The Effectivness of Suporting Public Passenger Transport from Public Funds

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Abstract The paper deals with the issue of efficiency of financial support for public passenger transport from public funds from the perspective of improving road safety. The aim is to verify the hypothesis that financing public passenger transport from public funds is a significant tool to influence the number of passengers carried by individual automobile transport, and thus it can be a tool for influencing road safety in a particular territory. The first part of the paper analyses the sources for financial support of public passenger transport. The last part analyses possible impacts of financing public passenger transport on the road safety in relation to the specified hypothesis.

Keywords: transport, financing, safety, factor, region, public

JEL Classification: R48, H40

1. Introduction

Regular public passenger transport cannot be provided on a commercial basis without the support from public funds (Poliak, 2013). Therefore, there are mechanisms through which public passenger transport can be ensured. Service operators may provide transport services either based on the award of exclusive rights to operate regular passenger transport in a certain territory or they have possibility to obtain the financial support for transport service provision. Public funds are used worldwide to finance the difference between revenue from fares and operating costs (Tscharaktschiew and Hirte, 2012). In the U.S., public funding contributes to cover 57 – 89 % of operating costs of bus service. In area of rail passenger transport, this proportion represents 29 – 89 % of operating costs (Parry and Small, 2009). Within the EU, operating costs are covered from public funds in the range of 23 – 50 % depending on the funding system in a particular EU Member State (Buehler and Pucher, 2011a, b). A prerequisite for the support of public passenger transport is provision of the sustainable system of transport serviceability. By the support of public transport, there is also an assumption that the population will use passenger cars to a lesser extent. For this reason, the following benefits can be achieved:

- Reduction of CO2 emissions because road transport is considered to be a significant contributor to greenhouse gas emissions (Figlus et al., 2014).
- Road safety increase because the accident rate of passenger cars is higher compared to the average accident rate of vehicles (Komackova and Poliak, 2015).

When considering that the number of passengers using public transport is increasing with the increasing financial support for public transport, there is an assumption that higher number of passengers carried will increase revenue from fares. Therefore, it is possible to expect the reducing need for funding transport serviceability in future under the increase in revenue from fares (Storchmann, 2001).

The aim of the paper is to verify the hypothesis that financing public passenger transport from public funds is a significant tool to influence the number of passengers carried by individual automobile transport, and thus it can be a tool for influencing road safety in a particular territory. Verification of the hypothesis is even more significant because the regions where public transport is entirely financed from public funds exist within the EU for the support of road safety, and thus the residents may use public transport for free (e.g. some cities in Estonia, Czech Republic, and a similar system is being prepared also in Zilina in Slovakia). The first part of the paper analyses the sources for financial support of public passenger transport. The next part describes the assumptions for improving road safety through increasing the support of public passenger transport. The last part analyses possible impacts of financing public passenger transport on the road safety in relation to the specified hypothesis.

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2. Sources for Financial Support of Public Passenger Transport from Public Funds

In general, public passenger transport cannot be financed only from revenue from fares and other revenue generated while service provision such as advertisement. This fact was already confirmed by the studies elaborated before 1990; for instance Bly et al. (1980), Pucher and Markstedt (1983) or Bly and Oldfield (1986). But, the conditions have not changed even in the present as it is demonstrated by Tscharaktschiew and Hirte (2012), Poliak (2013) or Drevs et al. (2014). The mentioned studies also point to the fact that the financial support from public funds tends to decrease the level of fares and to increase the frequency of public transport links. Lower fares make public transport more accessible for low-income population groups (Tisat, 1998) as well as groups of people with specific needs such as the disabled and elderly (Asensio et al., 2003). Higher financial support from public funds also allows using vehicles with a larger capacity in the provision of transport serviceability (Proost and Dender, 2008).

The most common financial support from public funds (state or local government budget) is in the form of compensation (van de Velde, 2008) that is also referred to subsidies in some literature (Black, 1995). A subsidy or compensation represents a payment that does not require a direct exchange of goods or services in the market economy. It is used to achieve a specific social objective or a specific intended effect (Black, 1995). It represents a payment transfer, however, it is not a gift because there are certain rules that must be kept in order to obtain subsidies for public transport provision.

In most EU Member States, public passenger transport is financed traditionally from general taxes (Ubbles and Nijkamp, 2002). State or local government generates revenue from various taxes which include direct and indirect taxes. Within the EU, indirect taxes represent in general the highest proportion of incomes of state budgets. Under this support, there is no direct link between the source of incomes and their allocation to financing transport serviceability. The main problem of this form of financing is that there is considerable competition between the requirements for subsidies from public funds (van de Velde, 2008). Public passenger transport is often financially supported from one budget together with other public services such as education, healthcare, and etc. (Storchmann, 2001). It is very difficult to maintain the financial support for public passenger transport because this support represents high financial resources provided for a long time period. For this reason, new forms of obtaining funds from public sources are being sought in the area of public passenger transport in some states. These are linked to specific incomes of public budgets. The possibilities for direct connection of public transport financing with the incomes are as follows:

- Fees for using road infrastructure – a traditional reason for introducing road fees is to obtain the incomes for construction of new roads and maintenance of the existing roads. The second and even more significant reason is to cope with traffic congestion and air pollution (Komackova and Poliak, 2015). Linking the incomes from the fees for using road network with the support of public passenger transport would be a good instrument for financing public transport in case if passenger cars are subjected to those fees. The use of such a method of financing is common in Scandinavian countries (Farrell, 1999), (Storchmann, 2001) and the U.S. (Small and Gomez-Ibanez, 1998).
- Excise duties – excise duties can be defined in general as indirect taxes of the selective character. These taxes apply only to selected goods. In the EU, Member States must apply excise duties to alcoholic drinks, tobacco products, mineral oils and energy (e.g. coal, electricity, natural gas). Given that consumption of mineral oils (gasoline, diesel) is directly dependent on the extent of transport, some of states (e.g. Germany, Switzerland) have introduced a specific proportion of collected excise duties on mineral oils as a source of the financial support of public passenger transport (Farrell, 1999). Thus, the higher fuel price assumes lower fares in public passenger transport and it also assumes reductions of traffic congestion and greenhouse gas emissions. Besides some EU Member States, this method of financing public transport is also used in the U.S. (Ubbels and Nijkamp, 2002).
- Motor vehicle tax – it is a tax which is compulsory within EU Member States and it applies to all vehicles that are used for business (Poliakova, 2010). In some EU Member States, this tax applies to all vehicles regardless they are used by entrepreneurs or private persons. Although the tax is related to transport, its collection in the EU is not directly linked to financing public transport. Incomes from collecting taxes on motor vehicles are directly used for the financial support of public transport in some regions in the U.S. and Canada.
- Income tax for legal entities and natural persons – incomes from these taxes represent the income of state or local budgets according to a particular state. A direct link between the revenue of income tax and financial support of public transport is applied mainly in the U.S. (e.g. Portland and Eugene) but also in some EU regions such as France (Wallis et al., 2010) and Germany (Beck et al., 2011).
- Property tax – as an instrument of creating sources for financing public transport, it is a commonly applied method in the world and it is used in several states in Europe, Asia and North America (Ubbels and Nijkamp, 2002). The principle of linking property tax with the support of public transport is that owners or users of properties may benefit from the fact that the territory, where their properties are located, is served by public passenger transport. This benefit is reflected in the increased value of the properties. Therefore, a higher property tax is applied to those properties (the tax includes a

fixed part which is determined for the financial support of public passenger transport).

- Parking fees – these fees are only exceptionally directly determined for the financial support of public passenger transport. However, there are regions, especially city centres, where parking fees or their part are directly determined for financing public transport in order to reduce traffic congestion and to reduce occupation of space by passenger cars in cities. For example, this method of the financial support of public transport have been applied in France since 1973 (Predki and Wilk, 1999).

It is impossible to clearly identify which method of the financial support of public transport is most effective or which combination of sources would bring the best results. Efficient use of funding sources is addressed in detail by Pawlak (1991), Slowinski (1995), and Beck (2011).

3. Possible Impacts of Financing Public Passenger Transport on the Road Safety

Based on previous analyses, it can be stated that public authorities are able to find financial resources for the support of public passenger transport. Thus, if passengers changed their way of transport (from passenger cars to public transport), the road safety would be increased. This part of the paper examines whether financing public transport from public funds motivates passengers to change their way of transport. Molander et al. (2012) pointed out that there is a relationship between the financial support of public transport from public funds and willingness of passengers to pay for using public transport. The importance of this relationship increases with the significance of the debate on transparency in public spending (Hilgers, 2012; Hilgers and Ihl, 2010). According to available sources, direct impact of the increasing financial support from public funds on the willingness of passengers to pay for transport has not been examined yet. However, the results of research on the impact of the financial support for cultural events from public funds show that such financial support may increase as well as reduce the willingness of the private sector to finance cultural events (Bekkers and Wiepking, 2011; Borgonovi, 2006; Maddison, 2004). Considering public transport, it is possible to increase the willingness of passengers to pay fares if the passengers will understand the financial support from public funds as sufficient support alongside incomes from fares. Therefore, public authorities must present the reasons for the financial support of public transport in an appropriate manner. There are also cases when willingness of passengers to pay fares decreased with the increased financial support from public funds. Those passengers had an opinion that they already paid for public transport in the form of taxes and the fares were understood as an additional payment for the same services. The similar problem is also addressed by Souche et al. (2012) and Tscharaktschiew and Hirte (2012).

In terms of verifying the hypothesis, it is necessary to address the issue whether the increased number of passengers and increased road safety can be achieved through increasing the financial support of public passenger transport. The increased financial support from public funds increases also the willingness of passengers to pay fares (Chang, 2010). The willingness to pay fares in public transport is defined by Homburg et al. (2005) as an amount of money that customers are willing to spend for provided services in case of knowledge about further support of the service provision from public funds. Phanikumar and Maitra (2006) point out that the willingness to pay for public services includes not only the user's values but also non-user's values. This means that the willingness to pay for public transport services includes the amount of fares and public financial resources which are being spent to ensure transport serviceability. The similar definition can be found in studies elaborated by Kotchen and Reiling (2000), Cooper et al. (2004), Geurs et al. (2006), Humphreys and Fowkes (2006), and Liebe et al. (2011). Horne et al. (2005) emphasized that knowledge of the financial support from public funds influences the opinion on the level of fares which passengers are willing to pay for provided services.

Based on Lai and Chen (2001), it can be stated that passengers are willing to bear with an increase in fares in case that they have sufficient knowledge of the financial support of public transport from public funds. Passengers are more willing to accept a price increase in case they are satisfied with provided services (Kim and Crompton, 2002).

On the other hand, the payment of fares and public funding can be understood as double financing by persons who pay taxes to public budgets (Buckley, 2003). In this context, Andreoni and Payne (2003) pointed out that the financial support of public transport may cause unwillingness to pay fares. The unwillingness is mainly manifested in case of increasing fares. Nyborg and Rege (2003), and Liebe et al. (2011) pointed to the fact that knowledge of financing transport services from public funds elicits the requirement for public transport provision for free.

Taxpayers who do not use public transport may also accept financing public transport from public funds (Chang et al., 2012). In this case, the financial support from public funds is understood as the support of maintaining the availability of services for a taxpayer in case he/she needs the services.

The question is whether the financial support of public passenger transport increases the road safety in that a part of travellers start to use public transport instead of individual automobile transport. A change in the number of passengers under the support of public transport must

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be examined through the elasticity of demand for public transport (Gnap et al. 2006). In general, the elasticity of demand refers to the relationship between the percentage change of the selected factor and the percentage change of demand (e.g. performance in public transport expressed in passenger-kilometres). If fares in public passenger transport decreased due to the financial support from public funds obtained from using passenger cars (e.g. an increase in excise duties on mineral oils), it would be possible to anticipate behaviour of the population based on the elasticity of demand for fuels.

Table 1. Price elasticity of demand for automobile transport and public passenger transport in relation to fuel prices

The purpose of journey	Automobile transport	Public passenger transport
Commuting to work	–0.092	+0.202
Commuting to schools	–0.136	+0.121
Business trip	–0.009	+0.047
Shopping	–0.020	+0.031
Leisure time	–0.120	+0.045
Holiday	–0.240	+0.016
Average	**–0.102**	**+0.070**

Source: Storchmann (2001)

According to the measurements of Storchmannom (2001) the results of which were also confirmed by Gnap et al. (2006) for Slovak conditions, it can be stated that the demand for driving by passenger cars during holiday (-0.240) and leisure time (-0.120) significantly decreases due to fuel price increases. However, those travellers do not change to public transport because price elasticity of demand equals to only +0.016 in case of holiday and +0.045 for leisure time. Price elasticity of demand for the use of passenger cars for the business and shopping purposes is very low (-0.009 and -0.020). This means that number of journeys of those groups of traveller does not change. Comparable elasticity can be seen only in case of commuting to schools where travellers change their type of transport from automobile transport (-0.136) to public passenger transport (+0.121). Development of commuting to work is also interesting. Elasticity of demand for driving to work by passenger cars is significantly inelastic in relation to fuel price increases. Very few of travellers are willing to switch to public transport. However, those, who have already started to use public transport, carry out more than double journeys compared to individual automobile transport. In relation to transport, it is necessary to point out that a price of transport does not represent the most important factor (Gnap et al., 2006). The most important factor is the travel time (Table 2).

Table 2. Factors affecting the volume of public passenger transport

Factors	Elasticity
Regional employment	0.25
Occupancy of city centres	0.61
Offer of transport (volume of vehicle-kilometres)	0.71
Waiting time	–0.30
Travel time	–0.60
Fare level	–0.32

Source: Gnap et al (2006)

Demand for transport services is characterized by inequality during a day. Figure 1 depicts the changes in demand for public transport services. The graph in this figure is processed based on the measurements carried out by the authors in particular regions of the Slovak Republic. The demand is characterized by two periods of peak hours in the morning and afternoon. During peak hours, offer of transport can be lower than demand for transport. Morning peak hours are in the interval from 6:00 till 8:00 when the proportion of nearly 15 % of the total daily number of passengers is transported. The number of vehicles which are need in public transport is determined based on morning peak hours. Maximum utilization of their capacity is taken into account during this period. During off-peak hours, offer of transport exceeds demand and therefore vehicles are not sufficiently utilized in terms of their capacity.

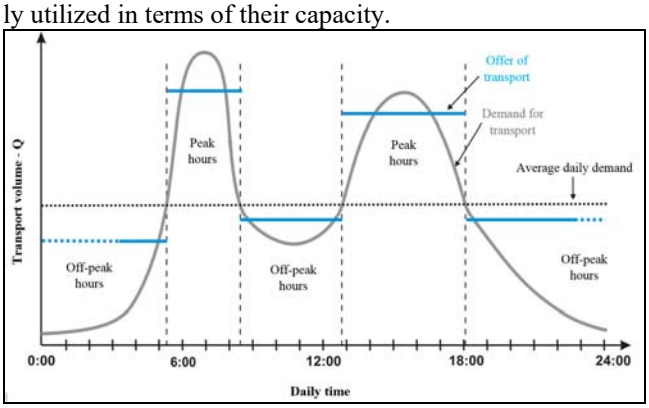

Figure 1. Offer of transport capacity and demand for public passenger transport depending on the daily time; *Source:* authors

If the financial support of public transport increased with the aim to decrease number of travellers in passenger cars, the desired effect would not be achieved because there are other important factors influencing transport mode choice. In the process of decreasing the fares, it is necessary to consider the fact that the increase in the number of passengers will not be uniform throughout a day. A higher increase of passengers can be expected during peak hours. A new passenger during off-peak hours causes below-average marginal costs (there is no need for investment into new vehicles because the existing vehicles are not sufficiently utilized). On the other hand, a new passenger during peak hours causes above-average marginal costs because the existing vehicles are fully utilized under actual conditions. Within a significant decline in fares, the increase in numbers of passengers is related to the fact that the passengers prefer

public transport to walking or cycling. Decreasing fares or public transport provision for free has a greatly limited impact on the road safety. To decrease number of passenger cars, it is necessary to take other measures that make travellers to use public transport. The example can be restrictions on parking vehicles at the traveller's destination or limitations for the ride of passenger cars what results in significantly longer travel time compared to the use of public transport.

4. Conclusion

The road safety is currently a topical issue given the fact that an increase of transport performance still persists and infrastructure capacity is limited mainly in cities. The probability of accidents increases with increasing performance of road transport. This results in decreasing road safety. This paper verifies the hypothesis that road safety improvement can be achieved through the support of public passenger transport from public funds.

The paper analysed the possibilities for financing public passenger transport from public funds. It was concluded that public transport is operated by service operators with the support from public resources. To handle demanding financial requirements for public transport support, several countries have established a financing system which is directly linked to specific taxes and fees. Financial sources are often generated from incomes of public budgets related to transport.

This paper confirmed that if travellers started to use public transport instead of passenger cars, the number of vehicle on roads and the probability of accidents would decrease. It is also possible to state that professional drivers have better prerequisites to handle risk situations on roads with respect to their practise and checks.

However, financing public transport from public funds itself do not directly mean increasing road safety. It is also necessary to address the elasticity of demand of individual groups of the population. Based on the elasticity, it can be concluded that a significant change in the road safety cannot be achieved unless other measures are taken alongside the financial support of public transport (e.g. reserved bus lines, parking bans for vehicles). Decreasing fares or public transport provision for free would attract only walkers and cyclists. Furthermore, it can be expected that the increased demand of those users could occur mainly in morning peak hours, and this could result in the need for investment and further requirements for financial support from public funds.

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REFERENCES

[1] ANDREONI, J. – PAYNE, A. A. (2003): Do government grants to private charities crowd out giving or fund-raising?. American Economic Review, *93*, No. 3, p. 792 – 812.

[2] ASENSIO, T. – MATAS, A. – RAYMOND, J. L. (2003): Redistributive effects of subsidies to urban public transport in Spain. Transport Reviews, 23, No. 4, p. 433 – 452.

[3] BECK, A. (2011): Barriers to Entry in Rail Passenger Services: Empirical Evidence for Tendering Procedures in Germany. European Journal of Transport and Infrastructure Research, 11, No. 1, p. 20 – 41.

[4] BEKKERS, R. – WIEPKING, P. (2011): A literature review of empirical studies of philanthropy: eight mechanisms that drive charitable giving. Nonprofit and Voluntary Sector Quarterly, 40, No. 1, p. 924 – 973.

[5] BLACK, A. (1995): Urban Mass Transportation Planning. New York: McGraw-Hill. ISBN 00-70055-57-2.

[6] BLY, P. H. – WEBSTER, F. V. – POUNDS, S. (1980): Effects of subsidies on urban public transport. Transportation, 9, No. 4, p. 311 – 331.

[7] Bly, P.H., Oldfield, R.H., 1986. The effects of public transport subsidies on demand and supply. Transport. Res. A: Gen. 20, 415–427.

[8] BORGONOVI, F. (2006): Do public grants to American theatres crowd-out private donations?. Public Choice, 126, No. 3-4, p. 429 – 451.

[9] BUCKLEY, R. (2003): Pay to play in parks: an Australian policy perspective on visitor fees in public protected areas. Journal of Sustainable Tourism, 11, No. 1, p. 56 – 73.

[10] BUEHLER, R. – PUCHER, J. (2011a): Sustainable transport in Freiburg: lessons from Germany's environmental capital. International Journal of Sustainable Transportation, 5, No. 1, p. 43 – 70.

[11] BUEHLER, R. – PUCHER, J. (2011b): Making public transport financially sustainable. Transport Policy, *18*, No. 1, p. 126 – 138.

[12] COOPER, P. – POE, G. L. – BATEMAN, I. J. (2004): The structure of motivation for contingent values: a case study of lake water quality improvement. Ecological Economics, 50, No. 1-2, p. 69 – 82.

[13] DREVS, F. – TSCHEULIN, D. K. – LINDERMEIER, J. – RENNER, S. (2014): Crowding-in or crowding out: An empirical analysis on the effect of subsidies on individual willingness-to-pay for public transportation. Transportation Research Part A, 59, No. 1, p. 250 – 261.

[14] FARRELL, S. (1999): Financing European transport infrastructure: policies and practice in Western Europe. London: Macmillan. ISBN 033-37-189-68.

[15] FIGLUS, T. – LISCAK, S. – WILK, A. (2014): Condition monitoring of engine timing system by using wavelet

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packet decomposition of an acoustic signal. Journal of mechanical science and technology, 28, No. 5, p. 1663 – 1671.

[16] GEURS, K. – HAAIJER, R. – VAN WEE, B. (2006): Option value of public transport: methodology for measurement and case study for regional rail links in the Netherlands. Transport Reviews, 26, No. 5, p. 613 – 643.

[17] GNAP, J. – KONECNY, V. – POLIAK, M. (2006): Elasticita dopytu v hromadnej osobnej doprave. Ekonomicky casopis/Journal of Economics, 54, No. 7, p. 668 – 684.

[18] HILGERS, D. (2012): Open government: conceptual insights into a new development in the public sector. Journal of Business Economics, 82, No. 1, p. 30.

[19] HILGERS, D. – IHL, C. (2010): Citizensourcing – applying the concept of open innovation to the public sector. The International Journal of Public Participation, 4, No. 1, p. 67 – 88.

[20] HOMBURG, C. – KOSCHATE, N. – HOYER, W. D. (2005): Do satisfied customers really pay more? A study of the relationship between customer satisfaction and willingness to pay. Journal of Marketing, 69, No. 2, p. 84 – 96.

[21] HORNE, C. S. – JOHNSON, J. L. – VAN SLYKE, D. M. (2005): Do charitable donors know enough - and care enough - about government subsidies to affect private giving to nonprofit organizations?. Nonprofit and Voluntary Sector Quarterly, 34, No. 1, p. 136 – 149.

[22] HUMPHREYS, M. – FOWKES, A. S. (2006): The significance of indirect use and non-use values in transport appraisal. International Journal of Transport Economics, 33, No. 1, p. 17 – 35.

[23] CHANG, J. S. (2010): Estimation of option and non-use values for intercity passenger rail services. Journal of Transport Geography, 18, No. 2, p. 259 – 265.

[24] CHANG, J. S. – CHO, S. – LEE, B. – KIM, Y. – YUN, S. (2012): A dichotomous choice survey for quantifying option and non-use values of bus services in Korea. Transportation, 39, No. 1, p. 33 – 54.

[25] KIM, S. S. – CROMPTON, J. L. (2002): The influence of selected behavioral and economic variables on perceptions of admission price levels. Journal of Travel Research, 41, No. 2, p. 144 – 152.

[26] KOMACKOVA, L. – POLIAK, M. (2015): Factors affecting the road safety. In: Trancom 2015. [11th European conference of young researchers and scientists.] p. 45 – 48.

[27] KOTCHEN, M. J. – REILING, S. D. (2000): Environmental attitudes, motivations, and contingent valuation of nonuse values: a case study involving endangered species. Ecological Economics, 32, No. 1, p. 93 – 107.

[28] LAI, W. T. – CHEN, C. F. (2011): Behavioral intentions of public transit passengers - the roles of service quality, perceived value, satisfaction and involvement. Transport Policy, 18, No. 2, p. 318 – 325.

[29] LIEBE, U. – PREISENDORFER, P. – MEYERHOFF, J. (2011): To pay or not to pay: competing theories to explain individuals' willingness to pay for public environmental goods. Environment and Behavior, 43, No. 1, p. 106 – 130.

[30] MADDISON, D. (2004): Causality and museum subsidies. Journal of Cultural Economics, 28, No. 2, p. 89 – 108.

[31] MOLANDER, S. – FELLESSON, M. – FRIMAN, M. – SKALEN, P. (2012): Market orientation in public transport research a review. Transport Reviews, 32, No. 2, p. 155 – 180.

[32] NYBORG, K. – REGE, M. (2003): Does public policy crowd out private contributions to public goods. Public Choice, 115, No. 3, p. 397 – 418.

[33] PARRY, I. W. H. – SMALL, K. A. (2009): Should Urban Transit Subsidies Be Reduced? American Economic Review, 99, No. 3, p. 700 – 724.

[34] PAWLAK, Z. (1991): Rough sets – Theoretical Aspects of Reasoning about Data. Dordrecht: Kluwer. ISBN 978-94-010-5564-2.

[35] PHANIKUMAR, C. – MAITRA, B. (2006): Valuing urban bus attributes: an experience in Kolkata. Journal of Public Transport, 9, No. 2, p. 69 – 87.

[36] POLIAK, M. (2013): Vztah primeraneho zisku a rizika v hromadnej osobnej doprave na Slovensku. Ekonomicky casopis/Journal of Economics, 61, No. 2, p. 206 – 220.

[37] POLIAKOVA, A. (2010): Dane a poplatky v doprave a zasielatelstve. Zilina: EDIS-publisher ZU. ISBN 978-80-554-0234-5.

[38] PREDKI, B. – WILK, Sz. (1999): Rough set based data exploration using ROSE system. In: Foundations of Intelligent Systems. [11th International Symposium, ISMIS'99 Warsaw, Poland, June 8–11, 1999.] p. 172 – 180.

[39] PROOST, S. – DENDER, K. V. (2008): Optimal urban transport pricing in the presence of congestion, economies of density and costly public funds. Transportation Research A: Policy Practice, 42, No. 9, p. 1220 – 1230.

[40] PUCHER, J. – MARKSTEDT, A. (1983): Consequences of public ownership and subsidies for mass transit: evidence from case studies and regression analysis. Transportation, 11, No. 4, p. 323 – 345.

[41] Slowinski, R., 1995. Intelligent Decision Support: Hardbook of Applications and Advances of Rough Set theory. Kluwer, Dordrecht.

[42] SMALL, K. A. – GOMEZ-IBANEZ, J. A. (1998): Road pricing for congestion management: the transition from theory to policy. Berkeley: University of California. Available on: <http://www.uctc.net/research/papers/391.pdf>.

[43] SOUCHE, S. – RAUX, C. – CROISSANT, Y. (2012): On the perceived justice of urban road pricing: an empirical study in Lyon. Transportation Research Part A: Policy and Practice, 46, No. 7, p. 1124 – 1136.

[44] STORCHMANN, K. H. (2001): The impact of fuel taxes on public transport – an empirical assessment for Germany. Transport Policy, 8, No. 1, p. 19 – 28.

[45] TISATO, P. (1998): Service unreliability and bus subsidy. Transportation Research A: Policy Practice, 32, No. 6, p. 423 – 436.

[46] TSCHARAKTSCHIEW, S. – HIRTE, G. (2012): Should subsidies to urban passenger transport be increased? A spatial CGE analysis for a Ger-man metropolitan area. Transportation Research A: Policy Practice, 46, No. 2, p. 285 – 309.

[47] UBBELS, B. – NIJKAMP, P. (2002): Unconventional funding of urban public transport. Transportation Research Part D, 7, No. 1, p. 317 – 329.

[48] VAN DE VELDE, D. (2008): A New Regulation for the European Public Transport. Research in Transport Economics, 22, No. 1, p. 78 – 84.

[49] Wallis, I. – Bray, D. – Webster, H. (2010): To Competitively Tender or to Negotiate – Veighing Up the Choices in a Mature Market. Research in Transport Economics, 29, No. 1, p. 89 – 98.