Media and Economic Growth: Country Groups Difference via Panel Data

Viktoriia Ahapova

Abstract — The present article investigates the link between economic growth, namely GDP per capita, and the media activity represented with the indicator of the press freedom alongside other factors such as infrastructure, institutional conditions, and foreign direct investments. A panel of 179 countries was used for the period from 2000 to 2015. In particular, we run two panel data analysis models, fixed effects and random effects models, and examined their output with Hausman's specification test, which pointed the fixed effects model as more efficient for the presented data set. However due to the presence of serial correlation, heteroskedastic, and cross-panel dependence, a Prais-Winsten regression with panel corrected standard errors (PCSE) was implemented. The comparative analysis of models of four country groups, divided by GNI per capita, was conducted. Both statistically significant correlation coefficients and models' output provided evidence of an association between economic growth and the press activity.

Index Terms — Development; Media Activity; Panel Data; Press; Revenue.

I. INTRODUCTION

An activity of media is highly attributed to the information side of society and its influence on culture. At the same time, researchers draw their attention not only to the most obvious functions and territory of media but dig deeper. A wide variety of social sciences studies are devoted to a relation between media activity and different aspects of development (economic, cultural, social, and political). The associations between one of the central institutional forms of information activities and the economic system attract the attention of scientists, mostly, economists.

Based on the quantitative measurement of empirical data, researches resulted in the evidence of both deep association and almost non-existent causality [1]-[5]. Although a considerable amount of research has been devoted to study the impact of media on the economic process, fewer attempts have been made to investigate the differences between countries in general. Thus, it would be interesting to compare econometric models, which represent variations of countries.

Over the last decade, researches on economic growth and development [6]-[8] and particularly relations between economic growth, development, and the media activity, primarily in form of the indicators of the freedom of media and press, have been elaborated on using econometric tools. One of the widespread economic techniques aimed to estimate the mentioned association is panel data analysis. Considering its advantages such as at least two dimensions,

time-series, and cross-sectional, panel data studies have a consequently greater capacity for modeling the complexity of human behavior [9]. Therefore, taking the continuity of practice and the advantages of the approach, we decided we exploit panel data models.

In this paper, we present the preliminary results of the panel data models' linear regressions on economic growth and a set of variables, represented with the press freedom, institutional environment, ITC indicators, and FDI. The study is organized as follows. In Section 2, we outline a literature review of theoretical and empirical studies. The data description and methodology are presented in Section 3, while Section 4 addresses model testing. Section 5 shows empirical results. Section 6 ends the article with the conclusions.

II. REVIEW OF LITERATURE

Coyne and Leeson [10] postulate that media is a key institutional mechanism for achieving a successful mix of policies that accelerate economic development. The authors apply game theory, namely games of conflict and games of coordination. Economic development considered as achieved when a potential conflict game becomes a coordination game and independent/free media is an element of this achievement.

Djankov et al. [11] analyzed the ownership structure of media in 97 countries. Their study finds that poorer countries have greater state ownership of the media as well as less level of media freedom.

In frames of Human Development Report in 2002, a study based on the cross-national analysis presented evidence that a freer press associated with more effective governance, higher political stability alongside strengthened development indicators such as higher income per capita, less economic inequality [12].

Media activity, especially the freedom of the press is found to be an effective and important tool against political and economic corruption [13]-[17] as well as enhancing democratization in less developed countries and impacting public choice [18]-[20].

Another role of the media could be mentioned as mediation. The media coverage of some specific news could affect the investors' decisions, influencing the economy [21]. Benesch et al. [22] found that media coverage of a definite topic, particularly migration them, has a causal impact on population worries. For Capriotti [23] media plays an intermediary role between stakeholders and companies,

influencing companies' corporate reputation. The impact of media on financial markets, particularly the relations between investors' reaction to news and local trading in the finance market was investigated by [24]. Besides, relatively poorer countries should increase access to global information and promote investments in information infrastructure in order to attract long-term capital inflows [25].

Some researchers studied the impact of media, namely press freedom on different aspects of economic activity. There were found significant relation, which shows that more freedom of the press and lower level of stock price synchronicity, enhancing information conditions of stock markets [26]. Another study in the field of stockiest prices suggested that free press enables free market disclosure with a more rapid market reaction [27]-[28], while media censorship affects foreign share discounts and international capital flows [29]. On the entity level, countries with freer media have more chances that corporate social responsibility activity enhances the value of local firms [30] as well as is considered a business environment and obstacles less significant [31].

We could distinguish some studies, which focus on media activity as the independent variable, using mathematical language. For example, the study of [32] suggests that more government control of media creates biases that reduce the value of information from the reader's point of view. Dutta and Roy [17] investigated the impact of foreign direct investment as a major determinant of media freedom.

As a review of the literature has shown, the relationship between the media and economic processes is investigated in various aspects, both at the micro and macro levels. At the same time, further investigation is needed to determine the intensity of causality. Continuing the direction of econometric modeling of the mentioned relationships, we intend to focus on the differences between the groups of countries, depending on the level of income.

III. DATA AND METHODOLOGY

A. Data

For our analysis, a panel data set of 179 countries from 2000 to 2015 was used. For the reason of capturing differenced, we divided countries into the four groups by criteria of national revenues level, gross national income (GNI) per capita, according to the World Bank methodology.

Economic growth (variable GDP_pc_ppp). The terms of 'economic growth' and 'economic development' are not identical. Growth may be necessary, but not sufficient, for development [33]. Economic growth means an increase in production in the country or a rise in a level of income per capita. Economic development means that economic growth is supplemented by changes in the distribution of production and the structure of the national economy. Growth implies a greater emphasis on quantitative indicators, while development research draws attention to changes in capacity. Although there is no absolutely all-inclusive, common, and indisputable measure of economic growth and despite the many shortcomings [34], the most widely used extent, as well as an important variable in analyses [35] of economic growth, is the GDP. It has a number of methods to be calculated and

represented, depending on the available source data and targets. Thus, for operational purposes, economic growth could be shown with nominal or real GDP (in constant or current international prices), GDP per capita or per person employed, or GDP growth rate in %. We chose *GDP per capita (PPP)* as a reflection of economic growth provided by the World Bank World Development Indicators online database.

Media performance (variable PFI). The difficulties in analyzing the direct indicators of the media activity lie in the lack of indicators as such, which would be harmonized for all countries at the international level. Therefore, one of the possible solutions might be the usage of aggregated indirect indicator, which primarily sets on agenda the question of press independence.

To indicate media, we use the *Freedom of the Press* index (PFI) made by Freedom House, which allows comparing countries on a global level for measuring media activity with regard to its country-based institutional environment. This index considers political pressure on media, legal environment, economic factors, and based on print, broadcast, and, what is important, digital forms of media in 199 countries and territories. PFI is represented with a 100-point scale. A score from 0 to 30 indicates that the press is free; a score from 31 to 60 indicates that the press is partly free and a score from 61 to 100 means that the press is not free.

Infrastructure dimension (variable use_Int). ICT spreading has resulted in a more efficient allocation of resources, significantly reduced production costs, and triggered much greater demand and investment in all economic sectors [36]. On the one hand, in our sample, we consider ICT as an accelerator for the formation of new forms of media and their development. On the other hand – as an infrastructure for media activity, taking into account its difficult-measured presence in a global network. In this case, we use the rate of *individuals using the Internet in %* (the Internet penetration) published by the United Nations specialized agency for information and communication technologies – International Telecommunication Union.

Institutional conditions (variables Cor, Gov_Ef, Reg_Q, Law). According to North, "institutions are the humanly devised constraints that structure political, economic and social interaction. They consist of both informal constraints (sanctions, taboos, customs, traditions, and codes of conduct), and formal rules (constitutions, laws, property rights)" [37]. In our study, we focus on formal rules, which are more accessible to detect. We chose four indicators, which might represent some general aspects of institutional conditions and could be comparable for different countries: Control of Corruption, Government Effectiveness, Regulatory Quality, Rule of Law. All four rates are provided by the World Bank Worldwide Governance Indicators project. Each estimate is ranging from around -2.5 to 2.5 (the country's score on the aggregate indicator in units of a standard normal distribution) [38].

Financial support (FDI). A wide plot of studies was delighted to the influence of foreign direct investments on economic growth. Some studies found evidence of positive effect (see for example [39]-[40], while some of them postulate limited or even no positive effects (see [41]-[42]).

In addition, some studies shown empirical results of the press freedom enhancement with the support provided by FDI [17]. As the measure of country openness and financial support for development, we use FDI in a form of net inflows (% of GDP) provided by the World Bank World Development Indicators online database.

Countries data is available not for all variables used in this study, which means that the estimations have been carried out with an unbalanced data set; however, panel data analysis still may be run [43].

B. Methodology

The aim of our study is to evaluate the impact of media activity, which expressed in terms of press freedom on economic growth (1) alongside other factors and find differences between the four groups of countries we mentioned above (low-income economies, lower-middle-income, upper-middle-income and high-income). Therefore, a non-random sample is selected. The regression analysis for the purpose of this study is specified as a panel regression model since it employs both time series and cross-sectional data. Panel data suppose higher informativeness of data, more variability, more degrees of freedom, less collinearity among the variables, and more efficiency [44].

$$GDP_{pc_ppp_{it}} = f(PFI, use_Int, Cor, Gov_Ef, Reg_Q, Law, FDI) \quad (1)$$

For better performance, we transformed variables Cor, Gov_Ef, Reg_Q, Law in such a rank that the values in the range from -2.5 to 2.5 were put in the range from 0 to 1. New variables are under names Corn, Gov_Efn, Reg_Qn, Lawn.

The most common and simple techniques in panel data analysis are fixed effects model (2) and random effects model (3), which in general form could be presented as follows:

$$y_{it} = \alpha_i + \sum_{k=1}^K \beta_k x_{kit} + \varepsilon_{it} \quad (2)$$

$$y_{it} = \sum_{k=1}^K \beta_k x_{kit} + (\alpha_i + \varepsilon_{it}) \quad (3)$$

where i represents each country in the panel and t indicates the time period, k is the number of explanatory (independent) variables. y_{it} is the dependent variable; x_{kit} is the independent variable; β_k is the coefficients for k -variable; ε_{it} denotes the error term; α_i is a fixed or random effect specific to country or time period that is not included in the regression.

We begin our study with such a full version of the empirical models given by the following function for the fixed effects model (4) and random effects model (5).

$$GDP_ppp_pc_{it} = \alpha_i + \beta_1 PFI_{it} + \beta_2 use_Int_{it} + \beta_3 Corn_{it} + \beta_4 Gov_Efn_{it} + \beta_5 Reg_Qn_{it} + \beta_6 Lawn_{it} + \beta_7 FDI_{it} + \varepsilon_{it} \quad (4)$$

$$GDP_ppp_pc_{it} = \beta_1 PFI_{it} + \beta_2 use_Int_{it} + \beta_3 Corn_{it} + \beta_4 Gov_Efn_{it} + \beta_5 Reg_Qn_{it} + \beta_6 Lawn_{it} + \beta_7 FDI_{it} + (\alpha_i + \varepsilon_{it}) \quad (5)$$

We hypothesize that media activity in the form of the freedom of the press, favors economic growth, although it has no high level of correlation. We expect the correlation

coefficient between GDP per capita and PFI to have a negative sign, while other variables, namely the Internet penetration, institutional conditions, and FDI to be positively correlated.

IV. MODEL TESTING

A. Normal Distribution of the Data

The empirical study was made using STATA 16.0 software as it provides convenient tools for computing panel data analysis.

We transformed the input data of the dependent variable GDP_pc_ppp and the independent variables PFI, use_Int using the natural logarithm ln, which helped to bring the data closer to the normal distribution, given the existing asymmetry (Fig. 1, Fig.2). As a result, the names of variables GDP_ln and independent variables PFI_ln, use_Int_ln were obtained.

Fig. 1. GDP_pc_ppp on a normal probability plot.

Fig. 2. Transformed GDP_ln on a normal probability plot.

B. Collinearity

Before applying the panel data models, it is crucial to check the correlation between independent variables in order to reject the problem of multicollinearity. Table 1 presents the correlation coefficients between the variables, for all coefficients are at the 0.05 significance level. The results in this table show the presence of the values of correlation, which exceed 0.6. Therefore, we assume the possibility of multicollinearity in our case. As can be seen from Table 1, the Freedom of Press is negatively correlated to other variables, considering that a higher level of PFI refers to less

independence, i.e. we observe inverse linear association. The strongest connection with PFI have indicators of institutional conditions, especially Lawn variable. This means the crucial

importance of developed institutions for support of media freedom as well as its positive effects on governing and political accountability.

TABLE I: PEARSON CORRELATION COEFFICIENT MATRIX

	GDP_ln	PFI_ln	use_Int_ln	Corn	Gov_Efn	Reg_Qn	Lawn	FDI
GDP_ln	1.00							
PFI_ln	-0.42	1.00						
use_Int_ln	0.78	-0.45	1.00					
Corn	0.69	-0.75	0.61	1.00				
Gov_Efn	0.76	-0.69	0.66	0.93	1.00			
Reg_Qn	0.73	-0.69	0.65	0.87	0.93	1.00		
Lawn	0.70	-0.77	0.63	0.95	0.94	0.90	1.00	
FDI	0.11	-0.12	0.10	0.13	0.13	0.14	0.14	1.00

Note: number of observations is 2,804.

The dependent variable, which represents an estimation of economic growth – GDP per capita, has the strongest correlation with a positive sign of coefficient (0.78) with the indicator of ICT (the share of individuals using the Internet). The weakest linear association is between GDP per capita and FDI (0.11).

In order to further check-up the current dataset, we test it for variance inflation factor – VIF (Table 2).

TABLE 2: VARIANCE INFLATION FACTOR

Variable	VIF	VIF/1
Gov_Efn	15.90	0.06
Lawn	15.80	0.06
Corn	12.32	0.08
Reg_Qn	8.45	0.12
PFI_ln	2.58	0.39
Use_Int_ln	1.81	0.55
FDI	1.81	0.98
Mean VIF	8.27	

The VIFs for *Cor*, *Gov_Ef*, *Law* exceed ‘rule of thumb’ of 10 [45], therefore we leave them out of our regression models.

C. Fixed Effects Model vs. Random Effects Model

In order to determine which model is more apposite in our sample case, we used both, fixed effects and random effects, estimators. Then we performed the Hausman specification test [46]. The Hausman H-test tests probe the null hypothesis that the coefficients estimated by the efficient random effects estimator are the same as the ones estimated by the consistent fixed effects estimator [47]. Rejection of the null hypothesis would result in the rejection of the random effect model. The results of the Hausman specification test are presented on Fig. 3.

As can be seen from the results, the Hausman test rejects the null hypothesis that the difference in coefficients between the fixed and random models is not systematic. These outcomes recommend the fixed effect estimator might be used without the possibility of producing biased estimates. The test shows significant results thus we reject the null hypothesis, that difference in coefficients is not systematic and we select fixed effects model. Such results are quite expected taking into account our sample is not random-selected.

Results from Table 3 show us that the coefficients of the only independent variable 4, FDI, are not at the significant level nor 0.05, nor 0.001. This suggests that growth in FDI does not produce changes in GDP per capita. At the same time, the p-value of the model is small enough (0.0000) to reject H_0 , which means that in general coefficients of this model are not equal to 0 and the model quite well approximates panel dataset. Rho is the percent of the variation explained by individual specific effects and in this fixed effects model, the indicator stays at 0.9347, showing the significance of the model.

TABLE 3: THE RESULTS FOR FIXED EFFECTS MODEL

Variable	β	Std. Err.	t
PFI_ln	0.31***	0.02	13.80
Use_Int_ln	0.17***	0.00	69.35
Reg_Qn	0.80***	0.07	12.07
FDI	-0.00	0.00	-1.06
Const.	7.03***	0.94	74.71
N		2804	
R ² within		0.6879	
F(4, 2621)		1444.02	

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

The coefficient of the Freedom of the Press index is significant, however, positive although we expected a negative sign. Several assumptions could be advanced to explain this discrepancy. First, we initially did not expect a strong correspondence between GDP per capita (PPP) and the Freedom of Press index, since we assumed indirect interaction. Secondly, some unknown and unobserved variables and/or adjustments may be involved in these connections.

Coefficients of other variables, such as the use of the Internet and regulatory quality are at the 0.001 significance level and have a positive sign. This means an increase in the

```

. hausman fixed random

```

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) fixed	(B) random		
PFI_ln	.31413155	.2544	.0597154	.
use_int_ln	.1731395	.1773158	-.0041853	.
Reg_On	.8035245	1.052057	-.2485322	.
FDI	-.0001975	-.0001753	-.0000222	.

b = consistent under Ho and Ha; obtained from xtreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

```

      chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
              = 951.35
    Prob>chi2 = 0.0000
              (V_b-V_B is not positive definite)

```

Fig. 3. Hausman H-test results/

value of the natural logarithm of GDP per capita by 0.17 units for each logarithmic unit of growth in the level of Internet penetration. Similarly, an increase in GDP per capita of 0.8 units is associated with an increase by one unit in the assessment of the government's ability to effectively implement policies that stimulate private sector development.

Given the statistical insignificance of the coefficients for the variable representing the foreign direct investment, we will continue further calculations without taking into account this variable.

D. Heteroskedastic, Serial Correlation, and Cross-Sectional Dependence Testing

The next step is to check the model with fixed effects for the heteroskedasticity of the residuals. To do this, we use a Modified Wald statistic for groupwise heteroskedasticity [48]. It results shown the presence of heteroskedasticity. Further, we test the model with fixed effects on cross-sectional dependence. Due to the fact that the number of countries is greater than the moments of time ($N > T$), and the panel is unbalanced, we use the Pesaran test to check [49]. The results of the test clearly reject the null hypothesis of no cross-dependence. The average absolute correlation of the residues is 0.492, which is a very high value. Thus, there is reason to believe that there is a cross-sectional dependence for our model specification.

Given the presence of cross-sectional dependence and the fact that our panel data is a micropanel with time series of 16 years, in order to choose a further approach to modeling, we test our panel data for the presence of autocorrelation. Fig. 4. shows a graphical representation of the autocorrelation of residuals.

Fig. 4. Presence of serial correlation.

Serial correlation causes a decrease in standard errors of β -coefficients and inflation of the coefficient of determination, so checking for its presence is important. We apply the Wooldridge test [50]. The test results also clearly reject the null hypothesis of no autocorrelation. Therefore, it is necessary to continue modeling taking into account the presence of heteroskedasticity, cross-sectional dependence, and autocorrelation. Recent research [51]-[52] in which researchers have faced a similar problem and conditions – the presence of heteroskedasticity, cross-sectional dependence, and autocorrelation under the short panel ($N > T$) – showed that the most acceptable approach for use, in this case, is a Prais-Winsten regression with panel corrected standard errors – PCSE.

V. EMPIRICAL RESULTS

In order to catch the impact of countries belonging to the relevant income group, we introduced dummy variables that take 1 and 0 and correspond to the group of countries depending on income level: Rev1 for low-income countries, Rev2 for lower-middle-income countries, Rev3 for upper-middle-income countries, Rev4 for high-income countries.

As a result, the new obtained regression equation has the next form (6):

$$GDP_ln_{it} = \alpha_i + \beta_1 PFI_ln_{it} + \beta_2 use_Int_ln_{it} + \beta_3 Reg_{qn_{it}} + \sum_{i=1}^4 Rev_{it} + \varepsilon_{it}, \quad Rev1 = \begin{cases} 1, & i = Rev1 \\ 0, & i \neq Rev1 \end{cases}, Rev2 = \begin{cases} 1, & i = Rev2 \\ 0, & i \neq Rev2 \end{cases}, Rev3 = \begin{cases} 1, & i = Rev3 \\ 0, & i \neq Rev3 \end{cases}, Rev4 = \begin{cases} 1, & i = Rev4 \\ 0, & i \neq Rev4 \end{cases}. \quad (6)$$

Table 4 presents the results of the model with Prais-Winsten adjustments. The use of dummy variables generally improved the model, as the coefficient of determination increased from 0.9941 to 0.9959. In addition, the value of Wald chi2 has also increased. All regressors in both models are statistically significant at 1%.

We have taken the group of high-income countries (Rev4) as a base, so other countries have negative coefficients compared to it. This is logical, as their growth rates (GDP per capita) are lower and are confirmed by the downward nature of the coefficients. Taking into account the division of countries into four groups, a 10% increase in the press freedom index will lead to a 2% increase in GDP per capita. The same growth can be achieved by increasing the assessment of the regulation of the institutional environment by 10%.

TABLE 4: PCSE-ADJUSTED REGRESSION RESULTS

Variable	PCSE-model		PCSE-model with dummies	
	Coef.	Std. Err.	Coef.	Std. Err.
GDP_ln				
PFI_ln	0.1189***	0.0345	0.2126***	0.0269
Use_Int_ln	0.2015***	0.0146	0.1142***	0.0096
Reg_Qn	2.2061***	0.2111	0.2410***	0.0634
Rev1			-2.7778***	0.0512
Rev2			-1.9707***	0.0443
Rev3			-1.0147	0.0242
Const.	7.1364***	0.2350	9.0256***	0.1231
Wald chi2	380.52 (3)		5773.32 (6)	
Prob>chi2	0.0000		0.0000	
R ²	0.9941		0.9959	

Note: degrees of freedom in parentheses; * p<0.05, ** p<0.01, *** p<0.001.

The results of the models depending on the group of countries are presented in Table 5. The table provides some evidence to support the hypothesis that press freedom has a greater impact on economic performance in relatively more developed countries, represented by middle-income and high-income economies. This conclusion could be made, given that only in the model for low-income countries, the coefficients are not statistically significant. For other groups of economies, the estimates of coefficients for PFI_ln are statistically significant at the level of 1%. For all models, the coefficient of determination is more than 99%, which

indicates a high level of data approximation. Estimates of coefficients for all other variables such as Internet penetration and institutional conditions are also statistically significant for high-income and lower-middle-income. Only for the group of countries with incomes above the middle coefficients of institutional conditions are not statistically significant.

TABLE 5: PCSE-MODELS FOR COUNTRY GROUPS

GDP_In	Low income	Lower-middle income	Upper-middle income	High income
PFI_In	-0.0424 (0.0427)	0.1828*** (0.0351)	0.2846*** (0.0323)	0.2919*** (0.0414)
Use_Int_In	0.0930*** (0.0088)	0.1196*** (0.0089)	0.1199*** (0.0168)	0.1644*** (0.0232)
Reg_Qn	0.3682** (0.1331)	0.4046*** (0.0931)	-0.0898 (0.1236)	0.5976*** (0.1509)
Cons.	7.2707*** (0.1862)	7.0986*** (0.1573)	7.9109*** (0.1459)	8.3697*** (0.2167)
N	424	692	845	857
R ²	0.9963	0.9968	0.9946	0.9977
Wald chi2(6)	120.33	192.28	94.06	96.56
Prob>chi2	0.0000	0.0000	0.0000	0.0000

Note: Std. Err. in parentheses; * p<0.05, ** p<0.01, *** p<0.001.

In general, all models quite well approximate data by group distribution, given that the p-statistic is less than 0.0000. Countries with high income and upper-middle-income have the largest change in GDP per capita, as in case other things being constant, a 10% increase in the press freedom index leads to a 3% increase in GDP, while for lower-middle-income countries it is 2% and for poorer countries is less than 1%. According to the results of our models, a 10% increase in the assessment of the institutional environment, i.e. its improvement, and specifically in our case the growth of expert assessment of the quality of regulation, allows to achieve 6% GDP per capita growth for developed countries, while for others the increase is 4%. The results of the model confirm our assumptions about the less strong direct link between media activity (index of press freedom) and economic growth. Moreover, we could assume that press freedom is more crucial and have a higher impact in the case of already more developed economies. That is, for the less developed countries, it is first of all important to establish an institutional orientation of development, and the development of freedom and activity of the press will have a supporting effect.

VI. CONCLUSION

In this study, we attempted to examine the relationships and effects of the Freedom of the Press, Internet penetration, institutional conditions, FDI on the economic growth of four groups of countries in 2000–2015 classified by the GNI per capita level. A panel of 179 counties was investigated by two most utilized panel data models (fixed effect model and random effects model). Although Hausman specification test suggested using fixed effects least squares method, the presence of cross-sectional dependence, serial correlation and heteroscedastic forced us to implement Prais-Winsten regression with panel corrected standard errors. Moreover,

we took dummy variables in order to assess the effect of the distribution of countries by national income.

Though previous studies (see [12], [1], [3]) found a fairly close relationship, based on the results of our study we can assume that associations between media activity represented with the press freedom indicator and economic growth reflected with GDP per capita have no undisputed strong linear connection. Although being negatively correlated considering Pearson's correlation matrix, the press freedom has positive coefficients in the consolidated model and in the three of four group-specified models. This could be explained with the multifactorial nature of obtained models and the presence of unobserved influences. At the same time, Internet penetration is essential for the economic development of all country groups and strengthens the association.

Further research is suggested to determine or reject the presence of a nonlinear association between economic growth and media activity as well as differences between countries. Moreover, some other aspects to be covered are changes over time in order to fix how rapid development of the ITC promotes or suppresses the influence of media on the economy. Very tentatively we assume that mentioned relations are weakening.

REFERENCES

- [1] M. Guseva, M. Nakaa, A. Novel, K. Pekkala, B. Souberou, and S. Stouli, *Press Freedom and Development*, UNESCO, 2008.
- [2] H. Tran, R. Mahmood, Y. Du, and A. Khrapavitski, (2011). "Linking measures of global press freedom to development and culture: Implications from comparative analysis," *International Journal of Communication*. 5, pp. 170–191. Available: https://repository.hkbu.edu.hk/hkbu_staff_publication/5185.
- [3] A. Alam, and S. Z. A. Shah, (2013). "The Role of Press Freedom in Economic Development: A Global Perspective," *Journal of Media Economics*. 26(1), pp. 4–20. Available: <https://doi.org/10.1080/08997764.2012.755986>.
- [4] A. Y. Khan, A. Razi, R. Mirza, S. Mazhar, A. Amjad, and U. Shafique, (2013). "Impact of mass media in Pakistan on social, ethical and economic grounds," *International Journal of Economics and Research*. Vol. 4 (issue 3), pp. 1–20.
- [5] F. J. Veiga, L. G. Veiga, and A. Morozumi, (2017). "Political budget cycles and media freedom," *Electoral Studies*. 45, pp. 88–99. Available: <https://doi.org/10.1016/j.electstud.2016.11.008>.
- [6] A. Bassanini and S. Scarpetta, (2002). "The Driving Forces of Economic Growth," *OECD Economic Studies*. 2001(2), pp. 9–56. Available: https://doi.org/10.1787/eco_studies-v2001-art10-en.
- [7] N. C. Leita, (2010). "Financial Development and Economic Growth: A Panel Approach," *Theoretical and Applied Economics*. 17(10:551), pp. 15–24.
- [8] S. Nawaz, N. Iqbal, and M. A. Khan, (2014). "The Impact of Institutional Quality on Economic Growth: Panel Evidence," *The Pakistan Development Review*. 53(1), pp. 15–31. Available: <https://doi.org/10.30541/v53i1pp.15-31>.
- [9] C. Hsiao, (2006). "Panel Data Analysis – Advantages and Challenges," *SSRN Electronic Journal*. Available: <https://doi.org/10.2139/ssrn.902657>.
- [10] C. J. Coyne and P. T. Leeson, (2004). "Read All About It! Understanding the Role of Media in Economic Development," *Kyklos*. 57(1), pp. 21–44. Available: <https://doi.org/10.1111/j.0023-5962.2004.00241.x>.
- [11] S. Djankov, C. Mcleish, T. Nenova, and A. Shleifer, (2003). "Who Owns the Media?" *The Journal of Law and Economics*. 46(2), pp. 341–382. Available: <https://doi.org/10.1086/377116>.
- [12] P. Norris, and D. Zinnbauer, (2002). "Giving Voice to the Voiceless: Good Governance, Human Development & Mass Communications," *Human Development Occasional Papers (1992-2007): HDOCPA-2002-11*, Human Development Report Office (HDRO), United Nations Development Programme (UNDP).

- [13] R. Ahrend, (2002). "Press Freedom, Human Capital and Corruption," *SSRN Electronic Journal*. Available: <https://doi.org/10.2139/ssrn.620102>.
- [14] T. Nam, (2012). "Freedom of information legislation and its impact on press freedom: A cross-national study," *Government Information Quarterly*. 29(4), pp. 521–531. Available: <https://doi.org/10.1016/j.giq.2012.03.003>.
- [15] S. Bandyopadhyay, (2014). "Are Mass Media and ICTs Associated with Inequality and Poverty? Research on Economic Inequality," *Economic Well-Being and Inequality: Papers from the Fifth ECINEQ Meeting*, pp. 185–216. Available: <https://doi.org/10.1108/s1049-258520140000022005>.
- [16] S. Bhattacharyya and R. Hodler, (2015). "Media freedom and democracy in the fight against corruption," *European Journal of Political Economy*. 39, pp. 13–24. Available: <https://doi.org/10.1016/j.ejpoleco.2015.03.004>.
- [17] N. Dutta and S. Roy, (2009). "The Impact of Foreign Direct Investment on Press Freedom," *Kyklos*. 62(2), pp. 239–257. Available: <https://doi.org/10.1111/j.1467-6435.2009.00434.x>.
- [18] M. Popescu and G. Toka, (2009). Public Television, Private Television and Citizens' Political Knowledge.
- [19] R. Dewenter, M. Linder, and T. Thomas, (2019). "Can media drive the electorate? The impact of media coverage on voting intentions," *European Journal of Political Economy*. 58, pp. 245–261. Available: <https://doi.org/10.1016/j.ejpoleco.2018.12.003>.
- [20] P. Kostadinova, (2015). "Media in the New Democracies of Post-Communist Eastern Europe," *East European Politics and Societies: and Cultures*. 29(2), pp. 453–466. Available: <https://doi.org/10.1177/0888325415577863>.
- [21] R. Melnick and R. Eldor, (2010). "Small investment and large returns: Terrorism, media and the economy," *European Economic Review*. 54(8), pp. 963–973. Available: <https://doi.org/10.1016/j.euroecorev.2010.03.004>.
- [22] C. Benesch, S. Loretz, D. Stadelmann, and T. Thomas, (2019). "Media coverage and immigration worries: Econometric evidence," *Journal of Economic Behavior & Organization*. 160, pp. 52–67. Available: <https://doi.org/10.1016/j.jebo.2019.02.011>.
- [23] P. Capriotti, (2009). "Economic and Social Roles of Companies in the Mass Media," *Business & Society*. 48(2), pp. 225–242. Available: <https://doi.org/10.1177/0007650307305724>.
- [24] J. Engelberg and C. A. Parsons, (2009). "The Causal Impact of Media in Financial Markets," *SSRN Electronic Journal*. Available: <https://doi.org/10.2139/ssrn.1462416>.
- [25] M. Pinar and E. Volkan, (2018). "Institutions and information flows, and their effect on capital flows," *Information Economics and Policy*. 43, pp. 34–47. Available: <https://doi.org/10.1016/j.infoecopol.2018.01.002>.
- [26] J.-B. Kim, H. Zhang, L. Li, and G. Tian, (2014). "Press freedom, externally-generated transparency, and stock price informativeness: International evidence," *Journal of Banking & Finance*. 46, pp. 299–310. Available: <https://doi.org/10.1016/j.jbankfin.2014.05.023>.
- [27] S. A. Masrorkhah and T. Lehnert, (2017). "Press freedom and jumps in stock prices," *Economic Systems*. 41(1), pp. 151–162. Available: <https://doi.org/10.1016/j.ecosys.2016.05.009>.
- [28] E. Kočenda and M. Moravcová, (2018). "Intraday effect of news on emerging European forex markets: An event study analysis," *Economic Systems*. 42(4), pp. 597–615. Available: <https://doi.org/10.1016/j.ecosys.2018.05.003>.
- [29] R. Ding, W. Hou, Y. L. Liu, and J. Z. Zhang, (2018). "Media censorship and stock price: Evidence from the foreign share discount in China," *Journal of International Financial Markets, Institutions and Money*. 55, pp. 112–133. Available: <https://doi.org/10.1016/j.intfin.2018.02.005>.
- [30] K. Chang, H. Shim, and T. D. Yi, (2019). "Corporate social responsibility, media freedom, and firm value," *Finance Research Letters*. 30, pp. 1–7. Available: <https://doi.org/10.1016/j.frl.2019.03.019>.
- [31] O. Farooq and C. Mertzanis, (2017). "Media independence and crime as an obstacle to firms' business operations," *Research in International Business and Finance*. 41, pp. 79–89. Available: <https://doi.org/10.1016/j.ribaf.2017.04.025>.
- [32] S. Gehlbach, and K. Sonin, (2011). "Government Control of the Media," *SSRN Electronic Journal*. Available: <https://doi.org/10.2139/ssrn.1315882>.
- [33] E. W. Nafziger, (2006). *Economic development*. Cambridge: Cambridge University Press.
- [34] J. E. Stiglitz, S. Amartya, and J.-P. Fitoussi, (2010). *Mismeasuring Our Lives: Why GDP Doesn't Add Up: The Report*. New York.
- [35] J. V. Henderson, A. Storeygard, and D. Weil, (2012). "Measuring Economic Growth from Outer Space," *American Economic Review*, *American Economic Association*. 102(2), pp. 994–1028. Available: <https://doi.org/10.3386/w15199>.
- [36] R. Bahrini and Qaffas, A. (2019). "Impact of Information and Communication Technology on Economic Growth: Evidence from Developing Countries," *Economies*. 7(1). Available: <https://doi.org/10.3390/economies7010021>.
- [37] D. C. North, (1991). "Institutions," *Journal of Economic Perspectives*. 5(1), pp. 97–112. Available: <https://doi.org/10.1257/jep.5.1.97>.
- [38] A. Kraay, D. Kaufmann, and M. Mastruzzi, (2010). "The worldwide governance indicators: methodology and analytical issues," *Policy Research Working Papers*. Available: <https://doi.org/10.1596/1813-9450-5430>.
- [39] A. Moudatsou, (2003). "Foreign Direct Investment and Economic Growth in the European Union," *Journal of Economic Integration*. 18(4), pp. 689–707. Available: <https://doi.org/10.11130/jei.2003.18.4.689>.
- [40] E. Borensztein, J. D. Gregorio, and J.-W. Lee, (1995). *How Does Foreign Direct Investment Affect Economic Growth?* Available: <https://doi.org/10.3386/w5057>.
- [41] L. Alfaro, (2003). "Foreign Direct Investment and Growth: Does the Sector Matter?" Harvard University, Harvard Business School: Working Paper.
- [42] J. B. Carbonell and R. A. Werner, (2018). "Does Foreign Direct Investment Generate Economic Growth? A New Empirical Approach Applied to Spain," *Economic Geography*. 94(4), pp. 425–456. Available: <https://doi.org/10.1080/00130095.2017.1393312>.
- [43] B. H. Baltagi and S. H. Song, (2006). "Unbalanced panel data: A survey," *Statistical Papers*. 47(4), pp. 493–523. Available: <https://doi.org/10.1007/s00362-006-0304-0>.
- [44] J. P. Elhorst, (2001). Panel data models extended to spatial error autocorrelation or a spatially lagged dependent variable.
- [45] J. R. J. F. Hair, R. E. Anderson, R. L. Tatham, and W. C. Black, (1995). *Multivariate data with readings*. US America: Prentice Hall Inc.
- [46] J. A. Hausman, (1978). "Specification Tests in Econometrics," *Econometrica*. 46(6), pp. 1251–1271. Available: <https://doi.org/10.2307/1913827>.
- [47] C. Anna, D. A. Antonello, and P. Angelo, (2014). "A Panel Data Approach to Evaluate the Passenger Satisfaction of a Public Transport Service," *Procedia Economics and Finance*. 17, pp. 231–237. Available: [https://doi.org/10.1016/s2212-5671\(14\)00708-4](https://doi.org/10.1016/s2212-5671(14)00708-4).
- [48] C. F. Baum, (2000). "XTTEST3: Stata module to compute Modified Wald statistic for groupwise heteroskedasticity," *Statistical Software Components*. Boston College Department of Economics. Available: <https://ideas.repec.org/c/boc/bocode/s414801.html>.
- [49] R. E. De. Hoyos and V. Sarafidis, (2006). XTCSO: Stata module to test for cross-sectional dependence in panel data models. Available: <https://ideas.repec.org/c/boc/bocode/s456736.html>.
- [50] D. M. Drukker, (2003). "Testing for Serial Correlation in Linear Panel-data Models," *The Stata Journal: Promoting Communications on Statistics and Stata*, 3(2), pp. 168–177. Available: <https://doi.org/10.1177/1536867X0300300206>.
- [51] A. C. Marques, and J. A. Fuinhas, (2012). "Is renewable energy effective in promoting growth?" *Energy Policy*, 46, pp. 434–442. Available: <https://doi.org/10.1016/j.enpol.2012.04.006>.
- [52] N. P. Canh, C. Schinckus, and S. D. Thanh, (2020). "The natural resources rents: Is economic complexity a solution for resource curse?" *Resources Policy*, 69(July), 101800. Available: <https://doi.org/10.1016/j.resourpol.2020.101800>.

Viktoriia Ahapova is a PhD student in the field of Economics at the University of Customs and Finance, Ukraine. She completed her Master's degree in International Economics, graduated from the University of Customs and Finance in 2017. Currently, her major research areas are media activity and its influence on economic systems; Development; Economics Methodology, and Behavioral Economics. She holds a position of Journalist at the international price reporting agency Metal Expert, following steel markets in the CIS and MENA regions.