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IMPACT OF SOCIAL MEDIA ON ECONOMIC GROWTH -EVIDENCE FROM SOCIAL MEDIA

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ABSTRACT

This paper attempts to investigate the impact of social media on economic growth. Using information obtained from memberships to social networks, we find that social media has a negative and significant impact on economic growth. This provides evidence in favour of our hypothesis that social media increases the search costs for information and also increases the substitution effect from labour to leisure thereby producing a negative impact on growth.

Keywords: social media, social networking, economic growth.

JEL: C10, C21, 040

1. Introduction

Is there a link between social media and economic activity? Our paper attempts to examine if social media is a significant determinant of economic growth. The motivation for our research is based on the observation that the use of social media (SM) worldwide has reached a significantly high level. For instance SM membership in the US has increased from 33% to 58%, while in Brazil and China, it has increased (respectively) from 64% to 75% and 47% to 68% (Hutton and Fosdick, 2011). SM is becoming a new channel for the accumulation of human and intellectual capital, as evidenced by the proportion of people who use SM to learn, share knowledge and access expertise (Fig. 1).

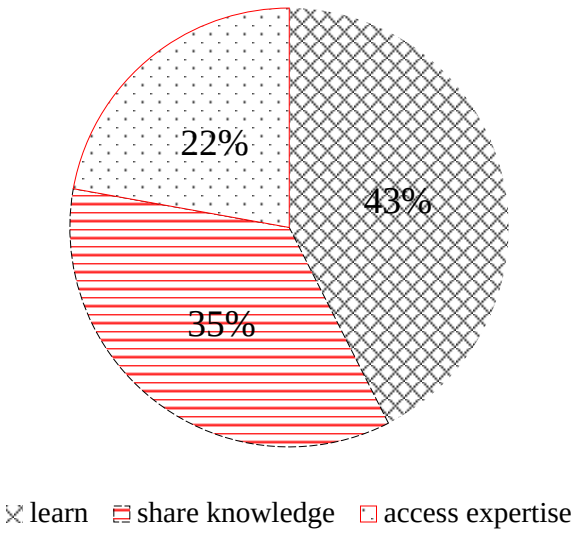

Figure 1: Uses of Social Media (Forbes, 2012)

However, SM usage does not necessarily result in increased productivity. Indeed, it can be argued that some content consumed on SM is of little economic value (e.g. 'LOLCats') and can even distract user's attention from productive activities. Therefore without further investigation, it is not clear to what extent social media contributes to economic growth.

So far there has been no published work on the impact of social media and economic growth and this is the main contribution of this paper. Our objective is to stimulate a discussion on what is a very timely issue and to influence the ongoing debate on the economic impact of social media.

2. Two Hypotheses on Social Media and Economic Growth

Our first hypothesis for a positive effect of SM on economic growth is very similar to the one traditionally used for Internet or broadband: such infrastructures generate and distribute decentralised information and ideas in markets that increasingly rely on information as input (Czernich et al., 2011). This effect is expected to be even higher for SM, as they completely remove barriers to entry and enable anyone to publish information and ideas at virtually no cost (Rayna and Striukova, 2010). The diversity of media involved (blogs, wikis, videos, pictures, etc.) further increases the potential of SM in regard to diffusion of knowledge and information, thereby enabling a multi-channel codification and diffusion of knowledge.

There are, however, arguments supporting a negative impact of SM on economic growth and this is our second hypothesis. The first argument relates to the potential increase in transaction costs (search, coordination, etc.) because of the very large amount of content published on SM (Rayna and Striukova, 2010). The other arguments relate to substitution effects: 1) SM (which have become ubiquitous) may be distracting workers and hereby reduce their productivity (substitution of labour for leisure); 2) SM are mainly non-monetary (no one is paid to produce content, no one pays to consume it) and hence only partially accounted for in GDP, hence substitution of paid-for leisure (e.g. newspapers, films, books) for non-monetary leisure (SM) may impact GDP negatively and, hence, the measured economic growth. While most SM are funded through advertisement, advertisement expenses

or revenues are a poor proxy for SM consumption, as they are only loosely related to SM production or consumption.

3. Empirical Model

We adapt an endogenous growth model by Czernich *et al*. (2011) by introducing a measure for social media as an additional determinant of economic growth as shown in (1). Appendix A presents a comprehensive overview of the variables, definitions, and data sources. To avoid spurious regression, we use stationary variables (growth rates) and control for the logarithm of initial real GDP per capita observed in the 1998 in order to capture convergence. By indicating with lower cases the growth rates of variables, the benchmark regression is:

$$y_i^{2013} = \beta_0 + \beta_1 sm_i^{'12} + \beta_2 a_i^{'07/'12} + \beta_3 \left(sm_i^{'12} * a_i^{'12} \right) + \beta_4 k_i^{'07/'12} + \beta_5 l_i^{'07/'12} + \beta_6 h_i^{'07/'12} + \beta_7 tr_i^{'07/'12} + \beta_8 \log(Y_{i,1998}) + \varepsilon_i \quad (1)$$

with $i = 1,...,88$.

3.1 Results

The main results as shown by models 2, 4, 6, 10 and 12 in Table 1. An increase in SM penetration has a negative and significant effect on economic growth. In particular, a 1% increase in the number of SM users contributes to a decrease in GDP growth of between 0.02% – 0.06%.

The results support our second hypothesis that social media can have a negative impact because the vast amount of content published on SM increases the search costs involved in filtering relevant information. Furthermore, the amount of time workers devote to networking on social meda reduces the labour productivity.

3.2 Drawbacks

Our analysis has three key drawbacks. The first are measurement errors in the existing proxies of SM users and technology state. Without access to more detailed statistics on SM, it is difficult to eliminate users who still have personal accounts but are not active anymore. On the other hand, there could be users with several accounts thereby overestimating the number of users.

Secondly are problems of endogeneity arising from the potential bi-directional causality arising from the regressors, including SM, and growth. We attempt to minimise this by introducing lags through regressing the growth rate of real GDP in the 2013 on regressors measured in the period between 2007-2012.

Thirdly, the period of the great diffusion of online SM (see Figure 2) coincides with the worst global crisis since the great depression. Consequently, it is difficult to disentangle the structural relationship between SM, technology and economic growth. So we attempt to the minimize the risk of errors in our estimation by using the growth rates of the determinants of economic growth between 2007 and 2012.

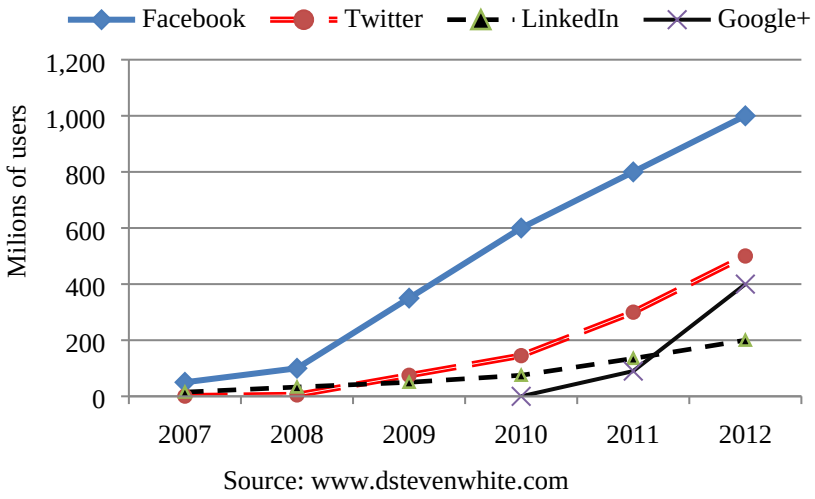

Figure 2: Social media growth 2007- 2012

Table 1: Dep. Var.: growth rate of real GDP per capita in the 2013

models	**LSDV**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Gr. Soc.Media (2012)	--	--	-0.062** (-2.22)	0.0035 (0.26)	-0.057* (-2.03)	--	-0.02** (-2.13)	0.017 (0.3)	-0.001 (-0.11)	--	-0.016* (-1.73)	-0.015 (-0.39)	-0.017* (-1.92)
Gr. Patents (2007-2012)	0.0001* (1.70)	0.077** (2.55)	0.006 (0.26)	-0.005 (-0.23)	0.012 (0.51)	--	--	--	--	--	--	--	--
Gr.Soc.Media(2012) Gr. Patents (2012)*	--	--	--	--	0.000 (-1.01)	--	--	--	--	--	--	--	--
Gr. Techn. index (2007-2012)	--	--	--	--	--	-0.005 (-0.50)	-0.022* (-1.84)	-0.019 (-1.58)	-0.007 (-0.70)	--	--	--	--
Gr.Soc.Media(2012) Gr.Techn. ind. (2012)*	--	--	--	--	--	--	--	-0.002 (-0.73)	--	--	--	--	--
Gr. Internet (2007-2012)	--	--	--	--	--	--	--	--	--	-0.001 (-0.19)	-0.016** (-2.09)	-0.016** (-2.13)	-0.016** (-2.04)
Gr.Soc.Media(2012) Gr.Internet (2012)*	--	--	--	--	--	--	--	--	--	--	--	0.000 (-0.02)	--
Gr. K on Gdp (2007-2012)	0.048** (2.37)	0.018 (0.22)	0.186*** (3.18)	0.228*** (4.05)	0.194*** (3.16)	0.051 (1.44)	0.178*** (3.13)	0.183*** (3.15)	0.196*** (4.56)	0.017 (0.43)	0.176*** (3.11)	0.176*** (2.94)	0.161*** (3.55)
Gr. Part. Lab. Force (2007-2012)	0.058 (0.72)	-0.491 (-0.95)	0.088 (0.29)	--	0.074 (0.24)	-0.329 (-0.84)	-0.236 (-0.78)	-0.257 (-0.83)	--	-0.060 (-0.13)	-0.148 (-0.5)	-0.149 (-0.47)	--
Gr. Education . (2007-2012)	-0.083** (-2.49)	-0.448* (-1.71)	0.217 (1.09)	--	0.216 (1.09)	-0.255** (-2.32)	-0.053 (-0.49)	-0.062 (-0.61)	--	-0.242** (-2.65)	0.003 (0.02)	0.003 (0.02)	0.038 (0.32)
Gr. Open Trade (2007-2012)	0.044** (2.14)	0.215 (1.32)	0.03 (0.24)	--	0.02 (0.16)	0.044 (0.61)	0.15 (1.24)	0.142 (1.15)	--	0.04 (0.61)	0.068 (0.62)	0.067 (0.59)	--
Log (Gdp cap) t=1998	-0.868*** (-12.96)	-1.254*** (-4.87)	-0.987*** (-5.85)	-0.824*** (-6.12)	-0.995*** (-5.9)	-1.273*** (-5.15)	-1.062*** (-5.73)	-1.064*** (-5.74)	-0.834*** (-5.56)	-1.137*** (-5.04)	-1.05*** (-5.5)	-1.05*** (-5.43)	-0.956*** (-5.95)
Constant	10.347*** (15.90)	13.109*** (5.13)	11.069*** (6.2)	9.071*** (6.9)	11.138*** (6.25)	13.45*** (5.21)	12.131*** (6.14)	11.899*** (5.89)	9.312*** (5.94)	12.152*** (5.49)	11.483*** (6.03)	11.478*** (5.95)	10.575*** (6.82)
Obs.	872(14/88)	43	40	58	40	61	52	53	83	68	53	53	55
R^2-adjusted	0.405	0.529	0.615	0.56	0.61	0.471	0.525	0.524	0.48	0.329	0.521	0.51	0.555
Jarque-Bera Test[a]	0.000	0.886	0.705	0.608	0.611	0.103	0.545	0.864	0.000	0.000	0.668	0.678	0.718

*Notes: ***,**,*Denotes significant at 1% , 5% and 10% level, respectively. The numbers in parenthesis are the t-ratios. Standard errors are robust to heteroskedasticity (White method). [a]Jarque-Bera Test, (p-value) the reported p-value is the probability that a Jarque-Bera statistic exceeds (in absolute value) the observed value under the null hypothesis. Therefore, a small probability value leads to rejection of the null hypothesis of a normal distribution. LSDV model include period fixed effects.*

4. Conclusion

In this article, we test the effect of social media on economic growth for a cross-section of between 40 to 88 countries and find that it has a significant negative effect.

References

Czernich, N., Falck, O., Kretschmer, T. and Woessmann, L. (2011). Broadband Infrastructure and Economic Growth. The Economic Journal, 121: 505–532.

Forbes (2012). The Developing Role of Social Media, *Forbes*, August 2012. Available at [http://www.forbes.com/sites/moneywisewomen/2012/08/08/the-developing-role-of-social-media-in-the-modern-business-world/]. Accessed on 12th September, 2014.

Hutton, G. and Fosdick, M. (2011). The Globalisation of Social Media: Consumer Relationships with Brands evolve in the Digital Space. *Journal of Advertising Research*, 51 (4): 564 – 570.

Rayna, T. and Striukova, L. (2010). Web 2.0 is cheap: Supply exceeds demand. *Prometheus*, 28(3): 267–285.

APPENDIX A: DATABASE

Var.	Description	Source [Code]
Gdp^{cap}	GDP per capita (constant 2005 US$)	WDI [NY.GDP.PCAP.KD]
SM	Social Media penetration Index: [Social network users/Total Population] or [Facebook users/Total population]	WDI [SP.POP.TOT]; http://www.internetworldstats.com [Facebook users]; http://www.statista.com [social network users]
A^1	Patent applications, (per 100,000 residents)	WDI [100,000*IP.PAT.RESD/SP.POP.TOTL]
A^2	Technological Index is a composite index of Internet users (per 100 people), Fixed broadband Internet subscribers (per 100 people) and Secure Internet servers (per 1 million people). The weights are calculated by Principal Component Analysis for each year, separately.	WDI [a(IT.NET.USER.P2)+b(IT.NET.BBND.P2)+c(IT.NET.SECR.P6)]
A^3	Internet users (per 100 people)	WDI [IT.NET.USER.P2]
K	Propensity to capital accumulation is calculated as 100*(Gross capital formation (constant 2005 US$)/GDP constant 2005 US$)	WDI [100*NE.GDI.TOTL.KD/NY.GDP.MKTP.KD]
L	Labor force participation rate, total (% of total population)	WDI [100*SL.TLF.TOTL.IN/SP.POP.TOTL]
H	School enrolment, tertiary (% gross). It is the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the secondary level of education.	WDI [SE.SEC.ENRR]
Tr	Trade openness Index. (Exports of goods and services in current US$ + Imports of goods and services in current US$) / GDP in current US$.	WDI [(NE.EXP.GNFS.KD+NE.IMP.GNFS.KD)/NY.GDP.MKTP.KD]
Fix.Inter	Fixed broadband Internet subscribers (per 100 people) – Used for PCA	WDI [IT.NET.BBND.P2]
Sec.Serv	Secure Internet servers (per 1 million people) – Used for PCA	WDI [IT.NET.SECR.P6]
Countries	Albania; Algeria; Argentina; Australia*; Austria*; Azerbaijan*; Bangladesh*; Belgium*; Bolivia; Bosnia and Herzeg.; Brazil; Bulgaria*; Cameroon; Canada; Chile*; China*; Colombia*; Costa Rica; Croatia; Czech Republic*; Denmark*; Dominican Republic; Ecuador; Egypt, Arab Rep.; El Salvador; Estonia*; Ethiopia; Finland*; France*; Georgia; Germany*; Ghana; Greece; Honduras; Hong Kong*; India; Indonesia; Ireland*; Israel; Italy; Japan*; Jordan*; Kenya; Korea, South*; Lebanon; Macedonia; Malaysia; Mexico*; Morocco*; Nepal; Netherlands*; New Zealand*; Nicaragua; Norway*; Pakistan*; Panama; Paraguay; Peru*; Philippines; Poland*; Portugal*; Romania*; Russian Fed.; Saudi Arabia; Senegal; Serbia*; Singapore; South Africa*; Spain*; Sri Lanka; Sweden*; Switzerland*; Tanzania; Thailand*; Tunisia; Turkey*; Ukraine*; United Kingdom*; United States*; Uruguay; Venezuela, RB; Vietnam.	A) On the right there are the 83 Countries included in the widest model (regression 8). B) * indicates the 44 countries included in the less inclusive model (regression 2). C) For the underlined countries we use the number of social network users (http://www.statista.com/). For other countries. we use the number of Facebook users (http://www.internetworldstats.com).