Exploring the Method for Determining the Gap between Revenues and Expenditures of Financial Subsidies for Transportation Emergencies

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Abstract. Emergencies accompany the process of human development, and in the face of all kinds of emergencies that threaten people's lives and properties, it is very important to provide emergency transportation in the fastest and most effective way. Emergency transportation has the attribute of public product, which should be subsidized by financial funds, but in practice, most of the carriers do not carry out special accounting for the subsidy funds, and the government departments do not have relatively mature experience in subsidy methods and subsidy standards, and there are few relevant research results in the domestic theoretical circles. In order to explore the calculation method and standard of compensation for emergency transportation security ser-vices, the team explores the emergency transportation security data of Province X, and proposes that the gap between income and expenditure of emergency transportation should be taken as the compensation standard of emergency transportation security services in performance evaluation practice, and measures and verifies the gap between income and expenditure of various types of transportation enterprises in different situations, so as to deter-mine the reasonable standard of financial subsidies, and provides a supporting basis for perfecting the compensation mechanism of the government's emergency transportation security services, as well as to provide methodological guidance for the formulation of subsidy standards for other similar financial subsidy projects.

Keywords: Emergency transportation, Financial subsidies, Compensation mechanism, Revenue and expenditure gap method

1 Introduction

In the course of social development, a variety of emergencies continue to occur, some of which even seriously affect the survival and development of man-kind. The report of the Twentieth Party Congress made clear the overall requirements for promoting the modernization of the national security system and capabilities, including emergency management. Emergency management capacity is an important part of China's governance system and management capacity, and through the establishment of a sound emergency management system with Chinese characteristics, we can maintain the long-term stability of our country, effectively safeguard the national public interests and the safety of people's lives and property, and guarantee national security and social stability.Emergencies are natural disasters, accidental catastrophes, public health incidents and social security incidents that cause or may cause serious social harm and require emergency response measures to cope

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with them, with more serious impacts[1], such as the outbreak of a new type of coronavirus pneumonia epidemic at the end of 2019, the exceptionally heavy rainstorms in Henan in July 2021, and the recent outbreak of an earthquake in Sichuan, all of which posed a major hazard to the lives and property of the people.

For emergency transportation projects of this nature need to be borne by the public sector and through public subsidies to attract the participation of enterprises[2], while such emergency management lacks clear compensation standards[3]. Therefore, it is necessary to establish a scientific incentive subsidy or compensation system, and to rationally formulate compensation methods and standards, which can effectively reduce safety risks and protect public life and property[4].2003, the national emergency management system has formed a relatively perfect "one case, three systems" system[5]. However, the emergency transportation compensation only "appropriate compensation" or "corresponding compensation" and other general provisions, coupled with the failure of the carrier to carry out special accounting of emergency transportation business, resulting in practice, the government departments are difficult to reasonably determine the compensation standards for emergency transportation, the carrier unit costs Compensation is difficult to reasonably guarantee, the current study of emergency transportation cost financial subsidy mechanism and standards have important theoretical and practical value.

This study is summarized and refined based on the team's performance evaluation practice of emergency transportation special funds, the data are simulated, and the financial subsidy revenue and expenditure gap measurement method is designed by the team for the characteristics of this type of evaluation project, but it has general reference significance for the construction of financial subsidy mechanism and standard measurement of similar quasi-public goods service projects.

2 China existing compensation system for emergency transportation security services

The "14th Five-Year Plan" for the National Emergency Response System (Guo Fa [2021] No. 36) states that it is necessary to improve the settlement of funds for transportation and improve the level of transportation control. The Ministry of Transportation issued the "Guidance on Strengthening the Transportation Emergency Management System and Capacity Building", which proposes that by 2025, the transportation emergency management system will be basically completed; by 2035, the transportation emergency management capacity will reach the inter-national advanced level, and a scientific, intelligent and comprehensive transportation emergency management will be formed in an all-round way.

China's emergency funding regulation and use of funds are still faced with the improper structure of funds expenditure, the use of funds is not standardized, unscientific supervision and other issues, the use of emergency funds is not clear and strict norms, so that the administration of the competent departments in the use of emergency funds in the practice of the existence of irregularities, which seriously affects the efficiency of China's use of emergency funds. At present, the various policies and systems of emergency transport funding subsidies to put forward relevant requirements and norms, but for the specific implementation of emergency transport operations on how to go to business and cost accounting, how to carry

out subsidies for emergency transport subsidy funds to monitor and performance evaluation has not yet been clearly stipulated, resulting in practice is often unable to judge whether the government to provide emergency transport security subsidies are reasonable, whether both to meet the emergency transport needs, but also can scientifically save financial resources and improve the efficiency of the use of special funds. Emergency transportation guarantee compensation standards can be realized through the organic combination of enterprise operating cost accounting and government supervision and auditing, requiring enterprises to carry out actual operating cost accounting in accordance with the Measures for Cost and Expense Management Accounting of Transportation Enterprises.

3 Methods of measurement

3.1 Emergency transportation security construction and financial subsidy model in Province X

Taking into account the fact that emergency transport tasks are characterized by suddenness and urgency, which are difficult to resolve through bidding or government purchase, and in order to reduce the costs of enterprises involved in emergency transport services, Province X subsidizes the Transport Group, the Bus Group, the Metro Group and other units, and incorporates them into the regularization process. Different from the Ministry of Transport's requirement to establish separate emergency transportation fleets to engage in emergency transportation mode, Province X adopts the establishment of emergency transportation capacity and teams on the basis of the existing capacity of the existing three large state-owned transportation groups, which meets the needs of emergency transportation and saves financial resources without lowering the construction standards and fully safeguarding the emergency transportation needs, and is a kind of emergency transportation capacity building that deserves to be fully affirmed.

The province's current emergency transport subsidy rate was approved five years ago, with the competent authorities using a discretionary quota of subsidies by vehicle or other means, based on the full cost of emergency transport operations actually incurred, as reported by each carrier, in conjunction with the province's emergency transport operations and the tasks to be carried out by the various enterprises in future years. This criterion, which is not necessarily related to actual work and costs and which remains unchanged for several years, is not reasonable and needs to be optimized as soon as possible.The new subsidy model should take full account of the existing emergency transport team construction mode of combining emergency transport, the reality that in the process of emergency transport, excess transport costs and short-term revenue generally occur compared with regular transport, and the use of statistical or accounting methods to measure the shortfall in income and expenditure of emergency transport operations, and accurately subsidize the shortfall in income and expenditure of the operation, in order to maximize the socio-economic bene-fits of financial funds.

3.2 Definition of emergency transport shortfall

Emergency transportation is a kind of public service, will occur than the daily transportation business more excess costs, need financial funds to be compensated; at the same time part of the emergency transportation is also in a certain price to the commissioner or the transport

object to collect a certain amount of money, in view of the special nature of the emergency transportation, the charges are generally lower than the market price or even individual emergency exempted from charges, resulting in the existence of a shortfall in revenue compared with the normal transportation business, so this part of the short income part also need financial funds to give subsidies. To sum up, financial resources should subsidize the shortfall in income and expenditure of emergency transport, so the measurement or monitoring of the shortfall in income and expenditure is necessary for determining the criteria for financial subsidies.

$$Contingency\ Transportation\ Income\ and\ Expenditure\ Gap = Contingency\ Transportation\ Excess\ Costs + Contingency\ Transportation\ Shortfall\ Revenue \quad (1)$$

3.3 Measurement of shortfalls in income and expenditure in the carrier sector of emergency transport operations for which a standard cost subsidy exists

3.3.1Measurement of the shortfall in emergency transportation revenues and expenditures of the bus group.

For bus groups where standard cost subsidies exist, the single waiting time, distance, and passenger capacity of emergency transport operations are different from normal operating shifts, and there is a certain difference between the single cost of normal transport emergency transport operations and the cost of normal operating shifts; therefore, unit passenger costs and unit passenger revenues are used to measure excess costs and shortfall revenues for emergency transport. The formula is shown below:

$$Contingency\ Transportation\ Excess\ Costs = \left(\frac{Total\ cost\ of\ emergency\ transportation\ operations}{Number\ of\ passengers\ transported\ in\ emergencies} - \frac{Total\ cost\ of\ passenger\ operations}{Number\ of\ passengers\ transported\ by\ passenger\ transport}\right) \times Number\ of\ passengers\ transported\ in\ emergencies \quad (2)$$

$$Contingency\ Transportation\ Shortfall\ Revenue = \left(\frac{Total\ revenue\ from\ passenger\ transport\ operations}{Number\ of\ passengers\ transported\ by\ passenger\ transport} - \frac{Transportation\ revenue\ for\ emergency\ operations}{Number\ of\ passengers\ transported\ in\ emergencies}\right) \times Number\ of\ passengers\ transported\ in\ emergencies \quad (3)$$

$$Income\ subject\ to\ financial\ assistance = Contingency\ Transportation\ Income\ and\ Expenditure\ Gap = Contingency\ Transportation\ Excess\ Costs + Contingency\ Transportation\ Shortfall\ Revenue \quad (4)$$

Emergency transportation revenues here do not include fiscal emergency transportation subsidies, and the P&L analysis naturally filters out the portion of the fiscal subsidy to the bus group's standard costs.

Measurement based on the Normal Transportation Operations and Emergency Transportation Volume and Revenue and Expenditure Statistics for 2017-2020 provided by the Bus Group shows that there is an excess cost of $3-4.7 million due to ineffective use of vehicles resulting from difficulties in forecasting capacity demand for emergency transportation, and a shortfall in revenue of $1.7-4.4 million due to inappropriate collection of fares; even if we do not take into account the inappropriate collection of fares resulting in shortfalls in revenue in the course of emergency transportation, there is still a shortfall in revenue and expenditure of $3-4.7 million for emergency transportation. See Table 1 for details:

Table 1. Transit Group Emergency Transportation Revenue and Expenditure Gap Analysis①

	Lower than normal revenue from emergency transportation（practice）($ million)			Emergency transportation is charged at regular fares（hypothesis）($ million)	
vintages	Excess cost	Revenue shortfalls	Shortfall in operational income and expenditure	Excess cost	Shortfall in operational income and expenditure
2018	470	170	640	470	470
2019	300	440	740	300	300
2020	460	180	640	460	460

3.3.2 Metro Group Emergency Transportation Revenue and Expenditure Shortfall Measurement.

For the subway group, its emergency transport business and normal business operations have been integrated, its three festivals, two nights and holidays emergency encryption trips similar to the daily morning and evening rush hour encryption behavior, should be a normal business behavior; delayed closing of the emergency business exists in the income is lower than the daily business of the qualities of the emergency business, should be considered in the excess cost and the short income in the standard cost subsidies in addition to a separate special subsidy from the emergency transport. As the subway group can not provide separate emergency transportation revenue, cost breakdown data, emergency transportation revenue data is based on emergency transportation business volume * normal transportation unit revenue (including financial comprehensive cost subsidies), the connotation is assumed to be emergency transportation and normal business to obtain the same operating income; emergency transportation costs based on emergency transportation business volume * normal transportation unit cost calculation, Emergency transportation income and expenditure gap = Post-emergency transportation cost - Emergency transportation income (including comprehensive financial subsidies). According to the Normal Transportation Business and Emergency Transportation Business Volume and Revenue and Expenditure Statistics Table for 2018-2020 provided by Metro Group, excluding the premise of comprehensive transportation subsidies given by the finance, the shortfalls of Metro Group's emergency transportation revenues and expenditures for the years 2018-2020 are measured to be $300,000, $280,000, and $5,100,000, respectively, and in view of the assumption of the measurement that the emergency transportation business receives the same operating revenues as the normal business and the reality of the actual delay in the closing of the shift for the

number of riders being smaller, the actual shortfalls should be great-er than this measured amount.

3.4 Measurement of shortfalls in income and expenditure in the carrier sector of emergency transport operations for which a standard cost subsidy exists

For Transportation Group and W Transportation Company, the type of emergency transportation business is the same as that of daily operations, with market-based pricing of revenues. Although there is a certain shortfall in actual arrivals, the shortfall in revenues receivable is not significant, and there mainly exists ineffective preparation of trucks due to inaccurate forecasts of emergency transportation volumes, which results in excess costs of emergency transportation, as well as short-term revenues caused by insufficient utilization of emergency transportation capacity; therefore, single costs and single revenues are used to measure excess costs and short-term revenues of emergency transportation. The formula is shown below:

$$Contingency\ transportation\ excess\ costs = \left(\frac{Total\ cost\ of\ emergency\ transportation\ operations}{Emergency\ transportation\ team} - \frac{Total\ cost\ of\ passenger\ operations}{Passenger\ transport\ service\ team}\right) \times Emergency\ transportation\ team \quad (5)$$

$$Emergency\ transportation\ shortfall\ revenue = \left(\frac{Total\ revenue\ from\ passenger\ transport\ operations}{Passenger\ transport\ service\ team} - \frac{Transportation\ revenue\ for\ emergency\ operations}{Emergency\ transportation\ team}\right) \times Emergency\ transportation\ team \quad (6)$$

$$Shortfall\ in\ income\ and\ expenditure\ for\ emergency\ transportation\ operations = Contingency\ transportation\ excess\ costs + Emergency\ transportation\ shortfall\ revenue \quad (7)$$

Emergency transportation revenues here do not include financial emergency transportation subsidies.

Measurement based on the Normal Transportation Operations and Emergency Transportation Volume and Revenue and Expenditure Statistics for 2018-2020 provided by the Transportation Group shows that there is an excess cost of $6.6-9.0 million due to ineffective use of vehicles resulting from difficulties in fore-casting emergency transportation capacity, and that emergency transportation revenues are higher than normal operating revenues to form $1.1-5.0 million of excess revenues, for a combined shortfall of revenues and expenditures in the range of $4.0-5.5 million. See Table 2 for details:

Table 2. Transportation Group Emergency Transportation Revenue and Expenditure Gap Analysis

vintages	Excess cost of emergency transportation ($ million)	Revenue from emergency transportation shortfalls ($ million)	Shortfall in income and expenditure for emergency transportation operations ($ million)
2018	660	-110	550
2019	900	-500	400
2020	850	-310	540

4 Conclusions

(1) Security emergency transportation services are not applicable to the government purchase of services approach.

(2) It is more appropriate to characterize the nature of the special fund subsidy as a subsidy for the shortfall in income and expenditure that occurs in the emergency transport of the carrier enterprises. Carrier enterprises and entrusted units work together to strengthen capacity forecasting and reduce ineffective vehicle preparation; they do their best to collect as much as possible of the emergency transport revenue as they can, and then subsidize the shortfall in the total loss incurred by the financial sector.

(3) From the point of view of the actual income and expenditure of the carrier enterprises, the existing amount of subsidy is basically reasonable, and it is necessary to continue the financial subsidy for emergency transportation.After the establishment of a dedicated accounting system, the subsidy can be approved on a regular basis, or the current system of annual flat-rate subsidies can be used, with the size of the flat-rate also needing to be approved on a regular basis.

(4) Approval of emergency transport subsidy rates. Emergency transport subsidy standard approval, the preferred way should be linked with the emergency transport business volume of the relevant way, the specific implementation, in accordance with the emergency transport revenue and expenditure shortfall in the accurate determination of the basis, with a certain rate, in order to compensate for the emergency transport capacity such as the development of emergency plans, emergency drills, and other construction costs incurred in the process of the relevant costs. Of course, for simplicity, it is also possible to apportion the total subsidy to the amount of standing emergency transport capacity to arrive at a standard amount of compensation based on a capacity quota.

5 Policy recommendations

(1) Accurately defining the nature of financial subsidies for emergency transportation for traffic safety. Traffic safety emergency transportation business has a sudden, acute and large degree of public nature, from the existing business type and situation, belongs to the non-standard transportation services, is not fully applicable to the market pricing, the use of government purchase of services to carry out the financial subsidy is not easy to define or define the cost is higher. In view of this, it is more appropriate to characterize the nature of compensation for emergency transport as a subsidy for the shortfall in income and expenditure incurred by carriers for emergency transport.

(2) Clarifying the scope of subsidies for emergency transport operations and establishing a comprehensive accounting system for financial subsidies. In order to accurately implement financial subsidies and enhance the accuracy and effectiveness of the use of financial subsidies, transport management departments and carrier enterprises should work together to clarify the definition of emergency transport operations for traffic safety, the scope of subsidies, subsidy standards and implementation procedures, and carrier enterprises should establish and improve the statistical system for emergency transport operations and the special accounting

system for special subsidy funds, and accurately count the volume of business related to emergency transport and the details of revenues and expenditures, so as to facilitate the monitoring of subsidies for the financial organizations, accurately implement financial subsidies and continually enhance the effectiveness of the use of subsidy funds.

(3) Carrier enterprises to strengthen the organization of emergency transport revenues and make every effort to collect as much as possible. Carrier enterprises need to strengthen the revenue management of emergency transport services, and for paid emergency transport operations, try to narrow the funding gap for emergency transport operations caused by uncollected or untimely revenue col-lection. Fare charges in the course of emergency transportation, such as three festivals and two nights, and late trains and airplanes, should be collected as much as possible; charges from contractual agreements should be actively collected to avoid long-term pending accounts.

(4) Operational departments should take the lead in strengthening the construction and application of emergency transportation information systems and im-proving the accuracy of emergency transportation tasking. In response to the problem of the large discrepancy between the number of capacity requirements and the number of actual needs that arises in the process of issuing emergency transportation tasks, it is necessary to strengthen information technology construction, improve the degree of coordination between the competent authorities, the parties issuing the tasks, and the relevant departments in the process of implementing the tasks, and promote the interoperability of information and data sharing and common use among all parties involved in the emergency transportation tasks. On the basis of existing historical data, appropriate methods are chosen to fully estimate emergency transportation demand, and redundant capacity is moderately set aside in consideration of its social benefits, so as to improve the accuracy of emergency transportation operations and reduce ineffective costs for enterprises.

Annotation: ① For confidentiality reasons, the relevant data are simulated data.

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