

Research on Price Involution and Development of China's New Energy Vehicle Market

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Abstract: This article examines the phenomenon of price volatility in China's new-energy vehicle market and separately analyses the causes and possible consequences in terms of technological innovation and government policies. The Chinese government's policies to promote new energy vehicles, such as subsidies and rapid technological modernisation, have led to high demand for green energy vehicles and a fiercer competitive environment for companies, resulting in a downward price trend in China's new energy vehicle market. Aggressive pricing strategies often come at the expense of profit margins. Continued price declines can lead to fierce competition in China's new energy vehicle market, reducing the living space for small enterprises and reducing the diversity and development potential of the latest energy market. This article identifies the importance of the sustainable development of China's new energy vehicle industry and highlights the need for innovation, differentiation and a stricter policy framework to address the problem of price volatility. The aim is to provide suggestions to the government and the public on how to address the challenges caused by price erosion to promote a healthier and more competitive market environment that drives the growth and technological progress of China's NEV industry.

Keywords: China's new energy vehicles, Government policy, Vehicle market prediction.

1. Introduction

Climate change and air pollution have become major global issues, leading countries around the world to adjust their consumption patterns and investigate strategies for creating clean and sustainable energy infrastructure [1]. As mentioned in the previous report, the transport sector is accountable for approximately 30% of CO₂ emissions in developed countries and contributes around 23% to global man-made CO₂ emissions, which means that eliminating CO₂ emissions and expanding green economy and transportation are significant [2]. Introducing new energy cars, fuelled by alternative energy sources instead of traditional fossil fuels, could effectively decrease harmful emissions created by combustion and mitigate the impact of climate change. China, being the foremost contributor of carbon dioxide globally, has set the goal of reaching the maximum level of its greenhouse gas emissions by 2030 and achieving zero emissions of carbon by 2060 [2]. The pervasiveness of NEV adoption could have a positive influence in ameliorating long-standing atmospheric pollution issues, which are strongly interlinked with communities' well-being [3]. More and more brands, including overseas and local companies, have entered the Chinese market and are fiercely competitive in price involution.

The previous research showed that the advancement of alternative fuel cars in China has reached the status of a national plan, and the government is placing significant emphasis on the development of these vehicles [4]. The research on the present state of new energy vehicles tends to focus on the business model from the industry level, such as the sale method, because the batteries and raw materials, to some extent, increase the cost of production, restricting these high-technology products expand in their market; however, In 2016, China began to encourage the use of the new energy vehicle [5]. The demand for new energy vehicles and the new energy market share have shown rapid growth [1]. When consumers make decisions to purchase the NEV, they take not only personal preference but also technological innovation, environmental awareness, and government policy into consideration [1].

Firstly, from the technological innovation side, more and more young people are pursuing continuous advancement of technology and individualisation, which has led to numerous new companies in the Chinese market, driven by innovative concepts in new energy and Internet technology [4]. NIO Inc. is an exemplary company that is at the forefront of the premium intelligent electric car market. It was established in November 2014 [6]. NIO is the second company specialising in purely electric vehicles to be listed in the United States, following Tesla and is prepared to expand to Europe and the United States [4]. Moreover, Competition in China's new-energy vehicle (NEV) industry has escalated as both domestic and international brands are trying to occupy market share by introducing price cuts and launching new models. The emergence of the new energy market has led to an increasingly intense rivalry. Companies' ability to capture market share will depend on their utilisation of sophisticated technologies and ability to offer cheaper pricing.

Secondly, environmental awareness is an important aspect when consumers purchase NEVs. China's efforts to develop new energy vehicles aim to mitigate pollution and enhance the energy consumption framework, in line with the nation's objective of advancing sustainable development [7]. Generally, higher consumer environmental awareness could play a positive role in developing a green economy because consumers who are aware of the environment subconsciously prefer products that are environmentally friendly or have sustainable features [1]. Even though there is no denying that environmental awareness could influence consumers' choices, the positive or negative effect still depends on how deeply consumers understand it. Consumers who lack accurate information about the environment or are entirely unaware of it would face difficulties in participating, such as putting themselves in the excluded position and associating global warming issues with industry factors rather than personal behaviour [1]. Even worse, consumers may resist repurchasing it if they feel stressed by the misconceptions. Take Build Your Dreams (BYD) as a typical example. BYD acknowledged that they ended the production of conventional gasoline-powered cars and were producing fully electric and heavily electrified plug-in hybrid cars only. It is the world's first automaker to end producing fuel-combusting vehicles [6]. This example indicates that the future need for new energy vehicles increased gradually; at the same time, companies that switched from gasoline to new energy could take market shares earlier and have competitive advantages.

Previous research also mentioned potential problems in the new energy market, including the need for uniformity in the standard of construction infrastructure and technical issues and the latest energy vehicle industry chain among many parties [5]. However, there are variations in charging methods, operational practices, and maintenance approaches. Regarding technical issues, China's new energy market has expanded rapidly in recent years and is facing high competition within this market. However, some gaps still exist between China and other countries, such as precision parts production and new business models. The basic infrastructures still need more improvement to serve better and give consumers more confidence and a sense of security in having green energy vehicles, which requires investment and collaboration among different parties. There is still a lot of research to be

done to analyse the shortcomings of the latest energy market and provide more suggestions for future market growth.

This article will first explore the possible reasons, including government policy and technical innovation, for the current relentless competition in China's NEV industry, which led to the price war and indicates that companies' efforts to differentiate themselves and secure market share. Potential problems, such as small businesses under increasing pressure to survive in a business environment due to intense competition and lower profits, should be taken into consideration. It is significant for the government to explore efficient methods to create a fair and healthy NVE market and practical regulations to provide more opportunities and innovation chances for various enterprises for sustainable development. Finally, it will make predictions for China's future new energy development and provide practical methods.

2. Causes and Problems of Internal Competition.

Government policy could be one of the potential reasons that push price involution in this market and cause fierce competition. A series of subsidies for consumers and the construction of charging infrastructures, tax incentives, and regulatory mandates have been put forward to increase NEV sales and market expansion [1]. However, these policies would contribute to what can be described as "price involution"—a phenomenon where intense competition leads to diminishing returns and unsustainable pricing strategies within the market.

2.1. The Government Policy

The government policy contributes to the intense competition in price involution in the NEV market because China's government shows encouragement and a positive attitude toward such new energy companies, including focusing on subsidies and infrastructure. The government policy increases the demand for NEV because the policy of the limited number of license plates for gasoline was adopted in some cities, such as Beijing and Shanghai, to address the issues of chaotic traffic and airborne pollutants. The limited number of license plates for gasoline cars but no such restrictions on NEVs have increased the demand for new energy cars in many cities in China [2]. The government would provide subsidies to individuals who buy new energy vehicles and raise funds to encourage the building of new energy vehicle-supporting facilities, such as charging facilities [6]. Therefore, the government's stringent regulations on emissions hint at the Chinese government's attitude and push traditional automakers to shift rapidly toward NEV production in seek of higher profits, making more and more new models and brands enter the market and further saturating the market, where oversupply becomes a risk. The government put forward a tax policy to decrease the pressure on small and new businesses and encourage more to innovate with advanced technological vehicles. Still, once the tax policy is cancelled, small businesses would lose their advantages and face the challenges of surviving in the competition with low prices. Subsidies and tax breaks have enabled many companies, including startups, to enter the NEV market with lower entry barriers. Even though the subsidies policy and restrictions for gasoline vehicles lower businesses' costs and provide consumers with more affordable cars, it has intensified competition to the point where companies are under immense pressure to cut prices to maintain or grow their market share [8]. A trend of continuous price reduction (price involution) would appear as more and more businesses compete to attract consumers, which in turn forces the market to follow the trend to gain competitiveness at the expense of profit margins, leading to a vicious cycle of price wars that can erode the companies' financial stability. In May, BYD released the fifth-generation DM technology and decreased the price of the new technology model to 90,000 yuan, which was a shock. Not only have Xpeng, NIO, and other new energy and new forces joined the war group, but Mercedes-Benz, BMW, Audi and other joint venture

car companies have sharply reduced prices to cater for consumers [9]. Additionally, there were 136 models with price cuts, more than 90% of the total price cuts in 2023 and exceeding the total price cuts in 2022 [8]. Since 2021, the NEV industry has transitioned away from reliance on subsidies, with technological advancements and supporting infrastructure steadily maturing. Even home appliances, mobile phones, and Internet companies have joined the new energy vehicle industry at the expense of cross-border [8]. With the decrease in subsidies in the NVE market, the companies that benefit from subsidies to decrease prices and gain competitiveness would be challenged because they need help competing with larger firms with the resources to cover these costs or achieve economies of scale.

2.2. Technical Innovation

Technical innovation should be taken into account because it relates to the companies' market shares and future development. Technological innovation is a driving force in China's new energy vehicle (NEV) market. Breakthroughs in battery technology, electric drivetrains, and autonomous driving systems have significantly enhanced the performance of NEVs [10].

The NIO could be an example to demonstrate that advanced technical creations could bring considerable benefits to the company and take market share as early as possible, emphasising the significance of innovation. The innovation investment funds in NIO from 2017 to 2023 have been showing an increasing trend. Increased from approximately RMB 280 million in 2016 to RMB 1900 million at the end of 2023, an increase of 6.79 times [11]. NIO Inc. could be an example to illustrate how sophisticated technological innovations can yield substantial advantages for a firm, enabling it to rapidly capture market share and showing the necessity of fostering innovation. The innovation investment funds allocated to NIO have exhibited a consistent upward track from 2017 to 2023. The amount rose from over RMB 280 million in 2016 to RMB 1900 million by the end of 2023, representing a growth of 6.79 times [11]. NIO Inc. has continually focused on developing and innovating new products and technologies, aiming to keep its fundamental competitiveness through ongoing research and development initiatives [4]. Therefore, companies' continuous innovation and new products inject a steady stream of vitality for future growth and enable them to occupy the market. The prospect of China's NEV market remains positive, and advanced innovation has become one of the most essential parts for enterprises to grow and take the market share. Companies would capture key markets once the affordable and more efficient NEV batteries are innovated and adopted. Technological innovation could solve consumers' worries about inadequate battery life and constrained mileage, increasing consumers' and businesses' confidence in future energy vehicle development. However, the pressure of technical innovation is the possible reason that leads to price involution and increases the difficulty for other businesses to enter the market. Price involution, while benefiting short-term sales, poses a long-term threat to the sustainability of the NEV industry. By focusing on cost reduction rather than product differentiation and innovation, the market risks stifling growth and progress, which could also diminish consumer trust in the quality of NEVs and limit China's competitive edge in the global energy market. The rapid release of new products accelerates the depreciation of existing models, compelling companies to lower prices on older inventory to stay competitive. To prevent China's new energy market into a vicious circle of price competition and stuck into stagnation, it requires government measures and businesses' correct orientation towards the future.

3. Future Prediction

While China's NEV market faces several challenges, the prospects for future growth remain strong. The future of China's NEV market generally looks promising, with continued growth expected in the

coming years [2]. On the positive side, the government encourages NEV production and makes related policies to decrease businesses' cost of production to contribute to solving environmental pollution problems. This action shows China's determination and responsibility to tackle emergency social obstacles. After further supervision and policy encouragement, NEV (New Energy Vehicles) will serve as an encouragement for the growth of associated firms in the industrial supply chain. The elevated fuel prices and the rising levels of airborne contaminants in China are driving consumers to turn their attention to buying green energy cars [5]. At the same time, in the knowledge development, battery cells, such as parts manufacturing, Chinese enterprises have achieved competitive advantages, forming a potent domestic battery [12]. Transforming raw materials into parts for electric vehicle applications brings innovation and energy to the industry. Because of the bright prospects of the new energy vehicle market, a significant inflow of resources has been driven to this growing industry, potentially leading to an expansion of the number of firms entering the field [12].

However, China's New Energy Vehicle (NEV) market still needs to overcome significant challenges that could hinder its future growth, including intense market competition in price involution and inadequacies in battery infrastructure. Addressing these issues is crucial to future sustainable development and continuous expansion in the NEV industry. The future of the NEV market in China is not just about meeting sales targets but also about setting new standards for innovation, sustainability, and environmental responsibility in the automotive industry. These challenges mentioned above require the government's policies to implement phasing out subsidies and enhancing procurement by government and public agencies [3]. The government and industry stakeholders should work together to control the harmful effects of price involution, encouraging companies to compete on factors other than price, such as quality and after-sales service. Regulatory measures could also be introduced to prevent excessive price-cutting from undermining market stability. As for the charging infrastructure, expanding and standardising the charging network across China is essential [5]. The government could focus on the underserved areas to develop charging stations, ensuring nationwide charging service coverage. The charging stations could even increase government income if the charging stations are charged. Additionally, as Tan et al. suggested, investing in R&D and enhancing battery capacity, increasing the charging efficiency and energy density, and reducing charging times would also address some of the issues consumers worry about [5]. China's future NEV market development and growth require collaboration between China's government and NVE businesses to make practical regulations and prevent potential problems that could harm consumer rights and the industry's future expansion.

4. Conclusion

In conclusion, the research has explored the phenomenon of price involution in China's new energy vehicle (NEV) market, analysing its causes and effects on the industry's development. Price involution within China's new energy market causes multiple influences on corporate profitability, innovation capacity, and the long-term stability of the industry. China's government's encouraging policies and technological innovation could be the drivers of the price involution in the current market, and the negative aspects of the phenomenon include the risk of corporate profits, weak sustainability and potential technology stagnation. While China's NEV market faces significant challenges in intense competition, targeted strategies would help mitigate these problems. It requires the collaboration of government policy and business-targeted strategies, fostering healthier competition and improving the basic infrastructure to provide better customer service. The government could encourage enterprises to focus on technological innovation and promote R&D investment to set higher industry standards, reducing the dependence on price-cutting strategies; more practical regulations of industry standards should be introduced to improve the quality of market competition rather than relying solely on price competition. Enterprises should strengthen innovation and create

high-value products to enhance market competitiveness. With the practical implementation, China's new energy market could step into a brighter and more sustainable future. If the industry could overcome price involution, the NEV market in China is well-positioned to achieve long-term sustainable growth and establish itself as a global leader in green technology and innovation.

References

- [1] Yun, J. (2024). *Factors Influencing the Market Share of New Energy Vehicles on China - A Case Study of BYD. Business Administration*. <https://e-research.siam.edu/wp-content/uploads/2024/08/MBA-2023-IS-Jiang-Yun-6317195861-Factors-Influencing-the-Market-Share.pdf>
- [2] Ma, S.-C., Fan, Y., & Feng, L. (2017). An evaluation of government incentives for new energy vehicles in China focusing on vehicle purchasing restrictions. *Energy Policy*, 110, 609-618. <https://doi.org/10.1016/j.enpol.2017.07.057>
- [3] Zhao, X., Li, X., Wu, Y., Qiao, L., & Zhang, C. (2023). Assessment of the effects of China's new energy vehicle industry policies: from the perspective of moderating effect of consumer characteristics. *Environment, Development and Sustainability*. <https://doi.org/10.1007/s10668-023-04078-z>
- [4] Ma, J & Mayburov, I. (2021). *The impact of taxation policies on the research and development of alternative fuel vehicle companies -- A case study of NIO Inc. IOP Conference Series: Earth and Environmental Science*. DOI 10.1088/1755-1315/958/1/012019.
- [5] Tan, Q.-T., Wang, Z., Fan, W., Li, X., Li, X., Li, F., Zhao, Z. (2022). Development Path and Model Design of a New Energy Vehicle in China. *Energies* 2023, 16(1), 220; <https://doi.org/10.3390/en16010220>
- [6] China's BYD ends full combustion engine cars to focus on electric, plug-in hybrids. (2024, April 3). Reuters. <https://www.reuters.com/business/autos-transportation/chinas-byd-ends-combustion-engine-cars-focus-electric-2022-04-03/>
- [7] Yang, T., Chen, X., & Li, X. (2021). Evaluation and analysis of new-energy vehicle industry policies in the context of technical innovation in China. *Journal of Cleaner Production*. <https://doi.org/10.1016/j.jclepro.2020.125126>
- [8] Xinhuanet. Internal volume" of new energy vehicles, where is the road. (2024, August 16). information. <http://www.cacsmofcom.gov.cn/cacscms/article/cgal?articleId=181490&type=>
- [9] The Paper reported. New energy vehicles inside the truth. (2024, June 8). . https://www.thepaper.cn/newsDetail_forward_27662060
- [10] Sun, S., & Wang, W. (2018). Analysis on the market evolution of new energy vehicle based on population competition model. *Transportation Research Part D*. 65. 36-50. <https://doi.org/10.1016/j.trd.2018.08.005>
- [11] NIO research and development expenses (2024). *Guru focus*. https://www.gurufocus.cn/stock/NIO/term/research_development
- [12] Gong, H., & Hansen, T. (2023). The rise of China's new energy vehicle lithium-ion battery industry: The coevolution of battery technological innovation systems and policies. *Environmental Innovation and Societal Transitions*. <https://doi.org/10.1016/j.eist.2022.100689>