of the Koyck transformations give the following regressive demand function:

$$\log \frac{M}{P} = a_0 + a_1 \log Y_{t-1} + a_2 \log \frac{M}{P}_{t-1} + V_t$$

with $a_0 = a_0 \lambda$, $a_1 = a_1 \lambda$, $a_2 = (1-\lambda)$, and in which $\log Y_{t-1}$ represents the logarithmic value of actual real income lagged one time period, $\log \frac{M}{P}_{t-1}$ is the stock of money in real terms lagged one time period and $V_t$ is the disturbance term. $a_1$, which
represents the elasticity with respect to expected income, is expected to be positive and finally the income coefficient of expectations \( \lambda \) is expected to be relatively high as in most of the investigations relative to the developing economies.

The estimations have given higher coefficients of multiple determination than those obtained when real national income was used. Indeed, the adjusted coefficients of determination are equal to 0.934, 0.920 and 0.930 for M1, M2 and M3 respectively. The F-statistics are highly significant (99% level of confidence) and the estimated coefficients have the expected sign. However, the elasticities of the demand for money with respect to expected income have been found lower than those with respect to real income and closer to unity: 1.027 for M1, 1.073 for M2 and 1.162 for M3. Moreover, unlike in many empirical studies relative to developing countries, the coefficients of expectations \( \lambda \) have been found quite low: 0.44 for M1, 0.52 for M2 and 0.46 for M3. However the main problem with the use of expected income as a scale variable is the statistical insignificance of the estimated coefficients which underlie a problem of multicollinearity. This problem has appeared as well, when per capita permanent income has been used as a scale variable.

Indeed, although the adjusted coefficients of determination have been found high*, the t-statistics of the estimated coefficients relative to the scale variable, that is permanent income per capita, have been found statistically insignificant. Besides the problem of multicollinearity, when per capita permanent income is used the elasticities of the demand for money with respect to the scale variable have dropped below unity: 0.901 for M1, 0.915 for M2 and 0.915 for M3. Secondly the income coefficients of expectation are smaller than those of the aggregated permanent income: 0.363 for M1, 0.418 for M2 and 0.234 for M3.

* They have been found higher than those of the regressions using real per capita income as a scale variable.
Because of the biased estimates for permanent income, no judgement could be made about which variable of the two aggregates: real national income - expected income, would be the appropriate scale variable for the demand function for real balances in Algeria.

The problem of multicollinearity might be due to the use of unreliable sets of data and therefore to overcome this obstacle new sets of information should be used. It might also be due to the use of an inadequate specification of the demand for money relationship and hence another specification should be used to solve the problem. The first solution is rather difficult to realise, but the second one is feasible. Before using another specification, it is instructive to continue the investigation using the Koyck lag process to see how the expected price level would perform.

The price level expectations, like the income expectations, are assumed to be generated by an adaptive expectation process of the form:

$$\log P_t^e - \log P_{t-1}^e = \theta (\log P_t - \log P_{t-1}^e)$$

with $\theta$, the price level expectations coefficient, ranging between zero and unity.

Given the size of the sample (small sample), it would be difficult to test an equation in which both expected income and expected price level are used as determinants, because the degree of freedom, which would be obtained when the equation is reduced, would be relatively small and hence the risk of obtaining insignificant estimates would be high. In these conditions, the expected price level variable, which would represent the opportunity cost of holding money, would be tested alongside the actual real national income.

In this instance the monetary demand function becomes:

$$\log \frac{M_t}{P_t} = \alpha_0 + \alpha_1 \log P_t^e + \alpha_2 \log Y_t + U_t$$
where \( \text{Log } Y_t \) stands for the logarithmic value of measured real national income and \( \text{Log } P_t^e \) is the expected price level and the reduced form of the regressive equation is as follows:

\[
\log \frac{M_t}{P_t} = \beta_0 + \beta_1 \log P_{t-1} + \beta_2 \log Y_t + \beta_3 \log Y_{t-1} + \beta_4 \log \frac{M_{t-1}}{P_t} V_t
\]

where \( \beta_0 = \alpha_0 \); \( \beta_2 = \alpha_2 \); \( \beta_4 = (1-\theta) \)

\( \beta_1 = \alpha_1 \); \( \beta_3 = -\alpha_2 (1-\theta) \).

The elasticity with respect to the expected price level is expected to have a negative sign and the income elasticity a positive one. The elasticity of expectation \( \theta \) is expected to be relatively high.

The estimations of the regressive equations for \( M_1, M_2 \) and \( M_3 \) have given satisfactory coefficients of determination, since the adjusted coefficients obtained are equal respectively to 0.899, 0.949 and 0.958. However the estimates have been found insignificant which implies a problem of multicollinearity. Moreover it has been noticed that the expected price level variable has a positive sign instead of a negative one which is in contradiction with the conventional theoretical arguments employed. These two problems (problem of multicollinearity and problem of the positive sign) have appeared also when this demand relationship has been investigated on a per capita basis.

It is thought that these two problems are due to the type of process used to generate expectations in the monetary demand model in this study. Indeed both Goldfeld and Darrat have had to face these difficulties in their studies of the demand function for money. The former had had to overcome the multicollinearity in his article "The demand for money revisited" [72], while the latter had to get around
both obstacles, the wrong sign of the price level and the statistical insignificance of the estimates, in his study of "The demand for money in some major OPEC members: regression estimates and stability results" [73]. The solution to these problems consisted of replacing the Koyck-lag mechanism by the Almon lag generating process in the model. The Almon distribution lag had been chosen by these two authors for its simplicity.

5.3 THE SECOND MODEL*

Given the difficulties which have emerged in the first attempt to determine the nature of the demand relationship for money and the solution proposed by Goldfeld and Darrat, a second model has been elaborated in which the Almon polynomial lag distribution process is used to represent the expectations structures in the demand function for money.

Under this hypothesis, the variable modelling the expectations is given by a distributed lag of its own current and past values:

\[ \sum_{i=0}^{n} \omega_i x_{t-i} \]

where \( \omega_i \) is the lag weights and \( n \) the lengths of the lags. Like Darrat, the Almon procedure is used without the end point constraints and no restrictions are imposed on the sign of the lag weights. Finally both the degree of the polynomial and the lengths of the lag are determined empirically.

With these assumptions, the new regressive equation representing the relationship between real balances and permanent income, since in the first model the role of expected income could not be determined, has been given the following form:

* The statistical results of the second model are given in Appendix II.B.
\[
\log \frac{M_t}{p_t} = \alpha_0 + \alpha_1 \sum_{i=0}^{n} \omega_i \log y_{t-1} + u_t
\]

in which \( \omega_i \) stands for the unconstrained Almon lag weights, which might be positive, negative or null, \( n_j (j = 1, 2, \ldots) \) are the lengths of the Almon lag and finally \( \alpha_1 \) represents the income elasticity which is expected to be positive.

Several series of regressions have been computed to determine both the degree of the polynomial lag distribution and the lengths of the lag. The selection has been based on the highest coefficient of determination obtained. The best results have been obtained using a quadratic polynomial lag with the lengths of the lag equal to 15 for \( M_1 \) and 16 for \( M_2 \) and \( M_3 \).

Indeed for \( M_1 \), the highest coefficient of determination has been obtained when \( n \) was equal to 15. The adjusted coefficient of determination was very close to 0.9 (0.896) and the F-statistic was highly significant (1% level of significance). Both the estimated coefficients for the real national income variable at time \( t \) and \( (t-1) \) were significant at a 99% level of confidence. The estimate of this variable at time \( (t-2) \) is significant at an 80% level of confidence. The derivation of the elasticity with respect to permanent income, however, has given a figure which is rather close to zero (0.194), while it was close to unity when the Koyck lag technique was used (1.073).

The same observations apply to \( M_2 \) and \( M_3 \). The adjusted coefficients of determination were found respectively to be equal to 0.923 and 0.947 (at \( n = 16 \)). Their F-statistics are highly significant and the estimated coefficients were found statistically significant at a 99% confidence level. The elasticities with respect to expected income were close to zero: 0.206 and 0.205 for \( M_2 \) and \( M_3 \) respectively.
The level of confidence obtained for the estimates implies that the use of the Almon technique has improved the results considerably and thus it appears to be a better specification than the Koyck-lag technique. Given the elasticities obtained, it appears that permanent income has little effect on the holdings of real balances in Algeria which implies that real national income is the appropriate scale variable for the demand function.

The computations using per capita values indicate the same features, in the sense that the lengths of the lags are equal to \( n = 15 \) for \( M1 \) and \( n = 16 \) for \( M2 \) and \( M3 \). The F-statistics are highly significant and the estimates are statistically significant. However the elasticities with respect to expected income have been found low indicating a small effect of expected income per capita on the per capita real cash balances.

The demand regressive equation in which price expectations are included as an explanatory variable, alongside the actual real national income, has performed in a satisfactory manner. This demand has been given the following form:

\[
\frac{\log M_t}{P_t} = a_0 + a_1 \log Y_t + a_2 \sum_{i=0}^{n} \omega_i \log P_{t-i} + U_t
\]

with \( \log Y_t \) standing for the logarithmic value of measured real national income, \( \log P_{t-i} \) for the logarithm of the price level, \( \omega_i \) representing the unconstrained Almon lag weights which have no restrictions on their signs, \( nj(j = 1, 2, \ldots) \) is the lengths of the Almon lag and finally \( a_1 \) and \( a_2 \) are the respective elasticities with respect to actual real national income and to the price level expectations.

The expectations are generated by a quadratic polynomial distribution lags and the lengths of the lag for \( M1 \), \( M2 \) and \( M3 \) have been found equal to 7. The adjusted coefficients of determination obtained are relatively high: 0.91, 0.866 and 0.875 for \( M1 \), \( M2 \) and
M3 respectively and the F-statistics have been found highly significant at a 98% level of confidence, except for the price level at time (t-2) which is significant only at a 70% level of confidence.

The most important finding of this second model is the sign of the expected price level variable. Indeed, while a negative sign was expected, a positive one has been obtained sustaining the Koyck lag specification sign for the price level. Besides this result, the values of the elasticities with respect to price expectations are significantly important. Their derived values have been found equal to 0.979 for M1, 0.845 for M2 and finally 0.803 for M3; whereas the use of the Koyck-lag technique has given lower elasticities which were respectively equal to 0.521, 0.525 and 0.539. Finally, the income elasticities which have the expected positive sign, are significantly above unity: 1.40 for M1, 1.27 for M2 and 1.37 for M3.

The per-capita regressions have given the same (positive) sign for the expected price level, but by introducing the population in the demand relationship the problem of multicollinearity has reappeared. Indeed, the estimates for the price level at time (t-1) have been found insignificant and those for the same variable at time (t) and time (t-2) are significant only at 80% level of confidence.

5.4 THE ECONOMIC INTERPRETATION OF THE RESULTS

The results relative to the scale variable, that is real national income, are in accordance with those obtained in most of the empirical studies of the demand for money in developing economies. Indeed, it has been observed that the demand elasticities with respect to real income fall, like in the study of Crockett and Evans [74] within the interval 1.00-1.50. Moreover, it has been noticed that the income elasticity for the broad definition of money (1.32 at 99% level of confidence) is well situated within the range 1.25-1.50 determined by these two authors.
The close examination of these figures has revealed two key features. Firstly the income elasticities indicate that the holdings of liquid balances, in Algeria, rise more than proportionately with income. This is verified not only when the real balances are related only to real national income, but also when they are related to both real national income and the expected price level. This kind of relationship means that money is considered in Algeria as a 'luxury' good, since money, through its income elasticities, appears to be a superior item.

The per capita income elasticity analysis gives rather a mixed signal. Indeed, when the real balances have been related only to per capita real income the figures sustain the above relationship, that is money is a luxury commodity. However when expected price levels are taken into consideration in the demand function, the income elasticities per capita contradict it and yield a relationship in which money grows less than proportionally with respect to real income per capita.

However, judging by the coefficients of determination and the level of significance of the estimates, it seems that the first relationship between money and real per capita income, that is money increases more than proportionally with income, is more probable than the second one.

The second feature, which has been identified by studying the demand functions in which the only determinant is the scale variable, points out that money in the narrow sense (M1) is subject to economies of scale. Indeed the comparison of the income elasticities between M1 and M3 (table below) shows that the elasticity with respect to real income is smaller when money is taken in the strict sense than when it is taken in the broad sense. This means that people make savings on transactions balances (M1) so that they could release more resources for the asset motive.
However this behaviour is not verified when the price expectations are taken into consideration in the demand relationship for real money.

**TABLE 5.1: INCOME ELASTICITIES**

<table>
<thead>
<tr>
<th>Monies</th>
<th>Elasticities</th>
<th>M1</th>
<th>M3</th>
</tr>
</thead>
<tbody>
<tr>
<td>In aggregate terms</td>
<td>1.18</td>
<td>1.32</td>
<td></td>
</tr>
<tr>
<td>In per capita terms</td>
<td>1.14</td>
<td>1.40</td>
<td></td>
</tr>
</tbody>
</table>

Although the results of the scale variable are in accordance with the empirical findings, the behaviour of the price level variable in this case appears to contradict them.

Indeed while a negative sign was expected, a positive one was obtained despite the changes introduced in the expectations generating process. Generally in such cases, price expectations are not accepted as a potential explanatory variable and thus they are dropped from the demand function on the ground that the sign obtained is a wrong one.

However, given the significance of the estimates it is thought that an explanation of this phenomenon is possible and does not contradict the teachings of the quantity theory of money. Such a phenomenon is considered to be an empirical verification of the real cash balance effect.

The statistical results, from which the elasticities with respect to the price level expectations are derived, show that the real balances are positively correlated to the expected price level. This relationship implies that when an increase in price level is expected people increase their money holdings, in other words when people expect that the price level is going to rise, instead of
increasing their stock of physical assets at present prices and foregoing the advantages generated by money through the running down of their liquid balances, individuals in Algeria build up their real balances by adding to their money holdings. It is thought that this positive relationship between expected price level and the money holdings is due to the characteristics of the supply function of goods of the Algerian economic system.

Indeed, to have the negative sign for the expected price level, that is a negative relationship between cash balances and expected price level, two conditions, at least, must be present. The first one is that the supply of physical assets must be flexible. The second one is that no restrictions are imposed on the goods markets. In the case of Algeria, these two conditions are not fulfilled.

First, because of the inefficient management of the productive capacities yielding durable and consumption goods, the supply function has difficulty in responding to the price level indicator. Secondly, the state has control over the network of distribution by means of both the public enterprises which provide the wholesalers and the retailers with the goods and the monopoly over foreign trade. This control generates bottlenecks because of the inefficient organisation of the wholesale network and the absence of a functional system to assess the quantitative needs of the consumers which in turn affect the plans or programmes of imports (AGI and PGI). The combination of this rigid supply function and these market imperfections provoke shortages which are intensified and propagated by the long bureaucratic procedures to import the required goods. Therefore products, which might be used as a hedge against inflation such as television sets, hi-fi apparatus, washing machines, cars and so forth, are not available regularly through the state network and their acquisition necessitates, through this state network, long delays.

These kinds of products might be purchased through the black market, however the quantities available are not sufficient and hence their
prices are very high. The high prices paid in the parallel market are induced, among other things, by the high exchange rate of foreign currencies in the black market and the high duties applied on the imported products. Most of the products sold in the parallel market, indeed, are imported and the dealers, because of the exchange limitations imposed by the exchange regulations, are obliged to buy the foreign currencies at a high rate from the black exchange market which contributes considerably to the swelling of prices. For instance, the most popular foreign currency, which is the French Franc, is rated in the black exchange market at \( FF1 = AD \) 2.5 to AD3 and sometimes higher. With this rate a car which is bought in France at FF40,000 (for example) is sold at a price of approximately AD150,000 in Algeria, that is \((40,000 \times 3)\) plus other charges (such as duties, transport costs, insurance etc) plus profit.

In these conditions, when individuals expect that the price level (or the shortages) is(are) going to rise, they expect that their balances are going to fall in terms of purchasing power, and hence to diminish the effect of the monetary erosion they build up their real balances by adding to their money holdings.

Indeed, if individuals prefer not to buy from the black market, because of the high prices, they have to wait for the product to be available in the state network, which might take several months if not years (in the case, for example, of the waiting list of buyers of cars from the public enterprise of distribution of cars). Meanwhile they augment their money holdings to acquire the product at the inflated price of sale when it will be available. On the other hand, if they prefer to buy from the parallel market, because they do not want to wait for the product to be available on the state market, they have to have a certain amount of money to have access to the product. This means that individuals have to build up constantly their money holdings, and therefore to hoard, to be able to buy the desired item at the increasing price, since their nominal incomes are strictly controlled.
Therefore, the Algerian population, because of the measures adopted by the government to restrict the private consumption, the unbalanced structure of the GDP induced by the allocation policy of investment between the industrial branches and the inability of the productive apparatus to respond to the consumption needs of the population, have been constrained and forced to augment their money holdings to protect themselves against the monetary erosion of their real cash balances.

5.5 CONCLUSION

The sign obtained for the price level in this study does not contradict the teachings of the quantity theory. On the contrary, it does point out one of the most important phenomenon in the monetary theory which is the real cash balance effect or the Pigou effect.

A negative sign of the price level reflects the important role of the opportunity cost effect of holding money through the real substitution effect, but a positive sign for this variable indicates the dominance of the real cash balance effect over the opportunity cost in an economic environment where not only private consumption and nominal income per employee are strictly controlled, but also where the domestic economy does not respond to the population needs because of its discrepancies and inefficiencies.

Finally, the estimations have shown that real cash balances do not respond to the changes in income expectations, because Algerian individuals give more importance to the current movements of the national income. This result is in conformity with the findings of Adekunle about the demand for money in less developed economies.
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### APPENDIX I

#### TABLE 5.1: CURRENT ACCOUNT BALANCE (millions of US dollars)
(minus sign indicates debit)

<table>
<thead>
<tr>
<th>Year</th>
<th>Trade Balance</th>
<th>Exports</th>
<th>Imports</th>
<th>Other goods, services and income, net</th>
<th>Private unrequited transfers</th>
<th>Official unrequited transfers</th>
<th>Current account balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1964</td>
<td>57</td>
<td>709</td>
<td>-652</td>
<td>-192</td>
<td>97</td>
<td>20</td>
<td>-18</td>
</tr>
<tr>
<td>1965</td>
<td>27</td>
<td>759</td>
<td>-732</td>
<td>-226</td>
<td>146</td>
<td>9</td>
<td>-44</td>
</tr>
<tr>
<td>1966</td>
<td>107</td>
<td>768</td>
<td>-661</td>
<td>-257</td>
<td>159</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>1968</td>
<td>103</td>
<td>869</td>
<td>-762</td>
<td>-337</td>
<td>167</td>
<td>32</td>
<td>-34</td>
</tr>
<tr>
<td>1969</td>
<td>-54</td>
<td>898</td>
<td>-952</td>
<td>-396</td>
<td>196</td>
<td>46</td>
<td>-207</td>
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<tr>
<td>1970</td>
<td>068</td>
<td>1010</td>
<td>-1078</td>
<td>-290</td>
<td>195</td>
<td>37</td>
<td>-125</td>
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<tr>
<td>1971</td>
<td>-180</td>
<td>816</td>
<td>-996</td>
<td>-225</td>
<td>225</td>
<td>41</td>
<td>42</td>
</tr>
<tr>
<td>1972</td>
<td>-79</td>
<td>1224</td>
<td>-1307</td>
<td>-312</td>
<td>224</td>
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<td>-127</td>
</tr>
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<td>1974</td>
<td>1277</td>
<td>4944</td>
<td>-3667</td>
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<td>1975</td>
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<td>20</td>
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<td>1976</td>
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<td>1977</td>
<td>-189</td>
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<td>-6198</td>
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<td>278</td>
<td>4</td>
<td>-2323</td>
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<td>1978</td>
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<td>6340</td>
<td>-7293</td>
<td>-2900</td>
<td>295</td>
<td>20</td>
<td>-3538</td>
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<td>1979</td>
<td>1679</td>
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<td>1980</td>
<td>4056</td>
<td>13652</td>
<td>-9596</td>
<td>-4107</td>
<td>277</td>
<td>24</td>
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<td>4024</td>
<td>14112</td>
<td>-10808</td>
<td>-4248</td>
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<td>5</td>
<td>85</td>
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<td>1982</td>
<td>3620</td>
<td>13509</td>
<td>-9889</td>
<td>-4132</td>
<td>347</td>
<td>-18</td>
<td>-183</td>
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<tr>
<td>1983</td>
<td>3226</td>
<td>12742</td>
<td>-9251</td>
<td>-3550</td>
<td>237</td>
<td>1</td>
<td>-85</td>
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<tr>
<td>1984</td>
<td>3557</td>
<td>12792</td>
<td>-9235</td>
<td>-3664</td>
<td>186</td>
<td>-5</td>
<td>74</td>
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</table>

Source: IMF
## APPENDIX I

### TABLE 5.2: EXTERNAL PUBLIC DEBT OUTSTANDING, DECEMBER 31 (US $ millions)

<table>
<thead>
<tr>
<th>Year</th>
<th>Disbursed Only</th>
<th>Total</th>
<th>Bilateral Official</th>
<th>Multi-lateral</th>
<th>Suppliers</th>
<th>Financial institutions (banks)</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972</td>
<td>1625</td>
<td>2827</td>
<td>1227.8</td>
<td>16.9</td>
<td>1152.2</td>
<td>368</td>
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</tr>
<tr>
<td>1973</td>
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<td>4788.9</td>
<td>1440.6</td>
<td>39.2</td>
<td>1346.8</td>
<td>1788.6</td>
<td>173.7</td>
</tr>
<tr>
<td>1974</td>
<td>3324.9</td>
<td>6039.5</td>
<td>1763.9</td>
<td>190.2</td>
<td>1863.9</td>
<td>2067.4</td>
<td>154.1</td>
</tr>
<tr>
<td>1975</td>
<td>4526.9</td>
<td>9003.1</td>
<td>1780.9</td>
<td>234.8</td>
<td>3377.8</td>
<td>3477.3</td>
<td>132.3</td>
</tr>
<tr>
<td>1976</td>
<td>5853.1</td>
<td>11340.8</td>
<td>1986.5</td>
<td>384.0</td>
<td>4006.7</td>
<td>4772.4</td>
<td>191.2</td>
</tr>
<tr>
<td>1977</td>
<td>8164.9</td>
<td>13785.2</td>
<td>2154.1</td>
<td>554.2</td>
<td>4869.3</td>
<td>6003.6</td>
<td>204.1</td>
</tr>
<tr>
<td>1978</td>
<td>13167.6</td>
<td>20093.2</td>
<td>2935.8</td>
<td>720</td>
<td>5655</td>
<td>10579.5</td>
<td>202.9</td>
</tr>
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<td>1979</td>
<td>15330.4</td>
<td>23376.6</td>
<td>3585.9</td>
<td>923</td>
<td>5334.5</td>
<td>13190.4</td>
<td>342.9</td>
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<tr>
<td>1980</td>
<td>15072.9</td>
<td>23061.6</td>
<td>4069.2</td>
<td>967.3</td>
<td>5025.2</td>
<td>12687.8</td>
<td>311.7</td>
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<tr>
<td>1981</td>
<td>14392.3</td>
<td>21685.8</td>
<td>3775.9</td>
<td>1028.1</td>
<td>5215.5</td>
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<td>1982</td>
<td>20270.4</td>
<td>13897.5</td>
<td>2293.6</td>
<td>279</td>
<td>3280.8</td>
<td>8043.1</td>
<td>-</td>
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<td>1983</td>
<td>18762.3</td>
<td>12942.5</td>
<td>2360.8</td>
<td>329.5</td>
<td>2789.1</td>
<td>7463.1</td>
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Source: World Bank annual reports
## APPENDIX I

### TABLE 5.3: EXTERNAL ASSETS (US$ MILLIONS)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Reserves (minus gold)</th>
<th>Gold (million fine Troy)</th>
<th>Commercial banks' foreign assets</th>
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<tbody>
<tr>
<td>1964</td>
<td>189</td>
<td>0.16</td>
<td>191</td>
</tr>
<tr>
<td>1965</td>
<td>179</td>
<td>0.16</td>
<td>191</td>
</tr>
<tr>
<td>1966</td>
<td>267</td>
<td>4.44</td>
<td>264</td>
</tr>
<tr>
<td>1967</td>
<td>287</td>
<td>5.86</td>
<td>384</td>
</tr>
<tr>
<td>1968</td>
<td>286</td>
<td>5.86</td>
<td>580</td>
</tr>
<tr>
<td>1969</td>
<td>204</td>
<td>5.47</td>
<td>1539</td>
</tr>
<tr>
<td>1970</td>
<td>148</td>
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<td>285</td>
</tr>
<tr>
<td>1971</td>
<td>299</td>
<td>5.47</td>
<td>295</td>
</tr>
<tr>
<td>1972</td>
<td>285</td>
<td>5.47</td>
<td>546</td>
</tr>
<tr>
<td>1973</td>
<td>912</td>
<td>5.47</td>
<td>702</td>
</tr>
<tr>
<td>1974</td>
<td>1454</td>
<td>5.47</td>
<td>2028</td>
</tr>
<tr>
<td>1975</td>
<td>1128</td>
<td>5.47</td>
<td>1449</td>
</tr>
<tr>
<td>1976</td>
<td>1765</td>
<td>5.47</td>
<td>2165</td>
</tr>
<tr>
<td>1977</td>
<td>1684</td>
<td>5.50</td>
<td>2554</td>
</tr>
<tr>
<td>1978</td>
<td>1982</td>
<td>5.53</td>
<td>3068</td>
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<tr>
<td>1979</td>
<td>2659</td>
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<td>2464</td>
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<tr>
<td>1980</td>
<td>3773</td>
<td>5.58</td>
<td>2709</td>
</tr>
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<td>1981</td>
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<td>5.58</td>
<td>2900</td>
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<tr>
<td>1982</td>
<td>2422</td>
<td>5.58</td>
<td>3009</td>
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<td>1983</td>
<td>1880</td>
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<td>1984</td>
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Source: IMF
APPENDIX IIA: USING KOYCK REDUCTIONS: DEMAND FOR MONEY IN ALGERIA: ANNUAL DATA 1966-1982

Absolute t values are given in parentheses. Scale variable is the real national income.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>M1</th>
<th>M2</th>
<th>M3</th>
<th>M1</th>
<th>M2</th>
<th>M3</th>
<th>M1</th>
<th>M2</th>
<th>M3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-0.77673</td>
<td>-0.90801</td>
<td>-1.4581</td>
<td>0.012620</td>
<td>-0.10604</td>
<td>-0.27902</td>
<td>1.3874</td>
<td>1.1059</td>
<td>0.69119</td>
</tr>
<tr>
<td>Scale Variable</td>
<td>1.1805</td>
<td>1.2071</td>
<td>1.3253</td>
<td>0.39475</td>
<td>0.44507</td>
<td>0.56998</td>
<td>(0.85574)</td>
<td>(0.99669)</td>
<td>(1.2227)</td>
</tr>
<tr>
<td>(10.633)</td>
<td>(11.892)</td>
<td>(13.379)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lagged Scale Variable</td>
<td>0.45244</td>
<td>0.55883</td>
<td>0.54049</td>
<td>-0.2845</td>
<td>-0.31658</td>
<td>-0.38674</td>
<td>(0.65709)</td>
<td>(0.79242)</td>
<td>(0.93025)</td>
</tr>
<tr>
<td>(1.3802)</td>
<td>(1.5819)</td>
<td>(1.3424)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Price Level Variable</td>
<td>0.43304</td>
<td>0.39952</td>
<td>0.38177</td>
<td>0.43304</td>
<td>0.39952</td>
<td>0.38177</td>
<td>(2.7214)</td>
<td>(3.0648)</td>
<td>(2.9273)</td>
</tr>
<tr>
<td>Lagged Dependent Variable</td>
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<td>0.47925</td>
<td>0.53507</td>
<td>0.16945</td>
<td>0.24016</td>
<td>0.29210</td>
<td>(0.64181)</td>
<td>(0.99750)</td>
<td>(1.1424)</td>
</tr>
<tr>
<td>(2.2628)</td>
<td>(1.7913)</td>
<td>(1.8861)</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
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<td>1.7946</td>
<td>1.8455</td>
<td>1.9900</td>
<td>1.8751</td>
<td>1.9324</td>
<td>2.0375</td>
<td>2.1225</td>
<td>2.1606</td>
</tr>
<tr>
<td>( \bar{R}^2 )</td>
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<td>0.909343</td>
<td>0.927087</td>
<td>0.934245</td>
<td>0.920704</td>
<td>0.930970</td>
<td>0.899834</td>
<td>0.949184</td>
<td>0.958519</td>
</tr>
<tr>
<td>S.E. reg</td>
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<td>0.0841223</td>
<td>0.0831728</td>
<td>0.089301</td>
<td>0.091006</td>
<td>0.0933916</td>
<td>0.0716931</td>
<td>0.0667733</td>
<td>0.0679394</td>
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<td>141.428</td>
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<td>95.4049</td>
<td>25.9535</td>
<td>53.1012</td>
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### APPENDIX II.A: USING KOYCK REDUCTIONS: SCALE VARIABLE IS THE REAL GDP

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<th>M3</th>
<th>M1</th>
<th>M2</th>
<th>M3</th>
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<tbody>
<tr>
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<td>-0.38865</td>
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<td>0.29453</td>
<td>4.9179</td>
<td>0.13688</td>
<td>-0.73712</td>
</tr>
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<td>0.99987</td>
<td>1.0680</td>
<td>0.84926</td>
<td>-2.0143</td>
<td>0.70001</td>
<td>0.99131</td>
</tr>
<tr>
<td></td>
<td>(3.6824)</td>
<td>(8.4616)</td>
<td>(23.765)</td>
<td>(0.98910)</td>
<td>(1.3624)</td>
<td>(6.9637)</td>
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<tr>
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<td>(3.3614)</td>
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<td>12.9600</td>
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<tr>
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<td>0.994034</td>
</tr>
<tr>
<td></td>
<td>0.283240</td>
<td>0.0738158</td>
<td>0.0426922</td>
<td>0.273841</td>
<td>0.0799033</td>
<td>0.0301525</td>
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### APPENDIX II.B: ESTIMATES OBTAINED USING THE ALMON TECHNIQUE

Absolute t values are given in parentheses. Computations based on the Cochrane-Orcutt method. A negative sign indicates a negative weight.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>M1</th>
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<th>M3</th>
<th>M1</th>
<th>M2</th>
<th>M3</th>
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<td>(3.7685)</td>
<td>(4.5784)</td>
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<tr>
<td>two times</td>
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<td>-0.020745</td>
<td>-0.023103</td>
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<td></td>
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<td>(6.0890)</td>
<td>(7.7364)</td>
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<td>-0.027431</td>
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<td>(1.8838)</td>
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<td></td>
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<td>(1.7132)</td>
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</tr>
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<td></td>
<td></td>
<td>0.015610</td>
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<td>0.011048</td>
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<td></td>
<td>(2.1485)</td>
<td>(1.2185)</td>
<td>(1.1044)</td>
</tr>
<tr>
<td>Price Level Lagged</td>
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<td></td>
<td>-0.053158</td>
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<td>-0.049597</td>
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<tr>
<td>three times</td>
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<td></td>
<td></td>
<td>(1.8220)</td>
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<td>(1.4865)</td>
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<td>Durbin-Watson Statistic</td>
<td>2.0212</td>
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<td>1.8767</td>
<td>2.5248</td>
<td>2.5096</td>
<td>2.5396</td>
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<td>0.896875</td>
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<tr>
<td>S.E. reg</td>
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<td>0.0783233</td>
<td>0.0776170</td>
<td>0.0811520</td>
<td>0.0855514</td>
<td>0.0848431</td>
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<tr>
<td>F</td>
<td>43.7391</td>
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</tr>
<tr>
<td>Lengths of the Lag</td>
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<td>16</td>
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</tr>
</tbody>
</table>