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In pursuit of Happiness in developing countries: does the diffusion of ICT matter?

Georges Ngnouwal Eloundou
University of Dschang - ACEDA - DSEM

Blaise Ondoua Beyene
University of Dschang - ACEDA

Marius Messoh Lonte
University of Ngaoundere

Abstract

ICTs have spread throughout developing countries, giving people access to information, economic opportunities and essential services (such as education and health). This has enhanced their knowledge of the world, their education and their social awareness. This paper assesses the effects of ICT on Subjective Well-Being (SWB). Using a sample of 98 developing countries (DCs), we specify and estimate a panel data model using the Pooled Ordinary Least Squares (POLS) and the System Generalized Moment Method (sGMM) over the period 2005-2020. Our results show that ICT diffusion improves subjective well-being. From an economic policy perspective, these results provide guidelines for the implementation and use of ICT in developing countries, which is an asset for a better quality of life.

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Contact: Georges Ngnouwal Eloundou - eloundou29@gmail.com, Blaise Ondoua Beyene - ondouabeyeneblaise@gmail.com, Marius Messoh Lonte - mariusmessoh@gmail.com.
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1. Introduction

Subjective Well-Being (SWB) is an alternative and complementary indicator to the conventional measure of economic well-being, namely Gross Domestic Product (GDP) per capita (Stiglitz et al., 2018). The measurement of subjective well-being is based on three indicators of well-being such as life evaluations, positive emotions and negative emotions (Rowan, 2022). International assessment of SWB, as measured by life satisfaction or happiness, has shown inter and intra-country heterogeneity in SWB over time (Lee et al., 2020). The renewed interest in SWB can be seen in the Sustainable Development Goals (SDGs), notably the United Nations (UN's) SDG-3 by 2030.

SWB has been investigated theoretically, and the emergence of this concept is situated in the economics of happiness with the seminal contribution of Easterlin (1974) extended by Sen (1985) and then by Clark and Oswald (1994) who laid the groundwork for an eudemonics, hedonic, objective and subjective understanding of well-being (Bourdeau-Lepage et al., 2018). This apprehension favoured the emergence of the economy of happiness (Zeidan, 2012). Thus, the Organisation for Economic Co-operation and Development (OECD) has launched the "Living Well" initiative by developing guidelines on the measurement of SWB to improve quality of life measures. It builds on the recommendations of the report Stiglitz et al (2009) which stresses that a place should be given to subjective indicators in measures of social progress. The literature identifies financial development, access to energy, natural resources and social media, women's political empowerment, physical activity (Song et al., 2023; Avom and Malah, 2022; Malah, 2021; Mignamissi and Kuete, 2021; Zhang and Chen, 2019).

Average levels of subjective well-being across countries have increased at different rates for people living in urban and rural areas. The term 'urban paradox' (Higher incomes and economic opportunities in cities are accompanied by higher, but declining, levels of happiness compared to rural areas.) has been used to refer to the joint presence of dynamic growth and social exclusion in urban areas. But for Morrison (2021) it refers to the mismatch between the popularity of cities as places to live and their lower levels of well-being (Hoogerbrugge and Burger, 2019). This refers to the apparent contradiction between the higher productivity and growth of urban centres in combination with being an attractive place to live and their lower average level of welfare (Burger et al., 2020).

To meet the challenges associated with SWB, a new conception is needed. Information and Communication Technology (ICT) offer modern opportunities with the advent of the digital economy. The spread of ICT continues to emerge as a global necessity. According to the (Digital Report, 2022), the figures for ICT diffusion remain telling. Access to ICTs through single mobile phones increased by 1.8% between 2020 and 2021. Similarly, Internet and social media connectivity have increased strongly with growth rates of 7.3% and 13.2% respectively (Digital Report, 2022). These technologies have not only increased economic growth and productivity, but have had a substantial impact on human amenities (Choi and Yi, 2009; Litan and Rivlin, 2001; Röller and Waverman, 2001). The observed effects are quite large in OECD countries, where widespread access to technology has been in place for several decades (Graham and Nikolava, 2013). In addition to making phone calls and sending text messages, mobile phones are used for activities (work, leisure, socialising, etc.).

Building on this theoretical framework and drawing on new methodologies, the aim of this article is to examine the effect of ICT on the life course. Two contributions stand out. First, we conduct a macroeconomic analysis on a panel of countries in the developing world. Second, we complement the literature on the potential determinants of happiness. The results of the study provide a framework for scoping future policy interventions and academic studies, such as

predicting the diffusion of ICT. Second, we provide empirical evidence that ICT diffusion could also be a relevant determinant of happiness.

Following this introduction, the rest of the article is organised into four additional sections. The first presents a selective review of the state of the art and the theoretical positioning. The second briefly outlines the different steps of the empirical strategy adopted. The third discusses the results. We conclude with suggestions for policy recommendations.

2. Brief state of the art

Without claiming to be exhaustive, the theoretical roots of happiness go back to the seminal contribution of Smith (1776) who laid the groundwork for well-being through labour productivity. Subsequently, the theoretical literature highlights four assumptions: *(i)* the growth hypothesis which emphasises that information and communication technologies, as a complement to capital and labour factors has a significant impact on SWB; *(ii)* the conservation hypothesis indicates the existence of a unidirectional causality from economic growth to SWB; *(iii)* the feedback hypothesis reveals the existence of a bidirectional causality between the diffusion of ICT and SWB; *(iv)* the neutrality hypothesis indicates the absence of a causality between ICT and SWB. These hypotheses favoured the emergence of behavioural economics and the economics of happiness with the seminal contributions of Arthur Cecil Pigou in 1920 and Daniel Kahneman (Nobel Prize in Economics 2002), which made it possible to measure happiness by means of opinion polls, but also to look at the determinants of this subjective feeling of individual happiness. Thus, happiness is understood as a discrete and subjective state of individuals (Sachs, 2019).

The empirical studies that have addressed this topic are grouped into two categories. The first group supports positive effects of ICT on happiness. Maurseth (2020) The second group links ICT to human well-being. Social media, from traditional email to social networks, have characteristics of relational goods (where utility increases when consumed with friends or family members). Consumption of such goods can increase happiness (Gui and Stanca, 2010). In contrast, the internet (with the development of online dating services) has significantly increased marriage rates among young people (aged 21-30) in the US (Bellou, 2015). This is because, without access to the internet, people become increasingly socially excluded (Pénard and Poussing, 2010). Pénard et al. (2013) argue that in most cases the internet helps individuals in consumer markets (online shopping), entertainment and paid employment. Graham and Nikolava (2013) indicate that access to television and mobile phones is negligible for people in developed countries, but more important in developing countries. Kavetsos and Koutroumpis (2011) point to network effects of ICT. The utility derived from the internet and mobile subscription increases with the number of other users.

A second group of studies supports the idea that ICT has negative effects on happiness. Bruni and Stanca (2008) indicate the presence of the isolation effect among TV viewers. Frey et al. (2007) find that heavy television viewers report significantly lower life satisfaction. Lee et al. (2011) find that communicating with people on the internet reduces people's happiness while face-to-face communication increases quality of life. However, this study does not control for other characteristics of Internet users (such as income, education and gender). Li and Chung (2006) argue that being connected to the Internet can create addictive behaviour and harm mental health. Kraut et al. (1998) find that Internet users became less socially involved and more lonely than low-level users (Kraut et al., 2001). Bhuler et al. (2013) estimate the effect of broadband access on reports, charges and convictions for rape and other sexual crimes. They suggest that possible causality lies in the effects of broadband on pornography consumption.

From the non-exhaustive synthesis of the literature review, three findings emerge. Firstly, the work focuses more on investigating the effect of Internet use on the SWB in developed

countries. Second, very few studies have focused on DCs at the macro level. Third, the non-consensus findings of the empirical work warrant further investigation in a context of rising welfare and increasing ICT diffusion.

3. Methodological strategy

3.1. The empirical model

To analyse the empirical relationship between ICT diffusion and happiness, we adopt the theoretical model of Ngoa and Song (2021) which studies the effects of ICT diffusion on women's labour market participation. The basic econometric specification adopted takes the form below:

$$LL_{i,t} = \alpha + X'_{i,t}\beta + \gamma ICT_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \quad (1)$$

In equation (1), *LL* is subjective well-being as measured by the scale of life index (Easterlin, 2001; Helliwell and Aknin, 2018) *ICT* is measured by the interent. *X* is the matrix of control variables comprising GDP per capita *(GDPpc)*, inflation *(Inf)*, population growth *(Pop)* and life expectancy *(Exp)* ; $\mu_i et\ \delta_t$ indicate unobserved individual and time effects respectively. $\alpha, \beta\ et\ \gamma$ are the vectors of coefficients to be estimated; and ε is the error term. Since happiness is a dynamic process that exerts a strong inertia on its past values, it is important to take this inertia into account. We then introduce the lagged value of the scale of life index into equation (1), in order to show that happiness operates with a memory effect process over time, we obtain equation (2) below:

$$LL_{i,t} = \alpha + \partial LL_{i,t-1} + \beta(GDP/hbt_{i,t} + Inf_{i,t} + Pop_{i,t} + Exp_{i,t}) + \gamma ICT_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \quad (2)$$

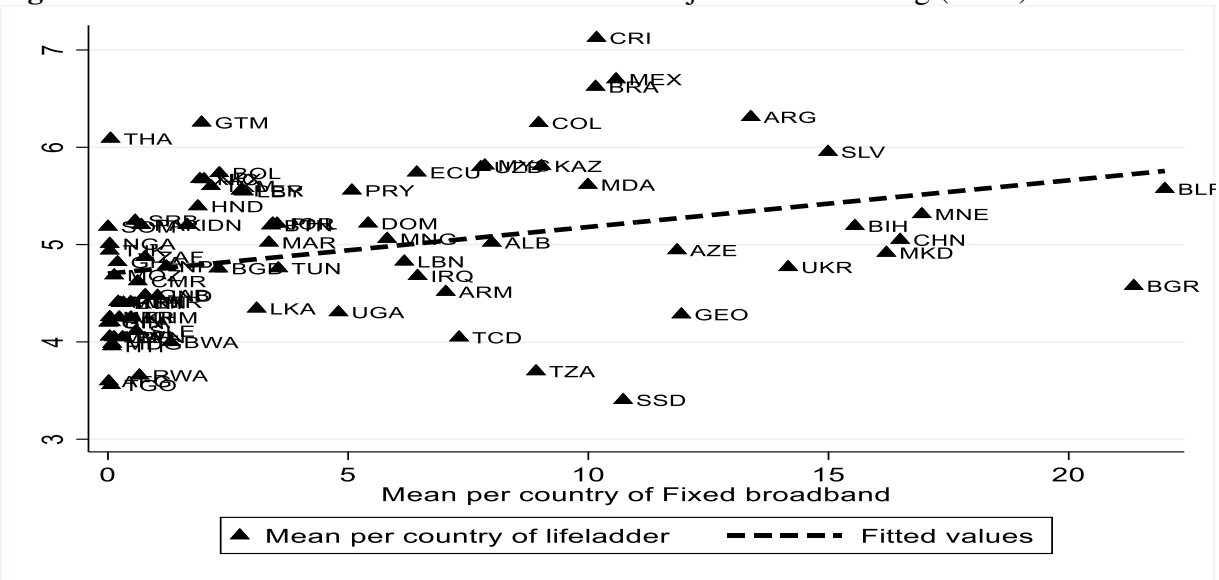
3.2. The estimation technique

Based on the current empirical literature, this study chooses the pooled ordinary least squares (OLS) method as the basic empirical estimation strategy to determine the direction of the relationship. However, the risk of a high correlation between the error term and the lagged dependent variable, known as Nickell bias, is high. This could produce biased estimators if equation (2) is estimated with traditional estimators. In addition, ICT diffusion may be endogenous with development outcomes. We estimate a linear dynamic panel data model using the two-stage generalized method of moments in system (sGMM) estimator of Arellano and Bover (1995); Blundell and Bond (1998) Arellano and Bover (1995), Blundell and Bond (1998). In particular, the system GMM estimator solves the problems of endogeneity bias, multicollinearity and omitted variables.

3.3. The data

Our sample consists of 98 developing countries at different income levels according to the World Bank classification (see List of countries - Appendix 2). We chose the period 2005-2020 because of the constraints given on a large number of countries. The Scale of Life Index is the most widely used measure of happiness in the literature (Mignamissi and Kuete, 2021; Njangang, 2019; Ram, 2017). The main source of this index is the Gallup World Poll and the data used is from the World Happiness Database (Rowan, 2022). Information and communication technology (ICT) is measured by access to the internet, fixed broadband, fixed telephone and mobile telephone (Avom et al., 2020) and are taken from the World Development Indicator (WDI, 2022). ICT is positively associated with happiness (Figure 1).

Figure 1: Correlation between ICT diffusion and Subjective Well-Being (SWB)



Source: Authors.

To make the analysis informative, our control variables are mainly economic, demographic and social variables. By focusing on the economic and non-economic drivers of happiness, we are able to assess the unfettered effect of ICT diffusion in DCs. According to Easterlin (2001), Frey (2018), Frey and Stutzer (2002) According to the survey, people with incomes unambiguously consider themselves to be more satisfied with their lives than people with low incomes. Di Tella et al (2001), Frey and Stutzer (2002) The study shows that people seem to be happier when inflation and unemployment are low. Helliwell and Aknin (2018) found that countries with higher health expectancy at birth have also been documented as being associated with higher levels of happiness. Furthermore, the table of descriptive statistics (Table 1) shows a low dispersion of the sample variables. This is visible because the values of the standard deviations are lower than the mean values. Except for inflation, which varies greatly.

Table 1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Life ladder	1139	4.949	.893	2.375	7.615
Fixed broadband	1035	5.185	6.85	0	34.011
lngdp2015	1132	7.809	.94	5.642	9.561
Inflation	1131	7.588	22.839	-30.2	558.56
Population	1139	1.59	1.205	-1.745	6.559
Health	1139	67.974	7.554	43.853	80.465

Source: Authors.

4. Results and discussion

4.1. Basic results and discussion

Overall, ICT captured by fixed broadband connectivity has a positive and significant effect on SWB (Table 2). Column (1) presents the results of the POLS with country effect. Subsequently we turn to methods that take into account the individual dimension. We start with fixed effects (FE) and random effects (RE) methods. The Hausman test suggests the existence of fixed effects. We then perform post-estimation tests to validate the model. The results show that there is autocorrelation of errors and heteroscedasticity. We correct for these errors using the Feasible Generalized Least Squares (F-GLS) method (Column 4). In column 5, we correct for any endogeneity bias that may arise from our analysis in a dynamic model represented in our equation (2). The TIC coefficients remain positive and significant when the method is changed.

Table 2: Baseline results

	Dependent variable: Life ladder				
	POLS	FE	RE	F-GLS	sGMM
Variables	(1)	(2)	(3)	(4)	(5)
Lifeladder(t-1)					0.276***
					(0.0154)
Fixed broadband	0.00824**	0.00824**	0.00811**	0.00655**	0.0171***
	(0.00406)	(0.00412)	(0.00367)	(0.00329)	(0.00187)
lngdp2015	1.159***	1.159***	0.732***	0.574***	0.292***
	(0.177)	(0.150)	(0.0704)	(0.0375)	(0.0268)
Inflation	-0.00365*	-0.00365*	-0.00311*	-0.000469	0.00122***
	(0.00207)	(0.00188)	(0.00185)	(0.00124)	(0.000421)
Population	0.0958**	0.0958***	0.0759***	0.0921***	0.0645***
	(0.0377)	(0.0324)	(0.0285)	(0.0247)	(0.00879)
Health	-0.0559***	-0.0559***	-0.0169**	0.0176***	0.0210***
	(0.0105)	(0.00946)	(0.00736)	(0.00487)	(0.00248)
Constant	-0.446	-0.439	0.219	-0.899***	-0.318*
	(1.022)	(1.019)	(0.504)	(0.300)	(0.176)
Country effect	Yes	No	No	No	No
Comments	1,027	1,027	1,027	1,024	879
R-squared	0.808	0.114			
Wald				0.0000	
Country		94	94	91	90
Instrument					72
AR(1) (P-value)					1.83e-08
AR(2) (P-value)					0.110
Hansen test (P-value)					0.140
Test for heteroskedasticity = 0.0003	Hausman Test = 0.000		Test for autocorrelation = 0.0000		
	Mean VIF = 1.76				

*Source: Authors. Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1,*

In other words, an increase in ICT of 1 percentage point leads to an improvement in SWB on average of about 0.01 points. Plausible explanations lie in several areas. First, the more people use ICT, the happier they are. The other effect is the network effect. The more people who start using the internet, the happier the existing internet users are. There is no way to distinguish these two effects from the data. They may well co-exist. It may be that network effects dominates when ICT is widespread, while the individual effects of personal ICT use are more important when ICT use is limited. This result is consistent with those of Fambeu (2023); Avom and Malah (2022); Maurseth (2020). But increased and uncontrolled access to ICT by individuals could have an adverse effect on happiness, specifically increasing isolation, obesity and harming mental health and education, as noted by Bhuler et al (2013); Bruni and Stanca (2008); Li and Chung (2006).

The results of the control variables suggest a positive and significant relationship between the level of income per capita and happiness (Easterlin, 2001; Frey, 2018). However, this result somewhat contradicts the famous Easterlin paradox according to which, beyond a certain threshold, further increases in income or GDP per capita do not necessarily translate into higher levels of individual happiness. The sign of inflation is not stable. But in most cases, inflation is negatively and significantly related to the scale-of-life index, as inflation could decrease subjective well-being by eroding the purchasing power of households. From a temporal point of view, it could decrease the profitability of financial investments in the sense of the Fisher relationship. Population growth is positively and significantly related to the scale of living index. The results do not validate the famous Malthusian hypothesis explaining the imbalance between the growth of resources necessary to determine well-being and population growth. Life expectancy positively and significantly explains happiness in the countries in our sample. This is consistent with the results found by Helliwell and Aknin (2018) which find that countries

with a higher health expectancy at birth are associated with a higher level of happiness. This means that the subjective nature of happiness is also a matter of apprehension.

4.2. Robustness analysis

4.2.1. Robustness by taking into account governance indicators

Table 3: Consideration of governance

	Variable estimate: sGMM					
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Life ladder(t-1)	0.223***	0.272***	0.291***	0.262***	0.226***	0.254***
	(0.0160)	(0.0107)	(0.0159)	(0.0157)	(0.0187)	(0.0156)
Fixed broadband	0.0214***	0.0161***	0.0137***	0.0185***	0.0229***	0.0233***
	(0.00225)	(0.00134)	(0.00238)	(0.00223)	(0.00227)	(0.00226)
Corruption	-0.357***					
	(0.0748)					
Governement_eff		-0.0681***				
		(0.0115)				
Political_stab			0.131***			
			(0.0378)			
Regulation_qual				-0.124**		
				(0.0533)		
Rule					-0.395***	
					(0.0808)	
Voice_account						-0.185***
						(0.0626)
Constant	-1.091***	-0.574***	-0.0311	-0.596***	-1.174***	-0.426**
	(0.232)	(0.109)	(0.176)	(0.184)	(0.240)	(0.198)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Country effects	No	No	No	No	No	No
Comments	879	879	879	879	879	879
Country	90	90	90	90	90	90
Instrument	72	84	72	72	72	72
AR(1) (P-value)	7.89e-08	4.58e-08	1.39e-08	1.78e-08	3.89e-08	3.15e-08
AR(2) (P-value)	0.0986	0.106	0.110	0.106	0.0904	0.0980
Hansen test (P-value)	0.116	0.310	0.154	0.118	0.119	0.112

*Source: Authors. Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*

It is possible that the relationship between ICT and happiness is simply related to the unobserved heterogeneity effect. To account for this, we control by inserting institutional factors, drawing on the empirical literature on the determinants of happiness. Studies such as those by Moller et al (2017) and Njangang (2019) have shown that the institutional framework and in particular governance improves the well-being of individuals in developing countries. The results remain consistent.

4.2.2. Robustness with consideration of other ICT measures

In Table (6) we present the results for the estimates of equation (2), the variable measuring ICT diffusion keeps a positive and significant coefficient at 1% in column (1). This is the same for the other measures, i.e. fixed telephone, mobile telephone except for the internet which maintains a negative sign with happiness. Therefore, these results suggest that, holding all other factors constant, a higher level of ICT diffusion boosts people's happiness.

Our results also suggest that the effect of fixed-line telephone diffusion is greater than other ICT measures in the countries in our sample. Also, the coefficients of the lagged dependent variable are relatively large and highly significant at the 1% level. This suggests that happiness shows persistence over time and that, therefore, its past levels are strongly associated with the present. Specifically, countries where the population has a higher scale-of-life index will tend to have higher levels of happiness in the future. This finding supports the idea that happiness

has a memory effect. Overall, the control variables show the expected signs and keep the signs of the baseline estimate.

Table 4: Consideration of alternative ICT measures

Variables	Fixed broadband (1)	Fixed phone (2)	Internet (3)	Mobile phone (4)
Life ladder (t-1)	0.276***	0.256***	0.877***	0.269***
	(0.0154)	(0.0146)	(0.0462)	(0.0148)
lngdp2015	0.292***	0.228***	0.0753**	0.308***
	(0.0268)	(0.0238)	(0.0298)	(0.0316)
Inflation	0.00122***	-0.000664**	-0.00142	0.00273***
	(0.000421)	(0.000312)	(0.00122)	(0.000446)
Population	0.0645***	0.0930***	-0.0144*	0.0268***
	(0.00879)	(0.00866)	(0.00862)	(0.00767)
Health	0.0210***	0.0230***	0.00576**	0.0222***
	(0.00248)	(0.00321)	(0.00259)	(0.00298)
Fixed broadband	0.0171***			
	(0.00187)			
Fixed phone		0.0259***		
		(0.00367)		
Internet			-0.00331***	
			(0.00106)	
Mobile phone				0.00109**
				(0.000471)
Constant	-0.318*	-0.0484	-0.207	-0.442**
	(0.176)	(0.225)	(0.177)	(0.211)
Country effects	No	No	No	No
Comments	879	922	885	929
Country	90	91	89	91
Instruments	72	72	42	72
AR(1) (P-value)	1.83e-08	2.10e-08	3.01e-09	1.13e-08
AR(2) (P-value)	0.110	0.130	0.493	0.156
Hansen test (P-value)	0.140	0.103	0.256	0.129

*Source: Authors. Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1,*

To ensure that our results sufficiently address endogeneity issues, we provide a number of diagnostic tests with the S-GMM results. These diagnostic tests include the Sargan/Hansen test for instrument validity and model non-overidentification, the AR(1) and AR(2) tests for first and second order serial correlation respectively. As can be seen in all our different tables, we do not reject the null hypothesis of instrument validity in the Hansen test. Indeed, the insignificance of the Hansen statistics indicates that the instruments used are valid and that the model does not suffer from over-identification. Since the p-value of the AR(1) statistic is significant in all tables, we can conclude that there is a first-order correlation in the model, while the non-significance of the AR (2) statistic shows that there is no second-order correlation.

4.2.3. Robustness with consideration of the level of development

In table (5) we present the effects according to the level of development. Overall, we notice that the lagged values of the life-span index affect the present values more strongly than in the overall model. In column (1) we present the total effect as found in the previous table. In column (2) we present the results for the upper-middle income countries. The effect of ICT diffusion is negative and significant at 1%. In columns (3) we present the results for lower middle income countries. ICT diffusion is positive and significant at the 10% level. Column (4) presents the results for low-income countries. ICT diffusion significantly influences happiness.

Table 5: Effect of ICT diffusion on happiness by income level

Variables	Total (1)	Upper Middle Income (2)	Lower Middle Income (3)	Lower Income (4)
Life ladder (t-1)	0.276***	0.610***	0.932***	0.697***
	(0.0154)	(0.0582)	(0.0422)	(0.0554)
Fixed broadband	0.0171***	-0.0109***	0.0110*	-0.00832***
	(0.00187)	(0.00329)	(0.00623)	(0.00203)
lngdp2015	0.292***	0.337***	-0.0841**	0.0926***
	(0.0268)	(0.102)	(0.0397)	(0.0265)
Inflation	0.00122***	0.00499***	-0.00470***	0.00304***
	(0.000421)	(0.00101)	(0.00169)	(0.000980)
Popgrow	0.0645***	-0.0151	0.0252**	0.0845***
	(0.00879)	(0.0166)	(0.0106)	(0.0287)
Lifexpect	0.0210***	0.0306***	0.00471**	-0.0171***
	(0.00248)	(0.00778)	(0.00198)	(0.00324)
Constant	-0.318*	-2.914***	0.625**	1.434***
	(0.176)	(1.028)	(0.251)	(0.472)
Country effect	No	No	No	No
Comments	879	389	349	141
Country	90	36	34	20
Instrument	72	24	24	18
AR(1) (P-value)	1.83e-08	5.15e-05	4.78e-05	0.0200
AR(2) (P-value)	0.110	0.768	0.694	0.358
Hansen test (P-value)	0.140	0.120	0.289	0.413

*Source: Authors. Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*

Conclusion

The objective of this paper is to investigate the effects of ICT diffusion on subjective well-being. Using a sample of 98 developing countries over the period 2005-2020 and a dynamic approach, we found a positive relationship between ICT diffusion and subjective well-being. More specifically, we found that ICT diffusion tends to increase happiness, but that this effect differs according to the level of development. Indeed, by studying the heterogeneity of results across countries, we found that the positive effect of ICTs on happiness tends to be amplified in middle-income countries, both directly and indirectly. Developing countries should take steps to control the perverse effects of ICTs and encourage their productive use. Several perspectives can be drawn from this work. Future studies could analyse, firstly, the non-linear relationship between ICT and happiness. Secondly, they could also take into account measures of the quality and quantity of ICT. Finally, it is interesting to take into account the dimensions of ICTs, i.e. access, use and penetration of the Internet.

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Appendices

Annex 1: Data description and sources

Variables	*Definitions*	*Sources*

Happiness index	*Subjective well-being obtained by inviting respondents to think of their lives as a ladder, with the worst possible life for them as 0, and the best possible life as 10.*	*WHR (2021)*
GDP per capita	*GDP per capita is gross domestic product divided by midyear population.*	*WDI(2021)*
Health	*Life expectancy at birth.*	*WDI(2021)*
Population growth	*Exponential rate of growth of midyear population from year t-1 to t.*	*WDI(2021)*
Inflation	*Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals such as yearly.*	*WDI(2021)*
ICT	Information and Communication Technology (04) : *Fixed Broadband subscriptions: refers to fixed subscriptions to high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s.* *Internet users: are individuals who have used the Internet (from any location) in the last 3 months. The Internet can be used via a computer, mobile phone, personal digital assistant, games machine, digital TV etc.* *Mobile Phone subscriptions: are subscriptions to a public mobile telephone service that provide access to the PSTN using cellular technology.* *Fixed Phone subscriptions: refers to the sum of active number of analogue fixed telephone lines, voice-over-IP (VoIP) subscriptions, fixed wireless local loop (WLL) subscriptions, ISDN voice-channel equivalents and fixed public payphones.*	*WDI(2021)*
Governance	*Control of Corruption: Estimate; Government Effectiveness: Estimate; Political Stability and Absence of Violence/Terrorism: Estimate; Regulatory Quality: Estimate; Rule of Law: Estimate; Voice and Accountability: Estimate.*	*WGI(2021)*

Note: authors' construction. WHR, WDI and WGI respectively designates World Happiness Report, World Development Indicators and World Governance Indicators.

Annex 2: List of countries

Albania	*Central African Republic*	*India*	*Moldova*	*Somalia*
Algeria	*Chad*	*Indonesia*	*Mongolia*	*South Africa*
Angola	*China*	*Iraq*	*Montenegro*	*South Sudan*
Argentina	*Colombia*	*Jamaica*	*Morocco*	*Sri Lanka*
Armenia	*Comoros*	*Jordan*	*Mozambique*	*Sudan*
Azerbaijan	*Costa Rica*	*Kazakhstan*	*Myanmar*	*Suriname*
Bangladesh	*Cuba*	*Kenya*	*Namibia*	*Tajikistan*
Belarus	*Dominican Republic*	*Kosovo*	*Nepal*	*Tanzania*
Belize	*Ecuador*	*Lebanon*	*Nicaragua*	*Thailand*
Benin	*El Salvador*	*Lesotho*	*Niger*	*Togo*
Bhutan	*Eswatini*	*Liberia*	*Nigeria*	*Tunisia*
Bolivia	*Ethiopia*	*Libya*	*North Macedonia*	*Turkmenistan*
Bosnia and Herzegovina	*Gabon*	*Madagascar*	*Pakistan*	*Uganda*
Botswana	*Georgia*	*Malawi*	*Paraguay*	*Ukraine*
Brazil	*Ghana*	*Malaysia*	*Peru*	*Uzbekistan*
Bulgaria	*Guatemala*	*Maldives*	*Philippines*	*Zambia*
Burkina Faso	*Guinea*	*Mali*	*Rwanda*	*Zimbabwe*
Burundi	*Guyana*	*Mauritania*	*Senegal*	
Cambodia	*Haiti*	*Mauritius*	*Serbia*	
Cameroon	*Honduras*	*Mexico City*	*Sierra Leone*	

Note: authors' construction