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## **Does Social Media Promote Democracy? Some Empirical Evidence**

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**Abstract**

This study explores the relationship between social media and democracy in a cross-section of over 125 countries around the world. We find the evidence of a strong, positive correlation between Facebook penetration (a proxy for social media) and democracy. We further show that the correlation between social media and democracy is stronger for low-income countries than high-income countries. Our lowest point estimates indicate that a one-standard deviation (about 18 percentage point) increase in Facebook penetration is associated with about 8-point (on a scale of 0–100) increase for the world sample and over 11 points improvement for low-income countries.

*JEL classification codes:* D72; D83; O1

*Keywords:* Democracy; Information; Facebook; Internet; Social Media

## 1 Introduction

Though several recent studies have argued that the liberation technology, such as the internet, mobile phones, and social media, has the potential to positively influence democratic outcomes (Diamond 2010; Saleh 2012); whether or not social media can promote democracy has not been empirically investigated in a cross-section of countries. Note that the empirical evidence on the relationship between the internet and democracy also remains mixed.<sup>1</sup> This is not surprising since the internet cannot only be used as a tool for democratization, but also as an instrument for authoritarianism (Aday et al. 2010; Morozov 2012),<sup>2</sup> indicating that the relationship between the internet and internet-based technologies such as social media and democracy may depend on other factors such as the role of civil society. Diamond (2010) has emphasized the importance of civil society, political organizations, and economic forces in determining the effect of technological progress on the strength of democracy. Moreover, since different internet-based technologies have different architectures and hence they influence different kinds of behavior (Lessig 2009), various scholars (*e.g.*, Farrell 2012) have suggested that, instead of studying the internet as such, researchers should study different technologies based on the internet such as social media and their implications for democratic and political outcomes. Yet, while several studies have argued that social media has the potential to promote the accountability and hence democracy in a country; there are no studies, to the best of our knowledge, that empirically report such a correlation. The primary objective and contribution of this study is to bridge this gap in the literature.

The relationship between social media and democracy has become even more important in the wake of the current reversal in democratic trend across the world.

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<sup>1</sup> For instance, Best and Wade (2009) find that the positive relationship between internet penetration and democracy is not globally consistent.

<sup>2</sup> Interested readers should refer to Morozov (2012) for an interesting and detailed discussion on the negative effects of the internet on democracy.

“Freedom in the World 2019” report by the Freedom House, a leading non-government organization dedicated to strengthening democracies around the world, finds that global freedom has been declining in countries in every region including the United States (Freedom House 2019). This is a worrying trend because several countries became more free (democratic) during 1988 to 2005 in its widely used index *Freedom in the World*, the trend has reversed since 2005 and has continued ever since. Over the period of 2006-2018, only 63 countries’ scores measuring the freedom of their citizens have improved, while that of 116 countries have declined. At the same time, the number of social media users around the world has increased tremendously in the last decade from under 1 billion in 2010 to 2.77 billion in 2019. Even though the internet remains inaccessible to half the population in the world (Alliance for Affordable Internet, 2018), social activists have utilized the internet and social media to bypass authorities to reach the masses in their bid to promote democracies in several countries. The governments in many countries have responded to that by targeting these social activists using vague laws and restricting the contents that can be accessed and share on the net (Freedom House 2015). But social media has made it possible to get such news out in the world forcing governments in many countries to retreat because of international censure and pressure. Consequently, the issue unrestricted access to independent news sources and the freedom to share such contents on social media without the fear of retaliation from the governments have become some of the important concerns in many parts of world. Additionally, this issue has become an unavoidable source of policy dilemma for the governments in many countries because while allowing the content to be shared results in the expansion of democratic power of the citizens reducing their political oligarchy, information censorship by restricting the use of the internet and/or controlling the content that can be shared on social media platforms draws censure from the international community. The above discussion gives rise to an important question: Can

social media promote democracy or is it subject to same kinds of censorship as traditional media such as print media and television?

The intention of this paper is to draw the attention of researchers to this important issue of investigating the causal relationship between social media and democracy and identifying the causal mechanisms through which the internet and internet-based technologies can affect democracy. Towards this end, the contribution of this study is two-fold that also convey its objectives. First and foremost, the study is the first one to empirically examine the relationship between social media and democracy in a cross-section of over 125 countries. Further, the existing literature suggests that while the internet and internet-based technologies such as social media have the potential to strengthen democracy, their effects may not be homogeneous across different parts of the world (Best and Wade 2009, Corrales 2002).<sup>3</sup> It is quite possible that social media may affect democracy in high-income countries differently from low-income countries.<sup>4</sup> This possibility arises since low-income countries are often characterized by weaker democracies and, therefore, social media has the potential to play a much bigger role in empowering the citizens of such countries. Hence, we also hypothesize and investigate whether the relationship between social media and democracy is stronger for low-income countries than high-income countries.

Studies have argued that there are multiple ways in which social media and the internet, which are forms of new information and communication technologies (ICTs), may strengthen democracy. First, the internet positively influences the capability of citizens to communicate information with the governments (Margetts 2013), which is likely to have a favorable impact

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<sup>3</sup> Corrales (2002) contends that the internet is likely to have a stronger democratic impact on regimes that are formally democratic but where the democratic rights are often suppressed.

<sup>4</sup> In fact, social media has received quite a negative attention lately: Even though the effect of social media in affecting the 2016 presidential election outcome in the United States is still debated, there is ample evidence that social media was used to spread fake news (Allcott and Gentzkow 2017). On the other hand, the focus of most pro-social media studies have been low-income and developing countries, where social media played an active role in providing information and facilitating the collaboration between different sections of the

on democracy in countries with defective, formally democratic countries. Second, the internet and social media provide means of multi-way communication, which is harder to control than one-way communication that is allowed by traditional platforms such as newspaper, radios, and televisions.<sup>5</sup> ICTs, including the internet and social media, promote transparency and accountability by enabling citizens to report and expose wrongdoings and thereby potentially reduce the frequency of human rights violations because they are more likely to be discovered (Diamond 2010). Further, social media can be utilized by civil society to reach a larger audience to mobilize protests against any attempts by the government that may potentially weaken the democratic freedom of the citizens. In support of this argument, Howard et al. (2011) find that, during “Arab Spring”, digital media facilitated the individualized, localized, and community-specific dissents in several countries to turn into structured movements.<sup>6</sup> Finally, it is also argued that individuals are likely to act more strongly in response to stories shared by their family and friends on social media because of the personal touch than stories that appear in traditional media where the victim is a stranger (Jha and Sarangi 2017). Based on these arguments, this paper investigates whether there is a significant association between social media and democracy across countries.

We find that there is a strong, positive correlation between social media usage and democracy: Countries with greater Facebook penetration (a proxy for social media) have stronger democracy. Furthermore, we show that the effect of social media on democracy is greater for low-income countries than high-income countries. These results are robust to the inclusion of a number of control variables, alternative empirical strategies, and to an instrumental variable (IV) analysis that addresses endogeneity concerns. Moreover, the effect of social media on democracy is economically sizable: Even with our lowest point

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society that shared a common objective towards a stronger democracy.

<sup>5</sup> It is widely known that governments in several countries including China, Malaysia, and Iran, control the content that can be accessed by the public and censor the information related to human rights violations, political corruption, judicial failures, and police brutality (Freedom House 2009).

<sup>6</sup> Acemoglu et al. (2017) also find that social media activity played an important role in mobilizing protesters during Egypt’s Arab Spring and these protests limited the ability of connected firms to extract excess rents.

estimates, a one-standard deviation (about 18 percentage point) increase in Facebook penetration is associated with an 8-point (on a scale of 0–100) improvement in the democracy score for the world sample and over 11-point improvement for the sample of low-income countries. Finally, we also find that when social media is controlled for, the coefficient of internet penetration is not statistically significant suggesting that the impact of the internet on democracy is due to the fact that it allows the use of social media.

In what follows, we first briefly discuss the existing literature on the internet, social media, and democracy to help make the need for and the contribution of this research clearer. In section 3, we describe our data sources, specify our empirical strategy, and discuss our instrument. Section 4 presents the results and section 5 concludes with a brief discussion of the policy implications of the study.

## **2 A Brief Review of Literature**

This section reviews the current literature to help make the need for and the contribution of this research clearer. In one of the earliest papers, Barro (1999) identifies several factors that determine democracy in a panel of over 100 countries. His findings indicate that democracy becomes stronger with increases in GDP per capita, educational attainment, as well as decreases in the gender gap in primary schooling attainment.<sup>7</sup> On the other hand, a greater urbanization and a greater reliance on natural resources have negative effects on democracy. Since then there have been a number of studies that have investigated the impact of different factors on democracy (which we discuss later in Results section). In the wake of recent advances in technology and the crucial role played by social media in the “Arab Spring”, there has been a renewed interest in democracy. Consequently, a plethora of recent studies have hypothesized and investigated the relationship between the internet and internet-based platforms, particularly, social media, on democratic and political outcomes. Most of these

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<sup>7</sup> Besides these factors, recent studies, e.g., Grigoriadis (2016) have underscored the importance of religion for democracy showing that radical governments are more likely to emerge in collectivist countries than

studies were inspired by the observation that social media played a crucial role in the success of the fight for democracy in many North African and Middle East countries during “Arab Spring”. A number of studies have analyzed the series of events that unfolded in these countries from the beginning to the end, and found that social media indeed played an instrumental role in the success of the revolution in many of these countries. For instance, Howard et al. (2011) find that social media played a crucial role in the success of Arab uprising by disseminating information and facilitating protest organization and mobilization against the dictatorship, resulting in even overthrow of the autocratic governments in some countries such as Tunisia. Breuer et al. (2015) confirm the important contribution of the internet and social media in Tunisian revolution, where the internet and social media was used by the digital elites to bypass the barriers that prevented the flow of information in the country. Similarly, social media has been credited to facilitate the protests in Egypt. Recent studies show that social media continues to be used in the way it was used during Arab Springs. For instance, evidence suggest that social media has facilitated the political and community engagements of Sudanese youth and has been used by them to organize demonstrations demanding regime changes (Kadoda and Hale 2015). In Chile, Facebook use has been found to be positively associated with protest activities related to political change. An investigation of this relationship shows that the use of social media platforms for news and socializing is driving this relationship (Valenzuela et al. 2012).

The issue, however, is that the role of social media on democratic outcomes has mostly only been empirically studied in the context of “Arab Spring”. Clearly, there are limitations of these studies in the sense that all these countries shared a common characteristic: Public in these countries have been unhappy with their dictators/rulers for decades in most instances. Social media and the internet in most of these countries simply fueled the public’s existing discontent and abetted the large-scale protests that turned into revolutions by providing them with the tools that allowed the like-minded people come together and gather in large



numbers. Nevertheless, the Middle East revolutions suggest that the internet and social media can be a powerful tool in the hands of the public and the civil society that seek to promote democracy.<sup>8</sup> Inspired by the findings of the above-mentioned studies, this study explores whether social media is significantly correlated with democracy in a cross-section of more than 125 countries around the globe.

There are, of course, more studies that study the impact of the internet on democracy and many of these studies have argued that the internet can have both the positive and the negative impacts on democracies (Aday et al. 2010; Morozov 2012). For instance, Farrell (2012) raises some interesting and pertinent questions on the impact of the internet such as whether the internet empowers the ordinary citizens or the political elites. The internet cannot only be used by activists to topple dictators but can also be used by the dictators to strengthen their hold on the power (Morozov 2012). In other words, the internet can be used both as a tool to promote democracy as well as authoritarianism.<sup>9</sup> Hence, the relationship between the internet and democracy need not be in the same direction for every part of the world. Consistently, one of the earliest studies investigating this relationship, Best and Wade (2009), finds that while there is a positive relationship between internet penetration and democracy, this association is not globally consistent. These findings, therefore, suggest the need for further research on this topic that can shed light on the causal mechanisms through which the internet impacts democracy. One way this can be done is by studying the impact of different internet-based technologies on democratic outcomes separately. This paper makes a step forward in this direction by studying the impact of social media—an internet-based technology—on democracy to help future research direct their attention to the causal mechanism towards the use of social media, among other platforms.

It is important to note that social media's impact on at least one important public policy

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<sup>8</sup> It must also be noted that in many instance, social media failed to make the protests demanding democracy successful. See Jha (2017) for a discussion of some such instances.

<sup>9</sup> The dual nature of the internet (as a tool to promote democracy or authoritarianism) was on full display during the Turkey military coup attempt in 2016. See <https://theconversation.com/is-internet-freedom-a->

issue, that is, corruption has been investigated by some recent studies which have documented that social media and corruption are negatively correlated both across and within countries. For instance, Enikolopov et al. (2018) report a causal negative impact of social media on corruption in Russia. Authors find that blog posts exposing corruption in Russian state-controlled companies is negatively related to their market returns and positively associated with both a greater management turnover and lower minority shareholder conflicts. Furthermore, Qin et al. (2017) find that social media promotes collective action and facilitates the surveillance of government officials.

They find that the use of social media website Sina Weibo in China is positively associated with the likelihood of protests against corruption. The correlation between social media and corruption has also been shown to be significant across countries. For instance, Jha and Sarangi (2017) find that Facebook penetration, a proxy for social media, is negatively correlated with corruption in a cross-section of more than 150 countries. Their findings also indicate that the relationship between social media and corruption is greater for countries where press is highly repressed indicating the importance of social media in information dissemination through informal channels when formal channels are subject to government censorship. The takeaway from these studies is that social media can promote accountability even in countries like China and Russia where traditional media is often suppressed.

### **3** Data and Empirical Model

#### **3.1** *Data*

In his seminal paper, Barro (1999) uses Gastil (1991)'s property rights and civil liberties indices as a measure of democracy. Following this, we use scores obtained by each country in these two indices using the Freedom House data as a measure of democracy. Each country is assigned a score between 0 to 40 in political rights on the basis of several factors that include

electoral process, political pluralism and participation, and the functioning of government. The electoral process takes into account factors such as the fairness of electoral laws and the existence of free and fair elections through which the head of the national governments, legislative representatives, and other national authority are elected. Political pluralism and participation score depends on (i) a country's standing on her citizens' right to participate in political parties, strength of the opposition, independence of people's political choices from the military, foreign entities, religious and economic powers and (ii) the electoral rights and opportunities that cultural, ethnic, religious, and other minority groups enjoy. Finally, functioning of government considers the elected government's ability to determine the policies of the government, whether the government is accountable to the electorate, and whether the government operates without corruption and with openness and transparency.

The civil liberties index, on the other hand, depends on a variety of factors that measure the freedom of expression and belief, associational and organizations rights, rule of law, and personal autonomy and individual rights. In freedom of expression and belief dimension, the independence of media, academic freedom as well as citizens' freedoms in areas of participation in cultural activities, cultural expression, and the educational system are included. Associational and organizational rights score reflects the freedom that a country's citizens have in terms of peaceful assembly, demonstrations, and protests, and the freedom that non-government, private, trade, peasants, and professional organizations enjoy. Further, rule of law takes into account the independence of the judiciary from the executive branch of government or from other political, economic, or religious influences, the freedom of law enforcement officials, defendant's right to a fair trial, protection from political terror, freedom from war and insurgencies, and whether all segments of the population enjoy equal treatment in terms of laws, policies, and practices. Finally, personal autonomy and individual rights score is awarded on the basis of the freedom that a country's citizens enjoy in their choices of employment, institution, higher education, marriage partners, and size of family among other things. Score in this

dimension also takes into account the citizens' right to own property, equality of opportunity, and the freedom from economic exploitation. The total score, known as the *Freedom in the World*, thus, ranges from 0 to 100 with a greater number indicating a stronger democracy.<sup>10</sup>

We borrow 2012 Facebook penetration data from Jha and Sarangi (2017), who obtain this data from Quintly', a social media benchmarking and analytic solution company. Facebook penetration measures the number of Facebook users per 100 people in the country. Data for internet penetration, defined as the percentage of the population with an internet connection, and the share of fuel in total merchandise exports come from the World Development Indicators. The technological adoption index in communication in 1500 CE from the CHAT dataset is used as an instrument for internet penetration (Comin and Hobijn 2009). The index is constructed using the following variables: 'the use of movable block printing', 'the use of woodblock printing', 'the use of books' and 'the use of paper'. It takes values in the range of 0 to 1 with a higher value representing better technological adoption in 1500 CE. GDP per capita data come from Penn World Table and the average years of schooling from Barro and Lee (2013). All the variables described here belong to the year 2012 except the schooling variable which is from the year 2010 (note that Barro and Lee (2013) data are available only for 5-year intervals). Summary statistics are reported in Table 1.

### **3.2 Empirical Model and Endogeneity**

We estimate the following specification using the ordinary least squares (OLS)

$$Democracy_i = \alpha + \beta_1 Facebook_i + \beta_2 internet_i + \mathbf{X}'\delta + \varepsilon_i \quad (1)$$

where  $Democracy_i$  is the index of democracy for country  $i$  and  $Facebook_i$  (proxy for social media) is the primary variable of interest.  $\mathbf{X}'$  includes a vector of control variables commonly

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<sup>10</sup> Visit <https://freedomhouse.org/report/methodology-freedom-world-2017> for further details.

used in the literature. We expect that social media should positively impact democracy and hence expect its coefficient,  $\beta_1$ , to be positive. Furthermore, we also investigate this relationship only for the sample of low-income countries since low-income countries also tend to have weaker democracy. This is also true for our sample: the average of the democracy for high-income countries is 87.26 as opposed to 58.95 for low-income countries. At the same time, Facebook penetration average for the set of high-income countries is 43.60, while it is only 15.85 for the set of low-income countries. Moreover, as can be seen in panel C of Table 2, the correlation coefficient between Facebook penetration and democracy is much stronger (and statistically highly significant) for low-income countries than for high-income countries (for which neither internet nor Facebook penetration is significantly correlated with democracy in panel B). It stands to reason, therefore, that low-income countries may have greater gains from social media than rich-income countries.

### *Potential Endogeneity and Instrument*

Democracy has been shown to be associated with technological change and there is evidence that dictators limit the diffusion of information to lengthen their time in office (Knutsen 2015) implying that internet penetration (a medium of information dissemination) is endogenous to the model. Hence, the OLS estimates are likely biased because the inclusion of internet penetration introduces endogeneity to the model. Several countries have censored the content that can be accessed on the internet (see Freedom House 2009 for a detailed discussion) making internet penetration potentially endogenous to the model. Exclusion of internet penetration from the model will clearly cause the OLS coefficient of Facebook penetration to be biased downwards since in that case Facebook will also be capturing the impact that internet will have on democracy through other ways than social media. On the other hand, if internet penetration is included in the model, the estimates will be biased because of the possibility of a reverse causality. Non-democratic countries may censor the internet

to prevent citizens from accessing information regarding corruption, police brutality, and human rights violations. For instance, countries like China and Iran restrict the citizens' access to contents using multi-layered censoring system (Freedom House 2009) and Tunisian government created focal points of control to censure the internet (Wagner 2012). Some other countries, including Egypt, Russia, and Malaysia, designed vague and flexible security laws to intimidate bloggers with an objective to prevent anti-government contents from spreading over the internet (Freedom House 2009).

To address endogeneity concerns, we perform an instrumental variable (IV) analysis. Following Jha and Sarangi (2017) we use technological adoption in communication in 1500 CE as an instrument for internet penetration.<sup>11</sup> Comin et al. (2010) argue that, for various reasons such as the lower cost of adopting new technology and innovation, economies of scale and cross-sectoral technological spillovers, the technological advantage persists over the long run. Consistently, they show that cross-country differences in technological adoption in the communication industry 1500 CE can explain current cross-country differences in technological states, even after controlling for a number of geographical, institutional, economic, and cultural factors. Since there is little reason to expect that technological adoption in communication in 1500 CE will have an effect on democracy other than via its effects on internet penetration, this is a valid instrument. Moreover, we find that the technological adoption in communication in 1500 CE is a strong predictor of internet penetration today making it a strong instrument.

## 4 Results

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<sup>11</sup> Following Jha and Sarangi (2017), the assumption here is that social media usage is independent of government control once the governments have decided to whether or not censure the internet. This assumption is not very far from reality since the governments will not choose to censor only social media content while making the information freely accessible elsewhere on the internet.

#### 4.1 OLS Results

Table 3 presents the OLS results. The coefficient of the Facebook penetration is positive and statistically highly significant in column 1 suggesting that social media is positively correlated with democracy. In next columns, we control for a number of variables that can potentially be correlated with social media and/or democracy to minimize the possibility of omitted variable bias. In column 2, we control for GDP per capita, but do not find a significant association between this variable and democracy. This result is consistent with the findings of Acemoglu et al. (2008) who do not find a causal relationship between income per capita and democracy. Furthermore, studies have also documented a positive association between globalization and democracy (Eichengreen and Leblang 2008) and a significant negative relationship between oil and democracy (Ahmadov 2014). Hence, we control for the economic globalization in column 3 using the index from Dreher (2006) and the share of fuel in total merchandise exports in column 4. Although the index of globalization is not significantly associated with democracy; consistent with the findings of the previous studies, we also find a statistically significant, negative association between fuel and democracy. Finally, Glaeser et al. (2007) argue that education increases the benefits of civic participation, which, in turn, raises the support for democracy. Following this, we include the average years of schooling in column 5. We do not, however, find a statistically significant association between this variable and democracy, which is consistent with the findings of Acemoglu et al. (2005). Also note that the coefficient of internet penetration, though positive, is statistically insignificant at conventional level in all the columns suggesting that internet penetration may not have an impact on democracy besides via facilitating the use of social media.

In columns 6–10, we present the results limiting the sample only to low-income countries. As argued earlier, there are strong reasons to believe that low-income countries may have more to gain from social media than high-income countries as far as democracy is concerned. Consistent with this hypothesis, we find that the coefficient of Facebook penetration is bigger

for the sample of low-income countries than the world sample. Moreover, we find that while globalization is not associated with democracy for the world sample, it is weakly, positively associated with democracy for the sample of low-income countries. This is an intuitive finding since globalization increases the citizens' exposure to other democratic countries, which is particularly relevant for low-income countries that have weaker democracy. As a result, citizens are likely to demand and fight for higher political rights and civil liberties leading to an improvement in the country's democracy scores.

#### **4.2 IV Results**

In this section, we report the two-stage least squares estimate to address endogeneity concerns. We instrument internet penetration with the technological adoption in communication in 1500 CE. As can be seen, the technological adoption in communication in 1500 CE is a significant predictor of internet penetration in all the columns reported in Table 4. Moreover, the  $F$ -statistics is always greater than the rule-of-thumb value of 10 (except in column 10) suggesting that instruments are strong. Note that the IV estimates of Facebook penetration is larger than the OLS estimates suggesting that OLS estimates may be biased downwards because of endogeneity. Furthermore, the coefficient of Facebook penetration is larger for low-income countries indicating that the positive effects of social media on democracy is stronger for low-income countries than high-income countries. This result is further supported by the fact that in the world sample, the coefficient of Facebook penetration is not only smaller but also statistically significant mostly at 10% level (column 2–5) whereas it is significant at 5% level in each corresponding specification for the low-income countries sample (columns 6–10). Again, the coefficient of internet penetration is not statistically significant in any of the columns, suggesting that social media is the mechanism through which internet promotes democracy. Moreover, the IV results also indicate a weak and positive association between social media and democracy for the set of low-income countries, while fuel is



strongly and negatively associated with democracy for both the world sample as well as the low-income countries sample.

### **4.3 *Iteratively Reweighted Least Squares (IRLS) Results***

Concerned with the possibility that our results might have been driven due to the presence of outliers, we also checked the robustness of our results using the IRLS estimation. As argued in Introduction, in recent years, several Middle Eastern countries have experienced revolutions against the dictatorships, and social media played a vital role in the success of the democratic movement in these countries (Howard et al. 2011; Breuer et al. 2015). In order to alleviate the concerns that the significance of the relationship between social media and democracy may have been driven due to such countries, we check the robustness of results to the presence of outliers. Results of the robust regression can be found in Table A1 of the Web Appendix. The results remain qualitatively unchanged and the relationship between social media and democracy remains statistically highly significant for both the world sample and the low-income countries sample.

### **4.4 *Fractional Response Model***

We perform a final robustness check on the association between social media and democracy in this section. Since our dependent variable, democracy, is bounded and takes values in the range of 0 to 100, OLS may not be the appropriate empirical strategy because it does not rule out the possibility that predicted values of democracy lie outside the bounded interval (Wooldridge 2010). Hence, we perform and present the results of the fractional response model in Table 6. In order to apply the fractional response model, we convert the democracy measure by dividing it by 100 such that the changed index takes values in the range of 0 to 1. We then apply a logit model. In Table 5, the coefficient of Facebook penetration is statistically significant at conventional levels in all the columns suggesting a significant association between social media and democracy.

However, since interpretation of the coefficient of the logit model is not very straightforward, we report the marginal effects of each regressor (at means of other control variables) in Table A2 in the Web Appendix. Each column in Table A2 reports the marginal effects of the specification reported in the corresponding column of Table 5. These results further confirm the positive relationship between social media and democracy. The marginal effect of Facebook penetration is positive and statistically significant in all the specifications. Moreover, the marginal effect of Facebook penetration is greater for the set of low-income countries than the world sample, confirming the hypothesis that low-income countries have more to gain from social media in terms of strengthening the democracy. Further, while marginal effect of fuel is negative and statistically significant for both the world sample and the sample of low-income countries, the marginal effect of globalization is positive and weakly significant only for the sample of low-income countries. Marginal effects of other variables, including internet penetration, is statistically insignificant suggesting these variables do not affect democracy. For the sake of illustration, we present the marginal effects of specifications 1, 5, 6, and 10 reported in Table 5 in Figure 1. As we can see, the marginal effect of Facebook penetration is positive and the 95% confidence interval excludes zero in each sub-figure of Figure 1. Besides Facebook penetration, it is only fuel, whose marginal effect is negative and 95% confidence interval excludes zero in sub-figures (c) and (d) suggesting a negative impact of fuel on democracy.

## **5 Discussion, Conclusion, and Policy Implications**

While a number of recent studies have discussed the implications of social media for democracy, none of the studies, to the best of our knowledge, empirically investigates the relationship between social media and democracy in a cross-section of countries. This study bridges this gap in the literature by using data for over 125 countries around

the world and finds that social media is positively correlated with democracy. The study aims to draw the attention of the researchers to this important issue of investigating the causal relationship and identifying the causal mechanisms through which the internet and internet-based technologies, particularly social media, can affect democracy. We also provide some exploratory IV evidence and find that the relationship between social media and democracy remains robust when internet penetration is instrumented with the technological adoption in communication in 1500 CE. Further, it is shown that this relationship is stronger for low-income countries, suggesting that these countries have more to gain from investing in infrastructural policies and human capital investment that enable citizens to use social media more effectively and empowers them. Empowered citizens will demand for more political rights and civil liberties strengthening the country's democracy. Our lowest point estimates indicate that a one-standard deviation (about 18 percentage point) increase in Facebook penetration causes an increase in the democracy index by about 8 points (on a scale of 0–100) for the world sample. For low-income countries, the same increase in Facebook penetration is associated with over 11 point improvement in the democracy index. Besides social media, fuel is shown to be significantly, negatively associated with democracy; and globalization is positively associated with democracy but only for the sample of low-income countries.

Our results have strong policy implications. First, policymakers need to focus on investments in infrastructure with a goal to expand the access to the internet, especially in developing countries. This is because our results show that social media has stronger effects on democracy in developing countries than developed countries, and the internet services remain very expensive in many of these low- and middle-income countries preventing a large proportion of the population from using the internet and, hence, social media. As of 2017, less than 10 percent of the population use the internet in over 10 countries. The findings of the 2018 Affordability Report indicate that more than half the world's population has no access to the internet and only 24 of the 61 countries

assessed in 2018 had affordable internet (Alliance for Affordable Internet, 2018). At a time when large majority of emerging and developing countries use cellphones to go online while owning a computer is much rarer (Pew Research Center, 2019)<sup>12</sup>, over 2 billion people reside in countries where 1GB of mobile data is unaffordable. The 2018 Affordability Report (Alliance for Affordable Internet, 2018) finds that 1GB data costs over 5 percent of monthly income in many low- and middle-income countries. The cost of mobile data varies widely even within low- and middle-income countries. For instance, while the average cost of 1GB mobile data is only \$0.26 U.S. dollars in India, in Zimbabwe, the average cost of 1 GB data is \$75.20 – over 5% of its per capita GDP in 2017.<sup>13</sup> Note that even in developed countries, time spent on social media is heavily skewed towards mobile devices.<sup>14</sup> The 2018 Affordability Report finds that policymakers in several countries are not doing enough to expand the infrastructure to facilitate access to the internet. In this context, it must also be noted that making internet affordable alone is not enough because in many low- and middle-income countries, a large proportion of the population lacks the level of education required to utilize the internet. To address this issue, policymakers must also invest in education. Additionally, computer education can be made a part of the curriculum to further enhance the ability of the population to consume the information available through the internet and social media (Jha 2014).

The second policy implication relates to the freedom that users can enjoy while using the internet. It is not enough to make the internet accessible by lowering the cost but ensuring that the users have the rights to share their political views and that these views

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<sup>12</sup> Countries included in this report are: Colombia, India, Jordan, Kenya, Lebanon, Mexico, Philippines, South Africa, Tunisia, and Vietnam.

<sup>13</sup> <https://www.forbes.com/sites/niallmccarthy/2019/03/05/the-cost-of-mobile-internet-around-the-world-infographic/#3b83522a226e> (accessed May 12, 2019). The data source is

<sup>14</sup> For example, at the end of 2015, mobile devices accounted for 79 percent of time spent on social media platforms in the United States: 67% using smartphones and 12 percent using tablets (Cross-Platform Future in Focus 2016, accessed on May 12, 2019 at <https://www.comscore.com/Insights/Presentations-and-Whitepapers/2016/2016-US-Cross-Platform-Future-in-Focus>)

are not censored is equally important. This issue has become even more important because freedom on the net is under threat in several parts of the world including many democratic countries which are considered to be leaders in providing freedom to its citizens such as the United Kingdom and the United States (Freedom House 2015), it is imperative for the researchers to point out its dangers for democratic institutions. The importance of this issue cannot be overstated in light of the fact that even in advanced countries like the United States, the internet remains a significant source for political news. A Pew Research Center (2004) survey reports that most internet users in America is exposed to more points of view (including those that challenge their preferred views and candidates) than other citizens.

Ensuring freedom on the net is not an easy task though because social media can and has been used to spread fake news and to promote extreme views and fraudulent content (Freedom House 2019). The recent evidence suggest that over 60 percent of adults in the United States get their news on social media (Gottfried and Shearer 2016) and Facebook is most commonly used medium to share fake stories (Silverman 2016). What is worse is that most people report believing the fake news stories (Silverman and Singer-Vine 2016). It is worth noting that social media has also been utilized to spread fake news with an objective to influence election outcomes in the 2016 U.S. presidential elections (Allcott and Gentzkow 2017), and some commentators believe that fake news may have been so influential that it may have altered the presidential outcome. For example, Read (2016) notes that Facebook's inability or refusal to address the issue of fake news enabled Donald Trump to win. Hence, the difficult task at hand for the policymakers is to maintain the freedom of expression on the net while, at the same time, to clamp down on the fake news. With this paper, we hope to raise this concern and open an important avenue for future research, that is, to identify the causal mechanisms that determine the relationship between social media and democracy. Once identified, the onus of defending the freedom on social media lies on the civil society since the

technological progress alone, as argued by Diamond (2010), will not determine the winner between the democrats and the autocrats. There is empirical evidence from Liberia suggesting that third-party actors can help promote democracy by reducing the barriers to information and promoting voter coordination (Mvukiyehe and Samii 2017). Social media can play an important role in reducing the barriers to information and promoting political organization and voter coordination on critical policy issues, thereby helping the civil society achieve their objective of strengthening democracy.

Democracy has a wide range of positive effects. For instance, democracy positively impacts long run economic growth (Acemoglu et al. 2019). The evidence also suggests that developing countries may benefit from improving institutional characteristics including democracy that results in a greater interactions with higher-income countries leading to a convergence in the growth rates (Ahmad and Hall 2017). Further, democracy helps protect environmental degradation in the long-run (Adams and Klobodu 2017) and mitigates pollution and environment problems because democracies serve a greater section of the society (Farzanegan and Markwardt 2018). Hence, it's important to identify factors that can strengthen democracy and this paper identifies one such factor, that is, social media. Further, it has also been shown that democracy, measured by election competitiveness and voter participation, lowers corruption but only if the press in the country enjoys a certain level of freedom (Kalenborn and Lessmann 2013). Similar findings have also been reported by Jha and Sarangi (2017) who report a complementarity between social media and press freedom in reducing corruption. Since a significant proportion of adults get their news using social media, ensuring the freedom of press is important in the present context as well. The final policy suggestion of this paper therefore is that policymakers need to complement an investment in infrastructure that provides the population a greater access to the internet with policies that ensure freedom on the net and maintain the freedom of the press. Awareness programs that enable the population to assess the veracity of the information

will be a crucial step to counter the effects of fake stories on social media.

Note that besides the spread of fake news, other negative effects of social media have also been documented by several recent studies. For example, social media has been used by terrorist organizations such as the ISIS (Islamic State) to spread their propaganda and even recruit new members (see for example, Awan 2017). In addition, social media has been found to affect a number of individual and social outcomes (see Bolton et al 2013 for a review). Hence, it is important to consider both the positive and negative effects of social media and take policy measures to mitigate any negative effects and augment the positive effects while expanding the internet access.

Finally, we must also note the limitations of this study: We use Facebook penetration as the proxy for social media due the unavailability of data on various other social media platform such as Twitter, Google Plus, and others. Future research should incorporate the broader measures of social media to investigate the relationship between social media and democracy. While the present paper does not necessarily make strong causal claims; by documenting a strong correlation between social media and democracy that is robust to controlling for a number of factors and an instrumental variable analysis, it hopes to attract the attention of the stakeholders—civil society, academics and researchers, and policymakers—to this pertinent issue, especially, in wake of the recent crackdown on freedom on the net.

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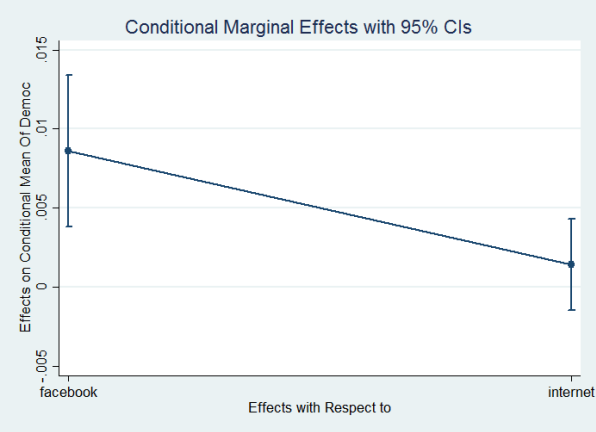
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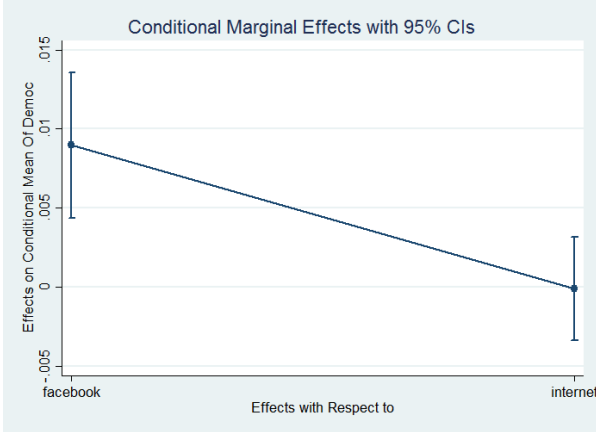
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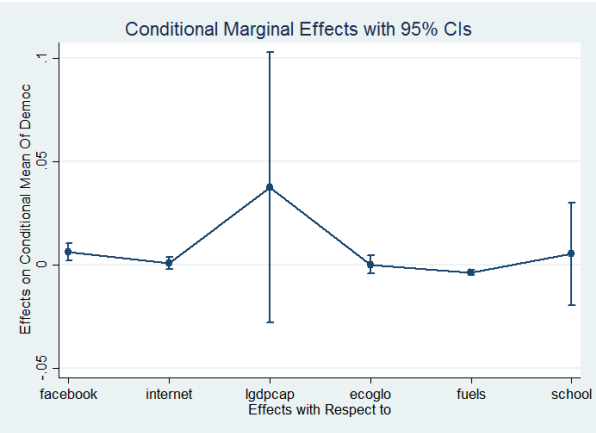
# Figures and Tables



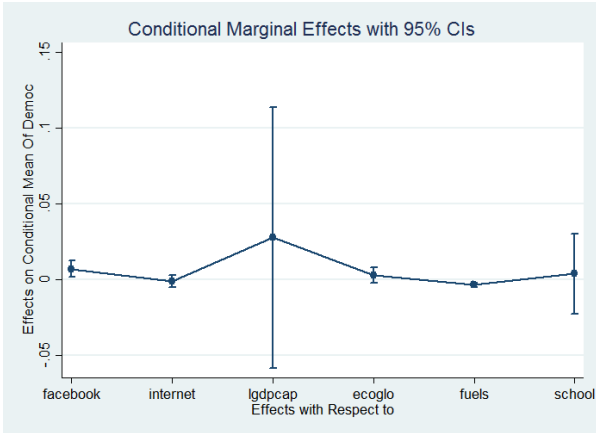
(a) Entire Sample (column 1)



(b) Low-income countries (column 6)



(c) Entire sample (column 5)



(d) Low-income countries (column 10)

Figure 1: Marginal effects corresponding to specifications reported in Table 5.

Table 1: Summary statistics

<b>Variable</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>N</b>
Democracy	62.264	27.815	174
Facebook penetration	20.741	18.468	174
Internet penetration	36.22	27.244	174
log (GDP per capita)	8.895	1.179	133
Economic globalization	64.072	15.981	128
Fuel	15.618	25.17	123
Schooling	7.264	2.864	120
Technological adoption in communication in 1500 CE	0.457	0.404	104

Refer to the data section for variable description.

Table 2: Cross-correlation table

Variables	Democracy	Facebook penetration	Internet penetration
Democracy	1.000		
Nb. Obs.			
Facebook penetration	0.617 (0.000)	1.000	
Nb. Obs.	134		
Internet penetration	0.594 (0.000)	0.830 (0.000)	1.000
Nb. Obs.	134	134	

Table 3: Social Media and Democracy: OLS Estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	World sample					Low-income countries				
Facebook penetration	0.650*** (0.203)	0.518** (0.200)	0.625*** (0.216)	0.412** (0.165)	0.438** (0.179)	0.818*** (0.211)	0.813*** (0.221)	0.858*** (0.241)	0.589** (0.224)	0.620** (0.249)
Internet penetration	0.192 (0.128)	0.203 (0.156)	0.121 (0.160)	0.0696 (0.127)	0.0315 (0.142)	0.000989 (0.162)	-0.0444 (0.189)	-0.134 (0.182)	-0.131 (0.156)	-0.141 (0.192)
log (GDP per capita)		0.884 (3.430)	-0.762 (3.559)	5.379* (3.132)	4.952 (3.154)		1.641 (3.684)	-3.289 (4.070)	2.783 (4.011)	3.015 (4.301)
Economic globalization			0.239 (0.179)	0.123 (0.164)	0.0496 (0.196)			0.485** (0.212)	0.380* (0.223)	0.269 (0.245)
Fuel				-0.390*** (0.0721)	-0.406*** (0.0757)				-0.331*** (0.0759)	-0.360*** (0.0747)
Schooling					0.817 (1.130)					0.457 (1.331)
Constant	41.82*** (2.827)	38.51 (25.48)	39.72 (25.16)	5.488 (22.21)	9.903 (22.51)	45.96*** (3.073)	33.74 (27.25)	49.01* (26.98)	13.62 (25.34)	16.33 (27.35)
Observations	174	133	128	119	109	99	98	95	86	77
Adjusted $R^2$	0.351	0.394	0.451	0.583	0.566	0.295	0.300	0.314	0.430	0.405

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Robust standard errors in parentheses.

Table 4: Social Media and Democracy: IV Estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	World sample					Low-income countries				
	<i>First-stage regression. Dependent variable: Internet penetration</i>									
Comm. tech. in 1500 AD	20.124*** (3.742)	12.423*** (2.775)	13.026*** (2.809)	12.522*** (3.266)	12.785*** (3.636)	15.482*** (4.343)	11.266*** (3.279)	12.320*** (3.096)	11.862*** (3.619)	11.254** (4.367)
F-stat <sup>#</sup>	28.927	20.044	21.513	14.702	12.365	12.710	11.803	15.833	10.745	6.643
	<i>Second-stage regression. Dependent variable: Democracy</i>									
Facebook penetration	0.821** (0.335)	0.499* (0.285)	0.487* (0.279)	0.465* (0.252)	0.437* (0.259)	0.982** (0.473)	0.926** (0.405)	0.916** (0.369)	0.811** (0.354)	0.804** (0.365)
Internet penetration	0.162 (0.225)	0.254 (0.368)	0.190 (0.370)	-0.0601 (0.341)	0.261 (0.379)	-0.133 (0.413)	-0.226 (0.567)	-0.348 (0.521)	-0.679 (0.510)	-0.466 (0.570)
log (GDP per capita)		1.302 (6.602)	-1.587 (6.580)	5.760 (6.174)	-3.127 (6.913)		3.345 (7.228)	-2.509 (6.902)	7.241 (7.497)	1.879 (8.104)
Economic globalization			0.375* (0.214)	0.263 (0.223)	0.0658 (0.219)			0.665*** (0.236)	0.574** (0.268)	0.218 (0.331)
Fuel				-0.332*** (0.0833)	-0.355*** (0.0888)				-0.320*** (0.102)	-0.398*** (0.0960)
Schooling					1.700 (1.398)					2.332 (1.929)
Constant	41.137*** (3.559)	35.82 (47.78)	40.89 (51.19)	-1.823 (47.16)	66.44 (53.15)	48.27*** (4.764)	23.59 (51.01)	38.01 (50.69)	-22.26 (50.40)	25.18 (55.27)
Observations	104	94	91	84	79	71	71	69	62	57
Adjusted R <sup>2</sup>	0.476	0.476	0.490	0.555	0.560	0.288	0.275	0.294	0.343	0.424

\* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Heteroskedasticity-robust standard errors in parentheses. The reported F-statistic are Kleibergen-Paap rk Wald F statistic (as reported by STATA 14) which are valid when i.i.d. assumption is dropped and “robust” option is invoked. Dependent variable is negative of control of corruption index such that a higher value implies more corruption. <sup>#</sup> Excluded instrument.

Table 5: Social Media and Democracy: Fractional Response Model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	World sample					Low-income countries				
Facebook penetration	0.0374*** (0.0108)	0.0308*** (0.0112)	0.0393*** (0.0117)	0.0280*** (0.00974)	0.0315*** (0.0111)	0.0373*** (0.00978)	0.0376*** (0.0103)	0.0395*** (0.0112)	0.0279*** (0.0105)	0.0300** (0.0118)
Internet penetration	0.00622 (0.00642)	0.0103 (0.00771)	0.00725 (0.00804)	0.00574 (0.00694)	0.00447 (0.00790)	-0.000488 (0.00696)	-0.00195 (0.00803)	-0.00582 (0.00781)	-0.00548 (0.00707)	-0.00566 (0.00861)
log (GDP per capita)		-0.0213 (0.155)	-0.118 (0.170)	0.202 (0.176)	0.195 (0.174)		0.0537 (0.153)	-0.157 (0.169)	0.107 (0.177)	0.119 (0.189)
Economic globalization			0.00961 (0.00956)	0.00473 (0.00962)	0.0000817 (0.0119)			0.0209** (0.00930)	0.0170* (0.0101)	0.0122 (0.0111)
Fuel				-0.0189*** (0.00359)	-0.0204*** (0.00356)				-0.0143*** (0.00333)	-0.0157*** (0.00320)
Schooling					0.0268 (0.0654)					0.0163 (0.0583)
Constant	-0.411*** (0.124)	-0.137 (1.149)	0.124 (1.176)	-1.780 (1.164)	-1.580 (1.190)	-0.183 (0.127)	-0.585 (1.127)	0.0555 (1.108)	-1.520 (1.102)	-1.417 (1.183)
Observations	175	133	128	119	109	99	98	95	86	77

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors in parentheses.

Web Appendix  
(Not intended for publication)

Table A1: Social Media and Democracy: Robust Regression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	World sample					Low-income countries				
Facebook penetration	0.670*** (0.176)	0.340** (0.152)	0.321** (0.153)	0.335** (0.139)	0.325** (0.141)	0.818*** (0.212)	0.807*** (0.216)	0.883*** (0.225)	0.588*** (0.210)	0.614*** (0.222)
Internet penetration	0.243** (0.119)	0.272* (0.142)	0.208 (0.145)	0.0688 (0.130)	0.0680 (0.137)	0.0159 (0.149)	-0.0306 (0.191)	-0.133 (0.195)	-0.122 (0.180)	-0.121 (0.201)
log (GDP per capita)		4.031 (3.200)	1.937 (3.325)	6.420** (3.079)	5.555 (3.378)		1.828 (3.883)	-3.984 (4.238)	2.800 (4.059)	2.985 (4.672)
Economic globalization			0.350** (0.170)	0.203 (0.155)	0.165 (0.164)			0.551** (0.241)	0.431* (0.228)	0.315 (0.244)
Fuel				-0.414*** (0.0587)	-0.403*** (0.0667)				-0.354*** (0.0795)	-0.380*** (0.0977)
Schooling					0.527 (0.863)					0.498 (1.214)
Constant	40.92*** (2.926)	14.64 (23.76)	14.64 (23.96)	-5.360 (21.87)	2.010 (23.59)	45.69*** (3.341)	32.08 (28.76)	50.78* (29.37)	11.06 (27.63)	14.21 (31.69)
Observations	174	133	128	119	109	99	98	95	86	77
Adjusted R <sup>2</sup>	0.380	0.491	0.519	0.627	0.613	0.268	0.274	0.307	0.437	0.421

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors in parentheses.



Table A2: Social Media and Democracy: Marginal Effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	World sample					Low-income countries				
Facebook penetration	0.0081*** (0.00247)	0.0066*** (0.00239)	0.0082*** (0.00246)	0.0056*** (0.00194)	0.0060*** (0.00210)	0.0090*** (0.00236)	0.0090*** (0.00248)	0.0095*** (0.00268)	0.0066*** (0.00249)	0.0070** (0.00274)
Internet penetration	0.00169 (0.00149)	0.00221 (0.00165)	0.00152 (0.00168)	0.00115 (0.00139)	0.000857 (0.00151)	-0.000117 (0.00167)	-0.000469 (0.00193)	-0.00140 (0.00188)	-0.00130 (0.00168)	-0.00131 (0.00200)
log (GDP per capita)		-0.00456 (0.0332)	-0.0248 (0.0357)	0.0406 (0.0356)	0.0375 (0.0334)		0.0129 (0.0366)	-0.0376 (0.0405)	0.0254 (0.0422)	0.0277 (0.0438)
Economic globalization			0.00201 (0.00200)	0.000951 (0.00193)	0.00002 (0.00228)			0.0050** (0.00223)	0.0040* (0.00239)	0.0028 (0.00259)
Fuel				-0.0038*** (0.000731)	-0.0039*** (0.000677)				-0.0034*** (0.000781)	-0.0036*** (0.000716)
Schooling					0.00513 (0.0126)					0.00379 (0.0135)
Observations	175	133	128	119	109	99	98	95	86	77

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Robust standard errors in parentheses. Marginal effects reported in each column of this Table refers to the specification reported in the corresponding column of Table 5 in the paper. Marginal effects are computed at the mean of each control variable.