

REMUNERATION IN THE ROAD FREIGHT TRANSPORT SECTOR WITHIN THE EU COUNTRIES

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Summary

The paper outlines problems of employment and social issues of transport policy in the EU. The aim of the contribution is to highlight the existing problems regarding of driver remuneration in the road freight transport sector. It identifies differences in the social field of drivers by hypothesis testing and points to the fact that in the western part of the EU, the driver profession is significantly higher in the wage than the middle and eastern parts of the EU. Individual states are putting pressure on wage increases in international road transport by national regulations to reduce the competitive pressure of lower prices for carriers located in the central and eastern parts of the European Union. These problems occurring on the road freight market are mainly due to the inconsistent payroll burden and the different levels of average wages across EU Member States.

Keywords: comparison, driver, harmonization, remuneration, road freight transport

1. Introduction

Work plays an important role in the functioning of the economy. From an enterprise perspective, labour costs include not only wages and salaries but also non-wage costs, in particular social contributions from the employer. Today's labour costs play a very important role because employees are taken to the point where the cost of their employment does not exceed their productivity. If the minimum wage exceeds the productivity of individual employees, their employment becomes unprofitable. This problem concerns mainly two groups of employees, one of which is low-productivity workers who are usually unskilled and the other are those who lack professional experience. The wage and salary system of an enterprise should be set so as to ensure the company's competitiveness when considering the cost of the company's costs affecting the price of the products or services and at the same time that the wage level can be competitive in the labour market, to maintain quality and qualified staff [1] [2].

Problems of employment and social issues are important dimensions of transport policy in the EU. Disparities between social regimes between Member States often lead to barriers

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to proposals aimed at opening up the market and improving competitive conditions [3]. Different salaries and requirements of wage regulations create a discriminatory environment among entrepreneurs however harmonization of salaries in the field of road transport is specific because carriers offer transport throughout the whole European Union market.

2. Identify Truck Driver Remuneration

The shortage of freight transport drivers is a persistent phenomenon across the EU. This fact is connected with an effort to employ the drivers from Central and Eastern Europe, often with an aim to reduce wage costs. The competitive advantage in this case is based on the fact that middle and Eastern European drivers offer supply of goods and especially cheap labour. Their average hourly wage is approximately 3 € / hour, which represents half to one third of the wages of western European drivers. The competitive effect is enhanced when a company uses two drivers for one vehicle.

Before 2004, carriers in Western Europe pointed to the risk of harmonizing the road freight transport market without harmonizing conditions in social and tax area. An opportunity to employ a driver from Central and Eastern Europe has caused a distortion of the competitive environment in the road freight transport sector [4]. An importance of distortion of competitive environment became meaningful, when manufacturing companies started to use the just-in-time method which significantly reduced their stock and the associated storage costs. This increased the use of freight transport and number of supplies between companies. The use of trucks began to increase and an emphasis was placed on carriers in terms of the quality of services, especially speed and reliability [5]. New conditions on the market led to an increased share of night work in the driver's weekly working time [6] and it also changed the drivers' willingness to perform the profession of a driver under particular wage conditions [7]. Employment of drivers from Eastern and Central Europe is connected with a survey conducted in 2000. It showed that the most illegal workers in the EU were employed in construction and road transport [8]. The wages of these employees are often lower than the average wage level in country [9] [10]. The aim of the European Commission concerning the EU enlargement in 2004 was a requirement that the candidate countries should catch up with the countries of Western Europe in terms of wages and social legislation through integrating into the European Union and by complying with Community requirements and EU regulations. It insisted on the fact that the social models should be consolidated through enlargement, as in the case of Spain and Portugal [11] [12]. Every carrier established in the European Union and with a license issued by the Community has the same access to this market. Individual states put pressure on increase of wages in international road transport with the use of national regulations in order to reduce the competitive pressure of lower prices of carriers located in the central and eastern parts of the European Union [13].

3. Comparison of Two Independent Samples

The random variable X is monitored in two basic files. Its probability distribution is normal for both files. It is assumed that in both the basic files, the random variable X has the same variability, which is expressed by the hypothesis

$$H_0: \sigma_1^2 = \sigma_2^2 \quad (1)$$

The test characteristic is used as the test criterion for its test. If the null hypothesis is true, the test is

$$F = \frac{s_1^2}{s_2^2} \quad (2)$$

and Fisher's probability distribution $F(n_1 - 1; n_2 - 1)$ which has number of degrees of freedom $v_1 = n_1 - 1$ and $v_2 = n_2 - 1$. An overview of critical regions for various alternative hypotheses is given in Table 1 [14].

Table 1. Critical Region for Various Alternative Hypotheses (F-Test)

Alternative hypothesis	Critical Value	Critical Region
$H_1: \sigma_1^2 \neq \sigma_2^2$	$F_{\frac{\alpha}{2}}, F_{1-\frac{\alpha}{2}}$	$v_\alpha = (0, F_{\frac{\alpha}{2}}) \cup (F_{1-\frac{\alpha}{2}}, +\infty)$
$H_1: \sigma_1^2 > \sigma_2^2$	$F_{1-\alpha}$	$v_\alpha = (F_{1-\alpha}, +\infty)$
$H_1: \sigma_1^2 < \sigma_2^2$	F_α	$v_\alpha = (0, F_\alpha)$

If we know the variances σ_1^2, σ_2^2 of these distributions and test the null hypothesis

$$H_0: \mu_1 = \mu_2 \quad (3)$$

against any alternative, as a test criterion we can use a characteristic assuming the null hypothesis is valid

$$Z = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}} \quad (4)$$

and normal probability distribution $N(0; 1)$. Selected level of significance α and critical regions for different types of alternative hypotheses are given in Table 2 [14].

Table 2. Critical Region for Various Alternative Hypotheses (Z-Test)

Alternative hypothesis	Critical Value	Critical Region
$H_1: \mu_1 > \mu_2$	$-Z_{1-\frac{\alpha}{2}}, Z_{1-\frac{\alpha}{2}}$	$v_\alpha = (-\infty, -Z_{1-\frac{\alpha}{2}}) \cup (Z_{1-\frac{\alpha}{2}}, +\infty)$
$H_1: \mu_1 > \mu_2$	$Z_{1-\alpha}$	$v_\alpha = (Z_{1-\alpha}, +\infty)$
$H_1: \mu_1 > \mu_2$	$-Z_{1-\alpha}$	$v_\alpha = (-\infty, -Z_{1-\alpha})$

4. Comparison of Truck Driver Remuneration by Hypothesis Testing

Regarding the remuneration of drivers, we conducted a research of drivers' compensation in selected transport companies. The research was conducted from January to March 2017 and the drivers of transport companies from 10 different EU states participated on it.

The questionnaire on driver remuneration was conducted in the form of an anonymous electronic survey for its relative ease of filling and also availability in terms of distance. The electronic questionnaire was completed by 309 respondents, while social data was also used to collect the data. The survey was attended by drivers of different age categories, mostly respondents aged 27 to 40, with the majority of respondents comprised of drivers with at least 10 years of experience. As far as the category of vehicle on which the drivers (respondents) are concerned, the ride is predominant. Concerning the mode of transport in terms of territorial division, the bulk of respondents are in international road transport.

In the research, the drivers responded to the form of remuneration and the amount of remuneration which appertain to them. The drivers were divided into groups according to whether they are remunerated with a monthly or hourly rate. On average, the highest hourly salary rate is reached by drivers in Luxembourg, it is 15.875 € / hour (Table 3). By the rates above 10 € / hour are also remunerated drivers in Germany and Austria. Significantly lower rates are in the Czech Republic and Slovakia, where they are below 5 € / hour.

In several countries, drivers are not remunerated with € / hour, but with monthly salaries. The highest average salary for drivers is in Luxembourg, Germany and the Netherlands and it is above 2000 € / month.

Table 3. Remuneration of drivers in international road transport

Country	Wage (€/h)	Wage (€/km)	Wage (€/month)
Germany	12.875	-	2347
Austria	10.33	-	1633
Belgium	-	-	1605
Denmark	-	-	1600
Netherlands	-	-	2100
Luxembourg	15.875	-	2381
Italy	-	0.15	1516
Czech Republic	3.77	0.083	1115
Poland	-	0.08	1400
Slovakia	4.33	0.131	1282

The conformity test is applied to the wages of drivers from the Western European countries (Belgium, Denmark, Luxembourg, the Netherlands, Norway, Austria and Italy) and wages of drivers from Central European countries belonging to the Visegrad group (V4 - Slovakia, Czech Republic, Poland).

In select Western EU countries, we have found the following average wages of drivers in € in the sample size range $n = 28$:

500; 1750; 2450; 1500; 630; 2200; 2160; 1650; 1600; 900; 1500; 1750; 2500; 2500; 2100; 2180; 3690; 2500; 1850; 2300; 2100; 4301; 1600; 1600; 1700; 1750; 600; 2200.

In the countries belonging to V4 we have found the average wages of drivers in € in the selection file of range $n = 148$:

1380; 1500; 1050 1170; 1250; 1350; 1400; 900; 550; 600; 1600; 2400; 1200; 1500; 1200; 1600; 1800; 850; 1700; 1800; 2000 1200; 1200; 1700; 1200; 1550; 1300; 1650; 1500; 1400; 1500; 1500; 800; 850; 900; 1200; 1200; 750; 1200; 1600; 1100; 1000; 1350; 1400; 600; 1400; 550; 1500; 1200; 600; 1200; 1600; 1200; 1000; 700; 1000; 1600; 2000 1500; 500; 1000; 1450; 1500; 600; 650; 1400; 750; 450; 2500; 1200; 2000 1400; 600; 800; 1400; 550; 2500; 1100; 650; 1100; 1300; 900; 700; 800; 1300; 1500; 1000; 530; 2300; 1000; 1400; 1500; 2200; 1400; 750; 1600; 1200; 2100; 1100; 1600; 1200; 1500; 1300; 1750; 2000 540; 404; 1400; 900; 1810; 1500; 1200; 500; 1300; 1400; 1500; 1356; 573; 1600; 1146; 620; 1612; 1774; 2063; 1070; 1375; 554; 1135; 688; 1146; 1176; 722; 1031; 1713; 1135; 879; 1146; 825; 840; 722; 928; 1031; 877; 2475; 722; 933; 1719; 1400.

Based on the general assumption, we can claim that wages in the V4 countries and in the selected western member countries vary significantly. This assumption is also verified mathematically, using the two-parameter parameter test [15]. We verify the assumption that the average wages of drivers in the Central European countries V4 and the wages of drivers in Western European countries are different at the level of significance $\alpha = 0.05$.

We want to verify the hypothesis $H_0: \mu_1 = \mu_2$ versus the bilateral alternative $H_1: \mu_1 \neq \mu_2$. Since the sample sets have a large range and do not know the variations of σ_1^2, σ_2^2 of the basic files, in order to correctly select the test criterion, we must first verify the hypothesis $H_0: \sigma_1^2 = \sigma_2^2$ over the alternative $H_1: \sigma_1^2 \neq \sigma_2^2$. From the selection data, we calculate the following selection characteristics:

- \bar{x}_1 – average of driver wages in Western EU countries
- \tilde{s}_1 – standard deviation of driver wages in Western EU countries
- \tilde{s}_1^2 – sample variance of driver wages in Western EU countries
- \bar{x}_2 – average of driver wages in the countries belonging to V4
- \tilde{s}_2 – standard deviation of driver wages in the countries belonging to V4
- \tilde{s}_2^2 – sample variance of driver wages in the countries belonging to V4

$$\bar{x}_1 = 1930.7500$$

$$\tilde{s}_1^2 = 663537.6207$$

$$\tilde{s}_1 = 814.5966$$

$$\bar{x}_2 = 1236.2838$$

$$\tilde{s}_2^2 = 211172.6919$$

$$\tilde{s}_2 = 459.5353$$

Now we can fit into the test criterion F-test and get it:

$$F = \frac{\hat{s}_1^2}{\hat{s}_2^2} = \frac{663567.6207}{211172.6919} = 3.1423$$

Then we determine critical values of F-distribution with and degrees of freedom (27; 147) $\alpha = 0.05$:

$$F_{\frac{\alpha}{2}} = F_{0,025} = 0.5219, F_{1-\frac{\alpha}{2}} = F_{0,975} = 1.562$$

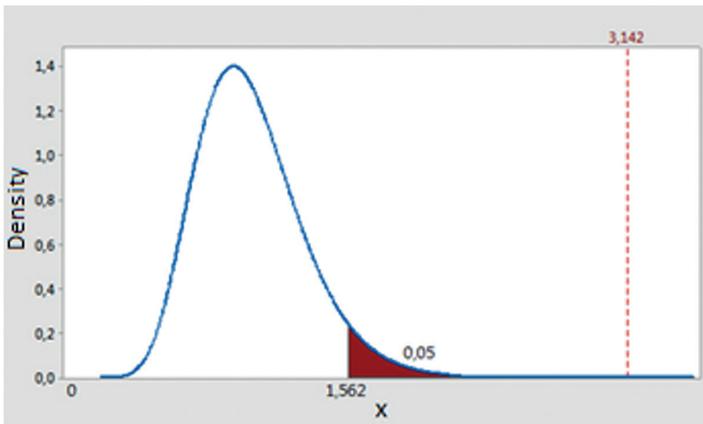


Figure 1. Distribution Plot – F-test

Since the value of the test criterion $F = 3.1421$ is greater than the critical value of 1.562, it belongs to the critical area:

$$v_{\alpha} = \left(0, F_{\frac{\alpha}{2}}\right) \cup \left(F_{1-\frac{\alpha}{2}}, +\infty\right) \quad (5)$$

For this reason, at the level of significance $\alpha = 0.05$ we accept the null hypothesis $H_1: \sigma_1^2 \neq \sigma_2^2$, which means that the variability of the wages of the V4 drivers and the selected Western member countries is indeed significantly different.

Subsequently, with the confidence $1 - \alpha = 0.95$ we determine the confidence interval for the share:

$$F = \frac{\sigma_1^2}{\sigma_2^2} \quad (6)$$

After fitting we get the following relationship:

$$P\left(3.1423 \frac{1}{1.6991} < \frac{\sigma_1^2}{\sigma_2^2} < 3.1423 \frac{1}{0.5219}\right) = 0.95$$

$$P\left(1.85 < \frac{\sigma_1^2}{\sigma_2^2} < 6.02\right) = 0.95$$

With a probability of 0.95, the dispersion of Western countries' wages is 1.85 to 6.02 - more than the wage variation of the V4 countries.

At the level of significance $\alpha = 0.01$ we verify the null hypothesis $H_0: \mu_1 = \mu_2$ versus the one-sided alternative $H_1: \mu_1 > \mu_2$ by fitting to:

$$Z = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}} = \frac{1930.7500 - 1236.2838}{\sqrt{\frac{663537.6207}{28} + \frac{211172.6919}{148}}} = 4.3813$$

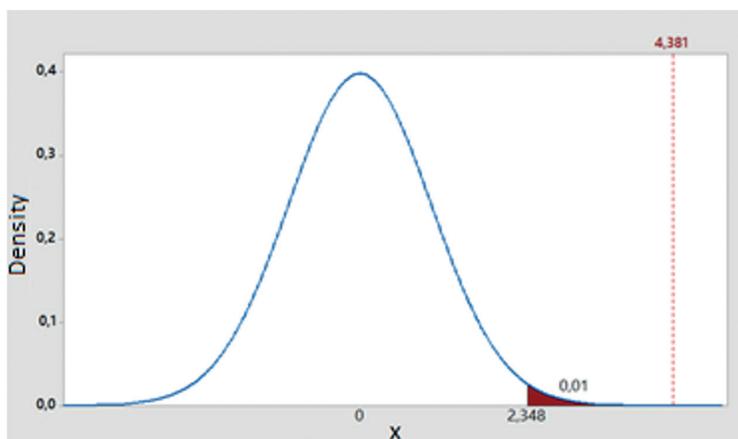


Figure 2. Distribution Plot - z-test

The calculated value $z = 4.3813$ exceeded the critical value $z_{0.99} = 2.348$ and according to Fig. 2 in the critical area [13] so at the level of significance $\alpha = 0.01$ we reject the hypothetical hypothesis and we accept the alternative hypothesis $H_1: \mu_1 > \mu_2$, and thus we can mathematically confirm that wages of drivers of selected Western European countries are significantly higher than the wages of V4 drivers.

At the level of significance $\alpha = 0.05$ we also test the null hypothesis H_0 :

$$\pi_1 = \pi_2$$

versus the one-sided alternative H_1 :

$$\pi_1 > \pi_2$$

Whilst π_1 and π_2 is the proportion of drivers with a wage higher than 2000 €, while in the sample files wages higher than 2000 € have 13 drivers of selected Western European countries and 8 drivers of V4 countries:

P_1 – proportion of drivers with a wage higher than 2000 € in Western European countries

P_2 – proportion of drivers with a wage higher than 2000 € in V4 countries

$$P_1 = \frac{13}{28} = 0.4643$$

$$P_2 = \frac{8}{148} = 0.0541$$

After fitting, we get the value:

$$z = \frac{(P_1 - P_2)}{\sqrt{\frac{P_1(1 - P_1)}{n_1} + \frac{P_2(1 - P_2)}{n_2}}} = \left(\frac{0.4643 - 0.0541}{\sqrt{\frac{0.4643(1 - 0.4643)}{28} + \frac{0.0541(1 - 0.0541)}{148}}} \right) = 4.2823$$

The calculated value of $z = 4.2823$ exceeded the critical value, so we accept an alternative hypothesis that the wage bill of more than 2000 € in the Western European countries is significantly higher than the wage bill above 2000 € in the V4 countries.

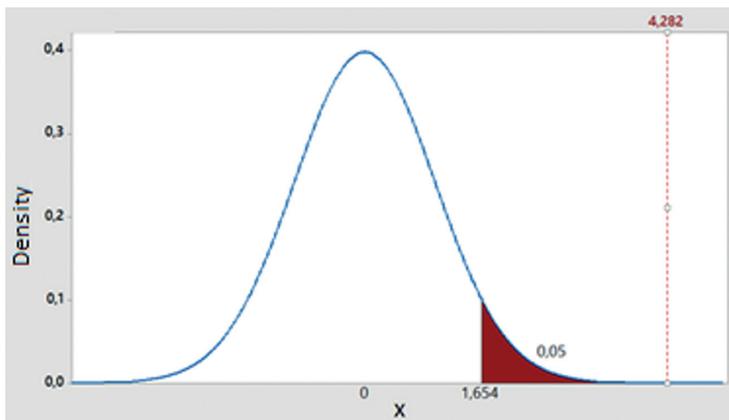


Figure 3. Critical area distribution plot and test criterion z - test at wage above € 2000

Assignment we get with a 0.95 confidence interval for $\pi_1 - \pi_2$:

$$P(0.252 < \pi_1 - \pi_2 < 0.568) = 0.95$$

If we express the lower and upper bounds of the confidence interval in percentages, we can say that with a probability of 0.95, the wage ratio of drivers above 2000 € in the

Western European countries is higher than the wage of drivers above 2000 € in the V4 countries by at least 25.5 % by 56.8 %.

5. Conclusion

There are significant differences between EU Member States in terms of the structure of labour markets and social market structures as well as the effectiveness of enforcement mechanisms. These differences create gaps in encouraging transport companies to promote practices of unfair competition and social dumping (such as, for example, charter companies, the use of drivers who unfairly present themselves as self-employed, performance-based employment systems) instead of providing opportunities for social and economic growth. Irregularities in the remuneration of drivers between Member States often lead to barriers to proposals aimed at opening the market and improving competitive conditions.

The European Union seeks to remove barriers to market access and to harmonize common rules on road transport business conditions. However, despite the gradual removal of barriers and the creation of a fairer competitive environment, there are still many areas where the issues in question are not jointly regulated by the European Union's rules and therefore the EU countries have individual areas regulated by their own national legislation. The persistent problem is also the different payload in road transport in the EU common market. EU and Eastern European carriers operate at lower wage costs in the same transport market than other EU countries. The contribution identifies differences in the social field of drivers by hypothesis testing and points to the fact that in the western part of the EU, the driver profession is significantly higher in the wage than the middle and eastern parts of the EU. Harmonization of the wages of international road transport drivers is problematic. For Western European countries, it is not possible to reduce the payable salary, as it is already below the average wage and on the other hand for the countries of the eastern and central part of the EU, it is not bearable to raise wages, because today they are significantly above the average wage.

The inability to harmonize social policy in road transport is addressed by some states by endeavouring to introduce a compulsory minimum wage for all drivers in international road haulage, but this would cause market distortions if such a procedure were to be applied.

To reduce the differences in driver remuneration between EU Member States and ensure the functioning of the single market in road freight transport, it is necessary:

- to create a balance between social protection for drivers and the freedom of operators to provide cross-border services and to discourage excessive regulatory measures that impede the proper functioning of the single market;
- clarify and simplify existing legislation and ensure uniform implementation and enforcement in the Member States with the ultimate objective of achieving a better functioning internal market and benefits for the European economy and the Community as a whole (not only for selected Member States);
- avoid excessive administrative burdens for operators from other countries of the European Union;

- consider the establishment of a uniform minimum hourly wage for the driver's profession in the EU countries.

Based on the results an important challenge for the coming years will therefore be to find the right balance that will contribute to economic growth. Basically, it is proposed to build on existing legislation, which should be clarified and significantly strengthened in law enforcement deadlines. In areas not addressed, a revision of existing legislation is needed, or a new legislation needs to be considered.

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