Does The Use Of Ict Affect Interest Rates In Transition Economies?

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ABSTRACT

This study empirically analyzes the association between the level of ICT-use and interest rates in transition economies. We hypothesized that an increase in ICT penetration level lowers interest rates in an economy. In order to test this hypothesis, we utilize four different proxies for ICT and two distinct indicators for interest rate. The study conducts panel data analysis and uses unbalanced data containing 24 years between 1990 and 2013. The size of samples varies from model to model and the largest sample includes 402 observations of 22 transition economies. After taking into consideration other macroeconomic determinants peculiar to interest rate, our primary finding reveals a strong and statistically significant negative association between ICT-use level and interest rate in these economies. This finding remains valid no matter which indicator is used for ICT penetration and interest rate in the models. Hence our results are robust.

Keywords: *ICT, Interest rate, Panel data, Transition Economies.*
JEL Classification: *C23, E43, O33, P29*

Bilgi İletişim Teknolojileri Kullanımı Geçiş Ekonomilerinde Faiz Oranlarını Etkilemekte Midir?

ÖZ

Bu çalışmada geçiş ekonomilerinde bilgi iletişim teknolojileri kullanımı ile faiz oranları arasındaki ilişki analiz edilmektedir. Hipotezimize göre bir ekonomide bilgi iletişim teknolojileri kullanımındaki artış faiz oranlarını düşürecektir. Söz konusu hipotezi test etmek üzere, bilgi iletişim teknolojileri için dört ve faiz oranları için iki belli başlı gösterge kullanılmaktadır. Çalışma panel veri analizi ile yürütülmekte olup; 1990-2013 yılları arasındaki 24 yıllık dönemi kapsayan dengesiz veri seti kullanılmaktadır. Örneklem büyüklüğü modelden modele değişmekle birlikte, en büyüğü 22 geçiş ekonomisi üzerindeki 402 gözlemi yansıtmaktadır. Faiz oranlarını etkileyen diğer makroekonomik belirleyiciler dikkate alınarak yürütülen analizin temel bulgusu, söz konusu ekonomilerde bilgi iletişim teknolojileri kullanım düzeyi ile faiz oranları arasında istatistiksel olarak anlamlı negatif bir ilişkinin varlığını ortaya koymaktadır. Bu bulgu, modellerde kullanılan gerek bilgi iletişim teknolojileri kullanımı gerekse faiz oranı göstergelerinin tamamında geçerliliğini korumaktadır. Dolayısıyla, sonuçların sağlıklı olduğu ifade edilebilir.

Anahtar kelimeler: *Bilgi iletişim teknolojileri, Faiz oranı, Panel veri, Geçiş Ekonomileri.*
JEL Sınıflandırması: *C23, E43, O33, P29*

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INTRODUCTION

The labor productivity growth in the US for about two decades until the last crisis has been attributed to ICT. ICT-use in the world has been demonstrating an enormous increase. Despite reaching the pace of a relatively steady state in developed economies, its penetration still continues to demonstrate an impressive growth in developing countries. In fact, improved economic performance in developing and underdeveloped economies is expected to be followed by a surging demand of these countries for ICT products. Taking the existing current gap between developed and developing (especially underdeveloped) countries in ICT-use into account, this forecast seems quite realistic. Afterwards, improved productivity produced by ICT-use is anticipated to result in higher rates of economic growth and to create new demands for ICT again. This self-feeding cycle may be expected to continue in foreseeable future.

Today's modern macroeconomic view contains certain conflicts in it and faces severe criticisms. Nevertheless, it is influential both on economics thoughts and real economy. This modern view argues that total demand is the most important incentive in an economy. Keynesian economists state that government intervention is needed to accomplish full employment and price stability. The modern era has been shaped by globalization and integration starting in the 1980s. However, supplementary new aspects and critiques are directed to current views. At this respect, in one hand, there is a prolonged growth problem that the Japanese economy is struggling with. In the other, the financial crisis triggered growth problems have been remaining to show its persistent effects in the US and more severely in Europe since 2008.

The world economies, especially the developed ones, are still under the pressure of the last crisis. Problems in economic growth currently dominate the agenda in most countries. This started a new argument whether this is a new era that economies continue to experience lower growth rates and should get used to it. Or, alternatively, what is next to create increase in productivity hence to reach higher growth rates as its pace back in the pre-crisis period? Should we foresee a breakthrough change in today's economic outlook? If so, what might be the next channel in this prospect? Nevertheless, assuming that advances in ICT will continue to play a major role in foreseeable future, its effects on different aspects of the economy are worth to investigate.

Exploring the effect of ICT-use on interest rates in Transition Economies constitutes the main purpose of this work. Accordingly, over an unbalanced panel data set of 22 Transition Economies, we test the hypothesis that ICT-use cuts back interest rates. To our best of knowledge, this is the first study in the literature analyzing the association between ICT and interest rates in Transition Countries. After controlling for other macroeconomic determinants peculiar to interest rate and taking into account heteroskedasticity and autocorrelation problems in the model, we found a strong and statistically significant negative association between

ICT-use and interest rate and this finding remains valid across four different ICT proxies and two interest rates. The findings are expected to reveal useful insights especially for policymakers of Transition Economies in setting and conducting monetary policies.

The rest of the study is organized as follows. The next section provides literature review. Section 3 contains data and methodology. Empirical results are presented in section 4. The paper completes with conclusions.

I. RELATED LITERATURE

Until recently, the related literature has mainly focused on developed countries. As pointed out by Meng and Li (2002), this is primarily attributed to the fact that developing countries suffer the lack of capital investment as well as knowledge know-how. Chinn and Fairlie (2010) present the empirical evidence for this issue. The results of their research show that the low rates of technology penetration in developing economies derive from disparities in income, telephone density, legal quality, and human capital.

In the related literature, studies by Jorgenson & Stiroh (1995, 1999) and Oliner & Sichel (1994, 2000) are considered as the pioneering ones. Afterwards, Jorgenson (2001), Oliner and Sichel (2003) and Martinez et al. (2010) examine ICT's effect on economic growth in the US while Jorgenson and Motohashi (2005) investigate the same matter on Japan. In addition, Jalava and Pohjola (2008) provide comparisons between ICT's and electricity's relative contributions to economic growth in Finnish and the US economies. Their findings indicate that electricity's contribution to growth is smaller yet ICT's larger in Finland than in the US.

Bakhshi and Larsen (2005) provide empirical evidence that ICT-based technological progress accounts for around 20% to 30% of long-term labor productivity growth in the UK. The researchers present that a permanent increase in the growth rate of technological progress specific to ICT sector is anticipated to amplify the investment expenditure share of GDP yet lower the total depreciation rate. On the other hand, a rise in ICT investment gain is expected to promote both the expenditure share and the depreciation rate.

Oulton (2012) argues that, in handling the subject, a two-sector rather than a one-sector growth model is needed due to the highly rapid changes in the prices of ICT products. That is, the prices of ICT products have fallen in the past and are expected to continue falling in the foreseeable future. According to Oulton's argument, the two-sector model indicates that the main strength of growth is not the production of ICT, yet the use of ICT. Oulton proves this thesis by an empirical analysis on 15 European and 4 non-European economies. Based on these results, the researcher argues that an economy even with zero ICT production may benefit via improving terms of trade. As supporting evidence, the issue of externalities is also presented by Lopez-Pueyo et al. (2008). They state that trade relations serve as a bridge in transmitting technological externalities.

The related literature on economies other than the US, Japan and European economies has been attracted researchers only recently. For example, Engelbrecht and Xayavong (2006) study the link between ICT intensity and New Zealand's labor productivity growth over 29 industries. In order to provide comparisons between the two industry groups' labor productivity (LP) growth, the researchers classify the industries into more and less ICT-intensive categories. Their results reveal that LP growth in more ICT-intensive industries has displayed progress over time compared to that of other industry group. The ICT-driven total factor productivity (TFP) growth case is also examined by Antonopoulos and Sakellaris (2009) for Greece. Their conclusion indicates that, in spite of being lower than in the US, the contribution of ICT investment to economic growth expands in Greece on the period of 1988-2003. Another finding of their study is that ICT investments are most beneficial for finance, insurance, real estate and business services industries, and wholesale and retail trade industries. There are also studies capturing different dimensions of ICT. For instance, Yartey (2008) examines the relationship between ICT and financial development while Mathur and Ambani (2005), Thadaboina (2009) and Ogutu et al. (2014) investigate the relationship between ICT and agricultural economy.

By using pooled OLS and random effect model, Yi and Choi (2005) examine the Internet's impact on inflation over a panel data set. They show that a 1% increase in the ratio of the Internet users to total population is led by a 0.04264% decline in the inflation. Nevertheless, since then, we have not seen any other studies touching the subject of interactions between ICT (or its components) and macroeconomic (or financial) indicators. Yi and Choi (2005) provide us with a strong evidence to expect that ICT shall put a downward pressure on interest rates. The rationale behind this thesis derives from two rationales. One is that the declining inflation, as proved by Yi and Choi (2005), should be led by a drop in nominal interest rates as well. The other is that productivity improvements as a product of ICT are expected to create a fall in interest rates through cost saving feature of ICT. Consequently, this logic inspired us to perform this study towards exploring the effect of ICT on interest rates.

II. DATA AND METHODOLOGY

This study examines the association between the level of ICT penetration and interest rate in transition economies. The panel analyses are conducted by using four distinct ICT indicators and two different interest rates. The study utilizes unbalanced data containing 24 years between 1990 and 2013. The size of samples varies from model to model and the largest sample includes 402 observations of 22 transition countries. Because of the unbalanced nature of the dataset, the number of time periods available may vary from country to country, but the number of variables remains the same for each year.

In our analyses we estimate the following univariate fixed effect model (FE);

$$INTRATE_{it} = \beta_{1i} + \beta_2 ICT_{it} + u_{it} \tag{1}$$

the following multivariate fixed effect model (FE);

$$INTRATE_{it} = \beta_{1i} + \beta_2 ICT_{it} + \beta_3 MONEY_{it} + \beta_4 FDI_{it} + \beta_5 INVESTMENT_{it} + \beta_6 POP_{it} + \beta_7 INFLATION_{it} + u_{it} \tag{2}$$

the following univariate random effect model (RE);

$$INTRATE_{it} = \beta_1 + \beta_2 ICT_{it} + \eta_i + u_{it} \tag{3}$$

and the following multivariate random effect model (RE);

$$INTRATE_{it} = \beta_1 + \beta_2 ICT_{it} + \beta_3 MONEY_{it} + \beta_4 FDI_{it} + \beta_5 INVESTMENT_{it} + \beta_6 POP_{it} + \beta_7 INFLATION_{it} + \eta_i + u_{it} \tag{4}$$

where *it* subscript stands for the *i-th* country's observation value at time *t* for the particular variable. β_{1i} represents country specific factors not considered in the regression, which may differ across countries but not within the country and is time invariant. η_i is a stochastic term, which is constant through the time and characterizes the country specific factors not considered in the regression. u_{it} is error term of the regression and independently and identically distributed among countries and years.

In our analyses, we use four different ICT indicators and two distinct interest rates in order to see how sensitive our findings are. Results may change across different ICT indicators and interest rates. If the findings remain the same regardless of which proxies are used for ICT and interest rate, then this will be an indication of robustness of the results. The list of dependent and independent variables, their definitions, and the data sources are given in Table 1 below.

Table 1: List of Dependent and Independent Variables

Variables	Definition	Source
DEPINTRATE	Deposit interest rate (%)	WDI
LENDINTRATE	Lending interest rate (%)	WDI
INTERNET	Percentage of individuals using the Internet	World Telecommunication/ICT Indicators Database of UN Database http://data.un.org/Data.aspx?d=ITU&f=ind1 Code%3aI99H#ITU
CELLPHONE	Mobile-cellular telephone subscriptions per 100 inhabitants.	http://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx
COMPUTER	Personal computers per 100 inhabitants.	http://www.nakono.com/tekcarta/databank/full/27/
FXBROADBAND	Fixed broadband subscriptions (per 100 people)	International Telecommunication Union, World Telecommunication/ICT Development Report and database.
INFLATION	Inflation, GDP deflator (annual %)	WDI
MONEY	annual percentage change of Broad money (% of GDP)	WDI

INVESTMENT	annual percentage change of Gross capital formation (% of GDP)	WDI
FDI	Foreign direct investment, net inflows (% of GDP)	WDI
POP	Population density (people per sq. km of land area)	WDI

Interest rate is the dependent variable; and, we use deposit interest rate (DEPINTRATE) and lending interest rate (LENDINTRATE) as two proxies for interest rate. Four indicators of level of ICT penetration are percentage of individuals using the internet (INTERNET), mobile-cellular telephone subscriptions per 100 inhabitants (CELLPHONE), personal computers per 100 people (COMPUTER), and fixed broadband subscriptions per 100 people (FXBROADBAND). Other control variables included in the models are GDP deflator (INFLATION), broad money growth (MONEY), gross capital formation growth (INVESTMENT), foreign direct investment (FDI), and population density (POP).

ICT may reduce interest rate via cost saving and productivity improving sides of ICT. Hence we expect a negative impact of ICT on interest rate. Inflation reflects the uncertainty and instability in an economy. Since interest rate is prone to increase in an uncertain and instable environment, a positive association between inflation (INFLATION) and interest rate is expected.

Money supply side in an economy is represented by two variables (namely MONEY and FDI) in the models. An increase in money supply reduces interest rate. Also, FDI inflows may cause an increase in money supply and thus a decrease in interest rate. Negative coefficients are anticipated for MONEY and FDI variables. On the other hand, money demand side in the model is represented by INVESTMENT and POP variables. Increases in investment level and/or population in an economy create a higher demand for money hence pushing interest rates upward. Coefficients of INVESTMENT and POP are expected to be positive.

We provide correlation matrix of ICT and interest rate variables in Table 2. Table 2 shows correlation coefficients and P-values for each particular variable pairs. As in the table, correlation coefficient values between LENDINTRATE variable and four ICT proxies (i.e., INTERNET, CELLPHONE, COMPUTER, and FXBROADBAND) are negative and vary from -0.5612 to -0.3326 while correlation coefficient values between DEPINTRATE variable and four ICT proxies are negative and vary from -0.4941 to -0.2715. Moreover all of the correlation coefficients are statistically significant.

Table 2: Correlation Matrix of ICT and Interest Rate Variables

	DEP. RATE	LND. RATE	INTERNET	CELLPHONE	COMPUTER	FXBRDBAND
DEPINTRATE	1					
P-value	-					
LENDINTRATE	0.8767	1				
P-value	*0.0000*	-				
INTERNET	-0.4805	-0.5612	1			
P-value	*0.0000*	*0.0000*	-			
CELLPHONE	-0.2968	-0.4133	0.6400	1		
P-value	*0.0079*	*0.0002*	*0.0000*	-		
COMPUTER	-0.4941	-0.5195	0.9364	0.6353	1	
P-value	*0.0000*	*0.0000*	*0.0000*	*0.0000*	-	
FXBROADBAND	-0.2715	-0.3326	0.8416	0.6905	0.8800	1
P-value	*0.0155*	*0.0028*	*0.0000*	*0.0000*	*0.0000*	-

III. EMPIRICAL RESULTS

Univariate and multivariate estimation results for lending interest rate and deposit interest rate are reported in Table 3 and Table 4 respectively. Each interest rate variable is separately regressed on each ICT penetration indicators and other control variables. Hausman test is used for the selection between FE model and RE model and selected models at %1 significance level are also reported at the bottom of Table 3 and 4.

Table 3: Univariate and Multivariate Results for Lending Interest Rate

ICT Proxies ======>	INTERNT	INTERNT	CELLPH	CELLPH	COMPTR	COMPTR	FXBRDBND	FXBRDBND
	Univariate	Multivariate	Univariate	Multivariate	Univariate	Multivariate	Univariate	Multivariate
ICT	**-0.67855**	**-0.42990**	**-0.07196**	**-0.07263**	**-0.28043**	**-0.10923**	**-0.16995**	**-0.22969**
Std. Err.	0.16941	0.07083	0.00802	0.00653	0.05326	0.04471	0.03579	0.03890
P-value	*0.00010*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.01680*	*0.00000*	*0.00000*
MONEY		**-0.37444**		**-0.04196**		**0.00399**		**-0.03749**
Std. Err.		0.09939		0.02154		0.05710		0.02514
P-value		*0.00020*		*0.05260*		*0.94450*		*0.13760*
FDI		**-1.63819**		**-0.30436**		**-0.46885**		**-0.19901**
Std. Err.		0.29408		0.05811		0.14425		0.06007
P-value		*0.00000*		*0.00000*		*0.00170*		*0.00110*
INVESTMENT		**0.02672**		**-0.02184**		**0.03268**		**-0.01923**
Std. Err.		0.00912		0.01571		0.05721		0.01620
P-value		*0.00360*		*0.16560*		*0.56940*		*0.23680*
POP		**2.30407**		**0.68863**		**1.93221**		**0.62465**

Std. Err.		0.54490		0.10936		0.29407		0.13644
P-value		*0.00000*		*0.00000*		*0.00000*		*0.00000*
INFLATION		**0.04525**		**0.27413**		**0.35397**		**0.17440**
Std. Err.		0.00789		0.02020		0.09280		0.03192
P-value		*0.00000*		*0.00000*		*0.00030*		*0.00000*
CONSTANT	**42.22854**	**-149.15390**	**20.16093**	**-34.99778**	**19.23253**	**-159.62930**	**14.53210**	**-35.55650**
Std. Err.	5.30574	45.48069	0.67143	8.74766	1.84975	26.03522	0.37771	11.17703
P-value	*0.00000*	*0.00120*	*0.00000*	*0.00010*	*0.00000*	*0.00000*	*0.00000*	*0.00170*
Number of obs.	*399*	*352*	*289*	*264*	*94*	*94*	*226*	*204*
Number of countries	*22*	*21*	*22*	*21*	*8*	*8*	*22*	*21*
R-square	*0.03910*	*0.53049*	*0.61869*	*0.82618*	*0.22781*	*0.82903*	*0.69991*	*0.78945*
F-statistic	*16.15512*	*14.12367*	*19.61826*	*43.32736*	*27.14130*	*29.83953*	*21.52110*	*25.52469*
P-value(F-stat.)	*0.00007*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*
Hausman-statistic	*0.00406*	*27.02991*	*12.70933*	*51.73098*	*2.94685*	*43.41689*	*11.45279*	*37.75864*
P-value (Hausman-stat.)	*0.94920*	*0.00010*	*0.00040*	*0.00000*	*0.08600*	*0.00000*	*0.00070*	*0.00000*
Selected Model	*RE*	*FE*	*FE*	*FE*	*RE*	*FE*	*FE*	*FE*

Table 4: Univariate and Multivariate Results for Deposit Interest Rate

ICT Proxies ======>	INTERNT	INTERNT	CELLPH	CELLPH	COMPTR	COMPTR	FXBRDBND	FXBRDBND
	Univariate	Multivariate	Univariate	Multivariate	Univariate	Multivariate	Univariate	Multivariate
ICT	**-0.30884**	**-0.20767**	**-0.02301**	**-0.02240**	**-0.13284**	**-0.06233**	**-0.05751**	**-0.06782**
Std. Err.	0.05506	0.03247	0.00532	0.00482	0.03321	0.02963	0.02666	0.02927
P-value	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00010*	*0.03850*	*0.03200*	*0.02160*
MONEY		**-0.18416**		**-0.02779**		**-0.01666**		**-0.02333**
Std. Err.		0.04530		0.01590		0.03783		0.01892
P-value		*0.00010*		*0.08190*		*0.66090*		*0.21910*
FDI		**-0.96350**		**-0.19045**		**-0.40025**		**-0.14562**

Std. Err.		0.13215		0.04290		0.09557		0.04520
P-value		*0.00000*		*0.00000*		*0.00010*		*0.00150*
INVESTMENT		**-0.01165**		**-0.02341**		**0.01365**		**-0.02830**
Std. Err.		0.00418		0.01160		0.03790		0.01219
P-value		*0.00560*		*0.04460*		*0.71980*		*0.02140*
POP		**1.31084**		**0.36996**		**0.78376**		**0.33350**
Std. Err.		0.24860		0.08075		0.19483		0.10267
P-value		*0.00000*		*0.00000*		*0.00010*		*0.00140*
INFLATION		**0.04176**		**0.16102**		**0.26257**		**0.15101**
Std. Err.		0.00362		0.01491		0.06148		0.02402
P-value		*0.00000*		*0.00000*		*0.00010*		*0.00000*
CONSTANT	**19.63957**	**-87.66280**	**8.65097**	**-20.91247**	**9.17704**	**-63.65223**	**6.81175**	**-20.19938**
Std. Err.	1.85360	20.80391	0.44520	6.45875	1.24701	17.24938	0.78678	8.41030
P-value	*0.00000*	*0.00000*	*0.00000*	*0.00140*	*0.00000*	*0.00040*	*0.00000*	*0.01740*
Number of obs.	*402*	*354*	*289*	*264*	*94*	*94*	*226*	*204*
Number of countries	*22*	*21*	*22*	*21*	*8*	*8*	*22*	*21*
R-square	*0.07300*	*0.66329*	*0.57739*	*0.75897*	*0.14688*	*0.79432*	*0.02039*	*0.75147*
F-statistic	*31.49791*	*24.77517*	*16.51898*	*28.70375*	*15.83986*	*23.76569*	*4.66200*	*20.58377*
P-value(F-stat.)	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00014*	*0.00000*	*0.03190*	*0.00000*
Hausman-statistic	*0.54785*	*34.04104*	*5.95954*	*43.65556*	*2.34280*	*25.09254*	*1.72864*	*38.80041*

P-value (Hausman-stat.)	0.45920	0.00000	0.01460	0.00000	0.12590	0.00030	0.18860	0.00000
Selected Model	*RE*	*FE*	*RE*	*FE*	*RE*	*FE*	*RE*	*FE*

All univariate estimation results in both tables indicate a statistically significant negative relationship between ICT proxies and interest rate proxies.

Multivariate estimation results indicate the following;

i.) Estimation results using INTERNET as proxy of ICT penetration in Table 3 and 4 indicate that:

All coefficients of INTERNET variable are highly statistically significant and take the expected negative sign in both models, indicating that ICT penetration in the form of percentage of individuals using the internet seems to decrease interest rate in an economy.

ii.) Estimation results using CELLPHONE as proxy of ICT penetration in Table 3 and 4 indicate that:

All coefficients of CELLPHONE variable are highly statistically significant and take the expected negative sign in both models, indicating that ICT penetration in the form of mobile-cellular telephone subscriptions per 100 inhabitants seems to lower interest rate in an economy.

iii.) Estimation results using COMPUTER as proxy of ICT penetration in Table 3 and 4 indicate that:

The coefficient of COMPUTER variable is statistically significant at least %5 significance level and takes the expected negative sign in both models. This implies that ICT penetration in the form of personal computers per 100 people leads to a decrease in interest rate in an economy.

iv.) Estimation results using FXBROADBAND as proxy of ICT penetration in Table 3 and 4 indicate that:

All coefficients of FXBROADBAND variable are statistically significant at least at %5 significance level and take the expected negative sign in both models. This implies that ICT penetration in the form of fixed broadband subscriptions per 100 people causes to a drop in interest rate in an economy.

In regard to other determinants of interest rate in the model, the estimated coefficient of INFLATION variable takes the theoretically expected positive sign and is statistically significant at least at %1 significance level in all models. Thus, as the inflation rate in an economy increases, interest rate in that particular economy rises.

The estimated coefficient of MONEY variable takes the theoretically expected negative sign and is statistically significant at least at 10% significance level in four out of eight models. The estimated coefficient of FDI variable takes the expected negative sign and is statistically significant at least at %1 significance

level in all models. Hence, an increase in money supply (i.e., increase in MONEY or FDI variables) lowers the interest rate.

The estimated coefficient of INVESTMENT variable takes the theoretically anticipated positive sign in just one model and is statistically significant at %1 significance level. Surprisingly the estimated coefficient of INVESTMENT variable takes the reverse sign in three models and is statistically significant at least at %5 significance level. The reason for this reverse sign might be the multicollinearity problem among independent variables. The estimated coefficient of POP variable takes the anticipated positive sign and is statistically significant at least at %1 significance level in all models. Therefore, an increase in money demand (i.e., increase in INVESTMENT or POP variables) rises the interest rate. Our results also are robust since our primary finding remains valid no matter which indicator is used for ICT penetration and interest rate in our models.

IV. CONCLUSION

A number of studies in related literature reveal that ICT supports macroeconomy by boosting productivity via its cost saving feature. The basic motivation of this study is to explore the influence of ICT on interest rates in Transition Economies. Fallowing Yi and Choi's (2005) work, which analyze the effect of the Internet on inflation, the literature seems to ignore similar associations between ICT and other macroeconomic (or financial) indicators, not in particular the interest rates. This study empirically analyzes the association between level of ICT penetration and interest rate in transition economies. And, to our best of knowledge, this is the first study touching the subject in the literature.

We hypothesized that an increase in ICT level lowers interest rate in an economy. In order to test this hypothesis, we utilize four different proxies for ICT and two distinct indicators for interest rate. The study conducts panel data analysis and uses unbalanced data containing 24 years between 1990 and 2013. The size of samples varies from model to model and the largest sample includes 402 observations of 22 countries.

After taking into consideration other macroeconomic determinants peculiar to interest rate, our primary finding reveals a strong and statistically significant negative association between ICT penetration level and interest rate in an economy. This finding remains valid across all univariate and multivariate models and also across all four ICT proxies and two interest rate indicators. Hence, we might say that countries with higher ICT penetration level have lower interest rate. Also, our results are robust in the sense that our main finding do not alter no matter which indicator is used for ICT penetration and interest rate in our models.

The findings are in line with our prior anticipations which are totally the product of economics thoughts. More specifically, our findings are in accordance with those of Yi and Choi's (2005) work which reveal the effect of the Internet on inflation. Our results carry valuable implications for policymakers especially for monetary policymaking authorities. In the future, it would be interesting to see the

results of similar studies examining the association of ICT with other macroeconomic and/or financial variables.

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SUMMARY

It is well accepted that increase in productivity is the main driving force in achieving a sustainable economic growth. In fact, it is the pace of productivity increase that differentiates countries as developed and developing ones. Nevertheless, the world economies, especially the developed ones, are currently under the pressure of the last crisis. Difficulties in economic growth currently dominate the agenda in most countries. This started a new argument whether this is a new era that economies continue to experience lower growth rates and should get used to it. Or, alternatively, what is next to create increase in productivity hence to reach higher growth rates as its pace back in the pre-crisis period? Should we expect a breakthrough change in today's economic perspective? If so, what might be the next avenue in this forecast? Nonetheless, considering that ICT improvements will continue to dominate many aspects of the economy in foreseeable future, its effects are worth examining.

This study empirically analyzes the association between the level of ICT penetration and interest rate in transition economies. To our best of knowledge, this is the first study examining the issue in the literature. Our hypothesis asserts that an increase in ICT penetration lowers interest rate in an economy. In testing this hypothesis, four different proxies for ICT and two distinct indicators for interest rate are utilized. The study employs panel data analysis on an unbalanced data set containing 24 years between 1990 and 2013. The size of samples varies from model to model with the largest sample including 402 observations of 22 countries.

The primary finding reflects a strong and statistically significant negative relationship between ICT penetration and interest rate in these economies. This finding remains valid across all univariate and multivariate models and also across all four ICT proxies and two interest rate variables. As a result, we might say that countries with higher ICT penetration level have lower interest rate. Moreover, our results are robust in the sense that our main finding does not alter regardless of indicator used for ICT penetration and interest rate in the models.