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Aysu Insel (Prof. Dr.)
E-mail : ainsel@marmara.edu.tr
Home page: http:/mimoza.marmara.edu.tr/~ainsel/

M. Nedim Sualp (Dr.)
E-mail : nsualp@marmara.edu.tr
Home page: http://mimoza.marmara.edu.tr/~nsualp/

Marmara University
Department of Economics (Ingilizce Iktisat Bolumu)
Goztepe Campus, Kuyubasi,
34722 Kadıkoy
Istanbul
TURKEY

TEL: +90 216 3368487
FAX: +90 216 3464356

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Abstract

This paper examines the roles and interrelationships among the main macroeconomic variables, namely the exchange rate, inflation rate, interest rate and real GDP in Turkey. It provides a descriptive data analysis in order to understand the behaviour of each variable and to explain the relationship between them. The data analysis has been performed considering the original and the decomposed variables over the five periods: 1987:01-2007:12; 1987:01-1994:03; 1994:04-2001:01; 2001:02-2007:12; and 2002:10-2007:12. Different lengths of the sample periods are selected for each variable covering the economic crises and different policy applications in order to compare the reasons and the consequences of different economic policy applications on these variables. It is concluded that the distribution of economic series is changing from one period to another. The contribution of this paper is to develop a base for econometric model construction for the Turkish economy all the way through their contemporaneous and causal relationship for different sub-sample periods.

Keywords: Inflation rate, Exchange rate, Interest rate, Real GDP, Descriptive data analysis, Turkey.

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1. INTRODUCTION

The starting point of this analysis has originated from the following question: *"Is it a puzzle to make a model for/with exchange rate, interest rate, inflation rate and real income in Turkey?"* The reason is that the foreign exchange rate, interest rate and inflation rate have played important roles as instruments, and their roles and impacts have been changed by policy administrations since 1980. In terms of policy evaluation, the exchange rate, interest rate and inflation rate have turned out to be of paramount importance. The performance of the economy has been closely linked to the inflation targeting policy through the determination of interest rates by the Central Bank. There has been a deep criticism that the imposition of this policy has caused the exchange rates to be over-valued leading to some structural imbalances in the economy such as high and persistent trade deficits.

The aim of this paper is to make a detailed data analysis in order to be aware of inconveniences with the available time series data in Turkey. With a purpose of sub-period analysis and decomposition, this paper reveals the shocks, outliers, erratic and persistent movements, and patterns or trends in the inflation rate, exchange rate, interest rate and real GDP. The analysis starts from January 1987 and ends in December 2007.

In this paper, data analysis is given in section 2 and the conclusion is presented in section 3.

2. DATA ANALYSIS

The data has been obtained from the Central Bank of Turkey, and the analysis has been started in January 1987 and ended in December 2007. The data set has been constructed backwards in time in order to solve the data revision problem and to achieve the accuracy of the analysis by relating to a high likelihood of reliable data. In this analysis, the monthly data on the nominal effective foreign exchange rate index (TL/$) and the ITO Istanbul Cost of Living Index for Wage Earners (1985=100) have been converted into year to year (annual) percentage changes. The exchange rate, interest rate and inflation rate series have been decomposed into the seasonal, trend-cycle and irregular components by the Tramo/Seats method, whereas the natural log of real GDP has been decomposed into seasonal, trend-cycle and irregular components by the X12-Census method. The HP filter has been used to separate the trend and cycle components for each of the series.

Most of the economic time series tend to be characterized by the presence of clear cut(s), oscillations, and/or persistence. Economic time series generally exhibit the regular seasonal peaks and troughs related to the calendar effects (seasonal component), the long term movements or the direction of the data over time (trend component), the short term oscillations (cyclical component) and the short term neither systematic nor predictable random fluctuations (irregular component). Since seasonal adjustment procedure removes seasonal fluctuations, the resulting series are much smoother than the original series. The seasonally adjusted series consist of the trend cycle and the irregular components. If the amplitudes of seasonal and irregular components do not change as the trend components changes, an additive decomposition model is the appropriate one. However, if their amplitudes change, then multiplicative decomposition model will be the appropriate one. Accordingly, in this analysis, an additive decomposition model has been employed for each series. In addition, the type of outlier(s) have been considered as the additive outliers (or shocks) since they refer to a temporary change in the character of data. There is no level shift type of outlier since none of the series displays a continuous jump after some point in time. Additive outliers in 1994 and 2001 are expected to change the distribution of the variables and the trend-cycle and seasonally adjusted components are expected to be consistent. The original series is equal to the sum of the seasonally adjusted series and the seasonal factors. Since the seasonal components consist of reasonably systematic and stable effects with respect to timing, direction and magnitude, these effects are captured by the seasonal factors over time. Seasonal factors are calculated depending upon the patterns of the seasonal fluctuations that took place in the past years and upon the unknown pattern of seasonal fluctuations in years to come.

This paper has examined the statistical characteristics of the foreign exchange rate (**ė**), the inflation rate (π), the nominal interest rates (1 Month Deposit Rate: $\mathbf{r_{1M}}$, 3 Month Deposit Rate: $\mathbf{r_{3M}}$, 6 Month Deposit Rate: $\mathbf{r_{6M}}$, 12 Month Deposit Rate: $\mathbf{r_{12M}}$), and the log of RGDP (RGDP). Thus there is an attempt to exploit the puzzle debate on the use of these variables in econometric modelling for the Turkish economy.

Transforming and decomposing of time series together with the visual and descriptive inspections and the contemporaneous and causality relationships have facilitated a more efficient statistical analysis and provided a full examination of data.

Figures have been used to illustrate and compare the movements of each series over the period 1987 to 2007 through monthly data. Moreover, different lengths of the whole sample period have been selected for each variable in order to cover the economic crises and different policy regimes. In other terms, a sub-period analysis is expected to provide more information about not only the reasons and consequences of different economic policy applications, but also the statistical properties of the series. Thus the data analysis has been performed for each variable considering the original and the decomposed items over the five periods: 1987:01-2007:12; 1987:01-1994:03; 1994:04-2001:01; 2001:02-2007:12; and 2002:10-2007:12. Each sub-period includes a kind of economic crisis or an important policy decision. The first sub-period starts before the capital liberalization in 1989 and ends a month before 1994 crisis. The second sub-period starts with the April 1994 financial crisis and ends a month before 2001 crisis. The third sub-period includes the February 2001 currency crisis and ends in December 2007. The fifth sub-sample comprises the AK Party administration performance. The April 1994 and the February 2001 crises are considered as the starting points of the samples in order to avoid the bias in the range of each data set and the impacts of economic policies.

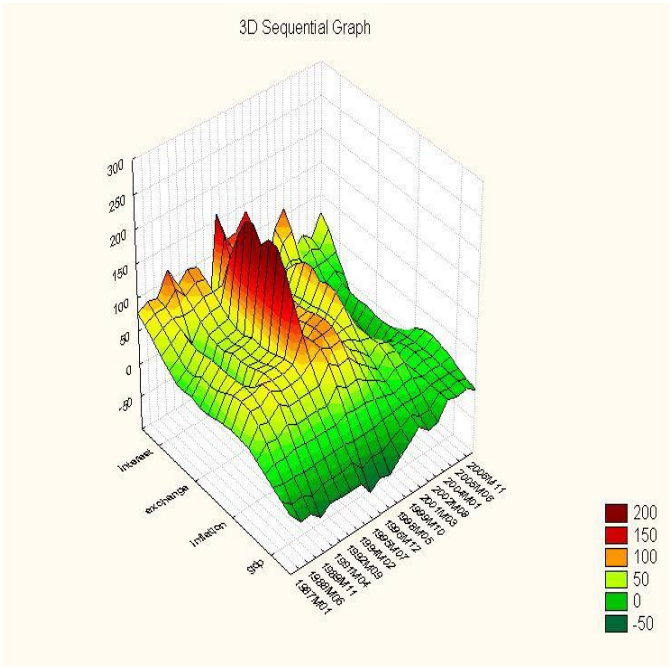
2.1. Visual Inspection:

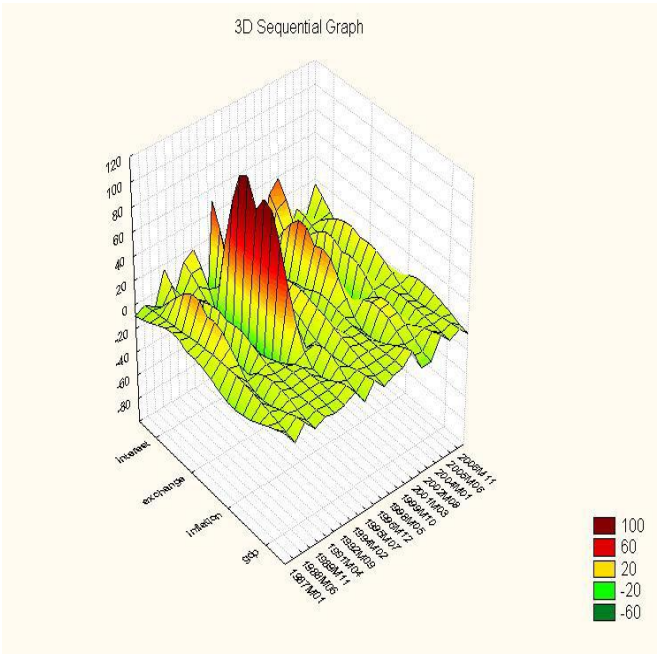
Visual inspection is extended to the descriptive statistical analysis using the mean, the standard deviation, the skewness, the kurtosis, and the maximum/minimum values in order to provide a powerful statistical data analysis.

In Figures.1a and 1b, the 3-dimensional sequential graphs display the spline-smoothed surfaces that have been fitted to each observations and successive values of the four variables in the forms of trend-cycle and cycle components. Their values are plotted along the X-axis with each successive series represented along the Y-axis. The two peak points show the 1994 April and the 2001 February crises.

Figure.1: Three Dimensional Views

a: Trend Cycle Components **b: Cycle Components**





Inspection of Figure.2 serves as an efficient tool of describing movements, outliers and/or level shifts in the original series. In Figure.2 (left panel) all the nominal interest rates (r_{3M}, r_{6M}, r_{12M}) except one month deposit rate (r_{1M}), follow similar patterns and they are more volatile between 1993 and 2002 period. In Figure.2 (right panel) the movements in the change in dollar exchange rate, inflation rate, and the trend-cycle and seasonally adjusted components of log of real gross domestic product are plotted over the periods 1987:01-2007:12. Detailed inspection of the decomposed series in Figure 3 to 5 provides a clear picture about the movements over the sub-periods. Figures 3, 4 and 5 display visible differences in the behaviour of variables over the periods 1987:01-2007:12 (left panel, whole period) and 2002:10-2007:12 (right panel, the AK Party administration period). In Figure.3, interest rate (middle panel) and inflation rate (lower panel) follow similar pattern, while exchange rate (upper panel) fluctuates up and down. In Figures.4 and 5, it is clear that there exist both erratic and persistent behaviour in the series in different sample periods. In addition, the movements of these variables have changed over time due to two severe disruptions in April 1994 and February 2001.

From a simple graphical examination, it can be seen that; (i) the deviations from trends show a non-constant cyclical pattern. The length of periods of oscillations and amplitudes are time

varying, so as over the 2002:10-2007:12 period (right panel) the oscillations become shorter and the amplitude turns out to be lower; (ii) the exchange rate, interest rate and inflation rate follow a similar cyclical pattern, but they appear to be the follower or leader of each other depending upon the sample period chosen; (iii) there is a decreasing variability at the end of period; (iv) the existences of nonlinear trends in rates, whereas linear trend in real GDP give some information about the long run pathways; (v) the real GDP follows a persistent pattern; (vi) from the sub-period analysis, the exchange rate, the interest rate, and the inflation rate have downwards trends after 1994 crisis; further, the non-linear trend components reveal a constant pathway, mainly after 2005.

Figure.2: Variables of Interest: (1987:01 – 2007:12)

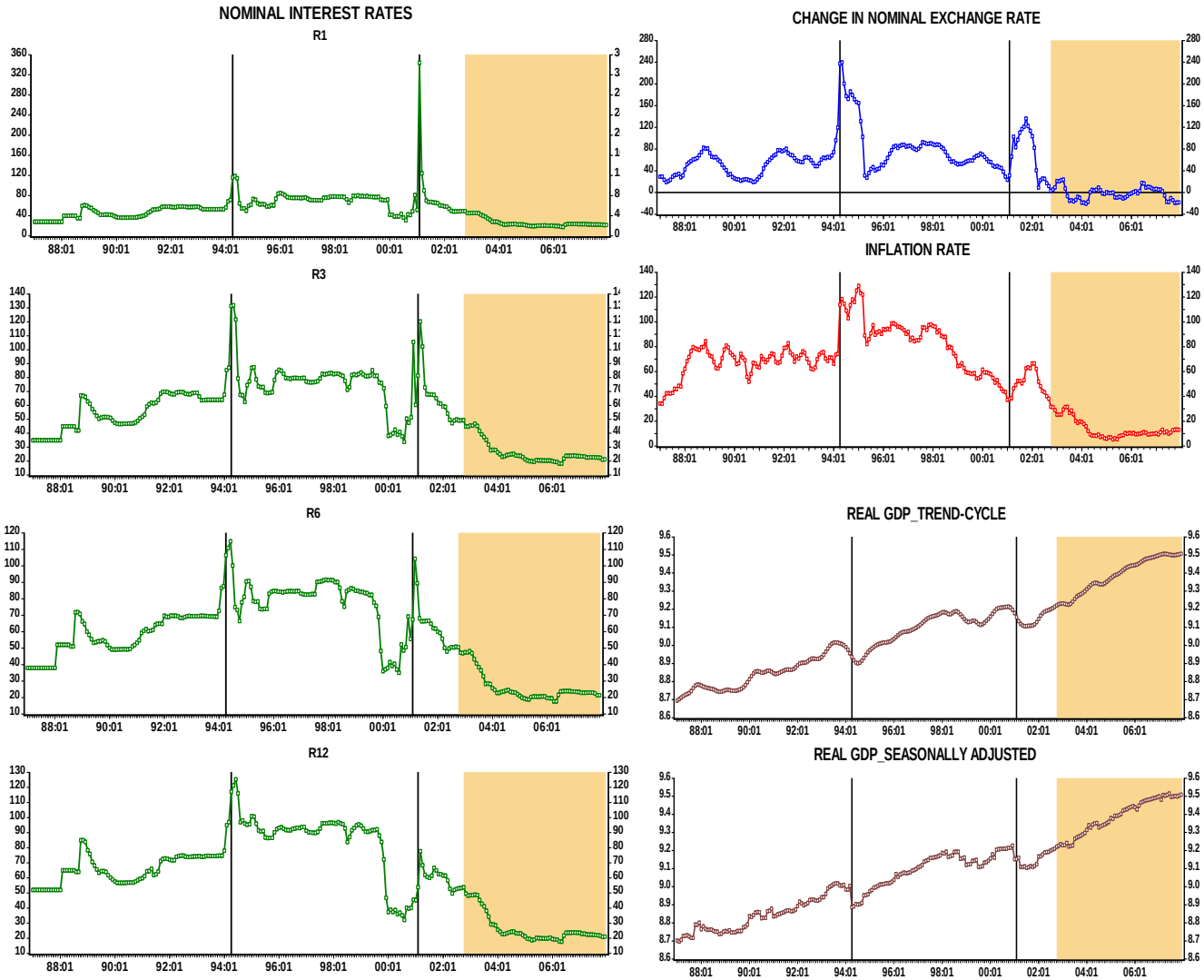


Figure.3: Behaviour of the Trend-Cycle Components

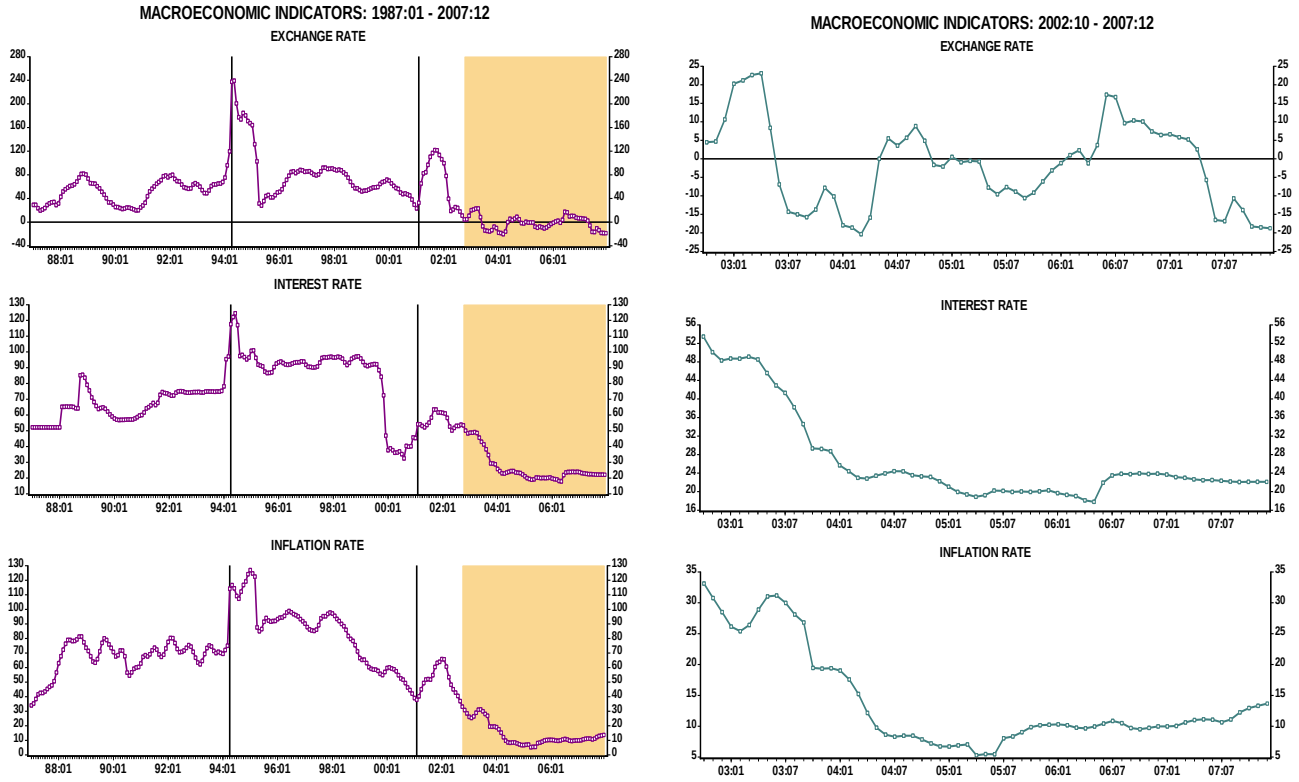


Figure.4: Behaviour of the Cycle Components

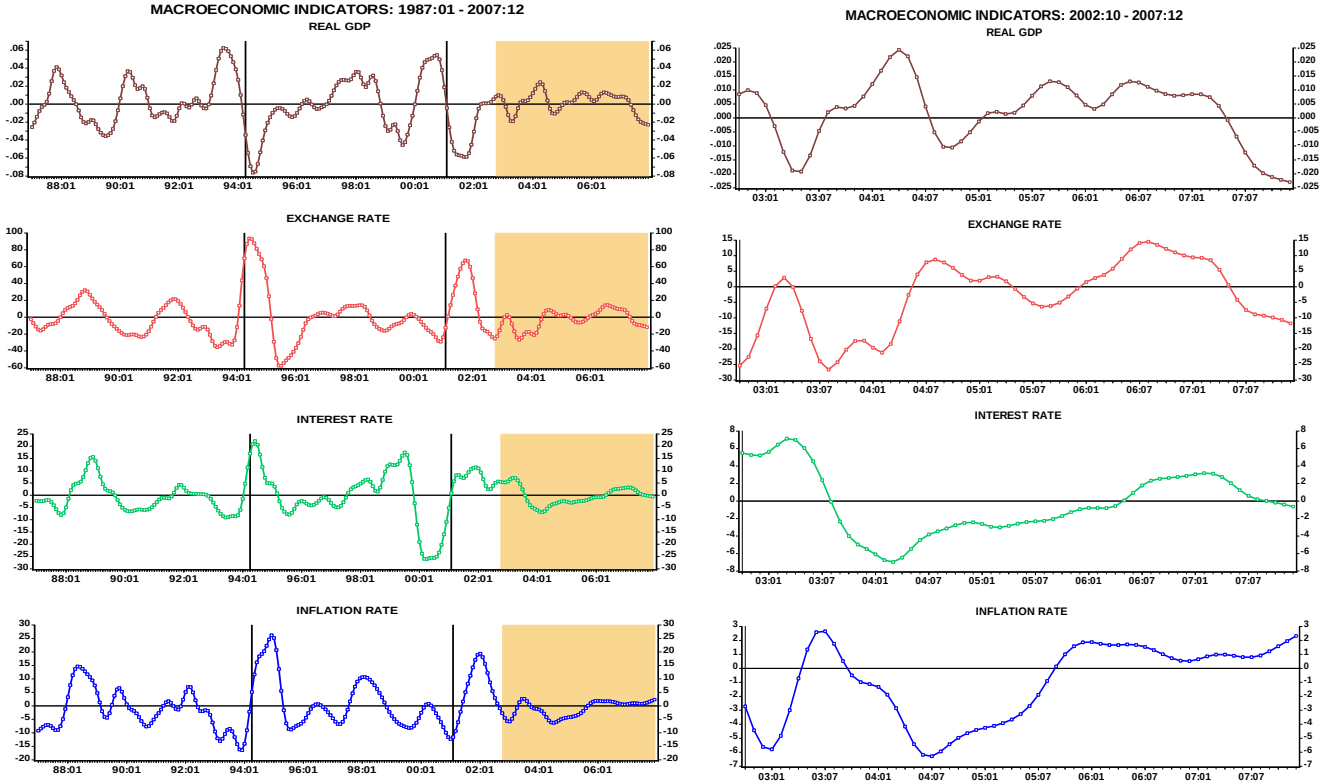
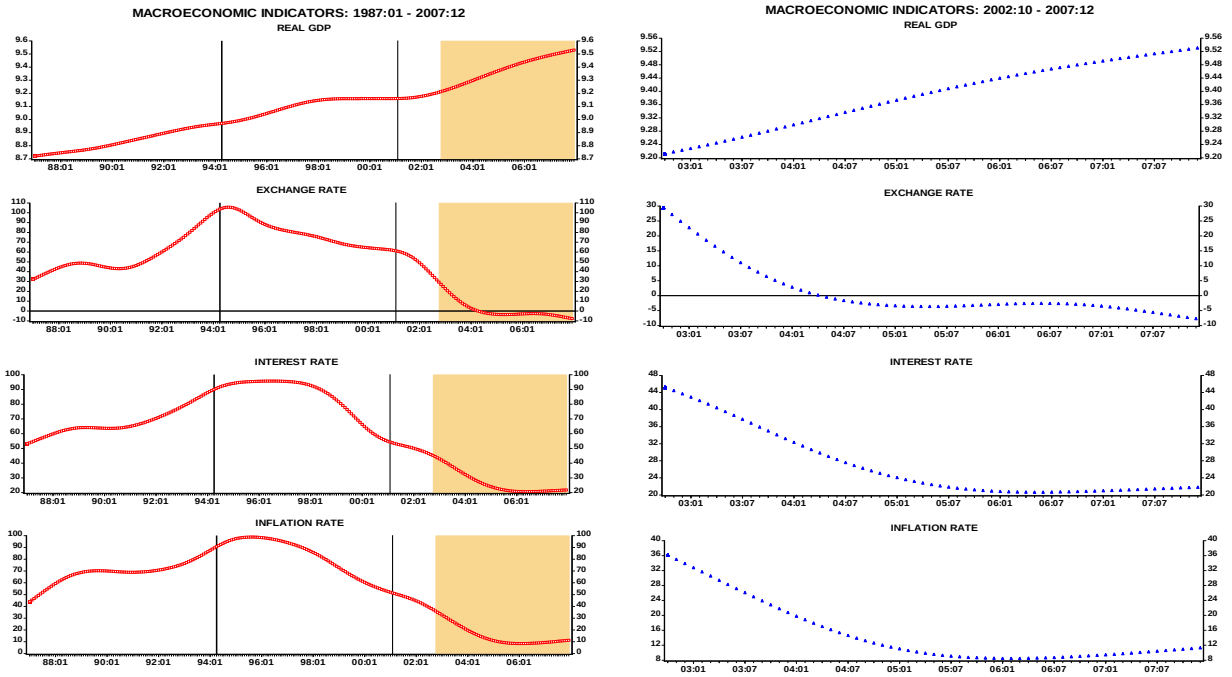


Figure 5: Behaviour of the Trend Components



Scatter diagrams have been used to represent the linear relationship between two series for the different ranges of sample period. This inspection provides information about the strength, shape and direction of the relationship as well as the presence of outliers. Examination of the scatter diagrams discloses the existence of any (mutual) contemporaneous linear relationship between two variables. A linear regression line is drawn through the each scatter plots in order to show the type of relationship between two variables, and also to detect the outliers. In Figure.6, there are four columns in which the first and the third columns show the relationship between two variables for the whole period, and the second and fourth columns show the relations over the AK Party period. Inspection of each plot suggests that there is not a strong contemporaneous linear relationship between these variables. It is important to note that contemporaneous movements in each variable cannot be explained by the other one in a linear context and they deviate from a linear path for different sample periods. These results are not unexpected, since the sequential-annual changes are not equal to each other in each variable.

In Figure.7-first and third columns, each variable shows a clockwise and upswings-looped path rather than a stable sloped line. The second and fourth columns reveal that exchange rate is always below inflation rate (second column-lower panel) except for the periods of crises and it is below interest rate (second column-middle panel) until 2001. Moreover, inflation rate

is below/above interest rate up to 2002, and then it is always below interest rate (second column-upper panel). These findings show that movement and the relationship between these variables vary over time period with respect to preceding economic policy and economic crisis.

Figure.6: Inspection of Linear Relationship:

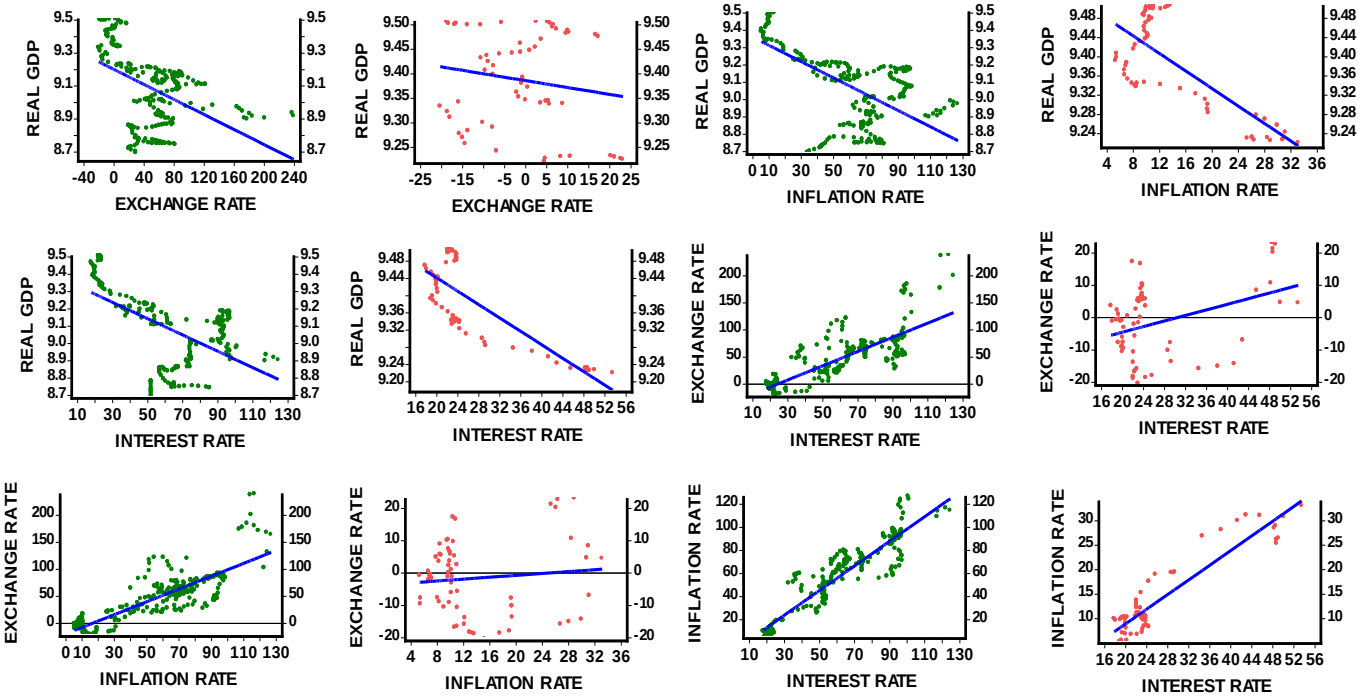
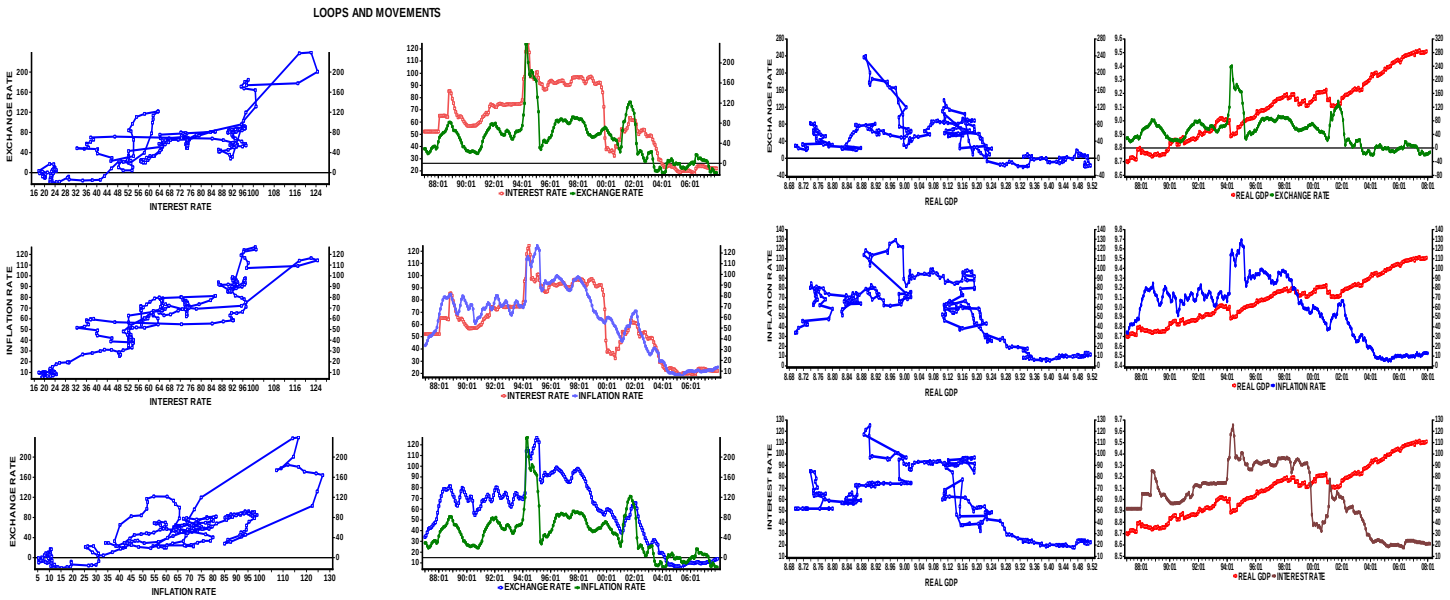


Figure.7: Looped Paths and Movements: (1987:01 – 2007:12)



2.2. Descriptive Inspection

Visual inspection has been extended to the descriptive inspection using the mean, the standard deviation, the skewness, the kurtosis, and the maximum/minimum values in order to provide a powerful statistical data analysis. It is believed that most of the economic time series do not fulfil the independent Gaussian distribution. A common problem in the economic time series is the presence of persistence. In general, there is a tendency for large (small) values to be followed by large (small) values. For example, during some periods, interest rate and exchange rate series exhibit persistence because these variables are usually used as the policy instruments, thus their behaviour cannot be arbitrary. Moreover, real GDP includes stochastic or deterministic trend and hence shows persistence. Another problem in the time series is the (large) fluctuations. So, the knowledge of these problems is crucial in econometric modelling and forecasting.

It is more convenient to start with the interest rates and the related descriptive statistics displayed in Table.1, in appendix. All interest rates move towards the similar rates within each sub-sample period, but the average rates vary from one sub-sample to another. The largest value of the standard deviation is on the one-month deposit rate during 2001:02-2007:12, whereas, the lowest standard deviation is for the sample period 2002:10 to 2007:12 being consistent with the foregoing policy applications. Additionally, the highest interest rates on 3, 6, and 12 month deposits over the 1994:04 and 2001:01 periods due to debt financing, whereas the highest rate is on one-month deposit rate in 2001:02 and 2007:05 period owing to insufficient liquidity. The results in Table.1 present that the kurtosis coefficient is different than three, and the skewness coefficient is different than zero for some sample periods. Specifically, the skewness and kurtosis coefficients for nominal interest rates show that there is a substantial deviation from normal distribution. It can be detected that the kurtosis coefficient is low for the whole sample period, except $\mathbf{r_{1M}}$, and its value varies for five different samples. High kurtosis coefficients reveal that fluctuations in a variable are wide in some periods, but smooth some other periods. Thus high shocks (outlier) are followed by high shocks, and hence the variance varies over time.

During the AK Party administration, interest rates decreased to the lowest average levels and all the rates have turned out to be closer to each other. The instability in the nominal interest rates has decreased towards the current period. Since the Central Bank has been using the

interest rate as the policy tool in order to attain the inflation targeting policy, it has managed to eliminate the volatility in interest rate.

The examinations of different nominal interest rates on deposits have shown that the distribution of these rates have varied over time considerably. In this paper, the 12-month nominal deposit rate has been chosen following the selection criterion based on the stability of interest rate.

The original rates and the seasonally adjusted real GDP series have been described in Tables 1 to 3 in appendix and in Table 4 in appendix, respectively. Table 2 shows that exchange rate has a kurtosis coefficient exceeding 3 and a skewness coefficient ranging between 1.09 and 1.75, except for the 1987:01-1994:03 and 2002:10-2007:12 sub-periods, implying the periods of turbulence with large exchange rate changes. In Tables 3 and 4, inflation rate and real GDP have lower skewness and kurtosis coefficients relative to the other two variables, respectively.

In Tables 5 to 9 in appendix, the descriptive statistics are defined for the three components, namely trend-cycle, cycle and trend. These results mimic an important feature that the movements in all of these variables are characterised by the tranquil periods and crisis periods.

2.3. Contemporaneous and Causality Relationships

Both the simple correlation and cross correlation coefficients are more accurate and comprehensive quantitative measures to assess the strength, the timing, and the direction of the relationship between variables. Linear nature of the contemporaneous relationship between two random variables in different sample periods is described by the simple correlation coefficient, whereas a phase relationship between two variables is classified by the cross correlation coefficient. Thus the direction and the time patterns of the variables of interest have been determined in order to provide some signals about the policy impacts.

Table.10 in appendix, displays the correlation coefficients between each variable in different sample periods and for different components. The relevance of the correlation analysis is twofold: First, the separation of the sample into five periods increases the understanding of the related economic policies and helps to construct empirical models for estimation and

forecasting; second, the consideration of components utilizes the information both on short and long term co-movements. Along with the above argument, although the simple correlation coefficients are high for the whole sample period, there are noticeable differences across each sub-period. Concerning the components, the correlation coefficients for the original series and trend-cycle components are very similar, but they are different for the cycle and trend components. The original and trend-cycle components of exchange rate, inflation rate, interest rate and RGDP are highly correlated before the AK Party period. During 2002:10-2007:12, the correlation coefficients with exchange rate have declined significantly, but the correlation of interest rate with inflation rate is much stronger as compared to those between exchange rate and other two variables. Although the trend components are highly correlated, the cycle components show low correlations. In other terms, the short run strength of movements is weak, but the long run strength is strong.

The correlation analysis has been completed with the cross correlation analysis. This analysis has provided information about the existence of high/low linear dependency between two variables and the impacts of different economic policy rules. Calculated linear cross correlation coefficients are displayed in Tables 11 and 12, in appendix. An investigation of cyclical components for the first four sample periods indicates that exchange rate is the leading indicator of inflation rate. Interest rate is the leading variable for exchange rate, inflation rate and real GDP during the 1994-2001 periods. However, interest rate becomes a leader only for inflation rate, while exchange rate leads both interest rate and inflation rate through the 2001:02-2007:12 periods. They all have the positive correlation, but RGDP is the leading and counter-cyclical indicator of all three variables. During the AK party administration period, exchange rate has a considerably low correlation both with inflation and interest rates, but interest rate is the leading indicator of both inflation rate and RGDP. Both exchange rate and inflation rate follow RGDP. Therefore, there is clear evidence that the key leading policy instrument is the exchange rate in the Turkish economy.

Existence of some causal relationship between economic variables indicates a non-contemporaneous relationship between them. The Granger causality test with one lag has provided a basis for addressing a feedback effect of one variable on another. Table.13 in appendix provides a detailed description of the causality relationships. Regarding the causality relationship between the original series, particularly during the AK party period knowing that the interest rate is the policy instrument, exchange rate causes both interest rate

and inflation rate; and inflation rate causes interest rate, but no causality exists between the RGDP and other variables. On the other hand, inspections of the trend-cycle components expose that exchange rate causes inflation rate, interest rate and real GDP. It can be seen that there is not an apparent and stable causality pattern between these variables across different sample periods; however, it is clear that exchange rate is the fundamental variable in the Turkish economy.

As a result, the evaluation of statistical data analysis has proved that the distribution of economic series is changing from one period to another. In this stage, it is important to remember the time invariance and independency properties of time series in the econometric model construction. However, most of the econometric models have been constructed for the longest sample periods using exchange rate, inflation rate, interest rate in Turkey, even if these variables are not generated from an independent stationary process.

3. CONCLUSION

This paper has been motivated to develop a detailed data analysis for the exchange rate, inflation rate, interest rate and real GDP series in Turkey from 1987 to 2007 using monthly data. A rather detailed and comparative elaboration of data provides some answers to the following questions: (i) Is it possible to solve the puzzle of constructing econometric models for longer periods even if the distribution of these series changes from one period to another? (ii) Is it possible to build a model for policy evaluation and forecasting if this series cannot achieve the time series properties? (iii) What is the best period (length) to construct an econometric model with volatile, changing, delayed, nonlinear, and complex nature of these series?

This paper has provided the answers to above questions by examining the movements and interrelationships between the three main policy instruments and real GDP in Turkey. Statistical evaluation of this data analysis has proved that the distribution of economic series has changed from one period to another, implying the relative importance of sub-period analyses corresponding to the different policy environments and solving the puzzle defined in this study. Therefore, it could be suggested that, at a cost of using smaller sample sizes, a better understanding of the relationship between the variables at hand could be achieved by the investigation of the sub-periods corresponding to the different policy environments.

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Appendix:

TABLE.1: Nominal Interest Rates (Original series)					
STATISTICS	**1987:01-2007:12**	**1987:01-1994:03**	**1994:04-2001:01**	**2001:02-2007:12**	**2002:10-2007:12**
$\mathbf{r_{1M}}$					
Mean	51.05	45.84	69.50	38.29	26.95
Standard Dev.	28.31	11.34	16.14	39.28	**8.49**
Maximum	344.10	71.42	118.71	**344.10**	48.84
Minimum	17.730	28.00	30.71	17.73	**17.73**
Skewness	4.56	-0.11	0.06	6.03	1.57
Kurtosis	46.87	1.91	4.54	46.63	4.05
$\mathbf{r_{3M}}$					
Mean	55.37	55.36	75.33	35.67	26.31
Standard Dev.	23.41	12.80	17.54	20.30	**8.39**
Maximum	131.80	87.05	**131.80**	120.26	49.37
Minimum	18.20	35.00	33.84	18.20	**18.20**
Skewness	0.22	-0.06	0.10	1.72	1.57
Kurtosis	2.76	2.19	5.49	6.24	4.10
$\mathbf{r_{6M}}$					
Mean	56.90	57.91	77.75	35.26	26.49
Standard Dev.	23.60	11.99	17.20	18.76	**9.07**
Maximum	114.83	87.65	**114.83**	104.25	50.62
Minimum	17.630	38.00	35.07	17.63	**17.63**
Skewness	-0.06	-0.10	-1.09	1.29	1.57
Kurtosis	1.98	2.35	3.91	4.20	4.05
$\mathbf{r_{12M}}$					
Mean	61.86	66.34	84.64	34.67	26.69
Standard Dev.	26.54	10.05	21.96	16.93	**9.83**
Maximum	125.29	96.90	**125.29**	77.69	53.83
Minimum	17.77	52.00	32.19	17.78	**17.77**
Skewness	-0.13	0.44	-1.29	0.75	1.57
Kurtosis	1.99	3.08	3.72	2.06	3.97

TABLE.2: Exchange Rate (ė) (Original series)					
STATISTICS	**1987:01-2007:12**	**1987:01-1994:03**	**1994:04-2001:01**	**2001:02-2007:12**	**2002:10-2007:12**
Mean	49.71	51.82	81.56	16.02	-1.74
Standard Dev.	45.27	21.23	45.80	39.50	11.53
Maximum	239.66	119.76	239.66	136.23	**23.78**
Minimum	-20.51	19.18	23.30	-20.51	**-20.51**
Skewness	1.09	0.17	1.75	1.74	0.24
Kurtosis	5.40	2.67	5.73	4.87	2.36

TABLE.3: Inflation Rate (π) (Original series)					
STATISTICS	**1987:01-2007:12**	**1987:01-1994:03**	**1994:04-2001:01**	**2001:02-2007:12**	**2002:10-2007:12**
Mean	58.06	67.31	83.72	23.02	13.98
Standard Dev.	30.93	11.38	21.85	18.11	**7.81**
Maximum	129.09	84.42	129.09	66.57	31.66
Minimum	5.30	33.95	37.35	5.30	**5.30**
Skewness	-0.19	-1.29	-0.14	1.03	1.14
Kurtosis	2.19	4.07	2.28	2.76	2.91

TABLE.4:Real GDP (Seasonal adjusted)					
STATISTICS	**1987:01-2007:12**	**1987:01-1994:03**	**1994:04-2001:01**	**2001:02-2007:12**	**2002:10-2007:12**
Mean	9.09	8.84	9.10	9.33	9.38
Standard Dev.	0.23	0.09	0.09	0.13	0.10
Maximum	9.51	9.02	9.22	9.51	9.51
Minimum	8.70	8.70	8.88	9.10	9.22
Skewness	0.14	0.35	-0.78	-0.20	-0.33
Kurtosis	2.08	2.00	2.63	1.70	1.77

TABLE.5: (ė) Components				
STATISTICS	**1987:01-2007:12**	**1987:01-1994:03**	**1994:04-2001:01**	**2001:02-2007:12**
Trend-Cycle component				
Mean	49.69	52.04	81.77	15.55
Standard Dev.	44.92	21.20	45.76	37.71
Maximum	239.27	119.65	239.27	121.76
Minimum	-20.35	19.60	23.14	-20.35
Skewness	1.11	0.16	1.74	1.70
Kurtosis	5.51	2.65	5.71	4.75
Cycle component				
Mean	0.000	-4.45	2.07	2.62
Standard Dev.	27.38	18.05	38.15	21.96
Maximum	134.72	32.95	134.72	67.51
Minimum	-70.07	-36.92	-70.07	-28.38
Skewness	1.47	0.24	1.26	1.30
Kurtosis	7.98	2.00	5.62	4.54
Trends component				
Mean	49.70	56.49	79.69	12.93
Standard Dev.	33.28	18.57	14.01	22.75
Maximum	105.65	102.63	105.65	61.24
Minimum	-7.72	32.30	61.65	-7.72
Skewness	-0.31	1.10	0.52	1.02
Kurtosis	2.06	3.02	2.05	2.47

TABLE.6: (π) Components				
STATISTICS	**1987:01-2007:12**	**1987:01-1994:03**	**1994:04-2001:01**	**2001:02-2007:12**
Trend-Cycle component				
Mean	58.06	67.11	83.88	23.06
Standard Dev.	30.89	11.21	21.77	18.09
Maximum	126.95	81.34	126.95	63.75
Minimum	5.31	33.98	38.96	5.31
Skewness	-0.19	-1.30	-0.16	1.01
Kurtosis	2.19	4.02	2.25	2.69
Cycle component				
Mean	0.00	-1.97	1.35	0.73
Standard Dev.	8.73	8.56	10.54	6.32
Maximum	29.52	15.25	29.52	21.78
Minimum	-18.13	-18.13	-13.59	-13.49
Skewness	0.89	0.18	1.10	1.34
Kurtosis	4.06	2.21	3.34	5.75
Trends component				
Mean	58.06	69.08	82.53	22.33
Standard Dev.	29.05	9.43	15.81	14.96
Maximum	98.80	89.63	98.80	51.40
Minimum	8.45	43.98	51.96	8.45
Skewness	-0.44	-0.49	-0.63	0.70
Kurtosis	2.00	3.75	1.88	1.91

TABLE.7: (r_{12M}) Components				
STATISTICS	**1987:01-2007:12**	**1987:01-1994:03**	**1994:04-2001:01**	**2001:02-2007:12**
Trend-Cycle component				
Mean	61.96	66.79	85.23	33.91
Standard Dev.	26.77	10.10	22.19	15.43
Maximum	124.61	97.14	124.61	63.46
Minimum	17.82	52.18	32.42	17.82
Skewness	-0.10	0.38	-1.32	0.63
Kurtosis	1.96	3.02	3.73	1.69
Cycle component				
Mean	0.00	-1.07	-0.17	1.29
Standard Dev.	8.86	6.64	13.05	4.80
Maximum	33.32	21.84	33.32	12.18
Minimum	-28.62	-11.72	-28.62	-7.63
Skewness	0.08	1.35	-0.07	0.45
Kurtosis	5.67	5.60	3.35	2.62
Trends component				
Mean	61.96	67.87	85.40	32.62
Standard Dev.	24.68	8.99	13.25	12.21
Maximum	95.67	89.34	95.67	54.32
Minimum	20.63	53.13	54.83	20.62
Skewness	-0.28	0.77	-1.14	0.50
Kurtosis	1.96	2.79	2.80	1.63

TABLE.8: (RGDP) Components				
STATISTICS	**1987:01-2007:12**	**1987:01-1994:03**	**1994:04-2001:01**	**2001:02-2007:12**
Trend-Cycle component				
Mean	9.09	8.84	9.10	9.33
Standard Dev.	0.23	0.09	0.09	0.13
Maximum	9.51	9.01	9.21	9.51
Minimum	8.69	8.69	8.90	9.11
Skewness	0.15	0.36	-0.74	-0.20
Kurtosis	2.08	2.00	2.44	1.69
Cycle component				
Mean	0.00	0.00	0.00	0.00
Standard Dev.	0.03	0.02	0.03	0.02
Maximum	0.06	0.06	0.05	0.02
Minimum	-0.08	-0.04	-0.08	-0.06
Skewness	-0.20	0.56	-0.35	-1.37
Kurtosis	3.40	2.54	2.68	4.12
Trends component				
Mean	9.09	8.84	9.10	9.34
Standard Dev.	0.22	0.08	0.07	0.12
Maximum	9.53	8.97	9.16	9.53
Minimum	8.72	8.72	8.97	9.16
Skewness	0.16	0.14	-0.71	0.02
Kurtosis	2.11	1.63	1.94	1.57

TABLE.9: Components: AK Party Period: 2002:10-2007:12				
	RGDP	**ė**	**π**	**r_{12M}**
Trend-Cycle component				
Mean	9.39	-1.54	14.04	26.82
Standard Deviation	0.10	11.46	7.94	9.83
Maximum	9.51	23.09	33.11	53.47
Minimum	9.22	-20.35	5.31	17.81
Skewness	-0.33	0.22	1.16	1.56
Kurtosis	1.74	2.30	2.92	3.95
Cyclical Component				
Mean	0.00	-2.80	-1.02	-0.15
Standard Deviation	0.01	11.78	3.09	3.89
Maximum	0.02	19.89	4.03	8.33
Minimum	-0.02	-25.38	-6.72	-7.63
Skewness	-0.60	-0.31	-0.36	0.26
Kurtosis	2.73	2.19	1.78	2.52
Trend Component				
Mean	9.39	1.26	15.07	26.97
Standard Deviation	0.10	9.06	8.23	7.77
Maximum	9.53	29.38	36.07	22.42
Minimum	9.21	-7.72	8.45	45.14
Skewness	-0.22	1.71	1.22	1.04
Kurtosis	1.75	4.85	3.12	2.66

TABLE.10: Correlation coefficients: Original and Components					
	1987:01 2007:12	**1987:01 1994:03**	**1994:04 2001:01**	**2001:02 2007:12**	**2002:10 2007:12**
Original					
ė and π	**0.82**	0.58	**0.70**	0.81	**0.10**
ė and r_{12M}	**0.79**	0.87	**0.52**	0.80	**0.37**
π and r_{12M}	**0.92**	0.61	**0.75**	0.93	**0.92**
RGDP and ė	**-0.45**	0.37	**-0.65**	-0.71	**-0.17**
RGDP and r_{12M}	**-0.55**	0.58	**-0.59**	-0.91	**-0.79**
RGDP and π	**-0.64**	0.36	**-0.71**	-0.87	**-0.74**
Trend-Cycle					
ė and π	**0.81**	0.62	**0.70**	0.81	**0.10**
ė and r_{12M}	**0.78**	0.89	**0.51**	0.77	**0.37**
π and r_{12M}	**0.92**	0.65	**0.75**	0.95	**0.93**
RGDP and ė	**-0.45**	0.35	**-0.64**	-0.71	**-0.17**
RGDP and r_{12M}	**-0.55**	0.56	**-0.58**	-0.91	**-0.79**
RGDP and π	**-0.64**	0.34	**-0.72**	-0.87	**-0.74**
Cycle					
ė and π	**0.67**	0.74	**0.71**	0.50	**-0.03**
ė and r_{12M}	**0.54**	0.85	**0.48**	0.45	**0.13**
π and r_{12M}	**0.43**	0.63	**0.32**	0.64	**0.34**
RGDP and ė	**-0.54**	-0.68	**-0.43**	-0.69	**0.06**
RGDP and r_{12M}	**-0.61**	-0.63	**-0.64**	-0.49	**-0.35**
RGDP and π	**-0.38**	-0.45	**-0.28**	-0.44	**-0.15**
Trend					
ė and π	**0.95**	0.83	**0.83**	0.98	**0.96**
ė and r_{12M}	**0.95**	0.98	**0.70**	0.96	**0.95**
π and r_{12M}	**0.99**	0.91	**0.96**	0.99	**0.99**
RGDP and ė	**-0.55**	0.88	**-0.98**	-0.87	**-0.83**
RGDP and r_{12M}	**-0.58**	0.94	**-0.58**	-0.95	**-0.92**
RGDP and π	**-0.67**	0.86	**-0.75**	-0.92	**-0.87**

TABLE.11: Cross Correlations				
	1987:01-2007:12	**1987:11-1994:03**	**1994:04-2001:01**	**2001:02-2007:12**
Trend-Cycle				
ė and π	Lead=Lag=0 r= 0.81 Coincident	Lead=Lag=0 r= 0.62 Coincident	Lead=Lag=0 r= 0.70 Coincident	Lead=3 r= 0.81 **Exchange rate is the leading indicator**
ė and r_{12M}	Lead=Lag=0 r= 0.78 Coincident	Lead=Lag=0 r= 0.89 Coincident	Lead=Lag=0 r= 0.51 Coincident	Lead=Lag=0 r= 0.79 Coincident
π and r_{12M}	Lead=Lag=0 r= 0.92 Coincident	Lead=Lag=0 r= 0.64 Coincident	Lead=Lag=0 r= 0.75 Coincident	Lead=Lag=0 r= 0.95 Coincident
RGDP and ė	Lead=Lag=0 r= -0.45 Coincident	Lead=3 r= 0.37 **RGDP is the leading indicator**	Lead=Lag=0 r= -0.63 Coincident	Lead=Lag=0 r= -0.71 Coincident
RGDP and r_{12M}	Lead=Lag=0 r= -0.55 Coincident	Lead=Lag=0 r= 0.56 Coincident	Lead=Lag=0 r= -0.58 Coincident	Lead=Lag=0 r= -0.91 Coincident
RGDP and π	Lead=4 r= -0.65 **RGDP is the leading indicator**	Lead=Lag=0 r= 0.34 Coincident	Lead=Lag=0 r= -0.72 Coincident	Lead=Lag=0 r= -0.87 Coincident
Cycle				
ė and π	Lead=2 r= 0.81 **Exchange rate is the leading indicator** **Procyclical**	Lead=1 r= 0.69 **Exchange rate is the leading indicator** **Procyclical**	Lead=2 r= 0.86 **Exchange rate is the leading indicator** **Procyclical**	Lead=3 r= 0.80 **Exchange rate is the leading indicator** **Procyclical**
ė and r_{12M}	Lead=Lag=0 r= 0.53 Coincident **Procyclical**	Lead=Lag=0 r= 0.85 Coincident **Procyclical**	Lag=1 r= 0.47 **Interest rate is the leading indicator** **Procyclical**	Lead=2 r= 0.58 **Exchange rate is the leading indicator** **Procyclical**
π and r_{12M}	Lag=1 r= 0.45 **Interest rate is the leading indicator** **Procyclical**	Lead=1 r= 0.63 **Inflation rate is the leading indicator** **Procyclical**	Lag=5 r= 0.37 **Interest rate is the leading indicator** **Procyclical**	Lag=1 r= 0.64 **Interest rate is the leading indicator** **Procyclical**
RGDP and ė	Lead=Lag=0 r= -0.56 Coincident **Countercyclical**	Lag=1 r= -0.69 **Exchange rate is the leading indicator** **Countercyclical**	Lead=Lag=0 r= -0.47 Coincident **Countercyclical**	Lead=1 r= -0.70 **RGDP is the leading indicator** **Countercyclical**
RGDP and r_{12M}	Lag=1 r= -0.65 **Interest rate is the leading indicator** **Countercyclical**	Lag=1 r= -0.63 **Interest rate is the leading indicator** **Countercyclical**	Lag=2 r= -0.75 **Interest rate is the leading indicator** **Countercyclical**	Lead=3 r= -0.58 **RGDP is the leading indicator** **Countercyclical**
RGDP and π	Lead=3 r= -0.45 **RGDP is the leading indicator** **Countercyclical**	Lag=2 r= -0.49 **Inflation rate is the leading indicator** **Countercyclical**	Lead=3 r= -0.34 **RGDP is the leading indicator** **Countercyclical**	Lead=1 r= -0.59 **RGDP is the leading indicator** **Countercyclical**

TABLE.12: Cross Correlations -AK Party Period-2002:10 - 2007:12		
	Trend-Cycle	**Cycle**
ė and π	Lead= 4 r= 0.26 **Exchange rate is the leading indicator**	Lead= Lag=0 r= -0.02 Acyclical
ė and r_{12M}	Lead= 1 r= 0.37 **Exchange rate is the leading indicator**	Lead=Lag= 0 r= 0.09 Acyclical
π and r_{12M}	Lead=Lag= 0 r= 0.93 Coincident	Lag= 5 r= 0.54 **Interest rate is the leading indicator** **Procyclical**
RGDP and ė	Lead=Lag= 0 r= -0.16 Coincident	Lead= 4 r= 0.49 **RGDP is the leading indicator** **Procyclical**
RGDP and r_{12M}	Lead=Lag= 0 r= -0.79 Coincident	Lag= 2 r= -0.43 **Interest rate is the leading indicator** **Countercyclical**
RGDP and π	Lead=Lag= 0 r= -0.74 Coincident	Lead= 2 r= -0.26 **RGDP is the leading indicator** **Countercyclical**

TABLE.13: Causality Relationship: (lag value: 1)				
	1987:01-2007:12	**1987:01-1994:03**	**1994:04-2001:01**	**2001:02-2007:12**
Original				
ė and π	**ė causes π**	no causality	**ė causes π**	**ė causes π**
ė and r_{12M}	no causality	**ė causes r_{12M}**	no causality	no causality
π and r_{12M}	no causality	no causality	no causality	**r_{12M} causes π**
RGDP and ė	no causality	no causality	no causality	no causality
RGDP and r_{12M}	no causality	no causality	no causality	**r_{12M} causes RGDP**
RGDP and π	**RGDP causes π**	no causality	**RGDP causes π**	no causality
Trend-Cycle				
ė and π	**ė causes π**	no causality	no causality	**ė causes π**
ė and r_{12M}	no causality	**ė causes r_{12M}**	no causality	**ė causes r_{12M}**
π and r_{12M}	**π causes r_{12M}**	no causality	no causality	no causality
RGDP and ė	no causality	no causality	no causality	no causality
RGDP and r_{12M}	**r_{12M} causes RGDP**	no causality	**r_{12M} causes RGDP**	no causality
RGDP and π	**RGDP causes π**	no causality	**RGDP causes π**	no causality
2002:10 - 2007:12				
	Original		**Trend-Cycle**	
ė and π	**ė causes π**		**ė causes π**	
ė and r_{12M}	**ė causes r_{12M}**		**ė causes r_{12M}**	
π and r_{12M}	**π causes r_{12M}**		**π causes r_{12M}**	
RGDP and ė	no causality		**ė causes RGDP**	
RGDP and r_{12M}	no causality		**r_{12M} causes RGDP**	
RGDP and π	no causality		**no causality**	