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Abstract

This paper investigates the relationship between domestic political conflict and youth bulges in economically stagnant societies. Considering the growing debate on population pressures and resource scarcity, their combined effect, I would argue, will likely increase the risk of violence. In this context, this paper estimates the heterogenous economic effect of large young cohorts on the likelihood of anti-government demonstrations, riots, guerrilla warfare, coups and civil wars. Using panel data on conflict, polity and demographic and economic characteristics, this paper's contribution is twofold. First, is to estimate the effect of youth bulges on political violence, where the latter is modelled as a continuum process (in terms of scale). Second, I assess the extent to which the impact of youth bulges on political violence might depend on the level of youth unemployment and education. I find robust positive effect of youth bulges on the different forms of political violence, particularly violence involving mass public participation. Such effect increases with the intensity of the violence outcome. Furthermore, the effect of youth bulges substantially hinges on high youth unemployment and education.

Keywords: Guerrilla wars, Civil wars, Coup d'etat, Riots, Youth Bulge, Political Institutions, Natural Resources, Conflict Resolution, Population Growth

JEL Classifications: D74, N50, Q34, E02, J13, O13, Q56

1. Introduction

Studying the impact of youth bulges on conflict started in the 1960's (Moller, 1968), while gaining much of interest during the past two decades in light of the recent debate on population pressures and resource scarcity[2]. The youth bulge phenomenon under certain circumstances is statistically associated with political unrest, as the percentage of a young population (relative to adults) rises the probability of intra-state conflict increases (Goldstone, 2002). During the period between 1971 to 2008 the world has witnessed a total of 3,157 internal conflict events: precisely 1,257 anti-government demonstrations, 823 riots, 757 guerrilla wars, 185 coup attempts and 135 civil wars (Banks & Wilson, 2018; Gleditsch, Wallensteen, Eriksson, Sollenberg, & Strand, 2002). The majority of such events took place in countries with high youth bulges, at the 70-90th percentile (youth bulges of 33-36%, see table 1).

Conflict theorists have linked persistant economic hardships and youth bulges with political violence[3]. Collier & Hoeffler (2004) and Huntington (1993) maintain that the activity of most fundamentalist movements is sustained by young and educated individuals seeking scarce opportunities to join a particular social elite. Therefore, as the percentage of young individuals increase, in countries suffering from economic stagnation and political dissolution, the likelihood of political violence also increases.

The youth bulge phenomenon received worldwide political and economic attention, yet only few relevant empirical work has been done on the topic. Collier & Hoeffler (1998) and (2004) are notable examples of quantitative studies addressing youth bulges. They found no such connection between large young cohorts and internal conflict. Primarily due to an underestimated measure of the youth bulge. Other empirical work by Urdal (2006) present a positive impact of large young cohorts on civil conflict onset, but overlooks the determinants of lower-scale political violence. Conspicuously, no empirical research has studied large young cohorts as a common determinant of different types of internal conflict. The novelty of this paper is to probe deeper to examine the role of youth unemployment and education as a channel for explaining the effect of youth bulges.

The literature on political violence focuses on understanding the causes of civil wars exclusively. Recent evidence, however, suggest that such approch overlooks the integrative impact of lower levels of political violence on civil wars (Bodea, Elbadawi, & Houle, 2017). Comparable research by Fearon & Laitin (2003) and Fearon (2004), explain civil wars as a result of incessant compilations of past internal conflicts and that coup attempts and minor insurgencies are straetgies employed in regime change schemes. Concurrently, in this paper I argue that popular discontent (such as riots and demonstrations) and leadership survival dynamics (such as coup attempts) are overlappingly interrelated with civil wars and guerrilla insurgencies in countries with large young cohorts. I estimate the effect of youth bulges on the likelihood of political violence in 159 countries

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[2] See Urdal (2004) and (2006) (2006), Barakat & Urdal (2009), Yair & Miodownik (2016) for cross-country analysis; and Murshed & Gates (2005), Do & Iyer (2010), and Macours (2011) for country-level survey analysis.
[3] See Moller (1968), Choucri (1974), Kaplan (1994), and Huntington (1993).

over the period from 1971 to 2008, investigating whether youth bulges do influence political violence, and what role does youth education and youth unemployment play in this association.

The following section summarizes some of the main findings in the literature and explicates the conceptual framework of the paper. Section 3 will define the different outcomes of political violence and section 4 will explain the research design, the paper's empirical approach, and the data used in the analysis. Followed by the results and robustness checks in sections 5 and 6, and concluding with policy implications and further research recommendations in section 7.

2. Conceptual Framework

The lack of robust evidence on the determinants of civil wars is largely attributable to the different definitions of what constitutes a civil war, the different operationalization methodologies of *ongoing* and *new* civil wars, as well as the reliability of data for newly formed or dissolved states (Sambanis, 2004). Studying political violence as a continuum process, from anti-government demonstrations to intensive civil wars, allows to eliminate such uncertainties and identify potential common determinants.

Common determinants of internal conflict was first presented by Gurr (1970), in postcolonial states in Africa and Southeast Asia. Gurr argues that different forms of political violence share three main contributing factors: the people's belief in the legitimacy of the state and the political system, popular discontent, and the effectiveness of ruling regimes in channeling or repressing such discontent. Gurr's theory of "*collective political violence*" maintains that social, economic, and/or political circumstances may be confered as common causes of different forms of political violence.

Building on the theoretical model by Gurr (1970); Bodea et al. (2017) suggest that various types of political violence are related and interwine under certain circumstances. They find that factional partial democracies and ethnic exclusion from power are common determinants of riots, coups, and civil wars. They also add that when designing ruling coalitions and deciding on the number of ethnic groups included in power, heads of state face a trade-off between increasing or decreasing the chances of coup d'etat and civil wars interchangeably. Research by Powell (2014) and Fearon (2004) suggests that attempts to eliminate one type of internal conflict can lead to increasing the likehood of another. Powell argues that "coup-proofing" strategies such as inducing ethnic and/or political fractionalization and abating military capacity, brings about highly unstable political institutions and potentially leads to civil wars. Sambanis (2004) highlights that in order to understand why one form of violence occurred it is essential to understand why another did not.

Research on youth bulges and conflict can be conveniently catalogued into two sub-categories: economic causes "greed" and social or ethnic motives "grievances". Collier (2000) holds that during economic hardships, the the opportunity cost of recruiting young men to join armed conflicts is quite low, leading to higher chances of civil wars. A well educated youth bulge enjoying higher income-earning opportunities, generally reduce the incentive to join armed conflicts. Correspondingly, Brett & Specht (2004) find strong evidence that poverty along with

low levels of schooling and fewer opportunities for economic migration, are major causes of joining a rebel group.

The association of large young cohorts and civil wars have been contested in the literature. Theoritical studies by Goldstone (1991) and (2010) and empirical evidence presented by Urdal (2006) and Collier, Hoeffler, & Rohner (2009) support the hypothesis of a positive association between youth bulges and civil conflict. Work by Fearon (2011) and Sommers (2011) on the other hand, defies the existence of such a relationship. For this paper and building on theories from Goldstone (1991), (2002) and (2010), I posit that youth bulges increase the likelihood of political violence. In a sociaety that suffers from high unemployement, as the percentage of young and educated individuals increase, the likelihood of political violence also increases. Rapid growth of a young and educated population competing for scarce opportunities, as well as social and ethnic imbalances, tend to increase the chances of violent conflict (Goldstone, 2002). Furthermore, the positive effect of youth bulges on civil conflict particularly rises in societies ruled by weak institutions and suffering economic hardships (Urdal, 2006).

Ensuing Gurr's theory, I pose that different forms of internal violence are indeed complementary to- and analogous of- each other. It is therefore valuable to investigate the underlying common factors leading to such outcomes. Furthermore, I argue that during episodes of economic stagnation and high youth unemployment, countries with considerable youth bulges, are more susceptible to internal conflict as the opportunity cost of joining a rebellion declines. Using a multinomial logit specification and applying heterogeneity analysis, I aim to identify and measure how significantly does the effect of youth bulges depend on youth unemployment and education.

Investigating whether youth bulges are common determinants of different forms of political conflict remains a lacuna in the conflict literature. Previous research looked at the nature of the relationship between large young cohorts and conflict. Huntington (1993) finds that youth bulges have a non-monotonic effect on the likelihood of armed civil conflict. Huntington further estimates the threshhold at which youth bulges maximize the probability of conflict at 20% of total population. Indeed, empirical evidence from Urdal (2004) and (2006) suggest strong evidence of a non-linear relationship between youth bulges and civil wars. Urdal in both papers argues that youth bulges in countries with slow economic growth are associated with higher likelihoods of civil war onset. He concludes that using a more relevant measure of economic hardship to young cohorts, such as youth unemployment, would provide a more compelling explanation of why youth bulges increase the chances of civil wars.

3. Defining Riots, Coups, and Civil Wars
The definition and coding of political violence could not be more contended in the literature – generating both theoritical and emperical debate. Goldstone et al. (2010) uses qualitative definitions based on the political outcomes of such events, while Gates et al. (2006) estimate quantitative measures of the casualties involved and the change in polity score. For the purpose of

this paper, I will use some of the most cited approaches to define and count such events, with the aid of different data sets (Banks & Wilson, 2018; Gleditsch et al., 2002; Powell & Thyne, 2011).

Anti-government demonstrations in this data set are often peaceful protests involving no casualties (Banks & Wilson, 2018). Riots however, are defined as potent demonstrations caused by political or social grievances, riots maybe catalougued or random in nature between different parties (civil or otherwise). Unlike coups and civil wars, riots are often characterized with mass public participation and the fewest casualties. A long history of riots, even if aimed at societal gains, can have severe political and economic consequences. The world in the 1960's had witnessed a great deal of such events: dominantly-the civil rights movement in the US , labor strikes in France, and riots in the Middle East and Latin America. Riots can be a direct cause of forced migration, growth hindrance, and may lead to civil wars and coups (Horowitz, 2001). Estimating the determinants of riots in my model allows to test for the relationship between youth bulges and popular discontent. I also attempt to explain the role of a long history of riots play in determining other forms of political violence (coups or civil wars).

Banks & Wilson (2018) define guerrilla wars as sabotage or armed activities by a group of citizens or diorderly forces looking to overthrow the current regime. Civil wars are defined as sizable domestic armed conflicts between state and "organized" non-state players for the sake of taking control of government, a geographic region, or to try and influence policies (Fearon & Laitin, 2003). Civil wars are not often aimed at changing the head of state, and involve a great deal of casualties. Domestic armed conflicts are often sustained over longer periods of time compared to coups and riots. Coup d'etat, on the other hand, is a sudden political change at the governing body's chief executive level to depose the head of state. Often illegally executed by armed personnel (the state's army, police forces, or others) and at times with the cooperation of the state's political and/or economic elite (Powell & Thyne, 2011). Based on the theoretical background by Morrison & Stevenson (1971), coups may not necessarily involve casualties, however, they do involve force or at least the threat of force. In contrast to demonstrations, riots, guerrilla and civi wars; coups do not involve public participation.

Anti-government demonstrations, riots, guerrilla wars, coups or civil wars are highly associated with political unrest and is agreed upon as an appropriate measure of instability (Goemans, 2008; Goldstone et al., 2010; Smith, 2004). A pair-wise correlation matrix (table 2) between all five violence outcomes, the Polity2 score, and a binary measure of transitional and interregnum regimes, shows how significantly correlated such variables are. Research by Belkin and Schofer 2003 and Acemoglu, et.al. 2010 associate coup d'etat attempts with onset of civil wars. Further supporting the hypothesis that coup-proofing strategies, where weak governments attempt to influence prennial domestic armed conflicts and guerrilla warefare, in order to prevent a strong military institution from seizing power.

4. Empirical Framework for Youth Bulges and Conflict

The sample used contains 4,996 observations extending over the period between 1971-2008 and covers 159 countries. Table 3 lists the groups of controls used in the model as well as the sources of the data and summary statistics.

The model used is a multinomial logit estimation of the log probability of onset of the five types of political conflict, relative to the reference group (countries at peace). The three types of conflict onset in the model are separately identified using 2 different data sets (Banks & Wilson, 2018; Gleditsch et al., 2002). Controlling for the number of peace years and the history of riots and anti-government demonstrations, as well as coup attempts in this model is quite practical in order to eliminate potential endogeneity bias within the model specification (Bodea et al., 2017; Goldstone et al., 2010). A recent history of popular discontent was found to be a consistent determinant of both civil wars and coups (Goemans, 2008; Smith, 2004). The model also contains regional and half-decadal dummies to control for various regional externalities and potential time-varying biases.

4.1. Measuring the Dependent Variables

Civil wars are coded using the Prio/Uppsala dataset, which identifies a civil war conflict when it records a minimum of 25. Additionally, a civil war onset is considered new, if it takes place two years after the previous conflict. This approach helps take into account the occurrence of preceeding smaller scale conflicts (Ross, 2012). As for coup d'etat (successful or not), Powell & Thyne (2011) argue to not count "plotted and alleged coups" as they are often misrepresented by governments to legitimize consequential political repression and harsh reforms. Not to mention that alleged coup attempts data sources can be unreliable. Data on riots, anti-government demonstrations, and guerrilla wars is obtained from the Banks Cross National Time Series. Where demonstrations are peaceful gatherings of 100 people or more to voice opposition to the government. While a riot is defined as the event at which 100 participants or more engage in a violent demonstration involving physical force.

When constructing the categorical dependent variable, the value of zero is assigned to countries at peace (used as the referrence group). In this model, civil wars are considered the most critical form of political violence, followed by coups then guerrilla wars, riots and demonstrations. The implications of this assumption are important for the operationalization of the data. The reasoning for such operationalization is as follows: first, civil wars involve the most casualties amongst all three possible outcomes, and generally occur over longer periods of time compared to the other forms of violence. Second, coup attempts are considered a more critical outcome compared to guerrilla wars and riots as they involve the change of the executive at the highest level in a state. Subsequently, for countries that have witnessed more than one of the five events in a single year, the highest instability outcome is assigned to that particular country for that year. For example Venezuela experienced both a coup attempt and a riot in 2002, in that case a coup attempt coding

instead of a riot is assigned. In addition, 38 civil wars in the PRIO dataset were changed to be coded as coups (Powell & Thyne, 2011)[4].

4.2. Youth Bulges and Political Institutions

Youth bulge is calculated following Urdal's (2004) definition, where the total population between 15-24 is divided by the total population above 15, instead of total population. The rationale behind such operationalization is to limit the potential bias stemming from countries with high fertility rates (i.e. countries with a relatively large population under the age of 15).

To account for the effect of political institutions and regime types the Polity2 data set is used in this model. Using the Polity2 data set however, has been critised in the political science literature for measurement errors. Cheibub, Gandhi, & Vreeland (2010) find that different measures of democracy are not interchangeable when replicating studies published in leading journals. Furthermore, Treier & Jackman (2008) find considerable measurement errors in modelling democracy as a latent variable using the Polity2 data set. Hence concluding that democracy measures using the Polity2 data set could potentially produce misleading results when used as a covariate in cross-country analysis. To check for the robustness of the results in the paper an alternative measurement of polity is included using the Varieties of Democracy (V-Dem) data set developed by Coppedge et al. (2018). In order to control for grievances stemming from social inequalities, corruption and a weak rule of law, the model specification includes a measure for equality before the law and individual liberties from the VDEM data set.

4.3. Model Specification

A multinomial logistic regression (equation 1) uses a linear prediction function to estimate the log probability of occurrence of different outcomes in a categoricaly defined dependent variable relative to a reference group. This is reffered to as the log of the odds ratio. In this case intra-state political violence is coded as one variable using the previously mentioned method with five possible outcomes, and countries at peace as the reference group.

$$f(k, i, t) = \alpha_{i,k} + \beta_{1,k} youth_{it} + \beta_{2,k} X_{it} + \eta_i + \upsilon_t + \varepsilon_{it} \qquad (1)$$

Where $\beta_{M,k}$ is the regression coefficient corresponding to the Mth independent variable and the kth conflict outcome: demonstrations, riots, guerrilla wars, coups or civil wars. $youth_{it}$ is a variable measuring the ratio of the population between the ages of 15-24 to the population above 15. X_{it} is the set of covariates measuring the endogeneity controls, opportunity cost of conflict, and institutions. While η_i and υ_t represent regional and half-decadal dummies, respectively.

The raw coefficients of the multinomial logit represent the relative log odds ratio of each conflict outcome. Equation (2) illustrates how the log odds ratio are calculated for each outcome using the Newton–Raphson maximum likelihood estimator, where a one unit increase/decrease in one

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[4] The list of coup events identified by Powell & Thyne (2011) as miscoded civil wars in the PRIO and COW dataset can be found at: http://www.uky.edu/~clthyn2/coup_data/home.htm

variable would be associated with β units increase/decrease in the relative log odds of the kth conflict outcome to the refernce gourp (Greene, 2002):

$$ln\left(\frac{P(outcome=conflict_k)}{P(outcome=peace)}\right) = \alpha_{i,k} + \beta_{1,k}youth_{it} + \beta_{2,k}X_{it} + \eta_i + \upsilon_t + \varepsilon_{it} \qquad (2)$$

Using the same multinomial logit specification, the model in (1) is extended to control for education and an interaction term between education and youth bulges in (3).

$$f(k,i,t) = \alpha_{i,k} + \beta_{1,k}youth_{it} + \beta_{2,k}enrol_{it} + \beta_{3,k}enrol*youth_{it} + \beta_{4,k}X_{it} + \eta_i + \upsilon_t + \varepsilon_{it} \qquad (3)$$

The variable used to control for education is the growth rate in total enrollments at the secondary and university levels, in thousands of students. Heterogeneity analysis of the youth bulge model in (3), is done by splitting the sample in to two groups: countries ranked at the highest and lowest 20th percentile of youth unemployment.The extended specification helps clarify two important drivers through which young people are associated with political violence, that is youth unemployment and youth education.

5. Results

The results of the baseline model for anti-government demonstrations, riots, guerrilla wars, coups and civil wars are shown in table 4. In congruity with Horowitz (2001), the model in table 4 resolutes evidence that recent history of popular discontent such as demonstrations and riots increases the chances of all five forms of political violence. In light of the coup-proofing strategies discussed earlier, the coefficient on the number of peace years (a proxy for the state's military experience) behave as expected, reducing the log likelihood of experiencing coup attempts. Meanwhile, coup attempts during the previous five years significantly increase the likelihood of demonstrations and riots, as well as new coup attempts.

The results in table 4 estimate a significant positive association between natural resource rents and civil wars, consistent with results found in the resource curse literature. Natural resources is estimated to have a slightly significant effect on demonstrations, in line with Gurr's (1970) hypothesis. Where natural resource rents can be used in wealth redistribution to mitigate popular discontent. The results on polity, measured using the Polity2 index as well as a binary variable for transitional and interregnum regimes, are also in congruency with other findings in the literature. The model estimates a non-monotonic relationship between polity and all forms of conflict. The coefficient corresponding to transitional and interregnum regimes, also has a significantly positive effect on the log likelihood of all forms of violence, similar to the results found by Gates et al. (2006), where perpetual regime change and transitional regimes are strong predictors of political violence.

5.1. The Youth Bulge

Table 5 below shows regression results of the impact of youth bulges on conflict. Youth bulges do not seem to influence coup attempts. On the other hand, youth bulges significantly affect the likelihood of riots, guerrilla insurgencies and civil wars. This is indeed expected, as coups are

secretive activities involving few power-seeking conspirators as opposed to riots or domestic wars. As the multinomial logit model estimates the log odds ratio of outcomes; exponentiating the coefficients would give the percentage change of the probability.

In table 5 youth bulges is estimated to increase the likelihood of riots, guerrilla wars and civil wars by 2.3% ($p<0.10$), 4.0% ($p<0.05$) and 7.9% ($p<0.01$), respectively. Notably, as the intensity of political violence increases the impact of youth bulges on the probability of violence increases. The below figure shows the marginal effect of a 1% increase in youth bulges on the probability of riots, guerrilla wars and civil wars, holding other covariates constant. A steeper curve for civil wars demonstrates the increasing effect a 1% increase in youth bulges have compared to riots and guerrilla warfare.

5.2. How Youth Bulges Affect Conflict

The two panels in table 6 show the estimation results of equation (3), where the sample is split to countries ranked at the highest and lowest 20th percentile of youth unemployment. The main effect of youth bulges in countries with considerably high youth unemployment; significantly increases the likelihood of demonstrations, riots, guerrilla wars and coups by 20.3% ($p<0.10$), 26.1% ($p<0.01$), 45.9% ($p<0.01$) and 63.4% ($p<0.10$), respectively. Such estimates resemble a similar pattern to the estimates in table 5, where the effect of youth bulges increases with the intensity of the conflict outcome. Moreover, this impact is also aggravated once education enrollment growth and the interaction between enrollment growth and youth bulges is controlled for. In such countries where a large percentage of young people are unemployed, the coefficient of youth bulges on civil wars loses its significance to enrollment growth rates and the interaction term between education and youth bulges. The significantly positive interaction term for civil wars in countries with high youth unemployment suggests that as large young cohorts getting more education increase, the probability of civil war onset increases. In the same group of countries, education enrollment growth significantly reduces the probability of civil wars by 12.3% ($p<0.05$). On the other hand, in countries with high youth employability, youth bulges are insignificant predictors of violence. In fact, all signs of the coefficients of the main effect of youth bulges, in countries where most young people are employed, are negative.

6. Robustness checks

To test for whether the five outcomes of political violence can be combined, I run the Wald and Likelihood Ratio tests for combined alternatives. Table 7 below shows the Chi-square values of combinations of the dependent outcomes and its associated p-values. The null hypothesis is that the coefficients of all outcomes are significantly indifferent from zero and thus can be combined. All the p-values on each pair of outcomes suggest that the null can be rejected.

One of the main drawbacks of using a Multinomial Logit specification is that the model does not accommodate estimating random or fixed effects. However, a number of other postestimation tests are available. Table 8 in the appendix summarizes the test for the inependent variables ran using the youth bulge model represented in table 6. As the model used is estimated using robust standard

errors the Likelihood Ratio test of independent variables and the Hausman IIA assumption test were inappropriate, therefore the Wald test was used instead. The first column in table 8 represents the Chi-square values for the Wald test for each of the independent values along with the its associate p-values in the second column. The Wald test results show that the hypothesis that all the coefficients of the covariates associated with each political violence outcome are equal to zero can be rejected. More importantly, it shows that the regional and half-decadal dummies are significantly associated with political violence, hence controlling for such covariates was both appropriate and necessary.

In order to test for the robustness of the estimation results discussed in the paper an altrenative measure of polity is introduced. Critiquing the Polity2 index, Cheibub et al. (2010) illustrate how the Polity2 index –although based on several polity components– is however arbitrarily weighted. Furthermore, the Polity2 index is prone to measurement errors (Treier & Jackman, 2008). Considering the debate on the conceptualization of the Polity2 measure of democracy, the Varieties of Democracy (V-Dem) data is used as an alternative to the Polity2 data. Tables 9 and 10 in the appendix shows the models estimated in tables 5 and 6 with the Liberal Democracy Index from the V-Dem instead of Polity2.

The results in table 9 show that the Liberal Democracy Index (LDI) is a considerably stronger predictor than the Polity2 index in terms of magnitude, particularly for guerrilla warfare. As for youth bulges however, the differences are not as stark. Using the LDI measure of polity the impact of youth bulges is higher on riots (2.4%: $p<0.10$) and guerrilla wars (6.2%: $p<0.01$) than when estimated using the Polity2 index. Using the V-Dem index when splitting the sample by youth unemployment ranking yields almost identical results in terms of the impact of youth bulges on the likelihood of demonstrations, riots, guerrilla wars and coups; in countries with considerably high youth unemployment. Also, the impact of youth bulges on riots in countries where most young people are employed, is now significantly negative reducing the likelihood of riots by 13.3% ($p<0.05$).

7. Discussion
Social, ethnic or political factors, associated with grievances and thought to influence conflict, are proven to have little explanatory power compared to economic circumstances that more directly impact the viability of political violence (Collier & Hoeffler, 2004; Fearon & Laitin, 2003). Abrupt population surges leading to youth bulges, if not synchronously followed by economic growth, may cause demand-induced scarcities to (Ehrlich, 1968; Simon, 1998).

Research on the relationship between large young cohorts and different forms of political violence identifies the availability and cost of recruitment as one of the main determinants of conflict onset. The main hypothesis of this paper is that youth availability and the cost of recruiting young people are significantly relevant determinants of political violence. In terms of availability, as the number of young people increase it is easier to recruit rebels (Collier, 2000). For young people, the opportunity cost of joining a rebellion drastically declines in times of economic hardships.

This paper attempts to answer two questions. First: is the availability of large young cohorts associated with different forms of political violence? Second, if such relationship exists, what are the underlying factors driving such effect? To address these two questions, heterogeneity analysis of youth bulges under different economic circumstances is presented to answer if youth bulges affect conflict, and if yes, how and why?

The results presented in this paper show that youth bulges have a significant impact on political violence involving mass public participation. Further, modelling political violence as a continuum process has helped identify how the magnitude of the effect of youth bulges changes from less intense to more intense violence. Where such effect tends to increase with the intensity of violence. and youth bulges. The significantly positive interaction term for civil wars (in countries with high youth unemployment) in table 6 suggests that as the enrollment rates of young people increase a 1% increase in youth bulges increases the probability of civil wars by 0.5% ($p<0.05$). Figure 2 shows this upward trend, illustrating that getting more education during times of high youth unemployment significantly increases the probability of civil war onset as young people experience more grievances and lower opportunity costs of rebellion.

Addressing such dilemma calls for a number of policies, this section will discuss the economically relevant ones and call for further research to address potentially political and social policies to mitigate the threat of a growing youth bulge.

The model estimates presented in this paper show that youth bulges robustly affect the likelihood of political violence in all most all specifications. Indeed, holding everything else equal, during episodes of economic stagnation, young people face a strenuous tradeoff between joining a rebellion or joining the labor market. The presence of a considerable youth bulge further deteriorates the situation, making the competition for scarce opportunities fiercer. An informative example of this tradeoff is mentioned by Collier (2000), where the desertion rates of the Russian civil war between 1919 and 1920 would largely decline during the summer time. Since most of the conflict's participants were peasants, and the summer time was harvest season, this offered a higher income-earning opportunity for the young rebels.

The impact of youth bulges facing fierce competition in the labor market calls for inclusive growth policies. Policies aimed at encouraging entrepreneurship and ease of doing business, not only provide an alternative to traditional job markets, but also ease the pressure on the government to provide public sector jobs for the youth bulge. Additionally, such policies are known to transform informal employment to the formal sector, boosting the productivity of such businesses in the process and improving working conditions. Productivity and high returns to non-rebellion activities are key to increasing the opportunity cost of joining a rebellion. Government policies must aim to enshrine two rather essential values in their youth. One is a sense of nationalization and ownership in the state's institutions; and two, is the high returns of non-rebellion economic activities. Other policies aimed at including young people in the political process can also drastically reduce the likelihood of political violence. However, this would require a political

dimension, and possibly an ethnic one too, to the heterogeneity analysis done in this paper to better inform policy makers. Thus, calling for more comprehensive data and research on youth political inclusion and youth ethnic disparities.

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Table 1. Youth Bulges and Political Violence

Youth Bulge Percentiles	Youth Bulges	Youth unemployment (%)	Second & tertiary enrollment (per 1000)	Demonstrations	Riots	Guerrilla wars	Coups	Civil wars
		Average per group		% of violence				
10	12-18%	17.3	3,289	0.19	0.08	0.03	0.00	0.01
20	18-21%	21.3	4,747	0.20	0.06	0.04	0.01	0.02
30	21-25%	18.8	4,054	0.25	0.10	0.05	0.02	0.00
40	25-29%	22.0	2,903	0.24	0.14	0.12	0.01	0.01
50	29-31%	17.7	7,530	0.31	0.15	0.12	0.02	0.02
60	31-33%	16.5	2,649	0.34	0.17	0.11	0.02	0.03
70	33-34%	14.9	1,368	0.26	0.16	0.08	0.03	0.06
80	34-35%	15.4	1,069	0.23	0.17	0.11	0.08	0.05
90	35-36%	16.8	838	0.16	0.12	0.12	0.07	0.05
100	36-42%	16.6	506	0.14	0.10	0.11	0.04	0.02

Source: Banks (2016), Armed Conflict (PRIO) and U.S. Census Bureau (2018).

Table 2. Significant correlation between Conflict Outcomes

	Demonstrations	Riots	Guerrilla wars	Coups	Civil wars	Polity2
Riots	0.484***					
Guerrilla wars	0.172***	0.204***				
Coups	0.032***	0.074***	0.097***			
Civil wars	0.061***	0.090***	0.212***	0.156***		
Polity2	0.154***	0.081***	-0.039***	-0.084***	-0.042***	
Transitional and interregnum regimes	0.059***	0.082***	0.147***	0.147***	0.125***	-0.0087

Source: Banks (2016), Armed Conflict (PRIO), Marshall, Gurr, & Jaggers (2018) and U.S. Census Bureau (2018).

Table 3. Summary Statistics

		Source	Mean	Std. dev.	Min	Max
Dependent variable	Anti-government demonstrations		0.240	0.427	0	1
	Riots	Banks (2016)	0.159	0.366	0	1
	Guerrilla wars		0.130	0.336	0	1
	Coup attempt		0.024	0.153	0	1
	Civil wars	PRIO	0.027	0.162	0	1
Endogeneity controls	Years since the last war	PRIO	21.382	17.287	0	62
	Riots & dem. in the past 5 yrs	Banks (2016)	5.200	12.347	0	256
	Coup attempt in the past 5 yrs		0.093	0.290	0	1
Opportunity cost of conflict	Youth bulge	U.S. Census Bureau	29.151	7.371	11.54	43.83
	Youth unemployment		17.597	12.228	.403	65.507
	GDP per capita (constant 2010 US$)	WDI	10,548	16,134	115	113,682
	Natural resource rent to GDP		0.074	0.107	0	0.826
	Population (thousands)		37,400	131,000	270	1,300,000
Institutions	Polity	Marshall et al. (2010)	1.748	7.407	-10	10
	Transitional and interr. regimes		0.024	0.153	0	1
	Equality before law and ind. liberty	Coppedge et al. (2018)	0.640	0.284	0.010	0.993
	Liberal Democracy Index		0.372	0.288	0.012	0.892

Source: Author's own calculation.

Table 4. Multinomial Logit: Baseline Model

	Demonstrations	Riots	Guerrilla wars	Coups	Civil wars
Years since the last war	-0.008**	-0.013***	-0.111***	-0.044***	-0.013*
	(0.003)	(0.003)	(0.010)	(0.012)	(0.007)
Riots & demonstrations in the past 5 years	0.053***	0.066***	0.058***	0.056***	0.052***
	(0.009)	(0.009)	(0.009)	(0.019)	(0.010)
Coup attempt in the past 5 years	0.805***	0.317*	0.093	1.099***	0.338
	(0.199)	(0.188)	(0.197)	(0.259)	(0.324)
Real GDP pc [a][b]	0.104	0.035	0.031	-0.329***	-0.202*
	(0.071)	(0.062)	(0.072)	(0.119)	(0.105)
Rents to GDP [a]	-1.160+	-0.382	0.456	-1.013	1.571*
	(0.723)	(0.557)	(0.578)	(0.938)	(0.835)
Lagged natural log of population	0.458***	0.555***	0.513***	0.111	0.367***
	(0.044)	(0.039)	(0.052)	(0.094)	(0.073)
Polity2 [a]	0.030*	0.034**	0.110***	0.077***	0.081***
	(0.016)	(0.014)	(0.017)	(0.029)	(0.025)
Polity2 square [a]	-0.004+	-0.006***	-0.006**	-0.010**	-0.011***
	(0.002)	(0.002)	(0.002)	(0.005)	(0.004)
Transitional and interregnum regimes	1.308***	2.095***	2.386***	2.779***	2.416***
	(0.506)	(0.414)	(0.425)	(0.533)	(0.543)
Equality before law & individual liberty [a]	-0.550	-0.685*	-2.713***	-2.550***	-2.146***
	(0.433)	(0.350)	(0.387)	(0.598)	(0.628)
Constant	-9.600***	-9.992***	-7.082***	-0.340	-6.543***
	(0.904)	(0.838)	(1.003)	(2.019)	(1.593)
Regional & time dummies	Yes				
Pseudo R2	0.235				
Observations	4996				

Robust standard errors in parentheses

[+] $p < 0.11$, [*] $p < 0.10$, [**] $p < 0.05$, [***] $p < 0.01$

[a] Lagged, [b] Natural log

Table 5. Multinomial Logit: Introducing Youth Bulges (15-24 – percentage of population above 15)

	Demonstrations	Riots	Guerrilla wars	Coups	Civil wars
Youth bulge	0.004	0.023[*]	0.039[**]	0.052	0.076[***]
	(0.016)	(0.013)	(0.017)	(0.036)	(0.028)
Years since the last war	-0.009[***]	-0.014[***]	-0.111[***]	-0.045[***]	-0.013[*]
	(0.003)	(0.003)	(0.010)	(0.012)	(0.007)
Riots & demonstrations in the past 5 years	0.055[***]	0.069[***]	0.061[***]	0.060[***]	0.055[***]
	(0.009)	(0.009)	(0.009)	(0.019)	(0.010)
Coup attempt in the past 5 years	0.845[***]	0.383[**]	0.171	1.202[***]	0.462
	(0.198)	(0.188)	(0.194)	(0.259)	(0.322)
Real GDP pc [ab]	0.074	0.034	0.066	-0.299[**]	-0.141
	(0.081)	(0.069)	(0.082)	(0.133)	(0.115)
Rents to GDP [a]	-1.164	-0.497	0.281	-0.968	1.434[*]
	(0.757)	(0.569)	(0.591)	(0.943)	(0.805)
Lagged natural log of population	0.460[***]	0.562[***]	0.514[***]	0.118	0.380[***]
	(0.044)	(0.040)	(0.050)	(0.092)	(0.074)
Polity2 [a]	0.026	0.027[**]	0.104[***]	0.077[***]	0.078[***]
	(0.016)	(0.013)	(0.016)	(0.028)	(0.024)
Transitional and interregnum regimes	1.347[***]	2.181[***]	2.476[***]	2.934[***]	2.620[***]
	(0.496)	(0.401)	(0.412)	(0.507)	(0.522)
Equality before law & individual liberty [a]	-0.513	-0.608[*]	-2.627[***]	-2.555[***]	-2.031[***]
	(0.434)	(0.354)	(0.389)	(0.600)	(0.631)
Constant	-9.667[***]	-10.973[***]	-8.691[***]	-2.588	-9.859[***]
	(1.190)	(1.132)	(1.302)	(2.654)	(2.162)
Regional & time dummies	Yes				
Pseudo R2	0.235				
Observations	4995				

Robust standard errors in parentheses
[+] $p < 0.11$, [*] $p < 0.10$, [**] $p < 0.05$, [***] $p < 0.01$
[a] Lagged, [b] Natural log

Table 6. Multinomial Logit: Youth Bulge and Youth Unemployment

	High Youth Unemployment (20%)					Low Youth Unemployment (20%)				
	Demonstrations	Riots	Guerrilla wars	Coups	Civil wars	Demonstrations	Riots	Guerrilla wars	Coups	Civil wars
Youth bulge	0.185*	0.232***	0.378***	0.491*	0.234	-0.029	-0.090	-0.086	-0.131	-0.003
	(0.095)	(0.071)	(0.140)	(0.261)	(0.185)	(0.047)	(0.067)	(0.105)	(0.163)	(0.158)
Secondary and uni. enrollment growth [a]	0.065	-0.033	0.013	-0.887	-0.132**	-0.155	-0.487	-0.592	0.197	0.526
	(0.132)	(0.096)	(0.108)	(1.006)	(0.059)	(0.147)	(0.338)	(0.395)	(0.692)	(0.682)
Youth bulge X Enrollment growth [a]	-0.003	0.000	0.001	0.028	0.005**	0.005	0.013	0.017	-0.006	-0.016
	(0.005)	(0.003)	(0.004)	(0.031)	(0.002)	(0.004)	(0.010)	(0.011)	(0.020)	(0.020)
Years since the last war	-0.015	-0.003	-0.153	-0.097***	-0.026	-0.012	-0.046***	-0.097***	-0.121*	0.052*
	(0.011)	(0.012)	(0.113)	(0.030)	(0.019)	(0.013)	(0.016)	(0.030)	(0.063)	(0.031)
Riots & demo. in the past 5 years	0.030	0.060**	-0.099**	0.035	0.010	0.091***	0.120***	0.010	-0.088	0.021
	(0.031)	(0.027)	(0.043)	(0.069)	(0.042)	(0.029)	(0.031)	(0.047)	(0.104)	(0.071)
Coup attempt in the past 5 years	1.586*	2.897***	1.961*	2.686*	3.647***	0.273	0.838	1.606***	-0.442	1.298
	(0.928)	(0.881)	(1.158)	(1.611)	(0.916)	(0.668)	(0.631)	(0.514)	(0.802)	(1.086)
Real GDP pc [ab]	0.480*	0.169	-0.017	-0.757	-0.576	-0.201	-0.165	0.123	0.720	-0.308
	(0.283)	(0.214)	(0.390)	(0.540)	(0.551)	(0.295)	(0.370)	(0.409)	(0.720)	(0.872)
Rents to GDP [a]	-2.399	2.701	2.625	3.972	11.151***	0.138	1.634	3.583*	-2.404	2.769
	(2.270)	(1.944)	(3.707)	(3.093)	(3.321)	(1.756)	(2.048)	(2.170)	(3.289)	(3.535)
Lagged natural log of population	0.341*	0.631***	1.580***	-0.290	0.644+	0.624***	0.525**	0.196	0.086	0.716
	(0.196)	(0.170)	(0.506)	(0.649)	(0.395)	(0.160)	(0.227)	(0.309)	(0.625)	(0.498)
Polity2 [a]	-0.022	0.142**	0.110	0.014	0.201*	-0.006	-0.028	-0.063	-0.041	0.169**
	(0.060)	(0.064)	(0.087)	(0.112)	(0.118)	(0.039)	(0.042)	(0.064)	(0.116)	(0.080)
Transitional and interregnum regimes	-18.643***	-0.106	2.387*	-15.582***	3.922**	1.713**	1.397	1.609**	2.704**	-0.245
	(0.945)	(1.118)	(1.355)	(2.032)	(1.706)	(0.785)	(0.946)	(0.812)	(1.241)	(1.186)
Equality before law & ind. liberty [a]	-1.198	-2.566*	-10.243***	-2.699	-0.373	1.052	1.792	-0.755	-2.642	-4.643*
	(1.304)	(1.355)	(2.511)	(3.048)	(2.992)	(1.273)	(1.619)	(1.389)	(2.128)	(2.709)
Constant	-16.526***	-21.112***	-37.646***	-25.571	-21.063**	-10.899***	-7.966	-2.720	-3.882	-14.086
	(6.277)	(4.894)	(11.383)	(19.794)	(9.541)	(3.895)	(5.659)	(8.805)	(17.132)	(15.571)
Regional & time	Yes					Yes				
Pseudo R2	0.395					0.325				
Observations	462					467				

Robust standard errors in parentheses

[+] $p < 0.11$, [*] $p < 0.10$, [**] $p < 0.05$, [***] $p < 0.01$

[a] Lagged, [b] Natural log

Table 7. Wald and LR Test of Combined Outcomes

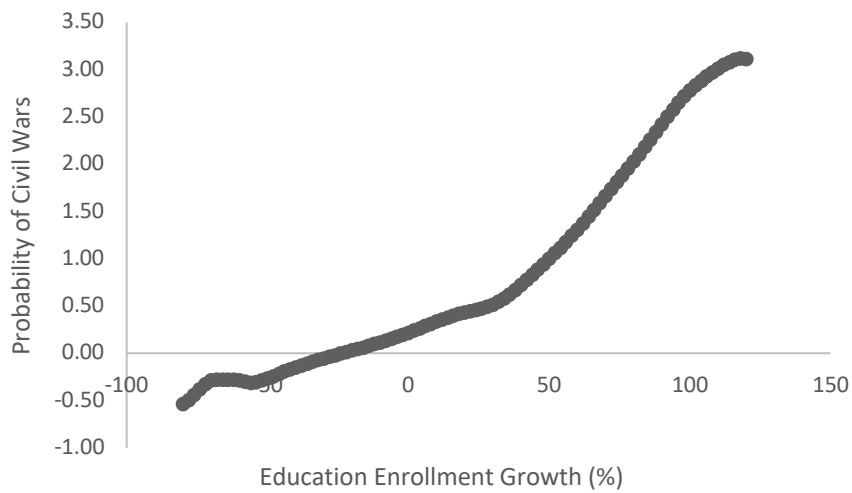|	Wald Chi-square	P>chi2	LR Chi-square[*]	P>chi2
Peace & Demonstrations	419.369	0.000	574.877	0.000
Peace & Riots	621.084	0.000	931.641	0.000
Peace & Guerrilla wars	677.662	0.000	1761.175	0.000
Peace & Coups	1763.908	0.000	305.629	0.000
Peace & Civil wars	312.221	0.000	207.507	0.000
Demonstrations & Riots	105.689	0.000	126.177	0.000
Demonstrations & Guerrilla wars	273.262	0.000	687.234	0.000
Demonstrations & Coups	2475.159	0.000	254.726	0.000
Demonstrations & Civil wars	142.854	0.000	134.007	0.000
Riots & Guerrilla wars	197.578	0.000	514.452	0.000
Riots & Coups	2019.448	0.000	198.794	0.000
Riots & Civil wars	90.278	0.000	73.673	0.000
Guerrilla wars & Coups	288.091	0.000	162.487	0.000
Guerrilla wars & Civil wars	131.653	0.000	164.842	0.000
Coups & Civil wars	218.537	0.000	46.658	0.002

[*]LR test is done on the model without robust standard errors

Figure 1. Marginal Effects of Youth Bulges
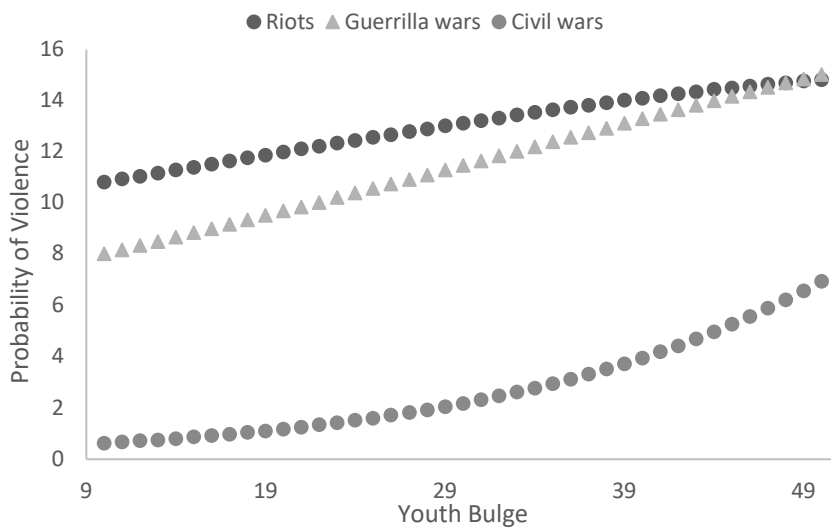
Source: Author's own calculation.

Figure 2. Marginal Effect of Youth Bulges on Civil Wars

Source: Author's own calculation.

Appendix A

Table 8. Wald Test for Independent Variables

	Wald Chi-square	P>chi2
Youth bulge	20.771	0.001
Secondary and uni. enrollment growth [a]	14.979	0.010
Youth bulge X Enrollment growth [a]	14.134	0.015
Years since the last war	139.423	0.000
Riots & demo. in the past 5 years	50.31	0.000
Coup attempt in the past 5 years	28.682	0.000
Real GDP pc [ab]	9.735	0.083
Rents to GDP [a]	9.669	0.085
Lagged natural log of population	221.462	0.000
Polity2 [a]	41.754	0.000
Transitional and interregnum regimes	44.206	0.000
Equality before law & ind. liberty [a]	53.143	0.000
Half-decadal dummy 1	40.984	0.000
Half-decadal dummy 2	29.052	0.000
Half-decadal dummy 3	18.977	0.002
Half-decadal dummy 4	33.387	0.000
Half-decadal dummy 5	20.767	0.001
Half-decadal dummy 6	4.341	0.501
Half-decadal dummy 7	7.179	0.208
Regional dummy 1	5.808	0.325
Regional dummy 2	42.009	0.000
Regional dummy 3	10.956	0.052
Regional dummy 4	1934.038	0.000
Regional dummy 5	29.554	0.000
Regional dummy 6	16.481	0.006

Table 9. Multinomial logit (Liberal Democracy Index): Youth bulge (15-24) and conflict, % of population above 15

	Demonstrations	Riots	Guerrilla wars	Coups	Civil wars
Youth bulge	0.006	0.024[*]	0.060[***]	0.053	0.070[**]
	(0.016)	(0.013)	(0.016)	(0.035)	(0.028)
Years since the last war	-0.009[***]	-0.014[***]	-0.117[***]	-0.049[***]	-0.017[**]
	(0.003)	(0.003)	(0.010)	(0.012)	(0.007)
Riots & demonstrations in the past 5 years	0.057[***]	0.070[***]	0.063[***]	0.064[***]	0.058[***]
	(0.009)	(0.009)	(0.009)	(0.019)	(0.010)
Coup attempt in the past 5 years	0.855[***]	0.392[**]	0.307[+]	1.207[***]	0.444
	(0.198)	(0.186)	(0.190)	(0.262)	(0.319)
Real GDP pc [ab]	0.054	0.022	0.045	-0.318[**]	-0.162
	(0.083)	(0.072)	(0.085)	(0.131)	(0.117)
Rents to GDP [a]	-1.167	-0.536	0.447	-0.925	1.320[*]
	(0.742)	(0.563)	(0.558)	(0.907)	(0.775)
Lagged natural log of population	0.467[***]	0.585[***]	0.490[***]	0.117	0.388[***]
	(0.045)	(0.040)	(0.049)	(0.094)	(0.074)
Liberal Democracy Index [a]	0.423	-0.037	3.116[***]	0.600	0.515
	(0.477)	(0.424)	(0.567)	(1.071)	(0.869)
Transitional and interregnum regimes	1.380[***]	2.223[***]	2.550[***]	2.998[***]	2.659[***]
	(0.500)	(0.404)	(0.414)	(0.499)	(0.513)
Equality before law & individual liberty [a]	-0.311	0.011	-2.813[***]	-1.709[**]	-1.134[*]
	(0.458)	(0.385)	(0.420)	(0.684)	(0.666)
Constant	-9.838[***]	-11.569[***]	-9.110[***]	-2.801	-10.013[***]
	(1.191)	(1.141)	(1.316)	(2.635)	(2.154)
Regional & time dummies			Yes		
Pseudo R2			0.235		
Observations			5028		

Robust standard errors in parentheses
[+] $p < 0.11$, [*] $p < 0.10$, [**] $p < 0.05$, [***] $p < 0.01$
[a] Lagged, [b] Natural log

Table 10. Multinomial logit (Liberal Democracy Index): Youth bulge (15-24) and conflict, % of population above 15

	High Youth Unemployment (20%)					Low Youth Unemployment (20%)				
	Demonstrations	Riots	Guerrilla wars	Coups	Civil wars	Demonstrations	Riots	Guerrilla wars	Coups	Civil wars
Youth bulge	0.188**	0.182**	0.368***	0.409*	0.237	-0.025	-0.143**	-0.102	-0.128	0.157
	(0.092)	(0.071)	(0.120)	(0.221)	(0.175)	(0.048)	(0.067)	(0.102)	(0.170)	(0.148)
Secondary and uni. enrollment growth [a]	0.042	-0.028	0.010	-1.418	-0.146**	-0.147	-0.787**	-0.832*	0.285	1.701**
	(0.095)	(0.092)	(0.145)	(1.228)	(0.061)	(0.136)	(0.394)	(0.429)	(0.727)	(0.818)
Youth bulge X Enrollment growth [a]	-0.002	0.000	0.001	0.044	0.006***	0.004	0.022**	0.023*	-0.008	-0.049**
	(0.004)	(0.003)	(0.006)	(0.039)	(0.002)	(0.004)	(0.011)	(0.012)	(0.021)	(0.024)
Years since the last war	-0.014	-0.004	-0.145	-0.102***	-0.028	-0.010	-0.047***	-0.107***	-0.117*	0.074**
	(0.010)	(0.013)	(0.100)	(0.039)	(0.023)	(0.013)	(0.016)	(0.029)	(0.061)	(0.038)
Riots & demo. in the past 5 years	0.027	0.055**	-0.027	0.037	0.007	0.091***	0.123***	0.012	-0.084	0.017
	(0.028)	(0.025)	(0.036)	(0.074)	(0.039)	(0.029)	(0.031)	(0.049)	(0.103)	(0.061)
Coup attempt in the past 5 years	1.561*	2.537***	2.317*	2.865*	3.382***	0.347	0.792	1.476***	-0.442	2.415**
	(0.908)	(0.862)	(1.320)	(1.593)	(0.897)	(0.660)	(0.588)	(0.511)	(0.800)	(1.227)
Real GDP pc [ab]	0.453	0.207	-1.031**	-0.771	-0.428	-0.275	-0.042	0.365	0.690	-0.514
	(0.308)	(0.214)	(0.467)	(0.755)	(0.489)	(0.318)	(0.390)	(0.423)	(0.773)	(0.791)
Rents to GDP [a]	-2.179	1.116	10.342***	4.312	8.667***	-0.186	2.699	4.286*	-3.182	2.017
	(2.371)	(1.904)	(2.871)	(3.247)	(2.659)	(1.786)	(2.028)	(2.215)	(3.086)	(4.314)
Lagged natural log of population	0.343*	0.781***	1.531***	-0.431	0.755*	0.616***	0.546***	0.123	-0.014	1.004**
	(0.195)	(0.181)	(0.403)	(0.664)	(0.436)	(0.157)	(0.209)	(0.285)	(0.590)	(0.440)
Liberal Democracy Index [a]	0.091	-2.289	11.367**	-1.786	-0.278	1.334	-4.404**	-7.071*	2.086	14.235***
	(2.040)	(1.842)	(5.169)	(6.250)	(3.056)	(1.912)	(4.114)	(3.459)	(3.459)	(4.934)
Transitional and interregnum regimes	-20.862***	-0.480	2.192	-17.810***	3.388*	1.576**	1.389	1.326*	2.639*	-0.509
	(1.056)	(1.225)	(1.612)	(2.164)	(1.930)	(0.798)	(0.904)	(0.782)	(1.355)	(1.218)
Equality before law & ind. liberty [a]	-1.757	-0.525	-12.901***	-2.082	0.861	-0.030	3.983**	1.063	-3.971*	-11.688***
	(1.464)	(1.507)	(3.678)	(3.476)	(2.504)	(1.588)	(1.918)	(2.050)	(2.193)	(4.459)
Constant	-16.291***	-21.894***	-32.685***	-20.307	-23.605**	-10.079**	-7.912	-2.101	-2.073	-22.890*
	(5.962)	(5.288)	(9.058)	(20.472)	(10.136)	(4.008)	(5.176)	(7.838)	(17.504)	(13.068)
Regional & time dummies			Yes					Yes		
Pseudo R2			0.396					0.335		
Observations			478					468		

Robust standard errors in parentheses

+ p < 0.11, * p < 0.10, ** p < 0.05, *** p < 0.01

a Lagged, b Natural log