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Oligopoly Theory Meets Practice: Collusion, Innovation, and Market Concentration in the 21st Century

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Abstract

In the 21st century, oligopolistic markets have become central to understanding economic dynamics, where a few dominant firms shape competition, innovation, and growth. This review addresses the nexus of oligopoly theory and practice in the real world, and it identifies collusion, innovation, and market concentration. On the basis of economic literature, it recognises erosion of competition in developed and emerging economies, leading to higher market power, reduced business dynamism, and implications for inclusive growth. Collusion implicit and explicit enables companies to set high prices, hurting the poor more and killing productivity. Innovation driven by Schumpeterian creative destruction can spur growth but increases top income inequality following an inverted-U path with trade-offs in patent rights and degree of competition. Market concentration, measured by tools like

the Herfindahl-Hirschman Index (HHI), arises due to economies of scale and network effects, such as in Big Tech and agriculture, with regressive impacts on consumers and labour shares. Within the Nigerian context of being part of sub-Saharan Africa, high mark-ups in non-tradable sectors enlarge poverty and inequality, while anti-competitive behaviour raises the cost of living and limits exports. The review compares theoretical paradigms (e.g., Cournot, Bertrand) to real gaps in digital and global markets, suggesting that the regulation should be adjusted to encourage the dynamic competition and equitable development. Results suggest that policies should manage the trade-offs between efforts to encourage innovation and instruments against concentrations to combat their adverse impacts, and they indicate opportunities of future research in new economic constellations.

Keywords: Oligopoly Theory, Collusion, Innovation and Market Concentration

1. Introduction

Oligopoly theory is a theory of markets that gives a theoretical foundation of the markets that are dominated by a few firms having a control on the prices, output and strategies. Classical models such as Cournot, Bertrand, and Stackelberg have non-collusive equilibria, whereas real repeated play allows tacit collusion, as it is consistent with super game theories of punitive enforcement of cooperative solutions (Aghion, Cherif & Hasanov, 2021; International Monetary Fund [IMF], 2019a) ^[7, 39]. According to the IMF (2019b) ^[40], market concentration and strength have increased in the 21st century, thus, limiting market competition and impacting inclusive growth. This review looks at the connection between theory and practice as it relates to collusion, innovation, and concentration in the emerging markets, particularly in Nigeria. On an international level, low competition could lead to higher mark-up and less dynamism. This situation is especially harmful to low income countries and contributes to inequalities (Fidelis, 2023; Philippon, 2019) ^[26, 43].

The sub-Saharan Africa have a higher markups compared to other developing regions, especially in non-tradable goods. This can be attributed to low expatriate shares, increased investments, and productivity (IMF, 2019a) ^[39]. This trend is also evident in markets like telecommunications and agriculture. These markets often have monopolies that set high prices, harming competition and livelihoods. The regressive effects of food and medicine prices are notable (Idisi, Adeagbo, Maduekwe, Fidelis & Udoh, 2025; Urzua, 2013) ^[36, 47].

The collusion processes maintain high prices, both openly and secretly, with invisible cartels accounting for 4 percent of GDP in developing economies (Ivaldi, Jenny, & Khimich, 2016) ^[41]. According to Schumpeterian models, creative destruction is beneficial. However, concentration can create barriers to entry, and both have their trade-offs (Aghion, Akcigit, Bergeaud,

Blundell & Hemous, 2016; Aghion, Cherif & Hasanov, 2021) ^[3, 7]. Small farmers rely heavily on inputs like seeds, which stifles their growth and limits poverty relief in a developing country like Nigeria. Additionally, agricultural subsidies from developed nations further undermine local agricultural products (Wang *et al.*, 2020) ^[48].

This study synthesises literature to bridge theory-practice gaps, using game theory, concentration metrics like HHI, and case studies from tech and agriculture. It deals with regulatory problems, and suggests policies to promote dynamic competition to enhance inclusive growth in situations such as that typified by Nigeria, where weak institutions increase the ills of concentration.

2. Introduction to Oligopoly Theory

Introduction to Oligopoly Theory The theory of oligopoly describes the behaviour and actions of firms that provide very similar products or services to consumers, resulting in a small number of large suppliers (Severová, Kopecká, Svoboda & Brčák, 2011) ^[45]. Would you like to have a market where there are few large players who dictate what to do? That is an oligopoly arrangement with the few firms controlling and the decision they make on prices, output, or investment is transferred to their competitors. The barriers to entry are very high in these markets such as large start-up costs or proprietary technology, deterring new entrants (Aghion *et al.*, 2021) ^[7]. This allows companies to sell at higher prices than they would have been in a busy and competitive market (Idisi, Ojokojo & Fidelis, 2023) ^[37]. Firm interaction is the core part of the oligopoly theory. They're like chess players, always guessing their opponent's next move. Models like Cournot (where firms set quantities), Bertrand (where they compete on price), and Stackelberg (where one leads and others follow) help explain this. In Cournot, firms pick output assuming rivals won't budge, landing at a balance where no one gains by changing alone. According to Aghion *et al.* (2021) ^[7], Bertrand's price wars can drive prices to rock bottom for similar products, though real-world twists like unique branding stop that.

The leader-follower relationship shown by Stackelberg shows the impact of an aggressive move by one firm to the others. The oligopolies are everywhere these days, take the think-tech giants, drug firms or telecoms. In richer societies innovation or inequality may be killed by a few firms which are too powerful in their hands. In less developed ones, there is a risk of raising prices by concentrated economies like banking and harming the quality of competition and ruining the quality of living. This is evident in the case of Big Tech, which enjoys the network effects (the larger the user base of a platform the better it is), not only efficient, but also able to dominate the market and push the suppliers to the fringes, not to mention that it creates fairness problems (Atherton and Chevallier, 2023) ^[11]. Greater problems are related to equitable development by which oligopolies are related. Less competition, rising inequality, and market entry can leave the poor vulnerable to poverty, and these phenomena can bring people out of poverty through innovation (Aghion *et al.*, 2021) ^[7]. Nevertheless, that has a negative aspect, some power in the market, e.g. patents, might stimulate companies to become creative but the concentration can be so high that it will stop innovations. This is more difficult with digital markets and international commerce, where mega companies are going viral due to the technological

innovations and reducing the labour portion of revenues and halting overall growth.

In short, oligopolies are a balancing act of rivalry versus collusion, innovation versus dominance (Bailey, Pitelis & Tomlinson, 2020) ^[14]. Knowing them will decode the contemporary problems, such as technology monopoly or whether the world markets are fair.

3. Methods

The review is a compilation of the prevailing literature to relate the theory of oligopoly with practical concepts, particularly, collusion, innovation, and market concentration. This review study engaged literature search to identify patterns and gaps between theory and practice. It also examines scholarly articles, industry research, and case studies from the 21st century in both developed and developing economies, focusing on technology, agriculture, and pharmaceuticals. The journals on economic theories and data, reports on global trends, and case studies of specific companies, including tech giants and seed firms, will be included. The analysis used game theory to model how firms respond to one another. It utilised the Herfindahl-Hirschman Index (HHI) to assess market concentration and econometric tools to measure price markups and the overall economic effects of productivity. Game theory helps achieve stable results. This may offer an intriguing view of theory and reality, though it is sometimes incomplete due to issues in emerging economies.

4. Co-Operation Amongst the Oligopolistic Markets

The Collusion is the collusion between the firms so as to reduce the competition by cooperating openly or secretly in order to gain most out of the profit. These agreements are the overt collusion manifested and may be between cartels, fixing of prices or segmentation of market and most of them are secret. Tacit co-operation is much more elusive wherein, state of affairs, firms derive their action devoid of consensus and by common action through a sharedly conceived action founded on repetitive transactions in the market. The same behaviour of the companies as is outlined in the economic theory is still evident, especially repeated game models. Deviations can be imposed in that way say, by temporary price cut on a company that values more long-term payoffs than short-term malfeasance (Atherton and Chevallier, 2023) ^[11]. This can only be held together in the framework of patience and the capability to cheque on competitors hence the omnipresent risk of collusion in the concentrated markets.

In developed economies, tacit collusion can be viewed on the example of Big Tech digital platforms such as Amazon. The cycles create cycles which guarantee the dominance as the network effects increase the value of a platform with increase in the number of people. These companies do not have to meet in smoky rooms and mutually sustaining competitive policies can also result in the same kind of thing, e.g. the price or service conditions that would make entry undesirable (Bessen, 2017). In agriculture, the situation is more extreme with concentration, as since the 1990s, the leading four companies in seeds and fertilisers have dominated more than fifty percent of the world market. Intellectual property has been shaken by mergers, allowing the joint price increases to make it more expensive to the farmers, especially in monopolistic markets where common knowledge lowers competition (Wang *et al.*, 2020) ^[48]. The

cartels enhance economic problems in developing economies such as sub-Saharan Africa.

Collusive practices in essential goods like food and medicines inflate prices by 15-50%, disproportionately affecting the poorest households who spend a larger share of income on necessities (Ivaldi *et al.*, 2017). One such implication is the retrogressive price adjustment in concentrated markets of commodities of primary necessity like food, which have the most impact on the low-income earners and increase inequality (Urzua, 2013) ^[47]. These impacts extend to the economies, decreasing the purchasing power and access to basic commodities, which chokes greater development goals.

The economic effects of collusion are so far reaching. This is translated to the consumers as less production and less choice as companies reduce production to remain profitable. United States The Rising markups where the prices exceed the cost of production have been linked to the decline of labour shares and business dynamism since the rate of entry of new firms into the markets where the collusive giants operate is less (De Loecker & Eeckhout, 2020) ^[25]. This reduces the rate of entry and exit slows the rate of productivity growth since the resources get allocated to less productive firms. The stakes are even greater in developing countries: non-tradable collusion in areas such as banking or telecommunication increase living costs, crunt down investment, and lower export competitiveness, which in turn are all detrimental to the reduction of poverty (IMF, 2019a) ^[39].

Collusion is also known to kill innovation as it acts as a form of entry. New companies that fear the market strength of colluding incumbents find it difficult to compete, and thus experiment less and develop technologies. This misallocation of resources where dominant firms hoard market share rather than innovate reduces overall economic efficiency, particularly in sectors critical to growth like technology and agriculture (Baqae & Farhi, 2019; Fidelis, Anaso & Achemu, 2025 ^[27]; Fidelis, Otitoju, Idisi, Anazo & Achemu, 2024 ^[28]). In poorer countries, these barriers amplify challenges, as concentrated markets limit access to affordable inputs, constraining small businesses and farmers.

Regulators counter collusion with antitrust policies, but challenges persist. A historical example is the 1958 AT&T antitrust case, which mandated patent sharing, spurring technological diffusion and job creation (Baker, 2019) ^[15]. The current day is presenting new challenges to the online platforms. The traditional means of antitrust regulation are less helpful in the conditions of their data advantage and network effects, new laws must be developed in response to the power of the suppliers and access to the market (Khan and Vaheesan, 2017) ^[42]. Bad institutions in the emerging economies are generating things out of a bad situation. Certain cartels may take up an entire 4% of the GDP and cause the inability of other sectors (Ivaldi *et al.*, 2017). This can be executed by reinforcing the enforcement and detecting that by empowering regulatory agencies by giving them more freedom and funds, and by focusing on the poor like food.

Collusion is conditional on the market nature. The fact that firms can effortlessly observe and contrast costs because of homogeneous merchandise such as agricultural inputs and even sustains the demand because of which firms can organise also helps bring coordination (Coyle & Muhtar,

2023) ^[23]. Nevertheless, large purchasers like retail chains also have an opportunity of disrupting collusion by identifying and reversing the price increment generated by the existence of counter-pressure in the market (Cherif, Engher & Hasanov, 2020) ^[21]. These regulators face challenges and hence need patent rights to drive their innovation (Akcigit, Grigsby, Nicholas & Stantcheva, 2018) ^[9].

The world struggles with a harmful incentive due to farm subsidies. These subsidies benefit farmers in developing economies and result from a concentration of market structures in input markets (Furceri & Ostry, 2019) ^[29]. Such subsidies could be adjusted through multilateral agreements so poor countries can support their own agriculture and reduce reliance on monopolies. Collusion is a major problem for economic growth; it distorts markets thus causing overpricing and blocking new ideas. It creates unequal competition in developing countries, contributing to poverty.

5. Innovation and Competitive Dynamics

The oligopolistic markets are fuelled by innovation where companies are compelled to innovate new products or processes in a bid to have a competitive advantage. Nevertheless, it may as well cement the monopoly of the largest corporations which is counterintuitive of the market authority and growth. Innovation will be a result of competition within some limit, as per the economic theory. The intensity of competition is moderate to encourage companies to invest in new ideas and high to discourage companies to invest because of low and very low profit margins (Aghion *et al.*, 2015) ^[6]. The technologically advantaged firms are likely to be innovative to sustain the advantage and the trailing firms may invest little in the case where the productivity gap between the leaders is too high and the trailing companies are unable to follow them (Aghion, 2016) ^[2]. This is a two sided affair in as far as patents are concerned. The latter give time-based marketing power, thereby encouraging risky research and development (R&D) whose companies benefit in case they achieve a breakthrough (Baqae and Farhi, 2020; Baqae and Farhi, 2020).

The problem with very wide, or very long patents, is however, that it may exclude the possibility of competition and, consequently, lock-in the leaders. The innovation would enhance the upper income inequality because the wealth of the entrepreneur would be concentrated among the high earners (Aghion *et al.*, 2019) ^[4]. But in the case of disruptive innovations as new firms are entering, they can make more social mobility by opportunity creation without necessarily promoting total inequality. Background problems: the wealthier the family, the more opportunities the child has to become an inventor, and that is why the access to an innovative talent is limited socioeconomically (Bell *et al.*, 2019). Technology, e.g. Uber, is an example of a company that employs network effects where value growth with no more potential users in a platform to innovate at a high rate, improving services like efficiency of ride sharing. However, this can stress out suppliers, such as drivers, which results in income disparities (Baker and Salop, 2015) ^[16]. In medications, patents have been applied to finance costly drug development and the advent of medications could considerably lower the costs, improving health care costs in the low-income group and aid in improving health

results (Tenn & Wendling, 2014) ^[46]. In agriculture, biotechnological advances, such as genetically modified seeds, have boosted yields, but seed prices rose 325% between 1985 and 2011, placing a heavy burden on small farmers in regions like sub-Saharan Africa, where access to affordable inputs is critical (Wang *et al.*, 2020) ^[48].

The telecommunication industry is a typical example of how competition drives innovation; companies face pressure to adopt technologies like artificial intelligence and the Internet of Things in order to strengthen their market positions, investing heavily in these areas (Armstrong & Sappington, 2006 ^[10]; Giorcelli, 2019). The risk is spread out, and technology develops more quickly due to collaborative R&D efforts, such as industry groups focused on electric vehicles (Cherif & Hasanov, 2019). However, there is a danger in tacit collusion, where companies secretly agree to limit competition. This can reduce the motivation to innovate since less competition lowers the ability to improve (Phlips, 2019).

Regulators face the challenge of pitching for innovation while preventing firms from taking over markets. Strong intellectual property rights protect new ideas, but excessive protection can create barriers to entry, especially in technical and pharmaceutical fields (Gilbert, 2020) ^[30]. Tax incentives for R&D encourage investment, but high tax rates risk driving talented inventors to other countries, reducing domestic innovation (Akcigit *et al.*, 2016) ^[8].

As Baker (2019) ^[15] argues, the antitrust policy must develop to judge the mergers not only based on their effect on the price but also on their effect on innovation and entry onto the market to keep the competition dynamic. Competition in oligopolies is driven by innovation but has to be managed to avoid the power of oligopolies. In other industries such as technology and pharmaceuticals, the incentive should be balanced between open markets and encouraging innovation to promote progress at the general level other than dominance.

6. Market Concentration: Trends and Effects

The extent of control that a small number of firms has is shown by market concentration, which can be expressed using tools such as the Concentration Ratio (CR4) the share of the top four firms or the Herfindahl-Hirschman Index (HHI), the sum of the squared shares of all firms. Less competitive ones are less competitive, as power is held by the key actors (De Loecker & Eeckhout, 2020) ^[25]. Mega companies gain economies of scale, therefore reducing the cost of production, invention of technology and soft laws that do not restrict mergers and anti-competitive practises. Digital platforms lead to enhanced network effects, which strengthen market leaders as each new user enhances the value of the platform because the value of the product is increased (Bessen, 2017). New entrants are also barred by mergers and tariffs or restrictive zoning and this also entrenches the old place of the firm (Hsieh & Moretti, 2019) ^[35]. The monopolised industries such as banking are also highly concentrated in the developing economies to overcharge and reduce the competitiveness of international trade (IMF, 2019a) ^[39].

Focusing on the consumers will result in the price increase and reduction of the options. Through the coordination of competition reduction, cartels are able to make super normal profits of 15-50 percent and undetected cartels in poorer countries can cost up to 4 percent of GDP especially in

necessities such as food (Ivaldi *et al.*, 2016) ^[41]. In sub-Saharan Africa, high markups in non-tradable sectors, such as banking or telecommunications, reduce wages, investment, and export growth, perpetuating poverty by raising living costs (IMF, 2018) ^[38]. The poorest are affected the most since they are those who use a bigger part of the income on necessities, which worsens inequality (Urzua, 2013) ^[47].

This is also caused by concentration that kills competition by reducing the rate of entry of the new firms hence killing innovation and productivity. Powerful companies that have high markups and charge way above their costs are less likely to invest in labour, which leads to the loss of labour-shares and increased income inequalities (Autor *et al.*, 2017) ^[13]. Nevertheless, concentrated markets are not all bad. In such countries as South Korea, such giants as Samsung use scale to promote exports, to provide high-wage employment and technological spill overs, which rent-seeking firms in closed markets cannot get because their profits are not widely distributed (Hausmann *et al.*, 2007) ^[34].

In the agricultural input industry, which includes seeds, the concentration of the top four companies with more than 50 percent of the market prevents innovation because of patent protection, which is not accessible to small competitors (Wang *et al.*, 2020) ^[48]. The advanced economies also have the negative effect of subsidising markets, disadvantaging farmers in the developing world and their competitiveness, which affects employment and poverty reduction (Agbonika, Abah, Fidelis, Hannah and Haruna, 2025; Cherif, Hasanov and Zhu, 2016) ^[1, 22]. In the US, markups have been on the rise since the 1980s, and this is based on an increasing market power, yet investment is lagging probably due to the fact that concentration is not a result of productivity improvements but rather barriers (Gutierrez & Philippon, 2017) ^[33].

7. Theory vs. Practice: Alignments and Gaps

Oligopoly theory assumes firms compete independently, reaching a balance known as a Nash equilibrium where no firm benefits by unilaterally changing its strategy. Models like Cournot, which focuses on output competition, Bertrand, which centers on price wars, and Stackelberg, which highlights leadership dynamics, predict outcomes better than monopoly but worse than perfect competition (Phlips, 2019). However, real-world markets often deviate from these one-shot models. Occasional communication allows firms to coordinate and keep prices stable through punishment for offenders, with one punishment being temporary price cuts; in line with game theories, where businesses form sustainable cooperatives over time. We see this in markets like technology and agriculture (Giorcelli, 2019; OECD, 2019).

The rise of digital markets challenges old assumptions. Platforms like Amazon use network effects, which attract more users and create more value while keeping marginal costs close to zero. This leads to a winner-takes-all situation (Bessen, 2017). Other effects of these dynamics include market dominance that cannot be explained using alternative models, such as the Bertrand model, which assumes infinite capacity and price competition. The international market adds complexity, as businesses compete in different market structures, enhancing their ability to retaliate against competitors in those structures (OECD, 2019). This forms a

multi-market context, which boosts tacit collusion that classical theory does not fully address.

One issue identified by the theory is that concentrated markets enable less efficient firms to survive and slow down productivity growth. This is evident in how developing markets such as that of Nigeria and India are focusing towards the US, leading to less competitive market being eliminated (de Loecker & Eeckhout, 2018) ^[24]. However, global distortions like agricultural subsidies in developed countries places the local farmers at a disadvantage in developing nations due to unfair trade practices. These issues are not part of the theoretical discussion and are absent from central models (Atkin, Khandelwal & Osman, 2017) ^[12].

Innovation theories, including the inverted-U relationship between innovation and competition, are problematic for UK companies. Restricted and controlled competition among leading firms discourages innovation (Aghion, Blundell, Griffith, Howitt, & Prantl, 2009) ^[5]. Furthermore, the dominance of digital giants raises the barriers for new companies, which stifles dynamism. This trend is no longer predictable with older theories (Autor *et al.*, 2017) ^[13].

8. The Recommendation of Policy and Practise

The existing reality would require the theory to be moved into dynamic models that focus on the innovation and market penetration rather than fixed price warfare and global trade and inequality effect needs to be put into the theory in such a way that the existing interconnected markets are initiated. The regulators would also have to alter the rules of competition in regard to the power of suppliers on online platforms with the greatest focus on the lowest levels. Bring more identification to the major industries like food using the stand-alone agencies. One is based on innovation and entry into a new firm, and the other one is that the exchange of data between the technological sector is encouraged. Support innovation with balanced patents and R&D tax breaks, but avoid losing talent to tax hikes. Coordinate globally on farm subsidies to help poorer countries. Firms should aim for export-led growth in high-tech sectors for wider benefits, invest in learning from others, and diversify innovations to meet regulations.

9. Conclusion

Oligopoly theory explains how a few firms shape markets, but real-world collusion, innovation, and concentration add twists. Collusion raises prices, innovation drives progress but can lock in power, and concentration cuts competition while offering scale benefits. Policies need to adapt for digital markets, firms should balance rivalry with collaboration, and theory must catch up to global and tech changes to support fair growth.

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