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Impact of Macroeconomic Announcements on the Stock Prices: An Empirical Study on the Turkish Financial Services Sector

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Abstract

The purpose of this study is to test the efficiency of the Turkish Markets in terms of the monthly inflation announcement effect. The study examines the reaction of the financial services sector to monthly inflation announcements, particularly, in case of unexpectedly low or high levels of inflation. Strong evidence emerges that the Turkish financial services sector does not react significantly to the announcements that are in line with the expectations. In other words, the cumulative abnormal returns around such inflation announcements are not significantly different from 0. The results of the robustness tests for no news, indicate that the t-statistics calculated by means of the Moving Average Approach are insignificant for the sector, which is in line with the results of the original approach. The results of the two robustness tests are found to be supporting the original findings of the adaptive approach.

Keywords: Abnormal Returns (ARs), Cumulative Abnormal Returns (CARs), effects of macroeconomic announcements

I. Introduction

In Turkey, high and fluctuating inflation has been one of the key features of the economy for almost 30 years. Among the major causes of inflation are persistent public sector deficits, high input prices due to rapid depreciation of the Turkish Lira (TL) and persistent inflationary expectations of economic agents (Dibooglu and Kibritcioglu, 2001: 2). Many programs based their anticipations on inflationary trends. Turkish inflation grew from single digit levels in the 1960s and reached its first peak in 1980 at more than 80% as shown in Figure 1. After reaching a second peak of 125% in

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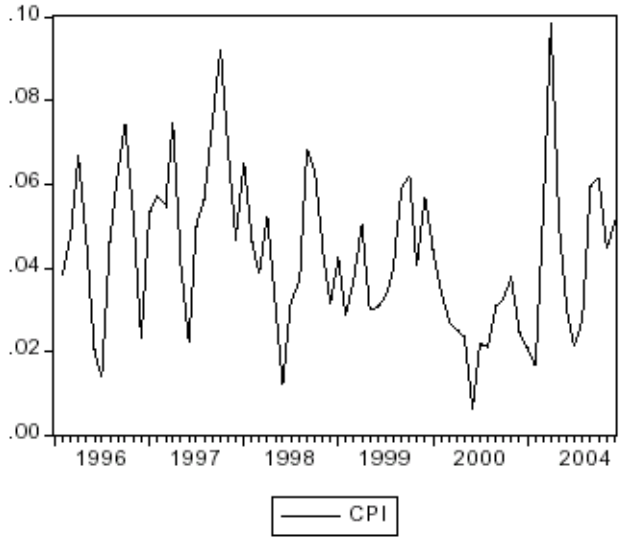
1994, inflation started a downward trend in response to a series of stabilization measures that were introduced in the same year. Throughout the second half of the 1990s, inflation continued to fluctuate within a 70 to 100% range. However, after the introduction of the 1999 Disinflation and Fiscal Adjustment Program and the three-year stand-by agreement signed with the International Monetary Fund (IMF), inflation dropped significantly. Under the three-year stand-by arrangement, the year-end inflation was targeted at 25% in 2000 and 10-12% by the end of 2001. A combination of internal and external factors starting in the late 1970s was responsible for Turkey's record of high inflation. Throughout the 1960s and the 1970s, Turkey followed an inward-looking growth strategy driven by import substitution policies.

Figure-1: Inflation (Consumer Price Index)



During the earlier stages of this strategy, inflation was relatively low and the expansionary effects of macro policies were moderate. The public sector, which was the driving force behind the growth strategy, relied heavily on domestic savings and foreign exchange receipts to meet borrowing requirements. However, as public sector borrowing requirements reached unmanageable levels due to excessive spending during the 1973-74 oil crisis, Turkey resorted to external borrowing and intensified its aggressive short-term borrowing practices. A balance of payments crisis followed and led to the debt crisis of 1978. Rising monetary aggregates exacerbated the inflation situation; that, and supply limitations resulting from shortages of imported inputs, caused inflation to accelerate

significantly toward the end of the 1970s. In 1980, Turkey introduced drastic measures to stabilize the economy, encourage export promotion, and gradually remove trade barriers and foreign exchange restrictions. The main goals of these measures were to lower inflation from the peak of more than 80%, improve the balance of payments, and through further restructuring transform Turkey into an outward looking export driven economy. Inflation initially fell to 30% in 1981, but gradually then began to rise and fluctuate within a 40 to 70 percent range during the rest of the 1980s.

Starting in 1988, Turkey began to follow populist measures that caused inflation to accelerate in the following years. As a result of excessive spending, rapid expansion of public sector credits, and expansionary monetary policies motivated by local and general elections, inflation rose significantly in the 1990s. Inflation reached its all time high of 125% in 1994, and Turkey experienced a severe financial crisis. In response to the rising inflation and the widening budget deficits, the government tried to keep interest rates low and switched from domestic borrowing to foreign debt and monetization. This policy, which was intended to reduce inflation without giving up economic growth, led instead to higher interest rates, higher deficits, and continued high inflation. The austerity plan introduced in 1994 did eventually succeed in bringing inflation down temporarily, but did not eliminate the macroeconomic imbalances. The year-end inflation, after surging to 125%, declined to 72% in 1995 but rose to almost 100% again by 1997. Efforts to reduce the interest burden on the budget continued, but that did not prevent the noninterest expenditures from rising. Thus, one primary source of inflation, excessive spending and the resulting budget deficits, remained in effect, and inflation continued to dominate Turkey's macroeconomic environment in the later 1990s. This article aims at examining the impact of inflation announcements on the performance of the financial services sector in Turkey through an event study methodology.

The article is organized as follows. The next section will provide a brief review of the literature. Section III will introduce the data and explain the methodology used. Section IV will present the results. The last section will point out the conclusions that emerge from the study.

II. Literature Review

There exists a rich literature on the relationship between stock prices and economic announcements. Bodie (1976), Nelson (1976), Fama and Schwert (1977), Feldstein (1980), Fama (1981), Schwert (1981), Geske & Roll (1983), Kaul (1987), and Pearce & Roley (1988) find a significant negative

relationship between inflation announcements and stock market returns in the United States. McQueen and Roley (1993) examine the relationship between stock prices and fundamental macroeconomic news. They investigate whether the response of stock prices to macroeconomic news varied over different stages of the business cycle and find out that the stock market's response to macroeconomic news depends on the state of the economy.

Connolly and Wang (1998) investigate the role of macroeconomic news announcements in explaining return and volatility spillovers between the US, UK, and Japan Stock Markets. Their results suggest that macroeconomic news announcements play a more important role in explaining volatility between stock markets than in explaining their return linkage. Pearce and Roley (1985) studied the daily stock market returns in terms of their reaction to announcements of the money supply, inflation, real economic activity, and the discount rate. Their findings indicate that money announcement surprises have a significant negative effect on stock prices, whereas the inflation and real economic activity surprises do not have a significant effect on stock prices. A thorough literature review is beyond the scope of this study. Interested readers may refer to Connolly and Wang (1998) for an extensive review of the literature.

III. Data and Methodology

In Turkey, inflation values for a specific month are announced in the following month by the State Institute of Statistics. The data for the announcement dates and inflation values are compiled from the Institute's website whereas the daily financial services sector indices are obtained from DataStream. The event window is set as 7 working days before and after the inflation announcement, and the event day is the first trading day after the announcement. The research is conducted over 1994:3 – 2003:5, and includes 112 announcements. As the first step of the calculations, the daily compounded returns are computed by means of the formulae (1) and (2) as shown below.

$$r_{i,t} = \ln\left[\frac{P_{i,t+1}}{P_{i,t}}\right] \tag{1}$$

$$r_{m,t} = \ln\left[\frac{P_{m,t+1}}{P_{m,t}}\right] \tag{2}$$

Where $r_{i,t}$ = daily return of sector i (i = 1,...,27) on day t, $P_{i,t}$ = price index for sector i on day t, $r_{m,t}$ = daily return of total market on day t, and ln = natural logarithm.

Next, inflation announcements are categorized into one of the following three groups as positive news, negative news, and no news. When the realized monthly inflation is at least 20 % less than the expected inflation for the same month, the announcement for that specific month is categorized as positive news. When the realized monthly inflation is at least 20 % more than the expected inflation for the same month, that month's inflation announcement is considered to be negative news.

When the realized monthly inflation is centred around the expectation by 20 %, it is categorized as no news.

A model of expectations is needed to find the deviations of actual observations from the expected inflation values and to categorize each individual announcement into one of the three groups discussed above. In this paper, two different approaches are used to form the expected inflation values where one approach serves as a robustness test for the other. In the first approach, adaptive approach, the realized inflation rate for any specific month is assumed to be the expectation for the following month. In other words, the expectation for any given month is the realized inflation rate for the immediate past month. Since the first announcement is used as the expectation for the second one, only 111 months remain to analyse the inflation announcement effect in this approach. Of the 111 announcements, 39 are categorized in good news, 33 turn out to be bad news and 39 are in line with the expectations (no news) in terms of the criteria discussed above. In the second approach, moving average expectations approach, the inflation expectation for any given month is assumed to be the average of the realized inflation values for the past 12 months in rolling windows. As the first 12 months are used to form the first expectation, only 100 months remain to examine the inflation announcement effect. Of the remaining 100 announcements, 39 turn out to be good news, 22 are categorized into bad news, and 39 are in line with the expectations (no news). As the first step of the event study, the daily Abnormal Returns (AR) are calculated using the following formula:

$$AR_{i,t} = r_{i,t} - r_{m,t} \tag{3}$$

Where $r_{i,t}$ = daily return of sector i (i = 1,...,27) on day t, $r_{m,t}$ = daily return of total market on day t and t= -7 ... +7. The next step is to

calculate the Cumulative Abnormal Returns (CAR) for each day ranging from (Day –7) to (Day + 7). The formula to calculate the CAR for time t is given below:

$$\mathrm{CAR}_t = \sum_{t=-7}^{t} \mathrm{AR}_t \qquad (4)$$

After calculating the ARs and CARs for the days in the event window for each announcement in the research period, average ARs and CARs for each category for each day in the event window are calculated. Formulae used to calculate Average AR and CAR values are given in Table-1 and Table-2 below.

Table-1: Calculation of Abnormal Returns (ARs)

	Adaptive Approach	**Moving Average Approach**
Good News	$\overline{AR}_{i,t,GN} = \frac{\sum_{n=1}^{39} AR_{i,t,GN_n}}{39}$	$\overline{AR}_{i,t,GN} = \frac{\sum_{n=1}^{39} AR_{i,t,GN_n}}{39}$
Bad News	$\overline{AR}_{i,t,BN} = \frac{\sum_{n=1}^{33} AR_{i,t,GN_n}}{33}$	$\overline{AR}_{i,t,BN} = \frac{\sum_{n=1}^{22} AR_{i,t,GN_n}}{22}$
No News	$\overline{AR}_{i,t,NN} = \frac{\sum_{n=1}^{39} AR_{i,t,GN_n}}{39}$	$\overline{AR}_{i,t,NN} = \frac{\sum_{n=1}^{39} AR_{i,t,GN_n}}{39}$

Table-2: Cumulative Abnormal Returns (CARs)

	Adaptive Approach	**Moving Average approach**
Good News	$\overline{CAR}_{i,t,GN} = \frac{\sum_{n=1}^{39} CAR_{i,t,GN_n}}{39}$	$\overline{CAR}_{i,t,GN} = \frac{\sum_{n=1}^{39} CAR_{i,t,GN_n}}{39}$
Bad News	$\overline{CAR}_{i,t,BN} = \frac{\sum_{n=1}^{33} CAR_{i,t,GN_n}}{33}$	$\overline{CAR}_{i,t,BN} = \frac{\sum_{n=1}^{22} CAR_{i,t,GN_n}}{22}$
No News	$\overline{CAR}_{i,t,NN} = \frac{\sum_{n=1}^{39} CAR_{i,t,GN_n}}{39}$	$\overline{CAR}_{i,t,NN} = \frac{\sum_{n=1}^{39} CAR_{i,t,GN_n}}{39}$

Where t= -7 to +7, i= 27 different sectors and n = number of news. There are 111 announcements in the adaptive approach (39 good news, 33 bad news, 39 no news) and 100 announcements in the moving average approach (39 good news, 22 bad news, 39 no news). CARs, on the other hand, are used to explain the impact of the announcement on the sector over the event window before and after the announcement. Next, the t-statistics for all days are calculated to test whether the average CARs are significantly different from 0 or not throughout the event window. The t statistics are calculated by the following formulae for all the average CAR values.

$$\text{t} - \text{statistic (CAR)} = \frac{\overline{CA}\overline{R}}{(\sigma / \sqrt{\text{n}})} \qquad (5)$$

Where σ = the standard deviation of the time series.

As described earlier, the secondary method will be provided as a robustness check along with the nonparametric robustness test. The adaptive approach is chosen as the main model due to its flexibility. The first robustness check is the moving average method. The results of the two methods will be compared to see whether the results are consistent. As the second robustness check, a non-parametric test is employed. The sign-test, which will be used to check the consistency of the results of the parametric t-test, is one of the most commonly used parametric tests. It is based on the assumption that the cumulative abnormal returns are independent and the probability of observing a positive or negative abnormal return is equal. If the null hypothesis is that there is a positive abnormal return associated with a given event, the null hypothesis is H0:$p \leq 0,5$ and the alternative is HA: $p>0,5$ where $p=Pr(CARi \geq 0)$. To calculate the test statistic, N+, the number of cases where the abnormal return is positive and the total number of cases, N are needed. Letting J be the test statistic, as N increases, $J=((N+/N)-0,5)xN1/2/0,5 \sim N(0,1)$ (Campbell, Lo & MacKinlay, 1997). The null hypothesis is rejected for the Js that are greater than critical normal values.

IV. Results

Table-1 shows the Average Cumulative Abnormal Returns for the financial services sector throughout the event window. Although the average cumulative abnormal returns are around zero throughout the research period, the average returns in cases of different announcements show

different characteristics. At a first glance, the financial sectors seem to be positively affected by unexpectedly high inflation announcements. This verdict is empirically evaluated with respect to CARs. Although the cumulative abnormal returns for total financials are negative on 14 of the 15 days in the event window they are not significantly different from 0 according to the t-test. The cumulative abnormal return reaches its absolute maximum on day +2 with – 0,454 %.

When the results of the Moving Average Approach and the Sign Test are either in line with the findings of the Adaptive Approach or inconclusive, they are considered to support the findings of the adaptive approach as shown in Table-2. As a result of the t-test, the CARs for the financial services sector are insignificant, i.e. inconclusive. These findings are identical to that of the Adaptive Approach. J-statistics indicate that the CARs for the sector are not significantly different from 0 on any of the days in the event window. Results suggest that the financial services sector takes advantage of unexpectedly high inflation announcements, as the t-statistics on Days -1 to +7 are all significant. The cumulative abnormal returns on days -6 to -2 are also positive, although they are not significant. The CARs reach the maximum on Day 0 when it is 1,667%. As can be seen from Table 2, CARs for total financials increase dramatically before the announcement and stay rather stable afterwards. Next, we examine the results of the robustness tests for bad news. According to the t-statistics, the average CARs calculated using the Moving Average Approach are not significantly different from zero for the sector on any day in the event window. The sign test strongly supports the findings for the sector with J statistics significant from day -1. Hence, as a result of the two robustness checks, it is possible to conclude that the original findings of the adaptive approach are consistent.

The third kind of news, no news, is considered to be important in showing the sectors' ability to predict the nature of the announcements and their performance when the inflation announcements are in line with the expectations. Financial services sector does not react significantly to the announcements that are in line with the expectations. In other words, the cumulative abnormal returns around such inflation announcements are not significantly different from 0. When we review the results of the robustness tests for no news, we see that the t-statistics calculated by means of the Moving Average Approach are insignificant for the sector, which is in line with the results of the original approach. The results of the two robustness tests are found to be supporting the original findings of the adaptive approach as evident from Table-2.

V. Conclusions

When inflation rates are high, the government and the other agents in the economy have to offer a higher nominal interest rate in order to be able to borrow from the market, since lenders require an interest rate that is higher than the expected inflation. As inflation rates turn out to be more than expected, it might imply instability in the market and higher interest rates. Therefore, financial institutions might perform well under inflationary environments and they might be adversely affected by unexpectedly low inflation announcements. The reaction of financial sectors might be explained by high interest rates associated with government bonds in Turkey, allowing small institutions to operate without conducting their core facilities.

Table-1: Average CARs

Days	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
Good News	-0.064	-0.076	-0.401	-0.18	-0.38	-0.18	-0.162	-0.28	-0.426	-0.454	-0.209	-0.139	-0.109	0.271	-0.127
Bad News	-0.066	0.05	0.334	0.281	0.528	0.56	1.413	1.667	1.345	1.24	1.478	1.623	1.608	1.471	1.463
No News	-0.008	0.077	0.11	-0.17	-0.39	-0.52	-0.935	-0.95	-0.781	-0.846	-0.829	-0.913	-1.114	-0.921	-0.997

(*), (**), and (***) indicate significant statistics at 90 %, 95 %, and 99 % Confidence

Intervals respectively.

Table-2: Statistical Results

DAYS	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
J-Stats															
GOOD NEWS	-1.121	-0.801	-0.801	-0.48	-0.16	-0.48	-0.16	-0.48	-0.16	-0.801	0.16	0.48	1.121	1.121	1.121
BAD NEWS	-0.174	-0.174	-0.174	1.219	1.567	0.87	1.915*	3.307***	2.959***	1.915*	2.611***	2.959***	3.307***	2.959***	2.959***
NO NEWS	-0,160	-0,480	0,160	0,161	0,162	0,163	0,164	-0,480	-0,160	-0,160	-0,801	-0,480	-1,121	-1,441	-0,801
T-Stats for CARs															
GOOD NEWS (AA)	-0.259	-0.221	-1.3	-0.4	-0.75	-0.28	-0.275	-0.45	-0.663	-0.63	-0.31	-0.211	-0.154	0.356	-0.144
BAD NEWS (AA)	-0.274	0.131	0.76	0.599	0.897	1	2.114**	2.297**	2.128**	1.8*	2.27**	2.243**	2.424**	2.129**	1.899*
NO NEWS (AA)	-0.038	0.189	0.234	-0.3	-0.54	-0.74	-1.32	-1.24	-0.977	-1.016	-0.864	-0.902	-1.056	-0.853	-0.901
GOOD NEWS (MA)	-0.933	-1.33	-0.911	-1.18	-1.19	-1.14	-1.146	-1.31	-1.45	-1.239	-1.195	-1.458	-1.781	-1.34	-1.366
BAD NEWS (MA)	-0.563	-0.241	0.483	0.18	0.08	0.18	0.104	0.707	0.818	0.591	1.171	1.268	1.385	1.201	1.242
NO NEWS (MA)	1.615	0.962	0.406	0.495	0.06	0.58	0.709	1.105	0.798	0.626	0.555	0.954	1.321	1.302	1.13

(*), (**), and (***) indicate significant statistics at 90 %, 95 %, and 99 % Confidence
Intervals respectively.
AA and MA stands for Adaptive Approach and Moving Average

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