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Article

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FINANCIAL ECONOMICS | RESEARCH ARTICLE

Cross-sectional returns predictability for emerging market banks: A study on Indian banking system

Sabyasachi Mohapatra^{1*} and Arun Kumar Misra²

Abstract: Using Indian bank-level data, we examine the cross-sectional returns predictability for banking stocks in view of the distinct industry parameters prevalent in the financial services space. We find the existence of abnormal returns in banking stocks. We also observe that the celebrated Fama–French (1992) 3-factor model could not explain the abnormal returns, primarily due to very high leveraged banks' balance sheets. Thus, we extend the Fama–French 3-factor model and Carhart 4-factor model alongside bank-specific conditioning information in the form of asset quality variables, operational efficiency variables and solvency variables to articulate the existence of abnormal returns. With the inclusion of conditioning information, the study predictability of abnormal returns improved significantly.

Subjects: South East Asian Studies; Finance; Business, Management and Accounting

Keywords: Asset pricing; banking stock returns; conditioning information; investment strategies

JEL Classification: G11; G12; G14; G21



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PUBLIC INTEREST STATEMENT

As systemic financial institutions, Banks serve as the backbone for the country's payment systems, contributing to macro-level financing and related economic activities. A self-sustaining banking system is essential for the economy's growth and progress. Resting on financial health and profitability, banks are an ultimate intermediary between "Savers" and "Lenders". They can either create value or wipe out depositors' wealth. For wealth creation, banks require adequate capital which is possible via public equity participation, which relies on overall sustainability and associated returns. Basing our discussion on existing Asset Pricing Model, we assess the impact of Operational Indicators (size, valuation, profitability) and Asset Quality Indicators (Loan Provisioning, Gross Non-Performing Assets and Ratio of Capital to Risk Weighted Assets) on shareholders' expected returns. We find that expected returns are governed not only by bank's size and valuation but also by its Business Operations and Asset Quality, which essentially need constant monitoring both by investors and by policymakers.

Extended Summary

Purpose—In this paper, using Indian bank-level data, we aim to contribute to the existing asset-pricing literature by presenting an assessment regarding the relevance of the bank-specific variables (conditioning information) for estimating the banking stocks cross-sectional returns. We employ variables such as previous loan commitments, change in Gross Non-Performing Assets (GNPAs), earnings change, operating margin, return on Assets, capital adequacy and leverage among others to predict the cross-sectional returns for Indian Banks. We further examine if this returns predictability is an outcome of the institution's increased business risk (Fama & French, 1992), the market microstructure effects or a sentiment led under or overreaction leading to unreasonable price patterns (Lakonishok, Shleifer, & Vishny, 1994) or the profitability and investment factors proposed by Novy-Marx (2013) and Aharoni, Grundy, and Zeng (2013) respectively.

Design/Methodology/Approach—We deploy one-way sorting techniques followed by cross-sectional regression proposed by Fama and MacBeth (1973) to test and confirm the presence of abnormal returns at both at the stock level as well as portfolio level in case of Indian banking stocks. Further, to explain the existence of abnormal returns, we design a combined empirical model by including the bank specific bank-specific conditioning information in the form of asset quality variables, operational efficiency variables and solvency variables alongside the Fama and French (1992) 3-Factor model and Carhart (1997) 4-Factor model for the estimations.

Findings—Our findings confirm that variables like the percentage changes in a bank's book-value and GNPAs turn out to be highly significant during the estimation of the cross-sectional returns for banking stocks. We also confirm that the cross-sectional returns are positively related with the firms' earnings, continuous depletion in the non-interest income, and rise in the banks' book value to total assets ratio. The results are unfailing with the investors' under-reaction to any bank-specific good or bad news. In particular, "good news" (Positive Shocks) to fundamental variables leads to increased monthly returns during the following months. Similarly, "bad news" (Negative Shocks) to fundamental variables leads to lesser monthly returns during the subsequent months.

Research Implications and Originality/Value—The findings suggest that the existing and highly exploited factor Models designed to measure the profitability and risk of the resultant portfolios comprising banking stocks fall short of explaining the predictability of the cross-sectional returns. On the other hand, we conclude that investors look forward to the banks' profitability metrics, valuation ratios, as well as the asset quality and leverage ratios prior including the stock in the portfolio. Moreover, in the context of emerging markets, we recognize the relevance of banking information, particularly the banks' asset quality and the provisioning in influencing the abnormal returns.

1. Introduction

1.1. Background

As money generators, safe keepers of public savings, credit allocators and channel for payment systems, banks are designated a unique position in a country's economy. According to the modern theory, banks build up proprietary information of their borrowers both during the loan origination process and during subsequent monitoring. Bhattacharya and Thakor (1993) conclude that the existence of financial intermediaries can be explained due to the presence of asymmetric information. The primary function of banks is to reduce the information asymmetry which helps in curtailing the non-performing loans, improve profit and reduce the capital requirement. As compared against non-financial manufacturing companies, owing to a significant degree of *systemic risk*, and a very high grade of regulation enforced by multiple-regulatory bodies, we strongly feel the urgency of a separate study to examine the returns predictability of banks leading to their inclusion in the resultant portfolio. We note that financial institutions, in particular "Banks", are typically excluded while conducting cross-sectional asset pricing studies because of their highly leveraged balance-

sheet and the multifaceted and strict industry regulations governing them. For example, while evaluating cross-sectional equity returns, Fama and French (1992) excluded highly leveraged financial firms indicating a higher likelihood of distressed balance-sheet. Similarly, in order to study the effect of industry-led momentum effect, Moskowitz and Grinblatt (1999) separately segregated financial firms and classified them as depository and non-depository institutions.

Corresponding to the available evidence based on the earlier studies by Fama and French (1992, 1993, 1996) it is imperative to note that much of the disparity in the expected returns related to firm-specific factors like “Profitability” and “Investment” remains unexplained. Novy-Marx (2013) identified expected profitability as a factor influencing the average returns. In a similar study, Aharoni et al. (2013) acknowledged a weak but statistically significant relationship between the average returns and investment as a factor. Taking a cue from these studies, Fama and French (2015) developed a 5-Factor model to incorporate the effects of additional factors like Profitability and Investment on average returns. However, the model has its own limitations as stated by Fama–French themselves. After the inclusion of the additional factors in the existing 3-Factor model, the value factor, *HML*, seems to lose its relevance in explaining the expected returns.

We realize that the aforesaid findings observed during the seminal and recent studies are resultant because of the firms’ classification pattern and due to the inclusion of supplementary factors in the existing asset pricing models. As a result, it seems highly relevant to exploit the financial services related to homogeneity, in specific to the banking industry. The objective is to scrutinize the potential of the banking-related accounting ratios to factor in the cross-sectional monthly returns of the banking stocks.

In this paper, using Indian bank-level data, we contribute to the existing asset-pricing literature by presenting an assessment of the relevance of the bank-specific variables acting as conditioning information for estimating the banking stocks cross-sectional returns. In order to test the effects of factors like a bank’s profitability and its investment portfolio without losing out on the relevance of the “size” and “value” investing theories, we propose to develop a joint model using bank-specific conditioning variables classified as *Operational Indicators* (viz, Price-Earnings Ratio, Price-Book Ratio, Change in Net Profit Margin) and *Asset Quality Indicators* (viz, Percentage Change in GNPA, Provisioning Ratio, Capital to Risk Weighted Asset Ratio and Return on Assets) alongside the 3-Factor and 4-Factor model to investigate the role of conditioning variables during stock selection and weight allotment in the resultant portfolio. Our objective is to develop a sample agnostic returns predictability model specific for emerging market banks like India.

1.2. Results summary and contribution

Liquidity creation and maturity transformation are important functions of banks. The primary variables arising out of these intermediation activities involving customary and non-conventional financial services capture the latest striking transformations that banks have undergone globally impacting the institutions’ riskiness (Shockley & Thakor, 1997; Carter & Sinkey Jr., 1998; Rogers & Sinkey Jr., 1999). We employ these variables such as previous loan commitments, change in Gross Non-Performing Assets (GNPAs), earnings change, operating margin, return on Assets, capital adequacy and leverage among others to predict the cross-sectional returns of Indian Banking Industry.

We deploy one-way sorting techniques followed by cross-sectional regression proposed by Fama and MacBeth (1973) and observe that variables like the percentage changes in a bank’s book-value and GNPAs turn-out-to-be highly significant during the estimation of the cross-sectional returns for banking stocks. We also confirm that the cross-sectional returns are positively related to the firms’ earnings, continuous depletion in the non-interest income- and rise in the banks’ book value to total assets ratio.

We further examine if this returns predictability is an outcome of the institution's increased business risk (Fama & French, 1992), the market microstructure effects or a sentiment led under or overreaction leading to unreasonable price patterns (Lakonishok et al., 1994). The tests are further re-run to confirm any changes contributed by factors such as book-to-market value, size of the lending institutions or due to the existing ownership pattern (private and public-sector) in case of the Indian Banks. The results are unfailing with the investors' under-reaction to any bank-specific good or bad news. In particular, "good news" (Positive Shocks) to fundamental variables leads to increased monthly returns during the following months. Similarly, "bad news" (Negative Shocks) to fundamental variables leads to lesser monthly returns during the subsequent months.

2. Institutions, explanatory variables and expected returns

In developed markets (Thakor, 1987; Madura & Zarruk, 1992;; Docking, Hirschey, & Jones, 1997) where linkages between the quality of the loan portfolio and the follow-on market valuation owing to the banks' fundamentals and performance have been extensively studied, it has been observed that investors, as well as managers, face difficulty in interpreting the accounted information regarding the loan-loss reserves for future terms, which are left to an individual's discretion (Slovin, Sushka, & Polonchek, 1992). These features of a bank's conventional approach toward day-to-day banking operations limit the adequate pass-on of information which is of utmost importance for estimating a given bank's risk-adjusted value.

In India, it has been close to three decades since economic reforms were introduced. This led to the economic liberalization resulting in the boom of the Banking and Financial Services sector. Non-banking financial corporations, housing finance institutions, small finance banks and many other non-depository firms gradually became more competitive in the traditional lending business, which were earlier limited to the banks only. In order to respond to the competitive pressures, commercial banks relied on measures like lowering the interest rates and aggressive marketing in segments like housing loans, retail loans, loans to small and medium enterprises, and also in off-balance-sheet activities like credit commitments, letters of credit and interest rate swaps. While the economy was performing well, banks reaped the profitability; however, with downswing of the business cycle, the profitability of the Indian banks has taken a major hit with a significant rise in the gross non-performing assets.

Our study further draws its motivation from the recent listing of the new-age Bandhan Bank (27 March 2018). The stock shot up by more than 70% within less than 6 months of its listing on the National Stock Exchange. Consequently, Bandhan Bank has positioned itself as the most expensive bank in terms of "Price-Book" ratio, albeit its overall loan book and total income remains much smaller as compared to its bigger peers in the banking sector.

In order to draw a quick comparison, we represent the Financial Data as of FY 2018 and the stock market data as of 17 August 2018 for the top 10 banks based on their market capitalization (Refer Table 1). From the table, we observe that Bandhan Bank's stock is quoting at a trailing price-book ratio of 8.9, as against the top (based on market-cap) public and private sector banks quoting within a range of 0.9–1.4 and 2.5–5.1, respectively. The premium valuation of Bandhan Bank defies the existing asset pricing models and the related concept of value investing.

We further observe that although Bandhan Bank has the lowest total income and the lowest total advances among the presented sample, it has the most impressive return ratios and much better asset quality as compared against the larger banks. In fact, Bandhan's gross non-performing assets (GNPA) ratio at 1.25% is also the lowest among the considered sample.

Based on the aforesaid anomalies, subsequently, we are compelled to scrutinize the variables affecting the banks' pricing in the emerging market context. We conduct a study to examine, if at all there exists, any relationship between the market valuations of Indian Banks owing to their balance-sheet and off-balance items. We estimate the role of the explanatory variables while examining the cross-sectional component of the banking stocks' expected returns. Further, we

Table 1. Financial data for top 10 banks based on market capitalization

Bandhan Bank has the highest price-book multiple

Rank #	Bank name	Market capitalisation	Total income	Total advances	Return on assets (%)	Gross NPA (%)	Trailing price-book ratio
1	Bandhan Bank	83,877.7	5508.5	32,339	4.0	1.25	8.9
2	Kotak Mahindra	240,758.7	23,800.7	169,718	1.7	2.22	6.4
3	HDFC Bank	562,997.1	95,461.7	658,333	1.9	1.3	5.1
4	IndusInd Bank	119,552.1	22,030.9	144,954	1.9	1.17	5.1
5	Yes Bank	90,628	25,491.3	203,533	1.8	1.28	3.5
6	Axis Bank	161,045.6	56,747.4	439,650	0	6.77	2.5
7	ICICI Bank	218,759.3	72,385.5	512,395	0.9	8.84	2.1
8	SBI	269,522.9	261,500.0	2,048,387	0.2	10.91	1.4
9	IDBI Bank	26,027.9	30,035.4	171,740	2.5	27.95	1.2
10	Bank of Baroda	38,624.3	50,305.7	460,744	-0.3	12.26	0.9

examine the significant variables in determining the banking firms' riskiness, while analyzing the latest banking norms that might have a say on the banks' risk. Taking a cue from the aforesaid studies and prevalent banking practices, we construct several measures to exemplify a bank's risk and then consider the impact of these measures on future expected returns. Our study contributes to the emerging market literature examining factors that establish linkages between the quality of the loan portfolio and the market valuation derived owing to the banks' fundamentals and performance in economies like India.

2.1. Banking variables construction

We put up fundamental information carrying seven firm-specific variables, representing a measure of quarterly changes, namely: (1) Price-Earnings Ratio, (2) Price-Book Value Ratio, (3) Return on Assets, (4) Gross Non-Performing Assets, (5) Operating Margin, (6) Capital Adequacy Ratio and (7) Provisioning Coverage Ratio. In order to capture any excessive volatility arising due to fund managers and investors over-reaction to quarterly results, we design information variables reflecting the percentage change over the previous quarter.

This is in contrast to the approach of Cooper, William, and Gary (2003) that has designed variables reflecting the percentage change during the quarter over the last four quarters in order to limit any excessive volatility arising due to quarterly changes.

In the next subsections, we elaborate the design of the information variables (classified mainly as *Bank's Operational Indicators* measuring the firm's efficiency and the *Asset Quality Indicators* reflecting the financial leverage and overall health of the firm) deployed to evaluate their linkage with expected returns.

2.2. Banks' operational indicators

2.2.1. Percentage change in price-earnings ratio (PE)

Investors and fund managers closely track the change in price-earnings ratio (a proxy for the improvement in earnings per share over the quarters) to scrutinize any changes in the performance of the concerned firm. Prior studies associated linkages between changes in quarterly earnings to prospective stock returns, irrespective of the firms' business nature (refer Bernard & Thomas, 1990; Rendleman, Jones, & Latane, 1982), well articulating the post-earnings announcement drift phenomenon. Even though the impact of the quarterly percentage change in PE ratio information is not limited to banks, yet we consider the variable in our study assuming wild swings in banks' earnings are expected to be less severe over time as compared to non-financial institutions. As per Docking et al. (1997), banks have the capability to keep their earnings unaffected to an extent, arising out of loan-loss reserves adjustments. Hence, any shock to the PE ratio is expected to cast a major impact on potential returns.

2.2.2. Percentage change in price-book ratio (PB)

Considering the fact that banks are the most leveraged institutions in a country's economy, it becomes highly relevant to understand the pricing effect with regard to the amount of money that can be borrowed relative to the amount of capital that banks allocate to their own assets, over the quarters. We include the PB ratio as an information variable in our study to determine if any quarterly changes in the variable resulting due to the leverage effect can explain the stock market performance. Prior studies like Brewer, Jackson, and Moser (1996a), 1996b) have determined the importance of financial leverage in explaining financial institutions' risk and returns. In the current study, the effect of the quarterly percentage change in the PB ratio is constructed as a proxy variable, in order to capture the effect of the banks' asset leverage.

2.2.3. Percentage change in profit margin (NPM)

Since the mid-1980s, the banking industry across the major economies has witnessed stiffening competition, particularly in traditional lending business, impacting the intermediation margins.

This change was a resultant of the evolving changes in regulation, technology shift and demand composition leading to modified credit market structure (Bhattacharya, Boot, & Thakor, 1998). Moreover, in the recent past, since the mid-1990s and early 2000s, cross-country variability of gross income as a percentage of total assets has dipped significantly, with major evidence in the Anglo-Saxon banking systems (Albertazzi & Gambacorta, 2009). Due to the decline in interest margins amounting from traditional lending services, banks are forced to look for newer avenues of income like trading services and other advisory roles. This entire paradigm shift has forced lending institutions particularly commercial banks to diversify their revenue sources and imbibe recent technology developments for improving the efficiency of production and distribution channels.

Taking a note of the fact that banking system stabilization and regulation have had severe implications on the banks' income statements, it becomes highly essential for us to evaluate if the information variable (i.e. percentage change in operating margin) has any significant impact on the profitability and future returns of the institutions.

2.3. Asset quality indicators

2.3.1. Percentage change in the gross non-performing assets (GNPA)

In the case of banking firms, loans comprise a significant portion of the overall assets portfolio. As a result, any major quarterly changes in the quality of total loans suggest an impact on the prospective health of the institution. Models are developed for financial institutions like banks to assemble and process private information concerning about existing and new borrowers and their corresponding borrowing activities (refer Diamond & Dybvig, 1983; Ramakrishnan & Thakor, 1984; Fama, 1985; Boyd & Prescott, 1986). As a result, the secrecy of the lender-borrower relationship and the limited disclosures accentuate the obscurity while marking bank loans as marketable and performing. This leads to an overwhelming difficulty while valuing the banks' loan portfolios (Refer, Kim & Santomero, 1993; Slovin et al., 1992; OHara, 1993). Hence, in our study, we have included the quarterly changes in the GNPA as a variable to measure the effect of a banks' loan portfolio quality on its current stock price and future returns.

2.3.2. Percentage change in the provisioning ratio (PROV)

Banks' capital position is hugely impacted due to a higher degree of non-performing loans which forces the institutions to oblige higher loan-loss provisioning. Big changes in loan-loss reserves arising due to higher provisioning might indicate a deteriorating state of the firm's loan portfolio which can be a huge deterrent in the potential performance in the coming quarters affecting the shareholders' wealth (refer Lancaster, Hatfield, & Anderson, 1993; Thakor, 1987). The effect becomes more intense if an increase in loan-loss provisioning is accompanied by a fall in operating profits and reduced dividend payouts (Docking et al., 1997). In the current study, it becomes imperative to test for banks performance owing to information contained in non-performing loans and higher provisioning, as reported by Wahlen (1994).

2.3.3. Percentage change in the ratio of capital to risk-weighted assets (CRAR)

Central banks and national regulators on a regular basis follow a bank's CRAR, i.e. the ratio of a bank's capital to its overall risk, in order to ensure that the firm meets the compulsory level of capital requirements which act as a bolster to absorb losses to a reasonable extent, before being declared insolvent. This level is maintained to ensure the financial system stability while safeguarding the depositors' interest. A higher CRAR provides a higher degree of protection. This observable fact becomes more relevant realizing the financial sector crisis and global meltdown of 2007. Regulators feel that one of the most persuasive ways to ensure the non-failure of commercial banks is by increasing the shareholders capital. This measure will certainly discourage banks from irresponsible and risky lending in order to protect shareholders' equity.

In our study, we have considered the variable for accounting the information essential in measuring the expected returns of banking stocks owing to any quarterly percentage changes in the CRAR ratio.

2.3.4. Percentage change in return on assets (RoA)

Taking a cue from the study of Cantor and Johnson (1992), our study tries to understand the impact of improving capital ratios (i.e. higher Return on Assets across quarters) over the potential stock returns in case of banking firms. It is expected that, over a period of time, improving capital ratios should lead to higher stock returns indicating a positive relationship. Realizing the magnitude of the variable, we have included the quarterly percentage change in RoA as an information variable to capture the discussed effect in our present study.

2.4. The data

We employ the Indian banks' data (35 in number), listed on the National Stock Exchange with continuous trading information available since 1 January 2008–31 March 2018. These data set are distinctive in nature as they provide a comprehensive set of information that captures the banking as well as non-banking activities. The period of study comprises the beginning of the global meltdown, the consolidation phase and finally the recovery phase spanning almost a decade involving 40 quarters of the information set.

We construct a consolidated sample comprising both public and private banks. To be more precise about the sample construction, the bank accounting information is obtained from the quarterly consolidated financial statements reported to the stock exchanges and the central bank. In order to design an in-depth database, without relaxing the objectivity of the specification, we design the seven information variables as detailed out in Section 2.1. The information variables are primarily classified under bank-specific information and asset quality indicators reflecting the performance, operational efficiency, valuation and asset quality along with adequacy ratios.

An important consideration of the study is the assessment of the growing non-performing assets on valuation and capital adequacy of banks.

3. Empirical design and estimation strategy

Our study focuses on two aspects of the previous findings, discussed above, which are key to estimate the cross-sectional returns of banking stocks, i.e. the banks' asset quality and the profitability ratios. The empirical design takes into consideration both the set of information values in designing the model at an aggregate level for estimating the extra-normal returns. The empirical model, however, turns out to be complicated by the likelihood that the banks' profitability ratios and assets quality are simultaneously estimated in projecting the future returns. In particular, a bank with a high capital adequacy ratio is expected to be less susceptible to macroeconomic shocks that usually complicate the working capital requirements of the firm. Moreover, a higher degree of non-performing loans accelerates the necessity for higher loan provisioning by banks impacting its capital position. Finally, as the banks become more leveraged, the overall risk-premium rises affecting the operational metrics, the profitability ratios and consequently the expected stock returns.

Based on the above interrelationships, we propose the below discussed simultaneous equations framework comprising operational parameters as well as asset quality inputs for estimating the cross-sectional returns.

3.1. Estimating extra-normal returns

We deploy the identical single-index model to estimate the presence of extra-normal returns for the following three cases:

- Case1: For Individual Banks across 40 Quarters of study (*Refer Equation 1*),

- Case2: For a Cross-Section of Banks across 40 Quarters of study (Refer Equation 2), and
- Case3: For a quintile Portfolio comprising banks designed on the basis of investment strategies (namely Size; Value and Momentum) over a duration of 40 Quarters (Refer Equation 3).

For each of the aforesaid cases, we carry out the α estimations and test for the below defined Null hypothesis:

Null Hypothesis—All α should be statistically zero, to substantiate the non-existence of any extra-normal returns at individual bank level, cross section of banks and portfolio comprising banks.

Alternate Hypothesis—If α should be statistically significant, then there exists a possibility of extra-normal returns at individual bank level, cross section of banks and portfolio comprising banks, which might be attributed to the returns predictability.

We test the aforementioned Null Hypothesis for all the three possible cases discussed below and present the summary results:

CASE 1: Testing presence of Extra-Normal Returns at Individual Bank Level using Time Series Regression for each of the 35 listed Banks over a period of 10 years (40 quarters)

We define the excess returns of the respective asset i (i.e. for *Individual Banks*) as a function of the excess benchmark returns, which is Nifty Bankex in the present case. We estimate the relative returns for each Bank i at each time instance t , over the past 10 years (40 Quarters) as per the below market-index model equation:

$$r_{it} - r_{ft} = \alpha_i + \beta_i(r_{Mt} - r_{ft}) + e_{it}, \quad (1)$$

where

r_{it} : Bank i 's returns during quarter t ; where t varies from 1 to 40;

r_{ft} : Average T-bill rate during quarter t ; where t varies from 1 to 40;

r_{Mt} : Nifty Bankex Returns during quarter t ; where t varies from 1 to 40;

e_{it} : Residual returns for asset i during quarter t ; where t varies from 1 to 40;

α_i, β_i : Parameters to be estimated.

In this scenario, our objective is to validate the presence of any abnormal quarterly returns in the case of individual banks. So, as per Equation 1, we regress the individual quarterly returns for each of the listed 35 stocks i , over the 40 quarters during the period 2008–2018 against the benchmark Nifty Bankex returns and generate a series of α_i . The regression estimates are presented in Table 2.

As per the extra-normal returns estimation summary reported in Table 2, we reject the Null Hypothesis stating non-existence of any extra-normal returns for the 35 Individual Banks during the study period of 40 quarters.

CASE 2: Testing presence of Extra-Normal Returns for Cross-Section of 35 Banks during each quarter over a period of 10 years (40 Quarters)

Table 2. Extra-normal returns estimation summary for individual banks

Null Hypothesis Test Results: All α_i statistically zero

t-statistic:	-2.67
One-tailed probability $P(h < x)$:	0.99
One-tailed probability $P(h > x)$:	0.00
Two-tailed probability $P(h = x)$:	0.01
Two-tailed probability $P(h \neq x)$:	0.98

In Case 2, we repeat the estimation process to validate the presence of any abnormal returns corresponding to the Cross-Sectional Returns for the set of 35 Banks during each quarter t over a period of 40 quarters. As per the below Equation 2, we regress the Cross-Sectional Returns of 35 Banks against the benchmark index, i.e. Nifty Bankex and generate a series of α_{CS} .

We define excess Cross-Sectional Returns as a function of the excess benchmark returns, which is Nifty Bankex in the present case. We estimate the relative Cross-Sectional returns for the set of 35 banks during each quarter t , refer to Equation 2. The estimation is carried out for the period of study comprising 40 quarters.

$$r_{CS,t} - r_{ft} = \alpha_{CS,t} + \beta_{CS}(r_{Mt} - r_{ft}) + e_{CS,t}, \quad (2)$$

where

$r_{CS,t}$: Cross-Sectional Returns for the set of 35 Banks during quarter t ; where t varies from 1 to 40;

r_{ft} : Average T-bill rate during quarter t ; where t varies from 1 to 40;

r_{Mt} : Nifty Bankex Returns during quarter t ; where t varies from 1 to 40;

$e_{CS,t}$: Residual returns corresponding to the Cross-Sectional Returns for the set of 35 Banks during quarter t ; where t varies from 1 to 40;

α_{CS} , β_{CS} : Parameters to be estimated.

We represent the regression estimates corresponding to Equation 2 in Table 3. On the basis of the estimation summary results reported in Table 3, we reject the Null Hypothesis stating non-existence of any extra-normal Cross-Sectional returns for the set of 35 Banks during each quarter over a period of 40 quarters.

CASE 3: Testing the Null Hypothesis for the presence of no extra-normal returns at the Bank Portfolio level owing to the Investment Techniques

Table 3. Extra-normal returns estimation summary for the cross section of banks

Null Hypothesis Test Results: All α_{CS} statistically zero

t-statistic:	-2.16
One-tailed probability $P(h < x)$:	0.98
One-tailed probability $P(h > x)$:	0.01
Two-tailed probability $P(h = x)$:	0.03
Two-tailed probability $P(h \neq x)$:	0.96

Table 4. Extra-normal returns estimation summary for banking portfolio

Null Hypothesis Test Results: All α_p statistically zero

t-statistic:	-43.51
One-tailed probability $P(h < x)$:	1
One-tailed probability $P(h > x)$:	0
Two-tailed probability $P(h = x)$:	0
Two-tailed probability $P(h \neq x)$:	1

In this scenario, we verify, if the Size, Value and Momentum investment strategies proposed by Fama and French (1993; 1995, 1996) has any say on the returns predictability of the portfolios designed using the one-way sorting technique for banking stocks.

To test the Null Hypothesis for the presence of no extra-normal returns arising due to the investment techniques, we estimate α_p by regressing the portfolio returns for each of the investment strategies over the past 10 years, against the Nifty Bankex benchmark as per Equation (3). The regression estimates for the portfolio returns are presented in Table 4.

$$r_{pt} - r_{ft} = \alpha_p + \beta_p(r_{Mt} - r_{ft}) + e_{pt}, \quad (3)$$

where

r_{pt} : Quintile Portfolio Returns for the set of 35 Banks during quarter t ; where t varies from 1 to 40;

r_{ft} : Average T-bill rate during quarter t ; where t varies from 1 to 40;

r_{Mt} : Nifty Bankex Returns during quarter t ; where t varies from 1 to 40;

e_{pt} : Residual returns corresponding to the Portfolio comprising 35 banks; where t varies from 1 to 40;

α_p, β_p : Parameters to be estimated.

Particularly at the start of every quarter, stocks are allocated to quintile portfolios on the basis of the recent most lagged values of their conditioning information variables. To be included in a specified sort of quarterly portfolio, a bank simply needs to have the corresponding sorting variable returns for the applicable ranking period.

To design a one-way sort portfolio, we randomly arrange the 35 listed stocks and build seven quintile portfolios. For an entire year, we have 28 randomly designed portfolios, which undergo three separate one-way sorting techniques to calculate the respective investment style returns of the portfolios.

We test the Null Hypothesis for the presence of no extra-normal returns generated by abiding by the investment techniques; we estimate α_p by regressing the portfolio returns for each of the investment strategies over the past 10 years, against the Nifty Bankex, refer Equation (3). We report the extra-normal returns estimation summary in Table 4. Based on the results, we reject the Null Hypothesis stating non-existence of any extra-normal returns for Banking Portfolios that are designed on the basis of investment strategies over a period of 40 quarters.

Table 5. Estimated coefficients of bank-specific variables

	Coefficient	t-ratio	p-Value	
Intercept	−0.02	−6.57	<0.00	
Δ Price-Earnings Ratio	0.00	0.14	0.88	
Δ Price-Book Ratio	0.72	6.02	<0.00	***
Δ ROA	−0.28	−0.90	0.37	
Δ GNPA Ratio	0.06	1.25	0.21	
Δ Opt Profit Margin	0.19	0.41	0.68	
Δ Capital Adequacy Ratio	−0.00	−0.08	0.92	
Δ Provisioning to Total Income	−1.97	−1.91	0.05	**
F(7, 27) = 8.67 (p-value: 0.00)		Adjusted R-Squared: 0.56		
Durbin-Watson: 2.65				

Δ: Quarter-to-Quarter Change

3.2. Bank-specific conditioning information: cross-sectional regressions

As a first step for linking the fundamental variables to the cross section of the potential returns of banking stocks, we study event-led cumulative returns at the bank level, as the underlying asset is subjected to a large or small shock depending on the firms' fundamental variables released during the quarter.

We deploy the below equation to examine and substantiate the relative significance of the firm-specific factors mainly classified as Operational Parameters and Asset Quality parameters in predicting the cross-sectional returns. We carry out the regression analysis of the cross-section of stock returns by including the conditioning information (refer section 2.1) as independent variables. We estimate the below Equation (2) and present the results in Table 5.

$$r_{it} = c_{i0} + c_{i1}\Delta PE_t + c_{i2}\Delta PB_t + c_{i3}\Delta RoA_t + c_{i4}\Delta GNPA_t + c_{i5}\Delta OPM_t + c_{i6}\Delta CRAR_t + c_{i7}\Delta PROV_t + e_{it}. \quad (2)$$

In Table 5, we present the estimated coefficients of the banking variables obtained by regressing the extra-normal stock returns against the fundamental variables for the period Jan 2008 to March 2018. The results from Table 5 indicate that the quarterly change in price-book ratio of the banks and the change in the ratio of quarterly Provisioning to Total Income have significant intercepts. These results support the plausibly strong evidence for the existence of cross-sectional returns predictability in the banking sector arising from quarterly changes in the price-book ratio of the stock and the quarterly change in provisioning to total income shown by the banks in their quarterly results. Our findings are in line with those of Barber and Lyon (1997) who showed that the book-to-market and the market capitalization of financial firms are important factors for predicting the cross-sectional returns.

We also observe that any increase in provisioning by the banks above the expected numbers produce a negative reaction in the banks' stock prices. The impact becomes even more negative if the more than normal provisioning is accompanied by poor quarterly results and fall in dividend payouts. Our finding with regard to the impact of the change in provisioning to total income has a similar effect as reported by Lancaster et al. (1993), Wahlen (1994) and Docking et al. (1997).

The next section of our paper focuses on explaining the cross-sectional returns predictability by adjusting for the portfolio based "Risk" factor and the corresponding "Fundamental Variables".

Table 6. Estimated coefficients of the 4-factor model dependent variable: excess portfolio return

	Coefficient	t-ratio	p-Value	
Intercept	−0.02	−0.96	0.33	
SMB	0.07	3.06	0.00	***
HML	0.13	4.57	<0.00	***
WML	−0.04	−2.03	0.04	**
EMR	0.07	2.06	0.03	**
Adjusted R-Squared: 0.44		F(4,281): 7.36 (p-value:0.00)		Durbin-Watson: 2.42

3.3. Alternative explanations of cross-sectional returns predictability: risk adjustment and conditioning information

From the results reported in the previous sections, we observe and document the visible returns predictability for banking stocks at all the three levels; namely at the individual stock level, for the cross section of stocks and the portfolios designed using the individual stocks. Thus, it becomes imperative for us to further examine, if this cross-sectional returns predictability, particularly at the portfolio level, is due to the perceived risk, the market microstructure effects or due to investors' and traders' irrational behavior to the quarterly change in conditioning information.

Fama and French (1992) argued that predictability confirmation due to the various investment strategies (growth and value) are subjected to risk. This is because; investors have a propensity to undertake higher risk for higher book-to-market-value stocks and a greater potential returns in turn simply compensate for that extra risk. However, Lakonishok et al. (1994) had a different opinion about the various investment strategies. They concluded that value investment strategies are not fundamentally riskier and rather the investors should focus on contrarian returns. To further investigate the influence of the investment strategies, we use the Carhart (1997) 4-Factor model to account for the risk and reward aspects of the following investment strategies:

- (a) Small Market Capitalization Banks vs Large Market Capitalization banks
- (b) Value-based Banks vs Growth-based banks
- (c) Winner Banks vs Loser Banks

We regress the combined portfolio returns on the quarterly return of the benchmark Nifty Bankex minus the risk free rate (EMR), quarterly book-to-market factor premium (HML), quarterly size factor premium (SMB), and the quarterly premium on winner banking stocks minus loser banking stocks (WML) from Fama and French (1996) and Carhart (1997) models. Deploying the below Equation (3), we estimate the relative returns for each portfolio “i” at each time instance “t” for the 10 years (40 quarters) study period and present the results in Table 6.

$$R_{it} - R_{ft} = \alpha_i + \beta_M EMR_t + \beta_S SMB_t + \beta_H HML_t + \beta_{MoM} WML_t + e_i. \quad (3)$$

From the results reported in Table 6, we observe that both “Value” and the “Growth” strategy turns out to be highly significant in the generation of extra-normal returns at the portfolio level comprising banking stocks. The asset pricing tests summary reported above might influence the reader to settle in for the more recent “Fama-French 5-Factor Model (2015)” by including Profitability and Investment as the additional factors, considering the fact that the 5-Factor model might provide better descriptions of average returns as compared against the existing 3-Factor model. However, as cautioned by Fama-French (2015) themselves, the inclusion of Profitability and Investment in the existing 3-Factor model leads to the redundancy of the value

Table 7. Cross-sectional regressions of combined portfolio returns on the 4-factor model

	Coefficient	t-ratio	p-value	
Intercept	−0.01	−2.12	0.03	**
SMB	−0.08	−3.04	0.00	***
HML	0.06	1.99	0.04	**
WML	−0.07	−3.36	0.00	***
EMR	−0.01	−0.26	0.79	
Δ Price-Earnings Ratio	0.00	2.21	0.02	**
Δ Price-Book Ratio	0.45	14.22	<0.00	***
Δ ROA	0.05	1.57	0.09	**
Δ GNPA Ratio	0.01	1.04	0.29	
Δ Opt Profit Margin	0.01	0.32	0.74	
Δ Capital Adequacy Ratio	−0.01	−0.56	0.57	
Δ Provs. to Total Income	0.38	1.78	0.05	**
Adjusted R-Square: 0.45	F (11,275) = 22.70 (P-Value: 8.4e-33)		Durbin-Watson: 1.25	

Δ: Quarter-to-Quarter Change

factor HML while describing the average returns. Hence, we refrain from using the 5-Factor model to describe the returns.

We also observe that the results reported in Tables 5 and 6 corresponding to the newly designed “bank-specific conditioning information” model and the existing “4-Factor” model is highly conflicting. As a matter of fact, in Table 5, while the intercept value is highly significant the corresponding bank-specific variables seem to be inconsequential in describing the average returns for banks. On the other hand, the intercept value corresponding to the 4-Factor model is highly insignificant although few of the factors like HML and SMB are found to be of relevance while describing the banking portfolio returns.

Sensing the discrepancy in the results, our current study proceeded by proposing a joint model taking into consideration the factors proposed by Fama–French and the bank-specific variables. However, instead of including Profitability and Investment as additional factors in the model, we propose to use bank-specific conditioning variables classified as Operational Indicators (Price-Earnings Ratio, Price-Book Ratio, Change in Net Profit Margin) and Asset Quality Indicators (Percentage Change in GNPA, Provisioning Ratio, Capital to Risk Weighted Asset Ratio and Return on Assets) to investigate the role of conditioning variables during stock selection and weight allotment in the resultant portfolio. We include the aforesaid conditioning information for building a sample agnostic returns predictability model specific for emerging market banks like India.

We employ Fama and MacBeth (1973) strategy for the 287 equally weighted quintile portfolios for the 10-year study period. For each portfolio, alongside the SMB, HML and WML factors, we use change in quarterly values of the portfolio-specific conditioning information to run the Fama and MacBeth (1973) regression equation. The results are reported in Table 7.

We observe that in addition to the significance of the investment strategies, fundamental variables like the quarterly change in price-earnings, the quarterly change in price-book ratio, quarterly change in return on assets and the quarterly change in the provisioning to total income play an influential role in the investor’s stock selection process. Particularly, we find that investors

have a tendency to chase banks with better valuation ratios along with high profitability metrics and better asset qualities.

4. Concluding remarks

In this paper, we document the predictability of the cross-sectional returns of banking stocks dependent on investment strategies, as well as fundamental variables that have linkages to the risk-return ratios as well as the shareholder's value.

Most of the earlier studies (Grammatikos & Saunders, 1990; Musumeci & Sinkey Jr., 1990; Madura & Zarruk, 1992; Docking et al., 1997) have focused on event-based methodology to articulate change in the shareholder's wealth around the announcement period corresponding to banks' corporate actions and disclosures. However, similar to the study by Cooper et al. (2003), in the present study we have shown that alongside the much-discussed investment strategies based on the 3-Factor and 4-Factor models, fundamental variables like the quarterly change in price-earnings, price-book ratio, return on assets and the change in the overall provisioning to total income can safely price-in the cross-sectional returns predictability of banking stocks.

Based on the results reported in Table 6 we conclude that the typical 3-Factor and 4-Factor models designed to measure the profitability and risk of the resultant portfolios comprising banking stocks fall short of explaining the predictability of the cross-sectional returns. Rather, we assume that investors look forward to altered parameters in order to identify banks and financials for portfolio construction. Taking a cue of our empirical results reported in Table 7, we conclude that investors look forward to bank-specific parameters like the banks' profitability metrics, valuation ratios as well as the asset quality and leverage ratios prior including the stock in the portfolio.

While the current study based on Indian Banks relies on quarterly data, there lies a possibility that the quarterly data can ignore price sensitive information arising due to variables like sector-led lending concentration, short-term policy rates (viz; overnight repo rate, call money rate and monthly term ending rate), associated market risk of the banks' investment portfolio & regulator-led market liquidity modulation. We further believe that while NPA recognition is on a quarterly basis, the occurrence of the credit overdue could be on a monthly basis. However, because of the restricted availability of data, the proposed model has its own limitations. Thus, considering the rationale discussed above, we strongly feel there remains a big necessity to further improve the returns predictability model by including price sensitive information variables available on a monthly basis.

The stability of the banking system with sound asset quality serves as an important tool for capital allocation, financial system stability, financial deepening and economic development. Risk spill-over from corporate to the banking system is one of the prime factors that influence the asset price of banks. Prices of banking stocks are influenced not only by potential macroeconomic conditioning factors but also by other factors like risk capital, asset quality, profitability, loan loss provision and risk leverage of banks.

We strongly believe that market participants while investing in banking stocks should not only focus on the systematic factors but should also evaluate the above-discussed bank-specific factors. Moreover, considering banks are systemic financial institutions, we expect the banking system regulator to continuously monitor the bank-specific unsystematic factors. Since prices of banking assets are more influenced by risk spill-over from corporate, policymakers should prevail upon banks to adopt risk-based pricing of loans and other assets.

We further believe that similar studies in other emerging markets context might help in determining and establishing the relevance of bank-specific fundamental variables (like asset quality and provisioning information), and the related macro-information (like sector-led lending concentration, short-term lending pattern and liquidity modulation by market

regulator) in influencing the abnormal returns predictability in case of Banks and other Financial Institutions.

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