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Relationship between consumer price index (CPI) and KSE-100 index trading volume in pakistan and finding the endogeneity in the involved data

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**RELATIONSHIP BETWEEN CONSUMER PRICE INDEX (CPI) AND KSE -100 INDEX
TRADING VOLUME IN PAKISTAN AND FINDING THE ENDOGENEITY IN THE
INVOLVED DATA**

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Abstract

This study examined monthly KSE-100 index trading volume response to announcements about Consumer price index (CPI) in the period of January 2004 to august 2009. Regression results supported the hypothesis that change in CPI has significant association with the change in KSE 100 index trading volume and regression was statistically significant and has shown that there is a negative relationship between CPI “Consumer price index” and KSE -100 index trading volume. More over the Presence of endogeneity has also been discussed via applying heckman's correction in the data.

Key words: Consumer price index (CPI) announcements, trading volume, different beliefs and information.

Introduction:

The purpose of this study was to examine the monthly trading volume of KSE 100 index response to announcements of Consumer price index (CPI).

It is usually considered that financial markets respond to announcements about economic variables such as money supply, consumer price index (CPI), wholesale price index (WPI), producer price index (PPI), unemployment rate, discount rate, industrial production etc.

Previous studies have examined the financial markets reaction to these announcements. But this study was only concerned with the hypothesis that change in CPI has significant association with the change in KSE 100 index trading volume. This study has shown that there is a negative relationship between consumer price index and KSE -100 index trading volume and the results were significant. This study is helpful for investors in decision making about changing their investment portfolios around these announcements.

Consumer Price Index (CPI):

Different price indices are used to measure inflation. A price index is a measure of the aggregate price level relative to a selected base year. In Pakistan a consumer price index (CPI), a sensitive price indicator (SPI) and a wholesale price index (WPI) are compiled and commonly have the base year 2000-01.

CPI is a principal measure of price fluctuations at retail level and it shows the cost of purchasing a representative unchanged basket of goods and services consumed by private households. In Pakistan, CPI covers the retail prices of 374 items in 35 main cities and reflects approximately the changes in the cost of living of urban areas.

Literature Review:

Previous studies have examined the stock market reaction to announcements about economic variables.

Schwert (1981) examined the every day returns to the S & P composite portfolio around the C.P.I. announcement dates from 1953-78 and found that stock market responds negatively to the announcement of unanticipated inflation in the CPI.

Schwert (1989) reported that there are at least three theories that predict a positive relation between volatility and volume. First if investors have heterogeneous beliefs, new information causes both the price changes and the trading. Second, if some investors use price movements as information on which to make trading decisions, large price movements cause large trading volume. Finally, if there is short-term "price pressure" due to illiquidity in secondary trading markets; large trading volume that is predominantly either buy or sell orders cause price movements.

Schwert (1989) results have shown a positive relation between stock volatility and trading activity and results supported the proposition that stock market volatility is higher when trading activity is higher and there was little evidence that financial volatility helps to predict future trading volume growth, except for stock volatility from 1920 to 1952.

Where as, using hourly data Jain (1988) found that CPI announcement surprises have significant negative effects on stock prices and trading volume was not associated with surprises in the CPI announcements and the results were consistent with the hypothesis that market participants interpret the surprises in announcements in an analogous manner and do not engage in additional trading.

Castanias (1979) reported that the variance of stock prices rises around the days of most economic news events, which Castanias (1979) interpreted as a reflection of new information appearing. Using daily data Pearce and Roley (1985) did not find an association between surprises in consumer price index (CPI) announcements and stock market reaction. By using

monthly data Chen, Roll and Ross (1986) found that inflation related variables were highly significant in the 1968-77 period and insignificant both earlier and later. Carlton (1983) reported that the inflation has a tremendous negative effect on volume traded. It appeared that the level of inflation, rather than the unanticipated component of inflation, was more significantly correlated with volume traded. A related reason for a decline in trading as a result of increasing inflation has to do with the different types of the commodity that are deliverable on the futures market. Smirlock (1986) found a significant positive response of long-term rates to unexpected inflation. Smirlock (1986) reported that the unanticipated component of the announced change in both the PPI and the CPI has an immediate positive effect on long-term rates in the post-79 period, but no effect in the pre-79 period.

Using daily prices of indexed bonds Huberman and Schwert (1985) found that about 85 percent of the reaction of bond prices to unexpected inflation occurred contemporaneously with the sampling of individual commodity prices from 2 to 6 weeks prior to the announcement. The remaining 15 percent of the reaction to unexpected inflation occurred on the day following the announcement. Black (1986) stated that the noise makes trading in financial markets feasible and therefore allows traders to monitor prices for financial assets. Noise causes markets to be inefficient to some extent but often prevents traders from taking benefit of inefficiencies. In Black (1986) model of financial markets, noise was compared with information. Traders at times trade on information in the common way. Traders are correct in anticipating making profits from these types of trades. On the other hand traders at times trade on noise like if it were information. If traders anticipate making profits from the noise trading then it is incorrect. Though, noise trading is important to the existence of liquid markets. Black (1986) further stated that an individual with information or insights regarding individual firms liked to trade but realize that

only another individual with information or insights get to the other side of the trade. From the viewpoint of someone who knows what both the traders know one side or the other must be making a mistake. In other words, it does not make sense to make a model with the information trading but no noise trading where the traders have diverse beliefs and beliefs of one trader are as good as any other trader's beliefs. Dissimilarities in beliefs should derive finally from differences in information. A trader with an exceptional piece of information knows that the other traders have their own exceptional pieces of information, and for that reason traders do not automatically rush out to trade. Black (1986) further mentioned that there was always a lot of vagueness regarding who is the noise trader and who is the information trader. Noise creates the possibility to trade profitably, but at the similar time makes it hard to trade profitably. Kandel, Ofer and Sarig (1993) found that the variance of the inflation anticipation errors declines with trading days in the period examined. The decrease in the variance indicates that traders learn by frequently observing prices around the distribution of other traders' information.

Kim and Verrecchia (1991) stated that the traders achieve their most favorable portfolios prior to the announcement through trading on what each one knows in the preannouncement period. Announcements change the traders' viewpoint and induce the traders to enter in a new round of trade. It is believed that traders are diversely informed and vary in the precision of their personal prior information hence traders respond in a different way to the announcement and it leads to the positive volume. When the new public information is released in period all traders revise their beliefs, and this revision is reflected in the change in market price. Relatively better informed traders revise their beliefs less because the new information is relatively less important to those traders than to those who are more poorly informed. The presence of differential

precision thus causes differential belief revision among traders, which in turn creates trading volume.

Huang (2008) investigated the impact of US economic news on German stock index futures and compared it with the impact of domestic German news. Huang (2008) found that US economic news affects German stock futures on multiple dimensions including prices, trading volume, volatility, quoted spreads, inventory holding costs and the informational role of trading. Huang (2008) investigated the impact of 17 types of German economic news announcements and 24 types of US economic news. For most US announcements Huang (2008) sample covered the entire investigation period from 1991 to 2005. Huang (2008) findings strongly suggested that German traders actively form private opinions about the implications of US economic news rather than just 'free riding' on the US market's response.

Theoretical Framework:

Following model was used to find the relationship between CPI “Consumer price index” and KSE-100 index trading volume and to test the hypothesis that Change in CPI has significant association with the change in KSE-100 index trading volume.

$$TV = \alpha + \beta(CPI) + \epsilon$$

Where TV = Monthly KSE-100 index trading volume, CPI = Monthly CPI “Consumer price index” and the coefficients α and β are regression parameters for the independent variable and $\epsilon = (1-R^2)$ denotes the error term.

Same model was used by Jain (1988), Smirlock (1986), Pearce and Roley (1985) for examining the effects of such announcements on financial markets.

Research Method:

Data Collection

The sample period used in this study covers 68 months period beginning at January 2004 and ending at August 2009. The monthly trading volume (Number of shares traded) of KSE -100 index data was obtained from Karachi stock exchange and monthly CPI “Consumer price index” (Percentage change) data was obtained from Federal bureau of statistics.

Methodological Model

Simple linear regression technique was applied on the 68 months per iod data of KSE-100 index trading volume and consumer price index to test the hypothesis that “ Change in CPI has significant association with the change in KSE -100 index trading volume” any sign (-ve or +ve) show the association and the hypotheses were accepted at $p < .05$.

Predictor	Dep.Variable	R Square	F	P- Value	B	t	P- Value
Monthly CPI	KSE-100index Trading Volume	0.420	47.79	0.000	-2500214	-6.9	0.000
Ignored Variable (X)	KSE-100index Trading Volume	0.403	44.51	0.000	-7762.7	-6.7	0.000

Interpretation

The estimation of error term was reported to find out endogeneity hence for the purpose heckman’s correction was applied to see the endogeneity and a new variable was found explaining trading volume significantly. Thus it was concluded that CPI explained trading volume significantly and as well as the trading volume was explained significantly by another

variable ignored in research and identified by the research through heckman's correction. The R-value .648 indicated that as Consumer price index increases the KSE 100 index trading volume decreases and this is a negative correlation.

R Square value 0.42 suggested that there is 42% variation in KSE 100 index trading volume due to the model having CPI "Consumer price index." as an independent variable. ($R^2 = .42$, $F = 47.788$ at $p < .05$).

Coefficient output table gives the regression equation and Unstandardized Coefficients B column provides the value of intercept for the constant row and the slope of the regression line from Monthly CPI row. It gives the following regression equation

$$TV = + (CPI) +$$

$$\text{KSE-100 index trading volume} = (5.622E8) + (-2500214.024) \text{ Consumer price index}$$

Results have shown that there is a negative relationship between CPI "Consumer price index" and KSE-100 index trading volume if CPI increases by 1 % the KSE-100 index trading volume decreased by (2500214.024) shares significantly due to its linear relationship ($\beta = -2500214.024$, $t = -6.913$ at $p < .05$).

Constant value (5.622E8) suggested that if the value of Consumer price index becomes zero then the value of KSE-100 index trading volume would be (5.622E8) shares ($\beta = 5.622E8$, $t = 10.345$ at $p < .05$).

As it is stated, the above Econometrical findings and the relevant literature suggest the presence of endogeneity in the data for which the heckman correction was applied to find the endogeneity. The multi-co-linear ignored variables with error term were found significant in explaining the

Dependent variable, as for the stated ignored variables, R Square value .403 suggested that there is 40.3% variation in KSE 100 index trading volume due to the model having only ignored variables say variables- X, ($R^2 = .403$, $F = 44.514$ at $p < .05$)

Coefficient output table gives the following regression equation for the ignored variables which were causing endogeneity. ($\beta = -7762.760$, $t = -6.672$ at $p < .05$).

KSE-100 index trading volume = $(3.681E8) + (-7762.760)$ Ignored variables

Results have shown that there is a negative relationship between new variable and KSE -100 index trading volume if new variable increases by 1 unit the KSE-100 index trading volume decreased by (7762.760) shares due to its linear relationship.

Constant value $(3.681E8)$ suggested that if the value of new variable becomes zero then the value of KSE-100 index trading volume was $(3.681E8)$ shares ($\beta = 3.681E8$, $t = 13.081$ at $p < .05$).

Hypotheses assessment Summary

Hypotheses	R Square	F	P- Value	B	t	P- Value	Empirical Conclusion
in CPI has an association with the in KSE-100index trading volume	0.420	47.79	0.000	-2500214	-6.9	0.000	Accepted
There are Ignored Variables (X) Explains KSE-100index trading Volume	0.403	44.51	0.000	-7762.7	-6.7	0.000	Accepted

Results:

Regression results were statistically significant and have shown a negative relationship between CPI and KSE-100 index trading volume. The ANOVA table suggested that Consumer price index explains a significant amount of the variance in the KSE -100 index trading volume and R Square value (0.42) suggested that there is 42% variation in KSE 100 index trading volume due to the model having CPI “Consumer price index.” Means KSE 100-index is 42% explained by the stated model. While using hourly data Jain (1988) found that CPI announcement surprises have significant negative effects on stock prices and trading volume was not associated with surprises in the CPI announcements.

Schwert (1981) found that stock market responds negatively to the announcement of unanticipated inflation in the CPI. Carlton (1983) reported that the inflation has a tremendous negative effect on volume traded. Using monthly data Chen, Roll and Ross (1986) found that inflation related variables were highly significant in the 1968 -77 period and insignificant both earlier and later. Using daily data Pearce and Roley (1985) did not find an association between surprises in consumer price index (CPI) announcements and stock market reaction.

Conclusion and Recommendations :

Conclusion

This study has examined the monthly trading volume of KSE -100 index response in the period of January 2004 to August 2009 to announcements of Consumer price index (CPI).

Regression results supported the hypothesis that “Change in CPI has significant association with the change in KSE-100 index trading volume” and regression was statistically significant and has shown that there is a negative relationship between CPI “Consumer price index” and KSE-100 index trading volume. While using hourly data Jain (1988) found that CPI announcement surprises have significant negative effects on stock prices and trading volume was not associated with surprises in the CPI announcements. Schwert (1981) found that stock market responds negatively to the announcement of unanticipated inflation in the CPI. Carlton (1983) reported that the inflation has a tremendous negative effect on volume traded. Using monthly data Chen, Roll and Ross (1986) found that inflation related variables were highly significant in the 1968 -77 period and insignificant both earlier and later. Using daily data Pearce and Roley (1985) did not find an association between surprises in consumer price index (CPI) announcements and stock market reaction.

In this study a related reason for a decline in trading volume as a result of increasing consumer price index has to do with the different beliefs of market participants and it indicated that market participants respond differently to consumer price index announcements because each market participant interpret the CPI announcements in different way.

Recommendations

Future Study can be done to check the relationship of consumer price index with stock prices and stock returns or with different financial markets like Bond market or foreign exchange market, which could be the ignored variables in this study. The findings suggested that they also have a greater explanatory power while explaining consumer price index but the independent explanatory power may be gauged of each ignored variables separately in the future studies.

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