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Is internet freedom good for society?

Nataliia Tashevtseva
The University of Melbourne, natasha.tashevtseva@unimelb.edu.au

Suelette Dreyfus
The University of Melbourne, suelette@unimelb.edu.au

Udaya Parampalli
The University of Melbourne, udaya@unimelb.edu.au

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Research-in-progress

Nataliia Tashevtseva
School of Computing and Information Systems
The University of Melbourne
Melbourne, Australia
Email: ntashevtseva@unimelb.edu.au

Suelette Dreyfus
School of Computing and Information Systems
The University of Melbourne
Melbourne, Australia
Email: suelette@unimelb.edu.au

Udaya Parampalli
School of Computing and Information Systems
The University of Melbourne
Melbourne, Australia
Email: udaya@unimelb.edu.au

Abstract

The Internet was founded as a technology of freedom 'for the benefit of scientists, engineers, and their students, with no direct military application in mind' (Castells, 2001). An analysis of the literature from 2000 to today shows substantial growth in the number of published papers relating to Internet Freedom and Digital Rights, reflecting an emerging field of research. Such papers illustrate that many western societies work on the assumption that a free internet is a 'good thing' - but is it? We propose a methodology for analysing both correlation and possible causation between internet freedom and indicators of the welfare of society, as well as initial hypotheses on the correlations. Fixed effects regression is used to quantify the positive relationship between the level of the internet 'freedom' and indicators of the welfare of society, finding 1.2-1.9% increase for each additional unit of FOTN score.

Keywords digital rights, internet freedom, socio-economic outcomes, internet impact

1 Introduction

Now we can hardly imagine our life without the Internet, as it has become a core pillar of the modern information society, with nearly 60% of the worldwide population being active internet users in 2021 (Statista 2022), and 95% of all known existing information being digitised and accessible on the Internet (Hilbert and López 2011). Originally the Internet was founded as a technology of freedom (Kling and Castells 2002). However, with the expansion of technology, restrictions and censorship sprang to life. Concerns about defining and protecting the most important aspects of freedom on the internet have grown too.

According to the 2021 report made by Freedom House, Global Internet Freedom (IF) declined for the 11th consecutive year worldwide (Shahbaz and Funk, 2022). In 2021, Access Now and the #KeepItOn coalition documented 182 internet shutdowns across 34 countries, 23 more shutdowns than a year before (Hernandez et al. 2022). Generally considered indicators of low internet freedom, Internet disruptions and shutdowns have a substantial negative impact on societies and the economy. The last year highlighted how vicious they could be (Shahbaz and Funk, 2022). While the number of shutdowns is increasing, so does the length of several cases and the severity of the impact. The COVID pandemic has again underscored the importance of Internet freedom. 0

Internet Freedom cannot be considered detached from real-life indices as the Internet is becoming an essential part of society. Access to information increases human capital (Barro 2001), which is, in turn, beneficial for Economic performance. The Internet has become a critical tool for people's life and business processes. Meanwhile, around 69-85% of businesses use broadband connections to implement basic activities in medium connectivity countries (Deloitte 2016). Thus, every internet disruption is very costly: the total internet shutdown time worldwide was 8,218 hours costing 3 billion U.S. dollars to the global economy (Statista 2021). There are two aspects of the Internet in the context of Freedom rights: Internet access rate and Internet Freedom level. Internet access has been proven to impact our society in various ways (Khazaeli and Stockemer 2013; Xu et al. 2019).

While arguments are asserted in the media on how Internet access enhances the quality of life and leads to economic growth, to the best of our knowledge this paper is the first academic enquiry into the a. the consequences of Internet Freedom and b. the correlation it has with important life indices. Internet Freedom began growing in the academic literature almost a decade ago. Since then, Internet use patterns have changed, and internet access and the internet have gained a completely different value for society. This research aims to fill that gap in the literature by creating a methodology for analysing Internet Freedom's impact on societies.

2 Internet Freedom and its emergence

With every year, the internet is becoming more integrated into society, making information the freest than it has ever been. People are using social networks to share information and spread ideas and awareness. The nature of the internet suggests that information is spread uncontrolled, which raises the concern of the internet being used maliciously or as a propaganda tool (Lock and Ludolph 2019). Moreover, governments are introducing more regulations on data for private companies and exploiting them to gain more access to private data. As more funding is put into providing and expanding Internet Freedom around the world, we can see that this topic is gaining more attention. The behaviour of the academic literature supplements that statement throughout the last years. Our analysis of the literature from 1990 (as we consider that the Internet became publicly available on the 6th of August 1991, we use the year 1990 as a starting point) shows substantial growth in the number of published papers relating to Internet Freedom and Digital Rights (Figure 1). This reflects an emerging field of research. We excluded years 2020 and 2021 from our analysis as they were influenced by pandemic shock. The year 2022 just started when this research is being conducted.

We used pre-identified keywords related to the topic of Internet Freedom for querying Google Scholar. This initial analysis aims to create the context for our deeper correlation analysis that follows.

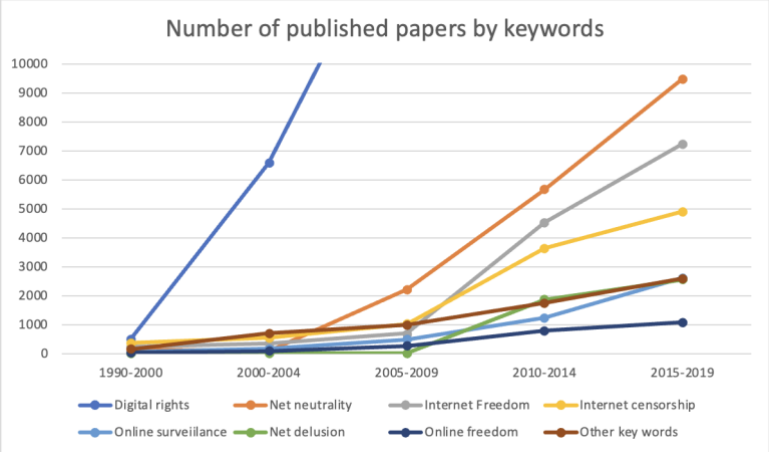

Figure 1. The number of published research papers on topics close-related to Internet Freedom searched by quoted keywords

3 Methodology

In this section, we present an overview of the methodology used. First, we will define the hypothesis which we aim to prove: "Internet Freedom has an impact on life indices in such a way that 1 point increase in the Freedom on the Net (FOTN) score by 1 point is associated with a certain increase in a particular life indicator score (economic, social, subjective, governance) on some amount". Second, we will define the variables used to create the correlation and causation models. After this, we describe the statistical approach. The qualitative part of the research is not discussed in this paper as this is a 'research in progress', though it's planned to be implemented further.

3.1 Independent variable: Internet Freedom level

For the quantitative part of this research, we use the methodology and definition of Internet Freedom suggested by Freedom House, which is aligned with Article 19 of the Universal Declaration of Human Rights (Freedom House 2022). The "Freedom on the Net" (FOTN) score represents each country's level of internet freedom based on a set of methodology questions, which includes 21 questions divided into 3 categories: Obstacles to access, Limits on content and Violations of user rights. A higher number of points would mean a freer situation (0 – Not Free, 100 – completely Free). Data on the Internet Freedom of 70 countries are analysed and added to the final dataset.

3.2 Dependent variables: the welfare of society indices

We have identified a combination of 3 indicators: economic, social, and subjective indicators, which are helpful for measuring the quality of life (Diener and Suh 1997). Government decisions have power over all these welfare measures and directly influence society's well-being. In previous research, governance indicators (e.g., democracy indicators) are affected by Internet access rate (Khazaeli and Stockemer 2013), as well as economic and social. Therefore, when measuring the "good life", we consider the following 4 indicators: economic, social, subjective, and governance.

- **Economic activity** indicators are considered useful when it comes to revealing insights into the economic well-being of society. For this research, we use the basic economic indicators: Gross Domestic Product per capita (GDPpc) and Gross National Income (GNI) per capita. As research proceeds, other economic indicators will be added to the analysis. The data is collected from the World Bank Databases, years 2011-2021 were used (as this is the only period for which FOTN scores are available)
- **Social** indicators are obtained from 2 projects: the "Quality of life" index from NUMBEO and "How's life?" from OECD. The Quality of life index (QOLI) estimates the overall quality of life level (NUMBEO 2022). The well-being indicator from the "How's life?" project is calculated based on a multi-dimensional framework covering 11 dimensions: income and wealth, jobs and earnings, housing, health, education, work-life balance, environment, social connections, civic engagement, safety, subjective well-being (OECD 2020).

- **Subjective** indicators representing mental states and how people experience their lives are obtained from the "How's life?" project: the life satisfaction and negative affect balance indices are considered.
- **Governance** consists of the traditions and institutions by which authority in a country is exercised (The World Bank 2022). The indicators used are obtained from the Worldwide Governance Indicators project, which aims to report on six broad governance dimensions for over 200 countries from 1996-2020.

3.3 Statistical approach

To examine whether there is a relationship between Internet Freedom on life indicators, we compile several datasets that include all available data on the Internet Freedom level (independent variable) and various life indices (dependent variables). As we are correlating Internet Freedom level to life indices, so the FOTN score is the main one and we include in our final dataset only those countries, for which the FOTN score is available (70 countries in 2022, however, for earlier years there are fewer data available). From all other datasets, we take available indicators for 70 identified countries. However, for some indicators, there are less data available (e.g., the "How's life" project only has 44 countries).

We measure the relationship between Internet Freedom and 'good' life indicators in 2 stages. First, we analyse Internet Freedom data to reveal further research patterns. Second, we implement panel Ordinary least squares (OLS) regression models to examine the causal relationships between Internet Freedom level and the number of life indicators. To prove the impact of Internet Freedom on life indices, we suggest using the OLS regression method and its extensions as the most appropriate and informative technique for use with panel data. In the case where there are n observations, the estimation of the predicted value of the dependent variable Y for the i-th observation is given by:

$$y_i = \beta_0 + \beta_1 x_i + \varepsilon,$$

Where x_i is the FOTN score (represents Internet Freedom), y_i would be the chosen life indices, β_0 is the model's intercept, ε is the random error with expectation 0 and variance σ^2. The question is to find the coefficient β_1, which would be the coefficient of interest. The following equation explains the regression model for the Fixed effects model:

$$y_{it} = \alpha_{country} + \gamma_t + \beta X_{it} + \varepsilon_{it}, i = 1, \dots, N - countries,$$

Where t – are years, ε – stochastic error, α *and* γ – country- and time-fixed effects, y – indices, X – the FOTN score. To make the model more realistic, we then add covariates – other economic indicators that have an impact on GDP. A 2020 study attempted to identify the set of factors that determine GDP per capita and as a result, the authors chose the model that included the following factors: Merchandise Trade (MT), Gross Domestic Savings (GDS), Gross Savings (GS), Final Consumption Expenditure (FCE), Foreign Direct Investment (FDI), and Net Income from Abroad (NIA) (Salma et al. 2020). We employ that approach and add suggested factors to our model as covariates. Robert J. Barro, while trying to emphasise the role of education in growth, used government consumption, the rule of law, international openness, the inflation rate, the fertility rate, the ratio of investment to GDP, the terms of trade, and the quantity and quality of schooling indicators as factors impacting growth (Barro 2001). In this research, we will also add those indicators as additional regressors to one of the models.

4 Results

4.1 Initial analysis of the datasets

One of the main concerns with the data at hand is that variation in the Freedom of the Net score throughout the years is insufficient to determine any causal effects on life indicators. If only minor fluctuations occur in the datasets, all relationships could be attributed to measurement error. The graphs below show paths for Freedom of the Net score (FOTN) adjusted for the initial (the first year with data available) level.

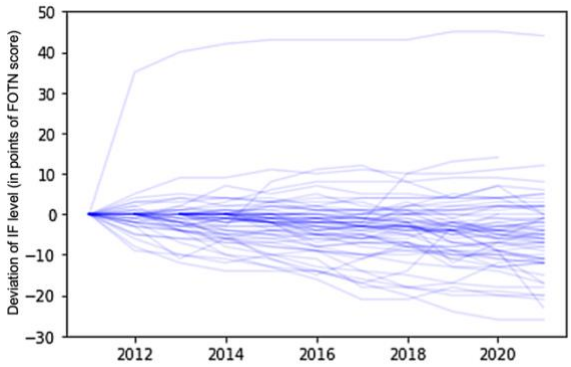

Figure 2. Deviations from the initial Internet Freedom level by countries. Notes: Graph shows dynamics of FOTN score by country (1st appearance in data is normalized to zero for each country)

Each line represents a country in the FOTN dataset for the years 2011-2021. Every point represents a deviation from each country's first available FOTN score. We can see that multiple countries deviated from the initial level by more than 5 points (of FOTN score). Furthermore, this graph substantiates the claim that the overall Internet Freedom level is gradually declining worldwide (we can see more lines fall below their baseline level). Notably, there are countries with rapid shocks at the IF level. For example, the FOTN score in Tunisia (+35 points in 2012) or India (-10 points in 2013). Shocks like this draw attention to the events in those countries during the decline/increase and can shed light on how the IF level interacts with other life indices. Here we expect that there will be visible cases when, after IF decline/rise, there will be an immediate or delayed response in the life indices level. Moreover, such cases would be helpful for further synthetic control analysis.

4.2 Model results

To estimate the causal effect of IF level on real-life outcomes, we gather a comprehensive dataset of Freedom of the Net combined with several socio-economic indices. The final dataset is panel data across countries surveyed by Freedom House and includes the FOTN score, outcomes of interest (such as GDP per capita and life satisfaction) and the corresponding covariates. The variables described in the previous chapter represent various welfare aspects and were treated as dependent variables in the regressions. Initial estimations were run to identify the causal relationship between Internet Freedom level and economic indicators without including other control variables. The models used at this stage are OLS regression over all countries in each given year, and a two-way fixed effects model ran over all available data. The fixed-effects model allows exploiting the panel nature of the data and yields causal estimates of the effect of interest.

All experiment results consistently show the expected outcomes at a significant level. For instance, the fixed-effect model shows that an additional point of the FOTN score is associated with a 254$ increase in GDP p.c. and a 1.76 increase in the Quality of Life index. For the economic indices (see Table 1, Panel A), the model yields result corresponding to a 1.9% increase in the GDP per capita and GNI indicators by each point added to the FOTN score. Estimation results for subjective indices (see Table 1, Panel B) are limited by the number of observations, so we consider the model insignificant and will investigate this case in further research. For social indicators (see Table 1, Panel B), the increase in the added value ranges from 1.4% to 1.7% of the mean value, meanwhile for governance indicators (WGI) (see Table 1, Panel C) this value ranges from 1.7% to 1.9%. These results substantiate our initial claim that Internet Freedom has positive outcomes in society.

Similarly, the OLS model for GDP and FOTN score ran over the years yields a consistently high positive effect of an increase in the FOTN score: from 2.4% to 3.2% added to GDP for each FOTN score point increased in different years between 2011 and 2021. Furthermore, we estimated the advanced model for GDP per capita with added control variables described in the Methodology section of this paper. As a result of this improvement R-squared measure, which illustrates how closely the model explains variation in GDP, increased from 0.45 to 0.65. The coefficient on the FOTN score decreased as we would expect but is still significant and shows that for each Internet Freedom level point (the FOTN score point) increase of 172.58$USD is added to the GDP per capita (1.3% added to the mean value). Some suggested controls were excluded from the model (educational attainment and net barter for terms of trade parameter) due to a lack of available data, while the Rule of the law indicator was excluded as it heavily correlated with the FOTN score (for each point of Rule of the Law added the FOTN score is

increased by 0.9758 point with R-squared 0.82 and P-value 0.0000). The final regression model is represented by: $GDP_{it} = \alpha_{country} + \gamma_t + 172.58 \cdot FOTN_{it} + \beta_1 X_{it} + \varepsilon_{it}$, $where\ X_{it} - set\ of\ regressors$

	Parameter	P-value	R-squared	# of obs.	F-statistics	Mean value of indicator	% added to the mean value
Panel A. Economic indicators							
GDP per capita	253.91	0.0000	0.4532	589	487.40	13160.25	1.9%
GNI	264.97	0.0000	0.4950	566	453.90	13708.45	1.9%
Panel B. Social and subjective indicators							
Negative affect balance	0.1731	0.0000	0.7507	155	463.73	13.6765	1.2%
Life satisfaction	0.0921	0.0000	0.9793	24	1088.6	72.7419	0.1%
Quality of life	1.7670	0.0000	0.8174	3730	1.67e+04	105.8612	1.6%
Health care	1.0219	0.0000	0.8968	3730	3.24e+04	64.4478	1.5%
Pollution index	0.88	0.0000	0.6550	3730	7080.5	62.3408	1.4%
Purchasing power index	1.0369	0.0000	0.7834	3730	1.349e+04	62.6827	1.7%
Safety index	0.8541	0.0000	0.8193	3730	1.69e+04	55.3964	1.5%
Panel C. Governance indicators							
Voice&Accountability	0.7928	0.0000	0.8916	521	4275.7	40.7830	1.9%
Political Stability	0.6551	0.0000	0.7442	521	1512.8	30.3002	1.8%
Government Effectiveness	0.9127	0.0000	0.8314	521	2564.0	53.1357	1.7%
Regulatory Quality	0.8984	0.0000	0.8426	521	2784.5	50.4649	1.8%
Rule of Law	0.8513	0.0000	0.8279	521	2501.8	48.5068	1.8%
Control of Corruption	0.8247	0.0000	0.7817	521	1861.7	47.3119	1.7%

Table 1. Fixed-effects model results for life indices

5 Discussion

So far, all our first round of results support the initial claim of Internet Freedom's positive impact on 'good' life indicators. As our research is still in progress, we are planning the further investigate the causal relationship between Internet Freedom and various specific life indices. We are aiming to improve the correlation models by adding control variables and exploring other methods, including qualitative research. Further experiments will be designed to prove the robustness of results gained in previous stages. These experiments might involve additional controls, dummy variables or method of instrumental variables. Moreover, we suggest exploring other life indicators to be added to our methodology.

6 Conclusion

The importance of and growing interest in Internet Freedom and its emergence as a research topic is highlighted by the growing number of academic literature published in recent years. However, none of

the current research literature we have detected in this field has attempted to measure, in a quantifiable manner, the relationship between Internet Freedom and 'good' life indices. This research attempts to establish a causal relationship between Internet Freedom and life indices to assess the accuracy of claimed positive impact of Internet Freedoms on societies. This question is important since it drives tens of millions of dollars in annual foreign aid spending and policies. To address this question, we designed fixed-effects models which consistently show the significant effect of Internet Freedom on social, economic, subjective and governance indices. Our model shows that generally increasing Internet Freedom level represented by increasing the FOTN score by 1 point leads to 1.2-3.2% of indices value added to its mean values, specifically: 172.58$ added to GDP per capita as established by our advanced fixed-effects regression model, 1.6% added to the Quality of Life index, 1.8% added to the governance indicators.

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