

An Analysis of Oligopoly: Evidence from India's Telecommunications Industry

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Abstract

This paper examines the characteristics and operation of oligopolistic markets, with a particular focus on India's telecommunications industry. It reviews the theoretical foundations of oligopoly, including its defining characteristics and principal models, before analysing the transformation of India's telecommunications sector following the entry of Reliance Jio in 2016. The paper evaluates the effects of Reliance Jio's market entry on competition, market concentration, consumer welfare, and regulatory policy. It also compares India's telecommunications market with telecommunications industries in other countries and with other oligopolistic industries to assess similarities and differences in market structure. The findings demonstrate the practical application of oligopoly theory to modern markets.

Keywords: Oligopoly; Telecommunications industry; India; Reliance Jio; Market concentration

1. Introduction

Market structure is one of the fundamental concepts in economics because it shapes how firms compete, determine prices, and respond to changes in consumer demand and technological innovation. The degree of competition within a market influences not only the behaviour of firms but also consumer welfare, economic efficiency, and long-term industry development. Economists generally distinguish between four principal market structures: perfect competition, monopolistic competition, oligopoly, and monopoly. Each structure differs in terms of the number of firms, barriers to entry, product differentiation, and the extent of market power possessed by producers. Among these, oligopoly is particularly important because many modern industries, including telecommunications, airlines, automobiles, banking, and digital platforms, are characterised by a small number of dominant firms whose decisions are strategically interdependent.

Unlike firms operating under perfect competition, oligopolistic firms cannot make decisions independently. Changes in prices, output, investment, or product quality by one firm are likely to influence the behaviour of competing firms, creating a complex environment in which strategic decision-making is central to business success. High barriers to entry, significant capital requirements, economies of scale, and strong brand recognition often limit the number of firms able to compete effectively in these markets. Consequently, competition in oligopolies frequently extends beyond pricing to include product differentiation, technological innovation, advertising, and customer service. Economic theory has therefore developed several models, including the Cournot, Bertrand, and kinked demand curve models, to explain how firms behave under different forms of oligopolistic competition. These models provide important insights into pricing behaviour, market stability, and the strategic interactions that arise when only a few firms dominate an industry.

The telecommunications industry provides a particularly relevant setting in which to examine these theoretical concepts. Telecommunications markets typically require substantial infrastructure investment, access to radio spectrum, and continuous technological innovation, creating significant barriers to entry that favour a limited number of large operators. At the same time, rapid technological change and evolving consumer demand have intensified competition among incumbent firms. India's telecommunications sector represents one of the most significant examples of these dynamics. The entry of Reliance Jio in 2016 transformed the competitive landscape through aggressive pricing, the deployment of an all-IP (Internet Protocol) network, and the rapid acquisition of subscribers. These developments triggered widespread industry restructuring, including mergers, acquisitions, changes in market concentration, and significant reductions in mobile data prices, making the sector an important case study for understanding oligopolistic competition in practice.

This paper examines the theory and operation of oligopolistic markets before applying these concepts to India's telecommunications industry. It begins by discussing the defining characteristics of oligopoly, including market structure, barriers to entry, product differentiation, and strategic interdependence, before reviewing the principal theoretical models used to explain firm behaviour in oligopolistic markets. Building on this theoretical foundation, the paper examines the evolution of India's telecommunications industry, with particular attention to the entry of Reliance Jio, the resulting changes in competition and market concentration, and the responses of incumbent firms and regulators. It then compares the structure and competitive dynamics of India's telecommunications market with those of telecommunications markets in other countries, considering the influence of regulatory frameworks, government policy, and national context on market outcomes. Through these analyses, the paper demonstrates how economic theory can be applied to explain the behaviour of firms operating in concentrated markets and the factors that shape competition in different industries.

2. Theory of Oligopoly: Structure, Characteristics, and Models

An oligopoly is a market structure in which a small number of large firms dominate the industry. These firms are interdependent, meaning each firm's decisions (such as pricing or output) affect the others. Oligopolies are characterised by high barriers to entry, significant market power, and competition through both price and non-price strategies, such as advertising and product differentiation. In some cases, firms may collude to increase joint profits.

2.1. What is the structure of oligopoly?

An oligopoly is a market structure characterised by a small number of dominant firms, where product differentiation is central to competition and market power. Firms deliberately distinguish their products through branding, design, quality, technology, and customer experience, creating unique identities that reduce direct substitutability. This differentiation builds brand loyalty, allowing firms some control over pricing and helping them maintain a stable customer base. At the same time, firms are highly interdependent, meaning that any change in product features, marketing strategy, or pricing by one firm directly influences the decisions of others. As a result, firms operate in a strategic environment, constantly refining their differentiation strategies to stay competitive.

The structure is reinforced by high barriers to entry, which protect existing firms and their differentiated products. These barriers include large capital requirements, access to advanced technology, strong distribution networks, and established brand recognition. New entrants must not only overcome financial

and technical challenges but also compete against firms with deeply embedded consumer trust, making entry difficult.

Within this structure, non-price competition dominates. Firms invest heavily in advertising, innovation, and product development to enhance perceived differences and attract consumers. Even when products serve similar functions, the value created through differentiation significantly influences consumer choice. Overall, the structure of an oligopoly is defined by a few powerful firms whose success depends largely on their ability to continuously differentiate their products while responding strategically to competitors.

2.2. Difference between oligopoly and perfect competition

An oligopoly consists of a small number of large firms, whereas a perfect competition market contains a very large number of small firms, none of which can influence the market individually. In an oligopoly, product differentiation is central, with firms deliberately creating differences in branding, quality, and features to reduce substitutability and build customer loyalty; in contrast, perfect competition is defined by complete product homogeneity, where all goods are identical and differentiation is entirely absent. Oligopolistic firms possess some degree of price control due to differentiation, while firms in perfect competition are price takers, forced to accept the market price.

Additionally, firms in an oligopoly are interdependent, carefully anticipating competitors' reactions before making decisions; in perfect competition, firms act independently, as no single firm's actions affect others. Barriers to entry are high in oligopoly, protecting established firms and their differentiated products, whereas free entry and exit characterise perfect competition. Overall, oligopoly is shaped by strategic behavior, differentiation, and limited competition, while perfect competition is characterised by uniform products, no market power, and purely price based competition.

2.3. Difference between oligopoly and monopoly

An oligopoly is characterised by the presence of a small number of dominant firms, whereas a monopoly exists where there is only a single firm controlling the entire market. In an oligopoly, product differentiation is an active and strategic tool, with firms competing through branding, innovation, quality, and design to distinguish their products from those of rivals; in contrast, in a monopoly, differentiation exists passively, as the product is unique simply because there are no close substitutes, not because of competitive pressure. Oligopolistic firms are highly interdependent, meaning each firm must consider how competitors will react to changes in price, output, or product features; on the other hand, a monopolist faces no competitive reactions at all, allowing it to make decisions independently.

Furthermore, oligopolies experience limited but real competition, which constrains firms and encourages continuous innovation and differentiation to maintain market share; conversely, a monopoly faces no direct competition, reducing the need for innovation or differentiation beyond maintaining its dominant position. While both market structures are protected by high barriers to entry, in an oligopoly these barriers protect a small group of firms from new entrants, whereas in a monopoly they protect a single firm's exclusive control over the market. Overall, oligopoly is defined by strategic rivalry and competitive differentiation, while monopoly is defined by absolute market dominance and inherent product uniqueness.

Overall, while oligopoly relies on active and strategic differentiation among competing firms, a monopoly as a firm produces a unique product with no close substitutes, which gives it full market power, eliminating the need for competitive positioning.

2.4. Difference between oligopoly and monopolistic competition

An oligopoly is characterised by a small number of dominant firms, whereas monopolistic competition consists of a large number of firms, each holding only a small share of the market. In an oligopoly, product differentiation is highly strategic and significant, with firms investing heavily in branding, innovation, and design to create strong identities and reduce substitutability; in contrast, in monopolistic competition, differentiation exists but is relatively limited, often based on minor variations in style, quality, or marketing, resulting in weaker brand loyalty. Oligopolistic firms are highly interdependent, meaning that each firm must consider the likely reactions of its few competitors when making decisions; on the other hand, firms in monopolistic competition act independently, as no single competitor has enough influence to affect the market significantly.

Furthermore, oligopolies are protected by high barriers to entry, such as large capital requirements, advanced technology, and strong brand dominance, which make it difficult for new firms to enter the market; in contrast, monopolistic competition is characterised by low barriers to entry, allowing new firms to enter easily with slightly differentiated products. In an oligopoly, competition is largely based on non-price factors, as firms avoid price wars and instead focus on maintaining differentiation and market power; conversely, in monopolistic competition, although non-price competition exists, firms are more constrained and may rely relatively more on pricing due to the presence of many close substitutes. Overall, while oligopoly involves strong, strategic differentiation among a few powerful and interdependent firms, monopolistic competition reflects weaker differentiation among many independent firms, leading to limited market power and less strategic behaviour.

2.5. Agreements: Collusive and non-collusive

A collusive oligopoly is one in which firms cooperate with one another to reduce competition and maximize joint profits. Firms may agree on prices, output levels, or market sharing, through formal agreements. The most common form of formal collusion is a cartel, where members explicitly coordinate production or pricing decisions. A classic example is OPEC (Organization of the Petroleum Exporting Countries), where major oil producing countries coordinate output levels to influence global oil prices. By limiting supply, member firms or countries can keep prices higher than they would be under competitive conditions. Collusion leads to price stability and higher profits, but it is often illegal in many countries because it harms consumers by raising prices and restricting choice. However, collusive agreements are difficult to sustain in the long run because individual firms may have an incentive to cheat by secretly lowering prices to increase their market share.

On the other hand, a non-collusive oligopoly is where firms do not formally cooperate, but remain highly interdependent. Each firm independently sets prices, output, and product strategies while carefully anticipating how competitors will react. A key feature of this structure is product differentiation, where firms seek to distinguish their products through design, technology, quality, and branding in order to reduce substitutability and build brand loyalty. This strategic behaviour often results in price rigidity, as firms avoid frequent price changes to prevent price wars. Instead, competition mainly occurs through non-price competition, such as advertising, branding, and continuous product innovation that strengthens differentiation. A suitable example is the global smartphone industry, dominated by firms such as Apple and Samsung. These companies do not collude on prices, yet each firm's pricing decisions, product launches, and technological innovations strongly influence the other's actions. Similar behaviour can also be observed in the soft drink industry, where firms like Coca-Cola and PepsiCo compete mainly through branding, taste variation, and marketing rather than price. Likewise, the airline

industry reflects a non-collusive oligopoly, with major carriers such as Delta Air Lines, American Airlines, and United Airlines differentiating themselves through service quality, route networks, loyalty programs, and brand reputation while closely monitoring each other's pricing and capacity decisions. As a result, competition is intense but strategic, with firms relying heavily on differentiation rather than aggressive price competition to maintain market share and profitability.

These concepts can be further explained through the Prisoner's Dilemma, which highlights the strategic behaviour and interdependence that exist within oligopolistic markets. The theory explains that although firms in a collusive oligopoly may benefit collectively from cooperation through stable prices and higher profits, each firm still has an incentive to act in its own self-interest by lowering prices or increasing output to gain greater market share. Similarly, in a non-collusive oligopoly, firms constantly anticipate competitors' reactions when making pricing and output decisions. Since firms cannot fully trust rivals to cooperate, they often avoid aggressive price competition and instead focus on product differentiation, branding, and innovation to maintain profitability and competitive advantage.

2.6. Models of oligopoly

Economists have developed several models to explain how firms behave in oligopolistic markets. These models focus on how firms respond to competitors when making decisions about price, output, and market strategy. One of the earliest is the Cournot (1838) model. The model explains oligopoly behaviour when firms compete by choosing output levels rather than prices. Each firm decides how much to produce while assuming that competitors' production decisions remain unchanged. Because firms are interdependent, each firm's output decision affects market price and the profits of rival firms. The model shows that firms in an oligopoly generally produce more than a monopoly but less than under perfect competition.

Another important model is the Bertrand (1883) model. In this framework, firms compete mainly through prices rather than output levels. Firms producing similar or identical products attempt to attract customers by lowering prices. This process can lead to intense price competition, forcing prices down toward marginal cost, similar to the outcome under perfect competition. The Bertrand model demonstrates how strong price competition can emerge even when only a few firms dominate the market.

A further explanation of oligopoly behaviour is provided by the kinked demand curve model (Sweezy, 1939). The model explains why prices in oligopolistic markets often remain stable over time. It assumes that if one firm raises its price, competitors will not follow, causing the firm to lose customers. However, if the firm lowers its price, competitors are expected to match the price cut to protect their market share. As a result, firms become reluctant to change prices, leading to price rigidity and relatively stable market prices.

3. India's Telecommunications Industry

3.1. Transformation of India's telecommunications industry

Before 2016, India's telecommunications sector consisted of several major operators competing in an oligopolistic market. Bharti Airtel was the largest firm by revenue, generating ₹966 billion while operating in 20 countries (Mishra & Tarannum, 2019). Vodafone served approximately 203 million subscribers, while Idea Cellular, part of the Aditya Birla Group, had around 191 million subscribers and accounted for 19% of industry revenue. State-owned operators BSNL and MTNL also remained significant market participants. Together, these firms formed a relatively stable competitive structure.

The competitive landscape changed dramatically with the launch of Reliance Jio on 5 September 2016. Unlike incumbent operators, Reliance Jio adopted an all-IP network architecture and entered the market with an aggressive pricing strategy. Its introductory “Welcome Offer” provided customers with free voice calls, text messages, and mobile data (Jadav, 2018). The strategy proved highly successful, allowing Reliance Jio to acquire 100 million subscribers within six months, the fastest subscriber growth recorded by any telecommunications company worldwide (Mishra & Tarannum, 2019; Deck, 2020). At the same time, average mobile data prices in India fell from approximately ₹225 per GB to ₹18.50 per GB within three years (Deck, 2020). This intense price competition placed considerable financial pressure on incumbent firms. During 2016 alone, Vodafone reported losses of US\$5.5 billion over two quarters, while Bharti Airtel’s revenue declined by 55% over the same period (Mishra & Tarannum, 2019).

Incumbent operators responded through consolidation. Vodafone and Idea Cellular merged on 31 August 2018 to form Vodafone Idea, creating a company with approximately 400 million subscribers and 42% of industry revenue, although it also inherited debt of ₹1.08 trillion (Jadav, 2018). Bharti Airtel likewise strengthened its market position by acquiring Telenor India in 2018 and Tata Teleservices’ consumer mobile business in 2020 (Telecom Regulatory Authority of India (TRAI), 2025). Meanwhile, Reliance Communications exited the market after abandoning its planned merger with Aircel (Jadav, 2018). As a result, the industry evolved from a four-player market into a three-player oligopoly dominated by Reliance Jio, Bharti Airtel, and Vodafone Idea.

Changes in market concentration are reflected in the industry’s Herfindahl-Hirschman Index (HHI). Data from the CMIE Prowess database show that the HHI declined from 0.44 in 1998 to 0.11 between 2012 and 2015 as liberalisation encouraged the entry of new competitors. Following Reliance Jio’s entry and the subsequent wave of mergers, however, market concentration increased, with the HHI rising to 0.23 by 2022 (Karonnon, 2023). Consistent with this trend, TRAI data for March 2025 show that Reliance Jio held 40.60% of subscribers, followed by Bharti Airtel with 33.69% and Vodafone Idea with 17.75% (TRAI, 2025). Over the same period, the total subscriber base declined from 219.82 million in 2024 to 205.36 million in 2025, continuing a contraction that has persisted since FY2020–21 (TRAI, 2025, 2026).

The evolution of average revenue per user (ARPU) further illustrates the changing competitive dynamics of the industry. During the intense price competition triggered by Reliance Jio’s entry, industry ARPU fell to a low of ₹128.40 between January and March 2019. As competition shifted from aggressive price discounting towards a more concentrated market structure, ARPU recovered steadily, reaching ₹182.95 between April 2024 and March 2025; a year-on-year increase of 19% (Deck, 2020; TRAI, 2026). These developments indicate that India’s telecommunications industry has transitioned from a relatively fragmented market to a concentrated three-firm oligopoly, with higher market concentration accompanied by rising revenues per subscriber.

3.2. Literature on India’s telecommunications industry

The emergence of Reliance Jio and the subsequent restructuring of India’s telecommunications sector have generated a substantial body of research. This literature can be broadly categorised into seven themes. The first examines the telecommunications industry as an oligopoly. The second analyses Reliance Jio’s market entry strategy. The third considers whether Reliance Jio’s pricing strategy constituted predatory pricing. The fourth investigates Reliance Jio’s financial impact on incumbent firms. The fifth examines changes in market concentration and industry restructuring, including shifts in

market shares, mergers, acquisitions, and concentration indices. The sixth evaluates the effects of Reliance Jio on consumer welfare. The seventh and final theme examines the regulatory response to the structural changes that followed the company's emergence and rapid growth.

Oligopolistic competition is a common feature of the telecommunications industry because markets are typically dominated by a small number of large firms whose pricing and production decisions are mutually interdependent. This characteristic is well established in oligopoly theory, which suggests that the strategic decisions of one firm influence the behaviour and performance of its competitors. Several studies have examined whether these characteristics are evident in telecommunications markets.

Saha et al. (2022) reviewed 56 studies published between 1990 and 2020 to identify the characteristics of telecommunications industries across the world. They found that market concentration is most commonly measured using the HHI and concentration ratios. Their review also indicates that competition typically occurs in two stages. Firms initially compete for access to spectrum licences before subsequently competing through the pricing of telecommunications services. In addition, the authors conclude that telecommunications markets exhibit several characteristics associated with oligopoly. First-mover advantages tend to diminish over time, stable oligopolies are more likely to coordinate prices than engage in sustained price wars, and industries characterised by high entry and exit costs frequently resolve competition through mergers rather than the exit of competing firms.

Sarkar and Shukla (2020) provide further support for these findings in the Indian context. They argue that telecommunications markets are characterised by substantial barriers to entry because firms incur high sunk costs when establishing networks, benefit from significant economies of scale, and operate in markets with strong network externalities. Collectively, these characteristics make entry into the Indian telecommunications industry particularly costly for new competitors.

The second stream of literature examines the strategy that Reliance Jio employed to enter the Indian telecommunications market. Gupta et al. (2019) and Sarkar and Shukla (2020) explain that Reliance acquired a 96% stake in Infotel in 2010. Infotel was the only company to secure broadband wireless access licences for all telecommunications circles during India's 2010 4G spectrum auction, providing Reliance with a nationwide platform from which to launch Reliance Jio.

Sarkar and Shukla (2020) further interpret Reliance's strategy through the concept of the "deep pocket". According to this theory, Reliance's profits from its oil, petrochemical, and retail businesses enabled the company to absorb substantial losses during Reliance Jio's market entry. In contrast, incumbent telecommunications operators, many of which carried significant debt, had far less capacity to sustain prolonged losses arising from aggressive price competition.

Gupta et al. (2019) also identify technology as a key element of Reliance Jio's entry strategy. Rather than relying on the circuit-switched 2G and 3G infrastructure used by incumbent operators, Reliance Jio deployed an all-IP and VoLTE (Voice over LTE) 4G network. The company also bundled its telecommunications services with a range of digital applications, enabling it to benefit from network externalities. As more consumers adopted these applications, switching costs increased, making customers less likely to migrate to competing providers.

Jadhav (2018) documents the commercial execution of this strategy. On 5 September 2016, Reliance Jio launched its voice and data services through the "Welcome Offer", which provided customers with free access to telecommunications services. According to Reliance, the company acquired 16 million subscribers within 26 days of launch, 50 million subscribers within 83 days, and more than 100 million subscribers within 180 days, representing the fastest subscriber growth achieved by any

telecommunications company. By March 2019, Reliance Jio's subscriber base had expanded to 306.7 million customers.

The third stream of literature examines whether Reliance Jio's market entry strategy constituted predatory pricing. Several authors argue that Reliance Jio's pricing behaviour exhibited characteristics consistent with predatory pricing. Sarkar and Shukla (2020) explain that predatory pricing theory suggests that firms with substantial financial resources can initially sustain losses by charging prices below competitive levels, with the expectation of recovering those losses through higher prices after weakening or eliminating competitors.

Bhatia and Palepu (2016), as reviewed by Mawandia (2021), argue that Reliance Jio's strategy of offering telecommunications services at extremely low prices prompted the Cellular Operators Association of India (COAI) to lodge a formal complaint with the Department of Telecommunications. However, Mawandia (2021) notes that the Competition Commission of India (CCI) dismissed the complaint. The CCI concluded that attracting customers through low prices is not, in itself, anti-competitive in a market where multiple firms compete. Furthermore, pricing below average variable cost does not constitute predatory pricing unless it forms part of an anti-competitive strategy undertaken by a firm with a dominant market position. As Reliance Jio did not possess such a dominant position when it entered the telecommunications market, the CCI concluded that its pricing strategy did not constitute predatory pricing. Mawandia (2021) also reports that the CCI found that Reliance Jio's bundled offers with companies such as Apple did not amount to predatory pricing.

Jadhav (2018) presents a related regulatory perspective. The Telecom Disputes Settlement and Appellate Tribunal determined that the Department of Telecommunications should establish tariff regulations to prevent predatory pricing and that telecommunications companies wishing to introduce free service plans should first obtain regulatory approval. Overall, while the theoretical literature suggests that Reliance Jio's pricing strategy shared characteristics associated with predatory pricing, Indian competition authorities concluded that the company's conduct did not meet the legal criteria for predatory pricing.

The fourth stream of literature examines the financial impact of Reliance Jio's market entry on incumbent telecommunications operators. Mawandia (2021), using Gross Adjusted Revenue (GAR) data published by the TRAI, demonstrates Reliance Jio's rapid financial growth following its launch. Although the company recorded average revenue of negative ₹303 crore in 2016, its revenue increased to ₹7,466 crore in 2017, ₹31,097 crore in 2018, and ₹44,800 crore in 2019. Over the same period, the revenues of incumbent operators declined substantially. Bharti Airtel's revenue fell from ₹48,880 crore in 2016 to ₹26,971 crore in 2018 before recovering slightly to ₹28,827 crore in 2019. Vodafone's revenue declined from ₹34,680 crore in 2016 to ₹26,625 crore, while Idea Telecom's revenue fell from ₹29,436 crore to ₹7,777 crore in 2018 before disappearing following its merger with Vodafone. Similarly, BSNL's revenue declined from ₹13,110 crore to ₹8,392 crore between 2016 and 2018, while Aircel's revenue fell from ₹11,164 crore in 2016 to zero by 2018 after it ceased operations (Mawandia, 2021).

Other measures of financial performance show a similar pattern. Using financial data published by Capitaline, Gupta et al. (2019) report that Reliance Jio recorded losses of ₹15.71 crore in 2016 and ₹31.37 crore in 2017 before earning a profit of ₹720 crore in 2018. During the same period, Bharti Airtel's profits declined from ₹5,826 crore in 2016 to ₹3,197 crore in 2017 and ₹1,123 crore in 2018. Vodafone reported losses of ₹2,306 crore in 2016, ₹822 crore in 2017, and ₹4,491 crore in 2018

following its merger with Idea. Idea Telecom recorded a loss of ₹3,528.79 crore in 2018, while Reliance Communications reported losses of ₹1,286 crore in 2017 and ₹23,912 crore in 2018. Gupta et al. (2019) also note that Reliance Communications generated revenue of only ₹8,014 crore in 2018 while recording an annual loss of ₹3,090.40 crore.

The literature attributes these outcomes to several factors. Gupta et al. (2019) argue that Reliance Communications' financial difficulties reflected its continued reliance on costly and outdated CDMA technology, in contrast to the more efficient 4G networks deployed by Reliance Jio and other competitors. Mishra and Tarannum (2019) further observe that before Reliance Jio's entry in 2016, Vodafone and Idea accounted for 20% and 19% of industry revenue, respectively, illustrating the substantial decline experienced by previously dominant operators following the intensification of competition.

The fifth stream of literature examines changes in market concentration and industry restructuring, including shifts in market shares, mergers, acquisitions, and concentration indices following Reliance Jio's entry. Using data from the TRAI, Lahiri (n.d.) concludes that Reliance Jio had become the largest telecommunications operator in India by 2023. Earlier evidence presented by Jadhav (2018) illustrates the speed of this transformation. In January 2016, Bharti Airtel was the market leader with 24.15% of India's wireless subscribers, while Telenor held 5.05% and numerous smaller operators each accounted for less than 1% of the market. By January 2017, however, Reliance Jio had already secured 7.88% of subscribers, while Reliance Communications held 7.54%. By January 2018, Reliance Jio's market share had doubled to 15.76%, whereas Reliance Communications' share had fallen to 1.05% and Idea Telecom's had declined to 4.50% (Jadhav, 2018).

The literature further demonstrates that the growth of Reliance Jio fundamentally reshaped the competitive structure of the industry. Following the merger of Vodafone and Idea in August 2018, Vodafone Idea became the largest operator with 35.12% of mobile subscribers in January 2019. This position proved temporary. By 2020, Reliance Jio had become the market leader with 32.56% of subscribers, compared with 28.45% for Vodafone Idea and 28.38% for Bharti Airtel. Reliance Jio further increased its market share to 35.30% in 2021, while Airtel held 29.62% and Vodafone Idea's share declined to 24.58% (Mawandia, 2021). According to TRAI data reported by Lahiri (n.d.), Reliance Jio's market share reached 40.60% by March 2025, compared with 33.69% for Bharti Airtel and 17.75% for Vodafone Idea (TRAI, 2026).

These changes in market shares were accompanied by significant industry consolidation. Vodafone and Idea merged in 2018 to strengthen their competitive position following Reliance Jio's entry, while Bharti Airtel expanded through the acquisition of Telenor India and Tata Teleservices. Reliance Communications also sought to improve its competitive position through a proposed merger with Aircel in 2016, although the transaction was ultimately abandoned. Collectively, these developments demonstrate that Reliance Jio's entry accelerated both market concentration and structural change within India's telecommunications industry.

Additional evidence on market concentration is provided by studies that employ concentration measures such as the HHI and the four-firm concentration ratio (CR4). Using Department of Telecommunications data on 4G subscribers between 2010 and 2020, Jomit, Savitha and Joseph (n.d.) conclude that the Indian telecommunications market evolved from a moderately concentrated, tightly oligopolistic industry into one characterised by substantially higher levels of concentration. In 2010, both the HHI and the CR4 indicated a moderately concentrated market with a tight oligopoly among the leading firms.

However, concentration increased markedly after 2018. By 2019, the HHI had risen to 2,678.79 and the CR4 to 97.86%, indicating that the market was dominated by a small number of major operators. This trend continued in 2020, when the HHI increased to 2,738.63 and the CR4 reached 99.24%, meaning that almost all subscribers were served by the four largest telecommunications companies (Jomit, Savitha and Joseph, n.d.).

Karonnon (2023) reaches a similar conclusion using subscriber data covering the period from 1998 to 2022. The study finds that market concentration declined between 1998 and 2012, as reflected by falling HHI values, before increasing steadily between 2012 and 2022. Karonnon (2023) attributes this reversal to the entry of Reliance Jio and the subsequent mergers among incumbent operators responding to the competitive pressure created by Reliance Jio's expansion. The study therefore concludes that the Indian telecommunications industry has evolved into a moderately concentrated oligopoly characterised by competition among a small number of dominant firms.

The sixth stream of literature examines the welfare effects of Reliance Jio's entry into the Indian telecommunications market. Gupta et al. (2019) and Mawandia (2021), both of whom conducted primary surveys of telecommunications subscribers, report that most respondents believed they had benefited from Reliance Jio's low prices and high-quality network. Both studies found that consumers perceived Reliance Jio's services to be less expensive than those of competing operators while also offering superior service quality.

The literature also highlights the magnitude of these consumer benefits. Gupta et al. (2019) estimate that Reliance Jio's entry generated consumer savings of approximately ₹60,000 crore (around US\$10 billion). Similarly, Deck (2020) and Mawandia (2021) report that the average price of mobile data in India fell from approximately ₹225 per gigabyte before Reliance Jio's market entry to around US\$0.09 per gigabyte afterwards.

Despite these positive findings, Gupta et al. (2019) acknowledge important limitations in their research. Both surveys were conducted primarily among telecommunications subscribers in India's major cities, particularly students aged between 15 and 20 years, limiting the representativeness of their findings for the wider population of Indian mobile subscribers. Mawandia (2021) also considers the implications of the increasing dominance of Reliance Jio, concluding that the combined market shares of Reliance Jio, Bharti Airtel, and Vodafone Idea, which together account for around 90% of subscribers, indicate that the industry is more appropriately characterised as a concentrated oligopoly than as a competitive market.

The seventh and final stream of literature examines the regulatory response to the structural changes in India's telecommunications market following the emergence of Reliance Jio. Lahiri (n.d.) discusses the recommendations arising from the Telecom Regulatory Authority of India's 2021 consultation and its subsequent 2023 proposals on the Ease of Doing Business in India. These recommendations focused on streamlining licensing requirements and reducing regulatory barriers to entry for new telecommunications operators.

Jadhav (2018) highlights a different aspect of the regulatory response, namely the ongoing negotiations between the Department of Telecommunications and mobile operators over the calculation of AGR, which determines the licensing fees payable by telecommunications companies. These negotiations have continued in recent years, with both Bharti Airtel and Reliance Communications announcing revised telecommunications plans in response to proposed increases in licensing fees imposed by the Department of Telecommunications.

Collectively, these studies suggest that Indian telecommunications regulators have sought to balance the promotion of competition with the financial sustainability of the industry. Rather than imposing extensive intervention following Reliance Jio's market entry, regulators have generally focused on reducing barriers to entry while continuing to address licensing and revenue-related disputes between the government and market participants.

4. International Comparisons

4.1. India and the U.S.: Similar oligopolies, different economics

In terms of market structure, both the U.S. and India are telecommunications markets that exhibit oligopolistic characteristics and are dominated by three main players. In the U.S., the three companies that dominate the country's mobile telephone market are T-Mobile, Verizon, and AT&T. AT&T has roughly 120 million customers, T-Mobile has 114 million customers, and Verizon has 130 million customers, giving each of these companies a significant portion of the U.S.' mobile subscribers (Statista, 2025). Within India, the three main telecommunications providers are Reliance Jio, Bharti Airtel, and Vodafone Idea, each of which holds a significant portion of the country's mobile phone subscribers. Vodafone Idea has around 477 million subscribers, Reliance Jio has 492 million subscribers, and Bharti Airtel has 340 million subscribers (IBEF, 2025). Furthermore, both markets are considered to be "highly concentrated" industries; both have Herfindahl-Hirschman Index values within the threshold of 0.15 that indicates a highly concentrated market (HHI thresholds of 0.15 for "moderate" concentration and 0.25 for "high" concentration). Within the U.S., the HHI of the mobile phone industry is around 3,200, while in India the industry HHI is around 2,700 (Congressional Research Service, 2019; Jomit et al., n.d.). Each of these markets converged into such an industry through slightly different methods, however. In the U.S., the market developed into such an oligopoly through mergers between existing telecommunications companies; the 2019 merger between T-Mobile and Sprint reduced the number of major American mobile phone companies from four to three (Hazlett & Crandall, 2025). India's formation into an oligopoly between Reliance Jio and its established competitors is a result of Reliance Jio's initiation of below-market fees for mobile data plans for consumers; those established providers began to merge with one another in reaction to the introduction of these low prices (Kumar et al., 2020). Finally, another difference between the two markets is the number of publicly-owned telecommunications providers within each market; while the U.S. does not have any publicly-owned telecommunications companies, India does have one major publicly-owned telecommunications provider: Bharti Airtel (BSNL, or Bharat Sanchar Nigam Limited).

The size of each market's companies and the revenue that they generate is another area of critical difference between the two countries. The three major mobile phone companies within the U.S. generate significant revenue, however; Verizon alone generated revenues of US\$134.8 billion during the 2024 calendar year (Verizon, 2025). Furthermore, its competitors include AT&T, which earned around US\$122 billion in 2024 (Statista, 2025), and T-Mobile, which earned around US\$81 billion in 2024 (Statista, 2025). In contrast, the total revenue earned by all Indian telecommunications companies during the 2024 calendar year was around US\$43 billion; Reliance Jio earned the bulk of the country's telecommunications revenue, with Vodafone India earning US\$5 billion, Bharti Airtel earning US\$4.9 billion, and BSNL earning US\$2 billion (IBEF, 2025). Furthermore, while Reliance Jio has the U.S.' number of mobile subscribers (its 492 million customers have 48 times the mobile subscribers of the U.S.' leading mobile provider, Verizon), it earns less than 0.5% of the revenue of the U.S.' leading

mobile company (Verizon's revenue of US\$134.8 billion versus Reliance Jio's revenue of US\$330 billion). Thus, despite the similarities in each market's structure, the cost of communications and telecommunications in the two countries are vastly different.

Within the telecommunications markets of both India and the U.S., the cost of data and other communication services is vastly different. In India, the cost of 1 GB of data is around ₹6.98, while in the U.S. the cost of 1 GB of mobile data is around ₹903 (Competition Commission of India, 2021). Furthermore, within each market the average revenue earned from the mobile phone customers of each country is vastly different. Within India, the average revenue earned from the mobile customers of the country's telecommunications providers is around ₹182.95 per customer per month (TRAI, 2026). In the U.S., however, the average revenue earned from mobile accounts of companies like Verizon is US\$139.77 per account per year (Verizon, 2025). These cost differences are the result of the differing economic levels of consumers within each country; the average income of citizens of India is around US\$5,300 per year, while that of the U.S. is around US\$60,000 per year (World Bank, 2025; World Bank, 2025). Additionally, another reason for which data costs are so low in India compared to the U.S. is as a result of the entry of Reliance Jio, which began offering below-cost rates for mobile data to subscribers of India; its entry into the U.S.' market 20 years ago led to a reduction in the prices of mobile data within the country (Kumar et al., 2020).

There are also differences between the regulatory frameworks of each of the two countries. Within the U.S., telecommunications is regulated by the Federal Communications Commission (FCC); established in 1934, the FCC is an agency of the U.S. government that regulates communications companies, implements Federal telecommunications laws, and licensing of telecommunications providers and facilities (LiveLaw, 2026). The government of the U.S. is traditionally "market-led" in the regulation of the telecommunications and information industries; it traditionally avoided direct regulation of private telecommunications companies, especially after shifting to the Federal Communications Commission to regulate telecommunications after the creation of the FCC in 1934 (U.S. Government, 1998). Despite this "market-led" regulation, however, telecommunications licensing by the U.S. government is traditionally a laborious and often lengthy process; many telecommunications companies have complained of the length of the licensing process established by the Federal Communications Commission and the difficulty in obtaining licenses for the FCC to regulate them (van de Kaa & Greeven, 2017). In contrast, telecommunications in India is regulated by two different bodies. The Telecom Regulatory Authority of India (TRAI) is responsible for recommending telecommunications policies for India and ensuring fair competition between telecommunications providers in the country (TRAI, 2026). However, responsibility for licensing telecommunications companies and allocating spectrum to those telecommunications companies lies with the Department of Telecommunications (DoT), an agency of the Government of India that provides telecommunications services and policies for India's telecommunication providers (Mitra et al., 2022). Thus, there are differences between the regulatory authorities of the U.S. and India; the government of the U.S. established the FCC and it directly regulates telecommunications within the U.S., while the governments of India established both the DoT and the TRAI and both of which regulate telecommunications within the nation.

Finally, one of the last areas of difference between the two telecommunications markets is each industry's contribution to the GDP of each country. Within India, telecommunications contribute around 6.5% to 8.2% of the GDP of the nation (Gupta et al., 2019). One study of the telecommunications industry within India discovered that the telecommunications industry contributed to more than half of

the total growth in the information and communication technology (ICT) sector of India between 2001 and 2008 (Narayana, 2011). The telecommunications industry within the U.S. contributes around 2.6% to the GDP of the U.S.; in 2016, the telecommunications industry contributed around US\$475 billion to the GDP of the nation. Furthermore, the value of the U.S.'s mobile industry is estimated to be around US\$825 billion (Compass Lexecon, 2022). In contrast to the U.S., whose telecommunications industry contributes less to its GDP, India's telecommunications industry contributes a significantly higher percentage of its GDP; India's telecommunications industry contributes around 5 times the percentage of the GDP of the U.S.' telecommunications sector. Additionally, while telecommunications contributes a smaller percentage of the GDP of the U.S. than of India, the economic size of each market is vastly different; the U.S. has the largest telecommunications industry in the world in terms of total revenue of its leading providers.

4.2. India and China: Similar oligopolies, different institutions

India and China together account for more than a third of the world's mobile subscriptions, and each is governed by three dominant operators. Yet the resemblance between them is one of form rather than of formation. China's oligopoly was constructed deliberately by the state; India's emerged from competitive disruption. Comparing the two markets across structure, operator revenues, pricing, regulation, and economic contribution demonstrates how far institutional origin shapes a market's character even where its structure appears identical.

China's mobile market is a triopoly of state-owned enterprises. China Mobile, China Telecom, and China Unicom are all ultimately controlled by the State-owned Assets Supervision and Administration Commission, and between them they account for effectively the whole market, their combined mobile customer bases standing at roughly 1.77 billion connections at the end of 2024, of which China Mobile alone served 1,004 million (China Mobile, 2025; China Telecom, 2025; China Unicom, 2025). A fourth licensee, China Broadcasting Network, received a 5G licence in 2019 but remains marginal and depends on network sharing with China Mobile. India's structure looks superficially similar but is differently constituted, with Reliance Jio holding 40.60% of wireless subscribers, Bharti Airtel 33.69%, and Vodafone Idea 17.75%, alongside the state-owned BSNL at 7.87% (TRAI, 2026). The decisive difference is causal rather than descriptive. China's three-operator configuration was engineered by the government through the 2008 restructuring of the sector (Fu & Mou, 2010), whereas India's arose from Reliance Jio's entry and the defensive mergers and exits that followed it. In China, concentration was a policy instrument; in India, it was a market outcome. The contrast in ownership follows from this: China's majors are wholly state-controlled, while India's are majority private, with BSNL a residual public presence rather than the dominant one.

The revenue asymmetry between the two markets is considerable. China Mobile reported operating revenue of RMB 1,040.8 billion for 2024, approximately US\$143 billion, an increase of 3.1% year on year (China Mobile, 2025). China Telecom reported RMB 529.4 billion, approximately US\$73 billion, with net income of RMB 33.0 billion (China Telecom, 2025), and China Unicom RMB 389.59 billion, approximately US\$54 billion, with profit attributable to shareholders of RMB 20.61 billion (China Unicom, 2025). Together the three generated close to RMB 1.96 trillion, or roughly US\$270 billion, against gross revenue of about ₹3.72 lakh crore, roughly US\$43 billion, for the entire Indian telecom sector in FY2025 (IBEF, 2025). China Mobile alone therefore earns more than three times the revenue of India's whole industry. Subscriber numbers do not account for this. China Mobile's 1,004 million customers are roughly twice Reliance Jio's 492 million (IBEF, 2025), a ratio of two to one, set against a

revenue ratio of more than three to one measured against the whole Indian market rather than against Reliance Jio alone.

Pricing explains most of the gap. China Mobile's mobile average revenue per user stood at approximately RMB 46.8 per month in 2024, roughly US\$6.50, against an Indian industry ARPU of ₹182.95, roughly US\$2.20 (TRAI, 2026). Chinese subscribers thus pay around three times what Indian subscribers pay for broadly comparable service. Both markets, however, are inexpensive by international standards: mobile data in mainland China averaged about US\$0.38 per gigabyte in 2023, ranking twenty-eighth of 237 territories surveyed and cheaper than the U.S., Germany, or the U.K., while India remains the cheapest market in the world (Cable.co.uk, 2023). The difference between them is therefore one of degree rather than of kind. Both deliver low-cost connectivity at enormous scale, but the mechanism differs: India's price collapse was produced by a private price war, whereas China's successive tariff reductions have been repeatedly directed by the government as instruments of policy.

The regulatory architectures diverge more sharply than the market structures do. China's sector is overseen by the Ministry of Industry and Information Technology, which sits within the State Council and combines policymaking, licensing, spectrum allocation, and enforcement in a body that is an organ of government rather than an independent regulator (van de Kaa & Greeven, 2017; Omdia, 2026). India divides these functions, confining TRAI largely to a recommendatory role while licensing and spectrum management remain with the Department of Telecommunications and the central government (Mitra et al., 2022). The distinction is more than administrative. India assigns spectrum through competitive auction, whereas China's allocation of 3G standards to particular carriers, with TD-SCDMA assigned to China Mobile, WCDMA to China Unicom, and CDMA2000 to China Telecom, was an administrative act designed in part to promote an indigenous standard (van de Kaa & Greeven, 2017). Liu and Jayakar (2012) characterise the underlying difference as one of policy style, arguing that Chinese telecommunications policy making is non-incremental and shaped by macro-level political rearrangement, while India's follows a more classical incremental model shaped by litigation and negotiation. The same contrast is visible in infrastructure. China Telecom and China Unicom co-build and co-share their 5G network under state coordination, and China Mobile shares with China Broadcasting Network, whereas India's operators have built competing networks in parallel.

Measured on a consistent basis, the sector also weighs more heavily on China's economy. Using GSMA's common methodology, which is applied identically across countries and therefore permits direct comparison, mobile technologies and services contributed US\$1.2 trillion to China's economy in 2024, equivalent to 6.2% of GDP, rising to US\$1.5 trillion and 7.2% in 2025 (GSMA, 2025, 2026). The corresponding GSMA estimate for India is 4.7% of GDP, although this figure dates to 2021 and the gap in vintage should be borne in mind (GSMA Intelligence, 2022). Mobile therefore contributes more to the Chinese economy both absolutely and proportionally, which reverses the pattern observed in the comparison with the U.S., where India's share was proportionally the larger of the two. This is consistent with the wider literature on both economies: Narayana (2011) finds that telecommunications services accounted for more than half of the total growth contribution of India's information and communication technology sector between 2001 and 2008, while comparable analysis identifies the digital economy as the single most significant contributor to Chinese growth and productivity since accession to the World Trade Organization (Wu & Yu, 2022).

Most revealing, however, is the divergence in trajectory. China's market has entered what industry analysis describes as a zero-growth phase, with China Unicom reporting flat full-year revenue and

earnings, China Mobile growing total revenue by only 0.4% across the first three quarters, and capital expenditure declining in successive years (Light Reading, 2026). India, by contrast, recorded ARPU growth of roughly 19% in a single year (TRAI, 2026). Two oligopolies of near-identical structure are thus moving in opposite directions: China's saturated and plateauing at high penetration with a mature 5G base, India's still extracting rising revenue from a market only recently consolidated. The comparison suggests that structural concentration alone is a poor predictor of pricing power, since the more concentrated market is the one with less room to grow.

The similarities are nonetheless substantial and should not be understated. Both are the world's largest markets by subscriber base, together accounting for over a third of global mobile subscriptions. Both are capital-intensive industries with high barriers to entry rooted in spectrum and infrastructure. Both retain a meaningful state presence in an industry treated as strategic national infrastructure, articulated through the Digital India and Digital China programmes respectively. Both passed through periods of consolidation that reduced the field to three principal operators. Both, as Jayakar and Liu (2014) argue in their comparative study of universal service in the two countries, have used telecommunications policy as a means of extending connectivity to underserved populations in ways that serve to legitimize the state itself. And both, notwithstanding the differences in mechanism, have delivered mobile data at prices far below those prevailing in developed markets.

India and China therefore present the same structural template resting on opposite institutional foundations. China's concentration was designed, its revenues are high, its market mature and plateauing, and its regulator an arm of the state. India's concentration was emergent, its revenues low relative to its subscriber base, its market still growing, and its regulatory authority deliberately constrained. The lesson for this study is that a three-firm oligopoly can be arrived at by state design or by market competition, and that while the resulting structures may be measured identically, their economic character, their pricing dynamics, and their implications for stakeholders differ profoundly according to how they came about.

5. Conclusion

The Indian telecommunications industry provides a compelling illustration of how oligopolistic markets evolve in practice. The theoretical characteristics of oligopoly discussed in this paper, including strategic interdependence, high barriers to entry, product differentiation, and non-price competition, are clearly reflected in the transformation of the sector following the entry of Reliance Jio. Rather than simply increasing competition, Reliance Jio fundamentally reshaped the market through aggressive pricing, technological innovation, and rapid subscriber growth. These developments triggered mergers, acquisitions, and the exit of weaker competitors, ultimately transforming a fragmented market into a concentrated three-firm oligopoly. At the same time, the evidence shows that concentration has not eliminated competition. Instead, firms continue to compete through network investment, technological advancement, service quality, and pricing strategies, demonstrating the dynamic nature of competition within oligopolistic industries.

The international comparisons reinforce the conclusion that market concentration alone provides only a partial explanation of market performance. Although India, the U.S., and China each exhibit highly concentrated telecommunications industries dominated by a small number of firms, the origins and consequences of that concentration differ substantially. The U.S. represents a mature private-sector oligopoly characterised by high revenues and relatively expensive telecommunications services. China

represents a state-directed oligopoly in which ownership, regulation, and industrial policy are closely integrated. India, by contrast, illustrates how a similar market structure can emerge through competitive disruption rather than government design. These comparisons demonstrate that similar levels of concentration can coexist with very different pricing outcomes, regulatory arrangements, growth trajectories, and contributions to national economic development.

Overall, this study demonstrates that oligopoly should not be viewed as a single or uniform market structure but rather as a framework within which competition can take many different forms. The experience of India's telecommunications industry shows that a concentrated market can simultaneously deliver intense competition, rapid technological innovation, expanding consumer access, and substantial reductions in prices. More broadly, the findings suggest that understanding oligopolistic markets requires moving beyond conventional measures of market concentration to consider the institutional, regulatory, and historical factors that shape how competition develops. Only by considering these broader influences can the behaviour and performance of modern telecommunications markets be fully understood.

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