Regression Analysis of Social Networks and Platforms for Tablets in European Union

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Abstract. In the last few years two operation systems for tablets: Android and iOS dominate in all states of European Union. Android is leading almost through whole Europe, it has a dominant position in all EU countries except the UK with a relatively small variations. Four social networks that are used on tablets, having the largest number of users in Europe include Facebook, Twitter, Stumble Upon and Pinterest. The number of portable electronic devices, whose major portion consists tables, is now experiencing worldwide growth. The aim of the paper is to create a regression model for individual model platforms and social networks for tablets in Europe, with a focus on the European Union and their analysis. The result of this paper will be also determination the degree of sensitivity of individual parameters in regression models.

Keywords: Social network, Regression, Tablet, European Union.

JEL Classification: C58, G21, C610
AMS Classification: 90C15

1 Introduction

The number of mobile devices more than doubled over the last two years in the Czech population. It results from a comparative analysis of data research of the Media project [11]. The fastest expansion is of distribution of tablets in last two years, whose numbers have tripled. 1.9 million people aged 12-79 years, representing 22 percent of the population currently own tablet according to their research [11].

In the European Union dominate two operating systems for tablets in last few years: Android and iOS. Other operating systems for tablets, namely Linux and Win8.1 RT, occupy only a small part of the market [1]. Android, which has a dominant position throughout Europe, also has a dominant position in all EU countries except the UK. According to standard deviations can be seen relatively small variations across the EU. Unlike iOS, this with a smaller variation achieves major deviations [1].

Facebook, Twitter, Stumble Upon and Pinterest are four social networks with the largest number of users using tablets in the European Union [11].

Social networks have been studied by many authors [6], [7].

The most important social network with many active users all around the world Facebook was founded in 2004. Facebook's mission is to give people the power to share and make the world more open and connected. People use Facebook to stay connected with friends and family, to discover what's going on in the world, and to share and express what matters to them. Facebook popularity and distribution of users by age shows Figure 1.

Statistics:

- 890 million daily active users on average for December 2015;
- 745 million mobile daily active users on average for December 2015;
- 1.39 billion monthly active users as of December 31, 2015;
- 1.19 billion mobile monthly active users as of December 31, 2015;
- approximately 82.4% of our daily active users are outside the US and Canada [2].

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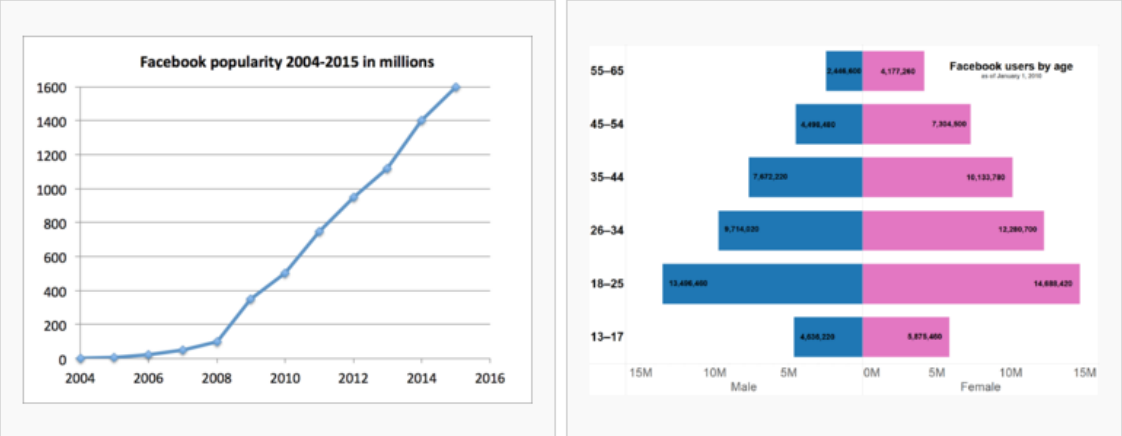

Figure 1 Facebook popularity and distribution of users by age [2]

Analysis in following chapters is focused on the European Union, states in Eurozone and states in European Union with their own currency. 19 countries of the European Union in Eurozone are: Belgium, Estonia, Finland, France, Ireland, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Portugal, Austria, Greece, Slovakia, Slovenia and Spain.

2 Data and methodology

Stats are based on aggregate data collected by StatCounter [4] on a sample exceeding 15 billion pageviews per month collected from across the StatCounter network of more than 3 million websites. Stats are updated and made available every 4 hours, however are subject to quality assurance testing and revision for 14 days from publication [4].

StatCounter is a web analytics service, tracking code is installed on more than 3 million sites globally. These sites cover various activities and geographic locations. It provides independent, unbiased stats on internet usage trends, which are not collated with any other information sources. No artificial weightings are used [4].

3 Analysis for Eurozone (19 states)

The correlation analysis will be performed in this part at first. Correlation matrix will be composed. This matrix will be established between different social networks and mobile platforms [3], [5]. Subsequently regression models will be developed where the dependent variable is the relevant social network, respectively mobile platform architecture and the independent variable is time (in years 2012-2015 for all countries of the Eurozone).

3.1 Correlation Analysis for Eurozone

The correlation analysis through all the years and states - marked correlations at a significance level of 0.05 are statistically significant. See Table 1 and Table 2.

variable	Facebook	Twitter	StumbleUpon	Pinterest	Other I
Facebook	1.000000	-0.813517	-0.756457	-0.858389	-0.668029
Twitter	-0.813517	1.000000	0.512300	0.505493	0.293331
Stumble Upon	-0.756457	0.512300	1.000000	0.662972	0.564610
Pinterest	-0.858389	0.505493	0.662972	1.000000	0.734851
Other I.	-0.668029	0.293331	0.564610	0.734851	1.000000

Table 1 Results of correlation analysis – correlation matrix for social networks

variable	iOs	Android	Other II.
iOs	1.000000	-0.994559	-0.029220
Android	-0.994559	1.000000	-0.045848
Other II.	-0.029220	-0.045848	1.000000

Table 2 Results of correlation analysis – correlation matrix for platforms

The significant correlation relations among variables can be seen from the correlation coefficients in Table 1 and Table 2. The significance was detected by Statistica software version 1.12. The insignificant relationship is between variables Other I. and Twitter or Other II and Android, iOS.

3.2 Regression Analysis for Eurozone

The regression models for variables Facebook, Twitter, StumbleUpon, Pinterest, Other I, iOS, Android and Other II will be analyzed in this part [8], [10], [12].

The regression models are properly assembled, the quality of the model is verified based on the p-values for the parameter beta b (the parameter is statistically significant at a level of 0.05, p-value is less than the significance level). The quality of the entire regression model is satisfied (p-value 0.0000), determination index is less than the statistic Durbin-Watson - it is not an apparent regression. This is applied to all models. Facebook and Android are expected a growing trend according to the regression model. StumbleUpon, Pinterest and iOS are expected conversely decreasing trend [9].

The regression coefficient indicates how much the variable changes when you increase the time unit by one. A positive sign means that the value will increase with the growth of time units, negative value of the variable will decrease with an increase in the time unit. See Table 3 and Table 4.

variable	Regression parameter	p-value	Confident interval -95%	Confident interval +95%
Facebook	0.573	0.00000	4.305	8.578
Twitter	-0.460	0.00000	-4.380	-1.656
Stumble Upon	-0.520	0.00000	-1.401	-0.636
Pinterest	-0.470	0.00000	-2.577	-1.006
Other I.	-0.330	0.00340	-1.02	-0.209

Table 3 Summary results of regression analysis for social networks

variable	Regression parameter	p-value	Confident interval -95%	Confident interval +95%
iOs	-0.610	0.00000	-7.917	-4.287
Android	0.575	0.00000	3.824	7.591
Other II.	0.450	0.00000	0.213	0.575

Table 4 Summary results of regression analysis for platforms

The tables above present the regression parameters "b" as well as the confidence intervals, which complement the conclusions regarding the statistical significance of the regression parameters. The regression parameters for all variables were identified as statistically significant (rejecting the null hypothesis H0: the regression parameter is insignificant), but the conclusion should be complemented by the confidence interval, respectively determining the interval in which the relevant parameter ranges.

The growth respectively average growth can be expected in the range values of 4.305 to 8.578 in the social network Facebook. The variable Twitter is expected to decline between the values of -4.380 to -1.656 in the next period. StumbleUpon, Pinterest and Other I. variables for mobile iOS platform also can be expected to decline in the next period, while Android is expected to grow.

4 Analysis for European Union without Eurozone (9 states)

The correlation analysis and regression models in years 2012-2015 for all countries out the Eurozone (9 states) will be performed in this part.

4.1 Correlation Analysis for states out of Eurozone

Table 5 and Table 6 show marked correlations at a significance level of 0.05, which are statistically significant.

variable	Facebook	Twitter	StumbleUpon	Pinterest	Other I
Facebook	1.000000	-0.863876	-0.758516	-0.888166	-0.836347
Twitter	-0.863876	1.000000	0.626506	0.602293	0.605628

Stumble Upon	-0.758516	0.626506	1.000000	0.614636	0.459498
Pinterest	-0.888166	0.602293	0.614636	1.000000	0.839374
Other I.	-0.836347	0.605628	0.459498	0.839374	1.000000

Table 5 Results of correlation analysis – correlation matrix for social networks

variable	iOs	Android	Other II.
iOs	1.000000	-0.996267	-0.251372
Android	-0.996267	1.000000	0.193457
Other II.	-0.251372	0.193457	1.000000

Table 6 Results of correlation analysis – correlation matrix for platforms

The significant correlation relations among variables can be seen from the correlation coefficients in Table 5 and Table 6. The significance was detected by Statistica software version 1.12. The insignificant relationship is between variables Other I. with StumbleUpon and Other II with Android and iOs.

4.2 Regression Analysis for states out of Eurozone

The regression models for variables Facebook, Twitter, StumbleUpon, Pinterest, Other I, iOS, Android and Other II will be analyzed in this part [8], [10], [12].

The regression models are properly assembled, the quality of the model is verified based on the p-values for the parameter beta b (the parameter is statistically significant at a level of 0.05; p-value is less than the significance level). The quality of the entire regression model is satisfied (p-value 0.0000), determination index is less than the statistic Durbin-Watson - it is not an apparent regression. This is applied to variables Facebook, StumbleUpon, Pinterest, iOS and Android. Twitter, Other I and Other II aren´t for regression models statistically significant. Facebook and Android are expected a growing trend according to the regression model. StumbleUpon, Pinterest and iOS are expected conversely decreasing trend [9].

The regression coefficient indicates how much the variable changes when you increase the time unit by one. A positive sign means that the value will increase with the growth of time units, negative value of the variable will decrease with an increase in the time unit. See Table 7 and Table 8.

variable	Regression parameter	p-value	Confident interval -95%	Confident interval +95%
Facebook	0.438	0.00810	1.262	7.615
Twitter	-0.310	0.063	-3.152	0.092
Stumble Upon	-0.600	0.00010	-1.507	-0.551
Pinterest	-0.390	0.02010	-2.468	-0.221
Other I.	-0.260	0.118	0.120	-1.217

Table 7 Summary results of regression analysis for social networks

variable	Regression parameter	p-value	Confident interval -95%	Confident interval +95%
iOs	-0.450	0.00560	-13.110	-2.410
Android	0.437	0.00780	2.162	13.104
Other II.	0.096	0.58080	-0.333	0.586

Table 8 Summary results of regression analysis for platforms

Similar conclusions are also found in countries that are not part of the Eurozone, despite the higher p-values and thus less difference compared to the 0.05 level of significance than was the case in the Eurozone countries. The regression parameters were not identified as statistically significant for all the variables (rejecting the null hypothesis H0: the regression parameter is insignificant). Parameters Twitter, Other I and Other II were labeled as statistically insignificant..

The growth respectively average growth can be expected in the range values of 1.262 to 7.615 in the social network Facebook. The variable Twitter is expected to decline between the values of -3.152 to 0.092 in the next

period. StumbleUpon, Pinterest and Other I. variables for mobile iOS platform also can be expected to decline in the next period, while Android is expected to grow. Average increases, respectively decreases are shown in the confidence interval.

5 Graph results

The results from previous chapters are illustrated by the figures below. Figures 3 and 4 show the boxplot comparison for different parts of Europe in years 2012 and 2015 for all variables. Growing trend for most of the compared countries can be seen in tables in previous chapters. Values in Figure 4 are for many countries much higher than values in Figure 3.

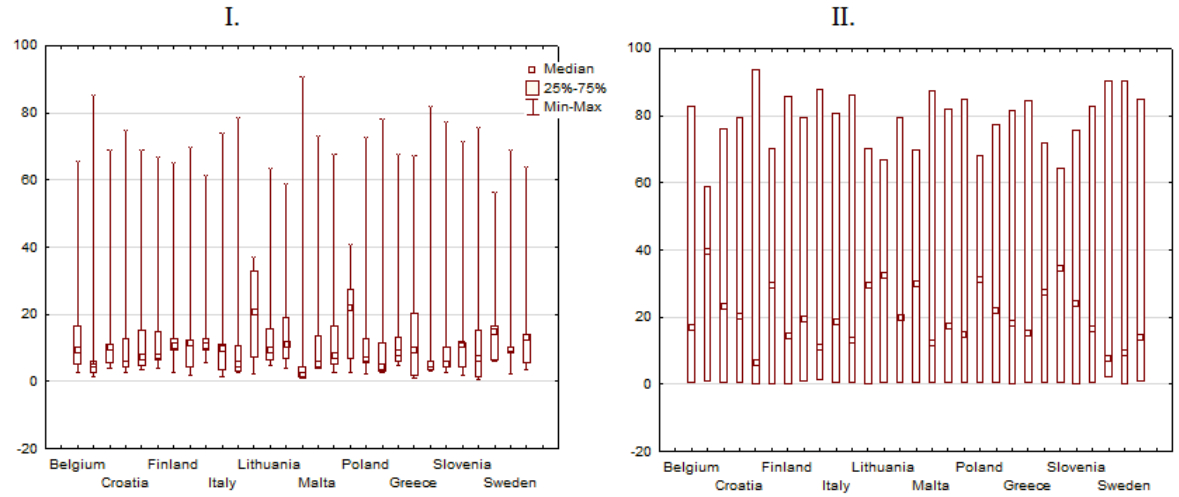

Figure 3 Boxplot comparisons for different parts of Europe in 2012

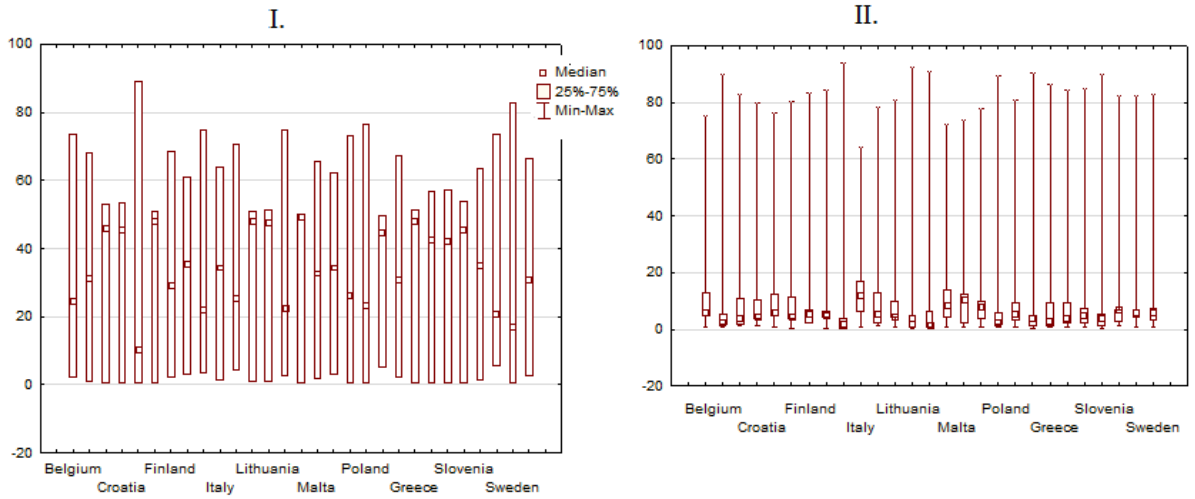

Figure 4 Boxplot comparisons for different parts of Europe in 2015

6 Discussions

The trend of social network Facebook is surprising in comparison with others social networks. Facebook is expected to grow, while Twitter, StumbleUpon and Pinterest are expected to decline. A similar phenomenon occurs in the case of mobile platforms. iOS is expected to decline in the upcoming period, while the growth of Android is anticipated. The argument proving the summary above could be a correlation matrix, respectively values of the individual correlation coefficients.

The compared confidence intervals have approximately the same values for both the Eurozone countries and countries outside the Eurozone except variable Facebook. Values for social network Facebook will grow faster in the Eurozone countries than in countries outside the Eurozone for the upcoming season.

7 Conclusions

The popularity of social networks is experiencing a worldwide growth (including people 60+). The number of users is increasing thanks to connectivity with mobile devices. It can be seen that Eurozone states and states with its own currency have the same trend in the upcoming period for both social networks and mobile platforms.

The price is the main reason, why cheap Android dominates the market of mobile devices against expensive iOS. Another reason is the brand of tables. Nowadays are popular products from Asia manufactures, which use in most cases Android operating system. Among other factors affecting the sale of various mobile devices are promotions, the purchasing power of the population, popularity, reliability, price, charging patent, easy to install software etc.

The analysis shows that for the social network Facebook is expected to grow for both compared areas – Eurozone and states outside Eurozone. The variable Twitter is expected to decline in next period. StumbleUpon, Pinterest and Other I. for the mobile iOS platform are also expected to decline in the coming period, while Android is expected to grow.

The results of regression models can be used as a recommendation for further development in the area. The results can be an incentive for additional marketing promotion and development within social networks. It can be also used for more complex regression models and further research.

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