Securities Market Research Databases: Issues and Challenges
Network for Securities Market Data
A Credible Solution

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Abstract

This report presents data issues and challenges faced by researchers in the broad area of Indian Securities Markets research. The availability of reliable and quality database are crucial for high quality research. Network for Securities Market Data, an initiative of NISM, expected to address most of the data challenges as it provides a common interface through which researchers can access different data provided by different vendors in a uniform accessible manner. Further, the report give a brief overview of relevant research issues in broad areas of Market Microstructure and Mutual Funds and highlights data unavailability to pursue such important research questions in the present context. NSMD, proposed to be launched in July 2010, is a plausible solution as it aims to uncover the data inconsistencies and provide comprehensive researcher friendly database.

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1. Introduction

The Indian securities markets have grown in size as well as in depth over the years and stood out in world ranking. India has the distinction of having the second largest number of listed companies after USA; 8th in terms of market capitalization and 15th in terms of turnover ratio. However, compared to its size, it is a heavily under researched market and relatively very few (countable) research papers working on Indian securities market have featured in top financial journals. High quality research demands access to high quality data. NISM took the initiative of providing clean and validated data to carry out high quality academic research by establishing Network for Securities Market Data.

This paper first highlights the issues and concerns of existing data bases the next section documents the formation of NSMD and describes specific unique features of NSMD interface. Subsequent sections document two important research areas in securities market where no complete data base exists and how far NSMD is planning to cover those data gaps.

2. Data base issues and concerns

Unlike in developed nations, none of the data vendors in India build and maintain a data base keeping academic researcher as the target customer. Some of the prominent issues or concerns of academic researchers to do high quality research are listed below:

- The data vendors maintain / sell data base of a particular segment of securities market, for e.g. the vendor selling primary data will not have secondary data of securities market. There is no single vendor who maintains all data bases at one place.

- Most of the data vendors who accumulate data relating to the financial information use their own channels and follow their own methods to acquire data. This practice has two major implications:

- They may not cover all companies which in turn leads to the missing values problem and data inconsistencies.
- They use their own definitions for various fields which in turn obstructs smooth integration of various datasets provided by different data vendors.

- Most of the data vendors replace the old data with the new data (that belongs to the same field) for some of the fields that don't have "commercial value". This has resulted in the death of historical information for some of the major "researcher value" fields.
- None of the data vendors have PhDs to design their data structures and validate their data. They follow industry experts' advice in the design and validation stage. This has resulted in the above mentioned gaps in data acquisition.
- The pricing of databases in India is quite prohibitive for researchers to engage in any research project.

Availability of reliable data on Indian securities market has been one of stumbling blocks for doing research.

3. Formation of Network for Securities Market Data

The effort to restore and build an integrated database and also to establish researcher friendly interface was initially formalized through a concept paper of Anshuman and Badrinath (2007). Their paper highlights the importance of having an integrated interface with a common standards approach as followed by WRDS. National Institute of Securities Markets (NISM), established by SEBI, recognized the need and importance to have a data base interface that integrates, validates and disseminates comprehensive data on Indian companies for the financial economics and accounting research community across the world. NISM took this initiative under its arm of School for Securities Information and Research by establishing, jointly with Indian School of Business, Network for Securities Market Data (NSMD).

3.1 Introduction to NSMD Interface

The main purpose of NSMD is to lead the research effort by providing clean, accessible, and comprehensive data on Indian securities market and thereby enhance our understanding of the

Indian securities markets. It is expected that the NSMD will be a researcher friendly interface as it provides a common interface through which researchers can access different data provided by different vendors in a uniform accessible manner. Further, the awareness of common researcher friendly interface will enhance research culture in the Indian universities and research led teaching initiatives may evolve. In addition, easy access to clean and reliable data will strengthen the PhD programs in India and will produce better quality PhDs.

3.2 Design of NSMD interface

The feasibility and design of NSMD interface are documented in NSMD scoping report of Vijaya Marisetty (2008) after taking note of similar interfaces (for e.g. WRDS of Wharton school; MFDS of Australia) in mind. NSMD integrates multiple databases related to the Financials, Prices, Primary Market, Mutual Funds, Corporate Governance, Analyst, Benchmark, Unit Link Insurance schemes. For instance we can integrate CMIE, NSE, BSE, PRIME, IRIS and CRISIL database. The motivation behind the integration is to eliminate the duplication of efforts in integrating these widely used databases. The readily available integrated data would allow the researcher to concentrate on their main research rather than worrying about integration of diverse datasets.

The user interfaces for all sections have been designed following similar flows to minimize the efforts in learning the interface. Once the user has selected the required data by going through the steps in the user interface, they can select the format in which the data should be downloaded. The downloads can optionally be zipped to reduce the download time. Once the download request is submitted the user can proceed to work on another download request. When the data is ready, the user can see the link to download the data file in the user submitted query results history view.

4. Relevance of Market Microstructure research

The underlying belief in market microstructure research approach relies on the idea that the specific trading mechanism features used in markets play an important role in influencing the asset price behavior. The microstructure research, as it affects asset values and efficiency of

prices and provides extensive characterizations of short-term price behavior, has important implications for other areas of research in finance. The interface of microstructure research with other areas of finance is fast growing in the world literature. However, very little work has been done in the Indian context. Here, we briefly outline the relevant research questions / avenues / areas which interact with other major areas of finance research which would help us in to understand the evolution of trading and information absorption in to prices (so called, Market Efficiency).

4.1 Asset Pricing

The **asset pricing** literature focuses on linking asset price dynamics to underlying economic fundamentals without looking at the underlying security trading specific features such as the presence of private information or trading practices. A research agenda that joins the asset pricing literature with microstructure specifics would fetch a good value addition. It is a well noted fact that the expected returns must reflect a compensation for illiquidity. A more complete understanding of time-varying nature of liquidity (and its various forms) and its relation to risk premiums, stock returns is a much needed area of study. Also from cross sectional view point, variations in expected returns across stocks arise because of variation in liquidity of stocks. There is growing evidence that signifies commonality in liquidity and little is known on the sources of this commonality in liquidity. In these research issues, how we measure / proxy liquidity matters and a correct proxy of liquidity (such as Impact Cost or price impact of trade for trading costs) warrants the use of microstructure level data.

4.2 Behavioral Finance

Another important avenue is to understand the return anomalies, at least from **behavioral finance** perspective, by incorporating the aspects of trader behavior as well as by studying the trading motives of investors. The microstructure literature relies heavily on the presence of uninformed or noise or liquidity motivated traders. A market can't exist without these noise traders as then every trade is initiated by a party with (private) information and results slowly in wider spreads to a point of no trade. It is important to understand exactly who are these noise / uninformed / liquidity traders and why do they trade? To undertake such research questions, a microstructure level data is a must and hence microstructure research matters.

4.3 Corporate Finance

Most of the present event studies (**corporate finance** perspective) in Indian context use daily returns as unit of observation. Such studies do not recognize the fact that the security prices react to new information in a matter of minutes rather than hours / days. The price sensitive corporate announcements made before, during and after trading hours in a day will have different impacts on the announcement day. Significant evidence on the nature of corporate events might be gleaned from intra-day data analysis. A researcher might be able to make a more precise determination of the market perceptions regarding insider trading and asymmetric information over time by using microstructure techniques such as decomposition of spreads in to transitory and permanent (information) based components. Use of such analysis might be very useful in testing hypotheses about the reaction of security prices to earnings and dividend announcements. The existing research data bases do not provide in a systematic way the date and time of corporate announcements and often the researcher tries to collect such information manually and tries to incorporate 'time' of the announcement in his/her event study.

4.4 Welfare Effects

Another promising research avenue and of huge importance is examining microstructure issues from **regulatory view** point as it addresses **welfare effects**. Here most questions are concentrated on market design issues and a sample of questions can be:

- How transparent a market needs to be that encourages both informed and uninformed traders?
- Is the best market the one that treats every order the same, or should markets be allowed to develop in order to meet specialized needs?

The debate on the competitiveness among (local vs. international) exchanges is important and a more fundamental research question is:

- Does international listing help or hurt local firms? While individual firms may be better off when they list on international exchanges, does their attrition to other exchanges impair the functioning of the local market?

There exists very few studies at least in Indian context that address these regulatory interest research questions and to address such questions, the researcher needs access to order level microstructure data.

4.5 Coverage of NSMD for Market Microstructure Research

The major difficulty or rather challenge in undertaking these kind of research studies is that we do not really have a well-structured and well-maintained researcher friendly data base. The National Stock Exchange of India provides microstructure (transaction level historical trade data from year 2000 onwards) for academic researchers at a very reasonable price. The transaction level microstructure data is huge to process and take huge amount of data learning time (rather than on research led thinking time) even for a very short period data. Lack of infrastructural (servers, sophisticated softwares etc.) facilities at Indian universities and institutions resulted in dearth of research studies in microstructure area.

The Network of Securities Market Data, an initiative of NISM, attempts to provide world-class microstructure data in a researcher friendly (ready to use) format and which in turn allows the researchers to spend more time on research led activities instead of data cleaning and processing activities. The Price database of NSMD interface provides daily data as well as intra-day data and the detailed list of variables and its coverage is listed below:

NSMD Interface coverage: Relevant to Market Microstructure Research

Price Database : Daily frequency			
Variables		**Data Source n Period**	**Coverage of Firms**
Price	Open High Low Close Adjusted	The raw data source is NSE. The data is available from Jan 2000 to Feb 2008.	Covers all top 500 firms of NSE (constituents of NSE S& P 500)
Liquidity	Volume traded (in shares) Number of Trades Volume traded(in value) Impact cost		
Volatility	Intra-day volatility		
Corporate Announcements	Dividend Bonus Split Rights Others (eg: Earnings; M&A)	The raw data source is NSE. The data is available from Jan 2007 to Dec 2009	Covers all top 500 firms of NSE (constituents of NSE S& P 500)
Corporate Actions: Ex-dates	Dividend Bonus Split Rights Others	The raw data source is NSE. The data is available from Jan 2007 to Dec 2010	Covers all top 500 firms of NSE (constituents of NSE S& P 500)
Price Database : Intra-day Trades data			
Price	First Last Max Min Average	The raw data source is NSE. The data is available from Jan 2000 to Feb 2008.	Covers all top 500 firms of NSE Spot and Derivative segments.
Volume	Number of Trades Trading Volume in shares Trading volume in value		
Granularity	at 1,5,15,30 & 60 mins		
Price Database : Intra-day Orders data			
Quotes	Best buy quote Best sell quote	The raw data source is NSE order book snapshots available 4 times a day. The data is available from Jan 2007 to Feb 2008. Covers all top 100 firms of NSE Spot and Derivative segments.	
Depth (for buy and sell separately)	Buy Volume offered (in shares and value) at the best (first, upto 5 and full) quote and # of orders supporting the quote		
Granularity	at 11, 12, 13 and 14hrs		

5. Relevance of Research Issues in Mutual Funds

Indian financial markets are getting more and more institutionalized. Foreign investors, local institutions and mutual funds are now playing a bigger role. Mutual Fund is a capital market instrument for investing money. With the interest rates on banks falling and the complexities of share price movement in the stock market, mutual fund turns out to be an alternative source of investment, apart from other non-bank financial institutions. Mutual Funds are essentially investment vehicles where people with similar investment objective come together to pool their money and then invest accordingly. Mutual fund schemes are managed by respective Asset Management Companies (AMC). Different business groups / financial institutions / banks have sponsored these AMCs, either alone or in collaboration with reputed international firms. With so many national and international funds operating in India, the performance of the mutual funds and within the mutual funds the performance of the schemes becomes a crucial area for enhancing research for the purpose of selecting the schemes and/or mutual funds, which draws interests of investors, practitioners and researchers alike. Along with performance, the other areas of interest pertaining to mutual funds include issues related to the incentive mechanisms that align the interests of fund managers with that of the investors, the regulation affecting mutual funds and the analysis of investors. There is a huge proliferation of research in each of these areas. Most of this research although involving the US mutual fund industry has relevance to India.

In this Section of the paper the next three sub sections would discuss the empirical literature associated with the above mentioned research issues and would draw implication about the nature of data appropriate to carry out the empirical analysis. In section 5.5, the paper discusses the kind of data that are available from different sources in the India, their quality and the gap in the data.

5.1 **Performance Measurement**

The first and foremost important issue concerning mutual fund is its performance. Mutual fund, being an instrument for investment, needs to meet high standards of performance. There are many techniques employed over the years in research to analyze and predict performance of

mutual funds. Performance evaluation in the finance literature dates back to Treynor (1961, 1962), Lintner (1965) and Sharpe (1964). The method generally adopted to estimate returns is to employ the Capital Asset Pricing Model which estimates return on a portfolio as a function of excess market return over the risk free return. Jensen (1968) has derived a risk-adjusted measure of portfolio performance, termed as Jensen's alpha that estimates the contribution of the fund manager's forecasting ability to its' returns. This has been followed by a number of modifications suggested by Eugene, French and Fama (1993) which is referred to as the three factor model that includes factors like market capitalization and value. Carhart (1997) further modifies the model by periodic momentum to market equity. These measures have been widely used in the empirical analyses of performance evaluation. It involves calculation of the annual returns usually proxied by annual NAV, income and capital gains reported annually. These are further refined by including reinvestment NAVs for capital gains and income distributions in order to account for dividend reinvestments.

Related to the question of performance measurement is the issue of the relationship between fund size, fund investment scale, economies of scale in the industry and performance. To address these issues researchers have employed factors like lagged fund size adjusting for fund heterogeneity by utilizing various performance benchmarks that account for different loadings on small cap stock, value stock and price momentum strategies and fund characteristics like fund age or turnover, expense ratio, total load, past-year fund inflows, and past-year returns.

While there is a huge literature focusing on performance measurement in mutual fund, a common criticism levied against them is that these analyses use data plagued with the problem of 'survivorship bias'. A database may suffer from the problem of survivorship bias if does not account for the funds which have disappeared. Funds or schemes can disappear either through merger with other funds or schemes or liquidation. If however, one does not account for the disappearance the consequent performance measure turns out to be inflated leading to predictability when there is none (Brown, Goetzman, Ibbotson and Ross (1992). Elton, Gruber and Blake (2001) analyze the accuracy of the survivor problem free CRSP database and make a comparison with the data available from Morningstar, which does not account for the deceased firms. Comparing the results from the survivor bias free data with the data from Morningstar, the

paper finds that neglecting this bias may cause overall performance measures to be inflated upto 40 basis points or more.

5.2 Incentive Problem

The purpose of mutual fund is to provide professional management and the opportunity for investors to diversify. Each mutual fund is overseen by a board of directors, responsible for carrying out the activities of the fund. The board of directors appoints a management company that chooses a portfolio manager to determine the composition of the investment portfolio within the bounds set by the fund's objective. Many of these companies are publicly traded and have a separation between ownership and control. The research in this area include exploiting the agency costs, designing of the compensation structures, the impact of the compensation structure on the behavior of agents. Further the impact of the decisions of the agents on the survival probability of the funds is also analyzed. Research on these issues is based on data on the compensation contracts, information regarding individual funds, their quarterly performance, and information regarding individual shareholders. Other factors generally accounted for are investor characteristics like account size and fund characteristics like family size, fund size, age of fund, turnover of the fund and volatility.

5.3 Regulation

Mutual fund as discussed earlier is an investment vehicle targeting to mobilize the savings from retail investors who are incapable of investing in the stock market on their own owing to lack of information and inability to handle the complexities and risk ensued in the stock market. Hence in order to ensure that mutual fund serves its defined purpose it needs to be one of the highly regulated industries in the capital market. The relationship between the mutual fund and the regulatory environments becomes another important area of research.

Another issue related to the relationship between mutual fund and public policy is the interaction between tax policy and mutual fund. From its very inception, mutual funds had some equity linked saving schemes (ELSS) which include schemes of investment on equities having tax benefits. Tax exemptions are also allowed on capital gains accruing from transactions involving mutual funds and dividend distributions. Hence fiscal policy of the government and its impact on the mutual fund industries also is an important research agenda. Such a research issue would

involve analysis of realized and unrealized capital gains, net asset values of the mutual funds, the amount of dividend announced and their interaction with tax rates.

5.4 Investor level analysis

Mutual Funds invest according to the underlying investment objective as specified at the time of launching a scheme. So, we have equity funds, debt funds, gilt funds and many others that cater to the different needs of the investor. One pertinent factor in this context is that the fund has to be selected keeping the risk profile of the investor in mind because the products listed above have different risks associated with them. For instance, equity funds are a good bet for long term investment, they may not be preferred by corporate or High Net-worth Individuals (HNIs) who have short-term needs.

Research on mutual fund is based on modern finance theory which is based on the assumption that decision to purchase individual financial asset should be based on the investor's belief regarding the future risk and return of the assets and covariance of the return from these assets with returns from other financial assets in the portfolio of the investor. Hence most research in this area has been restricted to the measurement of risk and return as discussed in Section 5.1. Very few researches have considered drawing descriptive inference of the consumer behavior vis a vis the selection of mutual fund scheme. In this context, Capon et al. (1996) in an exploratory study based on 3000 mutual fund investors in the US consider the relationship between four sets of variables, namely, information sources used for mutual fund purchases, criteria used to select between alternative mutual funds, mutual fund purchase behavior and consumer demographic data.

Information comprises of both internal and external source. Internal source would include previous experience of the customer, while external source consists of advertisements, brochures, articles etc. These sources provide information on price, past performance and level of service, which help investors in assessing the alternative offerings. This information forms the criteria for selection. In general the selection criteria would include three sets of variables, i.e. individual factors, like demographic and psychological characteristics of the decision maker, brand and product characteristics, like the price and performance level, usually measured by risk and return,

as discussed above and finally the purchase context, which again depends on the internal and external frame of the purchasing decision of the decision maker.

An alternative source to avail the investor level data is through primary survey. In the Indian context, there are few studies that analyze different aspects of mutual fund through primary survey. However, the scale of such surveys has been rather limited.

5.5 Empirical Data in India

In this section, we discuss another capital market instrument, namely mutual fund. Mutual fund has turned out to be one of the very important sources of investment in securities market.

Although in India the share of investment in mutual fund accounts for only 6-7% of total investment, the sector is growing over the years. In the area of financial research too, research with respect to mutual funds is crucial. Although one can find a large literature on mutual fund in the Indian context, there is dearth of formal or technical research in this area. One factor contributing to it is the lack of mutual fund databases available in the research domain. In India, to the best of our knowledge, reliable data on mutual fund is available from three sources: CMIE, NAV India and AMFI. Apart from that data is available with the individual websites of mutual fund houses. Recently, Morningstar also has started providing data for the Indian mutual fund industry through the morning star India segment. Some aggregate data on mutual funds are also posted with the SEBI website. A very important source of information on mutual fund is the individual websites of the AMCs. We now discuss in details the data that is available, and the problems associated with it.

AMFI provides information on Net Asset value and Asset under Management. The NET Asset value is available for both open and closed ended funds at monthly, quarterly and annual frequencies. However, the monthly details for all funds at a point of time would be available only for the latest month or quarter or year at a time. It also includes information on scheme details, dividend distribution, annual and semi-annual accounts. Besides this, AMFI also provides

information on the distributor agents, additional information about the funds, and the new schemes of the fund.

CMIE through its portal alpha provides detailed data on schemes under the following broad categories: Asset Management Company managing the scheme, the nature, status and type of scheme, options allowed, period of inception, and net assets value since inception, beta of schemes and scheme managers. It also provides information on the dividend history of the schemes. Alpha provides financial details of the schemes, including various performance ratios and portfolio of individual schemes. This information is available 2001 onwards.

Information similar to that provided by CMIE is available through Capitaline NAV. This provides information on the asset Management Companies, details about the schemes, portfolio of the schemes, ranking of the schemes and/or funds based on performance. It also provides details about the dividend history, which includes the dividend announced in percentage terms and the nature of the dividend for each scheme for a given period. The period for which they provide the data is restricted to the latest year in question. The data covers a period from 1995 onwards, depending on the period of inception of the scheme. The database includes data for asset and sectoral allocation.

ICRA through its portal MF Explorer provides data on mutual funds under the categories of fund and scheme names, dates of issue, redemption, listing, their performance which includes data on net asset value, rolling return, multiple returns, minimum and incremental investment, analyzed SIP investments, features on NRI purchase, investments, details of fund managers, which include their dates of appointment, performance of schemes under their management, details about the AMC, portfolio details which include rating, corpus, number of shares, instrument, nature, portfolio date, percentage exposure, aggregated value of PE, PB, market capitalization and dividend yield, names of companies, average maturity and modified duration. They also provide information on dividend frequency and turnover ratio.

A special feature of ICRA is that it provides customized analytical solutions along with raw data which acts as a research support. These solutions take the form of statistical comprehensives, the risk-return matrices, comparison of performances, and creation of indices and ratings of the schemes.

Information on resource mobilization at the aggregate level is available on SEBI and RBI websites. SEBI gives information on the monthly deployment of funds by all mutual funds to the different sectors. At present this is available for 2009 at the website. Moreover, SEBI also gives information on the unit holding pattern across public sector, private sector mutual funds at an aggregate level. However, historical data on individual unit holding pattern of the mutual funds is not available on the SEBI public platform. Yearly fund mobilization information is also made available by SEBI. Apart from these data, SEBI provides information on the various documents associated with mutual fund. This includes Scheme Information Document, Key Information Memorandum, Scheme Information Document, Statement of Additional Information. They also publish all circulars, press release related to mutual fund.

5.5.1. Data Gap

The problem with the available data sources lies in its comparability. We compare the NAV for few mutual funds from the following databases AMFI, CMIE Alpha, Capitaline and ICRA's Mutual fund database. We make a comparison between the databases. We arbitrarily choose Reliance banking Fund with the Institutional Growth option and query for a period of October 27, 2009 to January 27, 2010 for daily Net Asset Value. Data is obtained from Alpha, AMFI and the Reliance Mutual Fund website. The comparisons are given in Figure 1. It is observed that the data from all the three sources are matching for the period available. However, data from Alpha does not cover all the trading dates, as is clearly observable from the figure. This scheme is not included in ICRA. It is observed that the data coverage in terms of number of schemes and the period is systematically understated in databases like ICRA, Capitaline and Alpha when compared with AMFI. Thus, so far as the databases are concerned, there are issues of standardization involved. Often in many of the features provided by the databases, they are incomparable, rather they complement each other in terms of the coverage of variables is concerned.

One serious problem with the present databases in India is that they do not account for the 'survivorship bias' problem discussed in the earlier section. AMFI records the name of all funds and schemes with existed at some point of time. However for deceased fund, no record of NAV and AUM is available for the period they existed. The other databases do not account for funds that have disappeared owing to merger or liquidation. In this context, a database needs to be constructed which would provide historical data on funds that have existed in any period of time and track it till the time it exists. A further record of the fund's merger or liquidation also needs to be compiled in lines similar to Elton et al (1996) as discussed above.

What is not available at all in the public domain is information at the micro level regarding the investors. This information about the resource mobilization of individual mutual fund at the micro level is available with their respective Registrar and Transfer Agents. This information if available publicly would allow research on investor profiling and allow for policy research. This information includes investor characteristics like profession, age, the details of transaction, the portfolio of the investors. It allows us to analyze the investment behavior of the investors in terms of their personal characteristics. This is an important area off research which remains outside the purview of an academic researcher.

One can argue that in the absence of a comprehensive standardized database on mutual funds and lack of micro level data on investors there is scope for an all inclusive database for mutual funds. In this context, the national securities market database (NSMD), an initiative of NISM has a potential role to play. This involves collaboration with mutual funds, AMFI and SEBI. So far as the mutual fund is concerned, the collaboration would involve Asset Management Companies and also their registrar and transfer agents. NISM has begun its initiative on the development of a mutual fund database. However this would be taken up in a full-fledged manner in the second phase of its database construction within the aegis of NSMD.

6. Summary

The report gives an overview on data problems faced by researchers working on Indian Securities Market research, in particular research focusing on Market Microstructure and Mutual

Funds area. Probably, most of these data issues will be resolved with the launch of Network of Securities Market Data, an initiative of NISM. The first phase of NSMD, to be launched in July 2010, covers Price (Daily as well as Intraday) database and Financial Accounting database. The next phases of NSMD will cover databases relating to IPO, Mutual Funds, Corporate Governance, Debt markets and others. NISM is committed to support research in securities markets and intends to provide access to quality data to large number of researchers at a reasonable price and in most efficient accessible manner.

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