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Form Approved
OMB No. 0704-0188

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1. REPORT DATE (DD-MM-YYYY) 05-04-2021	2. REPORT TYPE Master of Military Studies (MMS) thesis	3. DATES COVERED (From - To) AY 2020-2021
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4. TITLE AND SUBTITLE Do Information and Communication Technologies Affect Violent Conflict? Assessing the Role of Mobile Broadband in Contributing to Violence	5a. CONTRACT NUMBER N/A
	5b. GRANT NUMBER N/A
	5c. PROGRAM ELEMENT NUMBER N/A

6. AUTHOR(S) Williamson, Curtis A. (Major)	5d. PROJECT NUMBER N/A
	5e. TASK NUMBER N/A
	5f. WORK UNIT NUMBER N/A

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) USMC Command and Staff College Marine Corps University 2076 South Street Quantico, VA 22134-5068	8. PERFORMING ORGANIZATION REPORT NUMBER N/A
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9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S) N/A

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release, distribution unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

The growth of access to high-quality information and communication technologies (ICTs) globally holds implications far beyond opening new markets and enabling connection over distance. The same connection over distance can also spread conflict-inducing messages and allow coordination that reduces barriers for movements to become violent. ICTs can also enable state-level control, particularly for authoritarian regimes. Through panel data analysis of political violence, fragility, and peacefulness and leveraging control variables from a diverse set of sources, this line of inquiry concludes that while the proliferation of ICTs may correlate with dissatisfaction and political turmoil, as other research has demonstrated, these technologies do not sufficiently create opportunity structures on their own. Further, as the literature regarding both violent conflict in general and its relationship with ICTs suggests, government and development status matter. While lower developed countries experience more adverse effects from mobile broadband and higher developed countries experience more positive effects, regime type appears to slightly matter more, with less democratic states accumulating more risk with increased access to mobile broadband. The troubling implication is that the same states experiencing higher ICT growth from America's chief rival, China, are the same countries most at risk for adverse effects from ICT growth.

15. SUBJECT TERMS

Information and communication technology, ICT, mobile broadband, connective action, conflict, political violence, fragility, stability, peacefulness, authoritarianism, polity, panel analysis

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			USMC Command and Staff College
Unclass	Unclass	Unclass	UU		19b. TELEPHONE NUMBER (Include area code) (703) 784-3330 (Admin Office)

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MASTER OF MILITARY STUDIES:

TITLE:

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of Mobile Broadband in Contributing to Violence

SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF MILITARY STUDIES

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Executive Summary

Title: Do Information and Communication Technologies Affect Violent Conflict? Assessing the Role of Mobile Broadband in Contributing to Violence

Author: Major Curtis A. Williamson, United States Marine Corps

Thesis: This research explores the relationship between ICTs and violence in a military and national security frame and examines how ICTs, specifically mobile broadband density in populations, affects opportunity structures for violent conflict on balance.

Discussion: Through panel data analysis of political violence, fragility, and peacefulness and leveraging control variables from a diverse set of sources, this line of inquiry concludes that while the proliferation of information and communication technologies may correlate with dissatisfaction and political turmoil, as other research has demonstrated, these technologies do not sufficiently create opportunity structures on their own. Further, as the literature regarding both violent conflict in general and its relationship with ICTs suggests, government and development status matter. Specifically, government capacity for action and propensity toward type of action interact with ICT growth to create opportunity structures for violent conflict.

Conclusion: While lower developed countries experience more adverse effects from mobile broadband and higher developed countries experience more positive effects, regime type appears to slightly matter more, with less democratic states accumulating more risk with increased access to mobile broadband. The troubling implication is that the same states experiencing higher ICT growth from America's chief rival, China, are the same countries most at risk for adverse effects from ICT growth.

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I. Introduction

The growth of access to high-quality information and communication technologies (ICTs) globally holds implications far beyond opening new markets and enabling connection over distance. Research since the middle of the 20th century has explored how ICTs might affect political and social structures, with contrasting theories between ICTs as democracy-enabling tools, barrier reducers, decision restrictors, and, more recently, government service alternatives, conflict enablers, and potential tools of oppression. This research aims to open dialogue on the question of whether the proliferation of mobile, high-capacity ICTs affect the spread of violent conflict.

Logically, ICTs do not cause conflict, nor can they reduce it. Instead, they enable opportunity structures. This research seeks to examine how ICT proliferation affects violent conflict through a lens of opportunity structure, leveraging McAdam's implications for opportunity on collective action as affecting it through changing and creating opportunities, but omitting his emphasis on the social structure of opportunity in favor of analyzing how infrastructure similarly affects opportunity.¹ In expanding McAdam's definition, this research uses the idea of connective action, not just collective action, drawing from Bennet and Segerberg.² Thus, the goal of this research is not to ascribe a single role to the proliferation of ICTs with regard to conflict, but to assess whether ICTs meaningfully contributes to opportunity structures that either favor or disfavor the spread of violent conflict on balance.

This is not a problem only for social science. How ICTs affect the global environment matters greatly to national security scholars and military thinkers. The 2017 National Security Strategy specifies a shift in focus away from the counterinsurgency and counter-terrorism that has dominated national security policy and thought for the past two decades in favor of a

renewed emphasis on Great Power Competition, principally with China and Russia.³ Building military capabilities to succeed in direct conflicts against both Russia and China merits the preponderance of attention, but understanding conditions for conflict across the globe outside of direct confrontation remains critical to both successful competition and in managing American interests. Considering the role of proxies and small-scale conflict in previous hegemonic competition, understanding how conflicts arise and spread holds particular importance designing military and security strategies appropriate for the realities of both Great Power Competition and the waves of instability propagating across the globe.⁴ Global instability probably has a greater chance of drawing American intervention, a key consideration for strategists and military thinkers who must prepare for the no-fail missions within the Great Power Competition problem set as well as keep the force postured to respond to violence outside war with China and Russia. This is worthy of continued study by itself, but even more saliently American adversaries sponsor the spread of communication technology, including in parts of the developing world and locations with a high degree of conflict recidivism.⁵ Communication technology is both a means of influence for America's Great Power adversaries, and a mechanism for the spread of violence.

This research explores the relationship between ICTs and violence in a military and national security frame and examines how ICTs, specifically mobile broadband density in populations, affects opportunity structures for violent conflict on balance. Through panel data analysis of political violence, fragility, and peacefulness and leveraging control variables from a diverse set of sources, this line of inquiry concludes that while the proliferation of information and communication technologies may correlate with dissatisfaction and political turmoil, as other research has demonstrated, these technologies do not sufficiently create opportunity structures on their own. Further, as the literature regarding both violent conflict in general and its relationship

with ICTs suggests, government and development status matter. Specifically, government capacity for action and propensity toward type of action matter. While lower developed countries experience more adverse effects from mobile broadband and higher developed countries experience more positive effects, regime type appears to slightly matter more, with less democratic states accumulating more risk with increased access to mobile broadband. The troubling implication is that the same states experiencing higher ICT growth from America's chief rival, China, are the same countries most at risk for adverse effects from ICT growth.

II. Literature Review

The diverse and expanding body of conflict literature provides a broad range of effects regarding the causes of conflicts, with greed and grievance standing as two of the most often studied causes. Paul Collier and Anke Hoeffler, in their important analysis of greed and grievance in civil war, conclude that opportunity factors, specifically economic factors, hold greater explanatory value.⁶ Work from Fearon and Laitlin, examining the role of ethnic divides as a conflict driver, similarly notes the importance of economic factors, demonstrating economic factors hold strong, negative significance to the onset of civil war in all models.^{7*} Updates to their research from Cederman, Wimmer, and Min, while finding different roles for ethnicity in conflict, similarly find economic development as a significant factor in determining the onset of conflict in all models except that of elite infighting.^{8†} Kim and Conceição analyze the relationship between conflict and development without the constraints of civil war or ethnic

* Interestingly, Fearon and Laitlin's work also shows no significance for democracy among the two models in which the authors included that variable. This contrasts with other literature, and in limited circumstances, the findings of this research.

† These authors conclude that autocracies and democracies share equal effects from ethnic conflict, but report ambiguity with respect to anocracies.

effects, concluding that development serves as a conflict mitigator, but also that recent episodes of war may contribute to decreased development.⁹

While much of the literature analyzes direct causal mechanisms, other conflict literature address structural contributors. Of particular importance to this line of inquiry, the role of regime type appears significant among many studies, particularly in the work of Steven Levitsky and Lucan Way. These authors introduce the concepts of linkage and leverage to describe democratization pressures, including the concept of information linkage important in integrating regime effects with those of ICTs in regime stability and competition between autocracies and other states.¹⁰ They later analyze authoritarian stability through a comparative analysis of African states, observing that authoritarian stability experiences structural changes largely through external factors, but also through distribution of resources and incentives APSA and adversely affective by historical violent recidivism.¹¹ In a further expansion of their ideas, Levitsky and Way examine democratic stability, observing that the perceived democratic recession from the 2000s fails to recognize much democratic strengthening, but also that democracies remain vulnerable to other kinds of disturbances, such as economic factors, which can facilitate backsliding.¹² Across all of their work, Levitsky and Way observe that regime type is a factor in stability, and by extension conflict, but nuanced and interactive with other factors. Ben Smith examines one of these factors, analyzing the links between development and regime type. He leverage range of literature on the effects of oil wealth on regime stability, concluding that development may stabilize autocracies more preferentially than democracies.¹³

Within regime-contribution studies, ICTs figure into a subset of the literature. Dan Slater and Sofia Fenner address structural effects within authoritarian systems, analyzing structural effects of regime type on regime durability through coercion, exploitation, and “cultivating

dependence.” They conclude that effective infrastructure creates state power through economic growth – that “a strong ruling party is more likely to be built on the foundation of a strong state than the other way around.”¹⁴ Elizabeth Stein examines the relationship between regime type and ICTs directly, observing that ICTs can indirectly contribute to both liberalization of authoritarian regimes, as well as “political retrogression,” and observing that exploitation of ICTs yields diminishing returns for opposition groups.¹⁵ Stein also describes how authoritarian regimes and political dissidents leverage ICTs, and the constraints in the effective use of ICTs to gain or maintain power. She attributes credibility challenges to authoritarian appeasement of elites, and difficulty in effective communication within authoritarian constraints for increasing risk.¹⁶ Seva Gunitsky finds that, like Smith’s analysis of development, ICTs can contribute to authoritarian stability. Specifically, he concludes that social media enables stability for autocratic states through “territorialization of the internet” and the proliferation of authoritarian techniques, enabling autocracies to “shift from contestation to co-optation.”¹⁷

Beyond stability effects from and within regimes and development, literature studying structural contributors to conflict also includes those examining the role of ICTs on conflict directly. Among the literature addressing the links between ICTs and violent conflict, two opposing schools of thought emerge to characterize the nature of the relationship. Sociologist Marshall McLuhan posits the idea of a global village, wherein communication technology reduces barriers and creates the benefits of local groups, which influences both theories of peace promotion and conflict resolution.¹⁸ Karl Deutch, his contemporary, hypothesized that mass media could adversely affect decisions of war and peace through constraints, or the perception of constraints, generated through both elites and the masses, a position supported in Haesebrouck’s more recent research.¹⁹ More recently, other scholars note the role of communication technology

in spreading conflict and facilitating the organization, recruitment, and indoctrination of groups prone to conflict.²⁰ Beyond these characterizations that either posit communication technology as a conflict-reducing mechanism or a conflict-spreading mechanism, scholars characterize the role of communication technology in how they affect the relationship. Theories that propose a conflict-reducing role describe ICTs as enabling collective social action for problem solving, providing alternatives to fighting, or as a means for governments to monitor and suppress movements before violence can erupt at scale. Among scholars who advocate for the conflict-contributing position, the literature generally qualifies how communication technology affects conflict either as an enabling function, wherein content and action form the principal basis for conflict escalation and spread, or as independently worthy of study as a contributor to conflict.

Information Communication Technology as a Conflict Mitigator

Drawing from the implications of McLuhan's global village, reducing spatial distance and barriers to create connections, Kingsley Owete and Vincent Olusakin observe that technology can improve intercultural communication, extending their idea that "contact among cultures will ensure peace," though their work focuses on intercultural communication as a whole, beyond technological facets.²¹ Yael Navaro uses a qualitative analysis of "technology for peace initiatives" in Cyprus to orient technological development toward nonviolent action. Though he in part examines the appropriation of military-like technology for peaceful purposes, he argues that technology can provide links between peoples that permit transcendence beyond the need for violent conflict, what the author describes as humanism.²² Nicole Stremlau's work provides similar conclusions through a case study of media functionality in Somalia, observing that ICTs provide a space for elites in conflict to negotiate power, and for fighters to "continue

the struggle by other means.” She does not specifically address whether ICTs promote peace or violence, instead leveraging the concepts of power, flow, and participation in describing how media and ICTs enable action outside of violence. Her approach prefers the integration of traditional media and newer forms of media, which she terms “hybrid media.” Central to her idea of hybrid media is the proliferation of ICTs, which enable a broader reach of culturally traditional information flows, and later describing how ICTs specifically enable non-violent dispute mechanisms.²³

Most theories of communication technology as a conflict mitigator primarily focus on its role in deliberate peace mediation. David Lanz and Ahmed Eleiba address the roles of social media in this context, identifying opportunities and acknowledging challenges. They conclude that ICTs, while “unlikely to revolutionize peace mediation,” can facilitate communication and coordination to achieve peaceful resolutions of existing conflicts.²⁴ Andreas Hirblinger expands on the idea that ICTs can contribute to peace, explaining that ICTs, including mobile technologies, tend to favor two-way communication between peace brokers, though allowing for extensive use in broader messaging. He also adds ICTs support transparency and reporting critical to accountability.²⁵ Grace Maina likewise suggests ICTs form an accountability mechanism that can reduce conflict, and leverages the concepts of narratives and framing to account for peaceful change within Kenya, while also acknowledging ICTs can facilitate violent frames and narratives as well.²⁶

Steven Livingston and Gregor Walter-Drop’s earlier work examines a similar line regarding transparency and reporting, but extend their work into ungoverned and low-governance spaces, describing how ICTs enable effective collective action, and providing examples of ICT-enabled platforms that serve to track and enable mitigation of conflict, such as

Ushahidi.²⁷ Livingston also analyzes ICT as a government tool in policing and security, observing that it forms an enabling structure for more transparent governments to enable security with low opportunity costs.²⁸ Ushaidi and other civil surveillance and response mechanisms figure prominently in other research. Simon Cottle considers the ICT-enabled functionality of visualization tools and crowd-funding as important parts of peaceful collective action, but also observes that they can enable surveillance and government response, for ill or worse, concluding that ICTs become effective enablers for an already effective government, but a burden for ineffective governments.²⁹ Sheena Greitens explores the varied role surveillance and ICTs play within authoritarian systems specifically, observing that within these regime types, ICTs, and specifically the internet, does not necessarily equate to liberation technology, but can instead enable and support undemocratic action.³⁰ None of the surveyed literature addressing how ICTs can positively impact peace empirically demonstrates that ICTs tend to impact peace more broadly, however.

Information Communication Technology as a Conflict Spreader

The idea that ICTs drive contention and violence manifests as the more dominant thought in the scholarly literature. T. Camber Warren finds merit to the conflict mitigating theory when examining ICT proliferation as mass media, but finds the opposite with social media through a fixed-effects regression analysis of ICTs and violence among 24 African states. He leverages the same framework as the conflict mitigator camp, finding utility in the idea of “economies of scale in the marketplace of ideas” to explain both how mass media increases the strength of these economies, and social media decreases the strength.³¹ Jan Pierskalla and Florian Hollenbach similarly find a link between ICT penetration and violence in Africa, but confine their statistical

analysis to mobile phones. They do, however, explicitly leverage a contentious politics framework, explaining that mobile phones specifically enable collective action.³²

Many explanations of ICTs as conflict enablers leverage contentious politics frameworks to explain how conflicts materialize and spread. However, the literature generally addresses either the content ICTs enable or the independent role of ICTs in the spread of conflict. Sociologist Zeynep Tufekci examines technology's role in the spread of contentious politics, observing that it serves to mutually enable both movements and governments (Tufekci 2014, 1-2).³³ In her book *Twitter and Tear Gas*, she argues ICTs serve as an enabling condition, but not a cause, essentially calling ICTs an intervening variable vice an independent variable in conflict transmission models.³⁴ While she does not describe contentious politics as necessarily causal for violent conflict, her works do consider the increased possibility of violence that can accompany contentious political movements. Her position that ICT-enabled content and action matters most in describing the spread of movements finds common cause with Rachel Brown and Laura Livingston, who observe that access to ICTs allows groups to manipulate identity, capitalize on biases, and construct opportunity frameworks.³⁵

Other scholars observe that ICT proliferation still explains some of the variance and merits study as such. Catie Snow Bailard uses Olson's collective action concept to describe how ICT affects conflict. Building from the theory that communication technology reduces collective action opportunity costs, she specifically analyzes ethnic conflict in relation to mobile phone signal penetration through a large-*n* statistical analysis using panel data and logistic regression. She finds mixed support for opportunity- and motivation-based theories, concluding that mobile phone access has a statistically significant, positive relationship with ethnic conflict, but mitigated by other means to coordinate collective action, such as population density.³⁶ Nils

Weidmann similarly examines ICTs as a potential transmitter of ethnic conflict, but specifically addresses transnational spread through diffusion processes using spatially-lagged regression analysis, concluding ICTs add a means of diffusion without replacing geographic proximity in predicting the transnational spread of violence.³⁷ Guriev and his colleagues demonstrate that the kind of technology matters in the potential transmission of conflict through examining government confidence and ICT proliferation. In a comparison between 2G and 3G penetration, they conclude that 2G provided a modest boost to government approval, while an increase of 3G penetration reduced confidence in government. They describe the effect of the simpler service as a popular perception of an effective government, while the better internet reach allows for efficient spread of conflict-promoting ideas and the organization of opposition groups in spite of the improvement in service, especially for populist movements.³⁸ The populism frame implies some role for narratives and frames within an ICT-driven framework for the transmission of violence, but Guriev and his colleagues make no attempt to assign causality.

Implications for Continued Research

Some scholars take the causality question further, observing challenges to meaningful inferential statistics in spatially-defined studies and because of reporting bias, proposing a means to test for biases between ICT and violence models, and describing the need for continued research to differentiate causal mechanisms within an ICT framework.³⁹ Zeitzoff further asserts that new ICTs neither advantage nor disadvantage a group or government alone, but the external contexts matter in describing opportunity.⁴⁰ Given the disagreements in the literature over causality and the difficulties ICT penetration implies for effective conflict prevention, how ICTs might create conditions for contentious politics to turn violent without considering framing and

other mechanisms contributing to contentious politics merits continued study. Continued research can, and should, include means to isolate framing, narratives, opportunity structures, and identity as both independent variables and controls within large-*n* analysis. This research, however, will focus on the role of ICTs independently to identify their role in creating conditions for conflict, specifically violent conflict. This research will build specifically from Bailard's tentative observation that mobile phone access can drive conflict, but without her constraint of ethnic violence, and leveraging the observation from Guriev and his colleagues that type of access matters in the transmission of contentious politics. As such, this research will consider the relationship between mobile broadband access and political violence as a cross-national time-series panel study using variable-appropriate estimation methods.

III. Methodology

This research takes a positivist, quantitative approach to examining the relationship between mobile broadband access and violent conflict. The below hypotheses will use a common dataset, with independent and control variables common to each hypothesis, which differentiate through their dependent variables. The specific means for conducting this research derive from constraints in the data and the research goal, favoring hypothesis testing over efficiency in identifying precise coefficients, and leaving ample opportunities for future research.

Previous research into how ICTs, specifically mobile broadband, affect conflict have focused on spatial density and reach. Guriev and his colleagues, as noted, used 3G coverage in square kilometers, comparable to Bailard's approach in analyzing ICT's and ethnic conflict. Instead of analyzing mobile broadband density geographically, this research will examine density within a population, using the International Telecommunication Union (ITU)'s data for

mobile broadband per 100 inhabitants. The per capita measurement indicates mobile broadband demand, whereas the geographic density indicates mobile broadband supply. Not only does this approach the independent variable from a demand- and population-centric standpoint, it also aggregates all forms of mobile broadband, not just 3G. This is important in part because of the rapidity of change within mobile internet structures, and it also permits a slightly longer panel across more countries, increasing the utility of the dataset.

Operationalization of violent conflict into specific dependent variables requires greater specificity. In this research, military and national security interests serve to scope the idea of violent conflict. Considering the range of political violence worldwide, this research makes no assumption that low-scale political violence and conflict creates military-level concerns and action, instead focusing on the highest categories of violence, instability, and aggression. In practice, this means avoiding indices and metrics built on protests, riots, and internally-managed conflict. Many interest groups, institutions, government agencies, and intergovernmental groups find these important, but broad political conflict and violence indicators may not prove salient military and national security policymakers.* Instead, a narrow operationalization of political violence from the Center for Systemic Peace, the Major Episodes of Political Violence (MEPV) index, serves to more meaningfully describe the specific kind of conflict that should most concern military and national security thinkers. Political violence, however, is not sufficient in accounting for the kind of conflict-proneness of concern. In addition, this study will examine state-level fragility, which itself creates conditions for conflict such as violent regime change and power vacuums amenable to facilitating terrorism. The Center for Systemic Peace's State

* Even among severe episodes of violent conflict, not all prompt international response. An examination of the Center for Systemic Peace's war list show many episodes of large-scale violence with little to no international response.

Fragility Index will stand as the state-level fragility indicator. Finally, in an era of great power competition, the study of conflict should also consider proneness to conflict in terms of state-level decision-making and societal trends. The Global Peace Index (GPI) from the Institute for Economics and Peace and The Economist Intelligence Unit provides the most appropriate operationalization of peacefulness and state-level conflict proneness, aggregating a broad range of indicators including internal conflicts, external conflicts, terrorism, refugees/IDPs, incarceration rates, homicide rates, weapons imports, defense spending, and perceptions of the population. Each of these operationalizations forms the basis for a separate hypothesis, formulated for ease of falsifiability and beginning from the position that mobile broadband access meaningfully contributes to opportunity structures that favor political violence, instability, and disfavor peacefulness. While these hypotheses each measure an important determinant in national security policy and military intervention, the dependent variables for each exhibit significant differences. Pairwise correlations show significant but modest relationships between the three dependent variables, indicating each in fact measures a different thing in practice, not just in theory.*

Hypothesis 1 (H1): Countries with greater growth in mobile broadband access will exhibit a higher tendency toward major episodes of political violence than countries with lower mobile broadband access.

The MEPV index creates an ordinal independent variable, with a range of possible values between zero, a condition of no violence, and seven, maximal political violence. The

* See table 2 for complete pairwise correlations.

independent variable, mobile broadband subscriptions per 100 inhabitants, includes data across 12 years for 144 counties. As such, hypothesis testing for H_1 will use random-effects panel ordered logistic regression with robust standard errors clustered within panels. Because the focus of this research is hypothesis testing, not creating predictive models for established theory, model interpretation will report log-odds coefficients, not odds-ratios. Odds-ratios may be unreliable given the gaps in data, limitations of the estimation methods, and additional control variables that may merit inclusion in future revisitations of this research question, and reporting coefficients permits a closer focus on falsification. Testing the validity of the hypothesis does not require interpretation of the coefficient beyond assessing its magnitude between models and the negative or positive relationship conveyed through the coefficient's sign, and this line of analysis will not include an effort to predict probabilities at Y set equal to each MEPV outcome. Using reported coefficients for the independent and control variables, a negative relationship between mobile broadband access and the MEPV index within statistically significant models falsify this hypothesis within the confines of their restrictions. A non-significant relationship does not permit the rejection of the null hypothesis (H_0), and without additional data, the hypothesis must be treated as falsified. All models will use Wald's χ^2 to assess the viability of any given model. Both coefficients and model-level statistics will use $p < 0.05$ as the standard for significance.

Hypothesis 2 (H_2): Countries with greater growth in mobile broadband access will exhibit greater fragility than countries with lower mobile broadband access.

Like the MEPV index, the SFI is an ordinal variable. Zero represents perfect stability, and 25 indicates maximal instability. The data sample for this hypothesis similarly includes 144 countries across 12 years. As with H_1 , H_2 will use random-effects panel ordered logistic regression under the same parameters, and with the same reporting considerations. Falsification for H_2 occurs with a negative relationship between mobile broadband access and SFI within statistically significant models. A non-significant relationship does not permit the rejection of H_0 , and without additional data, the hypothesis must be treated as falsified.

Hypothesis 3 (H3): Countries with greater growth in mobile broadband access will exhibit lower peacefulness than countries with lower mobile broadband access.

The GPI, unlike MEPV and SFI, is a continuous variable, bounded by one and five, with one representing a perfectly peaceful country. Drawing from the work of Moundigbaye and his colleagues, who demonstrate that for research oriented toward hypothesis testing, panel-corrected standard error (PCSE) estimation methods present the greatest utility, all models will use Prais-Winsten regression with AR(1) autocorrelation and the PCSE error structure.⁴¹ Further, this estimation method does not make an assumption of homoskedasticity or balance among the panel data, further reducing the need to add treatments for heteroskedasticity and unbalanced data. As with the first two hypotheses, Wald's χ^2 will serve as the primary means to evaluate whether the model has sufficient value to make statements regarding H_0 . Unlike ordered logistic regression methods, Prais-Winsten regression does allow for pseudo- R^2 , and each model will report a pseudo- R^2 coefficient, though as a special case of feasible generalized

least squares, Prais-Winsten regressions do not permit treatment of pseudo- R^2 as a measure of the amount of variation accounted for by the model. The pseudo- R^2 for each model will only offer comparative information between models if and when appropriate. As with the first two hypotheses, H_3 predicts a positive relationship – as mobile broadband subscriptions increase, GPI will increase. The same falsification parameters apply to H_3 as to the other two hypotheses.

Each hypothesis will use a similar set of control variables, drawn from both the literature specific to the relationship between ICTs and conflict, and the study of conflict in general. Common across the range of country- and event-level studies, economic indicators figure significantly in models of causes of violent conflict. While a range of complete, available indicators could serve to represent economic conditions, gross domestic product (GDP) purchasing power parity (PPP) per capita in constant 2017 American dollars provides the most utility. This measure requires no cross-country adjustments, and equally addresses both government economic capacity and individual economic prosperity on average. Hypothesis testing will use either the raw GDP PPP per capita figures, or their natural logarithm as most appropriate by the estimation method and testing parameters for each model.

GDP PPP per capita alone does not adequately describe opportunity, however. Several additional indicators might help to better address opportunity, and this research will rely on unemployment rates to serve that purpose. World Bank figures on unemployment are both reliable and available, and the limited gaps in data are spread across countries, making balancing concerns negligible compared to alternatives.*

* A Lorenz measure, such as the Gini Coefficient, might better serve this purpose in theory. However, data is considerably less available, and the data that exists favors Organization for Economic Cooperation and Development (OECD) countries, which will introduce bias in any model not specifically targeting OECD countries.

In addition to the economic prosperity indicators, the United Nations Development Programme's Human Development Index (HDI) serves as one of two means to divide the dataset into more meaningful parts for detailed analysis.* The UN Development Programme categorizes development into four categories – low, middle, high, and very high.⁴² This research will use the same four categories to examine how ICTs affect violent conflict among each hypothesis with each development category with the intent of exposing more completely how ICTs affect opportunity structures for violence.

Much of the literature includes both type of government and governmental effectiveness in theoretical models of how ICTs might affect conflict. This panel analysis will include a single indicator for each. The Center for Systemic Peace's Polity V index, ranging from -10 for a pure autocracy to 10 for a pure democracy, will represent government type. In models considering the entire set of countries, this variable will figure as a standard control variable, reporting a specific $\hat{\beta}$ for these models. Because each hypothesis will also restrict observations to more meaningful categories, and because of the important role ascribed to government in the scholarly literature, the Polity V index will also serve as a primary means to create categorical restrictions. These will follow the nomenclature and structure as described within the Polity V codebook, using -10 through -6 to define autocracy, -5 through 5 as anocracy, and 6 through 10 as democracy.⁴³ These codes will not change year-to-year within a country panel. Where a country experiences change over polity categories, this analysis assigns a category based on the preponderance of observations. That is, if a country ranks as an anocracy for eight of the 12 years covered, it will be listed as an anocracy, regardless of the most recent observation. In cases

* HDI itself expresses multicollinearity concerns with too many critical variables to be included in models directly. Additionally, with both GDP PPP per capita and school enrollment already included as components of models among all three hypotheses, HDI would be mostly duplicative.

where categories are evenly split, the average of numerical scores will determine that country's polity category.

Government effectiveness is more difficult to measure. Because this study focuses on initial hypothesis generation and testing, a single indicator, government expenditures per capita, will represent tangible government effectiveness. While a more comprehensive index could better represent government effectiveness, perhaps including power generation, social spending, health spending, and other markers of governmental service, no such comprehensive indicator was readily available at the time of generating the dataset for this research.* To augment the tangible, objective measure of government expenditures per capita, the World Bank's World Government Indicators dataset provides a metric that measures perceived government effectiveness.⁴⁴ The two together represent both the impacts of government action and popular perceptions within each model.[†]

Because of the means of communication mobile broadband enables, models must consider access-gating for those requirements. Unlike land- or satellite-based telephony, mobile networks enable non-voice communication. Short message service (SMS), a hallmark differentiator of mobile networks versus line-based networks, requires a level of literacy that may be important, especially among the lowest developed countries. Even with the introduction of true mobile broadband, SMS still provides easy, time-efficient communication options, while introducing the means for multimedia communication. Available literacy statistics, however, are not sufficiently complete to include in this panel analysis. Instead, the total school enrollment

* Many of these indicators were available through the Cross-National Time-Series dataset, the World Bank, and other data sources. However, the formulation and testing of an index created from these indicators is outside the scope of this research. Future research along this topic, and many others, might benefit from a deliberately-constructed and well-studied governmental effectiveness index.

[†] At .7459, pairwise correlations present no multicollinearity concern, and the lack of close correlation between government expenditures per capita and perceptions of government effectiveness is separately interesting.

indicator from the Cross-National Time-Series dataset will approximate this variable, and do so more completely, since comprehensive education should impact information creation and delivery more than literacy alone within the capabilities of a mobile broadband network. Additionally, school enrollment augments government expenditures in describing government effectiveness, especially for theories that associate ICT proliferation with conflict reducing theories in the liberation technology camp.*

Importantly, this research does not control for some of the grievance-based factors included in other research. This research deliberately omits ethnic fractionalization.† Aside from the well-established flaws with the most available dataset, the Atlas Narodov Mira ethnolinguistic fractionalization index, the yearly data from the more recent *Ethnic Power Relations* dataset does not cleanly address the time coinciding with the development and proliferation of mobile broadband technology.⁴⁵ This research also omits regional considerations, including proximity to existing conflict.

IV. Analysis and Results

Testing for H_1 predicted a positive relationship between mobile broadband subscriptions and MEPV, beginning with a model without polity or development category restrictions.‡ This model, including all controls, does not indicate a significant relationship between mobile broadband and MEPV. Further, the χ^2 indicates no significance at the model level. For the global model, H_0 cannot be rejected. Based on the conclusions from other scholars studying this

* Government expenditure per capita and school enrollment may appear more related than the descriptive statistics indicate. While school may be a function of government spending in some countries, the pairwise correlation for the whole dataset is low, statistically significant at the $p < 0.01$ level, and also negative, indicating no concern for multicollinearity.

† The implications of omitting ethnic fractionalization, geography, and religion, discussed in more detail in the conclusion, become important when considering opportunities for continued research.

‡ Model 1 in table 3.

and similar subjects, a lack of significance at the global level is unsurprising. Restricted models, however, yield more important insights. Among restricted models, those considering autocracies, anocracies, low development countries, and very high development countries, merit specific attention.*

Running the panel ordered logistic regression against only autocracies, mobile broadband subscriptions exhibit a strong negative effect on MEPV, the opposite of the effect predicted under H_1 .[†] This model, excluding only Polity V among the identified control variables because the polity restriction already accounts for regime type, effectively falsifies H_1 for autocracies in general. This negative relationship additionally appears to support the theories that favor reduction in political violence through oppression, since autocratic regimes have both the propensity and tools to suppress movements before they can become violent.

For anocracies, however, the data indicate rejection of H_0 and tentative support for H_1 .[‡] Here, both the model and mobile broadband subscriptions achieve significance above the $p < 0.05$ level, with the government effectiveness indicator standing as the only other significant variable. This result may reflect state vulnerability more than an outsized impact from mobile broadband. Transitional states, which inherently fit into the anocratic range of Polity V, and states with recent regime changes exhibit more conflict, and may be less robust to the potential disturbances enhanced mobile broadband access can introduce. In short, anocracies may be less

* Other restricted models either reveal no significance at the independent variable or model level, comprise a null set (low-development autocracies), or are mathematically infeasible. For each of these cases, this research cannot reject H_0 and treats the hypothesis as falsified, but with no special implications for conflict-reducing theories. Looking within models restricted by both regime type and development offers no additional inferential value. While the high plus very-high development autocracy model is significant, there are no low-development autocracies in this dataset, yielding a high overlap between this model and the autocracy only model. Similarly, the overlap between democracy and very high democracy is sufficiently high as to duplicate results.

[†] Model 2 in table 3.

[‡] Model 3 in table 3.

robust, allowing mobile broadband access to contribute to opportunity structures that favor political violence.

Similarly, the model restricted to low development countries indicates rejection of H_0 and tentative support for H_1 .^{*} The same logic of opportunity structure may apply here. States with lower resources and lower opportunity may be less robust to the kinds of political stressors ICTs can introduce. This proneness to conflict could reduce barriers for movements to turn violent, in line with Bailard's assessment of reduced opportunity cost. Extending this logic further places meaning on the very high development model, where the analysis indicates a strong negative relationship and falsifies H_1 .[†] The highest developed countries should be expected to be more robust through greater social stability and alternative means of dispute resolution.

The fragility hypothesis yields similar implications for the role of mobile broadband in providing structural conditions for conflict. The model without development or regime restrictions fails to meet the threshold for statistical significance for the independent variable, though the model itself is meaningful and several other variables register as impactful on fragility, notably GDP PPP per capita, government expenditures, government effectiveness, and regime type, with negative correlations among each.[‡] Among the restricted models, those covering anocracies, middle development, and high development countries provide further inferential value on the role of mobile broadband in determining state-level fragility.

^{*} Model 4 in table 3.

[†] Model 5 in table 3.

[‡] Model 1 in table 4. The implication for fragility in a global context is that more individual wealth, more spending, better perceived, and more democratic governments experience less instability. This structural robustness may provide some utility in assessing impacts in the first and third hypotheses. However, it also introduces concerns over endogeneity.

H_2 predicted a positive relationship between mobile broadband and fragility. The anocracy-restricted model for SFI indicates a statistically significant, negative relationship, however.* The $\hat{\beta}$ observed in this model describes lower fragility with a rise in mobile broadband subscriptions. For anocracies, the evidence suggests mobile broadband enables state-level stability, but permits political violence.† This appears counterintuitive, but with both a deeper examination of MEPV and SFI, as well as a consideration of their correlation coefficients, the disparity creates no concern.‡ Political violence can be a tool of stable states. In fact, an analysis of the dataset indicates civil political violence is the principal contributor to higher levels of total political violence within the MEPV dataset. The apparent disparity may indicate that stable states are more able to leverage political violence, or withstand it, while mobile broadband contributes to opportunity structures that both favor state-level stability and political violence within anocracies. Among development categories, both middle and high development groups exhibit significance. As with the anocratic model, the relationship is negative, effectively falsifying the hypothesis for these groups.

Between all models examining SFI and mobile broadband, no model achieved a significant positive relationship between SFI and mobile broadband. Most models showed no significance, and those that did favor falsifying the hypothesis. Among most cases, this research finds no inferential value for determining state-level fragility from mobile broadband. In those cases where significance emerges, mobile broadband enables state-level fragility.

* Model 2 in table 4.

† The analogous model in the MEPV hypothesis indicated a rise in mobile broadband subscriptions led to a rise in political violence.

‡ Pairwise correlation for MEPV and SFI is .4690.

H_3 predicted a positive effect on GPI from mobile broadband. With the full, unrestricted dataset, the Prais-Winsten estimation showed no significant effect, however.* Four models showed significance at both the model and variable levels – autocracies, democracies, high development countries, and the doubly restricted category of high plus very high development autocracies. Both models of democracy and high development countries show negative relationships between mobile broadband and GPI, indicating these categories become more peaceful with more access to mobile broadband.† In these two cases, this analysis falsifies H_3 . Logically, this could arise from either an inherently higher opportunity cost for violent action among high development countries and democracies, or that democratic values favor the open discourse mobile broadband can provide. An analysis of the controls for democracy tend to add weight to this supposition, with the subjective government effectiveness scores also holding a significant negative relationship, meaning countries who hold perception as more effective tend to be more peaceful.

The mobile broadband coefficient for autocracies, however, supports rejection of H_0 . This model identifies a statistically significant, positive value for the mobile broadband $\hat{\beta}$ at an absolute magnitude of about 11% greater than for democracies.‡ In this model, tangible government actions, as represented by government expenditures per capita maintains a negative relationship (in common with democracies), but the perception-based government effectiveness indicator loses significance. Autocracies become generally less peaceful with more broadband access, moderated by their own ability to spend.

* Model 1 in table 5.

† Models 3 and 4 in table 5.

‡ Model 2 in table 5.

The intersection of high developed countries with autocracy presents an interesting point for further analysis. Mobile broadband appears to damage peacefulness among autocracies, but enhance peacefulness among high development countries. The intersection model, high-development autocracies, shows no significance, but its sample size of six countries with unbalanced data weakens the model to such a degree that any inference loses value. When opening the range to include both high and very high developed autocracies, the model gains similar significance to the general autocratic model, with a positive value for both same statistically significant coefficients throughout the model.* The implication of this comparison is that authoritarian tendencies probably matter more than development status in determining how mobile broadband impacts peacefulness.

The lack of relationships at the full, unrestricted level among all three hypotheses is neither surprising nor particularly important. The repeated role of governments within the theory, and development in conflict theory more generally, support the idea that factors affecting the spread of conflict should vary by development and regime type. The implications common to all three hypotheses, that high or very high development countries tend to experience less proneness to violent conflict with an increase in mobile broadband is an important implication for the theory, tentatively supporting the notion that high development limits the potential negative impacts mobile broadband might bring to emerging conflicts.

The implications for authoritarian regimes appears more complex. The data suggest that as mobile broadband increases, political violence decreases, supporting the idea that authoritarian regimes might employ the unique advantages of mobile broadband for oppressive purposes. The data also suggest that autocracies experience less peacefulness with more

* Model 5 in table 5.

broadband. This could be a result of the increased complexity of the dependent variable, but requires more study.

Opportunities for Future Research

Importantly, any attempt to assign a specific mechanism to how mobile broadband affects any dependent variable lies outside the scope of this research. This research provides initial testing of the viability of each hypothesis, and the results yield a requirement for further, deeper analysis. Those opportunities for further research include better data, different estimation methods, and qualitative augmentation, specifically through process tracing and qualitative comparative assessments.

As discussed in the methodology section, a better variable for tangible government effectiveness will better fit the ideas described in the existing literature for an effective government. Further, as demonstrated in the work of Guriev and his colleagues, mobile broadband access likely has an independent determining effect on perceptions of government effectiveness. Future research should consider this or a similar variable, especially through mixed-effects probit or logit models better equipped to handle the endogeneity this variable inherently introduces.

The implications from H_3 regarding the relative importance of regime type relative to development category, particularly regarding autocracies, introduces an additional requirement for data – control over mobile broadband services. With data that categorized mobile broadband as either government controlled or not as a dummy variable, or better as an ordinal variable scaled from unregulated through moderate and strongly regulated and up to government owned or controlled, a greater understanding of how government type and mobile broadband interact to

affect conflict might emerge, and such a variable would better address Greiten's assertion that within autocracies outcomes vary with respect to ICTs. Similarly, a variable that addresses source of technology, whether domestic or foreign owned or controlled, as well as the Polity 5 score for the sourcing country if foreign supported, could enable a more meaningful study of how ICTs might affect regime stability and conflict through a lens of foreign intention.

In addition to new variables, the dataset as a whole could also benefit from refinement and different treatments. The panel data used exhibit gaps that limit estimation methods. Deeper research to refine gaps in data would balance the panel data and improve estimation outputs. Though unlikely to improve heteroskedasticity, more complete and balanced panel data will improve the efficiency of models and facilitate more realistic analysis of both exogenous and endogenous factors.

As noted, the variables used exhibit some concerns for endogeneity. A revisit of the dependent variable for H_1 and H_2 in the form of a binary variable would enable more reliable estimation methods, specifically binary logistic or probit panel estimations with fixed-effects or mixed-effects. Additional testing for H_3 should consider more efficient methods. While Prais-Winsten PCSE may be the most appropriate method for hypothesis testing, generalized least squares regression with treatments for heteroskedasticity and AR(1) autocorrelation will likely introduce reliable coefficients for moving beyond hypothesis viability and determining the degree to which mobile broadband affects peacefulness in a meaningful, measurable way.^{46*} Finally, continued exploration of this topic would benefit from additive research using conflict events, not countries, as the unit of measurement. Leveraging the country-level data provides

* The $t:n$ ratio for this dataset is .077, indicating a feasible generalized least squares method is the most efficient estimation tool for finding the closest approximation of β for relevant independent variables based on panel data efficiency research.

unique insights into state-level decision-making and opens the possibility of uncovering means by which states might directly affect how mobile broadband interacts with movements and opportunity structures, but event-level analysis would permit a deeper exploration of how mobile broadband might contribute to escalation or de-escalation of a given conflict.^{47*} Future research might consider the two units of measurement in concert as part of a larger study.

Despite the myriad opportunities in additional quantitative research, statistical modeling has limits to its utility in assessing how mechanisms from the theory interact and describe the relationships between mobile broadband and violent conflict. Qualitative assessment becomes critical in filling this gap. Much qualitative work has already been done, especially with regard to the conflict-reducing theories. However, more case studies, especially those using process tracing to describe precisely how mobile broadband access enables individuals, movements, organizations, and governments to either avoid or escalate conflict merits more attention. Additionally, many of the mechanisms described in the theory are not mutually exclusive. For example, mobile broadband in a given country at a given conflict event could serve both to provide a means for government surveillance while simultaneously lowering opportunity costs for opposition groups to engage in violence. Treating these as crisp sets fails to appreciate the range of effects mobile broadband, or any ICT, might have on violent conflict. Analyzing events through a fuzzy set analysis, however could yield insights as to which theoretical mechanisms affect the direction of a conflict or potential conflict, and may permit substantive discourse on the weights of various factors in determining the effect on conflict from mobile broadband. Such analysis would require study across events, vice across states, and would also enable a temporal

* The Uppsala Conflict Data Program offers data sufficient to build a separate event-level dataset in its dyadic set and its ethnic one-sided violence set.

examination of how and why the direction of ICT effects on conflict might change between conflict-promoting and conflict-mitigating.

Policy Implications

Though this research oriented on hypothesis testing and not on identifying specific measures of impact, it does postulate important implications for national security policy. These center on identifying conditions for mobile broadband effects on conflict, and on proliferation sources. More simply, policies favoring international development mitigate the negative consequences of mobile broadband growth, and policies incentivizing democratization along with mobile broadband could moderate risk of conflict, particularly among vulnerable anocratic states. This research identifies highest development countries as more resilient to the potential negative effects of mobile broadband under most circumstances. High development countries experience better stability, lower violence, and greater peacefulness from increased access to mobile broadband. Policies that favor broadband access coupled with development incentives may serve to increase stability and reduce the propensity for violent conflict. As models from H_3 indicate, regime type may matter more than development category in determining the effects of ICTs on violent conflict. The troubling implication here lies in China's growing exportation of digital technologies. The surface-level concern of increased surveillance and promotion of undemocratic ideals aside, the data from this study suggest the possibility of decreased stability and increased political violence associated with the proliferation of these technologies without additional controls. China's digital Belt and Road Initiative project targets countries within the lower two tiers of development and within the anocratic range of this dataset.⁴⁸ China's uncontested growth here could support their goals for dominance in "data governance,"

especially considering a decrease in global democratization.⁴⁹ It could also contribute to cascading instability as countries lack the resources to adequately respond to movements with increasingly lower opportunity costs for transitioning to violent modes of action. Neither outcome serves American interests.

V. Conclusion

This line of research cannot reject the null hypothesis for any of the three violent conflict hypotheses at the global level. Further, careful attention to the literature and the implications from models restricted by polity and development render unimportant the question of whether mobile broadband affects political violence, fragility, or peacefulness at the global level. Mobile broadband access does matter in determining the spread of violent conflict in some cases, but itself depends on environmental context, specifically regime type and level of development. Low development countries appear more vulnerable, and high development countries more robust to the potential adverse effects of mobile broadband.

Comparing results between the political violence and stability hypotheses, the implications of increased violence and increased stability coincident within anocracies merits more attention. One theoretical implication of this observation, that ICTs might lead to more stability through enabling selective political violence, specifically deserves further testing. More concerning, two models within the fragility and peacefulness hypothesis tests introduce an important, policy-relevant concern – mobile broadband penetration yields more instability within autocratic regimes, a growing concern with decreased democratization. While attributing a more specific cause from the existing literature is outside the scope or ability of this study and its

methods, it does provide tentative support for the idea that adversary-sponsored expansion of ICTs globally could harm stability and peacefulness globally in opposition to American interests.

Critical to any interpretation of the data analyzed in this research, this study examines how the balance of factors associated with mobile broadband access affects violent conflict, and supports Zeitzoff's assertion that while ICTs may factor in to the spread of conflict, they do so only inside of larger opportunity structures and do not favor any specific party or government inherently. This research does not establish any one factor as sufficiently causal, despite any tentative, logical support implied from the models tested. This research identifies the need for continued study of the relationship between ICTs and violent conflict, with particular attention to the kinds of conflict that affect national security decisions, and the need for better data, especially as technological progress continues globally.

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Appendix: Statistical Tables

TABLE 1. Summary Statistics						
	Observations	Mean	Std. Dev.	Min	Max	
MEPV	1856	.0226293	.3158436	0	6	
Global Peace Index	1857	2.08052	.4688927	1.179	3.681	
State Fragility Index	1855	8.452291	6.329906	0	25	
Mobile Broadband Subscriptions	1508	37.61262	37.91896	0	250.041	
GDP PPP Per Capita	1794	18710.72	18871.42	761.5242	99146.85	
Natural Log of GDP PPP Per Capita	1794	9.250245	1.186946	6.635322	11.50436	
Unemployment	1860	7.576327	5.684923	.11	34.934	
Government Expenditures	1339	484.877	761.6106	.008	4574.32	
Government Effectiveness	1856	.0919397	.9955921	-2.48	2.44	
School Enrollment	1354	1965.862	598.9937	19	3325	
Polity V	1845	4.070461	6.095002	-10	10	

TABLE 2. Pairwise Correlations for All Variables

	MEPV Total	Global Peace Index	State Fragility Index	Mobile Broadband Subscriptions	GDP PPP Per Capita	Natural Log of GDP PPP Per Capita	Unemployment	Government Expenditures	Government Effectiveness	School Enrollment	Polity V
MEPV Total	1										
Global Peace Index	.6611***	1									
State Fragility Index	.4690***	.7007***	1								
Mobile Broadband Subscriptions	-.1950***	-.3997***	-.5517***	1							
GDP PPP Per Capita	-.1890***	-.5262***	-.6889***	.6319***	1						
Natural Log of GDP PPP Per Capita	-.2063***	-.4872	-.8376***	.6163***	.8695***	1					
Unemployment	-.0091	.0641**	-.1566***	-.0103	-.0541*	.1373***	1				
Government Expenditures	-.1741***	-.5252***	-.5859***	.5421***	.8451***	.6980***	-.0526	1			
Government Effectiveness	-.3119***	-.6624***	-.8257***	.6125***	.8018***	.7962***	.0123	.7459***	1		
School Enrollment	-.0157	.0539*	.0977***	-.1146***	-.2123***	-.1965***	-.0299	-.0959**	-.0621*	1	
Polity V	-.0796***	-.3290***	-.4517***	.1644***	.1332***	.2219***	.1284***	.2546***	.4283***	.1238***	1

Note:

*** P<0.001, ** P<0.01, * P<0.05

TABLE 3. Multivariate Regression Analysis for Political Violence, H1
Dependent variable is Major Episodes of Political Violence, 2007-2018

	(1)	(2)	(3)	(4)	(5)
Mobile Broadband Subscriptions	.0173364 (.0274336)	-.0341466*** (.0065891)	.0670926* (.0319943)	.1108105* (.0485916)	-.105446*** (.0206501)
GDP PPP Per Capita	-.0001766 (.0001835)	-.0003574** (.000136)	.00019 (.0001073)	-.0006559 (.0011145)	-.0003038 (.0002213)
Unemployment	.1556336* (.0736383)	-.0284141 (.0688679)	.0448192 (.1353595)	.3262496 (.1831091)	-.2612373 (.4642393)
Government Expenditures	-.0055178* (.0027917)	.0021079 (.0025269)	-.0111953 (.0083003)	-.0422451 (.0564233)	-.0049238* (.0024719)
Government Effectiveness	-.9169324 (1.69764)	10.34796*** (2.944104)	-6.272028*** (1.89328)	-8.198478*** (2.577587)	6.92789*** (1.89071)
School Enrollment	-.0004195 (.0003729)	.0020409 (.0017713)	.0004955 (.0005493)	.0005185 (.0008155)	.0167356*** (.0036969)
Polity V	-.0835009 (.1010288)			-.6162581* (.2500613)	.110848 (.1684897)
Development Restrictions	None	None	None	Low	Very High
Polity Restrictions	None	Autocracy	Anocracy	None	None
Observations	788	97	198	137	335
Groups	144	17	38	28	56
χ^2	8.66	238.15***	15.69*	18.96**	989.38***
Log-psuedolikelihood	-222.83726	-7.8343941	-79.508565	-51.337152	-32.160018

Notes:

All models use ordered logistic regression estimations with robust standard errors clustered on countries in Stata 16.

Coefficients reported. Standard errors in parentheses.

*** P<0.001, ** P<0.01, * P<0.05

TABLE 4. Multivariate Regression Analysis for Fragility, H2
Dependent variable is State Fragility Index, 2007-2018

	(1)	(2)	(3)	(4)
Mobile Broadband Subscriptions	-0.0073137 (.0098433)	-.0433226** (.0139758)	-.0471133* (.0221465)	-.04026** (.0144569)
GDP PPP Per Capita	-.000392*** (.0000919)	-.0012738* (.0005287)	-.0002752 (.0001699)	-.0003858 (.0002451)
Unemployment	-.1063881 (.0785057)	-.2185106 (.2594812)	-.0663032 (.2170264)	-.0765794 (.1569114)
Government Expenditures	-.0022005* (.0009382)	-.0104141 (.0111086)	-.0014456 (.0018458)	-.0110161 (.0079594)
Government Effectiveness	-3.159433*** (.8437447)	-.5698067 (1.957482)	-3.655831** (1.341363)	-1.205247 (1.291072)
School Enrollment	.0002103 (.0001618)	-.0000779 (.0002306)	-.0000972 (.0002151)	-.0003137 (.0002742)
Polity V	-.5025866** (.1917313)		-.2837664 (.1866239)	-.3204651 (.2516388)
Development Restrictions	None	None	Middle	High
Polity Restrictions	None	Anocracy	None	None
Observations	788	198	130	186
Groups	144	38	27	33
χ^2	218.90***	46.08***	28.03***	38.23***
Log-pseudolikelihood	-1059.2353	-292.87582	-185.81933	-270.55307

Note:

All models use ordered logistic regression estimations with robust standard errors clustered on countries in Stata 16. Coefficients reported. Standard errors in parentheses.

*** P<0.001, ** P<0.01, * P<0.05

TABLE 5. Multivariate Regression Analysis for Peacefulness, H3*Dependent variable is Global Peace Index, 2007-2018*

	(1)	(2)	(3)	(4)	(5)
Mobile Broadband Subscriptions	-.0002233 (.000222)	.0010885* (.0005057)	-.0009803*** (.0003031)	-.0006205* (.0002901)	.0011247** (.000447)
Natural Log of GDP PPP Per Capita	.0304241 (.0128294)	.0224256 (.059662)	-.0062625 (.0260322)	.2174872** (.077435)	.0312159 (.0422008)
Unemployment	.0020566 (.00157)	.0089484** (.0032445)	-.0001867 (.0013654)	.0021059 (.0028634)	.0335266*** (.0047729)
Government Expenditures	-.0001015*** (.0000174)	-.0002617** (.000087)	-.000107*** (.0000143)	-.0002146 (.0001812)	-.0002408*** (.0000724)
Government Effectiveness	-.1701291*** (.0216054)	-.0402756 (.0242749)	-.1422676*** (.0285895)	-.0919076 (.0579504)	-.0606837 (.035904)
School Enrollment	6.97×10^{-6} (9.95×10^{-6})	-.0000141 (.0000253)	9.03×10^{-6} (.0000127)		1.05×10^{-6} (.000029)
Polity V	-.0051328* (.0020595)			-.0086221*** (.0012482)	
Development Restrictions	None	None	None	High	High & V. High
Polity Restrictions	None	Autocracy	Democracy	None	Autocracy
Observations	788	97	495	249	83
Groups	144	17	89	35	14
χ^2	1455.12***	80.51***	1517.86***	72.14***	197.62***
R ²	.9047	.9507	.8944	.9303	.9503

Note:

All models use Prais-Winsten regression with AR(1) autocorrelation and panel-corrected standard errors in Stata 16.

Models with polity or development restrictions outside those reported here do not provide additional inferential value.

High development model is not computable with school enrollment included as a control.

*** P<0.001, ** P<0.01, * P<0.05

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