PalArch's Journal of Archaeology of Egypt / Egyptology

SENSITIVITY OF ACCOUNTING INFORMATION TO INFLATION RATE - A CASE STUDY OF INDIAN BANKS

Dr. Srinath T K

Assistant Professor CMS Business School, Bengaluru, No.17, Seshadri Road, Gandhinagar, Bengaluru, Karnataka india 560009

Dr. Srinath T K , Sensitivity Of Accounting Information To Inflation Rate - A Case Study Of Indian Banks , Palarch's Journal Of Archaeology Of Egypt/Egyptology 18(8), 4406-4414. ISSN 1567-214x.

Key words: Sensitivity, Banks, Inflation, Regression.

Abstract

The purpose of this paper is to assess such sensitivity of sales and profits of banks to inflation rate. To study how inflation affects accounting information, an exhaustive sample of 35 banks is taken which includes PUS banks, private sector banks as well as foreign banks. Using a panel data of sales, operating profit and PAT of these banks over the study period vis-a- vis the WPI, attempt is done to capture the sensitivity of reported accounting information of banks to inflation (WPI). The method applied is simple linear regression. The paper begins by presenting descriptive statistics of WPI over the study period (2006-07 to 20015-16) and the descriptive statistics of 'Sales', 'Operating profit' and 'PAT' of the sample. The results of simple linear regression show that sales and PAT of banks are significantly affected by inflation but operating profit is not. Recommendations based on analysis are made to the banks.

1. Introduction

Inflation is an important macroeconomic phenomenon. Inflation rate is a very important macroeconomic variable. Inflation is defined in various ways as 'rising prices', 'more money chasing few goods' or 'fall in the purchasing power of money'. It is also often described as double edged sword. This is because both the extremities of inflation – very high and very low – are not desirable from the view point of an economy or the industry. But a mild inflation is always considered desirable. Such an inflation is believed to provide the required boost to the industry. It induces industry to make more productive investments, by increasing income level, it also increases the demand. However, different types of goods have different degrees of sensitivity to changes in prices. This is called 'Price elasticity'. The economic theory provides the basis that 'Necessary goods' have low price sensitivity where as 'Luxury goods' exhibit relatively higher degrees of price sensitivity. Hence for a seller, it is not only good but a 'Must' to know the nature and extent of price sensitivity of his goods. It can hit his sales directly and there by the profits.

A large proportion of price indices generally respond to exchange rate movements and/or foreign inflation (Aleksandra Hałka and Jacek Kotłowski, Poland, 2013). Similar idea is reiterated in the Euro area where two thirds of the items in the euro area were found to be cyclically sensitive, most robustly related to the business cycle being food items (processed and unprocessed), non-durable industrial goods and services related to recreation (Annette Frohling and Kirsten Lommatzsch, 2011). A long run relationship was revealed between expected and unexpected inflation with stock returns in Malaysia, US and China. Short run relationship between these variables any way did not exist except for China (Caroline Geetha et al, 2011). Cyclical responses to unexpected inflation of the three primitive forces which determine stock pricesinclude the discount rate, the expected growth rate of real activity and the equity risk premium. Changes in expected real activity and the equity premium, signalled by unexpected inflation, are important in explaining the asymmetric responses of the stock market to unexpected inflation across the business cycle (Chao Wei, 2009). Among Spanish companies the a low level of sensitivity of stock returns to expected inflation changes was found (Francisco Jareno, 2012). Overall, inflation exhibits a rather strong persistence, with a negative impact (KonstantinsBenkovskis, et al, 2011).

Methodology

Banks have large body of users of accounting information consisting of internal and external stake holders. Bank's financial performance and thereby the reported accounting information is impacted by the economic environment surrounding it. The experiences of the various modern economies like South East Asian countries, the USA and others in the past have given clear indications that the banking sector is susceptible to changes in the macro economic environment. Therefore a careful understanding of the sensitivity of reported accounting information like sales , operating profit , earnings etc. to the external, macro economic variables is important. This paper focuses on the sensitivity of financial performance of banks to inflation rate.

The impact of WPI on Sales, Operating profit and PAT of select banks over the study period (2006-07 to 2015-16) is analysed by applying suitable econometrics methods. The sample consists of 35 listed banks which are included in the index NSE 500. They are Allahabad Bank, Andhra Bank, Axis Bank, Bank of Baroda, Bank of India, Canara Bank, Central Bank of India, City Union Bank Ltd, Corporation Bank, Development Credit Bank, Dena Bank, Federal Bank Limited, HDFC Bank Ltd, ICICI Bank, IDBI Bank, Indian Bank, IndusInd Bank Ltd, Indian Overseas Bank, Jammu And Kashmir Bank Limited, Karnataka Bank Ltd, Karur Vysya Bank, Kotak Mahindra Bank Ltd, Lakshmi Vilas Bank Ltd, Oriental Bank of Commerce, Punjab National Bank, State Bank Of Bikaner & Jaipur, State Bank of India, State Bank of Mysore, State Bank of Travancore, South Indian Bank, Syndicate Bank, UCO Bank, Union Bank of India, Vijaya Bank and Yes Bank Ltd.

Financial data of the companies included in the samples have been taken from the data base Capitaline. Inflation rate (WPI) has been taken from the data base of Reserve Bank of India –Data Base on Indian Economy (DBIE). The data consists of both time series and cross sectional. The dependent variables data is in the Panel form while the independent variables data is in pure time series form.

To begin with Time series analysis is done. Minimum values, Maximum values, Mean, Standard Deviation and Inter Quartile Range (IQR) are computed for each of the dependent and independent variable over the study period. Time series plots for mean values for all the variables across each of the sectors are also done.The regression model enabled the researcher to analyze the variation in performance caused by inflation rate on the financial performance of the companies. Simple Linear Regression is applied to elicit the sensitivity of Sales , Operating profit and PAT to WPI. Chow's test for Poolability is done to know whether the panel regression based fixed effects or / and random effects models are appropriate. For each dependent variable, results of the test indicated that panel model is appropriate.Brusch – Pagon Lagrange Multiplier (BPLM) test for significance of random effectsis done after fitting GLS based random effects model. If the test rejects the null hypothesis, it indicates significant random effect.

Statistical hypothesis

Appropriate statistical hypothesis have been constructed in the analysis for the purpose of testing the theoretical hypothesis. The general format of the hypothesis is as under.

Sales is sensitive to Inflation rate.

- Null hypothesis: In Indian banking industry, WPI has no significant effect on sales of banks. H_0: $\beta = 0$
- Alternate hypothesis: In Indian banking industry, WPI has a significant effect on sales of banks. H_1: $(\beta \neq 0)$

Operating profit is sensitive to Inflation rate.

- Null hypothesis: In Indian banking industry, WPI has no significant effect on Operating profit of banks. H_0: $\beta = 0$
- Alternate hypothesis: In Indian banking industry, WPI has a significant effect on Operating profit of banks. H_1:$\beta \neq 0$

Profit After Tax (PAT) is sensitive to Inflation rate.

- Null hypothesis: In Indian banking industry, WPI has no significant effect on PAT of banks. H_0: $\beta = 0$
- Alternate hypothesis: In Indian banking industry, WPI has a significant effect on PAT of banks. H_1: $(\beta \neq 0)$

Analysis, Discussion and Results

Descriptive Statistics of Independent Variable - WPI

Table 1: Descriptive Statistics of WPI Across the Study Time Period

	Minimum	Maximum	Mean	SD	IQR
2007	111.4	111.4	111.4	0.0	0.0
2008	111.6	111.6	111.6	0.0	0.0
2009	126	126	126	0.0	0.0
2010	130.8	130.8	130.8	0.0	0.0
2011	143.3	143.3	143.3	0.0	0.0
2012	156.1	156.1	156.1	0.0	0.0
2013	167.6	167.6	167.6	0.0	0.0
2014	177.6	177.6	177.6	0.0	0.0
2015	181.2	181.2	181.2	0.0	0.0
2016	176.7	176.7	176.7	0.0	0.0
Total	11.4	181.2	148.73	25.282	50.7

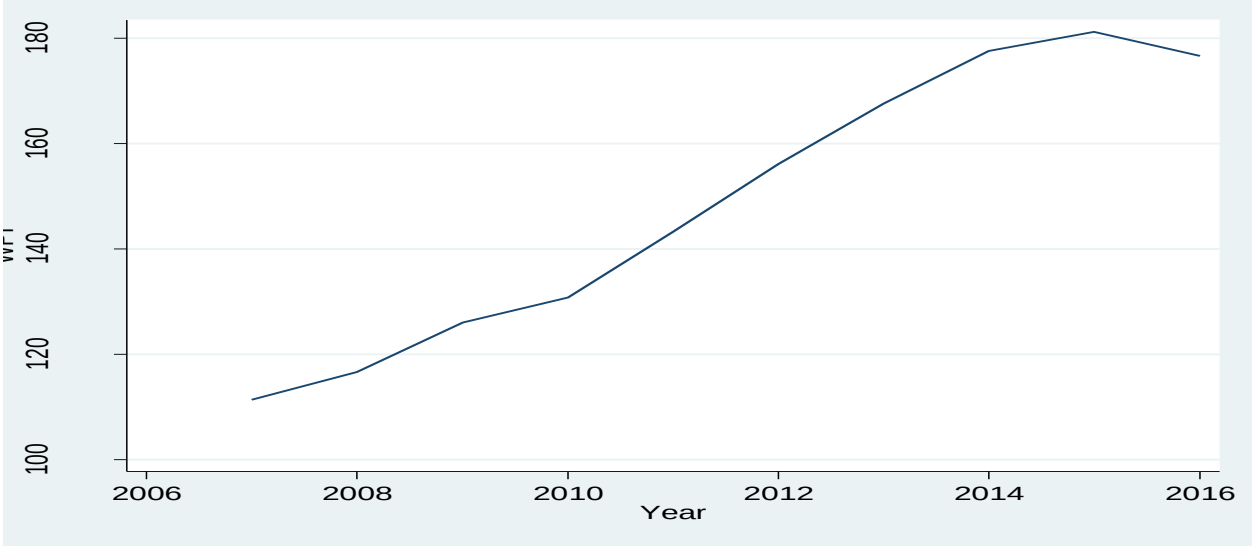

Fig. 1.Panel Time Series Plot of WPI

The least minimum WPI is reported in the year 2007(111.4).The highest minimum WPI is reported in the year 2015(181.2).The least maximum WPI is reported in the year 2007(111.4).The highest maximum WPI is reported in the year 2015(181.2).The mean WPI over the study period is 148.73, The SD of WPI over the study period is 25.282 and the IQR over the study period is 50.7. Overall 'WPI' shows an upwards trend over the study period.

Descriptive Statistics of Dependent Variables –Banking Sector

Table 2: Descriptive Statistics of Sales Across the Study Time Period for Banking Sector

	Minimum	Maximum	Mean	SD	IQR
2007	346.93	37242.33	5494.556	7001.123	4845.17
2008	506.06	48950.31	7301.774	9287.892	5606.65
2009	645.2	63788.43	9323.495	11565.36	8573.42
2010	458.97	70993.92	10102.66	12439.15	10245.8
2011	536.26	81394.36	12156.15	14291.37	12410.87
2012	716.97	106521.5	16281.56	18717.91	16635.46
2013	916.1	119655.1	18911.66	21104.63	18957.13
2014	1128.6	136350.8	21219.46	23928.06	22403.01
2015	1422.22	152397.1	23446.92	26802.0	24664.49
2016	1698.46	163685.3	24769.33	28806.38	24454.11
Total	346.93	163685.3	14900.76	19724.5	14769.46

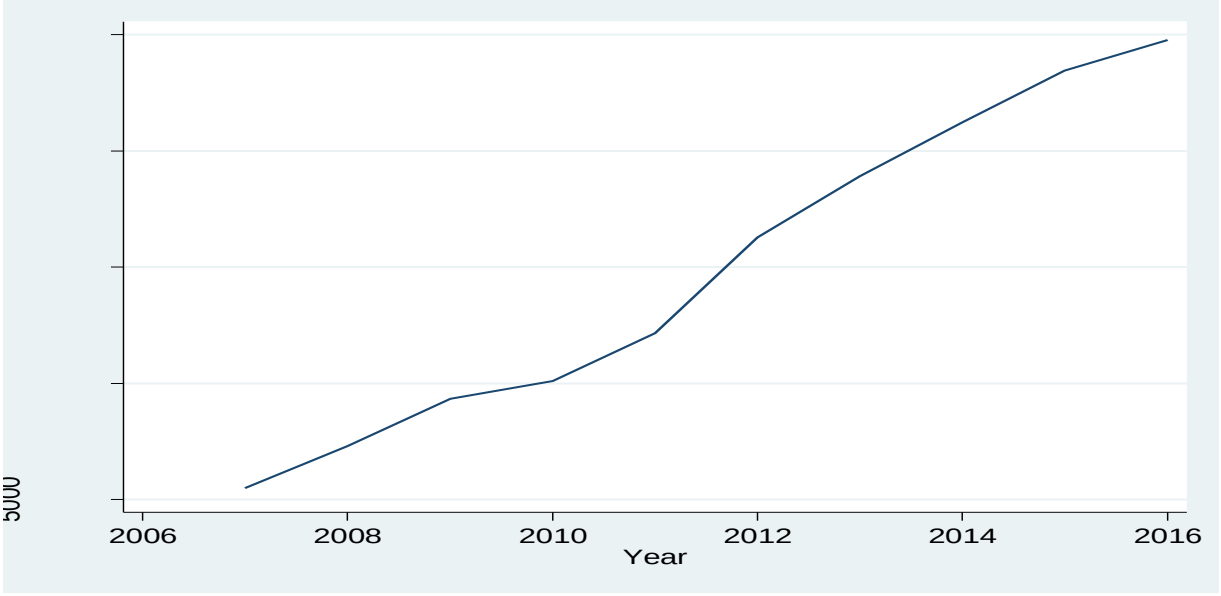

Figure 2:Time series plot of Average Sales for Banking Sector

The least minimum sales is reported in the year 2007(346.93). The highest minimum sales is reported in the year 2016(1698.46).The least maximum sales is reported in the year 2007(37242.33).The highest maximum sales is reported in the year 2016(163685.3).The least mean sales is reported in the year 2007(5494.556).The highest mean sales is reported in the year 2016(24769.33).The least SD sales is reported in the year 2007(7001.123).The highest SD sales is reported in the year 2016(28806.38).The least IQR sales is reported in the year 2007(4845.17).The highest IQR sales is reported in the year 2015(24664.49). Overall 'Sales' shows an upwards trend over the study period.

Table 3: Descriptive Statistics of Operating Profit Across the Study Time Period for Banking Sector

	Minimum	**Maximum**	**Mean**	**SD**	**IQR**
2007	-16.75	4581.09	788.921	912.827	1108.88
2008	-55.42	6172.57	857.218	1181.203	874.53
2009	-11.79	7434.934	1341.867	1445.389	1706.69
2010	-64.7	6386.04	1341.867	1445.389	1706.65
2011	18.49	12234.43	2122.577	2331.485	2102.28
2012	32.95	20745.05	2682.662	3644.126	2666.85
2013	70.37	19319.42	2889.312	3591.04	2450.44
2014	122.67	18924.09	3126.507	3785.749	2953.34
2015	179.2	23129.12	3397.11	4599.373	2511.91
2016	215.53	22371.45	3526.024	4897.088	2227.38
Total	-64.7	23129.12	2188.218	3248.403	1946.86

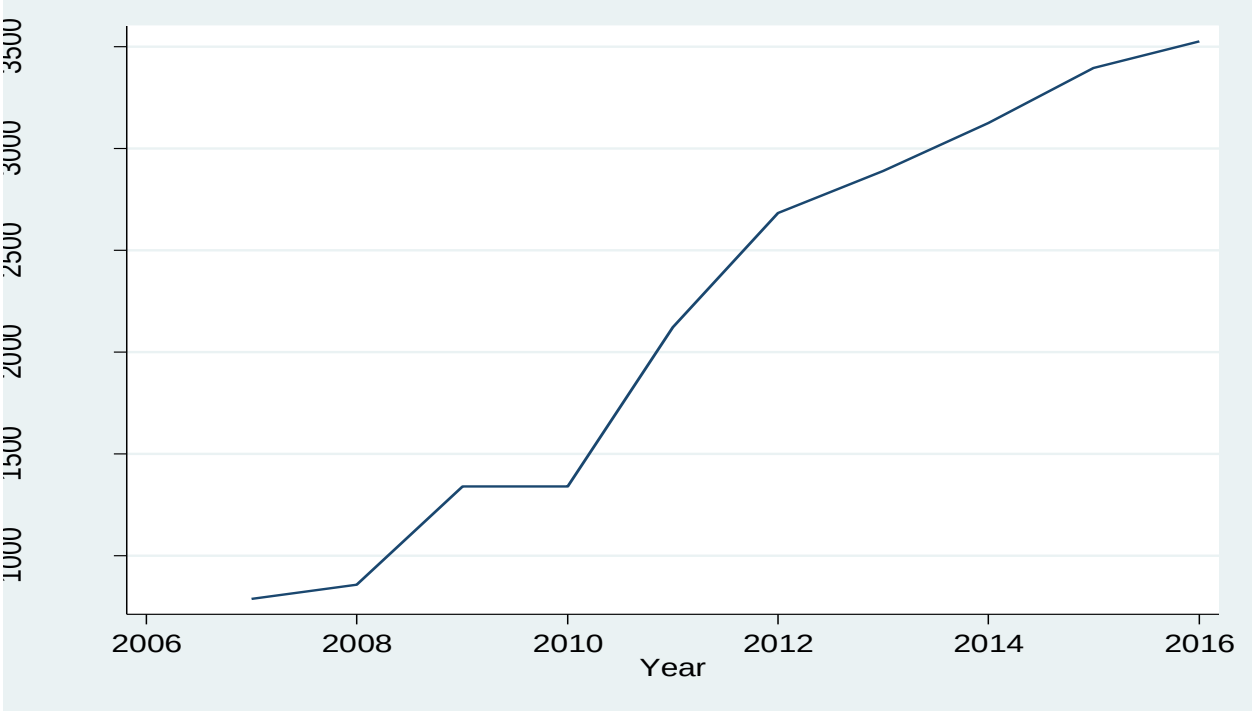

Figure 3:Time series plot of AverageOperating Profit for Banking Sector

The least minimum profit is reported in the year 2010 (-64.70).The highest minimum profit is reported in the year 2016 (215.53).The least maximum profit is reported in the year 2007(4581.09).The highest maximum profit is reported in the year 2015(23129.12).The least mean profit reported in the year 2007(788.921).The highest mean profit is reported in the year 2016(3526.024).The least SD profit is reported in the year 2007(912.827).The highest SD profit is reported in the year 2016(4897.088).The least IQR profit is reported in the year 2008(874.53). The highest IQR profit is reported in the year 2014(2953.34).Overall 'Profit' shows an upwards trend over the study period.

Table 4: Descriptive Statistics of PAT Across the Study Time Period for Banking Sector

	Minimum	**Maximum**	**Mean**	**SD**	**IQR**
2007	7.37	4541.31	701.854	894.804	668.36
2008	25.27	6729.12	948.239	1291.6	908.41
2009	-88.1	9121.23	1205.54	1675.417	1450.45
2010	-78.45	9166.05	1400.029	1735.939	1285.91
2011	21.43	8264.52	1678.362	1799.189	1531.07
2012	55.08	11707.29	1937.587	2357.727	1498.57
2013	91.57	14104.98	2141.099	2823.301	1572.32
2014	-1262.84	10891.17	1969.393	2773.264	1281.86
2015	-454.33	13101.57	2082.368	3248.525	1426.57
2016	-6089.21	12296.21	627.044	4006.291	2268.79
Total	-6089.21	14104.98	1469.151	2466.033	1269.7

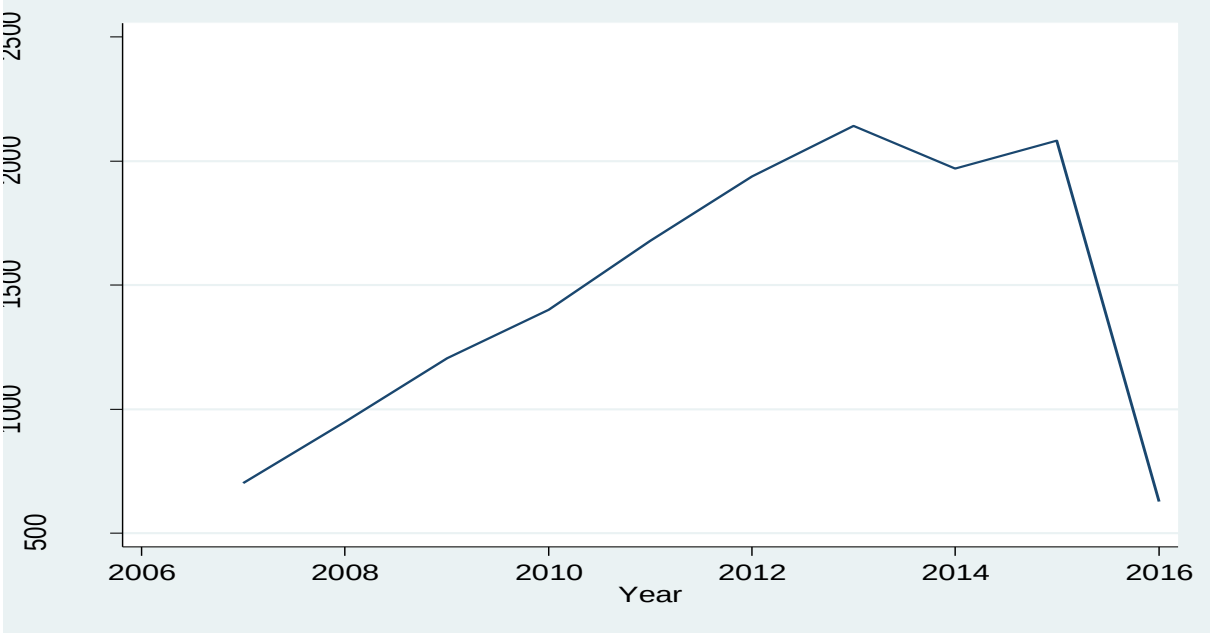

Figure 4:Time series plot of Average PAT for Banking Sector

The least minimum PAT is reported in the year 2016(-6089.21).The highest minimum PAT is reported in the year 2013(91.57).The least maximum PAT is reported in the year 2007(4541.31).The highest maximum PAT is reported in the year 2013(14104.98).The least mean PAT reported in the year 2016(627.004).The highest mean PAT is reported in the year 2015(2082.368).The least SD PAT profit is reported in the year 2007(894.804).The highest SD PAT is reported in the year 2016(4006.291).The least IQR PAT is reported in the year 2007(668.36).The highest IQR PAT is reported in the year 2016(2268.79).Overall 'PAT' shows an upwards trend till 2013 and then downward till 2016 over the study period.

Data Analysis: Sensitivity of Accounting information to Inflation rate (WPI)
Panel data based Simple linear regression is used to analyse the sensitivities of dependent variables (Sales, operating profit and PAT) of the select samples to inflation rate (WPI). The regression model applicable is

$$\Delta Y_{it} = a + b \Delta X_{it} + U_{it}$$

where
ΔY = % change in dependent variable (Sales, Operating profit and PAT , taken one at a time)
Δ X = % change in independent variable (Inflation rate WPI)
a = Constant
b = Beta
i= i^{th} cross sectional unit from 1 to n
n = Sample size (Number of samples)
t = 1 to 10 (years)
U = Error term

Hypothesis 1: Sales is sensitive to WPI

Null hypothesis H_0: In Indian banking sector, WPI has no significant effect on sales. ($\beta = 0$)

Alternate hypothesis H_1: In Indian banking sector, WPI has a significant effect on sales. ($\beta \neq 0$)

Table 5: Sensitivity of Sales to WPI (Banking sector)

	β	SE	Z	P	95% CI for β	
WPI	-.0027188	.0003781	-7.19	< 0.001	-.0034598	-.0019778
Intercept	.6180335	.0663845	9.31	< 0.001	.4879223	.7481447

Note: SE=standard error, CI=confidence interval

Interpretation:

Estimated coefficient for WPI was b = -.0027188 indicating negative effect of WPI on sales. Results of test for the significance of WPI predictor indicates that null hypothesis of no significant effect of WPI on Sales must be rejected at .05 level of significance (β = -.0027188, Z = -7.19 , p < 0.001). Hence the relationship between WPI and Sales is statistically significant at the 5% level of significance.

Hypothesis 2: Operating Profit is sensitive to WPI

Null hypothesis H_0: In Indian banking sector, WPI has no significant effect on Operating Profit. (β =0)

Alternate hypothesis H_1: In Indian banking sector, WPI has a significant effect on Operating Profit . (β ≠ 0)

Table 6: Sensitivity of Operating Profit to WPI (Banking sector)

	β	SE	Z	P	95% CI for β	
WPI	.0003531	.0042486	0.08	0.934	-.0079741	.0086802
Intercept	.0652745	.7319821	0.09	0.929	-1.369384	1.499933

Note: SE=standard error, CI=confidence interval

Interpretation:

Estimated coefficient for WPI was b = .0003531 indicating positive effect of WPI on Operating Profit. Results of test for the significance of WPI predictor indicates that null hypothesis of no significant effect of WPI on Operating Profit cannot be rejected at .05 level of significance (β = .0003531 , Z = 0.08 , p = 0.934). Hence the relationship between WPI and Operating Profit is not statistically significant at the 5% level of significance.

Hypothesis 3: PAT is sensitive to WPI

Null hypothesis H_0: In Indian banking sector, WPI has no significant effect on PAT. (β =0)

Alternate hypothesis H_1: In Indian banking sector, WPI has a significant effect on PAT. (β ≠ 0)

Table 7: Sensitivity of PAT to WPI (Banking sector)

	β	SE	Z	P	95% CI for β	
WPI	-.0110409	.0019068	-5.79	<0.001	-.0147782	-.0073036
Intercept	1.74392	.2542289	6.86	<0.001	1.24564	2.242199

Note: SE=standard error, CI=confidence interval

Interpretation:

Estimated coefficient for WPI was b = -.0110409 indicating negative effect of WPI on PAT. Results of test for the significance of WPI predictor indicates that null hypothesis of no significant effect of WPI on PAT must be rejected at .05 level of significance (β = -.0110409 , Z = -5.79 , p <0.001). Hence the relationship between WPI and PAT is statistically significant at the 5% level of significance.

Conclusion

It is thus clear that Inflation significantly affects the sales and the PAT of banks. It does not significantly affect the operating profits of any of the Banks.

To reduce the sensitivity of sales to inflation rate the banks will have to take relook at their credit policy and revise the policy to set lower ' Exposure limits' to sectors which are more susceptible to inflation rate like luxury goods and increase the ' Exposure limits' to sectors which are more price inelastic like basic goods. This, of course should be within the framework of 'Exposure Norms' laid down by the RBI. To reduce the sensitivity of PAT to inflation rate the banks will have to handle the ALM process (Asset Liability Management) with more care. Forecasting the inflation rate will be useful to the banks as they can take advantage of falling inflation rate and take adequate risk coverage measures in times of raising inflation rate.Overall, the banks need to practice prudent risk management in order to safeguard the assets of the bank and protect the interests of investors.

References

1. Aleksandra Halka, Jacek Kotlowski, "Does domestic output gap matter for inflation in a small open economy?", National Bank of Poland working paper No. 152, 2013.
2. Annette Frohling, Kirsten Lommatzsch, "Output sensitivity of inflation in the euro area: indirect evidence from disaggregated consumer prices", Discussion Paper Series 1: Economic Studies, No.25, 2011.
3. Caroline Geetha, RosleMohidin, Vivin Vincent Chandran, Victoria Chong, "Relationship between inflation and stock market: Evidence from Malaysia, United States and China", International Journal of Economics and Management Sciences, Vol.1, No. 2, 2011, pp 01 -16.
4. Chao Wei, "Does the stock market react to unexpected inflation differently across the business cycle?", April 24, 2009.
5. F. Lajeri, J. Dermine, "Unexpected inflation and bank stock returns", Journal of Banking and Finance, Jun 1999, Vol.23, Issue 6, pp 939-953.
6. Francisco Jareno, "Inflation Risk Management in Spanish Companies", Archives Des Sciences, Vol.65, No.11, Nov 2012.
7. KonstantinsBenkovskis, Michele Caivano, Antonello D'Agostino, Alistair Dieppe, Samuel Hurtado, Tohmas Karlsson, Eva Ortega, and TimeaVarnai, "Assessing the sensitivity of inflation to economic activity", Working Paper Series, No.1357, Jun 2011.