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An Empirical Analysis of Express Pricing Factors based on Unary Regression Equation

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Abstract

In the first half of 2020, when COVID-19 adversely affected the domestic logistics industry and consumption growth was weak, now the industry has been in a fierce price war. An object of this paper is to investigate factors affecting pricing in the express delivery industry. This paper also analyzes the development trend of express delivery pricing from the perspectives of express delivery industry and e-commerce express delivery. The results showed that both volume of business and operation routing had strong correlation with price. This paper provides a complete and comprehensive analysis of the impact of rising oil prices on the express delivery industry. Finally, this paper analyzes and explains the future development trend from the perspectives of the express delivery industry and e-commerce express delivery. The innovation of this paper is the analysis of influencing factors using univariate regression models.

Keywords

Express Industry; Express Pricing; Future Trend.

1. Introduction

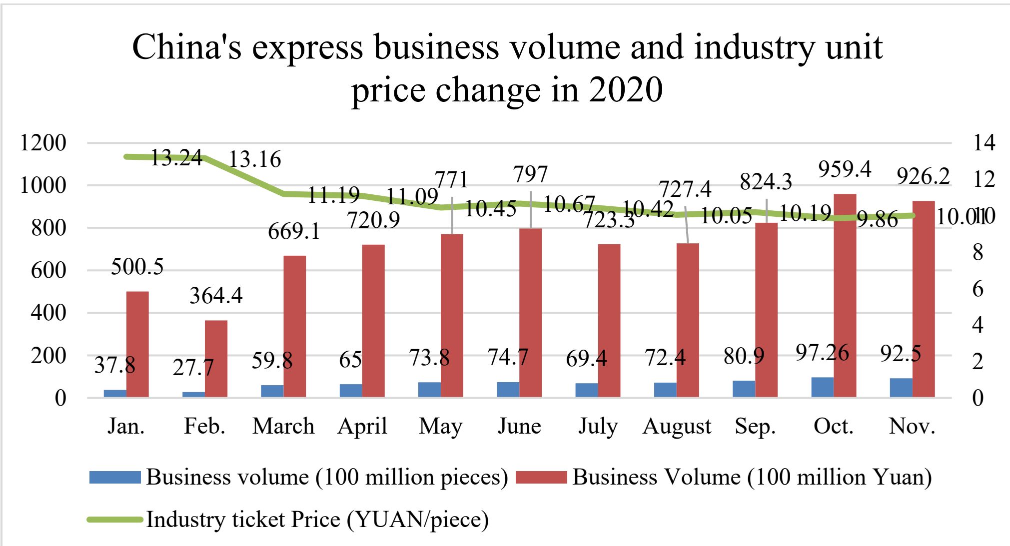

Figure 1. China's express business volume and industry unit price change in 2020 (Source: General Postal Office)

On January 14, 2021, The State Post Bureau released the operation situation of China's express delivery industry in 2020 (Figure 1). In the first half of 2020, when COVID-19 adversely affected the domestic logistics industry and consumption growth was weak, the number of express delivery orders in the industry reached 83.358 billion, with a year-on-year increase of 31.22%.

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The industry's express delivery revenue reached 879.54 billion yuan, up 17.31% year on year, indicating that China's express delivery industry has shaken off the impact of the epidemic on the industry But at the same time also want to see, although the domestic express industry to achieve the business and the double the amount of business growth, but in fact for a long time in China's express delivery industry running at a low price, industry of ticket price in 2020 from January's 13.24 yuan/single road fell to 10.01 yuan/single, now the industry has been in a fierce price war. Therefore, it is very important to help enterprises study the influencing factors of price and find the appropriate pricing model.

2. Analyze the Factors Affecting Express Delivery Price

Factors that affect delivery price mainly include: the size of the enterprise management cost Courier package transportation tax revenue from oil manpower cost operating costs time goods delivery timely rate of damage rate enterprise size affects the Courier price, enterprise scale, the greater the price tend to consumer expectations, on the other hand, higher than expected for consumers; The management cost of the enterprise also affects the express price, the higher the management cost, the higher the express price; The package of express also affects the price of express to a certain extent. The simpler the package, the lower the price of express. The choice of means of transport will also affect the price of express delivery; National tax policies also affect the price of express delivery. If tax increases, the price of express delivery will also increase. Transportation distance also affects the price of express delivery, the longer the distance, the price of express delivery will increase; The higher the oil price, the higher the cost of delivery; The higher the labor cost, the higher the delivery price will be; The higher the operating cost, the higher the delivery price; The shorter the shipping time, the higher the price; The higher the rate of timely delivery, the higher the price will be; The lower the damage rate, the higher the price of express delivery. By comparison, supply and demand and operational routing are selected as influencing factors. However, at present, oil prices are growing rapidly, and considering the practical factors, I will also start from the oil price and analyze it separately.

2.1. Factor 1: Supply and Demand (Volume of Business) Determines the Price

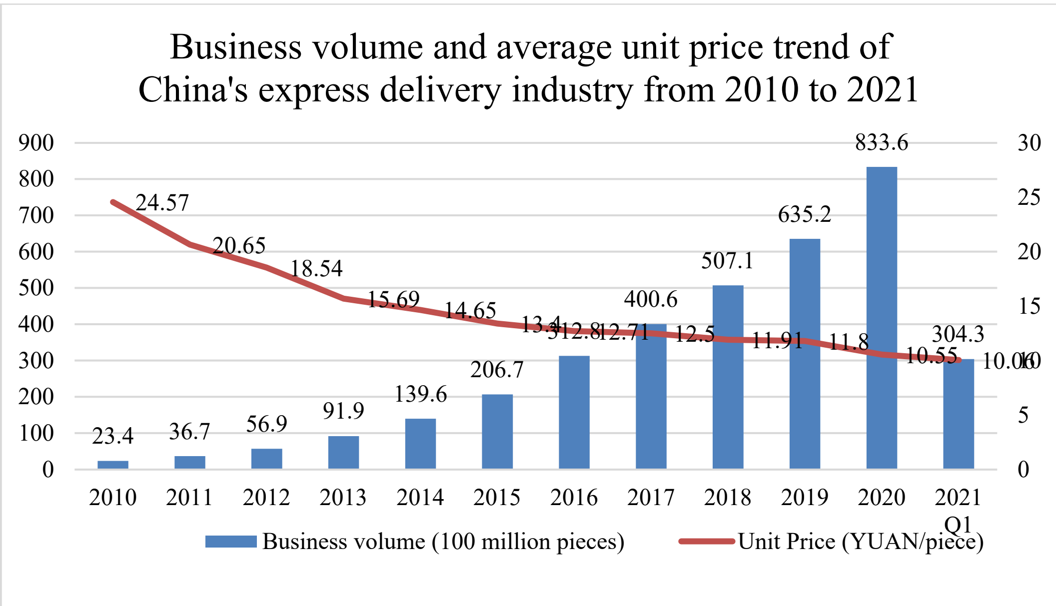

Figure 2. Business volume and average unit price trend of China's express delivery industry fr om 2010 to 2021

(Source: General Postal Office)

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From 2010 to 2020, the average unit price of China's express delivery industry showed a trend of annual decline, from 24.57 yuan/piece in 2010 to 10.55 yuan/piece in 2020, and from January to April 2021, it continued to decline to 10.06 yuan/piece. However, the business volume of China's express delivery industry increased year by year from 2010 to 2021, from 2.34 billion pieces in 2010 to 83.36 billion pieces in 2020(Figure 2). Linear fitting by unary regression equation(Figure 3), obtain r = 0.746. The two have a strong correlation. Therefore, it can be concluded that supply and demand will affect the price of the express industry.

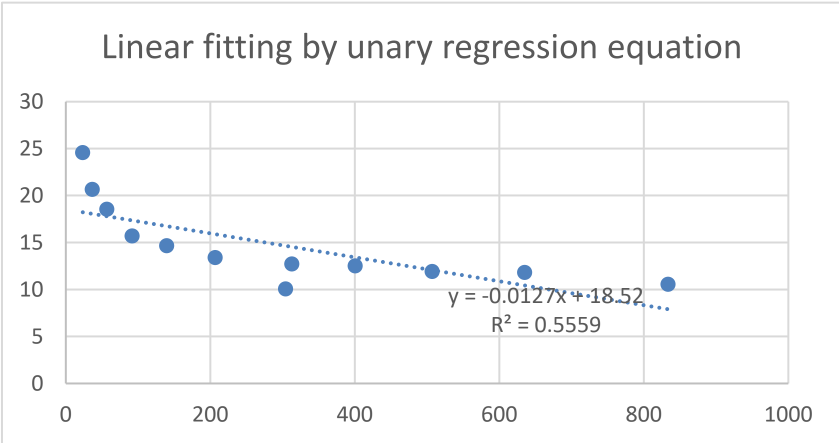

Figure 3. Linear fitting by unary regression equation

2.2. Factor 2: Operation Routing Determines the Price

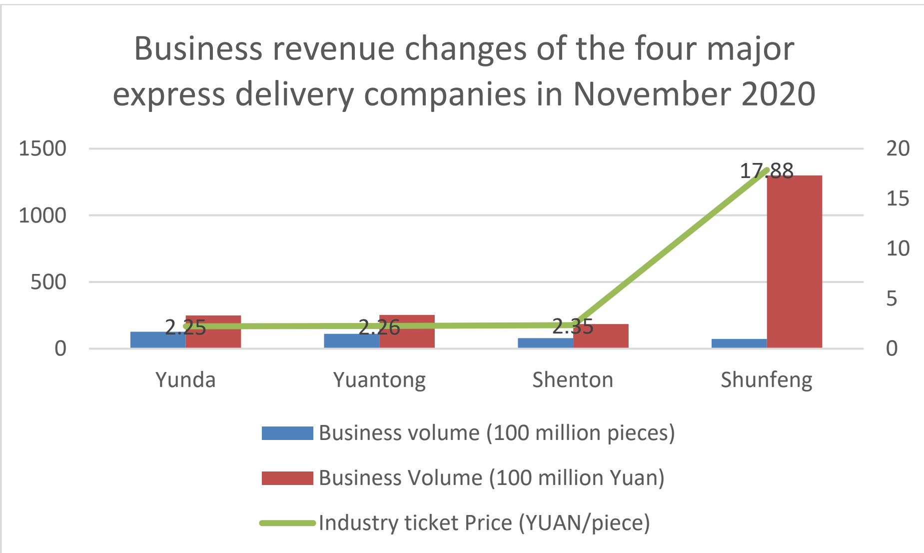

Figure 4. Business revenue changes of the four major express delivery companies in Novemb er 2020

(Source: General Postal Office)

According to Figure 4, based on the air route, the price is relatively high, most express enterprises are relying on air agent delivery, plus delivery fees, etc., the price is naturally high. At present, only sf Express and YTO have a certain size of the company, to take the way of freight or charter planes to operate, its price advantage will be obvious. Enterprises focusing on automobile transportation have unique advantages in pricing strategy. The price of their own sports cars can be flexibly controlled by enterprises and the cost of automobile transportation is much lower than that of aviation. With railway transport - based enterprises, the price is relatively higher than the motor transport, lower than the air, but the time is slow, the delivery

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is not convenient. Linear fitting by unary regression equation(Figure 5), obtain r = 0.778. The two have a strong correlation. Therefore, it can be concluded that operation routing will affect the price of the express industry.

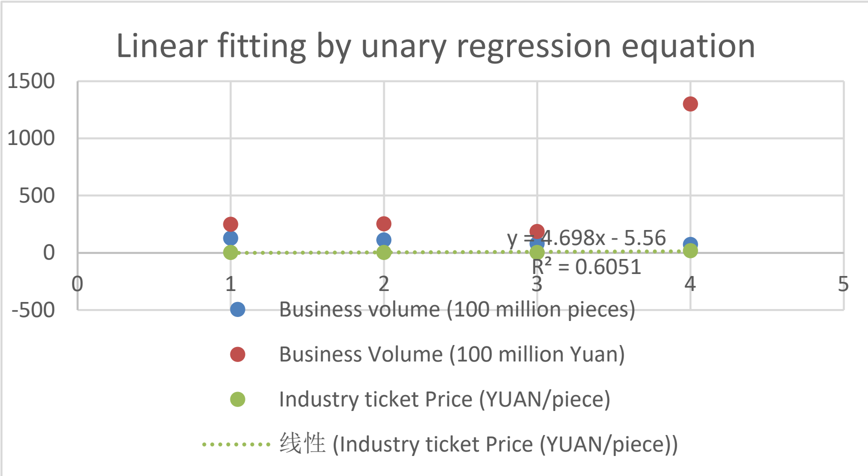

Figure 5. Linear fitting by unary regression equation
(Source: General Postal Office)

3. Impact of Oil Prices

3.1. Fluctuations in Oil Prices Directly Affect the Land Transport Costs of the Express Delivery Industry

Transportation is the main use of crude oil, and the industry is dominated by land transportation consumption

Transportation is the primary use of crude oil products, consuming 68.84% of all petroleum products in 2019 before the outbreak of the epidemic. In the transportation industry, gasoline and distillate (mainly diesel) consumed by land transportation demand accounted for 63.39% and 22.11% of total consumption (2019), respectively, ranking first and second of all demand.

The cost structure of the express delivery industry is split: the transportation cost is the main cost of the franchise system, and the labor cost is the main cost of the direct operation system

The business chain of the express delivery industry is composed of four links: collection, transfer, transportation and dispatch, and for the two different organizational forms of direct operation system and franchise system, the links generated by their costs are also different.

(1) From the perspective of the access system of the franchise system, the cost of e-commerce express delivery companies is mainly generated in the core transshipment link.

From the perspective of cost structure splitting, in addition to the cost of delivery fees, the cost of franchised e-commerce express delivery enterprises is composed of transit transportation costs, central operation costs and face sheet costs, of which transportation costs are the main components of the cost of e-commerce express delivery enterprises. According to the 2020 data, the transportation costs of Zhongtong, Yuantong, Yunda and Shentong accounted for 44.88%, 20.31%, 25.48% and 17.76% of the total express delivery costs respectively, with an average proportion of 25.98%.

(2) From the perspective of SF under the direct operation system, the operation mode of full-link direct operation makes its costs arise from the four links of collection, transfer, transportation and dispatch. From the perspective of the cost structure split, the cost of the whole link of SF is mainly composed of receiving cost, network cost, transit cost, transportation cost and delivery cost. From the perspective of total operating cost caliber, SF's transportation

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costs account for 11.07% of total costs (2020), while labor costs throughout all business links account for 72.89% (2020), which is the main cost source.

Focusing on transportation costs, land transportation costs are mainly composed of fuel costs, labor costs, road tolls, depreciation costs and other costs, of which fuel costs account for about 25% of transportation costs.

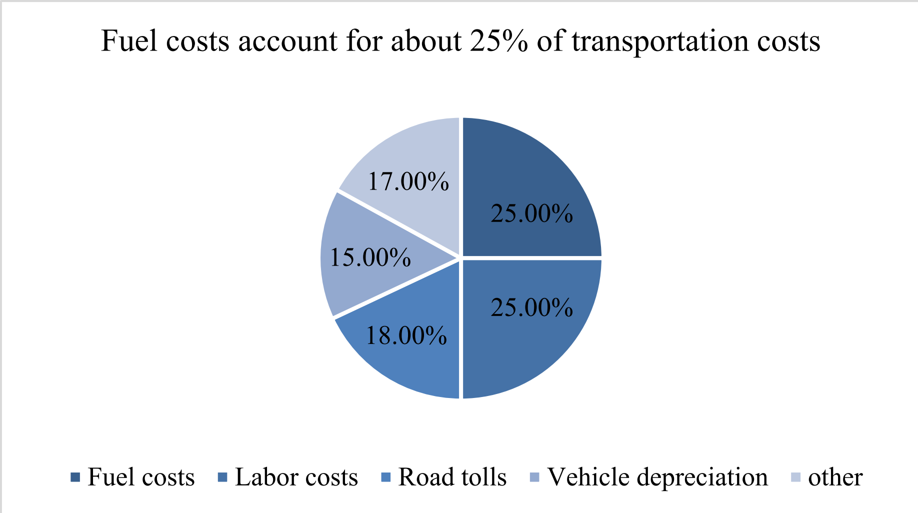

Figure 6. Fuel costs account for about 25% of transportation costs
(Sources: National road freight vehicle public supervision and service platform)

For express delivery companies, trunk transport vehicles are mainly composed of high-capacity trailers from 15 meters to 17 meters long, high-capacity trucks mainly use diesel, which are collected by enterprises, which is a variable cost, and the fluctuation of finished diesel prices is the main factor affecting fuel costs.

3.2. The Actual Impact of Rising Oil Prices on Transportation Costs in the Express Delivery Industry is Limited

The National Development and Reform Commission unified regulation and control, and the price of refined oil products fluctuated less

Affected by the global COVID-19 epidemic, liquidity flooding, supply bottlenecks and other factors, since 2021, crude oil prices have been rising, and the impact of recent geopolitical instability has further pushed up crude oil prices. As of March 9, Brent crude oil futures settled at $111.14 per barrel, up 117.54% from the beginning of 2021.

The rise in crude oil prices is bound to have an impact on the price of refined oil products in China. According to the Measures for the Administration of Oil Prices, the prices of Gasoline and Diesel in China are adjusted every 10 days according to the changes in crude oil prices in the international market, and the method of step-by-step price adjustment is adopted: when the price of crude oil is lower than 40 US dollars per barrel, it is priced according to 40 US dollars per barrel and the normal processing profit margin. When the price of crude oil is above $40 per barrel and less than $80, pricing is based on normal processing margins. When the price of crude oil is above $80 per barrel, processing margins are deducted until zero margin pricing is used. When the price of crude oil is higher than $130 per barrel, the price of gasoline and diesel is not raised or less in principle.

Under the unified regulation and control of the National Development and Reform Commission, the fluctuation range of China's refined oil prices is smaller than that of crude oil prices. On March 4, 2022, the National Development and Reform Commission raised the price of diesel to

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8210 yuan / ton, an increase of 3.21% compared with the last price adjustment, an increase of 44.16% compared with the beginning of 2021, and an increase much smaller than the change in crude oil prices (crude oil prices on March 4 increased by 131.18% compared with the beginning of 2021). During the window of each price adjustment, the change in China's diesel prices is significantly smaller than the change in crude oil prices, and the range of changes in the price of finished diesel products since 2021 is -5% to 5%.

Franchised and direct-operated express delivery companies are limitedly affected by rising oil prices

To measure the impact of oil price fluctuations on the cost side of the express delivery industry, it is necessary to separate the franchise system from the direct operation system.

(1) Franchise system: Since the purchase price of diesel is the variable cost of express delivery companies, historically, the NDRC adjusts the price 1-2 times a month, so the impact of oil price increases is measured through monthly data. From January 1, 2022 to March 4, 2022, the price of finished diesel in China was adjusted five times, and the average price was 7700 yuan / ton, an increase of 14% compared with the average price of 6756 yuan / ton in 2021. Taking Yuantong Express as an example, in 2021H1, the transportation cost of a single ticket of Yuantong is 0.51 yuan, and the fuel cost accounts for about 25% of the transportation cost, so the cost of YTO's single ticket fuel is about 0.13 yuan, if the same single ticket fuel cost level is maintained throughout the year, in the case of assuming that the loading rate, sorting efficiency and other indicators remain unchanged, the oil price increase of 14% will increase the cost of single ticket fuel by 0.0182 yuan. From January to February 2022, YTO completed a total of 2.297 billion votes of business, and the total fuel cost will increase by 0.0182 * 22.97 = 0.42 billion yuan, accounting for 7.71% of the net profit attributable to the mother in January-February 2022.

Recently, the highest price of Brent crude oil has exceeded the upper limit of China's oil price management method, and crude oil prices are always in a state of volatility, throughout the year, if China's diesel price level is 10% higher than last year's average, while the YTO business volume in 2022 will grow by 20% year-on-year, reaching 19.675 billion votes, roughly calculated, the total fuel cost will increase by 0.13 * 10% * 196.75 = 256 million yuan, calculated by the net profit attributable to the mother predicted in 2022, the new fuel cost accounts for about 2022 7.80%.

Using the same method to measure the fluctuation of Tongda fuel costs, if the business volume of Zhongtong, Yunda and Shentong in 2022 is 20%, 20% and 15% respectively, the 10% increase in oil prices will bring new costs of 347 million yuan, 374 million yuan and 127 million yuan, respectively, based on the net profit attributable to the mother predicted in 2022, the new fuel cost will account for 3.59%, 14.02% and 14.30% of the net profit attributable to the mother of Zhongtong, Yunda and Shentong, respectively.

(2) Direct operation SF Holdings: SF's costs are generated from all processes of the business, and labor costs are the main source of SF's cost end. In terms of transportation costs, in 2021H1, SF's transportation costs reached 9.569 billion yuan, accounting for 10.84% of the total cost. If the transportation cost of SF in 2021 is about 19 billion yuan, assuming that the fuel cost accounts for about 30%, and the SF transit transportation mode has trucks and aircraft, assuming that the diesel used in the truck accounts for 70% of the total fuel (SF is mainly land transportation, and the air shipment volume in 2020 accounts for about 11% of the company's total business volume), then the cost of SF land oil is about 190 *30%*70% = 3.99 billion yuan, and roughly calculated that the 10% increase in oil prices will increase fuel costs by about 399 million yuan, in 2022 Calculated from the net profit attributable to the parent of the annual forecast, the cost of new fuel oil accounts for about 4.79%.

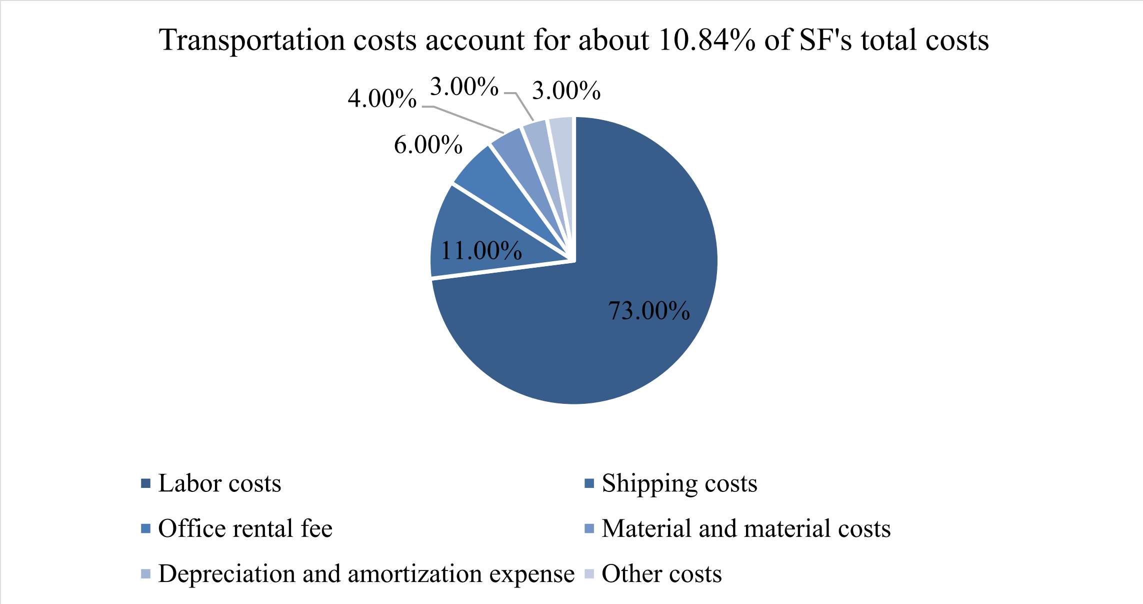

Figure 7. Transportation costs account for about 10.84% of SF's total costs
(Sources: National road freight vehicle public supervision and service platform)

To sum up, the 10% rise in fuel prices has an annual cost impact of about 100 million yuan to 400 million yuan on franchised and direct-operated express delivery companies, accounting for 4%-14% of the net profit attributable to the mother in the current year, but the actual impact is more likely to be lower than the estimated value, mainly for three reasons:

(1) The impact of the revenue side is much higher than the impact of the cost side, and the performance elasticity brought about by the repair of single ticket revenue is much higher than the impact of the change in the cost of a single ticket. Taking YTO as an example, in January 2022, YTO's single ticket revenue rose by 14.55% year-on-year to 2.72 yuan, an increase of 0.22 yuan month-on-month, while if the fuel price increased by 10%, the increase in the cost of a single ticket was about 0.13 yuan.

(2) From the cost side, the express delivery industry is a strong scale effect industry, and the continuous growth of business volume is expected to dilute the new fuel cost. Benefiting from the continuous improvement of e-commerce penetration rate and the trend of small pieces of express delivery, the business volume of head enterprises is expected to maintain a high growth center. The continuous improvement of business volume and scale, the continuous promotion of the refined management of superimposed express delivery companies, vehicle loading rate, line planning, etc. are expected to continue to be optimized, and then reduce the cost of a single ticket again.

(3) The bargaining power of the industrial chain of the express delivery industry continues to increase, and the head enterprise is expected to transmit the cost pressure downward. Compared with the development experience of overseas express delivery giants, in the context of stable pattern, FedEx and UPS will transmit the pressure of rising oil prices to the downstream through the method of collecting fuel surcharges. Under the support of the continuous enhancement of the bargaining power of the domestic leading express delivery enterprises in the industrial chain and the continuous consolidation of the stability of the industry pattern, Tongda Andfeng is expected to transmit the pressure of variable costs to the downstream through price increases in the future, and successfully enhance the anti-inflation ability through price increases.

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4. Future Tendency

4.1. Express Delivery Industry: The Growth Center of the Volume has Moved Downward, and the Price of a Single Ticket has Continued to Repair the Trend

Since 2021, one of the biggest changes in the express delivery industry is that the regulatory efforts of the management department to supervise the industry have become significantly stricter. On April 22, 2021, in accordance with the Postal Law of the People's Republic of China, the Interim Regulations on Express Delivery and other laws and administrative regulations, combined with the actual situation of Zhejiang Province, the 70th executive meeting of the Zhejiang Provincial Government deliberated and adopted the "Regulations on the Promotion of the Express Delivery Industry in Zhejiang Province (Draft)".

On January 7, 2022, the Ministry of Transport issued the Administrative Measures for the Express Delivery Market (Revised Draft) (Draft for Solicitation of Comments), which clearly stated that "express delivery services shall not be provided at a price lower than the cost without a legitimate reason", further pushing this constraint to the whole country. On March 1, the "Regulations on the Promotion of Express Delivery Industry in Zhejiang Province" was officially implemented, which is the first local regulation in China to promote the development of the express delivery industry, marking the first legislative norms in express delivery management and laying the foundation for continuous policy.

Since March 2022, the spread of the epidemic in various places has caused some disturbance to the volume of industry pieces, but the price of a single ticket has continued to repair the trend. Affected by the epidemic and prevention and control policies, the operational efficiency of some express delivery transfers and outlets has been reduced, which has had a certain impact on business volume. In March, the volume of express delivery business fell by 3.1% year-on-year, and the unit price fell by 1.08% year-on-year, and the epidemic repeatedly affected the growth rate of pieces. According to the data of the State Post Bureau, in March, the national express delivery business volume was 8.54 billion pieces, down 3.1% year-on-year; the average price of a single ticket fell by 1.08% year-on-year to 9.58 yuan (+2.4%/-14.8% year-on-year in January/February); among them, the unit price of off-site/same-city/international pieces was -6.9%, -7.7%, +24.6% year-on-year, respectively.

By region, due to the impact of the epidemic, the year-on-year changes in business volume in Shenzhen, Jilin and Shanghai in March were -17.7%/-47.0%/- 22.7%, respectively. In terms of "grain production areas", the year-on-year growth rate of Yiwu and Guangzhou business volume in March was -15.5%/+12.8%, and the year-on-year growth rate of single ticket prices was +12.1%/-10.5%, respectively, and the month-on-month growth rate was +0.1%/-2.2%.

4.2. E-commerce Express Delivery: The Price War has Slowed Down to bring About a Performance Inflection Point, and Leading Companies have Continued the Business Volume and Profit Balance Strategy

Since October 2021, from the perspective of the growth rate of the business volume of major e-commerce express delivery companies and the performance of single ticket prices, the business volume growth rate and single ticket price performance of e-commerce express delivery companies such as Yunda, Yuantong and Shentong have been better than the industry.

Overall, we believe that this performance is mainly due to: (1) the volume overflow caused by the poor integration effect of Jitu on Best Express. We discussed it in "Investment Strategy for the Transportation Industry in 2022: Policies Reshaping the New Pattern of E-commerce Express delivery, Waiting for Adversity reversal at aviation airports". In fact, as a form of express delivery organization with Chinese characteristics, the franchisee has a cultural tradition of regional franchise. The integration of Jitu to Baishi needs to solve multiple problems such as trunk network, franchisee integration and corporate culture integration. In terms of Chinese and foreign situations, there are few successful cases of integration between express delivery companies; (2) the differences in corporate strategies of various express delivery companies. From the branch's point of view, YTO continued to improve the timeliness and adjust the business strategy of customer structure, and the price of a single ticket continued to repair the trend; the price growth rate of Yunda single ticket has continued to rise this year, and the business strategy has focused more on network stability and service quality improvement; the growth rate of Shentong's business volume has risen significantly, which is also related to the new production capacity and the company's price band is closer to Jitu.

Judging from the changes in market share, we can also see the changes in the competitive strategies of leading companies: since entering the 22-year off-season, the major leading enterprises have maintained a peak season strategy, and the annual guidelines continue to focus on improving service quality and stabilizing the franchisee network, focusing on the improvement of long-term comprehensive strength.

The market is worried that after the impact of the current round of the epidemic slows down, the price war will restart and drag down the performance. In fact, this situation is exactly the industry performance in 2020. However, considering the following factors, the probability of the industry restarting the price war is not large:

(1) In 2020, the biggest feature of the express delivery industry in the first half of the year is that the business volume is concentrated in the second quarter of the business volume concentration In the second quarter, the express delivery company's demand for volume has intensified the price war; at the same time, preferential policies such as highway toll exemption and value-added tax reduction have broken the competitive pattern of express delivery costs, and the headquarters has increased the profit. (2) In contrast, this year, the industry does not have a cost-side preferential policy, more importantly, regulatory constraints are tightening, and leading companies are more focused on network stability and service quality improvement. Due to the obvious changes in the market environment, regulatory environment and corporate strategy, it is expected that the industry will still be in a weak competitive state.

Under the influence of the policy environment and the adjustment of competitive strategies, the profits of major e-commerce express delivery companies have improved significantly since the fourth quarter of last year. In the 21Q4 quarter, the profit per ticket of the express delivery business of Zhongtong, Yunda and Yuantong was 0.22 yuan, 0.09 yuan and 0.15 yuan respectively, with a month-on-month improvement of 38%, 350% and 400% respectively.

From the cost side, a commonality of the cost side of major express delivery companies in 2021 is that the cost downward speed brought about by the low base of the cost side is slowing down. Another feature is that the cost efficiency of the access to the Baigan network has reached a high level, and the margin of scale effect has not been large. Although there is still room for cost decline, the short-term decline is limited. This is mainly due to the fact that from the perspective of the overall cost structure, the higher the total cost efficiency of the company, the lower the variable cost expense ratio, which is the joint effect of operation networking and process automation, and its underlying logic is economies of scale.

5. Conclusion

In this paper, based on the existing research results and data, through the analysis of the price of the express industry to select the supply and demand relationship (business volume) and operational routes. The linear fitting of unary regression equation was carried out by scatter diagram. It was found that the r of the two equations were 0.746 and 0.778, both of which had strong correlation with price. Through a comprehensive and meticulous analysis of oil price factors, it is concluded that it will not have an excessive impact on express pricing. Moreover,

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express delivery industry will be the growth center of the volume has moved downward, and the price of a single ticket has continued to repair the trend. E-commerce express delivery will be the price war has slowed down to bring about a performance inflection point, and leading companies have continued the business volume and profit balance strategy.

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