DOES A MONETARY TIGHTENING RISE OR LOWER INTEREST RATES?
CASE STUDY - ALBANIA

By

Anita Rrodhe, MSc

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Approval Page

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Author	**:**	Anita Rrodhe, MSc
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Faculty	**:**	Economics and Administrative Sciences
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I certify that this thesis satisfies all the legal requirements as a thesis for the degree of Master of Science (MSc).

Assist. Prof. Dr. Urmat Ruskulov

Head of Department

I certify that I have read this study that is fully adequate, in scope and quality, as a thesis for the degree of Master of Science (MSc).

Prof. Dr. Güngör Turan

Supervisor

Exam Board of Thesis

Thesis Title	**:**	Does a monetary tightening rise or lower interest rates: Case Study - Albania
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Members

Prof. Dr. Güngör Turan …….

Assist. Prof. Dr. Urmat Ruskulov …….

Assist. Prof. Dr. Eglantina Hysa …….

Abstract: The purpose of this master thesis is to test the relationship between monetary policy and nominal interest rate, in case of monetary tightening for Albania in long and short run. To understand this link, the study is focused on liquidity preference and Fisher effect. Behind this hypothesis, the main ideas include money demand, money supply, interest rates, inflation and the role that Bank of Albania plays in the interaction of these components. The data was taken from the Bank of Albania and World Bank during time interval of years 1993-2012. This master thesis analyzed empirically the co-integrating relationship between nominal interest rate and inflation in the Albanian economy. Since the variables in this article are non-stationary and present a unit root, Johansen's co-integration technique has been applied. This methodology has allowed for obtaining a co-integrating relationship among these variables. The co-integration results provide evidence of a unique co-integrating vector. To put in precise words, a long-run stable relationship exists between nominal interest rate and inflation. This proves that nominal interest rate and inflation move together in the long run in Albania.

Key Words: nominal interest rates, inflation, Fisher hypothesis, non-stationary time series regression, Johansen co-integration Test.

Abstrakt: Qëllimi i kësaj teze masteri është për të provuar marrëdhënien midis politikës monetare dhe kursit nominal të interesit, në rast shtrëngimi monetar për Shqipërine, në afat të gjatë dhe të shkurtër. Për të kuptuar këtë lidhje, studimi u fokusua në preferencën e likuiditetit dhe efektin Fisher. Pas kësaj hipoteze, idetë kryesore përfshijne kërkesën e parasë, ofertën e parasë, normat e interesit, inflacionin dhe rolin që luan Banka e Shqipërisë në ndërveprimin e komponentëve me njeri-tjetrin. Të dhënat janë marrë nga Banka e Shqipërisë dhe Banka Botërore gjatë intervalit kohor prej vitit 1993-2012.

Kjo tezë masteri analizoi në mënyrë empirike e bashkë-integruese marrëdhëniet midis normës nominale të interesit dhe inflacionit në ekonominë shqiptare. Duke qënë se variablat në këtë artikull janë jo-stacionare dhe paraqesin një njesi rrënjë, është zbatuar teknika Johansen e bashkë-integrimit. Kjo metodologji ka lejuar për marrjen e një marrëdhënie bashkëpunimi të integruar midis këtyre variablave. Rezultatet e bashkë-integrimit evidentojnë një vektor të veçantë bashkë-integrues. Me fjalë të tjera me te sakta, ekziston një marrëdhënie afatgjatë e qëndrueshme midis normës nominale të interesit dhe inflacionit. Kjo provon se norma nominale e interesit dhe inflacioni lëvizin së bashku në afat të gjatë në Shqipëri.

Fjalëkyçe: normat nominale të interesit, inflacioni, politika monetare, preferencë e likuiditetit, hipoteza e Fisherit, regression kohe seri jo-stacionar, test ko-integrimi Johansen.

Dedication

I dedicate this thesis to my beloved parents and brothers for their support in order to complete this study in the best possible way. It is their unconditional love that motivates me to set higher targets. Thank you very much for your encouragement!

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I would like to express my deepest appreciation to my advisor, Prof. Dr. Güngör TURAN for his guidance, assistance and his valuable contribution throughout the preparation and completion of this study.

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Declaration Statement

1. The material included in this thesis has not been submitted wholly or in part for any academic award or qualification other than that for which it is now submitted.

2. The program of advanced study of which this thesis is part has consisted of:

i) Research Methods course during the undergraduate study

ii) Examination of several thesis guides of particular universities both in Albania and abroad as well as a professional book on this subject.

Anita Rrodhe

January 2014

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List of Abbreviations

ALL:	Albanian Lek
BoA:	Bank of Albania
CB:	Central Bank
EU:	European Union
GDP:	Gross Domestic Product
GoA:	Government of Albania
INR:	Interest rate
INSTAT:	Institute of statistics
IMF:	International Monetary Fund
M2:	Monetary Growth:
L-T:	Long-Term

List of Publications by the Candidate

Author: Anita RRODHE

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Title: Does a monetary tightening rise or lower interest rates:

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Conference Publication Name: ICES`13

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INTRODUCTION

Monetary tightening policy means that the Central Bank takes actions in order to constrict spending in an economy that is growing too quickly or, it can also be used to slow down inflation when it is rising too fast. The Central Bank will make money tight by rising the interest rates in the short term, and this in turn will increase the cost of borrowing and promote saving. It will affect all other interest rates offered by commercial banks in the country, because they borrow money from the Central Bank, thus the interest rates in general will increase. Banks will have less credit to lend, and less liquidity because this theory can reduce the amount of credit and banks which do not generate enough incomes from the interest rates on loans. Individuals and businesses that have taken loans and have insufficient capital may be unable to repay personal or business loans. Furthermore, in order to increase the liquidity, the Central Bank increases the bank reserve requirements. In order to restrict the money supply, the Central Bank can sell treasures, government bonds. In this way, it will take funds from the market, with the promise to pay them back with interest in time of tightening monetary policy.

The question that rises in this paper is how does the money tightening policy influence the interest rates? Is it the same in the short run and long run?

In order to answer this question, this master thesis will take into consideration the Fisher effect hypothesis and the Liquidity Preference Theory.

Analysis of the Fisher effect suggests that in the long run when prices are flexible, a reduction in money supply would lower inflation, and in turn this would lead to lower interest rates. But the theory of liquidity preference predicts that in the short run, when prices are sticky, anti-inflationary monetary policy would lead to lower money balances and higher interest rates (Mankiw, 2010).

Therefore, according to the theories, the answer depends on the time horizon and in order to understand the link between monetary policy and nominal interest rates, we need to keep in mind both the theory of Liquidity Preference and the Fisher

effect. A monetary tightening leads to higher nominal interest rates in the short run and lower nominal interest rates in the long run (Mankiw, 2010).

The master thesis starts with an introduction of the thesis topic and an overall view to understand why the BoA[1] decides to tight money in the market. Introduction part includes the objectives of the study: How does the money tightening policy influence the interest rates? Is the result the same in the short run and long run?

Chapter 1, which is a theoretical approach, demonstrates the relationship between money supply and interest rates; Fisher effect[2] and Liquidity Preference theory[3]. In chapter 2 it is provided the literature review, findings of other authors regarding the topic of study. Chapter 3 assesses the conduct of monetary policy in Albania during the transition period up to now.

For an answer with real data, a simple regression model will be built in chapter 4, to have a better picture of the Albanian case in the period of monetary tightening policy, and after that an examination of the relationship between nominal interest rates and inflation, non-stationary time-series data and Johannes's Co-integration Test.

[1] The BoA is the monetary authority of the Republic of Albania or the so called Central Bank of Albania. It has the exclusive right to design, approve and implement the monetary policy in Albania.
[2] An economic theory proposed by economist Irving Fisher that describes the relationship between inflation and both real and nominal interest rates.
[3] The desire to hold money rather than other assets.

CHAPTER 1

THEORITICAL APPROACH

1.1 Fisher Effect

Fisher hypothesized that the nominal rate of interest is made up of two components: the expected rate of inflation (π) and real interest rate (i):

$$i = r + \pi$$

(r) stands for the real interest rate which is the real cost of borrowing money.

$$r = i + \pi$$

Real interest rate is the growth rate derived from an investment. For example if a person earns 6 % interest rate (nominal interest rate) from the saving bank account and the inflation is 4 %, than the real interest rate that these person is earning is 6% - 4 % = 2 %

Fisher concludes that nominal interest rates move together with inflation. When inflation rises or lowers with x percentage, nominal interest rates also raise or lower with the same percentage. Real interest rate stays constant. In the long run, a permanent change in inflation will cause interest rates to follow inflation.

Fisher hypothesis provides a rationale idea that monetary policy should be concerned mainly for managing inflation expectations in order to keep real interest rates at a stable level that promotes saving and investment.

According to the data gathered for Albania, from year 1995 to 2011, it is noticed that interest rates are higher than inflation. Every time that it is noticed an increase in the interest rates (1995-1997) there is also an increase in the inflation, and every time that the interest rates decreased, inflation decreased.

Nominal interest rate can change for two reasons.

1) real interest changes,
2) The inflation changes.

The quantity theory of money shows that the rate of money growth determines the rate of inflation. If it is to be combined with the Fisher equation, money growth will affect nominal interest rate.

1.2 Liquidity preference

The liquidity preference refers to the desire of individuals to hold cash rather than income yielding investments. The desire to hold cash is considered as demand for money. The interest rate is determined by the supply[4] and demand[5] for money. According to this theory, the public holds money for three purposes:

1) To have money on hand for ordinary transactions. Individuals need money on hand to meet their expenses and businessmen need them to make payments or buy equipments and raw materials.

2) To keep as a precaution against extraordinary expenses. These extraordinary expenses can be illnesses, unemployment, accidents and other unforeseen expenses.

3) To use for speculative purposes. The amount held for the last purpose would vary inversely with the rate of interest. If interest rates are higher, people will tend to hold less money in their pockets, and if interest rates are lower they will decide to keep more money in cash on their hand. Individuals will speculate to make a profit from future changes in interest rates and bonds. According to Keynes the higher the interest rate, the lower the desire to speculate and the vice -versa. The speculative demand is expressed algebraically:

$M_2 = L_2 (r)$

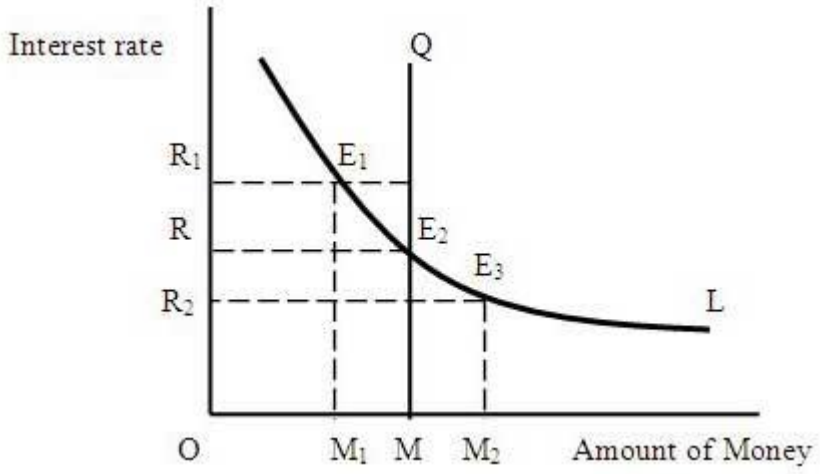
Where, L_2 is the speculative demand for money,

and r is the rate of interest.

[4] Total quantity of money in the country
[5] Desire of the public to hold cash

Fisher effect states that the real interest rate equals the nominal interest rate minus the expected inflation rate. Analysis of the Fisher effect suggests that, in the long run when prices are flexible, a reduction in money growth would lower inflation and this would lead to lower nominal interest rates. However, in the short run when prices are sticky, this monetary policy would lead to falling money growth and higher interest rates.

When a central bank sets the money supply, it determines the equilibrium interest rate. Like in every other product, the interest rate is determined where the money demand equals money supply:



In some ways, setting the money supply and setting the interest rate are two sides of the same coin.

CHAPTER 2

LITERATURE REVIEW

Peng Huanga, C. James Hueng and Ruey Yauc, (2010) on a research paper regarding the effects of monetary policy on exchange rates in Asia conclude that the relationship between interest rates and exchange rates should be modeled as time-varying in order to analyze the dynamics of the relationship during the period of crisis. The empirical results indicate that, for all three Asian countries taken into consideration, the direct channel through which a higher interest rate causes the currencies to appreciate is not statistically significant. Moreover, there is no significant evidence in favor of the traditional view which states that using a tight monetary policy defends weak currencies. Increases in interest rates lead to exchange rate appreciation in Indonesia and Korea, though the effect is highly insignificant. Raising the interest rates at the beginning of the crisis leads to higher exchange rate volatilities in Thailand, and the resulting increase in the exchange rate risk premium has a significant and negative effect on the exchange rate.

This is in line with the revisionist view which states that increasing interest rates could lead to currency depreciation because higher interest rates induce higher risk premiums (http://www.researchgate.net).

Magdalena Morgese, Borys Roman Horva´th and Michal Franta, (2009) in a paper regarding the effects of monetary policy in Czech Republic, find that prices and output decline after a monetary tightening, with the bottom response occurring after about one year. They document that the reaction of tradable prices is faster than that of non-tradable prices. While the maximum effect of a monetary shock on tradable can be seen after a year or so, it is at least a year and a half for non-tradable prices. Their results support the notion that the price puzzle is associated with model misspecification rather than with the actual behavior of the economy (http://deepblue.lib.umich.edu).

Results also indicate an appreciation of the domestic currency after a monetary tightening (Eichenbaum and Evans, 1995), with a gradual depreciation afterwards (http://www.nber.org).

Takayasu Ito, (2009) in a paper regarding the validity of the Fisher hypothesis in Japanese long-term interest rates, under different monetary policy regimes, concludes that Fisher hypothesis does not hold on the long-term for Japain. Thus, the real interest rates do not remain constant in time. The results of the co integration vector test demonstrates that all maturities of interest rates are in a one-to-one relationship in the first period. From the tests of co integration and the tests of co integration vector, it can be concluded that the Fisher hypothesis holds in the interest rates of two, three, four, five, seven and ten years only in the first period but not in the second and third period (http://dspace.lib.niigata-u.ac).

Leonardo Gambacortaa and S. Iannotti, (2007) investigate the velocity and asymmetry in the response of bank interest rates to monetary policy shocks in Italy in the period from 1985 to 2002.

The monetary policy changes have different impacts in terms of lending and deposits when the degree of competition in the banking system is somehow limited. In this case the policy maker should expect different overall effects on consumption and investment depending on the fact that the monetary action is easing or tightening. On the contrary, if a complete liberalization of the credit market has taken place, the adjustment of bank interest rates to monetary policy changes is faster and there are no significant asymmetries. Case in this framework-it may be more important to check for cross-sectional differences among banks, for example in terms of liquidity and capitalization that could determine a heterogeneous response in the bank rate pass-through (https://www.ecb.europa.eu).

Marta Muço, Peter Sanfey and Anita Taci (2004), in a research paper regarding inflation, exchange rates and the role of monetary policy in Albania conclude that exchange rate stability has played a key role in keeping inflation low for most of the transition period. The variety of monetary policy instruments available to the

authorities has widened in recent years. This has been associated with more stable and predictable changes in money supply and the price level.

The introduction of indirect instruments of monetary policy appears to have contributed in an effective role of the exchange rate transmission mechanism of monetary policy into the Albanian economy (http://www.ebrd.com).

CHAPTER 3

MONETARY POLICY IN ALBANIA

3.1 Background

Monetary policy is closely linked with the Central Bank (CB). Monetary policy affects GDP, price stability, unemployment etc. Therefore CB through monetary policy has a key role in the economic analysis of GDP growth. Management policy is made by the CB through these instruments:

- rate of mandatory reserves
- base interest rate

In any market economy exists: Central Bank (first level) and commercial banks (second level).

Central Bank supervises and serves as an umbrella for other commercial banks (second level), financial Institutions, securities market, exchange rate market.

It issues the currency (banknotes), meets the needs of the economy with money; it is a Bank for the banks of second level: clearing of checks, stocks, etc. Maintains reserves for institutions, provides loans for other banks, government bank (for deposits, withdrawals, etc.), regulates the money supply, intervenes and regulates money market and controls the interest rates.

Central banks in many countries are independent from the government (which manages the fiscal politics). But the government interferes in the work of CB by appointing directors of the Central Bank in the long term. Independence of CB independence consists of decisions that can be taken by CB about politics that will follow (setting interest rates and regulating the money supply and government lending, etc.).

Monetary policy objectives:

- Sustainable economic growth
- Price stability
- Full employment
- Stable currency, etc.

Not all objectives can be achieved simultaneously because of inverse relationship of some targets (high employment and price stability). CB does not have a control instrument for the realization of these goals. Therefore it uses: the interest rate and money supply as objectives.

Monetary policy instruments are the first links of the transmission mechanism. Instruments are divided into:

a) indirect instruments
    - Sale or purchase of securities: Treasury bill, bond, etc.
    - Re- financing (central bank provides credit to commercial banks).
    - Required reserves
b) direct instruments,
    - Not require developed financial market (developing countries)
    - Are temporary because they reduce competition in the banking system
    - Some of these instruments: credit control (limiting the volume of loan), interest rate control.

Monetary Market includes a set of institutions and economic agents where sale and purchase of securities is realized. :

- Shares
- Bonds
- Treasury bills, etc.

Securities are divided into: short-term (maturity< 1 year), Long-Term (maturity > 1 year). Interaction of money supply and money demand determines the quantity of money in circulation and the rate of interest on balance.

The demand for money by Keynes theory is based on these motives: transactions motive (to buy goods and services), the defense motive (in cases of unforeseen expenses), speculative motive (to avoid losses arising from holding securities).

The demand for money depends on the amount of money required and the interest rate: When interest rate rises, the demand for money lowers. When GDP increases, the demand for money also increases.

For illustration: What happens if the central bank wants to reduce inflation? It reduces money supply. People sell their assets to meet the demand for money. This leads to a reduction in the price of assets and the interest rate increases.

Expansionary Monetary policy:

- The Central Bank buys securities;
- Increased money supply (depending on the multiplier);
- Low interest rates;
- Low financing cost;
- Increased investment, costs , etc.;
- Increased GDP, employment, inflation.

3.2 Monetary policy in Albania

During the year of 1990 the communism regime in Albania collapsed and it was followed by a year of economic and social disorder. To stabilize the market it was used a one-year reform program that started in middle of 1992. The objective of this program was the reduction of inflation, which during autumn of 1992 was running at over 300 per cent. It was followed by a tight credit policy. At this time the two tier banking system was presented.

Monetary policy was based on direct instruments of monetary control and this program was supported by the International Monetary Fund and other international institutions. At this time the state of the banking system was, the external debt was high and the economy was suffering a large budget deficit. At the beginning of 1996 the state gave licenses to private banking activities which played an important role in encouraging the use of indirect instruments and at the same time they increased the bank competition and the service quality.

One of the most important parts of the stabilization policy for Albanian was the control of the interest rates. Real interest rates turned positive in the third quarter of 1994 when inflation declined but they remained under central bank control until the banking system began to consolidate and the monetary policy moved gradually

towards the use of indirect instruments instead of direct instruments. BoA started to eliminate direct control over interest rates at the beginning of 2000. Within a year the three controlled interest rates on 3 months, 6 month and 12 months deposits were removed and replaced with indirect instruments of monetary policy.

3.3 The transmission mechanism

As mentioned earlier there are four channels in which monetary policy can affect the economy: interest rates; credit ceilings; exchange rate; and inflation expectations. The interest rates were under the control of the CB until August 2000. An important indirect effect of interest rates on inflation may have occurred through the effect of high deposit rates on the demand for domestic currency deposits, which in turn helped to maintain or even appreciate the value of the domestic currency, thereby reducing import costs and prices.

Banks had large excess reserves. The Bank of Savings, which was the main bank of the country, was prohibited to lend during this period. For this reason, the amount of new credit issued in the economy was small and the direct influence of interest rates and credit decisions on the economy was negligible. The exchange rate channel is perhaps the most promising route for explaining inflationary developments in Albania. Exchange rate stability has in turn been aided by the substantial inflows of remittances throughout the transition period.

During the year of 1997, the exchange rate and the inflation rate increased rapidly, but they fell only when the security situation was under control. This is not a surprise for an open economy like the Albania one where foreign currencies circulate widely because of Albanians that live abroad and they bring high inflow of currencies. In fact, empirical evidence in Haderi et al. (1999) and Muco et al. (1999) showed that, for the early transition years (1993-96), the exchange rate and remittances explained much more of the variation in inflation than changes in the money supply do. From 1998, the CB has been announcing at the start of each year a clear target for annual inflation, usually within a fairly narrow band (e.g. 2-4 per cent). From 1994 to 1995,

money growth was robust while annual inflation was falling rapidly to single-digit levels. In 1997 money growth declined while inflation rose sharply in the wake of the pyramid scheme crisis.

CHAPTER 4

DATA AND METHODOLOGY

4.1 Simple Regression Analysis

The Regression Statistics Table gives the overall goodness-of-fit measures.

Multiple R shows the correlation between y and x, and it is 0.60, so 60 %.

When squared, the correlation is 0.36, so 36%. This indicates that only 36% of the correlation can be explained.

The standard error is high and it indicates that the data points are spread out over a large range of values.

The number of observations used in the regression is 17.

The analysis of variance table splits the sum of squares into its components.

Total sums of squares = Residual (or error) sum of squares + Regression (or explained) sum of squares.

R^2 = 1 - Residual SS / Total SS

= 1 - 430.2042835/ 678.7952941

=1 – 0.633= 0.367 (which equals R^2 given in the regression Statistics table).

The regression model is: $y = \beta_1 + \beta_2 x + u$

b1=4.8

b2=0.30

y=4.8 + 0.30x

Money supply = 4.8 + 0.30 interest rate

The supply of real money balances M/P equals the demand L(r, Y).
M/P = L(r*, Y).

The slope coefficient has estimated standard error of 0.103

The slope coefficient has t-statistic of 0.30614967 / 0.103987903 = 2.94

The slope coefficient has p-value of 0.010

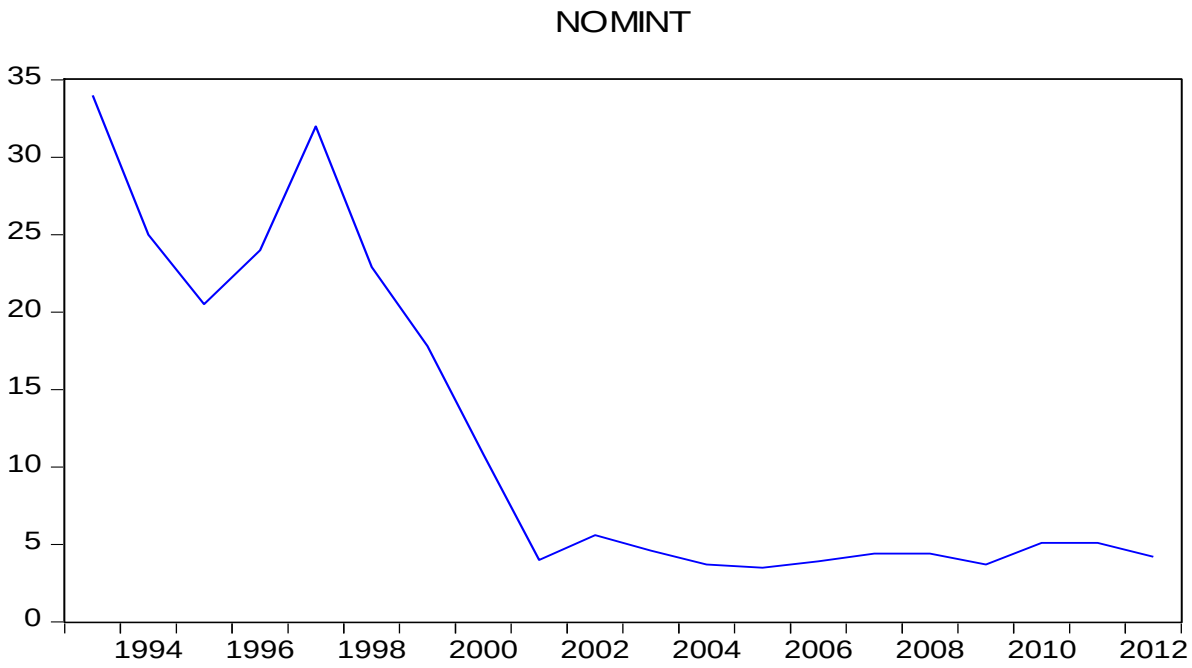
The 95% confidence interval for β_2 is (0.0845, 0.5277).

4.2 An examination of the relationship between nominal interest rate and inflation: no-stationary time-series data and Johansen Co-integration Test

Time series data display a variety of behavior. The main reason why it is important to know whether a time series is stationary or non-stationary before one embarks on a regression analysis is that there is a danger of obtaining apparently significant regression results from unrelated data when non-stationary series are used in regression analysis. Such regressions are said to be spurious (Hill et al., 2008).

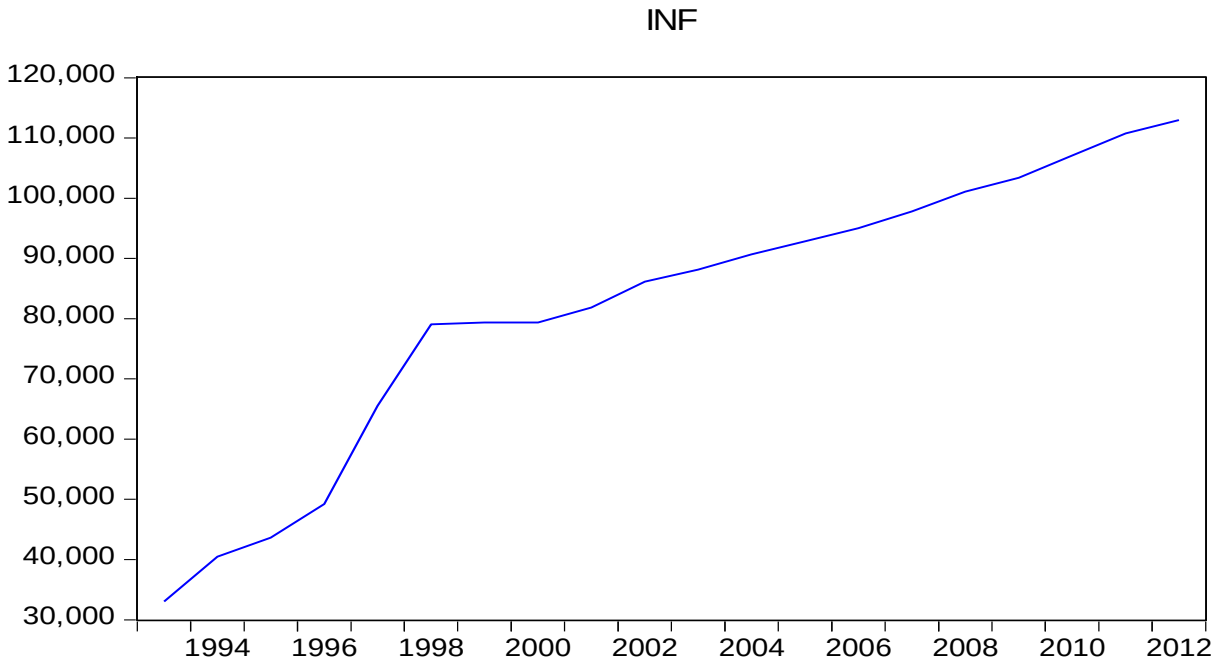
The data consist of yearly nominal interest rates obtained from INSTAT (www.instat.gov.al, accessed: 25 Jan 2014 for 1993-2009 time interval) and from www.tradingeconomics.com, accessed: 25 Jan 2014) and yearly inflation (CPI) from IMF, World Economic Outlook Database, October 2013 (www.imf.org, accessed: 18/01/2014) for Albania. The sample period is from 1993 to December 2013. All tests are performed by using E Views statistical program.

Graph 1: Nominal interest rate series in Albania, 1993-2012



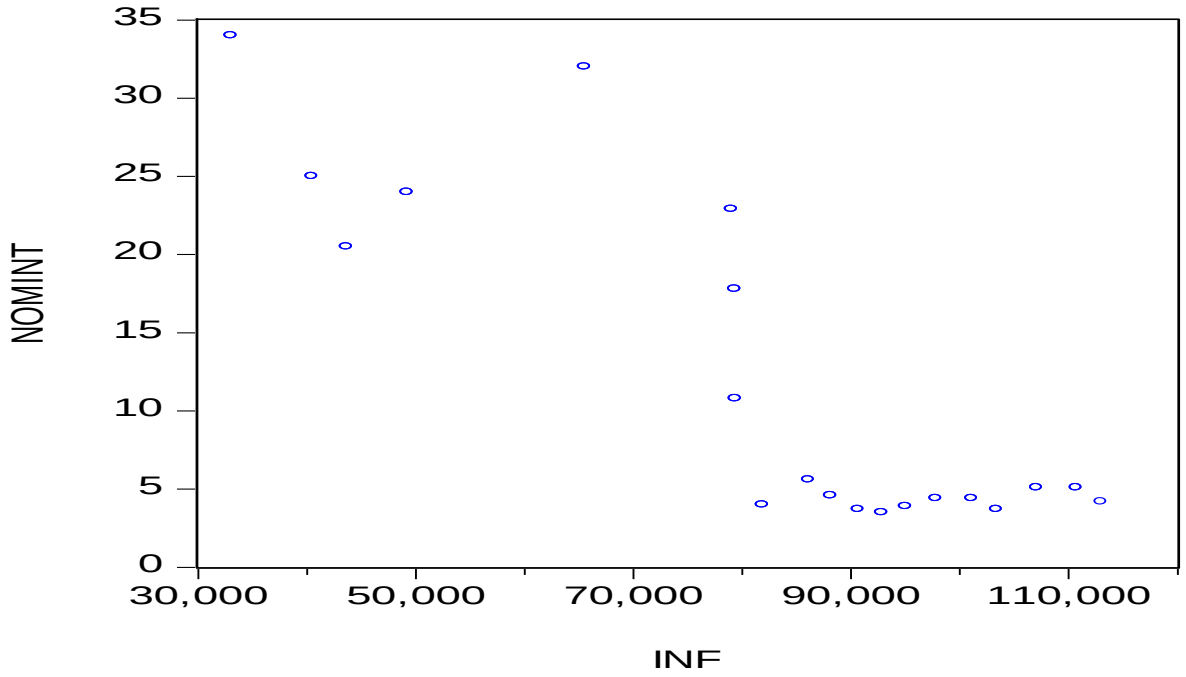
From the graph it is noticed that nominal interest rates in Albania were very high from 1993, with ups and downs and the nominal interest rate market started to stabilize after 2001.

Graph 2: inflation series in Albania, 1993-2012



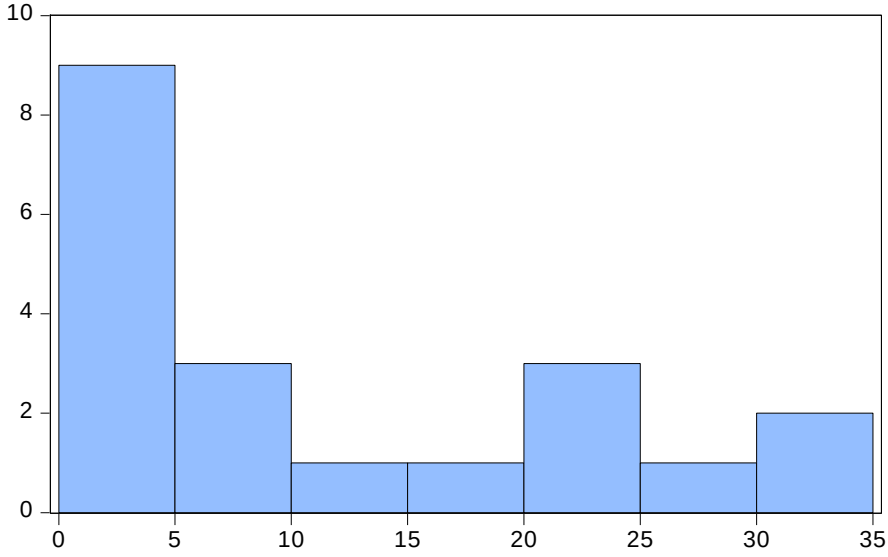
From the graph of inflation it is noticed that inflation has increased over the years.

Graph 3: Nominal interest rate and inflation series in Albania, 1993-2012, scatter diagram



The highest point on the Inflation and Interest Rate scatter diagram below corresponds to 1993 when the interest rate was 35 percent and the inflation rate was 300 per cent. There exists a relationship between the two variables. The scatter of points show that nominal interest rates and inflation lower as we move to the right; as i decreases, r tends to decrease and as i increases, r tends to increase. There comes a point when interest rates and inflation stabilize and it seems like they are almost constant.

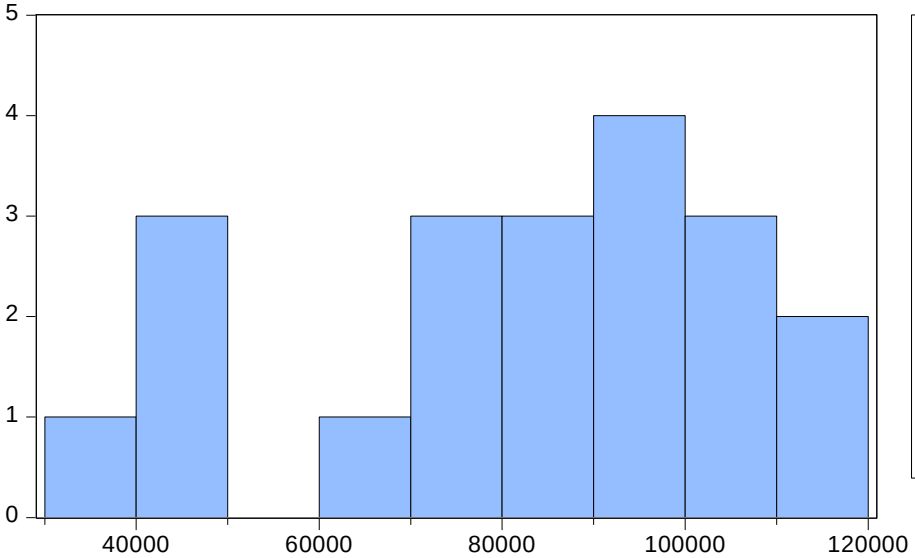
Graph 4. Histogram and statistics of nominal interest rate series



Series: NOMINT	
Sample 1993 2012	
Observations 20	
Mean	11.96000
Median	5.100000
Maximum	34.00000
Minimum	3.500000
Std. Dev.	10.58810
Skewness	0.884953
Kurtosis	2.247296
Jarque-Bera	3.082607
Probability	0.214102

The average of the sample is 24.503, the '95% Confidence Interval' indicates that, based upon this sample, we can be 95% confident that the true average of the process (from which the sample was taken) is between 23.990 and 25.016.

Graph 5: Histogram and statistics of inflation series



Series: INF	
Sample 1993 2012	
Observations 20	
Mean	81877.50
Median	87148.50
Maximum	112986.0
Minimum	33035.00
Std. Dev.	23916.25
Skewness	-0.736983
Kurtosis	2.451318
Jarque-Bera	2.061359
Probability	0.356765

Table 1: Descriptive statistics of nominal interest rate and inflation series

Mean	11.96000	81877.50
Median	5.100000	87148.50
Maximum	34.00000	112986.0
Minimum	3.500000	33035.00
Std. Dev.	10.58810	23916.25
Skewness	0.884953	-0.736983
Kurtosis	2.247296	2.451318
Jarque-Bera	3.082607	2.061359
Probability	0.214102	0.356765
Sum	239.2000	1637550.
Sum Sq. Dev.	2130.048	1.09E+10
Observations	20	20

Mean is the average across the observations.

Minimum is the smallest value of the variable and Maximum is the largest value of variable.

It is noticed that the Standard Deviation for inflation in very high. It measures the spread of observations.

Skewness measures the degree and direction of asymmetry. A symmetric distribution such as a normal distribution has a skewness of 0, and inflation skewness in this table is negative because the mean is less than the median.

Kurtosis is a measure of the heaviness of the tails of a distribution and a normal distribution has kurtosis 0. Kurtosis is positive and this shows that the tails are "heavier" than for a normal distribution.

Table 2: Estimation equation output of regression

Dependent Variable: NOMINT
Method: Least Squares
Date: 02/01/14 Time: 15:08
Sample: 1993 2012
Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF	0.000107	3.48E-05	3.067109	0.0063

R-squared	-0.567161	Mean dependent var	11.96000
Adjusted R-squared	-0.567161	S.D. dependent var	10.58810
S.E. of regression	13.25485	Akaike info criterion	8.055310
Sum squared resid	3338.128	Schwarz criterion	8.105097
Log likelihood	-79.55310	Hannan-Quinn criter.	8.065029
Durbin-Watson stat	0.123226		

Before analyzing the co-integrating relationship between nominal interest rate and inflation, it is important to carry out a univariate analysis. The economic series like those of nominal interest rate and inflation tend to possess unit roots (Hill et al., 2008). The presence of unit roots in the underlying series points towards the non-stationary of the underlying series. If both the independent and the dependent variables show the presence of unit roots, the regression results do not hold much meaning. This is referred to as spurious regression, whereby the results obtained suggest that there are statistically significant relationships between the variables in the regression model, when in fact all that is obtained is the evidence of contemporaneous correlation rather than a meaningful causal relation. The problem of spurious regression is compounded by the fact that the conventional t- and F-statistics do not have standard distributions generated by stationary series; with non-stationary, there is a tendency to reject the null in both cases and this tendency increases with sample size (Gül and Acıkalın, 2008).

The stationary of each series was investigated by employing the unit root tests developed by Dickey and Fuller. The test consists of regressing each series on its lagged value and lagged difference terms. The number of lagged differences to be included can be determined by the Akaike information criterion (Hill et al., 2008).

Table 3 reports the Augmented Dickey–Fuller test statistics under the null hypothesis of a unit root. This table also presents the number of lagged difference terms included in the regression. The hypothesis of unit root against the stationary alternative is not rejected at 5% levels for nominal interest rate and inflation with or without deterministic trend. However, the first differences of these variables are stationary under the test. Hence, it has been concluded that these variables are integrated of order 1. The results of these tests are shown in Table 3.

Table 3: Augmented Dickey-Fuller unit root test statistic on nominal interest rates

Null Hypothesis: NOMINT has a unit root
Exogenous: Constant
Lag Length: 1 (Fixed)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.362080	0.5769
Test critical values:	1% level	-3.857386	
	5% level	-3.040391	
	10% level	-2.660551	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 18

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(NOMINT)
Method: Least Squares
Date: 02/01/14 Time: 15:24
Sample (adjusted): 1995 2012
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NOMINT(-1)	-0.138429	0.101631	-1.362080	0.1933
D(NOMINT(-1))	0.167564	0.217805	0.769329	0.4536
C	0.659270	1.502365	0.438822	0.6670

R-squared	0.147478	Mean dependent var	-1.155556
Adjusted R-squared	0.033808	S.D. dependent var	4.091630
S.E. of regression	4.021870	Akaike info criterion	5.772383
Sum squared resid	242.6315	Schwarz criterion	5.920778
Log likelihood	-48.95144	Hannan-Quinn criter.	5.792844
F-statistic	1.297428	Durbin-Watson stat	1.887824
Prob(F-statistic)	0.302198		

Table 3 reports the ADF statistics under the null hypothesis of a unit root. The hypothesis of unit root against the stationary alternative is not rejected at 5% levels

(critical value) for nominal interest rate with or without deterministic trend. Since the calculated ADF t- Statistic (-1.36) is greater than the 5% critical value of (-3.04) do not reject the null of non-stationary. Therefore, inflation series has a unit root.

Table 4: Augmented Dickey-Fuller unit root test statistic on inflation

Null Hypothesis: INF has a unit root
Exogenous: Constant
Lag Length: 1 (Fixed)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.715046	0.4074
Test critical values:	1% level	-3.857386	
	5% level	-3.040391	
	10% level	-2.660551	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 18

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INF)
Method: Least Squares
Date: 02/01/14 Time: 15:25
Sample (adjusted): 1995 2012
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF(-1)	-0.077714	0.045313	-1.715046	0.1069
D(INF(-1))	0.294240	0.224492	1.310692	0.2097
C	9196.793	4283.283	2.147136	0.0485

R-squared	0.321919	Mean dependent var	4027.556
Adjusted R-squared	0.231508	S.D. dependent var	4189.604
S.E. of regression	3672.760	Akaike info criterion	19.40629
Sum squared resid	2.02E+08	Schwarz criterion	19.55468
Log likelihood	-171.6566	Hannan-Quinn criter.	19.42675
F-statistic	3.560629	Durbin-Watson stat	1.539887
Prob(F-statistic)	0.054276		

Table 4 reports since the calculated ADF t-Statistic (-1.71) is greater than the 5% critical value of (-3.04) do not reject the null of non-stationary. Therefore, inflation series has unit root.

Both nominal interest rate and inflation series have unit root, needed taking differences of both variables. Table 5 reports, after taking second differences (lags) of variable of inflation series, since the calculated ADF unit root test statistic (-5.03) is less than the 5% critical value of (-1.962) do not reject the null hypothesis of non-stationary. Therefore, inflation series has not a unit root, or it is stationary.

Table 5: Augmented Dickey-Fuller unit root test on D(NOMINT,2)

Null Hypothesis: D(NOMINT,2) has a unit root
Exogenous: None
Lag Length: 0 (Fixed)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.039625	0.0000
Test critical values:	1% level	-2.708094	
	5% level	-1.962813	
	10% level	-1.606129	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 17

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(NOMINT,3)
Method: Least Squares
Date: 02/01/14 Time: 15:27
Sample (adjusted): 1996 2012
Included observations: 17 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(NOMINT(-1),2)	-1.207329	0.239567	-5.039625	0.0001

R-squared	0.612949	Mean dependent var	-0.317647
Adjusted R-squared	0.612949	S.D. dependent var	8.626502
S.E. of regression	5.366839	Akaike info criterion	6.255378
Sum squared resid	460.8474	Schwarz criterion	6.304390
Log likelihood	-52.17071	Hannan-Quinn criter.	6.260250
Durbin-Watson stat	2.094279		

Table 6: Augmented Dickey-Fuller unit root test on D(INF,2)

Null Hypothesis: D(INF,2) has a unit root
Exogenous: None
Lag Length: 0 (Fixed)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.834499	0.0007
Test critical values:	1% level	-2.708094	
	5% level	-1.962813	
	10% level	-1.606129	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 17

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INF,3)
Method: Least Squares
Date: 02/01/14 Time: 15:29
Sample (adjusted): 1996 2012
Included observations: 17 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INF(-1),2)	-0.933005	0.243319	-3.834499	0.0015

R-squared	0.478477	Mean dependent var	168.8235
Adjusted R-squared	0.478477	S.D. dependent var	6220.335
S.E. of regression	4492.111	Akaike info criterion	19.71506
Sum squared resid	3.23E+08	Schwarz criterion	19.76407
Log likelihood	-166.5780	Hannan-Quinn criter.	19.71993
Durbin-Watson stat	1.802195		

Table 6 reports, after taking second differences (lags) of variable of inflation series, since the calculated ADF unit root test statistic (-3.83) is less than the 5% critical value of (-1.96) do not reject the null hypothesis of non-stationary. Therefore, inflation series has not a unit root, or it is stationary.

On the basis of the above-mentioned unit root tests, performed the Johansen's co-integration test to see whether any combinations of the variables are co integrated. This approach uses a maximum likelihood procedure that tests the number of co-integration relationships and estimates the parameters of those co-integrating relationships (Hill et al., 2008).

Table 7: Johansen Co-integration Test

Date: 02/01/14 Time: 15:33
Sample (adjusted): 1998 2012
Included observations: 15 after adjustments
Trend assumption: Linear deterministic trend
Series: NOMINT
Lags interval (in first differences): 1 to 4

Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.927505	39.36361	3.841466	0.0000

Trace test indicates 1 co-integratingeqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.927505	39.36361	3.841466	0.0000

Max-eigenvalue test indicates 1 cointegratingeqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

NOMINT
0.127263

Unrestricted Adjustment Coefficients (alpha):

D(NOMINT)	-3.110696

LR test statistics and critical values are shown in Table 7. The results suggest that there is a co integrating relationship between nominal interest rate and inflation at the 5% significance level. This reveals clearly that there exists a long-run stable relationship between the nominal interest rate and inflation. This indicates that nominal interest rate and inflation move together in the long run in Albania.

CONCLUSION

The scope behind this tight money is to slow down the high inflation that appears when economy is growing too fast. In the short term, the interest rates are raised, yet what is noticed in the long term is that the interest rates are lowered. Tight money discourage investment and spending because borrowing becomes more expensive and encourages saving in the banks. From the data in Appendix 1, it is noticed that Albania, from year 1995 up to 2011 has applied a monetary policy of tight money. In the same time, it is distinguished that the rate of inflation has been very high in the first years, from 1996-1998. This kind of policy effects negatively to the disposable income. People or investors who have to pay a mortgage or credit have to pay more with the new interest rate. In the same time, this kind of policy has effected the exchange rate and has appreciated ALL.

While there is considerable evidence that tight monetary policy has a large impact on short-term interest rates, the connection between this policy and long-term rates often appears weaker and less reliable. The analysis presented in this paper suggests a stronger but more variable connection between tight monetary policy actions and long-term rates. Market expectations play such an important role in the response of long-term rates to monetary policy. Monetary policy actions are likely to be most effective in changing long-term rates when these actions are seen as persistent. Consequently, to the extent that investors' views about the persistence of monetary policy actions change over the business cycle, the ability of monetary policy to influence long-term rates may vary over time.

This master thesis analyzed empirically the co-integrating relationship between nominal interest rate and inflation in the Albanian economy. Since the variables in this article are non-stationary and present a unit root, Johansen's co-integration technique has been applied. This methodology has enabled to obtain a co-integrating relationship among these variables. The co-integration results provide evidence of a unique co-integrating vector. This proves a long-run stable relationship between nominal interest rate and inflation in Albania.

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BIO-DATA OF THE AUTHOR

The author, Anita Rrodhe, was born in Gramsh in 1989. She continued her bachelor studies in Banking and Finance at Epoka University and graduated in 2012. Currently she is attending the Master of Sciences, second cycle program in Banking and Finance at Epoka University. She is also working as a Coordinator of Memorial Saglik Grubu. The author aspires to pursue administrative experience in the field of Banking and Finance.

APPENDIX

Appendix A: Money Supply, Interest rates and Inflation in Albania, 1995-2011

Years	Money Supply	Interest Rates	Inflation
1995	51.8	15.3	5.6
1996	43.8	16.8	28.4
1997	28.5	27.3	13.9
1998	20.6	22.6	13.6
1999	22.3	12.9	4.5
2000	12	8.3	4.3
2001	19.2	7.7	3.5
2002	4.3	8.5	3.3
2003	8.7	8.4	3.4
2004	13.5	6.6	6
2005	14.1	5.1	3.5
2006	16	5.2	2
2007	13.7	5.7	2
2008	7.7	6.8	4.4
2009	6.8	6.8	2.4
2010	12.5	6.4	3.5
2011	9.2	5.9	3

Source:World Bank

Appendix B: Money Growth and Inflation in Albania, 1993-2012

Years	M2	inflation	nominal interest INSTAT
1993	39,937	33,035	34
1994	57,472	40,490	25
1995	87,370	43,645	20.5
1996	120,646	49,203	24
1997	162,221	65,522	32
1998	199,264	79,050	22.9
1999	239,662	79,358	17.8
2000	264,497	79,389	10.8
2001	305,302	81,867	4.0
2002	324,727	86,139	5.6
2003	349,513	88,158	4.6
2004	391,411	90,688	3.7
2005	426,150	92,830	3.5
2006	477,739	95,031	3.9
2007	502,981	97,822	4.4
2008	549,957	101,108	4.4
2009	578,200	103,407	3.7
2010	604,500	107,076	5.1
2011	647,000	110,746	5.1
2012	669,600	112,986	4.2

Source: Bank of Albania

APPENDIX C: Regression Results

Regression Statistics	
Multiple R	0.605164298
R Square	0.366223827
Adjusted R Square	0.323972083
Standard Error	5.355397797
Observations	17

ANOVA

ANOVA					
	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	248.5910106	248.5910106	8.667661625	0.010053452
Residual	15	430.2042835	28.68028557		
Total	16	678.7952941			

Coefficients

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	4.883305625	2.271769968	2.1495599	0.048315131	0.041142582	9.725468668	0.041142582	9.725468668
Money Supply	0.306144967	0.103987903	2.944089269	0.010053452	0.084504702	0.527794638	0.084504702	0.527794638