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A study of the financial health of the telecom sector

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Working Paper 380

**A Study of the Financial Health of
the Telecom Sector**

Rajat Kathuria

Mansi Kedia

Richa Sekhani

June 2019



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Abbreviations

AGR	Adjusted Gross Revenue
ARPU	Average Revenue per User
CAPM	Capital Asset Pricing Model
COAI	Cellular Operator Association of India
DFL	Degree of Financial Leverage
DOL	Degree of Operating Leverage
DOT	Department of Telecom
EBIT	Earnings before Interest and Tax
EBITDA	Earnings before Interest, Taxes, Depreciation and Amortization
EMF	Electro Magnetic Frequency
FCF	Free Cash Flow
FDI	Foreign direct investment
GDP	Gross Domestic Product
GST	Goods and Service Tax
HHI	Herfindahl–Hirschman Index
ICR	Interest Coverage Ratio

IFRS	International Financial Reporting Standards
ITU	International Telecommunication Union
LSAs	Licensed Service Areas
MoCA	Ministry of Corporate Affairs
MoU	Minutes of Use
OTT	Over the Top
PAT	Profit after Tax
PBT	Profit before Tax
ROCE	Return on Capital Employed
ROE	Return on Equity
SUC	Spectrum Usage Charges
TRAI	Telecom Regulatory Authority of India
TSPs	Telecom Service Providers
WACC	Weighted Average Cost of Capital

Abstract

India's telecom sector is one of the largest and fastest growing networks across the globe. The increase in subscriptions has been nothing short of dramatic. Increasingly consumers are using phones to decrease transaction costs, access information and become more productive. Data price has fallen, while data consumption per subscriber per month has increased dramatically. While growth has been robust, the financial health of operators has become less rosy especially after the entry of Reliance Jio in the industry. There can be no denying the fact that a strong financial condition of the sector is desirable not only for its own sake, but for the sake of creating a robust platform on which other businesses can participate and thrive. Accordingly, this paper looks at trends across the industry, attempting to take stock of sectoral health through an examination of financial metrics by evaluating profitability and viability on the basis of revenue, cash flows, asset utilization, operating margins, return on equity/ capital employed and degree of leverage for the period 2011-2018. When measured for all operators, the sector appears to have experienced a slowdown in the rate of growth in revenue, especially towards the latter years of our analysis. Addressing regulatory burden and boosting infrastructure investment is important for the industry to remain competitive.

Key words: *Telecom Sector, Financial Analysis*

JEL classification: *L96, H83*

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A Study of the Financial Health of the Telecom Sector¹

Rajat Kathuria, Mansi Kedia and Richa Sekhani

1. Introduction

1.1 Sectoral Background

India's telecom sector is one of the largest and fastest growing networks across the globe. The increase in subscriptions has been nothing short of dramatic. Overall teledensity has increased from about 1 percent in 1994 to 91.45 percent in December 2018². Cumulative foreign direct investment (FDI) inflows have increased from a paltry US\$ 177.69 million in 2000 to US\$ 32.82 billion in March 2019³. The rise of mobile phones has contributed greatly to the Indian economy in terms of consumer benefit, employment, revenue generation and gross domestic product (GDP). The achievements can be attributed to a combination of factors, including private sector participation, technological innovations and an enabling institutional and regulatory environment. Besides, India has the inherent advantage of being endowed with a large addressable market. Increasingly consumers are using phones to lower transaction costs, access information and improve productivity. This is especially true since the launch of Reliance Jio in September 2016 that brought down data prices from Rs. 180 per GB in September 2016 to Rs. 10.52 per GB in December 2018⁴. During the same period, data consumption exploded from 239 MB to 8.74 GB per subscriber per month⁵. The distribution of mobile connections across rural and urban areas indicates that operators have increased their focus towards rural areas, although the gap remains significant. (*Figure 1*)

¹ We would like to thank Professor Sanjay Dhamija and Mr. Mahesh Uppal, for their invaluable comments. We are also thankful to all industry stakeholders for their inputs and data without which this analysis would not have been possible.

² TRAI Performance Indicators Report, December 2018

³ https://main.trai.gov.in/sites/default/files/PIR_04042019_0.pdf Accessed on April 4th, 2019

⁴ Cumulative FDI over time (Source: DIPP);

https://dipp.gov.in/sites/default/files/FDI_Factsheet_27May2019.pdf

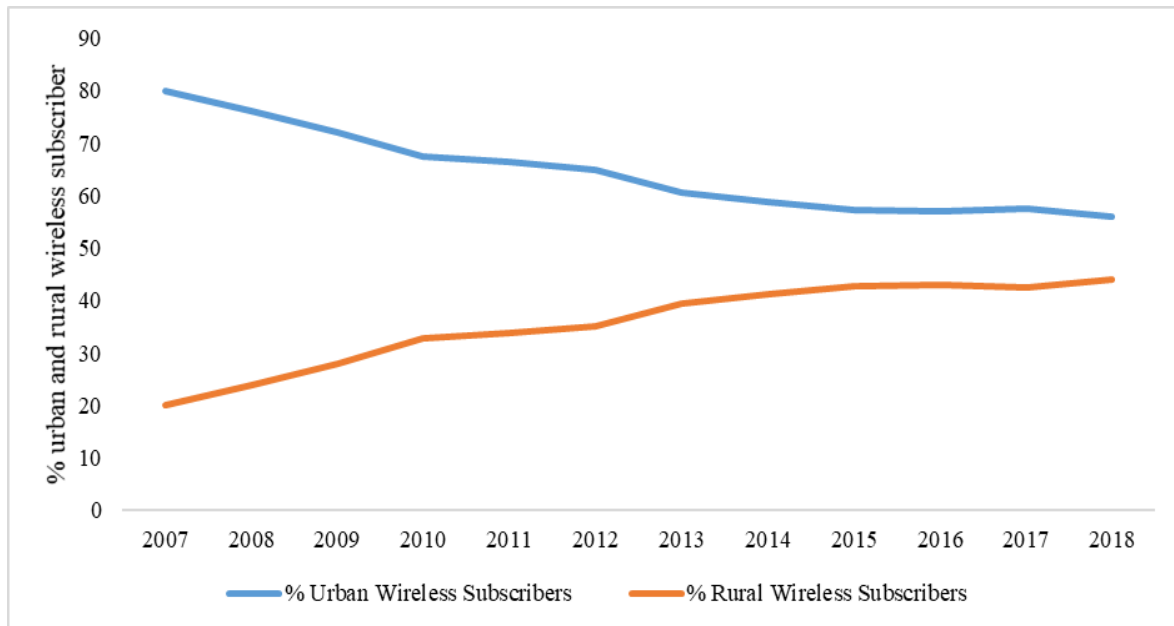
⁵ TRAI Performance Indicators Report September 2016 and December 2018

https://main.trai.gov.in/sites/default/files/Indicator_Reports_Ending_Sep_30122016.pdf and

https://main.trai.gov.in/sites/default/files/PIR_04042019_0.pdf Accessed on April 4th, 2019

⁵ *Ibid*

Figure 1: India's Narrowing Digital Divide - Percentage Share of Rural and Urban Customers in Total Wireless Subscriber Base over time



Source: Telecom Regulatory Authority of India (TRAI) Performance Indicator Reports

While growth has been robust, the financial health of operators has suffered. The disruption caused by Reliance Jio amplified financial stress for operators. As per TRAI, revenues of telecom operators declined by 3.43 per cent in the September-December 2018 quarter, on a year-on-year basis. Analysing the sector's revenue and costs based on the emerging demand and supply patterns can better inform policy for India's grand digital ambitions. Accordingly, this paper looks at trends across the industry, attempting to take stock of sectoral health through an examination of financial metrics. A strong financial condition of the sector is desirable not only for its own sake, but for the sake of creating a robust platform on which other businesses can participate and thrive. The following sub-sections provide details on operator profiles and the period of analysis used in this paper including a discussion on the changing nature of competition in the industry.

1.2 Operator Profiles

This paper covers both private and public sector operators of the Indian wireless market and is therefore representative. The analysis duly recognizes the diversity among operators due to technology, nature (public or private), length of operations and scope of services. To ensure that the heterogeneity across operators is not masked by averaging, we also attempt to bring out idiosyncrasies that may reflect underlying structural differences. We do this by way of presenting weighted averages and the corresponding range of values to indicate if the impact of any operator might be outsized for that category⁶. Industry wide averages are presented in all cases to indicate overall sector trends. Financial data for operators was obtained from

⁶ Graphs and tables presenting operator specific data are in the annexures to the report.

publicly available annual reports and financial statements wherever possible. For some operators' data was shared privately under non-disclosure arrangements. Accordingly, operator identifications have been withheld in the analysis. Moreover, the number of operators are not uniform across years, due to the entry and exit of firms and instances of consolidation in the sector.

Table 1: Operator Profiles (Wireless + Wireline Operations) as of December 2018⁷

	Subscribers (Millions)	Area of Operation	Market Share
Bharti Airtel⁸	344.30	All India	28.74
Vodafone Idea Limited*	419.03	All India	34.98
Reliance Jio	280.12	All India	23.38
BSNL (Post Corporatization)	125.81	20 Circles	10.50
Reliance Communications	0.78	All India (except Assam and North East)	0.07
Tata⁹	20.86	19 Circles	1.74
MTNL	6.74	2 Circles	0.56
Quadrant	0.23	1 Circle	0.02
Total	1197.87		

1.3 Period of Analysis

Our analysis focuses on the seven-year period between 2011 and 2018. 2011 is a good starting year for at least two reasons. One, because in February 2011 Indian Accounting Standards were changed by the Ministry of Corporate Affairs (MoCA) to align with the International Financial Reporting Standards (IFRS). And two, a new regime became applicable in which spectrum was delinked from licenses and acquisition was well and truly determined by an auction process. Thus the new licensing framework envisioned in the National Telecom Policy of 2012 makes for a good starting point for the data analysis¹⁰.

During this period (March 2011 to March 2018), total subscribers increased at an annual compounded rate of 4.03 percent and mobile subscribers increased at a compounded annual growth rate of 5.5 percent. Average Revenue per User (ARPU) declined steadily while Minutes of Use (MoU) and data consumption increased rapidly (Please refer to *Figure 2* and *Figure 3*)

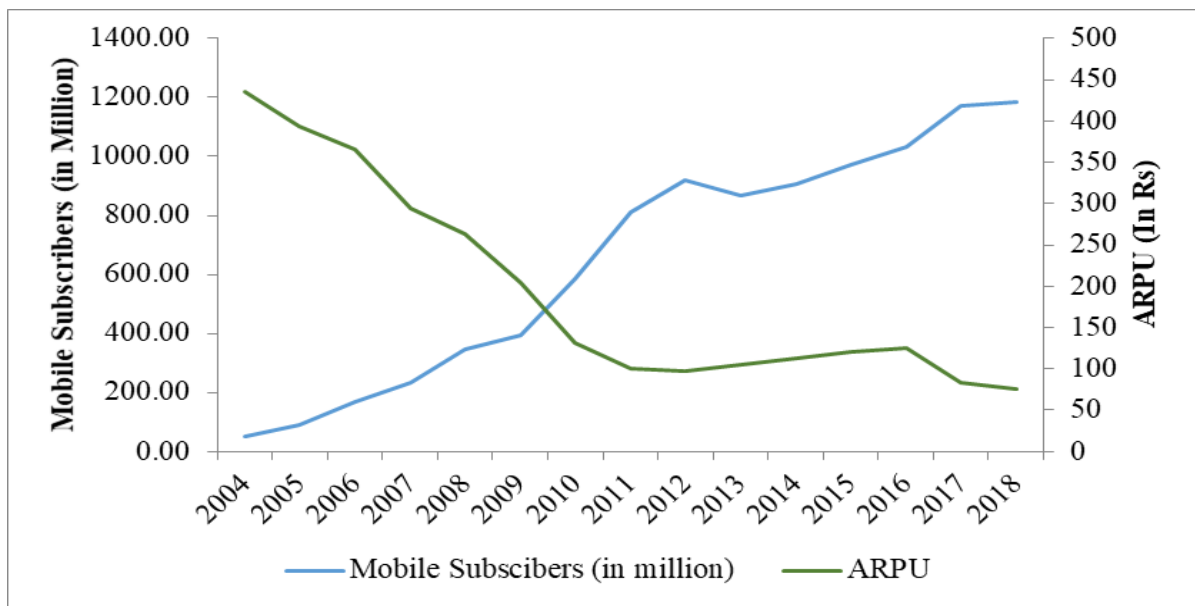
⁷ *Videocon is not included in our analysis from 2014-15 onwards. M/s Vodafone and M/s Idea have been merged during the QE September, 2018 and the new name of the company is M/s Vodafone Idea Ltd. For our analysis we treat them separately. Airtel has shutdown and filed for bankruptcy recently.*

⁸ Bharti Airtel acquired Telenor.

⁹ This report uses data from publicly available documents for "Tata Teleservices".

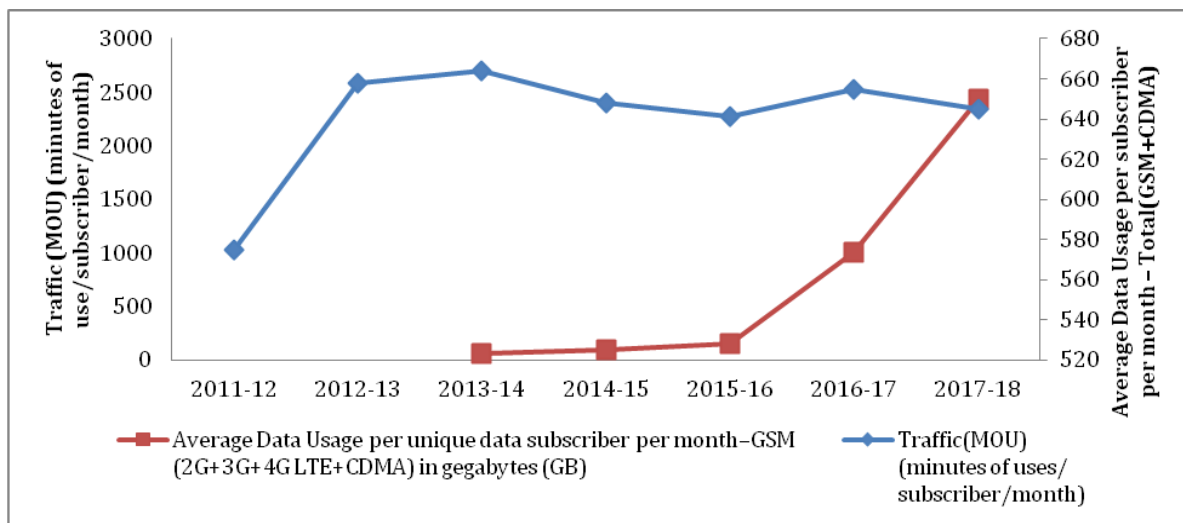
¹⁰ National Telecom Policy-2012 and Unified Licensing Regime <http://www.pib.nic.in/newsite/mbErel.aspx?relid=84612>

Figure 2: Change in Subscribers and ARPU



Source: TRAI performance Indicator Report

Figure 3: Change in Minutes of Use (MoU) and Data Consumed



Source: TRAI Performance Indicator Reports

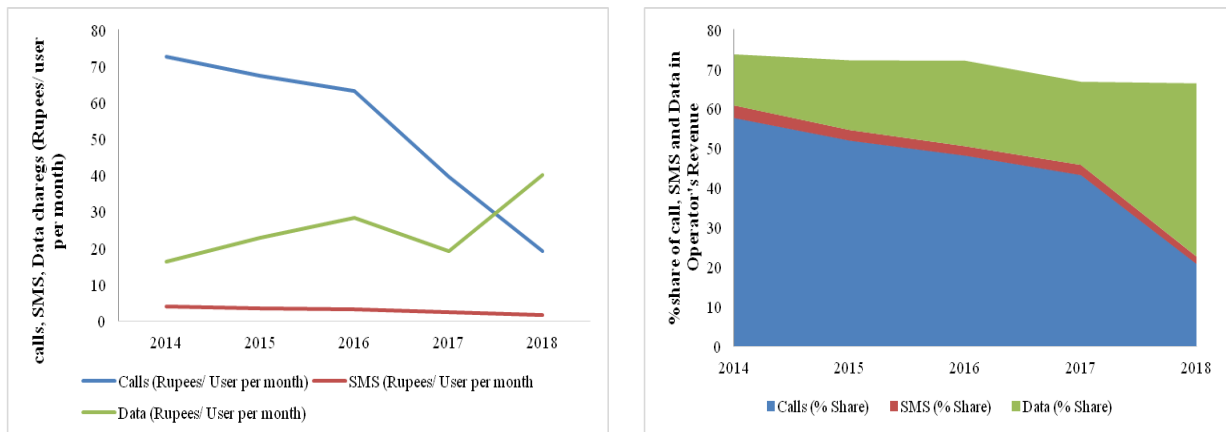
Publicly available reports for large operators show that data customers are increasing as a percentage of total customers¹¹, as is the intensity of data usage per customer over the last two years. As a result share of data ARPU has been rising for the last two years¹² even as revenue realization per megabyte has declined¹³.

¹¹ Users that also avail of data services – either 2G or 3G.

¹² Whether these services offer a “true” alternative in terms of defining the market for communications services is currently unclear.

¹³ While realization per MB could fall, consumption could increase disproportionately because of services that use high quantity of bandwidth, say videoconferencing.

Figure 4: Changing Components of Operator Revenue



Data Source: TRAI

1.4 Status of Competition

Reforms that came aligned with India's liberalisation efforts in the 1990s catalysed the first wave of competition and innovation in India's telecom industry. At its peak in 2013, a total of 15 operators were providing services in India. The recent entry of Reliance Jio led to consolidation in India's hyper competitive telecom market by weeding out inefficient and loss making operators. The fight for supremacy in the market today is a cornered contest among dominant private sector operators - Airtel, merged entity Vodafone Idea and the Schumpeterian Reliance Jio. The market structure captured by the Herfindahl–Hirschman Index (HHI) reflects an increased fight for market share between 2004 and 2012. The recent consolidation has triggered an increase in HHIs as reflected by the estimates for 2018, although the absolute levels of HHI are arguably still within the bounds that are adequate.

The HHI uses the size distribution of firms in relation to the industry to calculate the index. For a market comprising n firms, the index is determined as the sum of the squares of the market shares of all firms in the industry

$$HHI = s_1^2 + s_2^2 + s_3^2 + \dots + s_n^2 \text{ (where } s_i \text{ is the market share of the } i\text{th firm, where } i \text{ goes from 1 to } n\text{)}$$

The change in HHI over time is outlined in *Table 2*.

Table 2: HHI Levels over time across Service Areas (Wireline + Wireless)

State	HHI 2004	HHI 2007	HHI 2012	HHI 2018	States	HHI 2004	HHI 2007	HHI 2012	HHI 2018
Delhi	3071	2506	1593	1927	Punjab	3645	2545	1542	1926
Mumbai	2865	2452	1208	2002	Rajasthan	3209	2789	1764	2141
Kolkata	4471	2659	1387	1962	UP(E)	4898	3090	1494	1689
Andhra Pradesh	2396	2636	1616	2003	UP(W)	3485	2476	1441	1807
Gujarat	2813	3063	1723	1910	WB	5238	2519	1571	2590
Maharashtra	5093	2391	1516	2061	Assam	5774	2552	2078	2137
Karnataka	5314	3162	1589	2129	Bihar	5000	3507	1448	2073
TN (including Chennai)	2689	2700	1667	1839	Himachal Pradesh	4341	3724	1741	2599
Haryana	2725	2377	1507	1881	Jammu & Kashmir	10000	4570	2258	2338
Kerala	2559	2644	1568	2143	North East	5522	2730	2137	2301
Madhya Pradesh	2816	2427	1868	2497	Orissa	5218	2924	1497	2117

Source: Author calculations using TRAI Data

The rest of the paper is organised as follows. Section 2 examines the financial health of the sector and includes analyses on revenue, expenditure, leverage, profitability, return on equity and the impact of expenditure on spectrum. Section 3 looks at the regulatory costs borne by the sector as well as costs of spectrum. Section 4 concludes. Finally, a word of caution - given the technologically dynamic nature of the telecom sector, it is important to distinguish between messages from the analysis that are transient and lessons that stand the test of time and are therefore relevant for policy design. We elaborate ahead

2. Financial Analysis

This section focuses on assessing several dimensions of the industry's financial health using standard metrics. This includes profits, cash flows, asset utilization, operating margins, return on equity/ capital employed and degree of leverage. We use standard theories of finance such as the Du Pont analysis to deconstruct components of firm performance. The evaluation is contextualized with significant events in the industry such as spectrum auctions, change in the level of competition and other disruptions driven by technology.

2.1 Revenue Analysis

Revenue

Total Revenue and Earnings before Interest, Taxes, Depreciation and Amortization (EBITDA) form part of the revenue analysis. Total revenue for firms includes service revenue as well as revenue earned from other sources (sale of investment, lease rentals, etc.). Service revenue is the main source of revenue for all operators. EBITDA analysis assesses the sufficiency of firm revenue to meet operating expenditure, which includes variable and some proportion of fixed costs.

The entry of Reliance Jio represents a watershed moment in the recent history of the industry. Most operators have seen a decline in revenue, following the launch of 4G services by Reliance Jio. There is of course marked variation in individual operator revenues reflected in the divergence between the high and low.¹⁴ Table 3 shows that industry revenue growth, both simple and weighted average has decreased over time. Operator wise revenue is provided in *Annexure 5.1*. The steep rise in data usage and subscribers has been accompanied by a decline in price resulting in a decline in Average Revenue per User (ARPU) along with a decline in overall industry revenue in recent years. *Figure 5* and *Table 3* show the declining trend.^{15 16}

Figure 5: Revenue – Industry

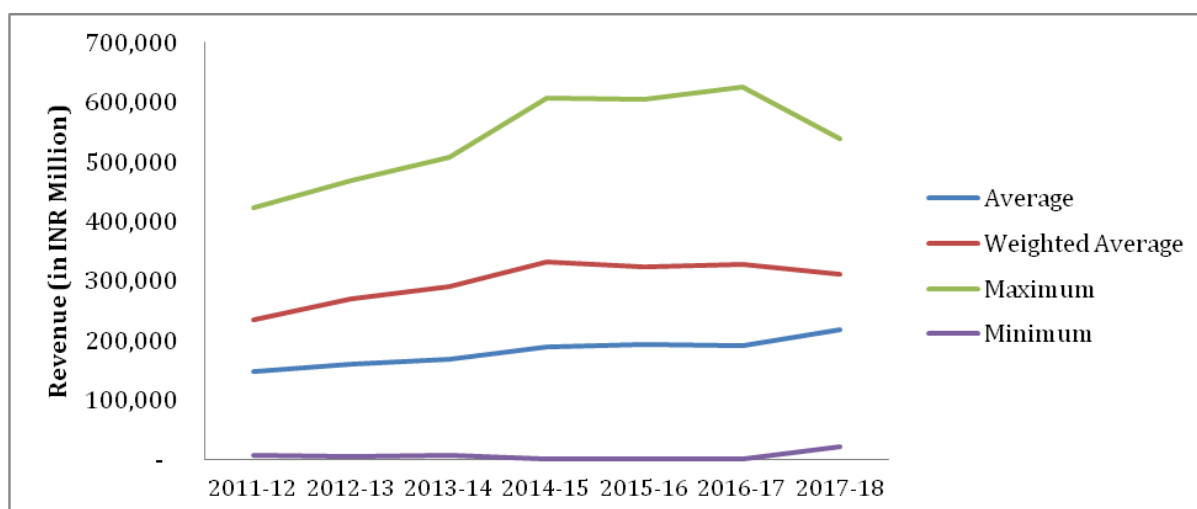


Table 3: Growth Trends in Industry Revenue

Year	Average	Subscriber Weighted Average ¹⁷	For Operator with Maximum Revenue	For Operator with Minimum Revenue
2012-13	5.56	10.42	56.63	-38.31
2013-14	8.26	6.05	45.56	-5.79
2014-15	12.88	13.59	37.10	-10.52
2015-16	2.31	2.18	13.39	-7.38
2016-17	-10.56	-7.21	5.35	-68.71
2017-18	-29.08	-14.02	-12.27	-75.63

EBITDA

The Earnings before Interest, Taxes, Depreciation and Amortization (EBITDA) indicates operating profit of a company since it represents net income prior to the effect of financing decisions and accounting practices. For capital-intensive industries mostly financed through

¹⁴ For representations across groups and industry operators see *Annexure 5.1: Revenue – By Operator*

¹⁵ For any given year we use data for minimum 8 operators, including the public sector service providers. Given the recent trends in consolidation, data for the same set of operators was not available for every year over the period of analysis.

¹⁶ Weighted by Subscriber Numbers

¹⁷ Weighted average results from the multiplication of each component by a factor (subscribers)

debt, EBITDA is a useful metric to evaluate operational viability in the long run. Healthy EBITDAs indicate operational feasibility and operations that have achieved scale. In case of new entrants, it is expected that EBITDAs will be negative initially as revenues are insufficient to cover high upfront fixed costs.

EBITDAs vary significantly across operators. This is visible in the wide range for EBITDA and EBITDA margins in Figure 6: EBITDA - Industry and Table 4: EBITDA Margins – Industry. The average EBITDA weighted by subscribers is noticeably higher than the simple average, indicating a skew towards operators with larger subscriber numbers. At the same time, the negative EBITDAs of loss making operators are hidden by the industry average. For representations of EBITDA for each operator and across operator groups, see Annexure 5.2: EBITDA – By Operator. We have omitted operators with negative EBITDAs in the calculation of averages and range for EBITDA margins to avoid arithmetical errors. While EBITDA margins help understand operating profitability, negative EBITDA already reflect operational infeasibility of the operator. There are at least 3 operators with negative EBITDAs in all years.

Figure 6: EBITDA – Industry

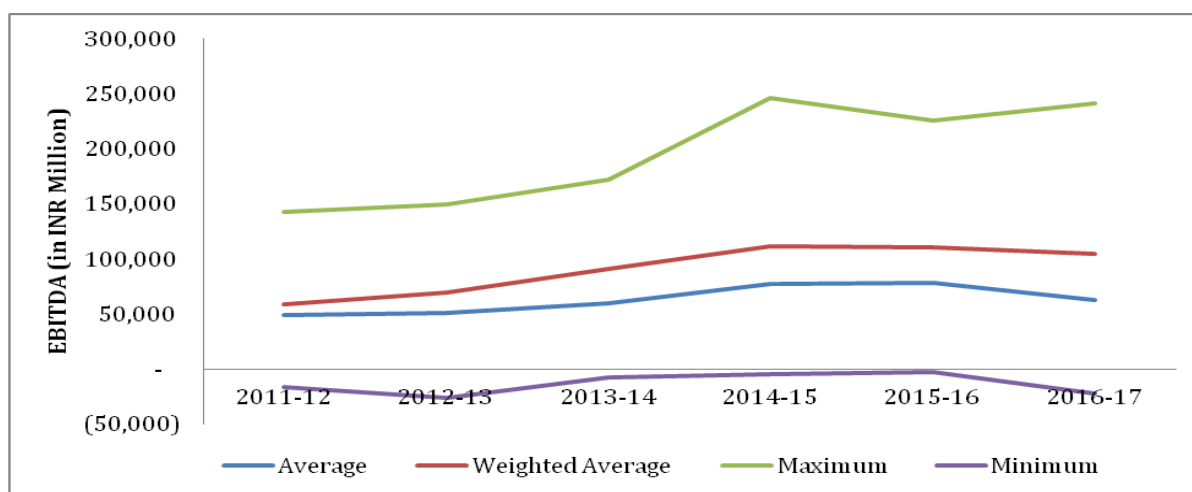


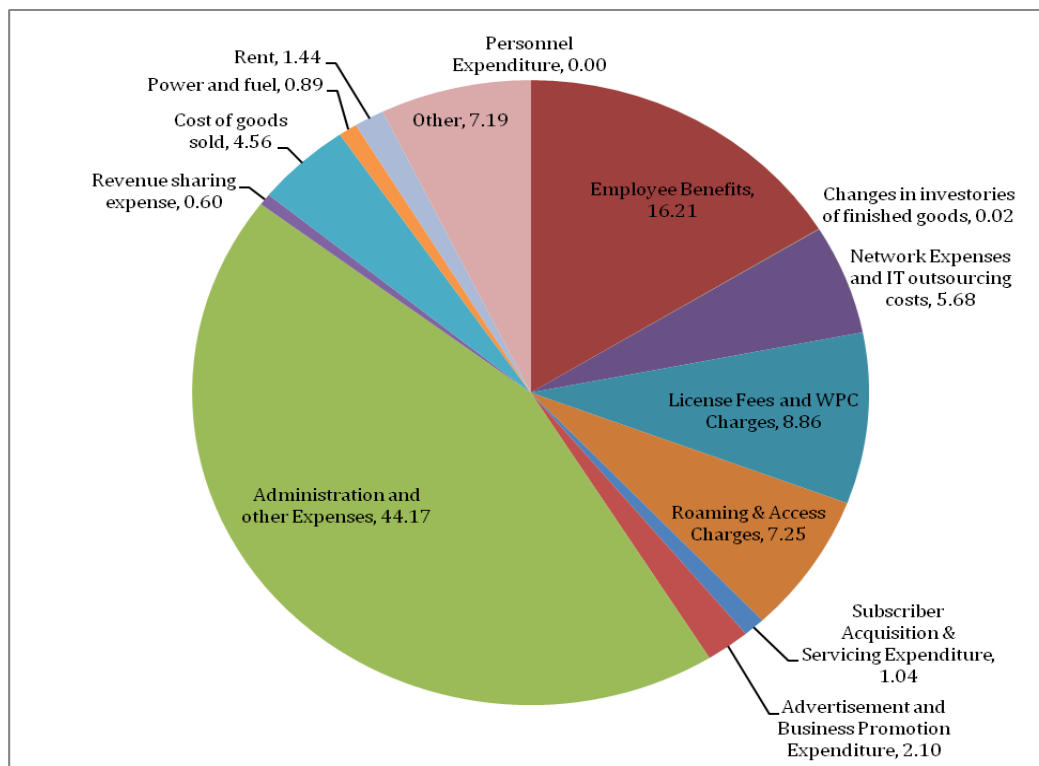
Table 4: EBITDA margins – Industry

	Average	Weighted Average	For operators with Maximum EBITDA Margin	For operators with Minimum EBITDA Margin
2011-12	0.31	0.25	1.10	0.02
2012-13	0.18	0.22	0.33	0.01
2013-14	0.20	0.25	0.34	0.07
2014-15	0.21	0.26	0.41	0.02
2015-16	0.23	0.26	0.37	0.09
2016-17	0.17	0.23	0.39	0.05
2017-18	0.24	0.27	0.34	0.12

2.2 Expenditure Analysis

Expenditure analysis is also important to evaluate operational efficiency of firms. Items of expenditure and their percentage contribution to total cost in the profit and loss account indicate the level of optimization firms achieve over a period of time. Items of expenditure from the profit and loss statements have been reorganised to fall under comparable heads. Average expenditure over the period of analysis finds that administration and other expenses and employee benefits together comprise over half of total expenditure.

Figure 7: Components of Total Expenditure (7 Year Average across Operators)

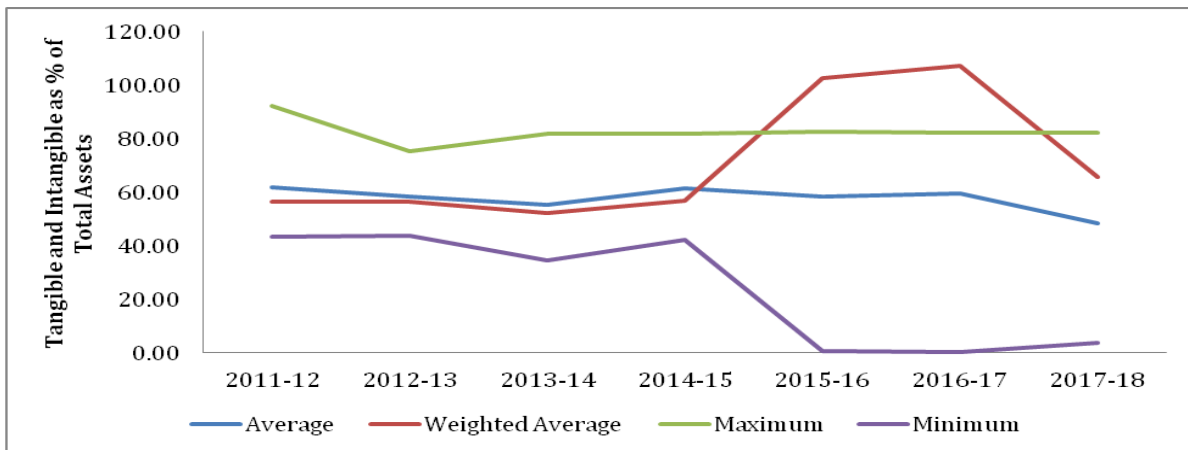


For some categories, expenditure share as a percentage of revenue vary widely across operators. For example, Network Expenses and IT outsourcing costs range from 2.38% to 39.75%. Similarly, roaming and access charges vary between 7.25% and 35.03% (See *Annexure 5.3: Operator Expenditure as a Percentage of Revenue*). Some of these shares have declined over time while others show very little variation. However, we find that total expenditure for most operators declined in 2014-15 and 2015-16 and increased thereafter. Trends are a bit different for the new entrant.

2.3 Assets, Depreciation and Amortization

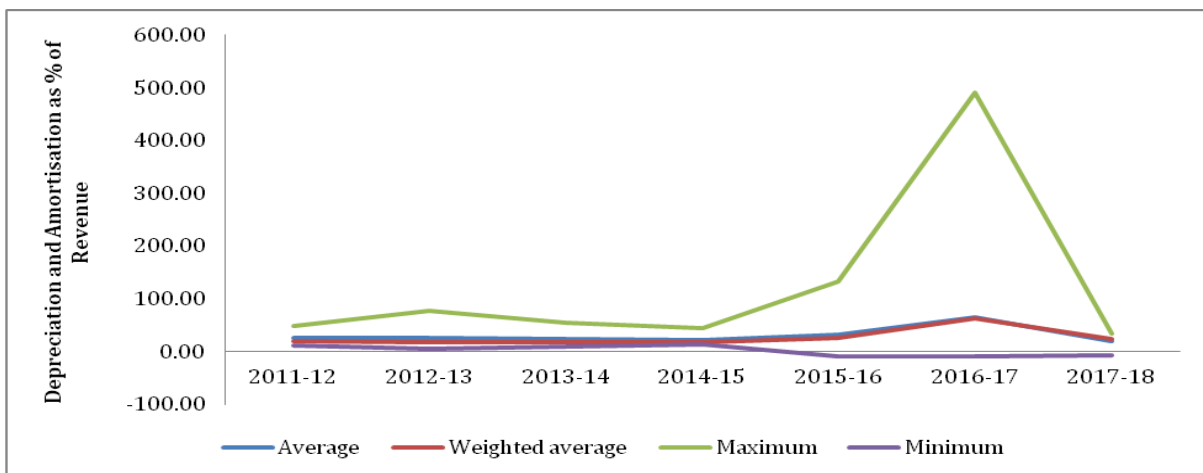
Telecom service provision requires high up-front investments in network infrastructure, equipment and radio spectrum. This is visible in the share of tangible and intangible assets as a percentage of total assets for all operators. Tangible assets include the cost of acquisition of physical infrastructure and investments for upgradation of existing assets. Intangible assets include license fees, spectrum costs and software purchase.

Figure 8: Tangible & Intangible Assets as % of Total Assets – Industry



The share of tangible and intangible assets is uniformly high across operators. However, some have witnessed a drastic decline. The decline is likely on account of firms exiting the industry. Capital-intensive businesses such as telecom services incur significant depreciation and amortization (D&A) costs on account of their investments in physical infrastructure and intangibles such as radio spectrum. Most operators adopt the straight-line method for depreciation – the value of the asset is amortized into equal parts over the life of the asset. We find that D&A is significant when viewed as a share of total revenues (although these values vary significantly across different operator groups).

Figure 9: Depreciation & Amortization as % of Revenue - Industry



The significant sale of tangible and intangible assets during a particular year, also result in a huge variation in depreciation estimates for some operators. (See also Annexure 5.4: Depreciation & Amortization-Operators).

2.4 Debt Analysis

Rising levels of leverage is definitely the biggest challenge facing the sector today. The burden of interest payments and the need to finance investments are weighing down growth.

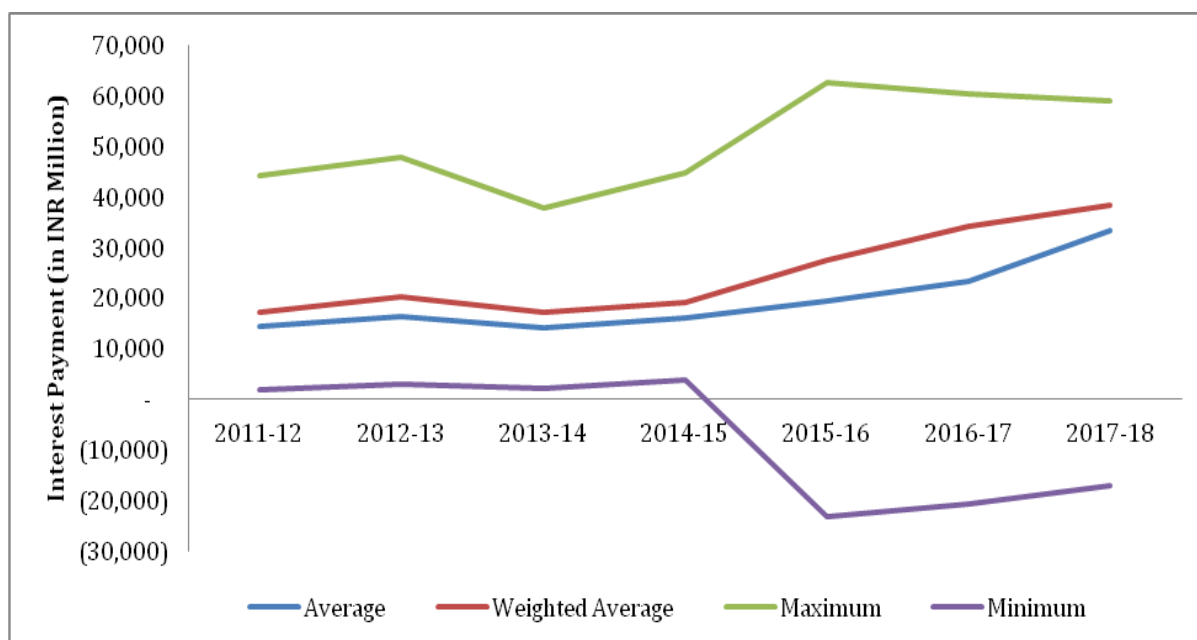
We examine the industry status by analysing financing costs, debt/equity ratios, interest coverage ratios and cash flows to provide a holistic view of leverage.

Financing Costs

Telecom is a capital-intensive industry with upfront investment costs often met using a mix of debt and equity financing. For new entrants, these upfront investment costs are often met with fresh borrowings, resulting in high financing costs. Over our period of analysis, all operators have significantly invested in infrastructure, including spectrum acquisition and service delivery. Mounting debts for financing spectrum acquisition and other investments even as competitive pressure increases, has led to a rise in interest payments of most operators. In some cases, interest payments are higher than revenues¹⁸.

Interest payments are subtracted from Earning before Interest and Tax (EBIT) to arrive at Profit before Tax (PBT). For large operators, absolute financing costs are high, although in percentage terms these are higher for smaller operators. This is visible when comparing *Figure 10: Interest Payments – Industry* and *Figure 11: Interest Payment as a percentage of Revenue – Industry*¹⁹.

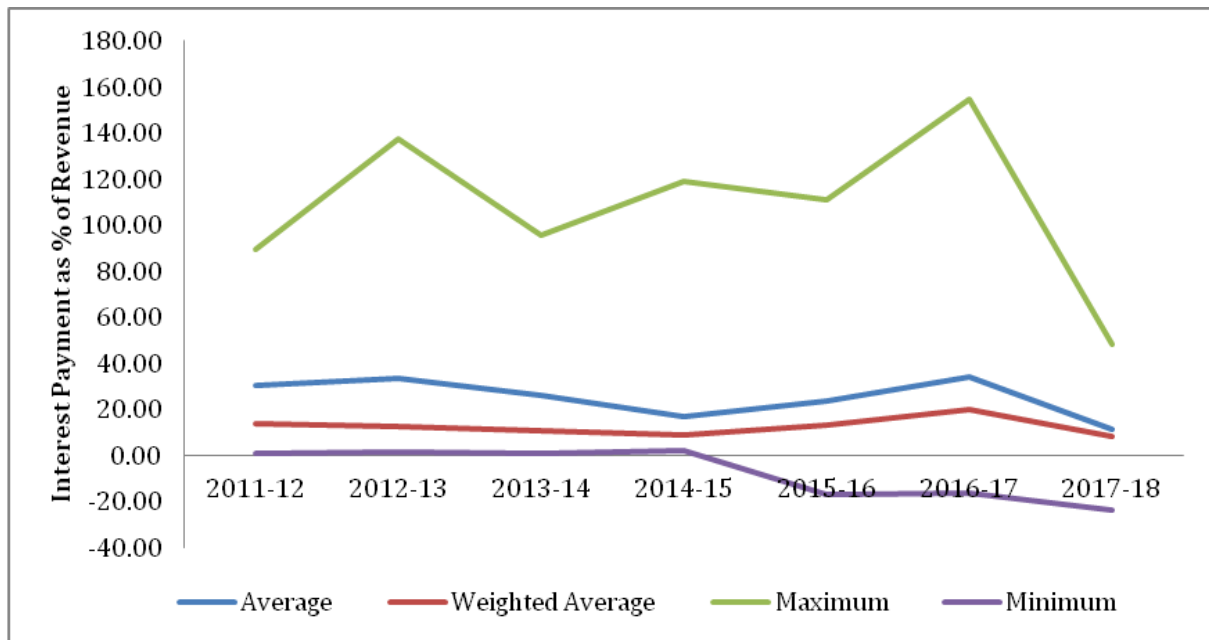
Figure 10: Interest Payments - Industry



¹⁸ One of the operators has showcased negative interest payment. A negative net interest means that interest received on investments is higher than that paid on loans.

¹⁹ See Annexure 5.5 5.5 Financing Costs (Interest Payments) – By Operator

Figure 11: Interest Payments as a % of Revenue – Industry



Debt/Equity Ratio

The Debt/Equity ratio (also known as “leverage”) indicates the relative proportion of debt and shareholders’ equity used to finance a company’s assets. The literature on optimal capital structure is rich and extensive and while there may not be an established benchmark to gauge what is optimal, it is generally accepted that increasing levels of debt increase the risk of bankruptcy²⁰.

To enable a meaningful analysis, we have not used ratios where equity values are negative. For the period under consideration, the average and weighted average estimates reflect a steady increase in leverage for most operators, with minor improvements since 2015-16 (*See weighted averages in Table 5: Debt/ Equity Ratio – Industry*). A debt burden of more than INR 5 million²¹ creates pressure on interest payments that are non-discretionary; especially when revenue streams have been imperilled because of technology and competition.

Elsewhere in mature industries, D/E ratios usually stabilise at reasonable levels. However, international comparisons of D/E ratios must be made with caution. Varying degrees of capital market development, interest rates, technological development and diffusion make comparisons infructuous and impractical for policy design. At the same time, firms with high levels of debt are not necessarily in poor financial health. (*See Table 6: Indicative D/E Ratios for Telecom Services sector in some Developed Markets*).

²⁰ Myers, S.C., and Majluf, N., 1984. Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics* 13, 187-221.

²¹ Total Debt across all the operators for 2017-18 is compiled for cumulative debt level of the Industry

Table 5: Debt/Equity Ratio - Industry

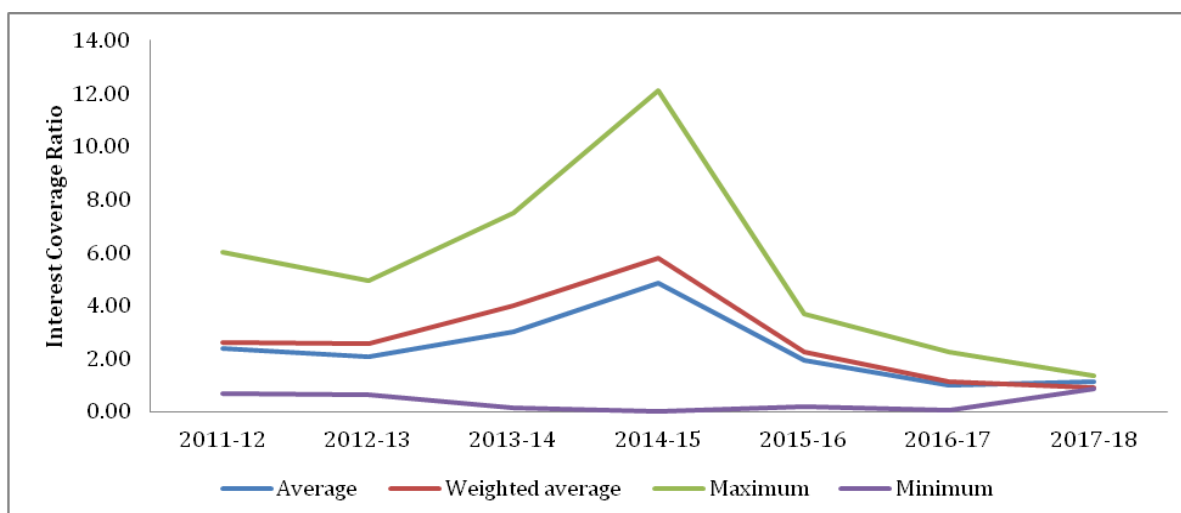
Debt/ Equity Ratio	Average	Weighted average	Maximum	Minimum
2011-12	5.39	4.17	16.99	0.43
2012-13	10.06	4.14	34.61	0.50
2013-14	3.18	2.74	8.58	0.43
2014-15	6.27	2.39	22.37	0.55
2015-16	2.18	2.35	6.17	0.35
2016-17	1.58	1.55	3.04	0.34
2017-18	2.04	1.49	5.01	0.48

Table 6: Indicative D/E Ratios for Telecom Services sector in some Developed Markets²²

Country/Region	D/E Ratio
United States	79.60%
Europe	85.88%
Japan	46.49%
Canada	40.67%

Interest Coverage Ratio

The Interest Coverage Ratio indicates the ability of a company to meet its interest payments on outstanding debt. It overlaps with the analysis on financing costs, but has complementary insights. For our analysis we have calculated the Interest Coverage ratio as the ratio of Earnings before Interest and Taxes (EBIT) to Financing Costs. We have not used ratios where interest coverage ratio is negative to enable a meaningful analysis.

Figure 12: Interest Coverage Ratio - Industry

The average for the industry is depressed considerably due to the presence of a few heavily indebted operators. An Interest Coverage Ratio (ICR) of less than 1 implies that EBIT is insufficient to cover repayment of interest and taxes. *Figure 12* shows a declining trend for

²² “Cost of Capital by Industry Sector” Datasets (for US, Europe and Japan), http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datacurrent.html;

ICR for the industry as a whole, since 2014-15. *Annexure 5.6 presents Interest Coverage Ratios by Operator reflecting the general inability among operators to service debt.*

Net Debt/ EBITDA is an alternate measure to the ICR Net Debt is calculated by subtracting cash and cash equivalents from long-term and short-term liabilities. Net Debt is also used as a metric to determine a business’s overall ability to pay off its debt. Our estimates of the Net Debt/ EBITDA ratio echo the findings of ICR above. *Table 7* reflects that debt repayment is a concern for many operators. As before, we have omitted operators with negative ratios.

Table 7: Net Debt/ EBITDA Ratio - Industry

Net Debt/ EBITDA	Average	Weighted average	Maximum	Minimum
2011-12	34.00	27.27	163.89	2.16
2012-13	77.22	46.95	423.89	2.25
2013-14	27.00	16.60	77.81	1.83
2014-15	17.65	12.92	39.28	1.96
2015-16	15.75	11.74	41.98	3.25
2016-17	29.74	19.94	94.69	3.71
2017-18	45.93	12.41	176.64	5.64

Unhealthy debt levels not only impact the stability of the telecom sector, it has adverse impacts on other sectors, especially the banking sector. As of November 2018, the banking sector has an exposure of Rs 906 billion in the telecom sector, which is grappling with financial distress illustrated above²³. Moreover, the year on year revenue growth of the industry has declined since 2016, while bank credit to the sector has increased. (*See Figure 13*). In such circumstances the probability of default is quickly magnified.

Figure 13: Revenue and Bank Credit Growth in the Telecom Sector



Source: Reserve Bank of India

²³ RBI Bulletin on Sectoral Deployment of Bank Credit in India. https://m.rbi.org.in/Scripts/BS_ViewBulletin.aspx?Id=18056

2.5 Cash Flows

Operating Cash Flow and Investing Requirements

Cash flow is an important determinant of a firm's financial health. It determines the ability of firms to utilize cash flows from operations to finance investments. All investments beyond what a firm is able to meet from its cash flows are financed through fresh borrowing or equity although there is evidence that firms also borrow to pay dividends to signal strength²⁴. For telecom the business model is such that it obviates the need to lock in cash for inventories and credit sales - in fact they benefit from supplier credit. This implies that cash flows are likely to be positive for operators that have achieved maturity in operations.

Table 8: Cash Flows over time in INR million – Industry

		Cash flow from operations (INR Million)	Cash flow from investing activities (INR Million)	Cash flow from financing activities (INR Million)
Average	2011-12	153997	-231063	32697
	2014-15	415581	-382589	111319
	2017-18	369197	-881954	354061
Weighted Average	2011-12	398705	-444309	-3227
	2014-15	825293	-654785	226071
	2017-18	717752	-1126186	712116
Maximum	2011-12	1143780	344764	252996
	2014-15	1793980	-12211	854438
	2017-18	1595430	397400	3304900
Minimum	2011-12	-307715	-1261180	-485900
	2014-15	-115688	-1280120	-519570
	2017-18	-263027	-3594900	-252800

The average and weighted average estimates of cash flow from operating activities is largely positive. Investments in tangible and intangible assets including spectrum acquisition explain the outflows for operators under investment activities. Cash flows from financing activities, including repayment and proceeds from borrowings, payments of dividend and interest, are positive for most operators. Tables containing operator specific cash flows in operating activities, investing activities and financing activities are provided in *Annexure 5.7 - Cash Flow by Operator*.

We combine cash flows from operating activities and investments in tangible and intangible assets to determine free cash flow (FCF). Free cash flows are useful in determining a firm's ability to make capital expenditure, not just to subsist but to grow. Free cash flows are determined using the formula.

$$\text{Free Cash Flow} = \text{Cash flows from operating activities} - \text{capital expenditure}$$

²⁴ Bostanci. F , Kadioglu.E and Sayilgan.G (2018). Determinants of Dividend Payout Decisions: A Dynamic Panel Data Analysis of Turkish Stock Market, International Journal of Financial Studies. Int. J. Financial Stud. 2018, 6, 93; doi:10.3390/ijfs6040093

Operators have also reported free cash flows in their annual reports. From our complete analysis on free cash flows for operators we find a mix of negative and positive outcomes. The averages and range are presented in *Table 9* below. In the latter years the average free cash flows are negative.

Table 9: Free Cash Flows in INR million – Industry

Free Cash Flows (INR Million)	Average	Weighted average	Maximum	Minimum
2011-12	(13,918)	99,587	973,240	(711,707)
2012-13	20,181	2,54,983	1,054,200	(686,204)
2013-14	123,856	3,39,569	1,213,870	(548,566)
2014-15	229,247	7,07,176	1,760,990	(343,481)
2015-16	(157,590)	66,808	1,142,920	(1,765,189)
2016-17	(375,658)	(3,31,645)	849,530	(3,858,475)
2017-18	(571,461)	(8,98,283)	(22,600)	(2,905,700)

Contribution Analysis for Spectrum Payments

In addition to cash flows, contribution margin analysis is another basis to determine an operator’s ability to finance investments, without fresh borrowings. This analysis is limited to private sector operators that have been in business for more than 15 years. Contribution margin for each operator has been calculated by subtracting expenditure per subscriber from service revenue per subscriber.²⁵ In the absence of a clear delineation of fixed and variable costs, we consider all items under operating expenditure to determine cost per subscriber. The result shows a squeeze in the average contribution margin for three incumbent private sector operators. The average contribution margin for these operators declined from Rs. 828 in 2014-15 to Rs 391 in 2017-18.

With declining contribution margin, the ability to finance say, spectrum payments that in 2015-16 summed up to almost Rs. 47,321 crores (following the auctions in February 2015) is curtailed. (See *Annexure 5.8: Contribution Analysis by Operator*). If interest payments are included, contribution margins will be further lower. It is imperative that a sustainable exit from the vicious cycle of borrowing more to invest is discovered.

2.6 Operating Leverage & Financial Leverage

Leverage is any method that amplifies firm profits or losses. Borrowed money can magnify profit i.e. financial leverage, or it can also describe the use of fixed assets to achieve the same goal i.e. operating leverage. Capital-intensive industries such as telecom run the risk of low profitability or high financing costs as they increase their leverage. The degree of operating leverage and financial leverage are both crucial to a firm’s performance.

²⁵ This calculation does not include income from other sources.

Degree of Operating Leverage & Financial Leverage

The degree of financial leverage (DFL) measures the sensitivity of a company's earnings to changes in operating income, as a result of changes in its capital structure. A high degree of financial leverage results in greater volatility in earnings - since interest is a fixed expense, higher debt increases the degree of financial leverage. When the going is good financial leverage can magnify returns-the opposite is true during slumps. Degree of Financial Leverage may be determined as follows -

$$DFL = \frac{EBIT}{PBT}$$

where EBIT is Earnings before Interest and Taxes
PBT is Profit before Taxes

Operating Leverage involves using a large proportion of fixed-to-variable costs in the operation of a firm. The higher the degree of operating leverage (DoL), the more volatile the EBIT figure will be to a change in sales (*ceteris paribus*). A rough measure of DOL may be determined using the ratio of the percentage change in EBIT to percentage change in revenue as follows -

$$DOL = \frac{\% \text{ Change in EBIT}}{\% \text{ Change in Revenue}}$$

In the case of telecom operators, negative PBT results in undefined ratios for DFL. When DFL equals 1, EBIT = PBT, implying no financing cost, in other words no leverage. We find that for most operator's average DFL is either negative or greater than 1 (*See Figure 14*). Negative DFL indicates quantum of borrowed funds in lieu of which interest payments exceed EBIT resulting in a negative PBT. For operators where DFL is greater than, there is some degree of leverage; higher the positive value of DFL, higher is the degree of leverage.

Average estimates for the degree of operating leverage (DOL) reflect better estimates for companies as compared to financial leverage. For all operators, barring one, DOL is less than 1²⁶ (*see Figure 15*). This means that for every percentage change in company sales, the operating income changes by less than one percent. (*See Annexure 5.9 – Degree of Operating and Financial Leverage*). This reduces the risk for firms in industries where revenues are declining. Generally, firms or industries with high operating risk tend to keep financial risk low. In India's telecom sector while financial risk is high, operating risk is mostly contained, with one exceptions where both financial and operating leverage are high.

²⁶ The Operating Leverage of 1 denotes that the EBIT level increases or decreases in direct proportion to the increase or decrease in sales level. This is due to fact that there is no fixed costs and total cost is variable in nature

Figure 14: Average DFL of the operators from 2011-2018

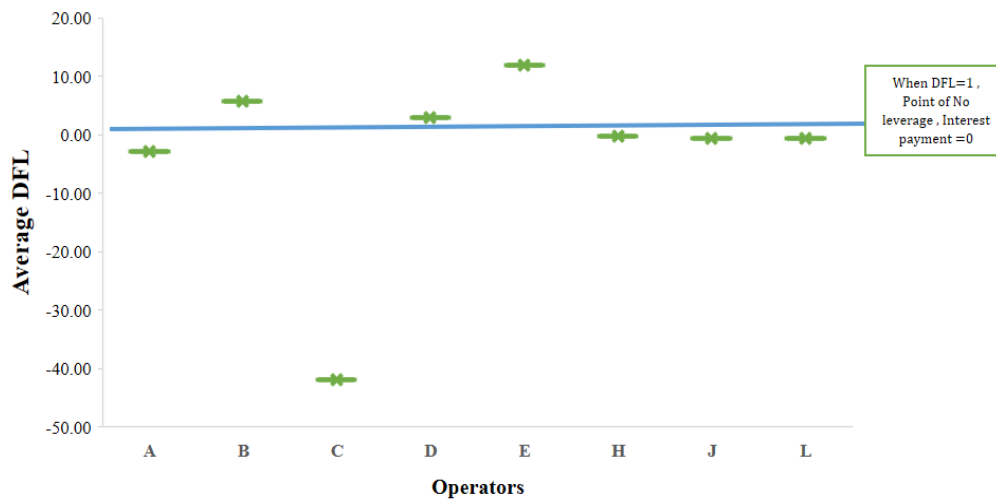
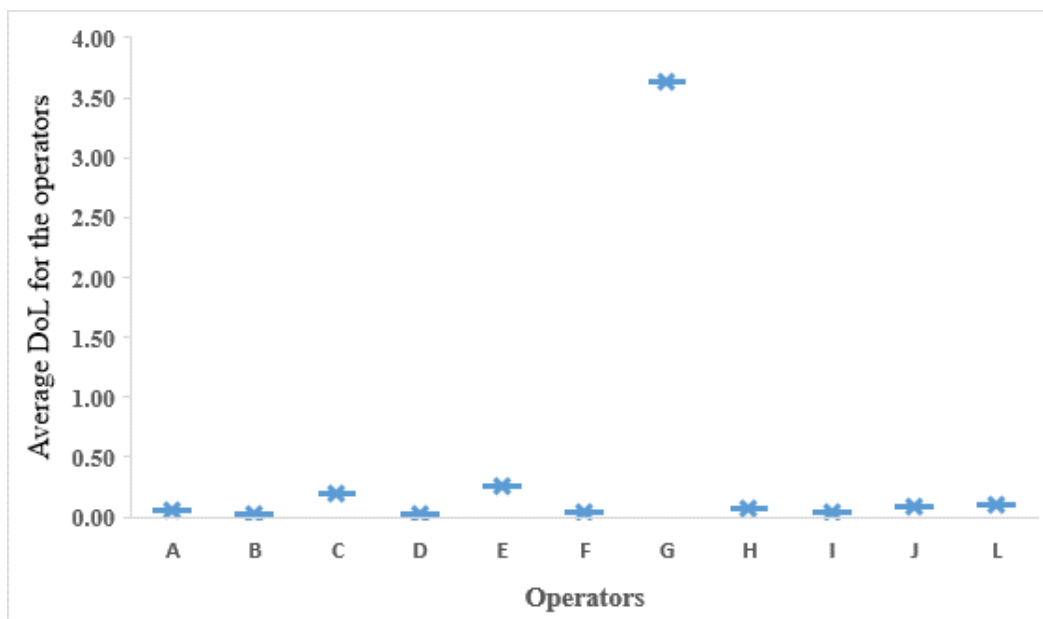


Figure 15: Average DoL of the operators from 2011-2018



Capital Structure and Impact of Leverage on Cost of Capital

Standard theory of finance based on the influential result of Modigliani and Miller (MM, 1958)²⁸, states that in an efficient capital market where there are no transaction costs or taxes, the way in which investment is financed is irrelevant. However, in the real world (with taxes, transaction costs, bankruptcy costs, differences in borrowing costs, the source of financing matters. In addition, the cost premium of external finance is also attributed to information

²⁷ For four operator's values are not defined or not available. See Appendix 5.8 for more details
²⁸ Modigliani.F and Miller.M (1958). "The Cost of Capital, Corporation Finance and the Theory of Investment", The American Economic Review, Vol. 48, No. 3 (Jun., 1958), pp. 261-297.
<http://www.jstor.org/stable/1809766>

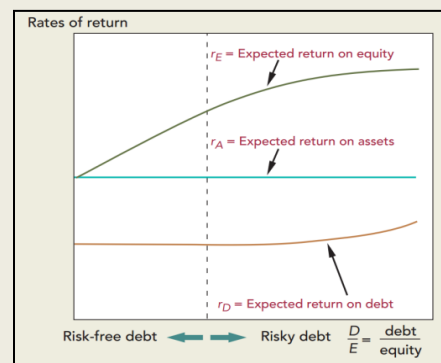
asymmetries in the capital market above and beyond the transaction costs of issuing debt and equity. In other words, the optimal capital structure will vary with the degree of financial leverage. We do not attempt to prove the MM hypothesis or its exceptions in this report; however, its conceptualization is important to understand the impact of debt burden on cost of capital and its comparison to returns.

Box 1: The Modigliani-Miller Theorem on Capital Structure

The Modigliani-Miller hypothesis posits that in perfect markets, the capital structure of a firm is irrelevant. Where the assumptions of the theorem (as outlined below) hold, the theorem states that the value of a firm is affected solely by the value of its underlying assets and not its choice of financing.

The key assumptions of the theorem include –

1. No taxes
2. No costs of bankruptcy
3. No transaction costs
4. Equal costs of borrowing for both investors and companies
5. No information asymmetry within the market
6. No impact of debt on a firm's EBIT



There are two key propositions to the theorem. **Proposition I** posits that given the aforementioned assumptions, *the value of a firm remains unaffected by changes in its capital structure.*

Proposition II states that the expected rate of return on the common stock of a levered firm increases in proportion to the debt–equity ratio (D/E), expressed in market values; the rate of increase depends on the spread between r_A , the expected rate of return on a portfolio of all the firm's securities, and r_D , the expected return on the debt. Note that $r_E = r_A$ if the firm has no debt. When the firm was unlevered, equity investors demanded a return of r_A . When the firm is levered, they require a premium of $(r_A - r_D)D/E$ to compensate for the extra risk. Thus Proposition 1 states that financial leverage has no effect on shareholders' wealth. Proposition 2 states that the rate of return they can expect to receive on their shares increases as the firm's debt–equity ratio increases.

Given these propositions, the theorem then includes the impact of corporate taxes where interest payments on debt are tax deductible. As a result of this "tax shield", debt becomes a cheaper source of financing for the firm and increases its value by increasing the available cash flow with an increase in the amount of debt resulting in a reduction in the firm's WACC.

Source: Allen, F., Brealey R., Myers, S., "Principles of Corporate Finance", McGraw-Hill Irwin, 10th Edition (2011)

We estimate the cost of equity for a listed incumbent operator (for which data on daily stock returns is publicly available) using the Capital Asset Pricing Model (CAPM) –

$$r_e = r_f + \beta \times (r_m - r_f)$$

Where, r_f is the risk free rate of return, $(r_m - r_f)$ is the expected market risk premium and β is the predicted equity beta

Using data from February 2002 to March 2018, the β value for the operator is estimated to be 0.85. The market risk premium has been estimated using annual returns on BSE Sensex 30 from April 1990 to March 2018. The risk free rate of return is taken as 6.97% (average return on 10 Year Indian Government Bonds in 2017-18). **The Cost of Equity for the operator is estimated to be 12.5%.** We use this estimate to calculate the Post-Tax Weighted Average Cost of Capital for the operator for which the reported cost of debt is 10%²⁹ and Debt/Equity ratio is 0.99 in the year 2017-18. The estimated post tax WACC is 9.5% in 2017-18. Some comparable estimates for cost of capital are discussed in Box 2.

Box 2: Alternate Estimates of WACC

An estimation of pre-tax WACC for the Indian Wireless Telecom Industry has been carried out by Steve Parsons and Jim Ramsey of Parsons Applied Economics. (Parsons, S., Ramsey, J., “*Weighted Average Cost of Capital (WACC) Concepts, Best Practices, Calculations & Data*”, Parsons Applied Economics, July 2015). This paper estimates the pre-tax WACC for the Industry across a range of 19.65% to 24.53%, varying due to change in beta values. We do not use this for the purposes of our study since the Parsons and Ramsey estimate includes tower companies in their selection of firms for determining Beta values (driving these values up). Their equity risk premiums also deploy a global weighted average plus a country risk premium, as opposed to our approach of using only Indian equity premiums. Additionally, we use a post-tax WACC instead of a pre-tax WACC for our comparison with Return on Equity since the latter is determined post-tax.

A more recent estimate is provided by Ashwath Damodaran (January 2019). According to his estimates the average post-tax WACC for companies providing wireless telecom services in India is 8.52% in USD and 11.6% in local currency terms. This method uses the unlevered beta for estimating cost of equity and an average of four companies.

As established, WACC is sensitive to the level of debt. Although it is difficult to determine the optimal debt-equity levels it is well established that some level of debt is good for firms. According to the trade-off theory of leverage, there are benefits to leverage within a capital structure up until the optimal capital structure is reached, after which the risk of bankruptcy sets in. The benefits stem from tax offsets available for interest payments. After a certain level, the benefit tends to get eclipsed by the greater riskiness associated with higher levels of

²⁹ Operator’s Annual Report 2017-18

debt. The theory can be applied to understand the implications of the high debt burdens of some telecom companies. As discussed in some of the earlier sections, indebtedness of telecom companies is on the rise.

From our analysis of leverage, financing costs, cash flows and interest coverage ratios, the current debt burdens of most operators seem to be at levels likely to result in high risk. The analysis has established that the Degrees of Financing and Operating leverage increases the riskiness of operator returns, necessitating measures to protect against increased vulnerability. Moreover, fresh investment in spectrum (analysed later) and infrastructure will mean that firms take on fresh debt, further increasing leverage to risky levels. As stated above, in the presence of imperfections in capital markets, progressively higher leverage, after the initial benefits, increases the levels of risk for individual operations. In the following sections we compare the cost of capital (WACC) against Return on Equity.

2.7 Return on Equity

Return on Equity (ROE) is among the key ratios that guide investor decisions. It measures the efficiency and profitability of a firm. In our analysis we find that the average and weighted average ROE are negative for most operators for most years over the period of analysis. We measure ROE as Profit after Tax (PAT)/ Shareholder funds. In most cases PAT is negative.

For the purpose of representation, we have retained the negative sign to reflect poor return on equity. The ROE for some operators has seen a recovery in the final year of our analysis. This recovery is mostly below the cost of capital estimated for an incumbent operator in 2017-18, while it is the lowest among other estimates available for WACC in the literature. For the industry overall, returns (as measured by PAT) have been negative in several years. Except for maybe two operators, return on equity is significantly lower than the rate offered by the Indian Government 10 Year Bonds (6.97%, the “least risky” investment) as well as the BSE Sensex average market return (13.5%, average determined for the period 1990 to 2018). A low/ negative ROE raises questions on the long-term profitability of the industry and may lead to a potential lack of interest in investors/ lenders to provide fresh capital to the sector.

Table 10: Return on Equity (PAT/Shareholder Funds - Industry)

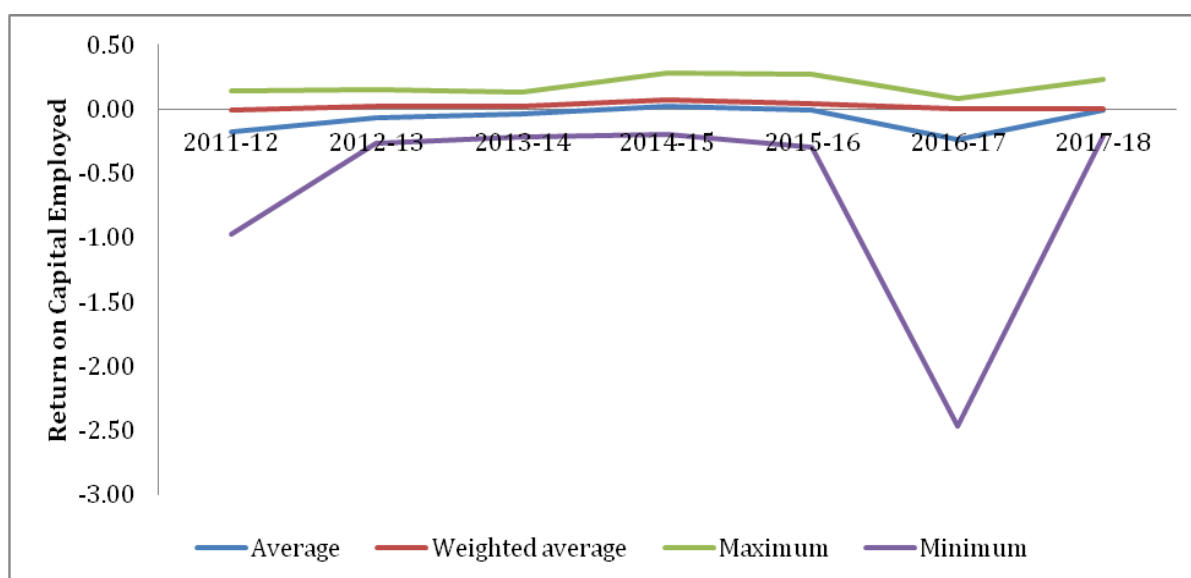
ROE=PAT/ Equity	Average	Weighted average	Maximum	Minimum
2011-12	-65.51%	-35.67%	-162.01%	-254.94%
2012-13	-240.76%	-7.64%	-795.31%	-868.41%
2013-14	6.04%	6.10%	159.52%	-120.96%
2014-15	-102.64%	-1.59%	-140.39%	-487.82%
2015-16	5.41%	7.46%	0.00%	-4.74%
2016-17	-5.01%	-6.82%	0.00%	-9.81%
2017-18	-6.67%	-7.59%	0.00%	-18.62%

**RoE is only estimated where denominator is positive*

Return on Capital Employed

ROE evaluation is often complemented with the assessment of Return on Capital Employed (ROCE), which measures a company's ability to utilize all available capital to generate additional profits. ROCE measurements indicate which companies are making better use of capital by examining earnings per unit of capital. We determine ROCE by the ratio of Earnings before Interest and Taxes (EBIT) and the difference between Total Assets Less Current Liabilities. We exclude instances of positive figures resulting from negative EBITs and Current Liabilities exceeding Total Assets (mentioned as "ND" or not defined (See Annexure 5.10 - Return on Capital Employed – All Operators). We find that ROCEs are negative for some operators for the entire period of analysis. Average ROCE values recover marginally in the final year of our analysis though significantly short of the rate of return offered by Indian Government for risk-free 10-year bonds.

Figure 16: Return on Capital Employed – Industry



2.8 Profitability and DuPont Analysis

From the return on equity (ROE) analysis in the section above we know that profitability is a concern for most telecom operators. We use the Du Pont analysis to reconstitute ROE in a three step calculation. The DuPont analysis decomposes ROE, measured by PAT/Shareholder funds, into Net Profit margin (PAT/Revenue, indicative of profitability), Asset Turnover (Revenue/Assets, indicative of operating efficiency) and Equity Multiplier (Assets/Shareholder Funds, indicative of financial leverage). The Du Pont decomposition allows identification of the weak link. The decomposition is as follows:

$$\text{Return on Equity} = \frac{\text{PAT}}{\text{Revenue}} \times \frac{\text{Revenue}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Shareholder Funds}}$$

An increase in net profit margin and asset turnover are both positive for business performance, an increase in financial leverage can result in heightened risk of bankruptcy.

We estimate each constituent ratio for the industry (*Table 11*) and relate to the corresponding value of Return on Equity measured by PAT/ shareholder funds (*Table 10*). What emerges is that net profit margin (PAT/ revenue) is negative and thereby driving the overall result of low ROE. Unless PAT/Revenue becomes positive, ROE will continue to suffer. The other interesting feature of the Du Pont Analysis is the extremely high equity multiplier which is a proxy for high leverage. As stated above, high leverage adds to volatility in returns (positive or negative) and is a feature of the industry that needs to be modified. Leverage can be reduced either by increasing shareholder equity which seems unlikely at this stage or by reducing the cost of investment including spectrum acquisition. This is further discussed below.

Table 11: Constituents of the Du Pont Equation – Industry

Net Profit Margin				
PAT/ Revenue	Average	Weighted average	Maximum	Minimum
2011-12	-71.99%	-22.93%	13.57%	-280.28%
2012-13	-86.10%	-21.92%	10.89%	-408.87%
2013-14	-13.57%	-10.73%	212.30%	-157.89%
2014-15	-29.81%	-5.09%	21.75%	-115.75%
2015-16	-94.03%	-56.10%	12.87%	-732.52%
2016-17	-369.96%	-340.26%	-2.34%	-3037.25%
2017-18	-67.60%	-25.96%	3.59%	-380.04%
Asset Turnover				
Revenue/ Total Assets	Average	Weighted average	Maximum	Minimum
2011-12	37.24%	41.46%	101.20%	13.47%
2012-13	31.89%	42.66%	64.16%	6.16%
2013-14	32.76%	42.41%	59.51%	7.76%
2014-15	37.79%	42.43%	59.19%	14.23%
2015-16	29.57%	30.45%	64.11%	0.00%
2016-17	29.01%	27.37%	71.26%	0.00%
2017-18	20.58%	22.61%	35.19%	3.99%
Equity Multiplier				
Assets / Shareholder Fund	Average	Weighted average	Maximum	Minimum
2011-12	413.23%	473.87%	1799.06%	-280.76%
2012-13	545.85%	272.14%	3561.45%	-1018.22%
2013-14	243.44%	249.70%	957.64%	-366.62%
2014-15	447.99%	5029.60%	2337.29%	-263.49%
2015-16	-313.78%	6639.05%	716.67%	-4706.55%
2016-17	47.23%	1948.91%	403.66%	-524.64%
2017-18	189.50%	14036.15%	600.57%	-256.41%

If we replace PAT by EBITDA in the Du Pont equation, the metric EBITDA/Shareholder funds and EBITDA/Revenue helps to understand the impact of financing, depreciation and amortization costs. Comparing the two Du Ponts shows that interest and depreciation costs significantly impact the bottom line of telecom companies, corroborating our findings above.

Table 12: Net Profit Margin and Return on Equity – Industry

Net Profit Margin= EBITDA/ Revenue				
EBITDA / Revenue	Average	Weighted average	Maximum	Minimum
2011-12	-8.29%	17.91%	110.30%	-150.33%
2012-13	-22.15%	15.62%	33.39%	-195.17%
2013-14	2.65%	20.57%	33.92%	-63.04%
2014-15	10.10%	23.77%	40.57%	-32.71%
2015-16	-38.07%	-12.85%	37.35%	-555.83%
2016-17	-380.91%	-354.79%	38.60%	-4115.69%
2017-18	10.45%	12.97%	33.58%	-14.10%
Equity* = EBITDA/ Shareholder Funds				
EBITDA/ Shareholder fund	Average	Weighted average	Maximum	Minimum
2011-12	8.53%	27.84%	118.53%	-63.05%
2012-13	-51.78%	44.88%	202.31%	-379.63%
2013-14	12.31%	39.00%	152.27%	-48.30%
2014-15	0.58%	32.28%	100.36%	-137.85%
2015-16	15.19%	25.12%	67.77%	-19.75%
2016-17	7.10%	14.68%	43.38%	-11.70%
2017-18	9.77%	13.04%	23.16%	-3.19%

**To avoid error in interpretation we have not used positive estimates of ROE which result from negative EBITDA and negative Equity Values*

3. Regulatory Costs & Costs of Spectrum

A conspicuous feature of the financial analysis presented with the help of several ratios is the burden of debt the industry carries. Debt in turn is determined by sector levies including licensing costs and high spectrum acquisition charges. These costs together constitute a large part of operator costs. In this section, we attempt to analyse the impact of the costs of spectrum acquisition and regulation borne by operators and at the same time reflect on the magnitude of revenue generated for the government by the sector. The regulatory costs for Microwave Access and Microwave Backbone, which can go up to 1.15% of Adjusted Gross Revenue, have not been included in the analysis.

3.1 Sector Contribution to Exchequer

A corollary to the analysis above in which operator financial distress has been highlighted, is that government collections from the sector ought to be buoyant. Indeed, that is the picture that emerges until 2015-16. Thereafter the scenario changes for the worse for the government. License Fee and Spectrum Usage Charges (SUC) which constitute a sizeable portion of government's non-tax revenue have registered a decline as a percentage of non-tax revenue (*See Table 13 below*). Telecom licence fee collections shrank nearly 19% year-on-year in 2017 – the first full year since the disruptive entry of the new operator— reflecting a similar fall in adjusted gross revenue (AGR) because of stress. The fall in overall spectrum usage charge inflows in 2017 is even bigger, plummeting nearly 33% year-on-year to Rs

5,089 crore from Rs 7,574 crore in 2016. When combined with costs of spectrum acquisition, regulatory costs aggregate Rs. 405,977 crores since 2010-11.

Table 13: License Fee (LF), Spectrum Usage Charge (SUC) and Spectrum Acquisition Charges since 2010-11

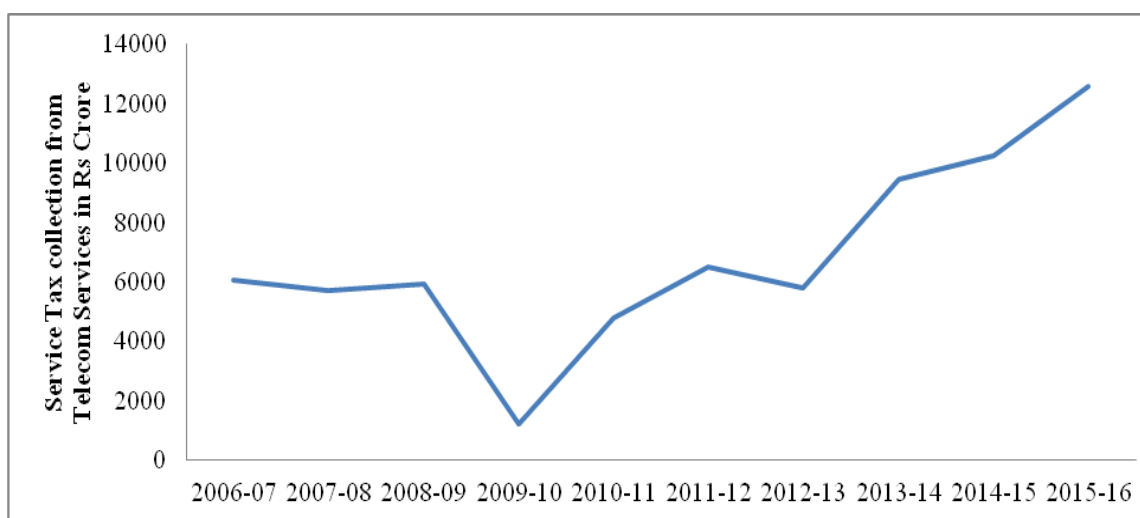
	License Fee	LF Y-o-Y Increase	SUC	SUC Y-o-Y Increase	Total Non-Tax Revenue	LF + SUC as % of Non-Tax Revenue	Spectrum Acquisition Charges (Upfront & Instalment)	Total
	(Rs. Crores)		(Rs. Crores)					Licence Fee + SUC+ Spectrum Acquisition Charge
2010-11	10297		3858		218602		106652	120807
2011-12	11386	10.58	4849	25.69	121672	6.48		16235
2012-13	11442	0.49	5198	7.2	137355	13.34	2801	19441
2013-14	12909	12.82	6375	22.64	198870	12.11	21563	40847
2014-15	14069	8.99	6537	2.54	217831	9.7	22556	43162
2015-16	14591	3.71	7541	15.36	258576	9.46	33902	56034
2016-17	15975	9.49	7574	0.44	334770	8.56	55166	78715
2017-18	12976	-18.77	5089	-32.81	235974	7.03	12671	30736
Total	103645		47021		1723650	7.66	255311	405977

License fee and SUC contribution estimates include data for all operators (including the public sector operator) and estimates of spectrum acquisition costs assume that all operators chose the deferred payment route

In addition, the collection of service tax from the sector is detailed in Box 3. Besides, firms also contribute to corporate tax collection. The telecom sector's contributions to government revenue are therefore significant.

Box 3: Telecom Sector Contribution to Service Tax Revenue

Service tax has emerged as a significant contributor to tax revenue. The service tax collection from telecom sector has grown at a compound annual growth rate of 52.8% from 2006-07 to 2015-16. The Goods and Services Tax was implemented in 2016. The prevailing GST on telecom services is 18% and full input credit on inputs and input services used in the furtherance of business by an operator is available. While sectoral data for GST is not available, the rise in data services implies that this collection continues to remain significant. Moreover, GST is also applicable to regulatory payments made towards spectrum and license fees.



Source: Compiled from Budget Documents

There is a trend, especially among developing countries, of raising taxes on the telecom sector. It is presumed that the increased regulatory burden on the sector is driven by a perception of high profitability, its size and formality as well as a ‘claw-back’ of generous concessions given during the early years of the sector³⁰. In the Indian context as well, the license fee regime was designed to meet administrative expenses, an annual fixed cost to operators when it was first introduced in the early 1990s³¹; auction revenue was separate. The New Telecom Policy 1999³² migrated to a licensing regime that was based on a revenue arrangement scheme. Over the last three decades, India has adopted a mixed approach for allocation of licenses and spectrum. According to International Telecommunication Union (ITU) guidelines (2016) spectrum prices can be determined using an administrative or market-based

³⁰ Matheson and Petit, “Taxing Telecommunications in Developing Countries”, IMF Working Paper, WP/17/247, 2017.

³¹ Intven. H and Tetrault. Mc(2000). Telecommunication Regulation Handbook: Module 2, Licensing telecommunication service, International Telecommunication Union (ITU)

³² New Telecom Policy 1999. <http://dot.gov.in/new-telecom-policy-1999>

or a combination of both approaches³³. Administrative mechanisms use spectrum fee formulas that cover the costs of spectrum management. The market-based mechanisms typically involve a market exchange such as auctions and (in the secondary market) spectrum trading. Auctions, which have the capacity to capture rents without distorting investment and prices, are a favored option, particularly for middle- and high-income countries with the regulatory capacity to design and implement them effectively. However, auctions are not a panacea, because they are based on expected rents, which could be lower or higher than actual rents, and leave an operator with a windfall or strain its financial position³⁴.

Since 2010, the DoT has almost uniquely applied the auction-based method for spectrum allocation, however it continues to impose spectrum usage fees (between 3 to 5%), which is traditionally charged as a resource rent to ensure that the users of spectrum utilize the resources efficiently. This objective is already met by the auction process which achieves economic and technical efficiency through competitive bidding. The current regime results in additional burden. Moreover, fee on secondary market transactions (spectrum trading and sharing) that allow for change in spectrum valuations over time are also a source of meeting direct and indirect costs associated with spectrum management.

In 2017, the average spectrum holding for an operator in India was 31 MHz, compared to the global average of 50 MHz³⁵. The National Digital Communications Policy 2018 has also set out policy objectives to optimize the availability and utilization of spectrum.

Table 14: Government Revenue Collections from Spectrum Auctions (2010 – 2016)

Auction	Band	Final Bid Amount (Rs. Crores)
May 2010	3G & BWA	1,06,262
November 2012	800 MHz & 1800 MHz	9,407
March 2013	900 MHz & 1800 MHz	3,640
February 2014	900 MHz & 1800 MHz	61,163
February 2015	800 MHz, 900 MHz, 1800 MHz, 2100 MHz	1,09,875
October 2016	700 MHz, 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz	65,789
Total		3,56,226

Source: Compiled by author from Department of Telecom (DoT)

3.2 Penalties

In addition to mandatory levies on telecom service providers, penalty claims made by departments for violations were reported as contributors to total cost of operations. Operators revealed during the interviews and stakeholder consultations that penalty claims were predominantly with regards to Electro Magnetic Frequency(EMF) certification requirements,

³³ Guidelines for the Review of Spectrum Pricing Methodologies and the Preparation of Spectrum Fees Schedule, Report by ITU, 2016.

³⁴ Matheson and Petit, “Taxing Telecommunications in Developing Countries”, IMF Working Paper, WP/17/247, 2017.

³⁵ Kathuria. R, Kedia, M, Sekhani. R and Bagchi. K (2019). Evaluating Spectrum Auctions in India, April 2019.

roll out obligations, Know-Your-Customer (KYC) and subscriber verification violations and delay in license fee payments.³⁶ As per TRAI annual report of 2017-18 the total amount of penalty/ financial disincentives collected from the telecom service providers (TSPs) on account of non-compliance to various regulations amounted to Rs 3,66,82,237 and have seen a 174% jump from the penalties collected in 2016-17. The financial disincentives amounted to Rs 1, 33, 58,278 in financial year 2016-17³⁷.

4. Conclusions

The telecom sector has been credited with delivering social and economic impacts like no other sector in recent times. Technological dynamism has resulted in new business models and new modes of service delivery, both public and private. A very sizeable portion of the Government's plans for enhancing service delivery, financial inclusion and skill development (such as the Digital India and Skill India initiatives) are hinged on widespread and affordable access to communications and IT services. There is a view that the sector may have become victim to its own success and that the public attention on it due to high profile scandals resulted in more onerous policies.

From a market with regulated entry in the late 1990s and early 2000s it is now a market with intense competition with no restrictions to entry except those posed by limited access to spectrum. The result has been a competitive yet heterogeneous market populated by operators that differ in scale, service and age or maturity. The older and newer entrants have naturally followed different paths based on their respective competitive advantages and in part those paths have been influenced by the changing nature of the regulatory regime. This is also reflected in the variation in performance visible in our analysis of the financial health of the sector. Recent consolidations following the entry of Reliance Jio has transformed the competitive landscape of the industry.

Studying the sector as a whole presents trade-off. While it allows us to collect and analyse a larger data set, it also masks individual operator idiosyncrasies due to the use of averages. To be as accurate as possible we also employ weighted averages wherever possible, but advise caution in interpretation of the result. Nevertheless, averages, simple or otherwise, can be useful in attempts to gauge sectoral health at a very broad level.

The glaring result is that fortunes of the sector have declined especially towards the latter years of our analysis. Leverage levels for most firms are high as debt burdens have risen resulting in decreasing interest coverage ratios. RBI's reported bank exposure to the telecom sector was recorded at Rs 906 billion as on November 2018³⁸. While increasing the

³⁶ It was stated by Operators that for KYC requirements, the DoT allowed no margin for error – operators expressed that even very high compliance requirements (to the order of 95%) were acceptable, but that currently every single KYC violation was penalized. However, there were no representatives from the DoT present at the consultation to respond.

³⁷ Recently India's telecom regulator has imposed a combined penalty of Rs 3,050 crore on Bharti Airtel Vodafone India and Idea Cellular for violating licence norms by denying adequate interconnection points to Reliance Jio Infocomm

³⁸ RBI Bulletin on Sectoral Deployment of Bank Credit in India, February 2019.

vulnerability of the sector itself, the spill over to the financial system is also a cause for worry.

The latest National Digital Communications Policy (2018) highlights the need to rationalise regulatory costs imposed on operators with the intent to capture the full benefits of a GPT like telecom.

The emergence of disruptive technologies and their potential to impact traditional telecom operations is also widely accepted. Under the current framework of regulatory asymmetry operators must acquire licenses to provide services that over the top (OTT) content providers can offer for dramatically lower prices without license. A level playing field can be achieved by imposing license conditions on unlicensed OTT services. We believe that this will not only be undesirable but also impracticable. Resolution of the OTT conundrum is perhaps best served by easing the regulatory burden on licensed operators. At the same time cooperation between operators and content providers will perhaps enable innovation and better product and service delivery.

The GST regime also impacted the sector's liquidity. The current standard rate of GST on the supply of telecom services and products is 18 per cent. DoT has recommended reduction of GST rate for telecom to 12%. The pre-GST tax rate was 15%. The industry has also recommended that spectrum and license fee payments be exempted from GST. According to media sources almost Rs. 30,000 crore was blocked again GST at the industry level³⁹.

Given these challenges, sectoral growth must be catalysed through policy action to ease existing constraints. For example, spectrum acquisition is a huge cost to the industry – since 2010-11 the total spectrum acquisition charge adds up to Rs. 2,55,311 crores. The auction design used for spectrum assignment must prioritise efficiency over revenue generation. The recent policy action allowing for spectrum trading and sharing is a step the right direction. Policy must also revisit the restrictions imposed on block size (which artificially limits use of certain technologies), caps on spectrum holding and the need for imposing additional charges on shared spectrum. TRAI's current recommendations for spectrum auctions including that for 5G spectrum continues to propose unaffordable reserve prices for most bands.

Investments in network infrastructure are equally important for operators to fulfil Quality of Service requirements mandated by TRAI. Costs associated with acquiring Right of Way also bear heavy on the operator's ability to improve efficiency and financial viability. NDPCP 2018 proposes several measures for co-ordinated and collaborative policy with respect to Right of Way.

Also on the reform anvil is the rationalization of penalties – the scale and sheer number of which adds to operational costs. Penalties have added to the number of disputes in a

³⁹ Devina. S and Sachin. D., "Telecom companies want GST on spectrum and license fee scrapped or refund of input credits, Economic Times, November 28, 2018.
<https://economictimes.indiatimes.com/industry/telecom/telecom-news/telecom-companies-want-gst-on-spectrum-licence-fees-scrapped-or-refund-of-input-credits/articleshow/66837147.cms?from=mdr>

historically litigious sector. There must be a concerted attempt made to reduce this on both sides of the divide-private and public. Given the widely acknowledged externalities generated by communications services, the taxation of such services is only optimal when it is reinvested to augment sectoral growth. However, government-led initiatives involving such reinvestment have been disappointing so far – despite the sizeable corpus that exists under the USO Fund, its redeployment for sectoral growth and increased penetration (including by way of the Bharat Net programme) has not been inspiring.

Given the seriousness and speed with which the government aims to enable digital citizenship and the essential role that private operators must play in this transformation, it is important that policy prioritise between the short term benefits of immediate revenue generation and the long term dividends that a robust connected economy can create. India has not yet exhausted potential returns from the telecom sector – in fact the second round of dividends may be round the corner from the data economy and 5G. Policy must do all it can to maximize this potential. Effecting most of these changes will hinge on institutional reform, especially in the form of greater cooperation between the line ministry and the independent regulator, which is a first order priority.

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⁴⁰ Aircel and Vodafone reports are not publicly available and obtained from industry stakeholders.

Annexure

5.1 Revenue – By Operator (In INR million)

Revenue	A	B	C	D	E	F	G	H	I	J	K	L
2011-12	422,285	193,223	363,503		118,630	279,335	30,228	36,244	11,602	37,815	6,234	123,445
2012-13	468,140	220,869	409,847		128,200	271,279	47,346	37,141	12,307	23,329	5,093	135,204
2013-14	507,719	261,795	411,160		124,450	279,964	44,606	37,874	12,452	33,957	6,213	133,024
2014-15	606,894	317,318	463,411	14	111,360	286,452	56,337	38,211	14,287	46,554		139,047
2015-16	604,732	359,810	436,443	33	103,140	324,113	62,617	36,932	15,134	45,554		137,075
2016-17	624,606	354,757	433,270	10	91,540	315,334	62,617	35,525	11,069	47,989		124,280
2017-18	538,986	281,268	351,272	201,580	22,310	250,706		31,164				72,286

5.2 EBITDA – By Operator (In INR million)

EBITDA	A	B	C	D	E	F	G	H	I	J	K	L
2011-12	143,016	43,128	73,287		31,610	7,058	(6,688)	(15,994)	(10,679)	41,711	(9,371)	1,930
2012-13	149,633	51,565	97,950		42,810	9,154	(13,590)	(26,445)	(9,575)	2,935	(9,940)	846
2013-14	172,207	73,233	130,057		30,860	(6,921)	3,047	(5,272)	(7,850)	3,334	(2,062)	9,014
2014-15	246,241	101,257	141,677	(181)	19,910	6,718	8,061	(3,042)	(4,673)	(3,932)		17,376
2015-16	225,860	120,719	112,896	(181)	24,360	29,313	6,924	(2,528)	(1,891)	(1,135)		25,195
2016-17	241,096	102,919	99,233	(420)	5,260	16,840	6,924	(4,094)	(22,445)	5,152		20,541
2017-18	181,001	59,440	67,600	67,350	2,640	(28,583)		(4,393)				(7,305)

5.3 Operator Expenditure as a percentage of Revenue (%)

	A			B			C			D			E		
	2011-12	2014-15	2017-18	2011-12	2014-15	2017-18	2011-12	2014-15	2017-18	2011-12	2014-15	2017-18	2011-12	2014-15	2017-18
Personnel Expenditure	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
Employee Benefits	4.98	4.69	4.81	5.72	6.29	6.30	4.48	5.36	6.07		16.21	7.17	5.47	2.94	1.42
Changes in inventories of finished goods	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.23	0.15		0.00	0.00	0.00	0.00	0.00
Network Expenses and IT outsourcing costs	0.00	0.00	38.97	37.70	38.36	43.93	0.00	0.00	0.00		0.00	36.66	0.00	0.00	0.00
License Fees and WPC Charges	16.81	18.59	15.54	15.48	16.36	12.92	0.00	0.00	0.00		0.00	13.16	48.80	57.47	41.99
Roaming & Access Charges	20.80	22.07	22.05	21.85	21.90	15.94	0.00	0.00	0.00		0.00	31.94	30.61	33.22	40.93
Subscriber Acquisition & Servicing Expenditure	0.00	0.00	0.00	13.69	11.59	13.14	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
Advertisement and Business Promotion Expenditure	0.00	0.00	8.53	2.81	2.28	3.67	0.00	0.00	0.00		0.00	5.94	8.21	0.00	15.66
Administration and other Expenses	29.61	26.55	10.10	2.75	3.22	4.10	22.07	24.45	92.93		83.79	5.13	6.91	6.36	0.00
Revenue sharing expense	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
Cost of goods sold	0.07	0.02	0.00	0.00	0.00	0.00	73.45	69.88	0.84		0.00	0.00	0.00	0.00	0.00
Power and fuel	10.64	11.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
Rent	17.09	16.58	0.00	0.00	0.00	0.00	0.00	0.08	0.00		0.00	0.00	0.00	0.00	0.00
Other1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
Total	66.13	59.43	66.42	77.68	68.09	78.87	79.84	69.43	80.76		1423.36	66.59	73.35	82.12	88.17

	F			G			H			I			J		
	2011-12	2014-15	2017-18	2011-12	2014-15	2017-18	2011-12	2014-15	2017-18	2011-12	2014-15	2017-18	2011-12	2014-15	2017-18
Personnel Expenditure	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.00	0.00	
Employee Benefits	49.24	53.49	53.13	0.00	7.55		71.05	64.32	68.79	15.25	15.42		0.00	5.45	
Changes in inventories of finished goods	0.00	0.00	0.00	0.49	0.00		0.00	0.00	0.00	0.00	0.00		0.00	0.00	
Network Expenses and IT outsourcing costs	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.00	0.00	
License Fees and WPC Charges	12.96	7.76	6.24	0.00	0.00		4.57	5.37	5.13	0.00	0.00		0.00	0.00	
Roaming & Access Charges	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.00	0.00	
Subscriber Acquisition & Servicing Expenditure	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.00	0.00	
Advertisement and Business Promotion Expenditure	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.00	0.00	
Administration and other Expenses	37.81	38.75	40.63	99.51	92.02		15.68	21.34	21.65	0.00	0.00		100.00	94.55	
Revenue sharing expense	0.00	0.00	0.00	0.00	0.00		8.69	8.97	4.27	0.00	0.00		0.00	0.00	
Cost of goods sold	0.00	0.00	0.00	0.00	0.43		0.00	0.00	0.17	0.00	0.00		0.00	0.00	
Power and fuel	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.00	0.00	
Rent	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.00	0.00	
Other1	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	84.75	84.58		0.00	0.00	
Total	97.47	97.65	111.40	122.13	85.69		144.13	107.96	114.10	192.04	132.71		-10.30	108.45	

	K			L		
	2011-12	2014-15	2017-18	2011-12	2014-15	2017-18
Personnel Expenditure	0.00			0.00	0.00	0.00
Employee Benefits	10.10			9.47	7.81	7.90
Changes in inventories of finished goods	0.00			0.00	0.00	0.00
Network Expenses and IT outsourcing costs	0.00			0.00	0.00	0.00
License Fees and WPC Charges	0.00			0.00	0.00	5.05
Roaming & Access Charges	0.00			0.00	0.00	13.74
Subscriber Acquisition & Servicing Expenditure	0.00			0.00	0.00	0.00
Advertisement and Business Promotion Expenditure	0.00			0.00	0.00	0.00
Administration and other Expenses	89.90			90.35	91.02	38.90
Revenue sharing expense	0.00			0.00	0.00	0.00
Cost of goods sold	0.00			0.17	1.17	0.22
Power and fuel	0.00			0.00	0.00	10.86
Rent	0.00			0.00	0.00	21.37
Other I	0.00			0.00	0.00	1.96
Total	250.33			98.44	87.50	110.11

Red highlights that the operators have exited the marke

5.4 Depreciation & Amortization – By Operator (in INR million)

Depreciation + Amortization	A	B	C	D	E	F	G	H	I	J	K	L
2011-12	59,160	25,628	44,009		18,430	91,743	10,269	14,962	3,134	9,499	3,016	27,309
2012-13	68,267	30,544	49,024		17,800	83,364	14,282	14,769	4,344	970	3,878	27,932
2013-14	72,313	40,932	62,821		20,950	60,232	11,062	11,657	5,402	2,952	3,353	29,497
2014-15	75,597	48,550	72,315		19,400	88,168	8,542	11,586	6,300	9,241		28,717
2015-16	95,753	62,232	78,227	43	20,140	72,056	19,642	11,516	6,750	16,124		(12,170)
2016-17	122,034	77,000	95,035	50	19,720	63,304	19,642	10,876	6,195	8,422		(10,516)
2017-18	130,486	83,161	98,220	35,770	2,000	58,316		10,287				(5,531)

Depreciation and Amortization - By Operator (as a % of Revenue)

Depreciation + Amortization as % of Revenue	A	B	C	D	E	F	G	H	I	J	K	L
2011-12	14.01	13.26	12.11		15.54	32.84	33.97	41.28	27.01	25.12	48.38	22.12
2012-13	14.58	13.83	11.96		13.88	30.73	30.16	39.77	35.30	4.16	76.15	20.66
2013-14	14.24	15.64	15.28		16.83	21.51	24.80	30.78	43.38	8.69	53.97	22.17
2014-15	12.46	15.30	15.60	245.26	17.42	30.78	15.16	30.32	44.10	19.85		20.65
2015-16	15.83	17.30	17.92	132.82	19.53	22.23	31.37	31.18	44.60	35.40		-8.88
2016-17	19.54	21.71	21.93	490.20	21.54	20.08	31.37	30.62	55.97	17.55		-8.46
2017-18	24.21	29.57	27.96	17.74	8.96	23.26		33.01				-7.65

5.5 Financing Costs (Interest Payments) – By Operator in INR million

Interest Payment	A	B	C	D	E	F	G	H	I	J	K	L
2011-12	13,962	9,078	44,317		12,650	1,841	15,409	9,492	10,366	14,652	5,085	21,946
2012-13	16,523	8,135	47,903		19,760	3,515	25,822	11,803	9,059	3,096	7,005	27,131
2013-14	13,364	6,248	37,872		17,960	2,180	20,175	13,902	6,408	2,699	5,956	30,775
2014-15	14,091	9,317	44,988	16	16,800	5,019	14,777	14,396	5,564	3,840		32,909
2015-16	35,453	17,779	62,773	14	20,490	5,849	16,890	13,513	16,838	5,535		(23,164)
2016-17	52,546	40,109	60,496	10	24,090	1,468	16,890	14,485	17,125	5,966		(20,650)
2017-18	59,107	49,245	56,343	20,490		483		15,055				(17,090)

Financing Costs: Interest Payments as % of Revenue

Interest Payment/ Revenue	A	B	C	D	E	F	G	H	I	J	K	L
2011-12	3.31	4.70	12.19		10.66	0.66	50.98	26.19	89.35	38.75	81.58	17.78
2012-13	3.53	3.68	11.69		15.41	1.30	54.54	31.78	73.61	13.27	137.55	20.07
2013-14	2.63	2.39	9.21		14.43	0.78	45.23	36.70	51.46	7.95	95.87	23.13
2014-15	2.32	2.94	9.71	118.98	15.09	1.75	26.23	37.68	38.94	8.25		23.67
2015-16	5.86	4.94	14.38	43.87	19.87	1.80	26.97	36.59	111.26	12.15		-16.90
2016-17	8.41	11.31	13.96	98.04	26.32	0.47	26.97	40.77	154.71	12.43		-16.62
2017-18	10.97	17.51	16.04	10.16		0.19		48.31				-23.64

5.6 Interest Coverage Ratios by Operator

	A	B	C	D	E	F	G	H	I	J	K	L
2011-12	6.01	1.93	0.66		1.04	-45.99	-1.10	-3.26	-1.33	2.20	-2.44	-1.16
2012-13	4.92	2.58	1.02		1.27	-21.11	-1.08	-3.49	-1.54	0.63	-1.97	-1.00
2013-14	7.47	5.17	1.78		0.55	-30.81	-0.40	-1.22	-2.07	0.14	-0.91	-0.67
2014-15	12.11	5.66	1.54	-13.18	0.03	-16.23	-0.03	-1.02	-1.97	-3.43		-0.34
2015-16	3.67	3.29	0.55	-15.70	0.21	-7.31	-0.75	-1.04	-0.51	-3.12		-0.56
2016-17	2.27	0.65	0.07	-46.98	-0.60	-31.65	-0.75	-1.03	-1.67	-0.55		-0.49
2017-18	0.85	-0.48	-0.54	1.54		-179.88		-0.98				1.37

5.7 Cash Flow – By Operator

Cash flow from operations (INR Million)

Cashflow from operations (INR Million)	A	B	C	D	E	F	G	H	I	J	K	L
2011-12	1,143,780	305,501	628,820		333,800	82,028	(59,555)	(75,419)	(150,520)	(307,715)	(144,998)	(61,756)
2012-13	1,388,470	570,831	758,720		270,700	63,543	(57,468)	(37,425)	(154,962)	(143,300)	(65,112)	(42,511)
2013-14	1,602,200	753,112	951,380		328,700	165,145	(96,544)	(424,912)	(109,330)	(93,566)	(28,081)	75,943
2014-15	1,793,980	947,439	1,122,220		332,300	60,023	(19,692)	(115,688)	(49,960)	(57,717)		142,903
2015-16	1,944,990	1,085,290	1,092,450	(436,587)	516,400	101,242	65,235	25,575	(31,000)	16,700		250,225
2016-17	2,116,550	1,017,276	703,190	340,583	(24,100)	858,809	65,235	(105,041)	(33,800)	20,560		225,490
2017-18	1,595,430	518,535	635,700	357,000	(155,400)	(263,027)		11,837				253,500

Cash flow from investing activities (INR Million)

Cashflow from investing activities (INR Million)	A	B	C	D	E	F	G	H	I	J	K	L
2011-12	(1,261,180)	(436,635)	(527,260)		(211,500)	(273,087)	344,764	(58,417)	107,120	(71,425)	(18,413)	(135,661)
2012-13	(1,072,590)	(312,591)	(381,840)		(73,600)	(244,072)	(55,282)	(33,095)	(65,980)	(140,551)	(72,511)	(168,820)
2013-14	(1,708,630)	(630,005)	(950,300)		(34,300)	(284,823)	(28,197)	315,043	10,900	(57,065)	(54)	(28,581)
2014-15	(1,280,120)	(540,545)	(976,380)		(434,500)	(244,865)	(31,850)	(12,211)	(21,910)	(51,262)		(232,248)
2015-16	2,198,930	(230,207)	(1,479,920)	(1,765,984)	(529,000)	(215,746)	(172,502)	(16,300)	(2,480)	(73,260)		(114,479)
2016-17	(2,428,320)	(1,565,955)	(1,629,350)	(3,856,399)	31,600	(209,083)	(172,502)	(939)	3,220	(87,170)		(320,482)
2017-18	(1,944,160)	(907,750)	(226,450)	(3,594,900)	397,400	(593,848)		(49,563)				(136,362)

Cash flow from financing activities (INR Million)

Cashflow from financing activities (INR Crore)	A	B	C	D	E	F	G	H	I	J	K	L
2011-12	140,080	5,775	165,590	-	(485,900)	130,486	(287,660)	128,508	53,940	252,996	181,934	106,619
2012-13	(318,570)	(167,160)	(243,410)	-	(192,200)	108,166	110,075	72,826	270,152	341,544	115,991	198,115
2013-14	118,220	(218,112)	(66,030)	-	(304,500)	95,998	185,587	123,511	43,570	78,827	35,163	117,971
2014-15	(519,570)	854,438	376,480	-	146,700	214,246	(6,200)	110,331	64,390	98,278	-	(3,268)
2015-16	189,840	(933,006)	(126,180)	2,201,207	(18,700)	95,598	108,694	1,010	58,730	58,440	-	(88,923)
2016-17	345,570	487,404	1,100,590	4,198,488	24,900	(473,173)	108,694	99,276	(10,550)	67,870	-	84,381
2017-18	386,770	389,623	(150,300)	3,304,900	(252,800)	622,623	-	34,464	-	-	-	(86,554)

5.8 Contribution Margin Analysis by Operator

Contribution Margin	A	B	C
2014-15	1,073	642	770
2015-16	886	690	570
2016-17	869	527	474

5.9 Degree of Operating and Financial Leverage

Degree of Financial Leverage (By Operator)												
DFL=EBIT/PBT	A	B	C	D	E	F	G	H	I	J	K	L
2011-12	1.21	2.08	-1.80	NA	8.50	ND	ND	ND	ND	-0.33	ND	ND
2012-13	1.26	1.63	-45.09	NA	4.01	ND	ND	ND	ND	-0.23	ND	ND
2013-14	1.19	1.24	2.29	NA	-1.31	ND	ND	-0.20	ND	-0.16	ND	ND
2014-15	1.09	1.21	3.93	ND	0.04	ND	ND	ND	ND	ND	NA	ND
2015-16	1.27	1.44	-1.23	ND	-0.26	ND	ND	ND	ND	ND	NA	-0.47
2016-17	-1.40	-1.83	-0.07	ND	ND	ND	ND	ND	ND	ND	NA	-0.14
2017-18	-7.42	ND	ND	2.85	1.00	ND	NA	ND	NA	NA	NA	ND

Instance of both negative EBIT as well as PBT values for an operator have been labelled as ND (Not Defined).

Degree of Operating Leverage (By Operator)												
DOL=EBIT/PBT	A	B	C	D	E	F	G	H	I	J	K	L
2012-13	ND	0.03	0.53	NA	ND	ND	ND	ND	ND	0.04	ND	ND
2013-14	0.03	0.05	0.04	NA	0.06	0.01	ND	0.03	0.00	ND	ND	0.05
2014-15	0.07	0.04	0.00	NA	0.72	ND	ND	ND	0.09	ND	NA	ND
2015-16	ND	0.01	ND	NA	ND	ND	3.64	NA	0.02	0.02	NA	0.24
2016-17	ND	ND	ND	0.02	0.24	0.01	NA	0.16	ND	0.22	NA	0.01
2017-18	ND	ND	ND	ND	0.01	0.11	NA	0.01	NA	NA	NA	0.10

Instances of a negative ratio have not been reported

5.10 Return on Capital Employed – By Operator

ROCE=EBIT/Capital Employed	A	B	C	D	E	F	G	H	I	J	K	L
2011-12	13.71	7.71	8.94	NA	1.81	-10.15	-10.47	-14.97	-41.71	-35.33	-97.84	-12.49
2012-13	11.89	7.89	15.46	NA	4.13	-9.73	-26.68	-22.81	-17.74	-4.02	-18.60	-13.67
2013-14	12.63	9.00	11.90	NA	1.71	-10.76	-21.90	-9.32	-18.69	-0.99	-7.66	-13.31
2014-15	16.51	12.87	10.74	-0.04	0.08	-15.77	-0.34	-8.71	-19.31	ND	NA	-6.16
2015-16	8.28	8.86	4.27	-0.02	0.75	-3.66	-9.53	-18.35	-29.50	ND	NA	5.96
2016-17	7.64	3.29	0.34	-0.03	-3.25	-4.16	-9.53	-21.14	-246.98	ND	NA	5.56
2017-18	3.13	-2.76	-2.61	1.89	0.34	-7.93	NA	-20.40	NA	NA		ND

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