THE DAMOCLES SWORD HANGING OVER COLLUSION BY CODE: IS CCI ADEPT TO TACKLE ALGORITHMIC COLLUSION?

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ABSTRACT

Life in the twenty-first century is unimaginable without the use of artificial intelligence, and so are the digital markets. Pricing algorithms are the order of the day, being implemented by all e-commerce platforms. The flip side of using these algorithms entails a myriad of new challenges, one of them being algorithmic collusion. The buried threat of these algorithms 'accidentally' colluding to achieve optimal profits for the deploying entities is looming large. While the conventional risks associated with AI, such as the absence of intent, human involvement, and proof of collusion, remain, the authors have highlighted several novel risks linked to algorithmic collusion. These involve the black-box problem of AI, cross-border collusion, algorithmic collusion aiding price discrimination, algorithms as a catalyst in inducing collusion in markets that are not 'collusion-prone', and the ineffectiveness of the leniency regime in addressing algorithmic collusion. A cross-jurisdictional analysis highlights the steps undertaken by China, the EU, and the US to address the elephant in the room. While China has adopted an interventionist approach, the US and the EU are spearheading the race to combat algorithmic collusion. In light of this, we trace India's tryst with algorithmic collusion and suggest adopting a proactive approach. The Competition Commission of India's Market Study on Artificial Intelligence and Competition has been a welcome step, with the hope that it will be followed by practical implementations rather than remaining theoretically valid. We argue that modern ex-ante methods of adding noise to the market, adopting a due diligence standard and a self-audit framework, coupled with ex-post methods of capacity building and lifting the AI veil in competition law, can keep in check the burgeoning problem of algorithmic collusion.

Keywords: Algorithmic collusion, Digital eye, Ex-ante methods, Ex-post methods, Price discrimination, Tacit collusion, Concerted action.

I. INTRODUCTION.....301

II. ALGORITHMIC COLLUSION: THE NEW FRONTIER.....302

A. What is Collusion in the Conventional Sense? 302

B. Algorithmic Collusion v. Price Discrimination.....303

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C. Theories of Harm 303
1. Messenger model 305
2. Hub-and-spoke configuration 306
3. Predictable agent 306
4. Digital eye or autonomous algorithmic collusion.....307

III. CROSS-JURISDICTIONAL APPROACHES TO ALGORITHMIC COLLUSION 308

A. China 308
1. Implications for Indian competition law 311

B. European Union.....311
1. Meeting of minds or meeting of algorithms? 311
2. Concerted practices 312
3. Parallel conduct using algorithms v. algorithmic collusion 314
4. EU's jurisprudential development on algorithmic collusion 315
5. Implications for Indian competition law 316

C. United States 316
1. Widening the Bounds of Concerted Action: The Topkins Saga 317
2. The Algorithm Made Me Collude: The RealPage Saga ..318
3. Parallel Legislative Developments in the US 319
4. Implications for Indian Competition Law.....320

IV. ALGORITHMIC COLLUSION: A MISSED OPPORTUNITY FOR CCI? 320

A. Stress on Evidence-Based Approach by the CCI 321

B. A Sliver of Hope: CCI's Recognition of the Possibility of Algorithmic Collusion.....322

C. A Need for Resurrection: The Grave of the Digital Competition Bill, 2024 324

V. STRUCTURAL RISKS ASSOCIATED WITH ALGORITHMIC COLLUSION.....325

A. The Overemphasis on Human-Conduct Driven Collusion 325

B. Absence of Smoking Gun Evidence 326

C. Fallouts of the Black Box Problem.....327

D. Proving Intent without Intention?.....329

E. Algorithms as a Catalyst in Inducing Collusion in Markets which are not "Collusion Prone" 330

F. Algorithmic Collusion Aiding Price Discrimination via Consumer Profiling 331

G. Algorithmic Collusion: The Achilles Heel of Leniency Regime? 332

H. Cross-Border Collusion.....334

VI. ALGORITHMIC ACCOUNTABILITY: SUGGESTIONS.....334

A. Ex-Ante Methods.....335
1. From Reactive Investigations to Preventive Monitoring: Self-audit framework.....335
2. Towards A Due Diligence Standard.....336
3. Adding Noise to the Market 336

B. Ex-Post Methods.....337
1. Capacity Building for Detection of Algorithmic Collusion.....337
2. Lifting the AI Veil in Competition Law 338

VII. CONCLUSION.....340

I. INTRODUCTION

"What will happen to society, politics and daily life when nonconscious but highly intelligent algorithms know us better than we know ourselves?"[1]

If you are witnessing the phenomenon of "made for you" advertisements and irresistible prices on your favourite products, there is a high probability that Artificial Intelligence (**'AI'**) or, more colloquially, an algorithm is at work. The digital economy has spurred widespread use of algorithms that convert large datasets into value through targeted advertisements, product recommendations, and dynamic pricing. Platforms like Amazon,[2] Flipkart, and Uber rely on such tools to adjust prices in real time based on demand and supply. One example of this is perhaps the price discrepancy in e-commerce applications between Android and iPhone users.[3] This growing reliance has, in turn, caught the eye of the competition regulators worldwide, with the unresolved question: Can algorithms collude?

[1] Yuval N Harari, *Homo Deus: A Brief History of Tomorrow* (HaperCollins Publishers 2017).
[2] Le Chen, Alan Mislove and Christo Wilson, 'An Empirical Analysis of Algorithmic Pricing on Amazon Marketplace' [2016] WWW'16: Proceedings of the 25th International Conference on World Wide Web <https://dl.acm.org/doi/10.1145/2872427.2883089> accessed 1 January 2026.
[3] Ram Sundaram, 'Same Trips, Different Price: Fare Differential Between iPhone, Android Stumps App-Cab Users' *Times of India* (Chennai, 26 December 2024) <https://timesofindia.indiatimes.com/city/chennai/same-trips-different-prices-fare-differential-between-iphone-android-stumps-app-cab-users/articleshow/116666956.cms> accessed 4 January 2026; Ishika Gupta 'Medianama Analysis: Is Differential Pricing Shaping Up as a Quick Commerce Trend? A look at Price Disparities across Blinkit, Instamart, and Zepto' (*Medianama*, 21 January 2025) <www.medianama.com/2025/01/223-medianama-analysis-differential-pricing-instamart-blinkit-zepto/> accessed 4 January 2026.

The recent Market Study on Artificial Intelligence and Competition[4] by the Competition Commission of India (**'CCI'**) is a step towards answering this question. This is the first comprehensive study in India to theoretically recognise the existence of tacit collusion by algorithms without any human intervention. This means that AI can be employed by companies to distort competition, leading to the subsequent question: How to detect and tackle algorithmic collusion in the Indian markets?

To address these questions, the article is divided into seven sections: (I) General overview of the questions that the authors tend to explore, (II) The concept of algorithmic collusion and its associated theories of harm, (III) A cross-jurisdictional analysis of the United States (**'US'**), the European Union (**'EU'**), and China (IV) An analysis of how India has fared so far in its dealings with algorithmic collusion, (V) The risks associated with algorithmic collusion, (VI) Suggestions and (VII) Conclusion.

II. ALGORITHMIC COLLUSION: THE NEW FRONTIER

A. What is Collusion in the Conventional Sense?

The Competition Act, 2002[5] prohibits collusion, which involves three ingredients. Firstly, an agreement entered into by persons or enterprises, secondly, which directly or indirectly determines the purchase or sale prices and thirdly, results in an appreciable adverse effect on competition (**'AAEC'**). Here, "agreement" includes practices carried on and decisions taken by persons, associations of persons, or enterprises. This definition is broad enough to encapsulate action in concert,[6] a form of tacit collusion.

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[4] Competition Commission of India, *Market Study on Artificial Intelligence and Competition* (September 2025) <www.cci.gov.in/images/marketstudie/en/market-study-on-artificial-intelligence-and-competition1759752172.pdf> accessed 1 January 2026.
[5] Competition Act 2002, s 3(3).
[6] Competition Act 2002, s 2(b).

B. Algorithmic Collusion v. Price Discrimination

Algorithms are employed in cases of both algorithmic collusion and price discrimination. While price discrimination refers to charging different consumers different prices for similar or identical products, algorithmic collusion pertains to market-distorting activities that occur without any human intervention in pricing.[7]

To realise the price discrimination, AI needs to be trained on large consumer data sets in order to categorise consumers into types. The objective behind price discrimination is to maximise overall profit even when the cost of production remains the same. This is based on consumers' susceptibility to pay for a product.[8] The epitome of this would be the use of AI to offer personalised discounts to price-sensitive consumers such as students.

On the other hand, algorithmic collusion is akin to collusion in the conventional sense, except that an AI is at play instead of humans. This facilitates tacit collusion without any agreement or communication to collude.

C. Theories of Harm

Although algorithms help improve efficiency by adapting to competitors' prices and consumer demand in real-time, 'collusion by code'[9] occurs when

[7] Zhang Xu, Mingsheng Zhang and Wei Zhao, 'Algorithmic Collusion and Price Discrimination: The Over-Usage of Data' (*arXiv*, 13 February, 2024) <https://arxiv.org/html/2403.06150v1> accessed 6 January 2026.

[8] Miroslava Marinova, 'Algorithmic Price Discrimination as Exploitative Abuse under Article 102 TFEU' (*Centro Competencia*, 29 October 2025) <https://centrocompetencia.com/algorithmic-pricing-discrimination/> accessed 4 January 2026.

[9] Commission, 'Guidelines on the Applicability of Article 101 of the Treaty on the Functioning of the European Union to Horizontal Co-operation Agreements' (1 June 2023) <https://competition-policy.ec.europa.eu/system/files/2023-07/2023_revised_horizontal_guidelines_en.pdf> accessed 4 January 2026.

an algorithm gradually studies and adapts to the pricing strategies of rival entities, using this insight to forecast their likely responses. It then applies the most advantageous counter-strategy, aiming not only to maximise short-term gains but also to secure long-term profitability by setting optimised market prices, thereby giving rise to anti-competitive outcomes.

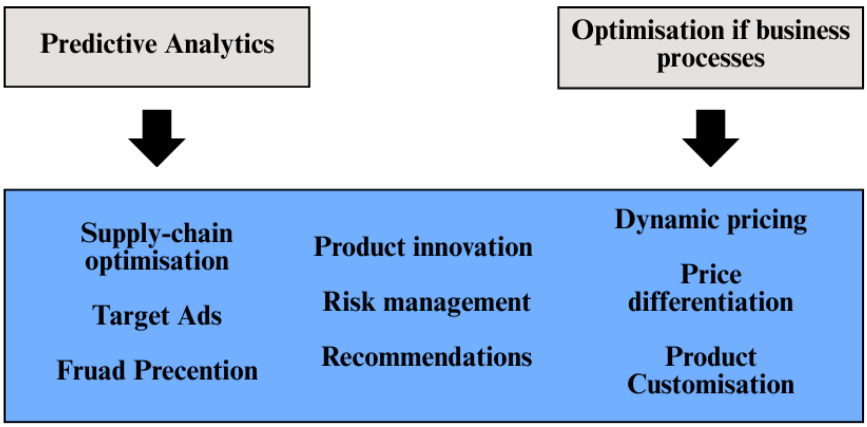

Figure 1: Applications of Algorithms in Business[10]

Such algorithmic interactions may evade existing competition law, as the primary agents are algorithms rather than individuals, and the behaviour does not exhibit the traditional features of cartel activity, such as explicit agreements or *sub rosa* communications among competitors. This means that evidence of both explicit cartel agreements, such as collusive emails, call or meeting records, and *sub rosa* or implicit agreements, such as mutual understanding between competitors and pricing anomalies, is absent in algorithmic collusions. Therefore, algorithmic collusion lacks the requirement

[10] Pedro Gonzaga, 'Algorithms and Collusion' (*OECD*) <https://asia.competitioncooperation.eu/wp-content/uploads/2019/01/Day-2-Session-I-Pedro-GONZAGA.pdf> accessed 1 January 2026.

of direct or indirect proof to demonstrate a "meeting of the minds" between competitors in order to qualify as tacit collusion or cartelism.[11]

There are four identified modes of algorithmic collusion:[12]

1. MESSENGER MODEL

In this scenario, algorithms are used as pawns by humans/firms who mutually agree to collude by fixing cartel prices irrespective of market fluctuations. This requires an explicit agreement among competitors, and thus, the use of an algorithm as a means of collusion does not introduce a novel competition concern. Algorithms, in the messenger model, are used as a 'means' just as computers, telephones, email, or messaging platforms, to facilitate cartel conduct.

An illustration of the model is the *Poster & Frames case*,[13] where the sellers conspired to market their posters on the Amazon Marketplace, using a common pricing algorithm to fix prices.

In fact, in the *1994 Airlines case*,[14] six airlines were found to be operating a joint computerised booking system that facilitated coordinated price-fixing, which was consequently held to be anti-competitive. This reflects the

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[11] *Re: Chief, Materials Manager – I*, CCI Reference Case No 07 of 2013; *All India Tyres Dealers Federation v Tyre Manufacturers, MRTP*, CCI Case: RTPE No 20 of 2008.

[12] Maurice E Stucke and Ariel Ezrachi, 'Two Artificial Neural Networks Meet in an Online Hub and Change the Future (of Competition, Market Dynamics and Society)' [2017] Oxford Legal Studies Research Paper No 24/2017, University of Tennessee Legal Studies Research Paper No 323, <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2949434> accessed 3 January 2026.

[13] 'Decision of the Competition and Markets Authority: Online Sales of Posters and Frames Case 50223' (*Competition and Markets Authority*, 12 August 2016) <https://assets.publishing.service.gov.uk/media/57ee7c2740f0b606dc000018/case-50223-final-non-confidential-infringement-decision.pdf> accessed 5 January 2026.

[14] Martin Tolchin, 'Six Airlines Settle Suit by Government on Fares' *The New York Times* (18 March 1994) <www.nytimes.com/1994/03/18/business/six-airlines-settle-suit-by-government-on-fares.html> accessed 4 January 2026.

"messenger scenario," where collusion is executed through the use of an algorithm as an intermediary.

2. HUB-AND-SPOKE CONFIGURATION

In a hub-and-spoke cartel, there is an exchange of sensitive information between horizontal competitors (spokes) *via* a common contractual intermediary (hub) operating at a different level of the supply chain.[15] For this arrangement to be established, it is necessary to show the existence of an agreement or collusion, illustrating that the spokes relied on the hub to exchange anti-competitive information.[16]

In the digital context, this model emerges when rival firms rely on the same pricing algorithm or draw from a shared data set to ascertain price.[17] While an isolated vertical agreement may not necessarily produce anti-competitive effects, the proliferation of such arrangements can result in a hub-and-spoke structure, with the algorithm developer acting as the hub to facilitate coordinated industry pricing, thereby inflating prices.[18]

3. PREDICTABLE AGENT

In this form of collusion, there is no agreement among competitors. Rather, each firm (using human intervention) unilaterally adopts its own pricing

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[15] Iga Małobęcka, 'Hub-and-Spoke Cartel – How to Assess Horizontal Collusion in Disguise?' (2016) <https://repozytorium.kozminski.edu.pl/server/api/core/bitstreams/90e418f0-746e-468a-ab4c-05a71ea9cb4f/content> accessed 24 December 2025.

[16] Basu Chandola, 'Algorithms and Collusion: Has the CCI got it Wrong?' (*Kluwer Competition Law Blog*, 28 February 2019) <https://legalblogs.wolterskluwer.com/competition-blog/algorithms-and-collusion-has-the-cci-got-it-wrong/#_ftn2> accessed 28 December 2025.

[17] Stucke and Ezrachi (n 12)

[18] ibid.

algorithm to continuously monitor and adjust to another algorithm's pricing strategies, thereby leading to predictable outcomes.[19]

This functions as a signalling and response model, akin to offer and acceptance in cartel dynamics. Each firm independently incorporates algorithms into its strategy to increase transparency and anticipate rivals' conduct. Competitors may either disregard the signal for collusion or adjust their own prices accordingly, thereby creating an informal cartel-like coordination. As a result, even without relying on a common algorithm, the programming of these algorithms adapts to one another's pricing, thereby giving rise to tacit collusion.[20]

4. DIGITAL EYE OR AUTONOMOUS ALGORITHMIC COLLUSION[21]

Lastly, in 'Digital Eye' collusion, machine learning algorithms (also known as black box algorithms) are programmed to autonomously pursue specific goals *via* self-learning with no human guidance, such as optimising profits, experimenting with new pricing strategies, etc.[22] It may happen that such algorithms learn to collude as a by-product of their optimisation process, without any explicit instruction or communication between competitors, and

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[19] Maria Giacalone, 'Algorithmic Collusion: Corporate Accountability and the Application of Art 101 TFEU' (2024) 9(3) European Papers <www.europeanpapers.eu/system/files/pdf_version/EP_EF_2024_I_020_Maria_Giacalone_00798.pdf> accessed 4 January 2026.

[20] Steven Van Uytsel, 'The Algorithmic Collusion Debate: A Focus on (Autonomous) Tacit Collusion' (*Elgar Online*, 20 April 2023) <www.elgaronline.com/edcollchap/book/9781802203042/book-part-9781802203042-9.xml> accessed 6 January 2026.

[21] Sheng Li, Claire Chunying Xie and Emilie Feyler, 'Algorithms & Antitrust: An Overview of EU and National Case Law' (*Concurrences*, 2021) <www.youraccountonline.com/content/dam/nera/publications/2021/Algorithms%20and%20Antitrust%20An%20Overview%20of%20EU%20and%20National%20Case%20Law.pdf> accessed 5 January 2026.

[22] Emilio Calvano and others, 'Artificial Intelligence, Algorithmic Pricing, and Collusion' (2020) 110(10) The American Economic Review <www.aeaweb.org/articles?id=10.1257/aer.20190623> accessed 4 January 2026.

simultaneously obscure the reasoning process that leads to a particular outcome. As a result, even the creators are unaware of how the algorithms reached the said output.[23]

It is not clear how machine learning algorithms may reach a collusive outcome (giving rise to the "black box" problem), but this lack of transparency behind the algorithmic decision-making processes in reaching the said output makes it difficult to prove intent or any communication regarding collusion.[24] Moreover, since the algorithm's conduct is not guided by direct instructions from the entity, its actions cannot be readily attributed to the entity itself.

III. CROSS-JURISDICTIONAL APPROACHES TO ALGORITHMIC COLLUSION

Although Competition Authorities across the world aim to promote the same objective, i.e. to develop an understanding of and to thereby place a check on unethical practices propagated by algorithmic collusion, their means differ. Since the rise of algorithmic collusion as a market phenomenon is rather recent, this section aims to gain valuable comparative insights that can augment the development of the Indian Competition regime.

A. China

China has adopted an interventionist approach to the effects of algorithmic use in the digital market, thereby departing from the *ex-post* enforcement model. The enactment of the Provisions on the Management of Algorithmic

[23] Prateek Tripathi, 'The AI "Black Box" Conundrum' (*ORF*, 11 June 2024) <www.orfonline.org/expert-speak/the-ai-black-box-conundrum> accessed 6 January 2026.
[24] Alessio Azzutti, Wolf-Georg Ringe and H Siegfried Stiehl 'Machine Learning, Market Manipulation, and Collusion on Capital Markets: Why the "Black Box" Matters' (2022) 43(1) University of Pennsylvania Journal of International Law <https://scholarship.law.upenn.edu/cgi/viewcontent.cgi?article=2035&=&context=jil> accessed 4 January 2026.

Recommendations in Internet Information Services[25] marks a limited recognition of the fallouts of algorithmic deployment in the market, specifically with respect to algorithmic price discrimination (referred to as *Sashu*), where long-term consumers are charged less favourable prices.[26] Even though these provisions specifically target personalised pricing, the underlying logic emphasises transparency and accountability in algorithms.

More relevant to algorithmic collusion are China's State Administration for Market Regulation Guidelines, 2021 **('the 2021 regulation')**, which acknowledge that 'coordinated behaviour' can happen through the hub-and-spoke model, i.e. use of identical pricing algorithms.[27] The regulations contain mandatory provisions for disclosure of the "fundamentals and mechanisms" of certain recommendation algorithms to which they apply. The intervention at the design stage is a direct confrontation to the black-box problem. It recognises that *ex-post* remedies may be inadequate to restore healthy competitive conditions. This ensures that businesses do not collude by misusing algorithms.[28]

The 2021 regulation[29] emphasises that algorithms can be used to carry out coordinated actions without any explicit or formal agreement or joint

[25] Provisions on the Management of Algorithmic Recommendations in Internet Information Services 2022.
[26] Steven Van Uytsel, Salil K Mehra and Yoshiteru Uemura, *Algorithms, Collusion and Competition Law: A Comparative Law Approach* (Edward Elgar Publishing Limited 2023).
[27] Han Wei and Li Liang, 'The New Anti-Monopoly Law of the People's Republic of China: Changes and Remaining Issues' (*CPI Columns: Asia*, August 2022) <www.competitionpolicyinternational.com/wp-content/uploads/2022/08/Asia-Column-August-2022-Full.pdf> accessed 4 January 2026.
[28] Karry Lai, 'Primer: China's New Anti-Monopoly Rules for Tech Companies' (IFLR, 25 March 2021), <www.iflr.com/article/2a63733ixysbvclr19hyw/primer-chinas-new-anti-monopoly-rules-for-tech-companies> accessed 2 January 2026.
[29] Seaton Huang, 'Algorithms Become a Point of Emphasis in China's Antitrust Efforts' (*Council on Foreign Relations*, 7 February 2022) <www.cfr.org/blog/algorithms-become-point-emphasis-chinas-antitrust-efforts> accessed 1 January 2026.

decision[30] between the businesses. Such tacit collusion[31] is dealt with within the regulations. At the same time, it carves out an exception for economically conditioned parallel behaviour. In simpler terms, it means that if the actions of the entity are almost a simultaneous response to a competitor, it helps the market remain competitive and ensure welfare. However, if the firms collude and raise prices, which harms consumer welfare, it would squarely raise an alarm with the competition regulator.

Therefore, it can be rationally observed that China employs a two-fold approach to address algorithmic collusion. This is achieved by regulating the use of algorithms (i) for explicit collusion, and (ii) for tacit collusion. For the former, a regulation of 2023[32] imposes a general ban on competitors in the market from entering into anti-competitive agreements by coordinating behaviour using pricing algorithms.[33] For the latter, the 2021 regulation addresses tacit collusion by algorithms, i.e., situations where there is no explicit, formal agreement between competitors.[34]

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[30] 'Article 5, Anti-Monopoly Guidelines of the Anti-Monopoly Commission of the State Council for the Field of Platform Economy' (*Anti-Monopoly Commission of the State Council*, 2 July 2021) <https://lawinfochina.com/display.aspx?id=35020&lib=law> accessed 1 January 2026.

[31] Maria Girich and Antonina Levashenko, 'The Concept of Digital Platform in Antimonopoly Regulation' (2024) 19(3) International Organisation Research Journal <https://iorj.hse.ru/data/2024/12/10/1926019368/8%20Girich_ENG.pdf> accessed 1 January 2026.

[32] 'Regulation on the Prohibition of Monopoly Agreements' (*State Administration for Market Regulation*, 15 April 2023) <www.gov.cn/gongbao/content/2023/content_5754538.htm> accessed 4 January 2026.

[33] 'Article 8, Regulation on the Prohibition of Monopoly Agreements' (*State Administration for Market Regulation*, 15 April 2023) <www.gov.cn/gongbao/content/2023/content_5754538.htm> accessed 4 January 2026.

[34] Huang (n 29).

1. IMPLICATIONS FOR INDIAN COMPETITION LAW

A lesson for India from the Chinese approach is that transparency must be introduced at the deployment stage of the algorithms itself, i.e., prioritising *ex-ante* preventive remedies over *ex-post* ones. For India, this approach is also grounded in the tools suggested by the CCI,[35] such as mandatory algorithmic audit for significant digital intermediaries and building up regulatory capacity. Most importantly, a proactive disclosure model akin to China's "fundamentals and mechanisms" framework can be adopted. This would require platforms to disclose the primary data variables influencing the price variations rather than their proprietary source code, thereby ensuring accountability without interfering with the firm's competitiveness in the market. Further, in terms of implementation, a sector-specific approach (like China) or market capitalisation approach can be adopted based on the dynamic needs of the market, which can be identified by relying on duly conducted market studies.

B. European Union

1. MEETING OF MINDS OR MEETING OF ALGORITHMS?

Article 101(1) of the Treaty on the Functioning of the European Union prohibits and declares void all kinds of agreements and concerted practices between competitors that restrict or distort competition.[36] Clause 3[37] carves out an exception and makes permissible such actions which may fall in the above category, but have more benefits than disadvantages for the competitive market. The provision seems rather simple *ex facie* however greater attention to detail would reveal the large scope of interpretation that it leaves behind.

[35] CCI, *Market Study on Artificial Intelligence and Competition* (n 4).
[36] Treaty on the Functioning of the European Union [2012] OJ C326/47, art 101(1).
[37] Treaty on the Functioning of the European Union [2012] OJ C326/47, art 101(3)

Notably, agreement or meeting of minds is one of the foundations upon which the provision stands. Thus, the principle that emerges is that there must be an agreement to constitute collusion, and if that does not exist, the collusion is *non est*. EU Competition law, as it stands today, has evolved through judicial precedents and interpretations. An agreement has been given an expansive interpretation to include any kind of meeting of the minds. Even a simple attendance at a meeting might be considered as sufficient evidence to conclude an agreement between the parties.[38] The kind of collusion as contemplated by "agreement" is referred to as explicit collusion, for which agreement needs to be proven by evidence.[39]

But the fundamental problem with applying the above law to tacit collusion using algorithms is that the stage of intentional agreement or information exchange can be easily bypassed. Now, when there is no evidence to indicate collusion between the undertakings, the existing law falls flat. The detriment that tacit collusion brings to consumer welfare, by increasing prices, technically referred to as supra-competitive pricing, still remains.[40]

2. CONCERTED PRACTICES

Yet another expression used is "concerted practices".[41] This refers to a situation one step prior to agreement, where some degree of coordination in the behaviour of the competitors exists but has not reached a conclusive stage

[38] Case C 8/08 *T-Mobile Netherlands BV v Raad van bestuur van de Nederlandse Mededingingsautoriteit* [2009] ECLI 343.
[39] Alison Jones and Brenda Sufrin, *EU Competition Law: Text, Cases, and Materials* (6th edn, Oxford University Press 2016).
[40] Richard Whish and David Bailey, *Competition Law* (9th edn, Oxford University Press 2018).
[41] Case C 49/92 *P Commission v Anic Partecipazioni* [1999] ECR I-04125; Case C 199/92 *P Hüls v Commission* [1999] ECR I-04287; Case C 8/08 *T-Mobile Netherlands BV v Raad van bestuur van de Nederlandse Mededingingsautoriteit* [2009] ECLI 343.

of agreement.[42] This category, in effect, does not mandate any element of meeting of the minds.[43]

Any exchange of information, including sensitive information, between competitors can distort competition by enabling price fixing. If competitors exchange sensitive data and know in advance about the pricing decisions of the competitors, then they can coordinate and increase prices to mutually benefit from the profits so gained.[44] This is essentially prohibited by considering it a concerted action.[45]

The EU, in its submission to the Organisation of Economic Co-operation and Development (**'OECD'**),[46] has recognised that collusion, using self-learning algorithms, leads to a 'profit maximisation cartel' without any human communication. It further suggested that the expression 'communication' must be given a purposive interpretation so as to include algorithm-enabled price matching within the scope of Article 101. The logic being that if two algorithms of different entities interact with each other repeatedly, it allows them to anticipate the other's reactions. This, according to the EU, would not be simply parallel behaviour but would be tantamount to a collusive arrangement between competitors.[47]

[42] Case C 40/73 *Suiker Unie v Commission* [1975] ECR 1663 (European Union).
[43] Case C 48/69 *Imperial Chemical Industries Ltd v Commission of the European Communities (Dyestuffs)* [1972] ECR 619; Case T-587/08 *Fresh Del Monte Produce v Commission* [2013] ECLI 129.
[44] Case C-455/11 *P Solvay SA v European Commission* [2013] ECR 0000; David Bailey and Laura Elizabeth John, *Bellamy & Child: European Union Law of Competition* (8th edn, Oxford University Press 2018).
[45] Commission, *Horizontal Co-operation Guidelines* (n 9).
[46] 'Algorithmic Competition – Note by the European Union' (*OECD*, 24 May 2023) <https://one.oecd.org/document/DAF/COMP/WD(2023)17/en/pdf> accessed 4 January 2026.
[47] ibid.

3. PARALLEL CONDUCT USING ALGORITHMS V. ALGORITHMIC COLLUSION

Whether the conduct is collusive or not depends on the amount and quality of evidence available to that effect. Within the broad scope of concerted action, parallel conduct may be seen as an indication of anti-competitive behaviour. But that does not necessarily imply that such parallel behaviour in itself is anti-competitive. It depends on the facts and evidence of the particular case. It can be said that due to the flexibility of the term 'concerted action', it might be broadly construed to include in its ambit a variety of anti-competitive behaviour.[48]

To address this, the EU has recognised this "collusion by code" as a cartel agreement by its guide,[49] which acknowledges that algorithms can facilitate collusion, whether explicitly programmed to do so or not. Recognising such collusion essentially means that it would be dealt with under the general provisions regulating anti-competitive behaviour.

This collusion by code, especially through pricing algorithms, is declared as collusive on two accounts. Firstly, if such behaviour in offline settings constitutes collusion, so would it in the online settings. Secondly, firms cannot create an apparent accountability crisis by saying that the prices were determined by algorithms and, therefore, as algorithms function under the

[48] Samuel Dobrin, 'Algorithms and Collusion: Competition Law Challenges of Pricing Algorithms' (Master's thesis, Faculty of Law, Lund University, 2019) <https://lup.lub.lu.se/luur/download?func=downloadFile&recordOId=8995599&fileOId=8995602> accessed 6 January 2026.

[49] Commission, *Horizontal Co-operation Guidelines* (n 9).

direction and control of the firm, just like its employees, they must be held accountable if such algorithms indulge in collusion.[50]

4. EU'S JURISPRUDENTIAL DEVELOPMENT ON ALGORITHMIC COLLUSION

The hub and spoke model of collusion was first dealt with in the *Eturas* case.[51] This case concerned an online travel booking site, whose administrator (hub) sent messages *via* personal email to all travel agencies (spokes), announcing that discounts would be capped at three % by using algorithms on its website. The question was whether the awareness of the message among the travel agencies could amount to tacit collusion. It was held that a presumption of collusion exists in such cases unless the agencies distance themselves from the conduct by reporting it to the authorities. Such awareness must be proved with evidence, and a cause-and-effect relation must exist between the supposed tacit collusion and the subsequent conduct in the market.[52]

In 2018, the European Commission[53] imposed penalties on firms (Asus, Denon & Marantz, Philips) that engaged in price fixing using algorithms that compare and monitor prices set by online retailers and track any deviations (closely resembling the predictable agent model). If there was any deviation from the prices as commanded by these companies, the online retailers faced

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[50] Commission, *Communication Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements* [2023] OJ C259/1.

[51] Case C 74/14 *"Eturas" UAB and Others v Lietuvos Respublikos konkurencijos taryba* [2016] OJ C 98.

[52] Case C 286/13 Dole Food and Dole Fresh Fruit Europe v Commission [2015] ECLI 184.

[53] Press Release, 'Antitrust: Commission Fines Four Consumer Electronics Manufacturers For Fixing Online Resale Prices' (*European Commission*, 24 July 2018) <https://ec.europa.eu/commission/presscorner/detail/en/ip_18_4601> accessed 1 January 2026.

threats or sanctions, such as the blocking of supplies. This intervention effectively hampered competition in the market, leading to higher overall prices, and was deemed to be a violation of Article 101.[54]

5. IMPLICATIONS FOR INDIAN COMPETITION LAW

Three conclusions can be drawn for the Indian Law. First, the evolution of Article 101 indicates that addressing algorithmic collusion does not necessarily involve creating an entirely novel framework, but it can be accommodated in the existing framework as well by expansive interpretation. Second, the *Eturas* doctrine has helped counter, at least to some extent, the problem of lack of smoking gun evidence or trail of digital evidence by shifting the burden of proof upon the deployers of pricing algorithms. Third, the EU's position on the accountability of algorithms (as employees of the entity deploying them) clarifies the application of vicarious liability to the deployers.

C. United States

"Everywhere the word algorithm appears, just insert the words 'a guy named Bob'. If it wouldn't be legal for Bob, it's probably not legal for the algorithm either." ~ Maureen Ohlhausen, FTC Chair[55]

[54] Art 101(1) TFEU.

[55] Maureen K Olhausen, 'Should We Fear Things That Go Beep In the Night? Some Initial Throughs on the Intersection of Antitrust Law and Algorithmic Pricing' (*Federal Trade Commission*, 23 May 2017) <www.ftc.gov/system/files/documents/public_statements/1220893/ohlhausen_-_concurrences_5-23-17.pdf> accessed 7 January 2026.

1. WIDENING THE BOUNDS OF CONCERTED ACTION: THE TOPKINS SAGA

The *Topkins case*[56] has been a landmark case on pricing algorithms and collusion. Herein, the director of a company which sold posters online was held liable for price fixing with other merchants on Amazon. He had agreed with other merchants on the prices of posters on Amazon, and thereafter, through his company's algorithm, set the prices as already agreed upon.

The price fixing here took place with direct communication, by the use of algorithms, and thus could be dealt with the traditional approach to collusion under the Sherman Act.[57] Section 1[58] prohibits competitors from sharing competitively sensitive information, either directly or indirectly, for the purpose of price fixing. This implies what cannot be done directly can also not be done indirectly. Therefore, collusion through pricing algorithms is susceptible to the broad scope of the Sherman Act.

But Section 1 deals only with concerted action.[59] Concerted action joins together separate decision-makers and, as a result, deprives the marketplace of independent centres of decision-making.[60] Like in *Topkins*, when anti-competitive information is shared between competitors to a third party, who then facilitates collusion, this can be termed as concerted action.[61] A contemporaneous agreement between the competitors is not a *sine qua non*;

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[56] *United States of America v Topkins* [2015] CR 15-00201.
[57] Ronald F Wick and William E Karlema, 'Mandatory vs Suggested Pricing: Algorithmic Price Setting and the Sherman Act' (*Cohen & Gresser*, 11 February 2025) <www.cohengresser.com/app/uploads/2025/02/Mandatory-vs.-Suggested-Pricing_Algorithmic-Price-Setting-and-the-Sherman-Act.pdf> accessed 8 January 2026.
[58] Sherman Act 1890, s 1 (United States).
[59] *American Needle, Inc v National Football League* (2010) 560 US 183.
[60] *Copperweld Corp v Independence Tube Corp* (1984) 467 US 752.
[61] *American Needle, Inc v National Football League* (2010) 560 US 183; *Relevant Sports, LLC v United States Soccer Federation, Inc* (2023) 61 F 4th 299.

even a tacit agreement would qualify as concerted action, provided that there is *consensus ad idem*.[62]

2. THE ALGORITHM MADE ME COLLUDE: THE REALPAGE SAGA

One of the most recent cases related to algorithmic collusion is the *RealPage* litigation.[63] The company provided revenue management software and algorithmic pricing recommendations for residential real estate housing. In 2023, several plaintiffs filed lawsuits against RealPage and the managers/landlords, claiming the existence of a hub-and-spoke cartel. It was contended that a tacit agreement exists despite the absence of direct communication, wherein RealPage software (hub) was used to share sensitive pricing information between landlords (spokes).

While a settlement was reached by the US Justice Department, in which RealPage agreed to a three-year monitorship and limits on how it collects and uses non-public data, the case remains an important development in competition law policy, recognising the possibility of algorithmic collusion.

The self-learning pricing algorithms further complicate the situation. Far from the competitors having a 'meeting of minds', the algorithms indulge in a 'meeting of codes' while functioning autonomously. This is problematic as it will allow the firms to take a back seat and escape liability for collusion, as the Sherman Act requires fulfilment of the threshold of concerted action, which is absent in autonomous algorithms. The potential risk for collusion arises as the pricing algorithms are based on a reinforcement learning model. The characteristic feature of this kind of algorithm is that they interact with other algorithms in the market and learn by a trial-and-error method, thus

[62] *American Needle* (n 59).
[63] *United States v RealPage Inc* (2024) No 1:24-cv-00710-WO-JLW.

require no prior knowledge of the operating environment. They leave no footprints behind, as they do not communicate with each other or follow any specific instructions to collude.[64]

3. PARALLEL LEGISLATIVE DEVELOPMENTS IN THE US

To address all these kinds of cases, the Preventing Algorithmic Collusion Act of 2024 was introduced in the US Congress, but it lapsed. It was later reintroduced as the Preventing Algorithmic Collusion Act, 2025 and has been referred to the Committee on the Judiciary.[65] It seeks to amend the Sherman Act and prohibit the use of pricing algorithms that can facilitate collusion through the use of non-public competitor data, and create an antitrust law enforcement audit tool.

The bill proposes a total ban on using pricing algorithms trained on or producing results from private data shared between competitors in the same or related markets. It establishes a presumption of collusion if a software developer provides the same pricing algorithm to multiple rivals, intending to suggest prices or terms. Similarly, collusion would be assumed if competitors independently created and used the same algorithms to produce uniform outcomes, as long as they knew or should have known that their rivals' private data was being utilised.[66] The law, when passed, would provide one of the toughest and clearest standards for the regulation of algorithmic price collusion.

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[64] Calvano and others (n 22).
[65] 'S 232 Preventing Algorithmic Collusion Act of 2025' (*119th Congress*, 23 January 2025) <www.congress.gov/bill/119th-congress/senate-bill/232/text> accessed 8 January 2026.
[66] ibid.

4. IMPLICATIONS FOR INDIAN COMPETITION LAW

There can be two major implications for Indian Competition Law landscape: Firstly, Section 3 of the Competition Act, 2002 targets anti-competitive agreements by enterprises engaged in "identical or similar trade".[67] But if an independent developer (algorithm provider) facilitates a cartel, then there is no framework to address his liability unless a clear "hub and spoke" cartel is proven. Acknowledging such realities, the US has shifted to a provider-centric framework in its proposed legislation, holding even the providers of the algorithm liable for facilitating collusive activities.

Secondly, within the framework of the Competition Act, 2002, CCI can be empowered to conduct algorithmic audits, i.e. inspecting the information relating to the pricing algorithm deployed by the company, which includes details such as developer information, involvement of human review, data and processes employed by the algorithms, etc. These details are akin to the "fundamentals and mechanisms" model in China. Although the Market study proposes the principles of a voluntary self-audit, a compulsory regulator-initiated audit along the lines of the US Model can be adopted.

Inferring from the US and China Model, one thing is certain: for investigation or audit purposes, there need not be full disclosure of proprietary information (including source code), but the data variables on which are relied upon can be disclosed without compromising the competitiveness of the firm.

IV. ALGORITHMIC COLLUSION: A MISSED OPPORTUNITY FOR CCI?

[67] Competition Act 2002, s 3.

The use of AI in business strategies has posed serious challenges to competition law in India. With businesses increasingly using algorithmic tools for pricing and decision-making, the possibility of algorithmic collusion, where electronic systems independently coordinate market conduct, is now a challenging regulatory issue.

India's Competition Act, 2002 has inherent weaknesses in addressing these trends. Section 3[68] forbids anti-competitive agreements, such as cartels and price-fixing schemes, but its application is predicated on the presence of an "agreement" or "concerted practice."[69] In the case of tacit algorithmic coordination, these are hard to prove. Where algorithms repeatedly interact and settle into stable pricing patterns without human intervention, proving an agreement under the current legal framework is becoming increasingly difficult, if not impossible.

A. Stress on Evidence-Based Approach by the CCI

A case in point is *Samir Agrawal v. ANI Technologies*,[70] wherein cab drivers (independent third-party service providers) acted as spokes and allegedly engaged in price coordination using Ola/Uber's platform as the hub. The question was whether this collaboration among drivers, facilitated through Ola/Uber, amounted to "concerted action" under the Act.[71] Though the CCI held that no *prima facie* case existed against the cab drivers, as there was no agreement between them to algorithmically coordinate prices, overlooking the possibility of algorithmic collusion.[72]

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[68] Competition Act 2002, ss 3(1), 3(3)(a).
[69] Competition Act 2002, s 2(b).
[70] *In Re: Samir Agrawal* CCI Case No 37 of 2018.
[71] (n 68)
[72] Ariel Ezrachi and Maurice E Stucke, 'Artificial Intelligence & Collusion: When Computers Inhibit Competition' [2017] 2017 University of Illinois Law Review

More recently, a price cartel in the airline industry[73] was detected,[74] where the airlines were alleged to have relied on third-party software to determine, implement, and dynamically adjust fares, factoring in variables such as seasonality, bookings, and competitor pricing. Although the CCI acknowledged that airlines used similar or even identical software systems, it emphasised that cartelization must be proven through direct or circumstantial evidence. Remarkably, the CCI found no conclusive evidence that multiple airlines had colluded by using the same software to set fares. Instead, it concluded that algorithms in this context were deployed to enable legitimate dynamic pricing in a rapidly changing industry. The presence of human oversight in determining final fares further demonstrated that the use of algorithms was aimed at facilitating genuine price-setting rather than establishing a price cartel.

B. A Sliver of Hope: CCI's Recognition of the Possibility of Algorithmic Collusion

As a result, the CCI, through its regulatory practices, has proposed two-fold criteria to deal with algorithmic collusion: firstly, human communication between entities and secondly, the role of algorithms.[75] This criterion was demonstrated in *Shikha Roy v. Jet Airways*,[76] wherein the CCI examined the

<www.illinoislawreview.org/wp-content/uploads/2017/10/Ezrachi-Stucke.pdf> accessed 5 January 2025.

[73] *In Re: Alleged Cartelization in the Airlines Industry* CCI Suo Motu Case No 03 of 2015.

[74] 'Pricing Algorithms: CCI's First Major Encounter with Assessing New-Age Collusions' (*AZB and Partners*, 24 September 2025) <www.azbpartners.com/bank/pricing-algorithms-ccis-first-major-encounter-with-assessing-new-age-collusions/> accessed 5 January 2025.

[75] Afifi Khan and Shifa Qureshi, 'Shikha Roy v Jet Airways: A New Approach to Algorithmic Collusion' (2022) 5(1) De Lege Ferenda <https://awards.concurrences.com/IMG/pdf/shikha_roy_v_jet_airways-a_new_approach_to_algorithmic_collusion-afif_and_shifa.pdf?103009/b0aab30d515eafc4f2085f6e0bd0cdb5169a4e3a4bba73f3bc304d2c4e62f1a8> accessed 5 January 2025.

[76] *Shikha Roy v Jet Airways (India) Limited and Others* CCI Case No 32 of 2016 (3 June 2021).

alleged cartelisation of airfares by several Indian airlines during the Jat Agitation of 2016. It was claimed that the airlines had exploited the extraordinary conditions to inflate prices. After acknowledging that the use of algorithms creates a *prima facie* possibility of collusive outcomes without explicit human coordination, the CCI ordered an investigation of the algorithms employed by the airlines.

However, no evidence of any communication or agreement among competitors was found. Thus, the CCI ruled out the existence of any anti-competitive agreement or cartelisation by the airlines. This was based on a three-pronged reasoning: (i) no common algorithm was used across airlines, (ii) distinct inputs and customised software produced different algorithmic outputs for each airline, and (iii) route analysts retained ultimate control over inventory decisions.

The decision is notable for recognising that algorithms may raise the possibility of collusion even without human coordination, but also for clarifying that distinct algorithmic systems and independent pricing decisions do not, in themselves, establish anti-competitive conduct under the current legal framework.

While the above-stated criteria are helpful in dealing with cases of algorithmic collusion, they fall short on two counts. Firstly, in identifying algorithmic collusion, the test focuses on whether rival firms employed the common algorithm. These risks excluding scenarios where competitors rely on distinct algorithms, limiting the ascertainment of liability by the CCI. Secondly, the criteria continue to reflect the conventional requirement of intent for collusion. While the test emphasises human involvement as one of the elements in assessing liability, it must be kept in mind that collusive

outcomes can materialise in digital markets even in the absence of any intention of the competitors to enter into anti-competitive arrangements. Subjective requirements of intent to establish collusion may boost algorithmic collusion in digital markets.

C. A Need for Resurrection: The Grave of the Digital Competition Bill, 2024

The Competition Act, 2002[77] employs an *ex-post* enforcement mechanism under which intervention occurs only after anti-competitive conduct has materialised, which may not address the realities of digital markets in a timely manner. This is because algorithms react to market changes in real-time and quickly adjust prices, thereby giving rise to undetectable 'flash' collusive outcomes.

In light of this structural limitation, the Committee on Digital Competition Law introduced the Digital Competition Bill, 2024,[78] which would empower the CCI to regulate select digital markets on an *ex-ante* basis. The proposed regime was intended to apply to Systemically Significant Digital Enterprises ('**SSDEs**'), which are core digital services having a substantial footprint in terms of financial strength, user base, resources and the volume of data they control.

The bill prohibited the SSDEs from engaging in specified practices that distort competition, such as preferential treatment of their own products or affiliated entities, leveraging non-public data of business users to compete

[77] Competition Act 2002.
[78] Ministry of Corporate Affairs, 'Report of the Committee on Digital Competition Law' (27 February 2024) <www.mca.gov.in/bin/dms/getdocument?mds=gzGtvSkE3zIVhAuBe2pbow%253D%253D&type=open> accessed 1 January 2025.

against them, limiting interoperability by restricting third-party applications, and conditioning access to a core digital service on the use of other offerings of the same enterprise. The Committee also emphasised the need to enhance the CCI's technical capabilities to facilitate early detection of AI-powered anti-competitive practices.

While the report[79] nowhere mentions algorithmic collusion, the bill could have been broadly interpreted to tackle the ill of algorithmic collusion.[80] However, due to strong opposition from the global Big Tech and domestic digital platforms, the government aims to withdraw the draft Digital Competition Bill in its current form.[81] As suggested by the Standing Committee on Finance,[82] there is hope for the reintroduction of a revamped Digital Competition Bill to better address algorithmic collusion and algorithm-driven anti-competitive practices using the above-discussed global best practices.

V. STRUCTURAL RISKS ASSOCIATED WITH ALGORITHMIC COLLUSION

A. The Overemphasis on Human-Conduct Driven Collusion

[79] ibid.

[80] Subham Sourav and Asmi Sharma, 'Regulating Algorithms and Market Power: The Legal Future of Tech Monopolies and State Influence' (*IJLT Blog*, 16 September 2025) <https://forum.nls.ac.in/ijlt-blog-post/regulating-algorithms-and-market-power-the-legal-future-of-tech-monopolies-and-state-influence/> accessed 5 January 2025.

[81] Manu Kaushik, 'Govt to withdraw draft Digital Competition Bill' (*Financial Express*, 10 August 2025) <www.financialexpress.com/business/industry-govt-to-withdraw-draft-digital-competition-bill-3942328/> accessed 6 January 2025.

[82] Standing Committee on Finance (2024-25), 'Twenty Fifth Report: Evolving Role of Competition Commission of India in the Economy, Particularly the Digital Landscape' (*Ministry of Corporate Affairs*, 11 August 2025) <https://sansad.in/getFile/lsscommittee/Finance/18_Finance_25.pdf?source=loksabhadocs> accessed 6 January 2025.

Traditional competition law models are primarily geared towards addressing collusion spearheaded by humans, with intervention instruments usually relying on proof of communication or overt agreement between competitors. Legislation, such as Sections 3 and 4 of the Competition Act, 2002,[83] Article 101 of the Treaty on the Functioning of the European Union (**'TFEU'**),[84] and the U.S. Sherman Act,[85] directly forbids cartels and price-fixing based on the existence of an "agreement" or "concerted practice." The advent of the algorithms (specifically, digital eye) makes this paradigm even more complicated, as they can generate collusive results independently without any immediate human intervention or information exchange.

B. Absence of Smoking Gun Evidence

It is a well-established rule that competition law requires evidence of anti-competitive agreements, indicating communication among competing firms to produce AAEC.[86] Smoking gun evidence refers to direct evidence indicating the existence of an agreement in cases of cartelisation.[87] This includes evidence of communication between competitors, such as emails, call logs, and physical meetings, which directly indicate the existence of anti-competitive collusive activities. Since in cases of algorithmic collusion, the collusion occurs *via* algorithms in undetectable, real-time flashes, there is hardly any possibility of obtaining hard evidence or, at the very least,

[83] Competition Act 2002, ss 3- 4.
[84] Consolidated Version of the Treaty on the Functioning of the European Union [2012] OJ C326/47, art 101.
[85] Sherman Act 1890 (United States).
[86] 'Algorithms and Collusion: Competition Policy in the Digital Age' (*OECD*, 2017) <www.oecd.org/content/dam/oecd/en/publications/reports/2017/05/algorithms-and-collusion-competition-policy-in-the-digital-age_02371a73/258dcb14-en.pdf> accessed 8 January 2026.
[87] CUTS International and National Law university, Jodhpur, 'Study of Cartel Case Laws in Select Jurisdictions – Learnings for the Competition Commission of India' (*Competition Commission of India*, 25 April, 2008) <www.cci.gov.in/images/marketstudie/en/docs1652440423.pdf> accessed 7 January 2026.

circumstantial evidence. While the CCI accepts circumstantial or indirect evidence as proof of agreements,[88] the absence of smoking gun evidence in cases of algorithmic collusion makes ascertaining liability a herculean task.[89]

C. Fallouts of the Black Box Problem

Algorithms are of two kinds: Black Box and White Box. As discussed above, Black Box algorithms are self-learning models that operate with a degree of autonomy, enabling them to evolve strategies independently while concealing the reasoning that underlies their particular outputs.[90] This leads to a lack of evidence or intent to prove tacit collusion.[91]

The field of Explainable AI (**'XAI'**) comprises two methods that facilitate human comprehension of algorithmic decision-making processes and, in turn, algorithmic collusion, i.e., White Box (interpretable algorithms) and reverse engineering methods.[92]

Algorithms that fall into the White-box category are those whose source code can be interpreted to understand the logic that went behind the outcome generated. One illustration of this is the signalling algorithm, where it first communicates a proposed price increase and observes the responses of its rivals. Where competing firms adjust their prices accordingly, the algorithm

[88] Harshita Fatesaria, Sakshi Saran Agarwal and Shourya Bhansali, 'Making a Case of Cartelisation' (*SCC Online Times*, 15 February 2021) <www.scconline.com/blog/post/2021/02/15/cartelisation/> accessed 7 January 2026.
[89] Aleksandra Lamontanaro, 'Bounty Hunters For Algorithmic Cartels: An Old Solution for a New Problem' (2020) 30(4) Fordham Intellectual Property, Media and Entertainment Law Journal <https://ir.lawnet.fordham.edu/cgi/viewcontent.cgi?article=1760&context=iplj> accessed 6 January 2026.
[90] Tripathi (n 23).
[91] Azzutti (n 24).
[92] 'Algorithmic Competition – Background Note' (*OECD*, 5 May 2023) <https://one.oecd.org/document/DAF/COMP(2023)3/en/pdf> accessed 6 January 2026.

retains the new price, or else it issues an alternative price signal and repeats the process.[93]

Given the fact that the White Box algorithms are equally effective as the Black Box models,[94] White Box algorithms and algorithms that can be reverse-engineered should be the preferred pricing algorithms so that communication, agreement, or intent can be proved in cases of algorithmic collusion.

One concern raised is that these methods are better suited to explain the individual conduct of an algorithm (linear relationship) rather than algorithmic collusion (non-linear relationships), where a complex network of algorithms dynamically collude and change rapidly.[95] However, research on XAI is promising and potentially addresses the concern raised.[96]

[93] Giacalone (n 19).
[94] Cynthia Rudin and Joanna Radin, 'Why Are We Using Black Box Models in AI When We Don't Need To? A Lesson From an Explainable AI Competition' (2019) 1(2) HDSR <https://hdsr.mitpress.mit.edu/pub/f9kuryi8/release/8> accessed 6 January 2026.
[95] João E Gata, 'Collusion Between Algorithms: A Literature Review and Limits to Enforcement' (2021) 1(1) European Review of Business Economics <https://erbe.autonoma.pt/articles/ERBE01105-Collusion-between-Algorithms-A-Literature-Review-and-Limits-to-Enforcement.pdf> accessed 2 January 2026.
[96] Thibault Schrepel, 'Collusion by Blockchain and Smart Contracts' (2019) 33(1) Harvard Journal of Law and Technology <http://dx.doi.org/10.2139/ssrn.3315182> accessed 2 January 2026.

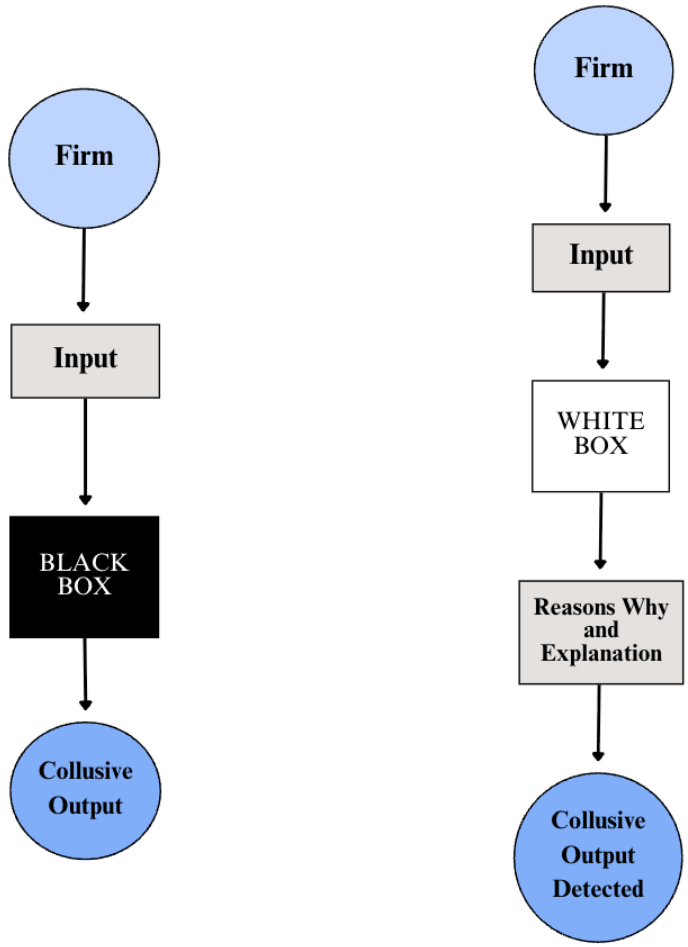

Figure 2: Self-Learning Algorithm[97] and White Box Algorithm

D. Proving Intent without Intention?

There is an added layer of complexity when one must prove intent or knowledge. Standard competition law assumes collusion is the result of conscious human action, but algorithms can generate collusive results through automatic optimisation routines. This poses difficult questions: are companies liable for collusive activity that arises solely as an outcome of an algorithm's

[97] Gonzaga (n 10).

reasoning? Do companies need to continually monitor and audit their algorithms to avoid potential collusion? The inability of the current legal framework to substitute the threshold of intent is the root cause of the stagnancy in dealing with algorithmic collusion.

E. Algorithms as a Catalyst in Inducing Collusion in Markets which are not "Collusion Prone"

The OECD, way back in 2017, recognised the potential of algorithms to induce cartels in markets which are conventionally non-conducive for cartels to operate. Thus, what was known as the "Oligopoly Problem",[98] limited to oligopolistic markets with high barriers to entry and low transparency, has now, with the advent of/extensive use of pricing algorithms, percolated to markets which generally are unsustainable for cartels to operate.[99]

While in oligopolistic markets, algorithms have the effect of making collusive outcomes more likely and cartels more stable, in non-oligopolistic markets, they create fertile ground for collusion to proliferate. The structure of some markets is such that, through interdependence and mutual self-awareness, collusive outcomes can be produced, deviating from what is called mere parallel conduct.

Algorithms have shattered the basic assumptions for the existence of cartels in the market and raised a number of red flags across sectors. Therefore, some scholars[100] have termed it "the end of competition as we know it".

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[98] Jasper van den Boom, 'The Artificial Hand of the Free Market: Algorithms and Collusion' (Master thesis, Tilburg University, 18 June 2018) <https://arno.uvt.nl/show.cgi?fid=145648> accessed 30 December 2025.

[99] OECD, *Algorithms and Collusion* (n 86).

[100] Michal S Gal, 'Algorithmic-Facilitated Coordination: Market and Legal Solutions' (*Competition Policy International*, May 2017) <www.competitionpolicyinternational.com/wp-content/uploads/2017/05/CPI-Gal.pdf>

Algorithms make collusive conduct easier[101] by making the costs of exchanging information negligible, and consequently, emerging as a facilitator of large-scale collusion.

F. Algorithmic Collusion Aiding Price Discrimination via Consumer Profiling

Algorithms can be deployed to make "digital profiles" of the consumers, gathering data about their attitudes towards various commodities and their prices. This can be capitalised by entities to increase their profits by offering different prices to different consumers. The 'invisible hand' of the market is replaced by the 'digital hand' of algorithms, which know exactly what one wants and how much one can spend.

Algorithms can monitor prices of all the market entities in real-time, and therefore, when almost every firm in the market deploys them, the tactic of reducing prices as compared to the competitors fails. This, in turn, makes the algorithm 'learn' that the best way to get profits is to keep prices high.[102]

Take, for instance, a case where the consumer profiling leads to a conclusion that a certain consumer has an expensive mobile device. Based on this fact, the algorithms set a personalised high price. Now, if different algorithms independently 'learn' that consumers with expensive mobile devices are more willing to pay higher prices, all of them increase the prices.

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accessed 4 January 2026; Ariel Ezrachi and Maurice E Stucke, *Virtual Competition: The Promise and Perils of the Algorithm-Driven Economy* (Harvard University Press 2019).

[101] Salil K Mehra, 'Antitrust and the Robo-Seller Competition in the Time of Algorithms' (2016) 100(1323) Minnesota Law Review <www.minnesotalawreview.org/wp-content/uploads/2016/04/Mehra_ONLINEPDF1.pdf> accessed 2 January 2026.

[102] Phil Beckett, 'The Antitrust Implications of Pricing Algorithms' (*Alvarez and Marsal*, 11 May 2020) <www.alvarezandmarsal.com/insights/antitrust-implications-pricing-algorithms#:~:text=market%20transparency%20increases.-,A%20market%20where%20all%20firms%20unilaterally%20adopt%20their%20own%20pricing,rivals'%20systems%20will%20respond%20immediately> accessed 4 January 2026.

This leads to collusion not only at the general market level but at the consumer level itself.

This can also happen when the competitors in the market deploy the same third-party provider or derive themselves from common databases.[103] Since they are fed on the same data, they result in the same outcome. This naturally creates a coordinated behaviour.

Therefore, algorithmic collusion facilitates price discrimination efficiently by utilising the consumer profiles, which is detrimental to the interests of the consumers.

G. Algorithmic Collusion: The Achilles Heel of Leniency Regime?

"*Today's partner-in-crime can be tomorrow's canary in the coal mine."*[104]

The idea behind the leniency program in competition law is that there are no permanent friends or enemies, just permanent interests.[105] The Competition Act, 2002[106] empowers the CCI to allow entities to voluntarily provide full and accurate disclosures of violations to the CCI.[107] Where such disclosures are considered significant, the CCI may grant a reduction in penalties. This

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[103] Michal S Gal, 'Algorithmic-Facilitated Coordination: Market and Legal Solutions' (*Competition Policy International*, May 2017) <www.competitionpolicyinternational.com/wp-content/uploads/2017/05/CPI-Gal.pdf> accessed 4 January 2026.

[104] Ankit Singh Rajput, 'When Cartel Loyalty Crumbles before the CCI's Leniency Mechanism' (*Bar&Bench* 24 September 2025) <www.barandbench.com/columns/alls-fair-until-the-beans-are-spilled-when-cartel-loyalty-crumbles-before-the-cci> accessed 4 January 2026.

[105] 'Oxford Essential Quotations' (*Oxford Reference*, 2016) <www.oxfordreference.com/display/10.1093/acref/9780191826719.001.0001/q-oro-ed4-00008130> accessed 1 January 2026.

[106] Competition Act 2002.

[107] Competition Act 2002, S 46(1).

framework is commonly referred to as the 'Leniency Regime' or the 'Lesser Penalty Regime.'[108]

Under the recently added Leniency Plus[109] benefit, the existing leniency applicant of the first cartel is given an extra or 'plus' benefit if he discloses the existence of an unknown (to CCI) second cartel. This means that the leniency applicant may get an additional/plus reduction in monetary penalty of up to thirty % in the pre-existing cartel, and a full or up to one hundred % penalty waiver in the second cartel.[110]

Notably, the Leniency Program is effective in sectors that produce relatively unstable cartels.[111] This is because in an unstable cartel, there is a propensity for members to disclose the collusive AAEC activities due to the existing distrust amongst them and a race for leniency. In sectors where cartels exhibit a higher degree of stability, the introduction of a leniency regime may paradoxically prolong their existence, as they are more responsive to the risk of detection and sanction than to leniency incentives. As a result, while leniency programmes may effectively destabilise unstable cartels, they may simultaneously reinforce stable ones.[112]

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[108] 'FAQs on Leeser Penalty Regime' (*Competition Commission of India*) <www.cci.gov.in/images/whatsnew/en/faqs-on-cci-lp-regime1708500979.pdf> accessed 1 January 2026.

[109] The Competition Commission of India (Lesser Penalty) Regulations 2024.

[110] Competition Act 2002, S 46(1).

[111] Renato Nazzini and James Henderson, 'Overcoming the Current Knowledge Gap of Algorithmic "Collusion" and the Role of Computational Antitrust' [2024] 4 Stanford Computational Antitrust <https://law.stanford.edu/wp-content/uploads/2024/02/Algorithmic-Collusion.pdf> accessed 1 January 2026.

[112] Joseph E Harrington and Myong-Hun Chang, 'Endogenous Antitrust Enforcement in the Presence of a Corporate Leniency Program' (*Wharton Faculty Platform*, 30 November 2012) <https://faculty.wharton.upenn.edu/wp-content/uploads/2012/12/WP-Harrington-Leniency_11-30-12.pdf> accessed 1 January 2026.

Now, cartels created by algorithms are relatively stable cartels because, firstly, there is no human intervention, and secondly, since the algorithms have self-learned to collude, there is a lack of direct or indirect evidence. This means that the Leniency Programs currently in place are ineffective in dealing with the threat of algorithmic collusion.

H. Cross-Border Collusion

The inherently global nature of digital markets adds another layer of complexity. With algorithms acting in real time across multiple jurisdictions, there are issues for national competition authorities to monitor, investigate, and take enforcement action regarding cross-border collusion. For example, an algorithm created by a US company may interact with algorithms being used by companies in Europe and Asia, resulting in a complex web of interactions taking place at the international level that no one regulator can fully supervise.[113]

Cross-border engagement of competition regulators would be required to tackle cross-border collusion. Even the market study by CCI[114] attempts, at least, in-policy to strengthen partnerships with International Competition Authorities such as OECD, ICN, etc., to know global best practices. However, the effectiveness of this depends on various external factors such as political and diplomatic ties, generally making it a long-term goal. Further, forming a temporary platform for engagement by hosting multilateral conferences with international authorities and coalitions will be beneficial in the short term.

VI. ALGORITHMIC ACCOUNTABILITY: SUGGESTIONS

[113] Arpita Gupta, 'Algorithmic Collusion and its Challenges to Antitrust Regulations' (2025) 2(7) IJLRA <www.ijlra.com/details/algorithmic-collusion-and-its-challenges-to-antitrust-regulations-by-arpita-gupta> accessed 3 January 2026.
[114] CCI, *Market Study on Artificial Intelligence and Competition* (n 4).

A. Ex-Ante Methods

The *ex-ante* approach of regulation focuses on prevention rather than penalising anti-competitive conduct. Traditional Competition law focused on ex-post methods only, i.e. to penalise the violations after they occur, but due to the nature of digital competition and algorithmic collusion, it becomes imperative to adopt this approach, which has been dubbed the New-Competition Tool. The two factors that make it a promising approach are (i) it empowers Competition authorities to conduct market studies and identify the market-specific structural issues facilitating collusion, and (ii) it helps them to coordinate with the entities in the market to implement "customised remedies".[115]

1. FROM REACTIVE INVESTIGATIONS TO PREVENTIVE MONITORING: SELF-AUDIT FRAMEWORK

CCI's market study emphasises a soft-regulatory approach by the introduction of a self-audit framework for companies deploying AI. It proposes a proactive assessment of the AI systems with regard to competition law risks and greater transparency, where algorithms have the potential to influence the market and consumer welfare.[116]

CCI's approach is akin to a sandbox model wherein the algorithm can be analysed in a controlled environment, thereby avoiding the risk of algorithms learning from the input data itself. But this comes at the cost of the algorithm

[115] Alexandra P Mikroulea, 'Algorithms and Collusion: Bridging the Gap with Alternative Tools' [2025] 56 IIC - International Review of Intellectual Property and Competition Law <https://link.springer.com/article/10.1007/s40319-025-01578-5#Fn16> accessed 2 January 2026.

[116] CCI, *Market Study on Artificial Intelligence and Competition* (n 4).

displaying non-realistic behaviour due to the artificial setting.[117] Moreover, real market settings are dynamic and may not be exactly replicated in the sandbox. While it provides flexibility and facilitates the empirical audit of the algorithm concerned, it is not in itself a solution to algorithmic collusion.

2. TOWARDS A DUE DILIGENCE STANDARD

Self-learning algorithms work on the principle of maximisation of profits.[118] They anticipate the behaviour of the competing algorithms and learn that by colluding, they can maximise the profits. The problem of 'lack of intent to collude' arises because they were not initially programmed by the deploying entity to collude, but subsequently learn to do so.[119] Therefore, in the Digital Eye scenario, where intention *per se* cannot be gauged from the working of autonomous algorithms, a due diligence standard can be developed. This would entail a self or regulatory audit framework, and failure to comply with it would trigger a rebuttable presumption of knowledge as to the collusive conduct of the algorithm.

3. ADDING NOISE TO THE MARKET

Recent studies[120] have highlighted the principle that the input determines the output. After all, algorithms, including reinforcement learning, are

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[117] Competition and Markets Authority, *Algorithms: How they can Reduce Competition and Harm Consumers* (May 2021) <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/991676/Summary_of_responses_to_algorithms_paper_publish.pdf> accessed 6 January 2026.

[118] 'Algorithmic Competition – Note by the European Union' (*OECD*, 24 May 2023) <https://one.oecd.org/document/DAF/COMP/WD(2023)17/en/pdf> accessed 4 January 2026.

[119] Colm Hawkes, 'A Market Investigation Tool to Tackle Algorithmic Tacit Collusion: An Approach for the (Near) Future' (*European Legal Studies, College of Europe*, March 2021) <www.coleurope.eu/sites/default/files/research-paper/ResearchPaper_3_2021_Colm_Hawkes.pdf> accessed 8 January 2026.

[120] Niuniu Zhang, 'Preventing Algorithmic Collusion by Adding Noise to Market Data' (*Promarket*, 19 December 2025) <www.promarket.org/2025/12/19/preventing-algorithmic-collusion-by-adding-noise-to-market-data/> accessed 5 January 2026.

dependent on 'market data', which is the fuel that powers them. Controlling the input can help shape the desired outcome. Introducing moderate noise to the market data would ensure that the algorithms work, but do not track competitors perfectly. Take, for example, driving on a foggy day. You can perceive that there is a vehicle ahead, but not enough to tailgate. This moderate level of fog provides a certain degree of safety. Similarly, noise is the fog in market data that enables the tracking of prices to a rough extent, allowing for competition, but discouraging collusion through algorithms.

This approach is powerful as it alters the market data characteristics itself and excludes any requirement of smoking gun evidence to prove collusion. Therefore, the approach lies one step before collusion and is a preventive approach.

Although this approach can be the next trailblazer, it requires research and market study as to what exactly is the optimum amount of 'noise' that needs to be added to the market data.

B. Ex-Post Methods

While it has been established that the Competition Act, 2002[121] is built on an *ex-post*, human-centric model, there are a few other *ex-post* methods (apart from penalties) that could be employed for the effective regulation of algorithmic collusion. These are as follows:

1. CAPACITY BUILDING FOR DETECTION OF ALGORITHMIC COLLUSION

India's regulatory environment has technical barriers in responding to AI-driven collusion. Although the CCI has made efforts to keep pace with

[121] Competition Act 2002.

changing market dynamics, it does not possess the technical know-how[122] to scrutinise sophisticated algorithmic systems. Probing algorithmic collusion requires not only knowledge of the law but also sophisticated data analysis capabilities, AI expertise, and the ability to trace decision-making chains of algorithms.

As a result, regulating algorithms requires specialised technical competence, particularly in understanding AI and its impact on market behaviour.[123] This insight is indispensable for examining algorithmic collusion or other AAEC outcomes. To regulate AI-driven markets effectively, the CCI must continue to strengthen its internal technical capabilities and infrastructure by developing in-house expertise in AI systems.[124] Such capacity-building would enable the CCI to monitor developments within digital markets and to detect instances of algorithmic collusion. Furthermore, specialised interdisciplinary Think Tanks may be established to navigate the complex interface between market dynamics and competition policy.

2. LIFTING THE AI VEIL IN COMPETITION LAW

When it comes to assigning liability, an algorithm cannot be held liable, and for this purpose, we need to lift the AI veil and look beyond.

In the Messenger model, where algorithms merely function as a means for facilitating a pre-existing collusive agreement, the presence of collusion is usually supported by direct evidence, thereby warranting the *per se* rule of

[122] CCI, *Market Study on Artificial Intelligence and Competition* (n 4).
[123] CCI, *Market Study on Artificial Intelligence and Competition* (n 4).
[124] Frédéric Marty and Thierry Warin, 'Deciphering Algorithmic Collusion: Insights from Bandit Algorithms and Implications for Antitrust Enforcement' [2025] 3 Journal of Economy and Technology <https://www.sciencedirect.com/science/article/pii/S2949948824000519> accessed 2 January 2026.

illegality. Similarly, in Hub-and-spoke arrangements, smoking gun or circumstantial evidence may exist. Thus, liability can be unambiguously assigned to the cartel participants and the involved entities.

Section 48[125] addresses the personal liability of individuals who are in charge of the conduct of the entity said to have contravened the Competition Act.[126] However, it is silent on whether the anti-competitive conduct carried out by an employee can be attributed to the entity itself. In the context of the Predictable Agent, algorithms effectively function as agents of the entity, performing roles traditionally associated with human employees. Consequently, liability can be directly attributed to the entities themselves under the principal-agent relationship.[127] A challenge for CCI is to determine the extent to which entities may be held accountable for the algorithmic conduct.

The complexity arises in the Digital Eye scenario, where self-learning algorithms analyse vast datasets and autonomously generate profit-maximising collusive outcomes, even without programming to coordinate with competitors.[128] As a result, attributing liability to the entity becomes contentious. It may be contended that where competitors deploy such algorithms with the awareness that their autonomous learning processes are

[125] Competition Act 2002, s 48.
[126] Competition Act 2002.
[127] Anna Beckers and Gunther Teubner, 'Three Liability Regimes for Artificial Intelligence – Algorithmic Actants, Hybrids, Crowds' (*British Association of Comparative Law*, 17 June 2022) <https://british-association-comparative-law.org/2022/06/17/three-liability-regimes-for-artificial-intelligence-algorithmic-actants-hybrids-crowds-bloomsbury-2022-by-anna-beckers-and-gunther-teubner/> accessed 1 January 2026.
[128] Jasper van den Boom, 'The Artificial Hand of the Free Market: Algorithms and Collusion' (Master thesis, Tilburg University, 18 June 2018) <https://arno.uvt.nl/show.cgi?fid=145648> accessed 30 December 2025.

likely to culminate in collusion, such knowledge may be considered to ascertain liability.

VII. CONCLUSION

The use of pricing algorithms in digital markets is expected to continue growing exponentially in the future, and so will their potential to elusively collude. Although a multitude of risks associated with algorithmic collusion have been identified, potential solutions also exist simultaneously. Despite the fact that *ex-ante* methods have been widely preferred, both methods (*ex-ante* and *ex-post*) must be employed *in tandem* to eliminate the harm of algorithmic collusion from the competition landscape. The US, EU, and China have been at the forefront of legal developments in regulating algorithmic collusion, while India has adopted a cautious approach. Therefore, this is a clarion call for India to catch up with the global best practices and move towards a proactive approach.