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Protests by the young and digitally restless: the means, motives, and opportunities of anti-government demonstrations

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Inspired by the recent wave of global protests, this paper seeks to empirically investigate the role and interaction of a burgeoning young population and the penetration of information and communications technology (ICT) in explaining the onset and diffusion of anti-government demonstrations. Employing a cross-national global analysis between the years 1995 and 2011, we find that youth bulges and ICT affect protest activities in a more complicated and nuanced manner than the conventional wisdom suggests. The proliferation of anti-government protests is multiplicatively heightened when the enhanced technological means of protest are fused with the structural and opportunity-based conditions often witnessed in countries with large youth bulges. In contrast, we do not find that either of our variables of interest affects the probability of the outbreak of protests, which is rather explained by more contextual factors. A nuance in our results pertaining to the prevalence of protests suggests that it is the proliferation of technology that is more important than demographic factors. This suggests that those communication mediums, more likely to be used by younger generations, have worked to successfully amplify calls for mobilization even when those cohorts are otherwise smaller in size.

Keywords: ICTs; politics; social movements; young people

> Across the globe – from Chile to the Middle East to South Korea – young protesters … aggressively used social media to organize and take to the streets, seeking to disrupt what they perceive to be the corruption and unfairness of existing political and economic systems. (Sorman, 2012, p. 1)

Introduction

Time magazine's person of the year for 2011 was 'The Protester', a designation befitting of a year that saw the 'indignant' fill the public squares in protest from Cairo to Wall Street to Wellington and Wenceslas Square. Scholars and pundits have largely pointed to the factors identified by Guy Sorman above – youth, information technology, and political and economic grievances – in an effort to explain this wave of political protests. Yet, upon closer examination, none of these factors in the years leading up to 2011 were hidden from view. Countries with sizeable youth

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bulges have been found to be more prone to political instability. And as Sorman states, youths *per se* have been involved in leading and organizing recent protests. Likewise, information and communications technology (ICT) mediums – such as cell phones and the Internet – have been credited with augmenting or even supplanting traditional mobilization networks and accelerating the rhythm of protests. Thus, should observers have foreseen the importance of growing numbers of youths using ICT to air their grievances causing political instability across different types of political and economic systems? In particular, do either of these factors in and of themselves spur demonstrations? Or, as Sorman points out, is it the interaction of them that has caused recent protests? Moreover, in adding nuance to this debate, can we distinguish the sparks that start the fires of demonstrations from the forces that fuel the spread of the flames?

In this paper, we attempt to fill a lacuna in the extant literature by empirically addressing these questions. To our knowledge, a systematic cross-national time-series (CNTS) analysis of youth bulges and ICT and their relationship to protest behavior has not been conducted. Furthermore, while qualitative or small-n studies theorize that the initial causes of contentious behaviors may be different than the forces that increase the prevalence of protests, the cross-national literature on demonstrations and protests tends to neglect this important consideration. Our analysis, therefore, seeks to highlight how youth bulges and ICT contribute to the initial *outbreak* of protests and also to their *frequency*. We begin our investigation in 1995, the first year for which we have reliable ICT data for a broad cross-section of countries, and we conclude in 2011. The time frame under consideration provides a fitting context to investigate whether the factors so prominently associated with the 'Year of the Protester' in fact fit into a larger structured pattern of protest behavior.

The paper unfolds in four sections. First, we address theoretical considerations regarding the separate processes for the outbreak and proliferation of protests, and we derive testable hypotheses from the roles that youth bulges and ICT play in the dynamics of protest behavior. In the second section, we detail and discuss our data and methods. The third section presents our principal findings. Foremost among these is that rising numbers of young people who are increasingly connected through ICT escalate the frequency of protests. In addition, a nuance in our results pertaining to the prevalence of protests suggests that it is the proliferation of technology that is more important than demographic factors. This suggests that those communication mediums, more likely to be used by younger generations, have worked to successfully amplify calls for mobilization even when those cohorts are otherwise smaller in size. In a fourth and final section, we conclude with a discussion of the implications of our findings and suggest paths for future research.

Theoretical considerations

Protests: occurrence vs. prevalence

We begin with the observation that large-scale anti-government demonstrations[1] are relatively rare events, and thus, they are often politically significant when they happen. When protests become sustained in a country, such contentious behavior can have far reaching consequences such as the collapse of governments or social revolutions. Thus, the particularly numerous and dramatic protests of 2011 have left in their wake the so-called Arab Spring and the Occupy movements. However, following Tarrow (1994, p. 23), we wish to highlight the fact that 'the power to trigger sequences of collective action is not the same as the power to control or sustain them.' The distinction between the initial conditions that inspire people to gather and protest may be different than the factors that lead to the continuation and scaling-up of protests. McAdam, Tarrow, and Tilly (2001) argue that for contentious behavior to become sustained there needs to be a scale-shift from the local to a broader polity. This shift is accomplished either through brokerage –

the linking of two or more currently unconnected social sites – or through diffusion – the moving from local to broader sites through currently established lines. In other words, the causes of an initial protest may not be the same as the causes of sustained protests.

This qualitative distinction, however, does not seem to be utilized by cross-national studies of protests. Instead, these studies either use aggregate counts of protest events, or they collapse events into dichotomous categories. Earlier research often merely counted demonstration events in analyzing the causes of protests (Reising, 1999; Watanabe, 2007). Backman and Finlay (1973), for example even drop countries with zero or small numbers of events. Andrews and Biggs (2006) use the first date of a protest event to measure protest prevalence. Another method of distinguishing the rarity of protests is to make the existence of protest behavior dichotomous – especially in individual level research (Opp & Roehl, 1990; Schussman & Soule, 2005). Machado, Scartascini, and Tommasi (2011) collapse individual response of 'sometimes' and 'almost never' participation in protests into a dichotomy with 'never'. Thus, as we consider the role that youth bulges and ICT play in fomenting and sustaining protests we seek to keep the distinction from qualitative studies in mind as we engage in a cross-national, time-series analysis of demonstrations.

The young and the restless

A large body of research has convincingly argued that countries with a large proportion of young adults, a so-called youth bulge, are more likely to experience political instability. Given particular economic and political conditions, youth cohorts represent particular grievances, thus increasing the risk of violence (Urdal, 2006, p. 609). Herein lies the structural *motive* for political unrest, as countries with a large youth bulge are more likely to experience social frustration, greater institutional crowding with implications for higher youth unemployment, and low mobility prospects reflecting weak political institutions (Bloom & Freeman, 1986; Goldstone, 2002, p. 14; Macunovich, 2000). Youth have become the main protagonists of protest, instability, reform, and revolution as a reaction to these grievances (Huntington, 1996, p. 117). After all, these were some of the 'youth-bulge conditions' that motivated social movements in a variety of countries across the globe (Al-Momami, 2011; Braungart & Braungart, 1990; Dhillon & Yousef, 2009; Fuller & Pitts, 1990; Keyfitz, 1986; Knickmeyer, 2011). And thus we hypothesize that these conditions of grievance can lead to a greater likelihood of protests happening.

H1: Countries with a large youth cohort will be more likely to experience the occurrence of at least one anti-government protest.

It is also instructive to consider the *opportunity* for political unrest provided by youth bulges and consequently the upsurge of protests. For example, political scientists studying rebellions have claimed that a youth bulge increases the prospects for violence because large numbers of youth provide a ready supply of rebel combatants (Collier, 2000; Collier & Hoeffler, 2004). Pertaining to other forms of mobilization, Huntington has claimed that young people provided recruits for fascist movements in the 1920s and demonstrations and protests in the 1960s (1996, p. 117). An analogous argument has been provided by sociologists. McAdam (1986, p. 70) suggests that youth constitute an ideal age cohort for social movement participation given the absence of personal constraints (such as full-time employment, marriage, and family responsibilities) that may increase the costs and risks of movement participation. Dubbed 'biographical availability', the literature further suggests that younger individuals are less invested in careers and are more inclined to be swayed by just causes and, therefore, are more willing to undertake risks involved in demonstrations (Jasper, 1997; Oberschall, 1973; Wiltfang &

McAdam, 1991). Consequently, large youth cohorts reduce collective action constraints, which are touted as important by political demographers and political scientists for explaining an increased likelihood of political mobilization (Cincotta & Doces, 2012, p. 102; Urdal, 2006, p. 610). Based on these opportunity arguments, we suggest another hypothesis:

H2: Countries with a large youth cohort will experience a higher prevalence of protests.

ICT: Revolution 2.0

The role of ICT has received increased attention in recent scholarship, particularly as it pertains to contentious political mobilization and political violence (Hussain & Howard, 2013; Lynch, 2011; Pierskalla & Hollenbach, 2013). While ICT includes a number of new information infrastructures such as social media portals (e.g. Facebook and Twitter) as well as online video-sharing applications (e.g. YouTube), much of the attention has been focused on two overarching (and measurable) modes of communication technologies: cell phones and the Internet. While it is recognized that ICT penetration does not inevitably lead to political mobilization, which in turn depends on appropriate opportunity structures, studies have suggested that the availability and use of such technologies contribute to social movement success (Castells, Fernandez-Ardevol, Qiu, & Sey, 2007; Garrett, 2006; George, 2005; McAdam, 1996; Miard, 2012). The general implication is that, *ceteris paribus*, ICT availability should increase the likelihood of political mobilization. However, rather than exemplifying the larger structural forces, or *motives*, often necessary to explain the grievances that are at the root of protest onset, ICT facilitates the organization that is a prerequisite to any social mobilization (Pierskalla & Hollenbach, 2013, p. 208). Consequently, ICT more clearly provides brokerage of the means, or *opportunity*, to engage in collective action.

ICT can impart a means for protest participation through 'political engagement', which refers to the notion that while mere political interest is important for understanding the motivation for participation in protests, individuals must also be informed about politics (Verba, Schlozman, & Brady, 1995). According to Shapiro (1999) the sheer use of ICT reflects a more complex, networked, informed, and participatory populace. Furthermore, ICT has allowed citizens to be not only consumers of a vast amount of information, but have allowed them to be active creators, collaborators, and sharers of information (Shirky, 2010). Along these lines, scholars have argued that the Internet not only serves to activate and energize already politically engaged citizens but likewise provides brokerage to mobilize otherwise politically 'inactive' or disengaged populations (Anduiza, Jensen, & Jorba, 2012; DiMaggio, Hargittai, & Neuman, 2001; Norris, 2001; Weber, Loumakis, & Bergman, 2003). In fact, in Boulianne's (2009) meta-analysis of research on the Internet and political engagement, she finds that the effects of Internet use are positive on political engagement (although the effects may not be substantial).

ICT can also facilitate protest participation as a result of 'structural availability', or the presence of interpersonal networks that promote recruitment to activism (Schussman & Soule, 2005). This pertains to the classic free rider and coordination problem intrinsic to collective political action. Such a 'rational choice' approach posits that the likelihood of individuals partaking in a protest increases as it becomes apparent that other individuals are likely to participate (Granovetter, 1978; Olson, 1965; Tullock, 1971). Specifically, scholars have claimed that ICT enhances political participation by reducing participation costs, creating social networks, and promoting a collective identity (Bentivegna, 2006; Garrett, 2006; Kalathi & Boas, 2003; Schwartzman, 1998). Boyle and Schmierbach (2009, p. 13) find that protesters tend to rely more heavily on the Internet than on traditional media sources, and the literature has noted that digital media

has helped turn local dissent into broad movements in contexts across the globe that range from the Zapatista movement (Cleaver, 1998) to the Arab world (Howard & Hussain, 2011, pp. 35, 41). Further, the utilization of ICT is not bounded by ideology, as both the Tea Party and Occupy Wall Street movements were adept in using various social media platforms to facilitate organization (see Caren & Gaby, 2011; Rasmussen & Schoen, 2010; Skocpol & Williamson, 2012).

Skeptical views regarding the role of ICT in political mobilization should also be acknowledged. For one, analysts have pointed to the relatively low Internet penetration rates in the developing world compared to the developed world (Norris, 2001). Some analysts dismiss the role of ICT altogether, claiming that the focus should be on other media such as satellite television (Alterman, 2011, p. 108). Finally, analysts have also touted the ability of repressive regimes to blunt the diffusion of the Internet into society, and states in general, to use the Internet and social media to counteract the efforts of the tech-savvy opposition, thereby neutralizing the effects of ICT in mobilizing the masses (Drezner, 2010; Morozov, 2011). Finally, some authors find that there is no relationship between new media and political participation or that there is even a positive relationship between the use of new media and political apathy (Noveck, 2000).

Despite the various arguments that point toward a positive relationship of ICT on engagement and potential for mobilization, ICT does not provide a structural factor of grievance that would best explain the outbreak of demonstrations. Thus, we hypothesize that:

H3: Countries with higher levels of ICT penetration are not more or less likely to experience the occurrence of at least one anti-government protest.

In contrast, and based on the balance of the arguments above pertaining to the effects of ICT, we hypothesize that increased availability of ICT should enable political engagement, help broker interpersonal networks, and reduce the costs of mobilization. These effects, in turn, facilitate protest diffusion.

H4: Countries with higher levels of ICT penetration will experience a higher prevalence of protests.

Interacting the main terms: young and the restless meet ICT

Each of our two explanatory variables – youth bulge and ICT – have been identified as principal causes of the 'wave of protests', and thus may provide interesting results regarding the propensity for political mobilization. In most discussions, like Sorman's (2012) that opened our article, it is their interaction that best explains the recent events. For example, ICT, in particular, may very well provide an efficient means to mobilize and express political frustration. Nonetheless, if the larger structural causes (exemplified by youth-bulge conditions in our analysis), which constitute the basic motive for such political action, are absent then there is less reason for individuals to engage in anti-government protest. At the same time, grievances alone may not be sufficient for diffusing political mobilization given that protest action requires coordination and organization. Overcoming the free-rider dilemma is likewise a problem despite the availability of a potentially large pool of youthful protesters. In all, studying the interaction of motives, means, and opportunities – the interface of youth bulge and ICT – may provide a more accurate basis for predicting the conditions for political demonstrations.

In particular, youth tend to be not only more technologically savvy but are usually at the forefront of using new media as a means for expressing their various political demands (Delli Carpini, 2000; Livingstone, Bober, & Helsper, 2005). In addition, ICT, such as the Internet, embodies

certain characteristics (e.g. interactivity, abundance of information, anonymity, and multimodality) as well as content, which not only appeal to young people but also help in their mobilization and empowerment (Lupia & Philpot, 2003; Welp & Wheatley, 2012; Youniss et al., 2002, p. 138). Finally, since countries with sizeable youth bulges tend to suffer from the structural conditions that are often the cause of grievances (and have potentially more protesters available to mobilize), these circumstances, combined with the conditions of greater penetration of the technology to communicate, may heighten the likelihood of political protests. In other words, by itself, greater penetration of ICT may not make the occurrence of protests likely. However, when the motives, means, and opportunity for young people to mobilize are present, protests are multiplicatively enhanced. Thus:

H5: Countries with high levels of ICT penetration and with a large youth cohort should be more likely to experience the occurrence of at least one anti-government protest

H6: Countries with high levels of ICT penetration and with a large youth cohort will experience a higher prevalence of protests.

Research design

To test the hypothesized relationships between ICT and youth bulges and the onset and proliferation of anti-government protests, we use a cross-sectional time-series research design with country-year as the unit of analysis. The dataset covers a maximum of 153 countries for the time period 1995–2011.

Dependent variable

The dependent variable for our study is the count of anti-government demonstrations occurring in a given country-year. The data are obtained from the CNTS Data Archive (Banks & Wilson, 2013). An anti-government demonstration is defined as any peaceful public gathering of at least 100 people for the primary purpose of displaying or voicing their opposition to government policies or authority, excluding demonstrations of a distinctly anti-foreign nature.

Several aspects of the anti-government demonstrations count data are worth noting. First, overdispersion is present in the data. The unconditional variance of the count-dependent variable (5.8) is nearly 10 times larger than the mean (.61).[2] Second, there is good reason why *Time* magazine named 'The Protestor' as its person of the year for 2011. The average of 2.6 protests per country for 2011 stands out compared with the 1995–2010 average of .49 protests per country.[3] Third, anti-government demonstrations continued to be relatively rare events even in the year of 'The Protestor', with 93 countries reporting no protests while a few countries experienced very high counts of protest events. The country with the most anti-government demonstrations in 2011 was Syria (74), followed by the United States (49), Bahrain (33), Greece (21), and Tunisia (16).[4]

Explanatory variables

The ICT index is based on two variables from the World Bank's World Development Indicators (World Bank, 2013). The first is Internet users per 100 persons, and the second is mobile cellular subscriptions per 100 persons. The values are log transformed to reduce skewness and to minimize the impact of extreme values. The ICT index (Cronbach's alpha: .91) is created by equally weighting and summing the two indicators.

There are several aspects of the ICT data worth noting. First, there is an upward trend in the penetration rates for ICT. Globally, there was an average of 1.6 cellular phone subscriptions per 100 persons in 1995; by 2011 that figure had risen to 93.6. Similarly, there were 0.8 Internet users per 100 persons in 1995 and that figure had risen to 35.7 by 2011. Second, there is also a noticeable gap in the penetration rates for different ICT mediums.[5] For example, in 2011 there were, on average, more than twice as many cellular phone subscribers (93.6 per 100 persons) as Internet users (35.7 per 100 persons). Third, there is a noticeable skew in the distribution of both cellular phone subscriptions and Internet users in the pooled data. The median for cellular phone subscriptions, 17.4 users per 100 persons, is substantially less than the mean, 37.7. Similarly, the median for Internet users, 4.3 users per 100 persons, is also substantially less than the mean, 15.5. The data show, however, that as cellular phone penetration has increased over time, its distribution has also become less skewed and approximates a normal distribution in 2011.[6] However, we continue to see an apparent global digital divide – a relatively small number of countries have high levels of Internet use, while many countries have witnessed only low to modest Internet penetration rates.[7]

The second explanatory variable is *Youth Bulge*. Following Urdal (2006), we operationalize *Youth Bulge* as the number of 15–24-yearolds relative to the total adult population aged 15 years and older. The data originate from the *World Population Prospects* (United Nations Department of Economic and Social Affairs, 2011). For 2011, Italy has the smallest youth bulge (.10), while Zimbabwe has the largest (.42). We also created an interaction term, *ICT * Youth Bulge*, to test our hypotheses regarding the effects of the interaction of ICT and youth bulges on anti-government protests.

Control variables

We control for several relevant factors that might have an impact on the occurrence of anti-government protests. Davenport and Armstrong (2004) have demonstrated that democracy is a robust predictor of lower levels of state repression, and hence should facilitate both the occurrence and prevalence of anti-government protests. Democracies may also allow their citizens greater access to ICT since those regimes are less likely to fear empowering the populace at the expense of the state (Milner, 2006; Zhang & Lalana, 2013, pp. 250–251). ICTs and protest behavior may therefore correlate spuriously without a control for democracy. Further, Nordås and Davenport (2013) have shown that autocratic regimes are more likely to engage in repression where youth bulges are present in order to forestall the political-demographic threat that they represent to the status quo. Thus, it is also possible that youth bulges and anti-government protests may correlate spuriously without a control for democracy. We control for *Democracy* by using the Freedom House (2012) indices of political rights and civil liberties. The political rights index measures the degree of democratization. Each index ranges from 1 to 7, with 1 representing the most liberal country, and 7, the most autocratic. We invert the resulting sum of the two Freedom House indices (Cronbach's alpha: .93) so that higher scores correspond with greater levels of democratization. The variable ranges from 2 to 14.[8]

Macroeconomic conditions and economic grievances are a potential cause for anti-government protests. We therefore control for *Economic Growth*, which is estimated as the annual percentage change in per capita GDP adjusted for purchasing power parity (PPP) in constant 2005 international dollars. The data are obtained from the *Penn World Tables* (Heston, Summers, & Aten, 2012). In order to account for the *potential* for economic growth we consider the non-working age population and fertility rates by measuring the dependency ratio within a given society. *Dependency Ratio* is measured as the number of 0–14-yearolds relative to the number of 15–64-yearolds in a population, with low values on the measure implying declining fertility

and thus dependency. The data are obtained from the *World Population Prospects* (United Nations Department of Economic and Social Affairs, 2011). Also, given that the level of ICT penetration in a country as well as the presence of a youth bulge is related to its level of development, we use per capita GDP as a control for a country's level of economic development. The measure is taken from the *Penn World Tables* of GDP per capita adjusted for PPP in constant 2005 international dollars (Heston et al., 2012).[9] This variable is log transformed to reduce skewness.

To account for potential differences in the number of anti-government demonstrations resulting from comparing countries of vastly different sizes, we include a log transformed variable, *Population*. The data are taken from the *World Population Prospects* (United Nations Department of Economic and Social Affairs, 2011). We introduce a variable, *Urban Growth*, to control for the level of urbanization and to account for the fact that protests are usually an urban phenomenon and that rapid urbanization, in general, can be destabilizing in particular contexts (Goldstone, 2002, pp. 5, 10). The data are obtained from the *World Development Indicators* (World Bank, 2013) and measure the annual increase in urban populations. To control for inequality within a country, as well as an educated citizenry that may be economically and politically disenfranchised thus contributing to political upheaval, we also include a variable, *University*, which measures university enrollment per capita. The data originate from the CNTS Data Archive (Banks & Wilson, 2013).

Data and statistical techniques issues

The use of cross-sectional time-series data where cross sections of countries are pooled over time present some methodological issues. First, there is a possibility that there is a serial autocorrelation process in the dependent variable. This may be the result of underlying social, economic, or political grievances remaining unresolved. We employ a lagged dependent variable in our model to account for any residual variance in the error terms due to correlation. Second, our dataset is unbalanced (i.e. there are different numbers of years for different countries) and there is also the possibility of highly correlated errors within the panels. We therefore cluster the standard errors on countries when estimating the regressions to obtain robust standard errors, which are robust to both heteroscedasticity and serial correlation. Third, anti-government demonstrations may be affected over time by the increased penetration rates of ICT or by other time-dependent biases. Therefore, we control for any possible time patterns by including year dummy variables.[10]

We utilize a zero-inflated negative binomial (ZINB) model to deal with overdispersion and excess zeros in the data. Vuong test statistics confirm that the ZINB approach is preferable to both the negative binomial and the Poisson. With the ZINB model we are able to examine if there is a separate process for the zero and nonzero counts, i.e. if there are separate processes for the occurrence of protests vs. the frequency of protests. The ZINB model was estimated using Stata 11.2.

Empirical results and discussion

Do ICT and youth bulges increase the occurrence of protests?

We wish to examine the notion that the causes of protests may be different than the causes of sustaining protests as they pertain to our explanatory variables. In Table 1 we report the factors that are likely to lead to the occurrence of at least one anti-government protest event.[11] Positive signs indicate the factors that are likely to lead to the occurrence of at least one anti-government protest event.

Table 1. Factors predicting the occurrence of at least one anti-government demonstration.

	Coefficient	Robust standard error
Youth Bulge	+3.937	3.692
ICT	−0.192	0.179
ICT * Youth Bulge	−0.265	0.461
Democracy	+0.112***	0.043
Economic Growth	+0.066*	0.038
Dependency	−0.226	0.479
Per Capita GDP (ln)	−0.511	0.216
Population (ln)	+0.553***	0.095
Urban Growth	−0.151	0.098
University	+7.463	8.915
Lagged DV	+1.342	0.264
Constant	5.316*	2.784
N	2221	
Zero Observations	1715	
Non-zero Observations	506	
Vuong test *z*	5.97	
Pr > *z*	0.000	

Note: Model run with year dummies (not reported).
*Significant at 10%.
**Significant at 5%.
***Significant at 1%.

Based on our theoretical discussion, we expect that larger youth bulges will lead to an increase in the probability of a demonstration occurring (H1). We do not find support for this hypothesis. While the youth bulge variable has a positive sign, it does not rise to conventional levels of statistical significance. We also expect that an increase in a country's level of ICT penetration will have no effect on the probability of at least one anti-government demonstration occurring (H3). We do find support for this hypothesis. Our findings thus indicate that neither youth bulges nor ICT affects the likelihood of an anti-government demonstration occurring. We also find that there is no empirical support for the proposition that countries with high levels of ICT penetration and with a large youth cohort will be more likely to experience the occurrence of at least one anti-government demonstration (H5).

In contrast, we do find that other contextual factors do help provide the spark for protests as two of our control variables perform as expected. *Democracy* is statistically significant ($p < .01$) and positive, indicating that higher levels of democracy increase the probability of a country experiencing at least one anti-government demonstration. Our finding supports the idea that protest is common and expected in democracies while autocracies are much less tolerant of the forces that may contribute to the inception of popular anti-government activity (Tilly, 2006, p. 187). The impact of *Population* ($p < .01$) also goes in the expected direction with larger populations increasing the probability of at least one anti-government demonstration occurring. An increase in *Economic Growth* also results in an increase in the probability of an occurrence of an anti-government protest but only at weakly statistically significant levels ($p < .10$) and without much substantive influence. With such results we find some, but not very remarkable, support for arguments like the 'structural strain' of modernization (Huntington, 1968) or the hazards of uneven economic development and 'relative deprivation' (Gurr, 1970).

In sum, our cross-national, time-series analysis finds that ICT and the youth bulge (and their interaction) do not allow us to better predict the onset of anti-government demonstrations. In particular, we interpret the insignificant results pertaining to *Youth Bulge* (and its interaction with

ICT) to mean that despite the structural complexities intrinsic to societies with a large youth cohort (and the technologies that may enable their mobilization), other contextual factors better determine protest onset (see Goldstone, Kaufmann, & Toft, 2012). In other words, predicting the outbreak of protests on the basis of ICT and youth bulges remains generally elusive.

Do ICT and youth bulges increase the prevalence of protests?

Do our variables of interest better explain the proliferation of protests once they have started?[12] We report the results in Table 2. The covariates increase or decrease the expected count of anti-government demonstrations.

First, we do not find any support for H2: *Youth Bulge* does not attain conventional levels of statistical significance; hence we cannot be certain that its effects on the number of protests are different from zero. Second, and based on our theoretical discussion, we expect higher levels of ICT penetration to be associated with a greater number of anti-government demonstrations (H4). The results indicate that the ICT index is statistically significant ($p < .05$). Due to the inclusion of the interaction term, however, the coefficient for the ICT main effect in the count equation can only be interpreted as the conditional effect of ICT when *Youth Bulge* equals zero. Because the negative binomial coefficients in Table 2 are not easily interpretable, we estimate expected counts of protests instead. An increase in ICT from two standard deviations below its mean value to two standard deviations above reduces the expected number of anti-government protests from .41 to .05. In other words, contrary to H4, we find that an *increase* in ICT levels results in a *decrease* in the number of anti-government protests when interaction effects are controlled for.

Moving to the interaction, we hypothesized that countries with high levels of ICT penetration and with a large youth cohort will experience a greater prevalence of anti-government demonstrations (H6), and the results in Table 2 show the interaction to be significant ($p < .05$). While

Table 2. Factors predicting the expected count of anti-government demonstrations.

	Coefficient	Robust standard error
Youth Bulge	−2.231	2.047
ICT	−0.230**	0.099
ICT * Youth Bulge	0.634**	0.247
Democracy	−0.129***	0.024
Economic Growth	−0.115***	0.023
Dependency	0.185	0.280
Per Capita GDP (ln)	0.453***	0.130
Population (ln)	0.196***	0.041
Urban Growth	0.104	0.062
University	10.054**	5.092
Lagged DV	0.068**	0.032
Constant	−6.297***	1.591
N	2221	
Zero Observations	1715	
Nonzero Observations	506	
Vuong test *z*	5.97	
Pr > *z*	0.000	

Note: Model run with year dummies (not reported).
*Significant at 10%.
**Significant at 5%.
***Significant at 1%.

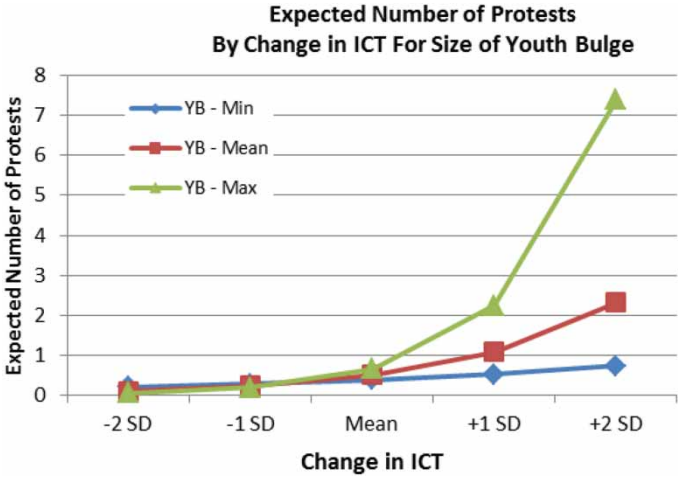

Figure 1. Protests, ICT levels, and youth bulges.

we do find support for our hypothesis, its effect is complex and not simply linear. Figure 1 graphs the expected number of protests by changes in levels of ICT conditional on the size of the youth bulge, holding all other variables at their mean values. When ICT levels are below the mean value, there appear to be little substantive differences in the expected count of protests, regardless of the size of the youth bulge. Substantive differences, however, emerge and start to grow when ICT levels are increased above the mean value. With ICT set at one standard deviation above the mean, the expected number of demonstrations is 0.5, 1.1, and 2.2 for countries with small, mean, and large youth bulges, respectively. Given this level of ICT penetration, countries with a mean youth bulge can be expected to experience approximately twice the number of protests compared to countries with a small youth bulge, and countries with a large youth bulge can expect to experience about twice the number of protests compared to countries with a mean-sized youth bulge. With ICT levels at two standard deviations above the mean, countries with large youth bulges (expected *y*: 7.4) can now be expected to experience 10 times the number of protests compared to countries with small youth bulges (expected *y*: 0.7), and about thrice that of countries with a mean-sized youth bulge (expected *y*: 2.3).

Figure 2 graphs the expected number of protests by changes in the size of the youth bulge conditional on levels of ICT penetration, holding all other variables at their mean values. For countries with low levels of ICT penetration, changes in the size of the youth bulge have a negative but not necessarily substantive effect on the number of expected numbers of anti-government demonstrations. For these countries, an increase in the size of the youth bulge from two standard deviations below the mean to two standard deviations above the mean decreases the expected number of protests from 0.12 to 0.01. For countries with a mean-level ICT penetration, a similar increase in the size of the youth bulge results in an increase in the expected count of protests from 0.4 to 0.7. However, it is in countries with high levels of ICT penetration that we see the largest substantive impact of an increase in the size of the youth bulge. It results in an increase in the expected number of expected numbers of anti-government protests from 0.6 to 3.3 – a 550% increase.

Modeling the interaction reveals that the availability of ICT may be more important than levels of youth bulge within a given country when predicting protest counts. In other words, when ICT levels are at their lowest yet youth bulge levels at their maximum, the expected

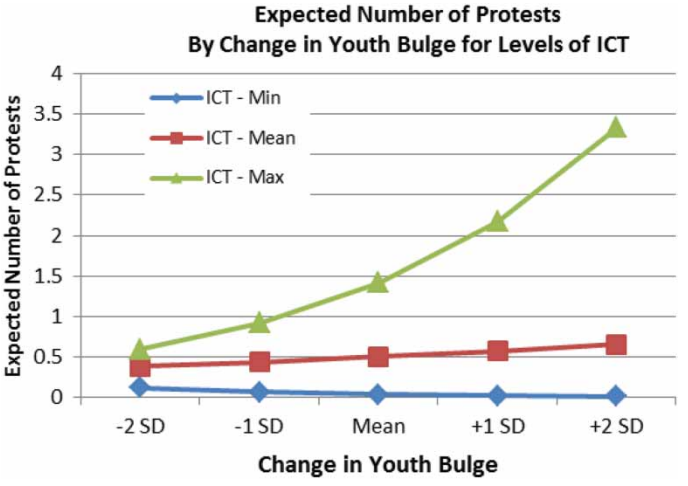

Figure 2. Protests, youth bulges, and ICT levels.

protest count is not positively affected. It is only when ICT levels are increased that the protest count increases as well, even when holding youth bulge levels at their mean. That being said, the enhanced effects on protest count occur when both ICT and youth bulge levels are at their highest. We interpret these latter results to mean that when a large youth bulge exists (denoting particular structural grievances, the reduction of collective action constraints intrinsic to a large cohort with shared consciousness, as well as a demographic cohort with the inclination to use new media to organize) combined with a proliferation of the technology that can facilitate mobilization (by helping to reduce participation costs and promoting a collective identity), the proliferation of protests is facilitated.

When considering the control variables we find that *Democracy* is statistically significant ($p < .01$) and negative, indicating that once at least one anti-government demonstration has occurred, higher levels of democracy decrease the prevalence of demonstrations. This result would follow from the argument that democracies offer the aggrieved opportunities to express dissent beyond taking to the streets (Machado et al., 2011). Per capita GDP, population size, and university enrollment rates are also positively associated with higher expected counts of anti-government demonstrations. The results pertaining to university enrollment, in particular, confirm arguments by some scholars that expansion in higher levels of education may be particularly relevant for explaining low-intensity violence such as riots and protests (Urdal, 2006). Greater per capita GDP likewise predicts higher expected counts of protests as explained by the common spread of post-material values in wealthier countries (Inglehart, 1997). Economic growth is statistically significant ($p < .01$) but negative, indicating that a slowdown in the economy increases the prevalence of anti-government demonstrations. Based on the literature, all of these controls follow their expected patterns in increasing the number of anti-government demonstrations within a country.

Concluding remarks

The protests of the Arab Spring as well as the demonstrations that grappled so many other countries around the world in 2011 led pundits and scholars alike to suggest that understanding these episodes of political contention required looking to frustrated youth using social

media and other new technologies to mobilize. This paper set out to empirically investigate the claim that a burgeoning youth bulge and the availability of ICT, as well as their interaction, are instrumental in explaining protest behavior more generally. Furthermore, and in an effort to further investigate the distinctive role played by these two variables, this paper distinguishes between the conditions that lead to the occurrence of an actual protest and the subsequent expansion of protests.

When examining the occurrence of at least one anti-government protest, our results indicate that demographic and technological factors (as well as their interaction) do not appear to play any explanatory roles. Thus, despite the structural conditions and problems that may characterize societies with sizeable youth bulges, contextual factors (political, in particular) seem better suited at explaining the onset of a protest.

When examining the proliferation of protests (once one protest has occurred) our two variables of interest provide instructive results. Considered independently, youth bulge remains insignificant. ICT, however, is significant, but the results show that more technological penetration in a given country actually reduces protest count, suggesting a type of apathy rather than a politically energizing effect on society. However, when interacting the two terms, we find that when ICT and youth bulge are at their highest levels, protest count is multiplicatively enhanced when compared to the interaction at other varying levels. It appears that the proliferation of anti-government protests is heightened when the technological means of protest are fused with the structural conditions often witnessed in countries with large youth bulges. The interaction of these two variables seems to be reflecting not only the present situation of a number of countries (such as those in the Middle East, North Africa, and Southeast Asia), but likewise may be foretelling the future of other countries (such as those in sub-Saharan Africa), which will be seeing an increase in the numbers of disgruntled youth gradually gaining access to ICT.

Perhaps equally revealing, however, is the importance our findings attribute to one variable over the other when explaining the expansion of protests. In fact, we find that when youth bulge levels are at their highest, yet ICT is at its lowest levels, the number of protests is not positively affected. It is only when ICT levels begin to increase that protest count increases in turn. This suggests that even countries with relatively small youth bulges may experience political protests due to the availability of ICTs – explaining why countries not considered to have large youth bulges (Western industrialized nations in particular such as Spain, Italy, and Greece) still experienced an increased number of protests in the recent past. Thus, in addition to facilitating collective action as well as recruiting potential activists, ICT functions to successfully amplify calls for protest and mobilization even in countries with small youth cohorts – where the key constituency most likely to be using this technology for mobilization purposes is comparatively smaller.

Our findings suggest that the 'Year of the Protester' is situated in a larger structured pattern of protest behavior, and that youth bulges and ICT affect protest activities in a more complicated and nuanced manner than the conventional wisdom suggests. This complex relationship belies the increasing movement toward instant analysis – our results cannot fit into 140 characters. However, when these factors do converge into the conditions for protests, the results can be dramatic – a drama that *can* be tweeted. We believe our findings justify continued research along several lines. First, subsequent research should ascertain the impact on other forms of contentious politics: e.g. strikes, riots, government crises, and revolutions. Our analysis was limited to a specific form of contentious political behavior – anti-government demonstrations, but there are theoretical reasons to expect that youth bulges and ICT can help organize and mobilize individuals and groups to partake in other forms of contentious politics. Second, subsequent research should also assess the relative impact of new forms of information communication technologies with more traditional or mature technologies such as television, radio, and newsprint on contentious political behaviors.

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Notes

1. Following Banks and Wilson (2013), we define a demonstration as any peaceful public gathering of at least 100 persons whose primary purpose is to voice or display their opposition to government policies or authority.
2. For descriptive statistics, please see Table A1.
3. See Figure A1.
4. See Figure A2.
5. See Figure A3.
6. See Figures A4 and A5.
7. See Figure A6.
8. We recognize that the Freedom House indices are not without controversy (see e.g. Munck & Verkuilen, 2002) and hence we also used the Polity IV Index (Marshall, Gurr, & Jaggers, 2013). This did not substantively alter our findings and we chose to report the Freedom House indices because they generated fewer missing values. The Freedom House indices and the Polity IV Index correlate at $r = -.89$ ($p < .01$).
9. We do not believe that the use of per capita GDP to measure both economic growth and development is an issue, either methodologically or conceptually. Per capita GDP is a valid measure of economic development and multicollinearity is not an issue as the two variables correlate at $r = .22$ ($p < .01$). Please see Table A2 for the full correlation matrix. We also recognize that 'development' is a multifaceted concept and we believe that our other control variables such as the dependency ratio and per capita university enrollment account for other aspects of development.
10. Our results are robust even when year dummies are excluded.
11. The first stage of the ZINB model – the inflation equation – estimates the probability of being in the 'always zero' group (i.e. the variables predict the likelihood of being in the 'never experienced' anti-government demonstrations group) in order to estimate the causal factors in the onset of protests. In the inflation equation, a *negative* sign means that the variable *reduces* the likelihood of being in the 'always zero' group. However, for the purpose of presentation and ease in interpreting the results we invert the signs such that positive signs are indicative of factors that are likely to lead to the occurrence of at least one anti-government protest event.
12. To address this question, we utilize the second stage of the ZINB model – the count equation, which estimates an answer to the question that given that at least one anti-government demonstration occurred in a country, what is the expected number of demonstrations?

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Appendix

Table A1. Descriptive statistics.

Variable	Mean	Standard deviation	Minimum	Maximum	Observations
Anti-Government Protests (dependent variable)	0.608	2.408	0	74	2549
ICT (ln)	3.463	4.773	−13.806	9.604	2341
Youth Bulge	0.277	0.081	0.098	0.444	2529
Freedom House	7.284	3.875	2	14	2574
Economic Growth	1.857	3.311	−44.853	16.740	2516
Dependency	1.705	0.419	0.627	3.335	2549
Population (ln)	7.003	0.654	5.585	9.134	2549
Urban Growth	2.397	2.104	−8.079	19.733	2548
University	0.020	0.018	0	0.125	2533
Per Capita GDP, PPP (ln)	8.467	1.365	4.767	11.978	2538

Table A2. Correlation matrix.

	Anti-Government Protests	ICT (ln)	Youth Bulge	Freedom House	Economic Growth	Dependency	Population (ln)	Urban Growth	University	Per Capita GDP, PPP (ln)
Anti-Government Protests	1.0000									
ICT (ln)	0.030	1.0000								
Youth Bulge	−0.027	−0.538*	1.0000							
Freedom House	0.040	−0.429*	0.563*-	1.0000						
Economic Growth	−0.013	0.221*	0.161*	−0.073*	1.0000					
Dependency	−0.055*	−0.595*	0.719*	0.428*	−0.230*	1.0000				
Population (ln)	0.197*	0.014	−0.091*	−0.018	−0.006	−0.081*	1.0000			
Urban Growth	−0.014	−0.291*	0.563*	0.416*	−0.048	0.545*	−0.047	1.0000		
University	0.053*	0.513*	−0.665*	−0.468*	0.141*	−0.643*	0.110*	−0.528*	1.0000	
Per Capita GDP, PPP (ln)	0.037	0.610*	−0.820*	−0.482	0.219*	−0.706*	−0.012	−0.425*	0.654*	1.0000

*$p < .01$.

Figure A1. Average number of anti-government demonstrations (per country), 1995–2011.

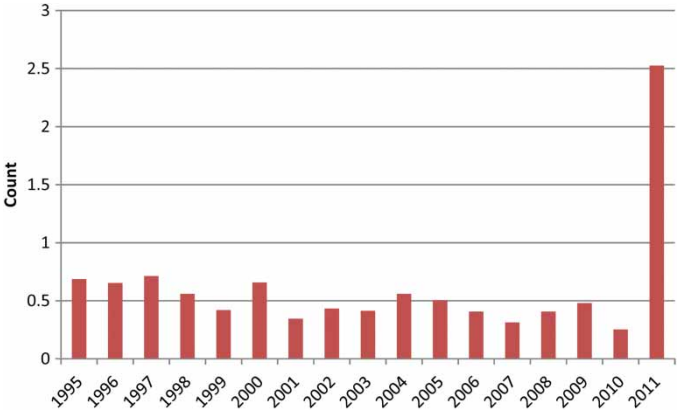


Figure A1 displays the average number of anti-government demonstrations per country from 1995 to 2011. The average of 2.6 protests per country for 2011 stands out compared with the 1995–2010 average of .49 protests per country.

Figure A2. Anti-government demonstrations (2011).

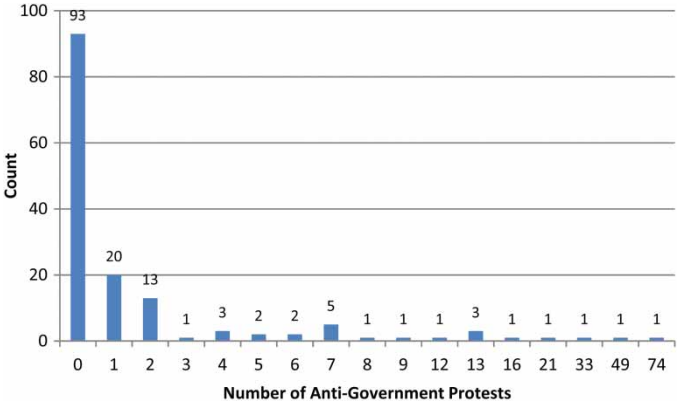
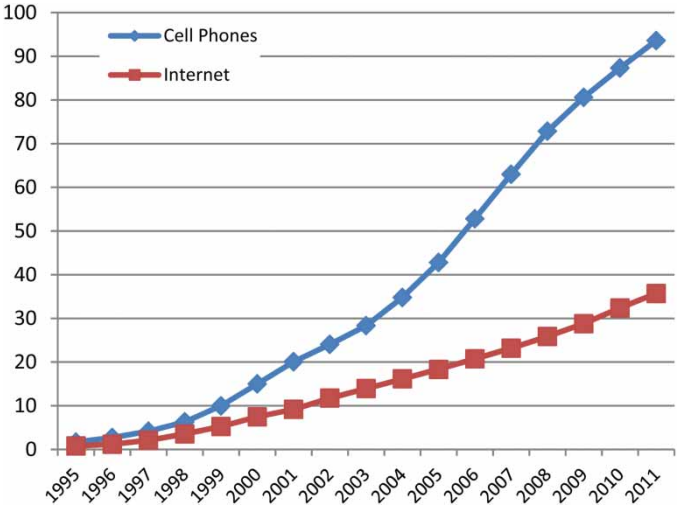


Figure A2 provides a histogram describing anti-government demonstrations in 2011. It graphically illustrates that anti-government demonstrations continued to be relatively rare events even in the year of 'The Protestor', with 93 countries reporting no protests while a few countries experienced very high counts of protest events. The country with the most anti-government demonstrations in 2011 was Syria (74), followed by the United States (49), Bahrain (33), Greece (21), and Tunisia (16).

Figure A3. Mobile cellular subscriptions and Internet users (per 100 persons), 1995–2011.



As is evident in Figure A3, there is an upward trend in the penetration rates for ICT. Globally, there was an average of 1.6 cellular phone subscriptions per 100 persons in 1995. By 2011 that figure had risen to 93.6. Similarly, there were 0.8 Internet users per 100 persons in 1995 and that figure had risen to 35.7 by 2011. There is a noticeable skew in the distribution of both cellular phone subscriptions and Internet users in the pooled data. The median for cellular phone subscriptions, 17.4 users per 100 persons, is substantially less than the mean, 37.7. Similarly, the median for Internet users, 4.3 users per 100 persons, is also substantially less than the mean, 15.5.

Figure A4. Mobile cellular subscriptions (per 100 persons) – 1995.

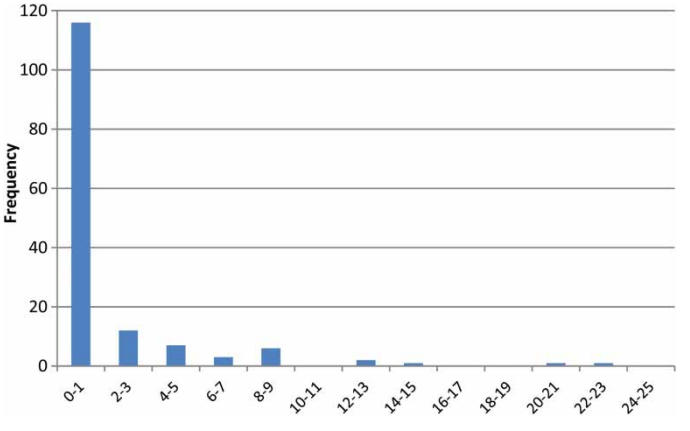
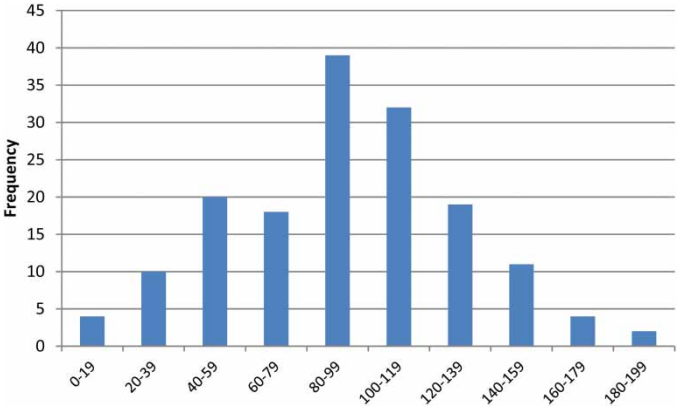


Figure A5. Mobile cellular subscriptions (per 100 persons) – 2011.



Figures A4 and A5 provide histograms describing mobile cellular phone penetration levels in 1995 and 2011, respectively. The figures show that as cellular phone penetration has increased over time, its distribution has also become less skewed and approximates a normal distribution in 2011.

Figure A6. Internet users (per 100 persons) – 2011.

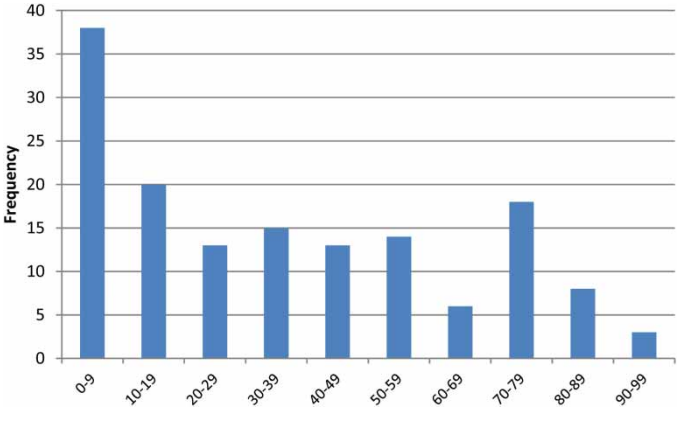


Figure A6 is a histogram describing Internet use in 2011. We continue to see an apparent global digital divide – a relatively small number of countries have high levels of Internet use, while many countries have witnessed only low-to-modest Internet penetration rates.

Figure A7. Size of youth bulge – 2011.

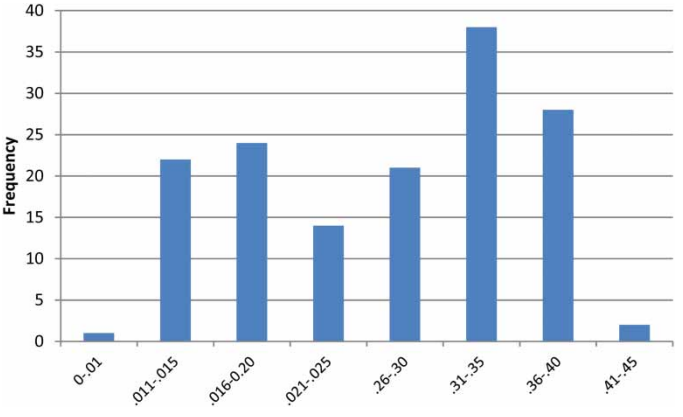


Figure A7 provides a histogram describing the distribution of the youth bulge in 2011. Italy has the smallest youth bulge (0.10), while Zimbabwe has the largest (0.42).