

Market Concentration and Competitiveness in Indian Telecom Industry

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Abstract

The importance of telecommunication services is increasingly growing as an integral part of the infrastructural base for socio-economic development of an economy. In order to efficiently provide communication services with improved quality at the lowest price, it demanded a shift of market structure from a government monopoly to a more competitive structure. We are analyzing the changes in the market structure and competition of telecom service industry in India. The major data source of this study is Centre for Monitoring Indian Economy (CMIE) Prowess firm level data, from which the telecommunication service data of firms are taken. The major methodology which followed to measure competition in a market, the concentration ratios is computed, due to their ability to capture structural features of the market. It is found that almost all the concentration indices exhibit the same trend in the concentration level of the market. Concentration level is decreasing year by year and thus, competition is increasing. Even though there are many players in the market, the Indian telecom industry is controlled by a few. Through accuracy measures of index, it is found that the GRS index is the ideal index which indicates a moderate level of competition compared to other indices. As far as telecom industry is concerned, moderate level of competition exists with the oligopoly market structure.

Keywords: GRS ,HHI, Market concentration, Telecom industry, market competitiveness.

1. Introduction

India has one of the fastest growing Information Communication Technology (ICT) service industries in the world. The importance of communication services, especially telecommunication services, is increasingly growing as an integral part of the infrastructural base for socio-economic development of an economy. In order to efficiently provide communication services with improved quality at the lowest price, it demanded a shift of market structure from a government monopoly to a more competitive structure. Being a crucial infrastructural base, the telecom industry has high linkages with other industries of an economy, leading to a multiplier effect in the economy. The significance of the industry, added with the multiplier impact, draws tremendous attention from policy-makers. Eventually, these factors, along with the privatization, led to a structural change initially from monopoly to duopoly, and later to oligopoly and monopolistic competition.

Indian economy witnessed many reforms in the 1990s. The reforms made the telecommunication services, being viewed as a necessary service rather than a luxury one. Due to the huge fixed and sunk costs associated with the investment, formerly this industry was under total government control, in the form of natural monopoly. The major policies that made the sector more competitive are National Telecom

Policies of 1994 and 1999, and the interventions of Telecom Regulatory Authority of India (TRAI). It is observed that policies like fixing tariffs, ensuring the standards of services and provisioning of licenses enabled the easy entry of new firms into the industry. If the number of firms in the industry increases, then it will lead to more network effects. Further, the cost per customer will come down. Hence, the policies have a crucial impact on the competitiveness in this industry. The tremendous growth in this sector was mainly because of numerous proactive and positive Government interventions, with a fair contribution by both the public and the private sectors, and most importantly, due to the changing market structure after privatization.

2. Literature Review

Numerous studies have tried to understand and analyze different aspects of market structure and competitiveness in various industries. The major effect of globalization was that it led to the increase in the market concentration in world markets (Ginevicius & Cirba, 2009). The strategy mix of firms has correspondingly changed according to the changes in the economic and policy environment. A deeper understanding of structure of different markets and their changes over the years is very important for designing a comprehensive policy framework for greater competition (Mishra, Mohit, & Parimal, 2011). Assessing the level of market concentration will enable the policy-makers to come up with effective policies.

In a globalized market, the major task in front of the firms is to capture the market share within the dynamics of the market. The firms must be competitive with their strategies and products to sustain in the market. The trade-off between the stage of technology adoption of the industry and the degree of liberalization is also important, and any future policy of reforming the market structure should be commensurate with the progress in technology adoption (Das, 2000). Market structure has crucial role in determining the level of competition and market performance (Martin, 2012). Mishra & Rao (2014) compared the market structures in different industries using conventional additive measures and various indices of firm inequality. They found that the changes in market structure are not consistent across concentration measures. However, the inequality measure gives more consistent results and can be used for further analysis.

There are a few studies that focused on telecommunication sector in terms of market structure and competitiveness. Jain & Sridhar (2003) found that Indian telecom industry is shifting from an era of monopoly to duopoly and even oligopoly in certain service areas. Further they found that in an oligopoly market, quality is a vital factor in determining the overall competitive performance of service providers. Quality offers a strategic advantage in a duopoly competitive situation. According to Jerbashian (2015) market structure in the telecommunications industry has effect on its competitiveness and it leads to incentives to innovate. The study found that policies which increase the number of firms and toughen the competition create higher innovative effort in telecom industry and strengthen its contribution to economic growth. The recent study on the performance of mobile phone sector in India, particularly after the policy and regulatory uncertainty, showed that the telecom market became hyper-competitive after the entry of new players in 2008 (Mehta, 2017).

Changes in market structure has played a key role in the strong growth of telecom sector, especially in increasing the subscriber base. Introduction of new service providers expanded the choice of different services to the customers and increased the subscription level. It led to higher revenues for the services-providers and increase in the investment. Hence, competitiveness and market structure have very significant roles in the growth and development of telecom service industry. The existing literature reveals that there is lack of a comprehensive firm-level study on Indian telecom industry with respect to market structure and competitiveness. This study aims to fill that gap in literature and thus, to conduct a firm-level study for Indian telecom industry.

3. Data Source and Methodology

The major data source of this study is CMIE Prowess firm level data, from which the telecommunication service data of firms is taken. The data point ranges from 1998 to 2022. The selection of firms includes both basic cellular and internet providers as per NIC code-2008. In order to measure the competition in a market, it is a well-accepted practice to use the concentration ratios, mainly due to their ability to capture structural features of the market. Here, concentration ratios are the measures of the total output produced in an industry by a given number of firms in the industry.

3.1 Concentration Indices

3.1.1 K Concentration ratio

K Concentration ratio is one of the basic indices to measure market structure. The index approaches zero for an infinite number of equally sized firms. Concentration ratio is the ranking of firms according to their market shares. It is based on the share of one firm's sales to total sales. While calculating, the data is arranged in ascending order based on the sales. K concentration ratio is only taking care of the largest firms. The ratio is highly sensitive to the choice of K firms.

3.1.2 Herfindahl-Hirschman Index (HHI)

Herfindahl-Hirschman index is a statistical measure for concentration, which can measure the degree of concentration of the output of the firms in an industry. Herfindahl Index “ equals a weighted average of all the relevant firms market share with, each market share given a value equal to its own market share” (Sleuwaegen et al., 1986) . This method is also called full information index because of its feature of capturing entire distribution. This index becomes less sensitive if the number of firms becomes larger. The general norm is that the HHI with a value of less than .10 is un-concentrated industry, between .10 to .18 is moderately concentrated industry and more than .18 is highly concentrated industry.

$$HHI = \sum_1^n MS_i^2$$

HHI assigns greater weight to the larger firms and lower one to the lower firms. It raises the role of larger firms in the index and reduces the effect of smaller firms in the industry. This limits the smaller firms' role in industry. (Mishra, Mohit, & Parimal, 2011). Such a measure also limits the scope for understanding the role of the smaller firms in market competition.

3.1.3 The Hall-Tideman Index

Hall and Tideman bring forward a number of properties which concentration measures should satisfy, and they accept the HHI on the basis of those properties. Index calculation includes the number of firms because it reflects to some extent the conditions of entry. In the HT Index the market share of each firm

is weighted (k) by its ranking in order to ensure that the emphasis is on the absolute number of firms, and the largest firm will get the rank 1, followed by other firms. The HTI ranges between zero and one, close to zero for an infinite number of equally sized firms and one is for monopoly.

$$HTI = 1 / (2 \sum_{i=1}^n kSi - 1)$$

The difference between HTI and HHI is that HHI gives more weightage to the largest firms, whereas HTI provides more weightage to the smallest firms.

3.1.4 Horvath Index or Comprehensive Industrial Concentration Index

The Horvath index of market concentration can reflect both relative dispersion and absolute magnitude. The index is defined as the sum of proportional share of the leading company and the summation of the squares of the proportional size of each company, weighted by a multiplier reflecting the proportional size of the industry.

$$HOR = S1 + \sum_{i=2}^n Si^2(2-Si)$$

S1 is the market share of the largest firm in the industry. The index is unity in the case of monopoly. As compared to HHI, this index assigns larger weights to all the firms in the industry. Besides the division of the measure into discrete and additive part as well as the weights assigned to the firms are arbitrary (Mishra, Mohit, & Parimal, 2011).

3.1.4 Ginevicius index

Ginevicius index is intended to assess two basic market indicators, the number of firms in the industry and their market share in a balanced way. The value of GIN measure lies between 0 and 1. 1 indicates the presence of monopoly in the market.

$$GIN = \sum_{i=1}^n \left(\frac{si}{1+n(1-si)} \right)$$

3.1.5 GRS index

The GRS index by Ginevicius and Cirba (2009) tries to account for the weighting problem through an accurate measure of market concentration. The weights assigned to different measures of market concentration are not always consistent or supported by theory. As a result, these measures may provide an inaccurate picture of market competition. In GRS index, the weights to different firms are assigned in such a way that (1) the value of the index ranges from zero to one, (2) if all firms in the market have equal size, ie, if $Si = 1/n$, $GRS = 1/n$, and (3) it gives a more accurate measure of market concentration.

$$GRS = \sum_{i=1}^n ((n^2s_i + 0.3S_i^2) / (n^2 + 0.3nS_iS_i)) S_i$$

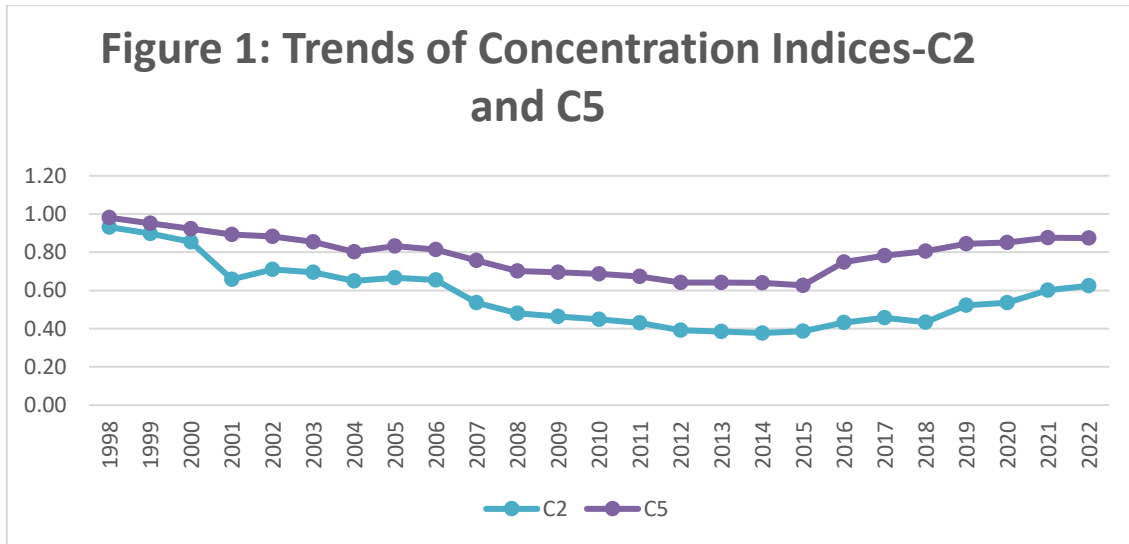
4. Empirical Results

We have calculated seven concentration measures to understand the market structure and competitiveness in the telecom industry. The number of firms in the telecom industry increased from 19 to 73 from 1998 to 2022 (given in Table 1).

In the initial years the telecom industry was controlled by the incumbent firms such as VSNL (later taken over by Tata telecommunications), and MTNL, which resulted in duopoly in the market. In the beginning of 20th century, the department of telecom owned company known as BSNL came to force and controlled more than 50 percent of the market share. The changes in the policies, especially the National Telecom Policy 1999 led to a new licensing policy and reduction in the spectrum charges which ushered in the entry

of private firms to the industry. This made the companies like Bharati Airtel, Reliance communications, Tata communications, Vodafone India and Ideal cellular to entry into the telecom service field.

Figure 1: Trends of Concentration Indices-C2 and C5



Source: Calculated from CMIE Annual financial statement

In the diagram, we observe a sudden fall in C2 in the year 2001, unlike in the case of C5. The reason is that corporatization of the Department of telecommunication to BSNL led to the distribution of market share to more than two firms. Thus, the trend in the largest 5 firms has not changed. The analysis shows that around 80% of the market share is still controlled by the top 5 firms in the industry where half of that is controlled by the leading two firms. The concentration ratios of the largest firms declined from 1998 to 2015 which implies that the market share was distributed to more than two firms. Post 2015, there is an upward trend in the concentration indices. This is mainly associated with the entry of Reliance Jio and merger of VI (Vodafone – Idea) and Tata Teleservices Ltd with Bharti Airtel.

Table 1: Concentration Measures

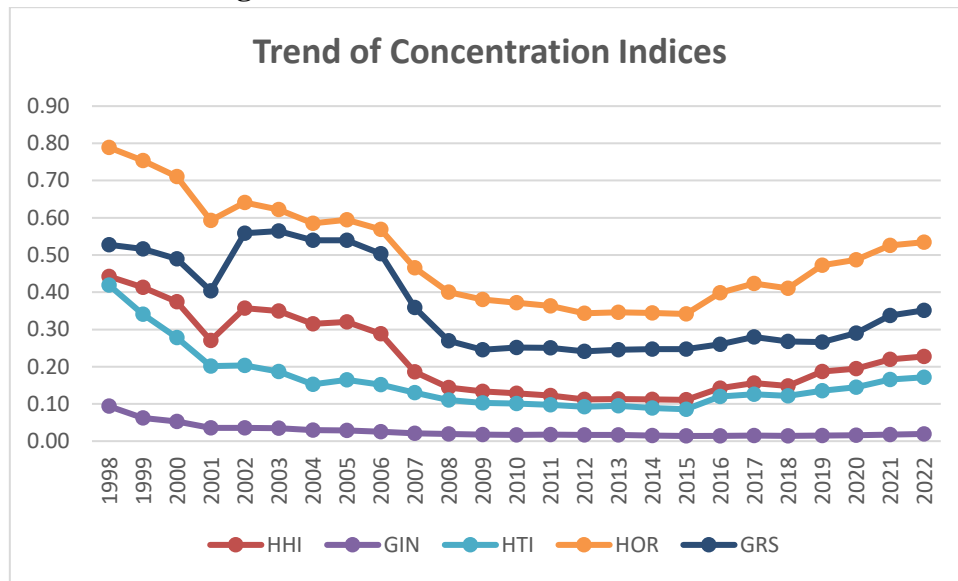
Concentration Measures								
Year	Number of firms	C2	C5	HHI	GIN	HTI	HOR	GRS
1998	19	0.93	0.98	0.44	0.09	0.42	0.79	0.53
1999	27	0.90	0.95	0.41	0.06	0.34	0.75	0.52
2000	31	0.85	0.92	0.37	0.05	0.28	0.71	0.49
2001	40	0.66	0.89	0.27	0.04	0.20	0.59	0.40
2002	50	0.71	0.88	0.36	0.04	0.20	0.64	0.56
2003	53	0.69	0.85	0.35	0.03	0.19	0.62	0.56
2004	57	0.65	0.80	0.32	0.03	0.15	0.58	0.54

2005	61	0.67	0.83	0.32	0.03	0.16	0.59	0.54
2006	63	0.65	0.81	0.29	0.03	0.15	0.57	0.50
2007	65	0.54	0.76	0.19	0.02	0.13	0.47	0.36
2008	65	0.48	0.70	0.14	0.02	0.11	0.40	0.27
2009	71	0.46	0.69	0.13	0.02	0.10	0.38	0.25
2010	74	0.45	0.69	0.13	0.02	0.10	0.37	0.25
2011	68	0.43	0.67	0.12	0.02	0.10	0.36	0.25
2012	72	0.39	0.64	0.11	0.02	0.09	0.34	0.24
2013	73	0.38	0.64	0.11	0.02	0.10	0.35	0.25
2014	83	0.38	0.64	0.11	0.01	0.09	0.34	0.25
2015	87	0.39	0.63	0.11	0.01	0.09	0.34	0.25
2016	88	0.43	0.75	0.14	0.01	0.12	0.40	0.26
2017	89	0.46	0.78	0.16	0.01	0.13	0.42	0.28
2018	88	0.43	0.80	0.15	0.01	0.12	0.41	0.27
2019	85	0.52	0.84	0.19	0.02	0.14	0.47	0.27
2020	82	0.54	0.85	0.19	0.02	0.14	0.49	0.29
2021	83	0.60	0.88	0.22	0.02	0.17	0.53	0.34
2022	73	0.62	0.87	0.23	0.02	0.17	0.53	0.35

Source: Calculated by the author from CMIE Annual financial statements, various years

From Table 1, Concentration 2 and concentration 5 (C2 and C5) measure the market share of largest firms. These two indices explain that in the beginning the market was controlled by two firms, however, it has come down mainly since 2001. Other than C2 and C5, we have calculated five concentration measures. Even though these measures are showing a similar trend, there are marginal differences among the indices. In a general trend, we can observe that there exists high competition in the market from 2008 to 2018 (as shown in Figure 2). The HHI shows that a moderate level of competition existed during this period. From the literature, GRS is an ideal index to measure the market concentration (Mishra, Mohit, & Parimal, 2011). Our analysis shows that there is a gradual decline from 2006 to 2019, this suggests that the market concentration in the Indian telecom industry has changed drastically from 2005 to the entry of Jio in the market. The entry of Reliance Jio with the predatory pricing policy forced other firms to either exist or merge with competitors.

Figure 2: Trend of Concentration Indices



Source: Calculated from CMIE Annual financial statement

5. Conclusion

In the Indian telecommunication industry, the market structure has changed mainly because of the policy initiatives. In the pre-reform period, the sector can be characterized as a government monopoly, the poor performance of the sector with huge waiting lines, low quality of services and high prices lead to the privatization of the sector. A duopoly structure was introduced in the circle base in the early post reform period between a government enterprise and a private enterprise. Initially the private firms were not able to compete with the public firms mainly because of the huge sunk cost involved in the production process. As better technologies were adopted by private firms, their position improved over the year. This leads to the introduction of oligopoly market situation in the sector.

The market concentration measures showing an increase in competition in telecom industry especially from 2006 to 2018. The general trend has been captured by all the concentration indices. The GRS index is considered as an ideal index which indicates a moderate level of competition compared to other indices. The telecom service sector contains both basic cellular services and internet services, even though these two firms have large numbers of firms in the industry, the market is controlled by a few among them as shown using the C2 and C5 ratio. The latest data indicates that the top two firms control more than 60 percent and the top five have captured 87 percent of the market share. As far as the telecom industry is concerned, a moderate level of competition exists with the oligopoly market structure.

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