

PRICE LEADERSHIP IN DIGITAL MARKETS: ECONOMIC AND COMPETITIVE IMPLICATIONS

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Abstract.

Price leadership represents an important mechanism of price formation and coordination in oligopolistic markets, whereby one firm assumes the role of leader and other firms adjust their behavior in response to the price established by the leader. The development of digital markets has altered the conditions under which this mechanism operates, due to high price transparency, rapid access to information, increased comparability of offers, and reduced search costs for consumers and firms. In this context, the article analyzes price leadership in digital markets from the perspective of competition economics, focusing on the relationship between the structural characteristics of these markets, the behavior of the leading firm, and the response of follower firms. The research methodology consists of a theoretical analysis and a critical review of the relevant economic literature, complemented by a case study of e-commerce, namely the case of Amazon. The algorithmic dimension of price setting is not examined from a technical perspective but is considered only to the extent that it may influence the price leadership mechanism and competitive outcomes. The findings indicate that the specific characteristics of digital markets may strengthen the role of a price leader by increasing price observability and reducing competitors' response times. Price leadership may generate efficiency effects by reducing strategic uncertainty and contributing to market stability, but it may also create competition concerns when the economic position of the leader and the reactive behavior of follower firms weaken competitive pressure. The study therefore highlights the need to assess price leadership in relation to the specific structure of the market and its effects on competition, rather than merely on the existence of a price leader.

Keywords: price leadership, digital markets, competition, price setting, digital economy, dominant firms

JEL Classification: L13, L86, L41, K21

1. Introduction

The accelerated digitalization of the economy has significantly altered the structure and functioning of markets, affecting both firms' behavior and the process of price formation. Unlike traditional markets, digital markets are characterized by a high degree of information transparency, rapid access to information on prices and trading conditions, increased comparability of offers, and reduced search costs for consumers. These characteristics modify the way firms observe and anticipate each other's behavior and may influence the intensity of price competition.

In competition economics, price leadership is primarily associated with oligopolistic structures, in which one firm or a small group of firms has the ability to influence the price level, while other market participants adjust their decisions accordingly. A leading firm may acquire this role as a result of cost advantages, a significant market position, superior reputation, or a greater ability to assess market conditions. For follower firms, adopting the leader's price may represent a strategy for reducing uncertainty and avoiding price wars that could diminish the profitability of the industry as a whole. At the same time, price alignment may reduce competitive pressure and lead to price levels higher than those that would prevail in an environment characterized by more intense competition.

The characteristics of digital markets may amplify these mechanisms. In an environment where competitors' prices are easily observable, price changes can be identified and followed within a short period of time. Reduced search costs allow consumers to compare offers quickly, but at the same time facilitate the mutual observation of firms' pricing behavior. In the case of standardized or easily comparable products, price may become a central dimension of competition,

while the price charged by a retailer with a significant market position may serve as a reference point for other market participants.

Research on digital markets has likewise emphasized the importance of information transparency, search costs, network effects, and the economic position of digital platforms for the functioning of competition. However, these two strands of research have largely been addressed separately. The literature on price leadership primarily explains how oligopolistic market structures and the position of the leading firm determine competitors' responses, whereas the literature on digital markets focuses on the structural and behavioral transformations brought about by digitalization. Consequently, the integrated relationship between the structural characteristics of digital markets and the economic mechanism through which a price established by an important market player may become a reference point for competing firms remains insufficiently explored.

The main contribution of this research is conceptual and consists in developing an integrated perspective on price leadership in digital markets. This perspective connects traditional economic models of price leadership with the structural characteristics of the digital environment and enables an examination of the relationship between three elements: the conditions that favor the emergence of a price leader, the mechanism through which follower firms respond to the leader's price, and the consequences of this dynamic for competition and consumers. An additional contribution consists in distinguishing between price leadership resulting from market conditions and situations in which price alignment may lead to tacit coordination with potentially anticompetitive effects.

To examine concretely the mechanisms identified through the theoretical analysis, the research employs a case study of e-commerce, namely the case of Amazon. The case study is illustrative in nature and aims to highlight how the position of an important player in a digital market may contribute to transforming its prices into a reference point for other retailers.

The research is based on the premise that price leadership may have ambivalent effects on market functioning. On the one hand, it may contribute to reducing strategic uncertainty, avoiding price wars, and increasing predictability for market participants. On the other hand, when the leader holds a strong economic position and high transparency enables follower firms to react rapidly and predominantly through price alignment, the mechanism may reduce competitive pressure and contribute to the maintenance of higher prices. From this perspective, the analysis of price leadership in digital markets should go beyond the mere identification of a leader and examine the concrete effects of its behavior on the structure and intensity of competition.

2. Research Methodology

The research is predominantly qualitative and aims to analyze how the structural characteristics of digital markets may facilitate the emergence and consolidation of price leadership, as well as its implications for competition and consumer welfare. To achieve the research objective, three complementary methods are employed: theoretical analysis, a critical review of the specialized literature, and a case study [6].

The three methods are integrated into a sequential analytical approach. First, the theoretical analysis identifies the economic mechanisms through which price leadership may emerge and operate within oligopolistic market structures. Subsequently, the critical literature review enables a comparison of theoretical explanations and existing research findings concerning price leadership, competition in digital markets, and price transparency. In the final stage, the mechanisms identified are applied to a specific case, namely Amazon in e-commerce, in order to examine how they may be illustrated in a digital environment.

The theoretical analysis serves to establish the conceptual framework of the research and to identify the main economic mechanisms relevant to price leadership. At this stage, economic concepts and models relating to dominant-firm leadership, cost-based leadership, and barometric leadership are examined.

The theoretical stage also considers the characteristics of digital markets that may influence the price leadership mechanism. Particular attention is given to price transparency, reduced search costs, comparability of offers, the speed of price adjustments, economies of scale, network effects, and the economic position of digital platforms. The theoretical analysis does not aim to statistically test a hypothesis and does not involve estimating causal relationships based on a dataset. Instead, its purpose is to establish an analytical framework that will subsequently be used in the literature review and the case study.

The literature review aims to identify and compare the main theoretical and empirical contributions relevant to the research topic. The review focuses on studies concerning price leadership, oligopoly, the identification of leadership relationships between firms, price transparency, search behavior in digital markets, competition in e-commerce, and algorithmic pricing.

The selection of sources was based on their relevance to the research question and to at least one of the dimensions under analysis. The research relies primarily on scientific articles published in specialized journals, works in the field of industrial economics, studies concerning online markets, and relevant public documents related to competition analysis. The outcome of this stage is the identification of mechanisms and analytical criteria that are subsequently used in examining the case study.

To examine concretely the mechanisms identified in the previous stages, the case study method is employed, focusing on Amazon and its activity in e-commerce. The choice of this case is justified by Amazon's relevance to the proposed analysis, given its importance in e-commerce, the high degree of price visibility in the online environment, and the availability of public information concerning dynamic pricing practices and the use of pricing algorithms. The case study is illustrative and explanatory rather than statistical. Therefore, the Amazon case is not used to claim that the mechanism under investigation is present in an identical manner across all digital markets, but rather to examine, in a specific context, the mechanisms identified through the theoretical analysis and literature review [15].

Project Nessie is used in the research as an example of a dynamic pricing mechanism and is analyzed exclusively on the basis of publicly available information. The research does not seek to technically reconstruct the algorithm or independently verify the data or claims presented by competition authorities. Instead, it examines the economic implications of the mechanism described in public sources. In particular, the analysis focuses on the compatibility between the mechanism described and the theoretical characteristics of price leadership: the existence of a reference price, the possibility for competitors to observe it, the response of follower firms, and the potential effects on the intensity of competition [21].

The methodology used presents several limitations. First, the research does not employ an original dataset concerning price developments and does not econometrically estimate the relationship between changes in Amazon's prices and the responses of competitors. Consequently, the findings should not be interpreted as statistical evidence of a causal relationship between Amazon's behavior and the prices charged by other retailers. Second, the case study relies on publicly available information and secondary sources, which limits the possibility of independently verifying certain claims concerning the operation of pricing algorithms. Third, the selection of a single case does not allow for the statistical generalization of the findings to all digital markets. The purpose of the case study is to illustrate and examine an economic mechanism identified theoretically, rather than to demonstrate that all digital platforms or retailers operate in the same manner.

Therefore, the findings of the research should be interpreted as the results of a theoretical and qualitative analysis, supported by the specialized literature and illustrated through a case study. Further research could employ price databases, time-series observations of price changes by

multiple retailers, and econometric methods to test the relationship between the leader's price and the response of follower firms.

3. Price leadership in the economic theory of competition

Price leadership can be defined as a mechanism of price coordination in an oligopolistic market in which one firm assumes the role of leader by setting the price, while the other firms adjust their behavior in response to it. The economic literature distinguishes between several types of price leadership: low-cost leadership, dominant-firm leadership, and barometric leadership [4, 10].

In the dominant-firm model, the leader holds a significant market share and has the ability to influence the market price without losing a substantial portion of its demand. The other firms, referred to as "followers," accept the price established by the leader and adjust their output or commercial strategies accordingly [10].

The emergence of price leadership is closely related to market structure. Markets characterized by a small number of firms, barriers to entry, and limited product differentiation are more susceptible to this phenomenon. From a competition perspective, price leadership may be interpreted either as a form of efficient coordination or as a potential risk to effective competition [14].

In competition theory, price leadership lies at the boundary between competitive behavior and tacit coordination [1]. Although it does not necessarily involve explicit agreements between firms, it may produce effects similar to those of an anticompetitive agreement, particularly when it reduces competitive pressure on prices.

Classical economic literature treats price leadership as an outcome of strategic interaction among firms in an oligopolistic market. Early theoretical contributions emphasize that price leadership may emerge when a firm possesses significant advantages in terms of production costs or the ability to influence aggregate demand. Under these conditions, the leader can set a profit-maximizing price while anticipating the responses of follower firms [11].

Another important strand of the economic literature emphasizes the role of uncertainty and incomplete information in the emergence of price leadership. Firms may follow the leader's price as a signal of market conditions, particularly in contexts where demand is volatile or costs are difficult to estimate. Thus, price leadership may function as a mechanism of implicit coordination, reducing competitive uncertainty [11, 8].

4. The particularities of digital markets relevant for price leadership

A defining feature of digital markets is the high degree of price transparency. Consumers can quickly compare the offers of different firms, while companies can easily observe changes in competitors' prices. This transparency facilitates the emergence of a reference price established by a leading firm [6].

Reduced search costs affect consumers' price sensitivity and increase the importance of the leader's position. Firms that succeed in establishing a price perceived as "fair" or representative of the market may attract a significant volume of demand [19].

In digital markets, some firms benefit from structural advantages, such as brand recognition, access to large customer bases, or economies of scale. These advantages can strengthen the role of a price leader and limit competitors' ability to deviate significantly from the price established by the leader [2].

In the context of imperfect competition, price leadership is often analyzed as an alternative to intensive Bertrand-type competition. By following the price established by the leader, firms can avoid price wars that may reduce the profitability of the entire industry. However, the literature emphasizes that such behavior may lead to higher prices than those that would prevail in a fully competitive environment. From a competition policy perspective, it is essential to distinguish

between price leadership resulting from market conditions and price leadership that conceals anticompetitive coordination. Recent economic studies emphasize that the mere existence of a price leader is not sufficient to establish anticompetitive conduct; rather, the structural context of the market must also be taken into consideration [14].

An increasingly important strand of recent literature focuses on how digitalization affects traditional price leadership mechanisms. Research indicates that digital markets, through their specific characteristics, facilitate the observation of competitors' behavior and reduce the time required to respond to price changes. This may result in greater price stability around the level established by the leading firm [6].

Evidence from e-commerce indicates that firms with high market shares or strong reputations tend to assume the role of price leaders, while smaller firms adopt reactive strategies. This dynamic is frequently observed in digital marketplace environments, where product comparability is high [3, 9].

5. Economic models of price leadership applicable to digital markets

The **dominant firm model** is one of the most widely used theoretical frameworks for analyzing price leadership. In this model, the leading firm sets its price based on residual demand, taking into account the aggregate response of the following firms. In digital markets, this model is relevant in situations where a platform or a merchant holds a significant market share. Applying the dominant firm model to the digital environment highlights that economies of scale and increased visibility can amplify the leader's power to influence prices. Following firms often face difficulties in deviating from the leader's price without losing demand [10].

The barometric model occurs when a firm is perceived as having a superior ability to interpret market conditions and anticipate developments in demand or costs. In digital markets, this type of leadership is frequently associated with firms that have a central position in the market and are considered benchmarks for setting prices. This model does not necessarily imply a dominant position in terms of market share, but rather an informational or reputational advantage. Follower firms adopt the barometric leader's price to reduce uncertainty [4].

Limitations of **classical models** in the digital context - although classical price leadership models provide a useful framework for analysis, their application to digital markets has certain limitations [6]. Online markets are characterized by rapid dynamics and a large number of participants, which can reduce the stability of leadership in the long term. However, the literature shows that, in practice, price leadership persists in many digital markets, especially those with standardized products [10].

6. Case study: Price leadership in e-commerce – the case of Amazon

To examine the mechanisms of price leadership in digital markets in a concrete way, this study analyzes the case of Amazon, the world's largest online retailer, which holds a dominant position in important segments of standardized products, such as consumer electronics, home appliances and IT products [20]. In the e-commerce environment, Amazon's price levels are often used as a reference price for other online retailers, who adjust their pricing strategies according to the market leader's price developments. The importance of this case derives from the fact that the influence exerted on prices does not result from explicit agreements between firms, but rather from Amazon's ability to use advanced algorithmic tools and to capitalize on the market power accumulated over time [21].

A significant example of algorithmic price leadership is represented by the use of an internal automated pricing system, called "Project Nessie" [21], in an antitrust investigation initiated by the Federal Trade Commission (FTC) in the United States. According to the FTC complaint, Project Nessie was designed to identify products for which Amazon could raise prices with a high probability that other retailers would follow suit, thereby driving higher prices across the internet.

This approach led to competing retailers often adjusting prices upwards based on algorithmic predictions, and Amazon then maintained these high levels, resulting in significant additional profits for the company. The FTC alleges that the use of this algorithm generated more than \$1 billion in “excessive” profits for Amazon during the period under review by indirectly influencing prices across the online marketplace. Amazon responded to these allegations by stating that the tool was used to prevent situations where its price-matching policy led to unsustainably low prices, and that it is no longer used.

From an economic perspective, the Amazon case can be interpreted as an example of tacit price leadership in digital markets, in which the market leader does not directly impose prices on competitors, but influences overall price levels through its ability to anticipate and shape the behavior of rivals. Algorithmic mechanisms allow for dynamic price adjustments that, in turn, create signals that other traders can follow, thus maintaining a relative coherence in the price structure in the market. Such a mechanism can lead to price stabilization, reducing the volatility caused by price wars between traders and providing a level of predictability for both firms and consumers [21].

However, this form of implicit price coordination can also have effects that are counterproductive to intense competition. In an environment where competitors become more reactive to changes initiated by the leader than actors initiating their own strategic adjustments, competitive pressure is reduced. This can strengthen the dominant position of the leader and make entry and expansion more difficult for smaller competitors, thereby reducing the competitive dynamics of the market [22].

For consumers, the existence of a price leader such as Amazon has both positive and potentially negative effects. Price stability and predictability can facilitate purchasing decisions and reduce the uncertainty associated with online transactions. However, if tacit price leadership causes prices to be maintained above competitive levels, consumers may experience a loss of welfare in the form of higher prices than they would be in a more aggressively competitive environment.

From the perspective of competition authorities, the Amazon case highlights the need to monitor pricing algorithms in digital markets. Although price leadership is not, in itself, an illegal practice, its use in conjunction with a dominant market position can generate indirect anti-competitive effects by creating barriers to entry and efficiency for rivals. Authorities must be able to distinguish between legitimate competitive behavior and practices that may lead to the restriction of competition under the guise of efficient algorithmic optimization.

In conclusion, the analysis of the price leadership phenomenon in e-commerce, illustrated by the case of Amazon and the Project Nessie algorithm, confirms that digital markets can favor the emergence of price leaders due to high transparency and the use of algorithmic technologies for dynamic pricing [21]. Although these mechanisms can contribute to the stability of markets and reduce uncertainty, they can also attenuate the intensity of competition and, implicitly, negatively affect consumer welfare in certain circumstances.

The main limitation of this study is its reliance on secondary information provided by antitrust investigations and press reports, without direct access to original price data or the algorithm itself. Future research could include detailed quantitative analyses of price evolution for specific product categories and the direct impact of pricing algorithms on competition and consumer welfare in digital markets.

7. Conclusion

This article has analyzed the phenomenon of price leadership in digital markets from the perspective of competitive economics, highlighting how the specific characteristics of the online environment influence traditional pricing mechanisms. Theoretical analysis and case study have shown that digital markets favor the emergence of price leaders due to high transparency, reduced search costs and dominant positions of some firms.

The case study analysis of price leadership in e-commerce, illustrated by the case of Amazon, highlights several results relevant to understanding competitive dynamics in digital markets. First, the results indicate that Amazon operates as a price leader in standardized product segments, where non-price differentiation is reduced. Price adjustments initiated by Amazon are followed, within a short time, by other online retailers, which confirms the existence of a tacit price leadership mechanism, based on the dominant position and high visibility of the platform. Second, the study shows that dynamic pricing algorithms play a key role in consolidating this leadership. The use of Project Nessie allowed testing of competitors' reactions to gradual price increases and the maintenance of those levels that were not countered by discounts. This behavior suggests that algorithms can facilitate implicit price coordination, without any explicit understanding between firms. A third important result is related to the reduction of the intensity of price competition. Smaller competitors showed a predominantly reactive behavior, preferring to follow the leader's price instead of initiating aggressive price reduction strategies. This alignment decreased the frequency of price wars and contributed to greater price stability in the market. Fourth, the results suggest that price leadership in the digital environment can lead to higher price levels than those corresponding to a perfect competition environment. Indirect evidence presented in competition authorities' investigations indicates that maintaining high prices, as a result of general alignment of traders, can generate additional costs for consumers. In terms of consumer welfare, the results are mixed. On the one hand, price stability and predictability reduce decision uncertainty and search costs. On the other hand, consumers may be disadvantaged if price leadership limits competitive pressure and prevents the emergence of lower prices. Finally, the study highlights that price leadership in digital markets is not necessarily anti-competitive, but becomes problematic when it is supported by a dominant position and high barriers to entry. The results underline the importance of prudent intervention by competition authorities and the need to adapt regulatory tools to the realities of the digital economy and pricing algorithms.

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