EVALUATING THE IMPACT OF ROAD FREIGHT UBERIZATION ON THE TRUCKING SECTOR

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Overview

Over the past twenty years, China has been the largest source of oil consumption growth around the globe. Among all domestic end-use sectors, road freight transport has been one of the leading contributors to the surge in oil consumption during this period. Several factors may explain the rapidly growing road freight transport activities in China. On the demand side, the Chinese economy has quickly expanded since China's entry into the World Trade Organization at the beginning of the century, and has maintained relatively higher speed of growth despite the marked economic slowdown in rest of the world in the Post-2008 era. From the perspective of freight transport service supplies, trucking has remained the primary means of domestic freight transport, carrying over three quarters of China's total freight tonnages between 2001 and 2018. Road transport has maintained its competitive edge against other transport modes in providing more convenient and less costly overall transport services.

Despite the fast growth of the freight trucking industry, many issues remain with the road freight sector in China. A low barrier to market entry and an oversupply of trucks and carriers has resulted in a highly fragmented and disorderly market structure. This has in turn discouraged economy of scale and has led to low overall efficiency. The economic consequence is that logistics cost accounts for a much larger share in China's GDP compared to the United States and the European Union. On the energy front, the lack of operational efficiency has suppressed room for fuel economy improvement at the individual truck level, and has led to a low level of overall energy performance.

The recent advances in information and communication technologies has brought about a valuable opportunity to reduce market inefficiencies with a digital approach. The wide availability and affordability of smart phones and mobile applications have enabled the establishment of digital platforms to effectively match shippers with trucks and carriers, using a business model that is very similar to Uber. By significantly reducing the freight matching cost and the possibility of empty backhauls, the Uberization of road freight may have great potential in improving overall performance of the road logistics system, thereby lifting energy efficiency at the systemic level (IEA, 2017). In view of this important new trend, this research intends to evaluate the impact of this technological disruption on the energy performance of the trucking sector. Specifically, recent data from China's road freight sector is utilized to provide an estimation of the share of empty miles under the new Uberized business model.

Methods

The data used in this research are sourced from China's trucking industry. Trip information from 2000 active trucks are collected for the period of October - November 2018, containing over 50000 consecutive road freight trips. Detailed information includes truck locations and trip characteristics, such as cargo weight, origin and destination locations of the trips. Other available information include truck and commodity attributes for the covered trips, such as vehicle type, vehicle length, carrying capacity, curb weight and cargo commodity type, as well as fuel type.

Empty running is defined as the truck distance driven between the destination of the previous trip and the origin of the current trip. The share of empty miles is then calculated as its percentage in the total distance, which is the summation of distance of empty running and distance of the laden trip.

Data on locations and trips are first matched to calculate the share of empty miles for all recorded trips. The produced results are then further used for an in-depth investigation to evaluate the impacts of numerous trip, vehicle and geographic factors on the trucks' empty running behavior.

Results

This section presents the estimated share of empty running for the entire sample, as well as results for different subsamples using several ways of classification. Aggregate share of empty running is defined as the ratio of total empty running distance against total trip distance at the sample/subsample level.

Overall, aggregate share of empty running is 10.38% for the entire sample, which is equivalent to a 74.05% drop compared to the previously reported average value of 40% for China's trucking sector, and even a 58.48% drop compared to the value reported for the US market (assuming a 25% empty running ratio). In terms of distribution, share of empty running for the majority of trips is less than 20%, while those with a value higher than 40% accounts for only 3.14% of the total trips.

Next, distribution of share of empty running is compared against categorization of commodities, vehicles, trip distances, vehicle carrying capacity, and geographic origins, respectively. The results suggest that commodity types, vehicle types, and trip distances have clear impacts on empty running by trucks, whereas vehicle carrying capacity and geographic origins of the recorded trips do not betray a strong effect.

Overall, Uberization seem to have indeed generated an important impact on the operational efficiency of the road freight system and energy performance of individual truckers, by substantially facilitating the dissemination of freight information and reducing wasted truck miles. The effects seem to be pervasive and significant across all trip characteristics, including commodity types, vehicle types, vehicle carrying capacity, trip distances, and geographic locations. This implies the low effectiveness of the freight matching process in China's conventional trucking sector, and the urge to utilize the latest technologies to improve efficiency.

Conclusions

The rapid development of the information and communication technologies in the last decade have "Uberized" a number of industries and is now starting to transform the freight trucking sector. By overcoming market inefficiencies and creating economy of scale, the digitalization of the road freight system could potentially greatly improve its operational efficiencies and thereby boosting its energy performance. Along these lines, this research utilizes recent trucking data sourced from China's emerging digital freight matching industry to provide a quantitative evaluation of the Uberization's impact on one of the key energy efficiency indicators of the trucking industry. The results suggest that the Uber-like online freight marketplace does bring about a significant 74.05% reduction in the overall percentage of empty running for the analyzed sample.

For the road freight sector, which is one of world's largest, and in many countries, the top oil consumer, the potential energy implications of this finding are huge. Given the rapid dissemination of new technologies and the growing market penetration of the "Uberized freight" business model in major developed and developing countries, the digitalization process may significantly alter the energy demand pattern of the road freight sector. For emerging markets such as China and India, the energy efficiency improvement effects is likely to be more pronounced, considering the presence of greater market inefficiencies as a result of lower market development level. While these economies also account for the largest share of global transport oil consumption growth, the progress of this digital transition should be carefully followed.

References

IEA. 2017. *The Future of Trucks*, OECD/IEA, Paris