



Analysis of Influencing Factors in The New Energy Automobile Industry Based on Linear Regression Models

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Abstract. In today's world, environmental protection is being valued by more and more people. Under this circumstance, the new energy vehicle market is booming. This passage examines the impact of three influencing factors on the share prices of NIO and Tesla, two new energy vehicle companies from China and the United States, from September 2020 to April 2022. The three influencing factors are China's domestic CPI, the exchange rate of the renminbi against the US dollar and the price of Brent crude oil futures and drew the conclusion that CPI and the brent oil price both have negative impact on the stock price of NIO company. the CPI and the exchange rate between Chinese Yuan and US dollar both have negative impact on the stock price of Tesla, however, the brent oil price has positive impact on that of Tesla.

Keywords: Linear regression models; New energy vehicles; Influencing factors; CPI; Exchange rate

1 Introduction

Since 2020, the covid-19 pandemic has swept the world, causing a huge impact on the global economy, according to IMF data, and the global economy will shrink by 3.5% in 2020, which means that the total global GDP will fall from \$87.75 trillion in 2019 to \$84.68 trillion in 2020, directly reducing \$3.07 trillion, equivalent to the GDP of the United Kingdom or India for the whole year. This reminds the article of the impact of the financial crisis of 1998 and 2008 on the economy. The financial crisis has been linked to crash of asset, decrease in employment, reduced productivity, and increased government debt. Of all the causes of economic fluctuation, the deficient energy is an important part. Due to the rising price of oil and natural gas, there has been a shortage of energy in Asia, Europe and the United States, and electricity prices have continued to rise. As the situation of the COVID-19 pandemic improves, the global demand for fuel is increasing. Obviously, the current energy system is no longer fit the global development. Renewable energy sources such as solar, wind, and hydro-power should occupy a greater percentage, and renewable energy should gradually become mainstream. From the perspective of environmental protection, new energy technology is

also an important way to reduce carbon dioxide emissions and achieve carbon neutrality. In the application of new energy, new energy vehicles are a very important emerging industry.

According to the notice of the Ministry of Commerce of the People's Republic of China on October 20, 2020, the development of new energy vehicles is the only way for China to move from an automobile power to an automobile power, and is a strategic measure to cope with climate change and promote green development. Since the State Council issued the "Energy-saving and New Energy Vehicle Industry Development Plan (2012-2020)" in 2012, China has stick to the strategic orientation of pure electric vehicles, and the development of the new energy automobile industry has made great achievements, becoming one of the important forces in the development and transformation of the world's automobile industry. According to the statistics of the China Association of Automobile Manufacturers, China achieved sales of new energy vehicles in 2020 at 1,367,315 units, an increase of 13.35% year-on-year, and an average annual compound growth rate of 32.80% in the past five years, with a penetration rate of 5.40%, and from January to March 2021, China sold 515,000 new energy vehicles, and the penetration rate increased to 7.49%. Among these new energy vehicles companies, there are some leading companies: Tesla, Weilai, BYD, etc., who lead the development of the industry with technological innovation. On January 7, 2021, the world's richest man changed, Musk, with Tesla's crazy soaring stock, became the richest man in the world. This also reflects the fiery heat of the new energy automobile industry. The article seeks to analyze the deeper relationship between the new energy automobile industry and the economy. It is common sense that new energy vehicles have countless advantages. Firstly developing new energy vehicles can cut down the exhaust emission. Data from the press conference jointly held by the National Development and Reform Commission, the Ministry of Commerce and other departments on promoting green consumption show that the current number of new energy vehicles exceeds 7.8 million, and the annual carbon emissions of new energy vehicles are reduced by about 15 million tons. Promoting the green development of automobile consumption is an important part of comprehensively promoting green consumption, and China has achieved remarkable results in promoting the green development of automobile consumption. In terms of new energy vehicle sales, data show that in 2021, China's new energy vehicle sales reached 3.521 million, an increase of 1.6 times year-on-year, and the ownership of new energy vehicles reached 7.84 million, accounting for 2.6% of China's total number of cars and about half of the global new energy vehicle ownership. Compared with traditional fuel passenger cars, existing new energy passenger cars reduce carbon emissions by about 15 million tons per year in use. Secondly, the cost of using new energy vehicles car is low, not considering wear, maintenance and other costs, the cost of electric vehicles per kilometer is only between 2-4 dimes, almost half of the fuel vehicle, with 150,000 kilometers as the limit of the family car, pure electric cars can save nearly 45,000 yuan. However, new energy vehicles still have some imperfections. Firstly the popularity of public charging piles is not enough, and private charging piles are a large cost. This undoubtedly brings great inconvenience to consumers. Many remote areas still do not have charging piles, leading to the result that charging becomes difficulty. Also the charging time of new energy electric vehicles is long, and some models do not

support fast charging, and slow charging takes about 5 to 10 hours, in low temperature environment, the battery cell performance of new energy vehicles declines rapidly, and the battery life is greatly reduced. In the cold areas, the situation is even worse, the mileage may be directly folded, and even the situation that cars cannot be started is possible due to the damage of battery.

2 Literature review

2.1 Policies on new energy vehicles

Among all the scholars who do research on policy of the New Energy Automobile industry, Wang Hai and Yin Junya [1] deserve extra attention for their cutting-edge research on the relationship between local industrial policies and Industry innovation and development. On the basis of constructing regional policy effectiveness indicators, demand-based policy effectiveness indicators, supply-based policy effectiveness indicators, and environment-based policy effectiveness indicators, the paper empirically test the impact of local industrial policies on the innovation and development of the new energy automobile industry.

Similarly, Zhou yan and Pan yao's [2] research focus on those policies of the industry but they do it from the perspective of subsidy policies and tax reduction, which can influence greatly on the transaction cost. The researchers studied three high-tech new energy companies to draw the conclusion that the policy choice of high-tech industries, including new energy vehicles, should shift from financial subsidies to industry-based taxes relief.

On the contrary, research made by LiuYing-Qi and Wang-Jingyu [3] focus on the global experience of demonstration policy and Business Model innovation which can be referential to China as effective ways to solve energy crisis and environmental pollution. This paper concludes that the development of China's electric vehicle industry needs to increase investment in government policies, business model innovation, partners and public awareness, so as to accelerate the development of China's electric vehicle industry. The paper selects 14 cities/regions-New York, Los Angeles et.al, (2014) TTwhich are well known by good performance on development of electric vehicles for the research. Based on the analysis on the cities' basic data of population, area, car ownership, this paper analyzes the policies in these cities/regions from 4 aspects-industry development strategies and investments, subsidy and the tax policies, related rules and specialized agencies

2.2 Market and consumers of new energy vehicles

Research made by Zan Xin and Ou Guo-li [4] focus on the influence on the consumers, to be more precise, They Study on the Heterogeneity of Subsidy Models and Consumers' Purchase Behaviors under the Background of "Subsidy Regression" To prove there exists strong relationship between Government's Promotion Policies and the Demand of New-energy vehicles. The researchers believe that under the collaborative supervi-

sion model between the government and consumers, the new energy vehicle manufacturers will improve the production technology. After the retreat of stimulating policies, the new energy automobile industry can continue to develop in an independent, independent and healthy direction.

This passage drew the conclusion that the government must consider the production end, the car purchase end and the application side at the same time, and pay attention to the operation and use of new energy vehicles. Based on the above theoretical analysis and simulation results, this paper proposes the following policy recommendations: First, from the production side, pay attention to the technical input cost of new energy vehicles, and avoid the occurrence of negative sabotage phenomenon of enterprises occupying subsidies. We should refine the audit standards for the qualifications of new energy vehicle production enterprises, pay close attention to the quality of new energy vehicles, ensure that the later products of new energy vehicles can meet the standards, and avoid the blind mass production of high-quality enterprises to expand market share, and the occurrence of inferior enterprises in muddy waters to follow the industry boom. Secondly, from the application side to ensure the convenience and economy of consumers, such as from the perspective of subsidizing infrastructure construction, improve the basic charging facilities of new energy vehicles, and fundamentally improve the convenience of new energy vehicle buyers. At the same time, it can be right

The electricity bill for charging new energy vehicles gives a certain degree of preferential treatment, stimulating consumers' enthusiasm for the purchase of new energy vehicles. Promote the widespread use of new energy vehicles in the public sector first, and then gradually popularize them in the private sector, strengthen the construction of new energy vehicle infrastructure, ensure that new energy vehicles gradually mature with the help of financial subsidies, and can develop independently and stably after the subsidies disappear

2.3 The current situation and the future of new energy vehicles

Research made by Wang Xu [5] discusses the concept and development status of new energy vehicles, expounds the problems existing in plug-in hybrid vehicles and fuel cell vehicles, and introduces the development situation of key components of new energy vehicles, such as drive motor, battery and battery management system, and looks forward to the future development trend, whose production process and efficiency will be greatly improved. This passage illustrated the advantages of new energy vehicles compared with traditional fuel vehicles. More energy-saving and environmentally friendly, low emissions, good economy. New energy vehicles mostly use pure electric or hybrid, as well as fuel cells. The system powers the car. Pure electric and fuel cell vehicles have zero emissions and their pollution. The dye is extremely low, in line with the concept of protecting the environment of our people, and hybrid vehicles are only available. In case of acceleration, hill climbing, and insufficient battery power, the engine participates in the work., the emission of exhaust gas is greatly reduced, and the price of electric energy is lower and the economy is better

3 Current situation of new energy industry

On September 17, 2013, the website of the Ministry of Industry and Information Technology published the "Notice on Continuing to Carry out the Promotion and Application of New Energy Vehicles" jointly issued by the Ministry of Finance, the Ministry of Science and Technology, the Ministry of Industry and Information Technology, and the National Development and Reform Commission, which means that the subsidy policy for the promotion and application of new energy vehicles is proposed. Then The subsidy policy in 2017 gradually shifted to promote the progress of cruising range to solve the biggest shortcoming of new energy vehicles: cruising range. However, such a simple reliance on subsidies to guide the market blindly increase the mileage also laid a certain safety hazard for battery safety, new energy vehicle companies in order to get the highest subsidies, blindly increase the number of batteries, improve energy density, ignore the battery safety issues, from time to time there are new energy vehicle spontaneous combustion news, but also led to the public still have a skeptical attitude towards new energy vehicles. In that case Subsidies were gradually withdrawn in 2019. In the future, the Ministry of Industry and Information Technology 's "New Energy Vehicle Industry Development Plan (2021-2035)" was released to continue to promote the electrification, intelligence and networking of automobiles! The plan expected that: In 2025, the average electricity consumption of new vehicles for pure electric passenger cars will drop to 12.0 kWh/100 km, the sales volume of new vehicles will reach about 20% of the total sales of new vehicles, and highly autonomous vehicles will achieve commercial applications in limited areas and specific scenarios. By 2035, pure electric vehicles will become the mainstream of newly sold vehicles, fully electrified vehicles in the public sector, commercial applications of fuel cell vehicles, and large-scale applications of highly autonomous vehicles, effectively promoting the level of energy conservation and emission reduction and the improvement of social operation efficiency.

From 2021, the proportion of new energy vehicles in the public sector of the National Ecological Civilization Pilot Zone and key areas for air pollution prevention and control will not be less than 80% of new or updated vehicles such as buses, taxis, logistics.

When it comes to new energy vehicles, Tesla is a company that cannot be ignored. From the perspective of new energy vehicle manufacturers, Tesla sold a total of 499,500 new energy vehicles in 2020, which is more than 1 times higher than the second-ranked Volkswagen. From the perspective of new energy vehicle models, although the brake system of Tesla Model 3 has been questioned in the Chinese market, Tesla Model 3 sold 365,200 vehicles in 2020, ranking first. Tesla's other model, the Model Y, sold 79,700 units in 2020, ranking fourth. Compared with other new energy vehicle manufacturers, Tesla's new energy vehicle products are widely distributed, from high-end sports cars to space-rich MPVs, and then to the cost-effective Model 3, Tesla can meet any needs of car owners for new energy vehicles, which is one of the reasons why Tesla has become the leader of global new energy vehicle companies.

4 Influencing factors

4.1 Consumer Price Index

Consumer Price Index, also known as consumer price index, or CPI for short.

It is a relative number that reflects the trend and degree of price change of consumer goods and services purchased by urban and rural residents in a certain period of time, and is the result of comprehensive summary and calculation of urban consumer price index and rural consumer price index. Through this index, it is possible to observe and analyze the extent to which the retail prices of consumer goods and changes in the prices of service items affect the actual cost of living expenditure of urban and rural residents.

It is a macroeconomic indicator that reflects the change in the price level of consumer goods and services generally purchased by households. It is a relative number that measures the price level of a representative set of consumer goods and services changes over time in a specific period of time, is used to reflect the change in the price level of consumer goods and services purchased by households, and is the change coefficient of the retail price of goods and services in one month.

The statistical survey of consumer prices is the final price of social products and services, which is closely related to the lives of the people on the one hand, and also has an important position in the price system of the entire national economy. It is an important indicator for economic analysis and decision-making, monitoring and regulation of the overall level of prices and national accounts. Its rate of change reflects, to some extent, the extent of inflation or austerity. Generally speaking, prices are considered inflationary if they rise comprehensively, in contrast, and continuously.

How does the CPI index affect the Tesla's stock price? Strictly speaking, the CPI has no direct positive and inverse relationship with the stock market, but the stock market is a barometer of the economy, and it will indirectly affect the capital market such as: affecting the stock market, futures market, etc. The high CPI index indicates that the consumption level of residents is improved, and there will generally be excess capital investment, and the stock market is also the preferred investment channel for investors, which will affect the rise of stock prices. The rise in the CPI index has led to the huge development of the new energy industry, and Tesla's turnover has shown an upward trend

4.2 The exchange rate

The exchange rate (also known as foreign exchange rate, foreign exchange rate or foreign exchange market) The exchange rate between two currencies can also be regarded as the value of one country's currency against another. The exchange rate is also a financial means used by various countries to achieve their political objectives. The exchange rate will change due to interest rates, inflation, the politics of the country and the economy of each country. The exchange rate is determined by the foreign exchange market. The foreign exchange market is open to different types of buyers and sellers for a wide range of and continuous currency transactions (foreign exchange trading is

carried out 24 hours a day except weekends, i.e. from 8:15 GMT time on Sunday to 22:00 GMT time on Friday. Spot rate refers to the current exchange rate, while forward rate refers to the exchange rate quoted and traded on the same day, but paid on a specific date in the future).

The rise and fall of a country's foreign exchange market will have an impact on import and export trade, economic structure, production layout, etc. The exchange rate is the most important regulatory lever in international trade, and the decline in the exchange rate can play a role in promoting exports and inhibiting imports.

In order to Expand into the Chinese market, Tesla removed the exchange rate fluctuations at the time of pricing when entering China, and aligned Chinese pricing with other markets around the world. This means that Tesla's sales price and exchange rate are tightly "tied together." Because Tesla is produced overseas and re-exported to China, it generates a large amount of net assets in renminbi in China. When the renminbi depreciates, its cash flow in China decreases accordingly. In order to protect profits, Tesla can only rely on raising the selling price to make up for the loss of profits caused by exchange rate changes.

4.3 Non-systemic risk

The price of a single stock is closely related to the operating performance and major events of a listed company. Changes in the company's operation and management, financial situation, market sales, major investments and other factors will affect the company's stock price trend. This risk mainly affects one kind of security, and is not directly related to other securities in the market, and investors can offset this risk by diversifying their investments. This is non-systemic risk.

The reasons for non-systemic risks are mainly some factors that directly affect the operation of enterprises, such as the reduction of the management ability of listed companies, the decline in product output and quality, the reduction of market share, the aging of technical equipment and technology levels, the increase in raw material prices, and the occurrence of unpredictable natural and man-made disasters in individual listed companies. The occurrence of these events leads to a decline in the operating profits of listed companies and even losses, which leads to a downward adjustment of the stock price

Since December 2021, international oil prices have generally shown a volatile upward trend. Geopolitical factors, especially the Russian-Ukrainian conflict, became the main factor dominating the international crude oil market at this stage, and by March 10, the average daily settlement price of Brent crude oil futures rose to \$109.33 / barrel, of which the risk premium caused by the Russian-Ukrainian conflict accumulated about 20-25 US dollars / barrel. Affected by the soaring oil prices, many consumers in the United States have switched the choice of buying a car to an electric vehicle. Tesla sold a total of 37,162 electric vehicles in the United States in January, an increase of 49% year-on-year, accounting for 74% of the market share of electric vehicles in the United States, which means that for every 4 new cars sold in the United States, three are Tesla. Under the pressure of high oil prices, the sales of new electric vehicles in the United

States have increased significantly, and Tesla has also benefited the most, and Tesla's new car orders in some regions have surged by more than 100%.

The Russian-Ukrainian conflict has also affected the supply chain of new energy vehicles.

Nickel is the upstream key raw material for electric vehicle power battery manufacturing, and is used in the manufacture of ternary cathode materials in power batteries. On March 8, nickel futures on the London Metal Exchange soared 67.2% in one day, climbing to a record 101365 US dollars / ton. Industry insiders estimate that the average input cost of manufacturing each electric vehicle at this price will increase by \$1,000

5 The collection and analysis of data

This passage collected CPI, Brent crude oil futures, exchange rate between US dollar and Chinese Yuan as influencing factors to the stock price of Weilai and Tesla from investing.com during the period of 2020.9 to 2022.4.

The result of SPSS analysis is as follows:

5.1 Results of linear regression model

Table 1. Results for Tesla.

Influencing factors	BETA
CPI	-0.209
Brent crude oil futures	0.707
Exchange rate	-0.182

Table 2. Results for Weilai.

Influencing factors	BETA
CPI	-0.181
Brent crude oil futures	-0.238

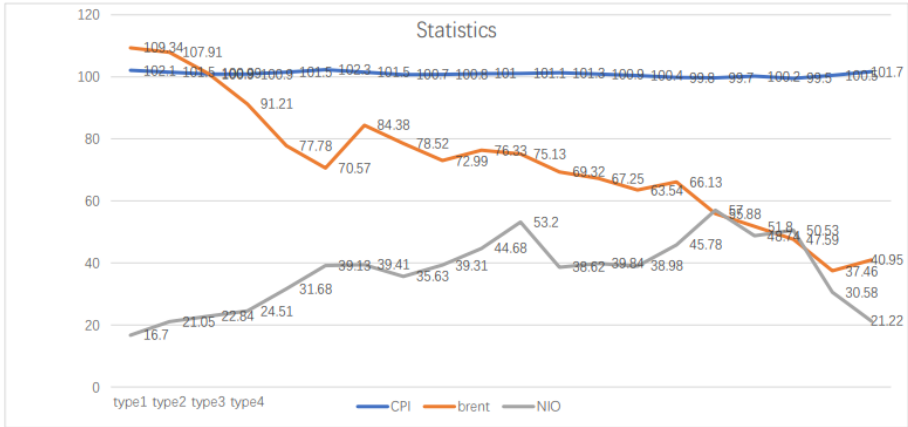


Fig. 1. Statistics of two influencing factors and stock price of NIO

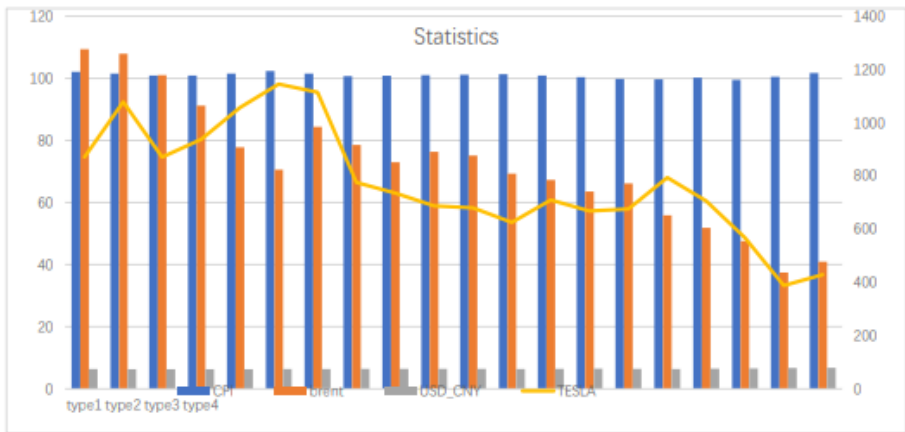


Fig. 2. Statistics of three influencing factors and stock price of TESLA

6 Conclusion

To analyze the future development strategy, this passage offer four different advice.

(1) The government should innovate input methods, give play to the effect of fiscal leverage, and increase investment in research and development.

Make full use of the guiding power of financial funds, amplify the role of incentives, accurately invest, and improve the efficiency of the use of funds. Explore paid funding methods, comprehensively leverage various element resources in the capital market such as banks, insurance, securities, and equity funds to invest in scientific and technological innovation, and create a comprehensive innovation ecosystem in an all-round way. A national automobile industry innovation and development fund can be established to guide social capital to increase investment in technological innovation in the

automobile industry; It is also possible to innovate the R&D organization model, increase support for the industry-renowned and competitive new energy automobile industry technology innovation alliance, and guide collaborative research and development among innovative entities.

(2) The policies should Concentrate on supporting large-scale production, focusing on cultivating star products.

Under the guidance of the development path, it is necessary to identify vehicle or parts enterprises with rich innovation potential and a certain output scale to carry out key training, give play to their leading role, and play a leading role in the new energy automobile industry technology chain, with the goal of cultivating a number of star model products. In addition, it will create a good policy environment for enterprise business model innovation, such as O2O integration of time-sharing leasing model, and appropriately promote application.

(3) The government should Strengthen the formulation and implementation of supporting policies for infrastructure construction.

Further do a good job in the top-level planning of the construction of new energy vehicle infrastructure, and integrate with the construction of new urbanization, smart grid, transportation hub planning, regional economic planning, communication networks, housing urban planning, and fire protection. We should make full use of existing energy nodes such as points, lines, and surfaces, including supporting traditional power supply enterprises such as the State Grid and china Southern Power Grid to increase the construction of charging and replacing infrastructure, and encouraging traditional automobile energy supply enterprises such as Sinopec and PetroChina to participate in the construction of charging and replacing infrastructure. Unified standards, innovative revenue replacement, to avoid the idle situation of facilities due to different standards and interest division, and to improve the utilization rate of charging infrastructure.

(4) The government should Carry out Incentive policies for diversified consumption ends.

Strengthen the diversity of incentive policies at the consumer end, and enhance the guidance and effectiveness of preferential tax policies. Focusing on the incentive, implementation and innovation of the consumer demand side, in addition to direct financial subsidies and tax reductions, low-interest loans, lane use, parking concessions, charging concessions, license plate concessions, car insurance discounts, new energy credit management, green tax system and other methods can be widely adopted. In particular, we can learn from the green tax system of developed countries to increase the cost of using traditional cars in a negative incentive way and create advantages in the use of new energy vehicles. In addition, when designing policies for the reduction and reduction of purchase tax, it is necessary to take the improvement of the cost performance of new energy vehicles as the core, give differentiated tax preferences to different models and different degrees of energy conservation and emission reduction, and improve consumers' understanding of new energy vehicles

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