

STUDY OF THE RELATIONSHIP BETWEEN ECONOMIC GROWTH AND INFLATION: APPLICATION TO THE COUNTRIES OF THE SOUTH SIDE OF THE MEDITERRANEAN: A PANEL DATA APPROACH

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ABSTRACT

This paper examines the relationship between economic growth and inflation taking into account other economic indicators in the analysis of this relationship. This study uses the random effects model of panel data applied to a sample of four countries on the south side of the Mediterranean during the period that runs from 1980 to 2008. The analysis concludes that, in general, the relationship between the variables appears particularly if inflation or hyper-inflation. Indeed, if a country prices rise faster than in other countries, we will see an increase in imports and a decline in exports. To balance the balance of payments, it will attract the foreign exchange reserves.

Keywords: Monetary policy, Random effects model, The fixed effects model, Tunisia.

JEL Classification: C5, E2.

Contribution/ Originality

This paper examines the relationship between economic growth and inflation taking into account other economic indicators in the analysis of this relationship. Our study takes a different analysis: retaining a panel approach in terms of countries, we wondered if there is a relationship between inflation and economic growth through the unemployment rate, the interest rate the balance of payments and exchange rates. We concluded that all of these countries (Morocco, Algeria, Tunisia and Egypt) chose conservative monetary policies based on the independence of the Central Bank and the fight against inflation goal promoted. The ability has been the relaxation of exchange controls, but still significant linkages (eg the issue of the exchange rate in Algeria does not seem to be marked by financial reforms). Significant efforts have been shown to develop economic growth. Most of the countries studied have developed a liberalized market, the magnitude and the degree of activity varies according to the size of the domestic private sector.

1. INTRODUCTION

The Growth - Inflation can present the sources of inflation. Three explanations are to emphasize the existence of inflation: inflation from the currency, demand inflation and cost inflation. For inspiration monetarist inflation in the currency that inspires the rise in the general level of prices derive an issue of too much money.

Milton Friedman, "the cause of inflation is everywhere is always the same: increased abnormally rapid money supply relative to the volume of production." The rationale for this idea is based on the existence of an economic relationship, called "Quantity Theory of Money" or Irving Fisher equation. The latter is expressed as: $MV = PY$, where M is the mass of money in circulation (money demand), V the velocity of money, P is the general price level and Y is the volume of transactions (or volume production). This equation highlights an increase in the quantity of money causes a mechanical increase in the general level of prices. It justifies the idea of a dichotomy (real economy - monetary sphere) in the neoclassical theory. In other words, changes in the money supply should be correlated with changes in the volume of production. This equation also states that the currency fulfills an essential function of the average transaction. A measure of economic growth higher must not lead to an increase of money in circulation. In the theory of markets, the price is determined by an equalization of supply and demand. However, in some situations, demand may exceed supply: the price tends to rise automatically. When such a mismatch occurs on a wide range of markets, an "inflationary gap" was born, leading to a rise in the general price level. In Keynesian theory, inflation is caused by an imbalance between aggregate demand and aggregate supply. More frequently, increasing the quantity of money is synonymous with inflation when aggregate supply is not able to start from an increase in demand, and we speak of demand inflation. The excess of aggregate demand may result from several factors: an increase autonomous velocity of money; increased business investment not self-financing their investments, a policy of economic recovery of the state based on the budget deficit. Edmond Malinvaud defined in the 70s, the concept of contained inflation from what is expected to call today imbalance theory. The latter is characterized by rationing agents on the labor markets, and goods and services. In the case of excess demand in both markets, quantities traded are offers constraints on both markets. And households are rationed goods and services companies are rationed labor.

The purpose of this paper is to describe the relationship between inflation and economic growth in a panel of selected countries. The interest of our approach on panel data macro is to show a number of determinants, such as the balance of payments, interest rates, unemployment rates and the exchange rate. Indeed, the structure of the article consists of two sections. In the first section we present the theoretical arguments of capital flight and the depreciation of the value of the currency. In reference to a set of theoretical work on the issue. The second section is to perform a series of empirical validation.

2. CAPITAL FLIGHT AND THE DEPRECIATION OF THE VALUE OF MONEY

Bodin gave an explanation inflationary monetary phenomenon, but it is the classic returns authorship of the quantity theory of money. Ricardo tries to establish the actual value of a property is determined by the quantity of labor necessary for its production: the relative cost. If the amount of currency in circulation encourages the general level of prices, the relative price is not changed.

Keynes argues that inflation may have in times of underemployment. In these situations any growth in the money supply is narrated by an increase in quantities. Samuelson and Solow is synthesized using Keynesian Phillips curve. According to this curve, a monetary recovery is divided into a price effect (inflation) and a quantity effect (increased production). The importance of the price effect in relation to the quantity effect depends on the rate of unemployment if the unemployment rate is high, monetary recovery is particularly explained by increased quantities; conversely, if the unemployment rate is low, the monetary recovery from mainly in inflation.

Inflation, when strong, can hinder economic activity in that it has created uncertainty about future prices in a context of openness to the outside and fixed exchange rates, inflation often held in the name of competitiveness. From a theoretical point of view, the effects of inflation on consumption and savings appear ambiguous:

- In terms of consumption volume, inflation can have a depressed; the agent reduces its consumption to restore its real cash. But inflation can also stimulate growth by an effect of anticipation.

- In terms of savings, inflation has an effect on the choice between investment and financial investment.

- Inflation causes changes in the income distribution agents penalized are those whose real wages are eroded by inflation. Especially in times of high inflation, interest rates are low or even negative (Fisher relation interest rate / inflation).

Indebted agents whose debts are not indexed properly and immediately benefit from inflation: the latter is a transfer of income to creditors the debtors. Inflation encourages agents structurally borrowers, such as contractors or government as Keynes pointed out. There is no univocal relationship between inflation and real economic growth:

the inflation-like growth factor reducing real interest rates, inflation promotes the use of corporate debt (leverage) and households to finance consumption and investment.

- Inflation as a symptom of growth: it occurs when the factors of production to run full and the work is fully mobilized.

- Inflation and growth are not necessarily related.

- Inflation as an obstacle to growth: degrading competitiveness, inflation hampers exports that are a part of aggregate demand. It creates a climate of uncertainty that is not conducive to uncertainty.

Indeed, a higher inflation rate than other countries domestic currency depreciates. In the context of the liberalization of capital movements, what is the result on the direction of economic

policy? Liberalization of capital movements is accompanied by an increase in the corporate finance model financial markets, protected by rising pension funds. The integration of global capital markets space under surveillance States' economic policies: the level of interest rates and the exchange rate in each interval belongs to the monetary judgment by the markets. The level of economic integration in the world today is the same than it was in the late nineteenth century. Capital transfers from richer countries to emerging countries are not more important than today.

Similarly, the end of the last century was marked by separations technology that has simple integration of markets. Finally, the regime of the gold exchange standard ensured the free movement of capital, like today. This parallel with the nineteenth century thought-provoking: the integration of the world economy has not disturbed then the slope of the agreements between the forces. Certainly, the present situation is different, but the persistent gap between a globalizing economy and rationalizations which remain national or regional problem. Globalization, the dependence of nations it entails, makes both stronger and more attractive competition their cooperation. In the absence of a self-regulating capacity of markets, the alternative is clear: either new regulation is introduced to the regional and global levels in order to avoid adverse effects of unlimited competition, or the temptation to withdraw the wins. With all the risks that entails.

3. SPECIFYING THE GROWTH EQUATION AND ESTIMATION TECHNIQUE

The sample of this study consists of four countries Morocco, Algeria, Tunisia, Egypt. These countries have been affected by the crisis through their heavy dependence on developed economies themselves into recession, while relatively protected because of limited financial integration, both regionally and globally. If the local financial sector was little affected and external debt well controlled, the impact of the crisis is interpreted by a decrease of growth (2 to 2.5 points on average) and had an impact on the employment and public budgets. The European Investment Bank EIB requires the presence of the state in the economic sphere: If the principle is displayed both a restoration of the role of the state in relation to market failures and support for local businesses, as well as conceptualization local general recommendations, many legitimate considerations, the form looks like a return to support the protection.

We find in this section, a detailed description of the variables used in the regression:

•GDP

• Inflation (INF) is an explanatory variable monetary FDI and explaining the internal stability of the country. He interprets the country's ability to lead the process of hyperinflation and even its ability to keep monetary policy stabilization plausible expectations.

The real exchange rate (RER) is an indicator of competitiveness is that it is defined by the strength of a currency. The definition depends on the idea that we have a strong currency: → 1st idea: a strong currency is a currency whose purchasing power is higher abroad than in the country because the national price level is higher than foreign prices for a given nominal rate. Similarly, the nominal exchange rate is overvalued: it creates an inability for companies that

pushes them to become more competitive and for the national economy as a good foundation to import disinflation and thus assist in the fight against rising prices.

This concept refers to a situation which may lead to a short-term enrichment but ultimately leads to a deterioration of growth and external balance.

→ Second idea: a currency is strong because the economy is competitive thanks to a favorable inflation gap and an efficient production system.

The real exchange rate is undervalued, the economy has improved price competitiveness for the lower inflation, thanks to a risk premium correspondingly lower on international capital markets that allows this lower increase price. This concept of the hard currency policy a way to fight against inflation and ensure the restructuring of the productive that it offers a more competitive.

→ third idea: a strong currency is a currency in high demand, whose products are in greater demand. This excess demand is interpreted by the nominal appreciation of the currency, but if the nominal exchange rate is maintained at its previous level, the currency depreciates in real terms it is undervalued. This concept of the strong currency a situational goal is intended or to be defended when it is acquired by a policy of disinflation seeking a lower inflation rate than other countries and constant adaptation tool production to global demand.

In total, the second concept can be considered as the access of third.

Balance of Payments (BB) for the balance of balance of payments, exchange two main systems are possible: a system of price adjustment, the floating exchange rate system (the intervention of the Central Bank is a priori useless), and a system of adjustment quantities, the fixed exchange rate system (Central Bank must have foreign exchange reserves to allow it to intervene in the foreign exchange market if necessary). Each of these systems is a type of international monetary system (IMS), and each SMI is generally an international standard, that is to say, a term of reference between different national currencies. Reduced interest rate (TIR) is positively when people and businesses will borrow more, promoting GDP growth, unemployment will decrease and the increase in interest rates affects negatively when people and firms borrow less, thereby reducing economic growth, unemployment will increase.

The relationship between the unemployment rate (TCHO) has provided a theoretical basis for empirical studies summarized by the Phillips curve equation econometric assembles unemployment and inflation in the short term. In this model, inflation is the result of excessive aggregate demand, from a tight labor market and forcing companies to raise their prices to cover these increases. The Niru (non-inflationary rate of unemployment, unemployment non inflationary) is the threshold rate of unemployment when the unemployment rate is higher than Niru, inflation is low. In contrast, the New Keynesian economists believe that higher inflation rates would lower unemployment.

While the new Keynesian Phillips curve transform (Triangle model), speaking of "augmented Phillips curve. In 1980, James Tobin emphasizes the divergent nature of the evolution of inflation below Niru and proposes the formulation to account NAIRU. The difference between the NAIRU and the unemployment rate explains more inflation, but inflation variations:

- if the unemployment rate is lower than U natural rate U *, inflation tends to increase;
 -if it is higher, it tends to decrease;

- neighbor if it remains constant. Indeed, the cyclical monetary policy has been used to make a prescription between inflation and employment: crisis phase, an expansive monetary policy would allow an upturn in risk of higher inflation, while during overheating, a restrictive monetary policy aggregate simplify inflationary pressures may prevent growth somewhat. For example, in the mid-1970s, OECD countries have adopted the fight against inflation. This is the case of France in particular. In this study, we try to pursue four objectives of economic growth, full employment, price stability and balance of the balance of payment.

We present the main results of the econometric analysis for the following model:

$$PIB_{it} = \alpha + \beta_1 INF_{it} + \beta_2 TCR_{it} + \beta_3 BB_{it} + \beta_4 TIR_{it} + \beta_5 TCHO_{it} + \varepsilon_{it}$$

Descriptive statistics of variables

Table-1. Variability intra-and inter-individual data

| Variables | Mean | Std. Dev | Min | Max |
|----------------|-----------|----------|-----------|----------|
| INF | | | | |
| Overall | 8.063393 | 6.833634 | 3 | 31.7 |
| Between within | | 3.649416 | 4.768965 | 11.8 |
| | | 6.050392 | -1.981435 | 29.418 |
| BB | | | | |
| overall | -3.127586 | 8.40757 | -17.8 | 34.6 |
| Between | | 6.9456 | -8.0689 | 5.982 |
| Within | | 6.4169 | -19.41034 | 25.48 |
| TIR | | | | |
| overall | 7.2388 | 3.259548 | 1.8 | 16.6 |
| Between | | 2.984072 | 5.2 | 9.886 |
| Within | | 2.680 | 2.897 | 17.697 |
| TCHO | | | | |
| Overall | 14.69759 | 5.696958 | 5.67 | 29.3 |
| Between | | 5.25259 | 8.428 | 21.25 |
| Within | | 3.403398 | 3.673 | 23.514 |
| PIB | | | | |
| overall | 4.058017 | 3.18074 | -6.6 | 12.2 |
| Between | | 1.0040 | 2.7034 | 5.0551 |
| Within | | 3.058504 | -6.522 | 12.27 |
| TCER | | | | |
| overall | 1.039274 | .6604808 | .32493 | 3.6176 |
| Between | | .5108283 | .45131 | 1.694752 |
| Within | | .4886962 | .16782 | 2.9621 |

Source: Estimated by the author in the WDI database

Study intra-individual variability (within) is to determine whether it is justified in a dimensionally stable countries or it is related to specific situations. This is a consistent estimate even in the case of correlation between individual effects and regressors. The estimation by the method of least squares, generalized (QGLS), effective in countries where the effects are not correlated with the regressors, is used as a test: the number of observations per country is high, this estimator is asymptotically (T) equivalent to the estimator "within". However, it is

recognized that the estimator "within" is used to represent short-term effects estimator while "between" (inter-individual) can better represent long-term effects. Thus, [Pirotte \(1996\)](#) showed that inter-individual estimator is a good estimator of long-term relationships. However, the small number of countries surveyed (n = 4) by making insignificant estimated coefficients from a regression between individuals. However, we can advance the idea of long-term effects by using the ordinary least squares estimator because of the superiority of the inter-individual variability in the total variance of our observations (values are shown in red table No. 1The highest values), we test this framework in the following model, which estimates are presented in the following tables:
 -Estimation by OLS without individual effects.

-Estimate intra-individual (within)

-Estimate the QGLS (error component model, and apply the associated test: the test d'hausman. The nature of spatio-temporal data has been heteroscedasticity tests: a test of reasonableness, on heteroscedasticity group and White test. The reasonableness test was applied for all countries (pooling single), the assumption of homoskedasticity is rejected more than 99%, the statistic is 57.9%. White's test, performed on the fixed effects model simple, also rejects the homoscedasticity thresholds of 1.1% for the period 1980-2008.

Table-2. OLS estimation of the without individual effects

| PIB | Coef. | Robust Std. Err | t | P>t |
|------------|--------------|------------------------|----------|---------------|
| inf | -0.020248 | .0471031 | -0.43 | 0.668 |
| bb | -0.0175795 | .0672502 | -0.26 | 0.794 |
| tir | -1.1532127 | .1586789 | -0.97 | 0.337 |
| tcho | .0113678 | .0753055 | 0.15 | 0.880 |
| tcer | -3.531247 | .8098418 | -0.44 | 0.664 |
| _cons | 5.531544 | 2.99 | 0.004 | 1.841 |

Source: Estimated by the author (stata 10)

Table-3. Estimate intra-individual (within)

| pib | Coef. | Std. Err. | t | P>t |
|------------|--------------|------------------|----------|---------------|
| tcer | -3.531247 | .8683512 | -0.41 | 0.685 |
| tir | -1.1532127 | .1753531 | -0.87 | 0.385 |
| tcho | .0113678 | .1121596 | 0.10 | 0.920 |
| bb | -0.0175795 | .0716586 | -0.25 | 0.807 |
| inf | -0.020248 | .0573051 | -0.35 | 0.725 |
| _cons | 5.531544 | 2.050164 | 2.70 | 0.009 |

Source: Estimated by the author (stata 10)

Table-4. Estimation by QGLS (error component model)

| pib | Coef. | Std. Err. | z | P>z |
|------------|--------------|------------------|----------|---------------|
| tcer | 1.660367 | 1.680297 | 0.99 | 0.323 |
| tcho | -2.584907 | .5042543 | -0.51 | 0.608 |
| tir | -0.0744546 | .3666941 | -0.20 | 0.839 |
| bb | .2035151 | .3298638 | 0.62 | 0.537 |
| inf | .214591 | .3462182 | 0.62 | 0.535 |
| _cons | 6.585124 | 6.958758 | 0.95 | 0.344 |

Source: Estimated by the author (stata 10)

Hausman-Test: This test is based on comparing the estimates "within" and QGLS. The probability test is greater than 10% ($0.954 \geq 0.1$) which implies that the random effects model is more appropriate than the fixed effects model, that is to say, accept the non-correlation of the individual effects with the explanatory variables, however, the inter-individual variation is greater than intra-individual variation, the error component model is more appropriate than the fixed effects model.

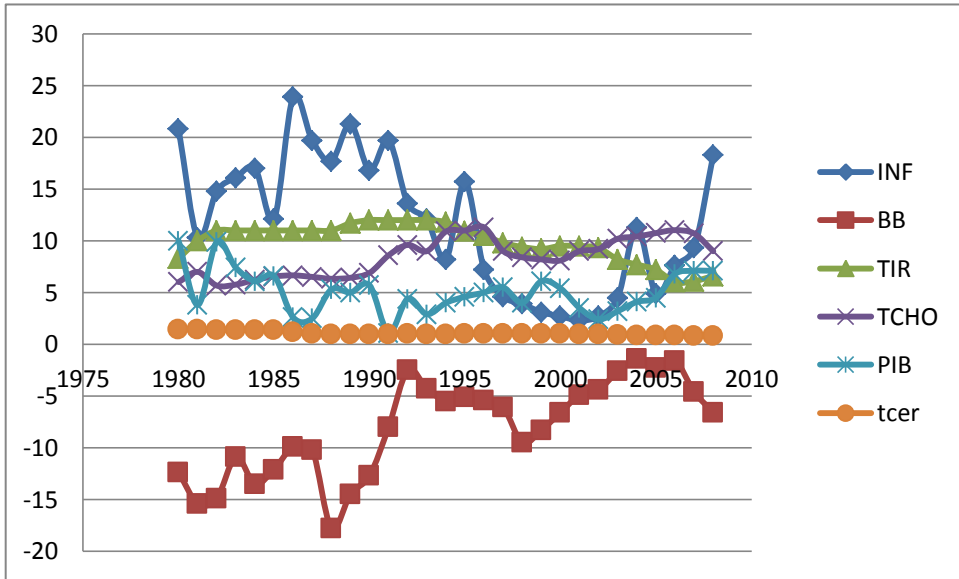
From Table No. 4, we noticed the significance of non-negative variables and for each interest rate and unemployment rate of economic growth, while the other variables are positive and insignificant. We can mention that the presence of the international financial and economic crisis is causing an increase in the confidence of investors and consumers, a decline in demand, anguish trade and international capital flows and a decline production, that reflect the non-significance of these variables. This process is a recession in economic activity in industrialized countries and a delay in emerging and developing countries and an increase in unemployment. However, the persistence of high unemployment and rising budget deficits in many countries continue to assess the prospects for development of the global economy.

3.1. Economic Conditions in Each Country

3.1.1. Case of Egypt

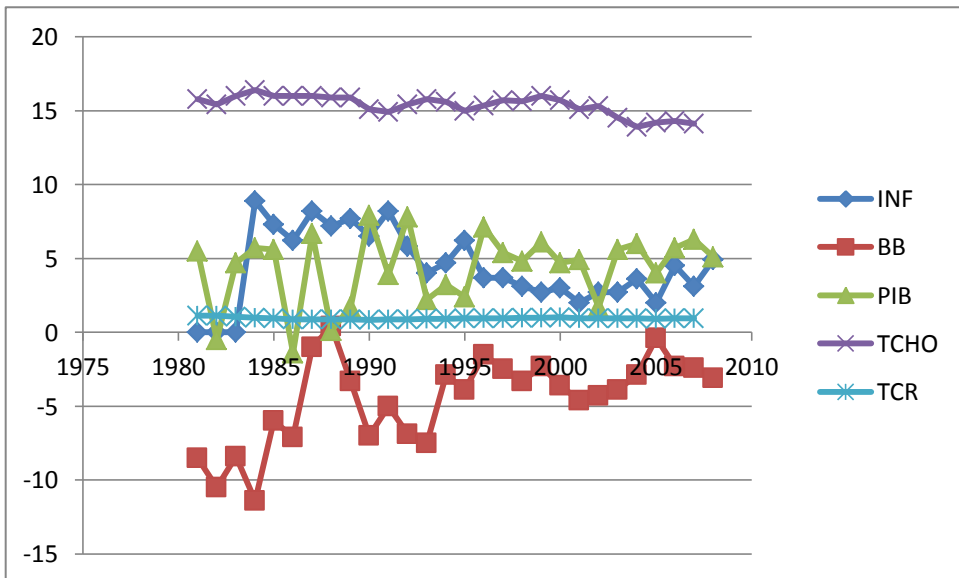
Egypt has launched an economic reform program in 2004, a broad recovery plan in 2008. Indeed, rates and taxes were lowered. Transparency of the national budget was supported. "This new policy has borne since causes growth had reached a high level in 2009 and 2010, with a rate of more than 5%, thanks to the recovery in private and public consumption. Sectors of construction, communications, wholesale and detail, catering and hospitality, as well as manufacturing also contributed to the development of growth. However 2010 was marked by a performance in sectors with the greatest weight in GDP, namely agriculture and extractive industries. Growth forecasts for 2011 are estimated at between 5.5% and 5.8% by the IMF, building on the increased consumption. Although the Egyptian economy is entering a cycle of gradual recovery, the level of growth remains very insufficient to maintain employment and achieve truly reducing the share of population living below the poverty line (18%). In addition, the country faces a high rate of inflation (about 10%). External accounts, weakened during the crisis by lower foreign exchange earnings and net capital flows have recovered and the balance of payments surplus is returned to in 2010.

Figure - 1. Conjuncture economic of Egypt



3.1.2. Case of Tunisia

Figure -2. Presentation of the different variables for the case of Tunisia



According to a report by the Central Bank of Tunisia (BCT), the national economy is growing trade with the outside world in terms of exports and imports of goods and services. The rising price of commodities has turned on the evolution of the trade balance, especially food and energy, and hence the current account deficit. On the monetary side, the money is progressed at the end of June 2008, 8.9% and 5.6%, respectively, and excess bank liquidity continued in July, required the intervention of the Central Bank to mop up the excess. The interest rate on

overnight money market fluctuated between 5.13% and 5.38% for the month. On the foreign exchange market, the dinar has been since the beginning of the year up to July 22, 2008, a 5.2% appreciation against the dollar and a decline of 2.6% versus the euro. According to the Central Bank, these developments require more effort to optimize the use of available capacity and potential and control costs. It is imperative to strengthen the competitiveness and streamline consumption in order to preserve financial balances internal and external to strengthen the pace of economic growth. In view of these factors, the Board has decided to maintain the interest rate of the Central Bank.

3.1.3 Economy of Algeria

Algeria is dependent on hydrocarbons generating two negative effects that organized its economy:

- not job creation: Due to the low intensity of labor in the production of hydrocarbons.
- The oil price change which results a significant imbalance in the balance of payments, fiscal revenues and the money are also volatile.

During these years, a macroeconomic change has been made following the implementation of a series of reforms that have allowed a return to economic and financial stability. The reforms have resulted in the consolidation of public enterprises and the restoration of external balances through fiscal policy focused and well-coordinated based on a set of three converging policies: fiscal policy, monetary policy and the politics of exchange rates. Thus inflation was controlled from 29% to 2% in 2004, a level that is comparable with that existing in industrialized countries. International reserves reached a considerable level representing 30 months of imports and external debt to GDP ratio increased from 33% to 20% during this period. Public companies, being in good order, a recovery plan was implemented in 2001, which enabled the growth rate from 2.2% in 2001 to 6.8% in 2004. The unemployment rate for its part, declined significantly from 30% in 2000 to 16% in 2005 (according to the Office for National Statistics).

3.2. Economy of Morocco

Morocco has an economic climate in saw-tooth which is highly dependent on climatic conditions. If the rains were sufficient, the year will be good, otherwise bad year. The Moroccan economy suffers from certain weaknesses that the global crisis may increase in the short term. "Moreover, the crisis has had a negative impact on tourism receipts and remittances from Moroccans living abroad. These two main sources of foreign exchange have so far offset the imbalance of trade balance and kept the current account balance to a positive level, says the Report of the ADB / OECD / UNECA. Growth should have stalled in 2010 and not exceed 4.3%. Domestic demand grew by 6.8% in 2009 and expected to grow 7.7% in 2010. Supported by a decrease in income tax and salary increases, it has also been driven by the excellent crop, an unemployment rate below 10% and a surge in consumer credit, up 19.3% between January and October 2009 compared to the same period in 2008. As a result, domestic demand helped offset the decline in external demand. Household demand should contribute to 4.3% growth in 2009 and

4.6% in 2010. It should be supported by a further decline in income tax, scheduled for January 2010, the dynamism of the labor market and keeping inflation at around 2.9% in 2010. Ordinary expenses grew slower in 2009 than in 2008, due to lower compensation costs. "

4. CONCLUSION

Our study takes a different analysis: retaining a panel approach in terms of countries, we wondered if there is a relationship between inflation and economic growth through the unemployment rate, the interest rate the balance of payments and exchange rates. We concluded that all of these countries (Morocco, Algeria, Tunisia and Egypt) chose conservative monetary policies based on the independence of the Central Bank and the fight against inflation goal promoted. The ability has been the relaxation of exchange controls, but still significant linkages (eg the issue of the exchange rate in Algeria does not seem to be marked by financial reforms). Significant efforts have been shown to develop economic growth. Most of the countries studied have developed a liberalized market, the magnitude and the degree of activity varies according to the size of the domestic private sector.

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