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Noah Q. Bricker, Department of Economics, Davidson College, United States
Mark C. Foley, Department of Economics, Davidson College, United States

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Noah Q. Bricker, Department of Economics, Davidson College, United States
Mark C. Foley, Department of Economics, Davidson College, United States

Recent uprisings in the Middle East have increased interest in the roots of moderate as well as severe political and social conflicts. One popular explanation for upticks in violence is the "youth bulge," the presence of disproportionately large youth cohorts. We refine that model using a panel dataset that includes more countries and years than previous literature and implement new measurement techniques to capture the relationship between large youth populations and violence. Contrary to prior literature, we find that the mere presence of a "youth bulge" is not enough to generate violence, but instead the causal roots of violence lie in the pressure youth cohorts exert on the total labor force. We use a new variable, the Youth Risk Factor (the ratio of the youth population to the total labor force), to measure the stress youth cohorts exert on labor markets, and find a significant and large effect on violence. These results have policy implications for countries that currently face large youth cohorts and help explain why conventional policy measures such as increasing educational access are likely not the answer to reducing violence.

The demographic trend of increasingly large youth populations in the Middle East, Latin America, and Africa is a cause for concern among academics, policymakers, and governments (Zogby 2011). Youth now represent a disproportionately large fraction of total populations in much of the developing world and will continue to do so as countries complete the demographic transition with fertility rates declining to match already low death rates. This well-documented phenomenon appears to be accelerating among developing nations, and as a consequence, youth are playing an increasingly important role in society and politics. Iran's experience, where the fertility rate fell from 7.0 births per woman in 1979 at the onset of the revolution to around 2.1 in 2000, epitomizes the transition (Abbasi-Shavazi, McDonald, Meimanat 2003). The speed of change is unprecedented, especially when compared to the several-century transitions of Western nations (Van de Kaa 2002). As a result, the swelling youth populations pose an increasingly large problem and almost every country has experienced, is currently experiencing, or will experience a ballooning youth population.

Policymakers' concerns over the demographic transition arise from the suggested link between large youth populations and conflict. While Richard Easterlin published much of the original work on the sociological and economic implications of cohort crowding, more causal links to violence appear only in more recent work (Easterlin 1978, 1980). With a greater focus on the developing world, contemporary literature suggests that large youth populations alone are enough to increase the likelihood of violence and conflict (Kaplan 1994; Marcus 2008; Urdal 2004). Sociologists, anthropologists, and economists pose various hypotheses as to why violence is more prevalent in nations experiencing large youth bulges, but few seem to doubt the trend. Hudson (1999) expresses the now prominent idea that youth disproportionately participate in extreme behavior because of a lack of developmental maturity; therefore, a population with more youth is inherently more volatile. A corollary argument states that when young populations vastly outnumber older generations, the older members of society are unable to control and discipline the more unruly youth cohort (Hart, Atkins, and Youniss 2005). Others believe that the young, commonly con-

sidered "revolutionaries," are easily won over by charismatic leaders and convinced to take part in radical movements (Hudson 1999) or that perhaps youth have lower opportunity costs of violence because of typically having lower wages and fewer opportunities than other members of society. Regardless of the theory, two measurements are predominantly used to capture the tension created by the youth bulge in society: the ratio of 15- to 24-year-olds to either the 15-plus population or the total population. We argue that these rough indices less accurately capture the effect of youth than other potential measures, and thus have led to incomplete results.

Additionally, historical evidence shows some of the most violent periods of unrest in human history are linked to the presence of large youth cohorts and times of generational instability. Youth demographics have grown in importance recently after links were made between youth bulges and periods of severe conflict related to independence in countries such as Algeria and El Salvador (Kahl 2006). Mayer has argued that the French Revolution and the "year of unrest" in 1848 may also have roots in ballooning youth populations (Mayer 2002). Regardless of these correlations, the effects of youth bulges are still largely unknown, and contradictory research is emerging about possibly positive side-effects of large youth cohorts (Bloom and Williamson 1998 ; Laipson 2002; Urdal 2006). Using the term "demographic dividend," Bloom and Williamson (1998) argue that youth populations played an important role in the success of the Asian Tiger economies. The term "demographic dividend" indicates that economic growth occurs within youth-heavy populations because they contain a large productive labor force relative to a small group of dependent young and elderly. Bloom, Canning, and Malaney (2009) attribute one-third to one-half of East Asian growth to favorable demographics. And Bloom and Finlay (2009) show that the large positive impact remains true when the data are extended through 2005.

In response to the seemingly contradictory results, Urdal (2006), Barakat and Urdal (2009), and Marcus, Islam, and Moloney (2008) argue that the presence of youth alone does not generate violence, and place a renewed emphasis on the social, economic, and political factors surrounding the successes and failures of countries experiencing large youth cohorts. Marcus, Islam, and Moloney (2008) scrutinize other demographic factors such as the size of the elderly and the extremely young population cohorts in an attempt to find a more nuanced relationship between demographics and violence. However, their reasoning follows earlier theory based upon the premise that the 15- to 24-year-old age group being inherently unruly without other parts of the population serving as a balance mechanism. Barakat and Urdal (2009) promote the idea of increased access to education and argue that large male youth cohorts increase the likelihood of conflict when their level of education is low, but our results do not support their theories. Additionally, they begin to consider the idea of measuring the size of the youth cohort in different ways with a relative youth cohort size variable.

While good scholarly work exists, there is a need for continued research, and our paper adds to the literature in three important ways: larger sample sizes, additional control variables, and a measure of youth population more closely tied to the labor force. To address sample size, contemporary works like Barakat and Urdal (2009) and Marcus (2008) include data for about 120 nations and only seven years (using annual data or, at times, data in five-year increments). We improve upon this with 166 countries and annual data from 1996 through 2010, representing a substantial increase in data points. Furthermore, we work with more recent data that is relevant to present policy formation and more accurate because of advances in data collection techniques and measurement (World Bank 2007). Furthermore, we found that the results from several previous models did not hold for our expanded dataset, which raises doubts about the robustness of the main effects. Additionally, these models omit important control variables, in particular natural resource wealth, trade openness, and education.

Our last contribution is to capture more accurately the causal effect of youth on violence by employing a new variable called the Youth Risk Factor (YRF), which is the ratio of the number of 17- to 26-year-olds to the size of a country's total labor force. This ratio measures the relative stress a youth cohort exerts on labor markets as they look to become employed. Our theory is that youth, regardless

of education level, cause increased violence as the ratio of youth 17 to 26 to the total labor force grows, indicating the strain exerted on labor markets and governments. As far as we are aware, no empirical research has measured a youth cohort in this manner. Prior research has focused on younger age groups that are less likely to seek full time employment, and also not directly compared the size of a rising youth cohort to the size of the labor force. We compare this age group with the labor force, rather than the general population, in order to more directly capture the labor-force-related stresses young individuals experience in moving toward independence. We also attempt to account for the phenomenon of large groups of "idle" youth exiting the labor force out of discouragement, and potentially turning their frustration into violence.

An expansion upon our theory and model, as well as a more in-depth look at youth labor markets, follow in section 2. Section 3 addresses the details of our dataset along with our econometric techniques. Section 4 discusses results and countries with high Youth Risk Factor values, and we close with conclusions and policy implications in Section 5.

1. The Difficult Transition into the Labor Force

The difficulties youth encounter upon entering the labor force is not a new topic of research, which makes its absence from the study of youth demographics and conflict surprising. Bloom, Freeman, and Korenman (1987) as well as Korenman and Neumark (1997) provide the most detailed discussion of youth labor markets and demographics with several key points. Bloom, Freeman, and Korenman (1987) claim that members of the baby boom generation in the United States and other large youth cohorts after World War II faced reduced wages and high rates of unemployment because of the stiff competition among individuals within a large age cohort. Similarly, Korenman and Neumark (1997) report in their preferred regression results that unemployment increases for members of large youth cohorts. We wish to take their cohort crowding theory one step further and apply it to the concept of violence. Not only do unemployment and underemployment rise for members of large youth cohorts, potentially increasing violence, the number of idle youth also rises as a result of large youth cohorts (International Labor Organization 2012). These youth exit the labor force out of frustration, so they are not captured in employment data, but only through the use of demographic data, which we implement in the Youth Risk Factor.

Barakat and Urdal (2009) try more explicitly than Korenman and Neumark (1997) to connect the size of youth cohorts to conflict, but focus on education as a mediator and potential solution to the problem of youth-created unrest. They theorize that decreased levels of education lead to a higher likelihood of conflict and while they mention the possible difficulties of transition from education to the labor market, they do not attempt to measure the problem or test it. They do address the possibility mentioned by Gurr (1970) that increased educational opportunities might increase grievances and frustration among the youth unable to find jobs, but find no evidence for the theory. They instead primarily argue that higher education levels among youth increase the opportunity cost of violence and should therefore lead to decreased levels of violence. This research implicitly assumes that people with more education will be better able to find jobs, which is not presently the case in a number of economies, especially in the developing world. Furthermore, there is evidence that increased access to educational opportunities has no positive effects on wages or poverty reduction in developing countries (Fazih 2008; Assaad and Roudi-Fahimi 2007). Additionally, the transition from the educational world to the labor force is not seamless. Therefore, we control for education and use a measure of youth relative to the labor force to account, however imperfectly, for the stress a demographic cohort places on the labor market.

1.1. Youth Risk Factor Defined

As previously stated, our Youth Risk Factor is the ratio of the 17- to 26-year-old age cohort to the size of the total labor force. This measurement is a departure from previous literature and youth bulge measurement in several respects. First, we have shifted the age group to an older section of the population to compensate for the later entrance of youth into the labor force among current generations. Fewer 15-year-olds than in previous generations are expected to have finished school or vocational training, or to hold consistent full-time employment (Donahue and

Tienda 1999). Donahue and Tienda (1999) also argue that the expectation of stable employment does not begin until the late teens or early twenties, with important implications. In general, 15-year-olds unable to find jobs may be frustrated but do not expect to be fully employed or feel that unemployment prevents them from achieving future goals. Only in older age groups would unemployment prevent youth from achieving social independence, contributing substantially to their communities, and achieving the financial independence to marry, which are the most frustrating side effects of youth unemployment, especially in the Middle East (Kent and Roudi-Fahimi 2007; Assaad and Roudi-Fahimi 2007; Watkins 2011). Consequently, 17 years of age is a more appropriate age to target as the beginning of a demographic measure. Estimation results support this idea.[1] As the age group is shifted to represent an older portion of the youth population, our results indicate that the older age-cohorts have a larger effect on violence.

Next, we compare this youth cohort to the size of the total labor force in order to measure the pressure on the labor market to absorb these youth, which we think is an important determinant of whether conflict will occur in a country experiencing a relatively large group of 17- to 26-year-olds. We hypothesize that the greater the size of the youth cohort relative to the size of the total labor force, the greater the likelihood of conflict because ultimately youth need jobs to put food on the table, marry, and progress into adulthood. The labor force is equal to the sum of unemployed plus employed persons, but many members of the youth cohort have little to no attachment to the labor force. This idleness leads to discouragement and frustration, and thus, violence can emerge among youth when labor markets are unable to absorb them.

When number of jobs needed to absorb a rising youth population is large, youth face underemployment, unemployment, and many simply leave the labor force altogether (International Labor Organization 2012). This is why youth unemployment rates, even if available,[2] would not adequately capture the effects on violence. We therefore use demographic and population measures to capture these "idle and discouraged" youth who are absent from the labor force.

The traditional youth bulge measurement can differ dramatically from this Youth Risk Factor variable in certain countries. Take Tunisia over last decade as an example: the typical youth bulge measurement, the ratio of 15- to 24-year-olds to the population older than 15, hovers around the world average of 0.27 and dips below it in recent years. However, the Youth Risk Factor for Tunisia has been more than 1 standard deviation above the world average for most of the past decade and especially recently, which is particularly noteworthy in light of the recent political unrest in Tunisia. This trend is true for many of the countries that have entered into conflict since 2010, where our data end, thus the events that have transpired are consistent with the basic premise of our model.

1.2. Model Development

Our model rests on the assumption that we can measure not only cases of severe conflict but also low-level violence, protests, and tensions between different groups. We did not use the Uppsala PRIO datasets of conflict, which have been a common source in prior literature (Marcus 2008; Barakat and Urdal 2009). For the most part, these conflict indices are more suited for capturing large-scale incidences of violence because of the requirements that there must be battlefield deaths and government involvement in the conflict. Furthermore, they fail to capture the intensity of conflict accurately as they only rank conflicts in terms of deaths and use 1,000 deaths as the divider between severe and minor conflict, which is a blunt cutoff.

We desired a broader measure of conflict and therefore, following Marcus, Islam, and Moloney (2008), constructed a conflict index compiled from the *Conflict Barometer* reports published by the Heidelberg Institute for International Conflict Research (HIIK). HIIK is associated with the Department of Political Science at University of Heidelberg and concentrates on the documentation of intra-

1 The coefficient for the Youth Risk Factor grows steadily larger as we move the lower bound from 15 to 16 to 17 to 18, before leveling off at a fairly consistent value. We believe these results further support our theoretical reasons for raising the lower bound of the demographic measurement.

2 Youth unemployment data is at this point unavailable or not accurate enough to use in a study that includes developing countries.

and interstate conflicts. Their results are published annually in the *Conflict Barometer* which reports current global conflicts, their escalations and de-escalations, coups d'état, protests, and terrorist attacks. HIIK provides detailed coverage of these events listing state and non-state actors, duration, historical analysis, and most importantly, intensity of conflict. They define conflict as "as the clashing of interests and values of some duration and magnitude between at least two parties whether they be organized groups, states, groups of states, or other organizations," making it a highly detailed and comprehensive dataset of conflict. HIIK separates conflict into five categories: latent conflict (defined as a dispute), manifest conflict (a non-violent crisis), crisis (involving sporadic periods of violence), severe crisis (which is limited war), and war (which indicates a full-scale conflict). These categories are scored from one to five, with latent conflict counting as one up to war counting as five. A country's *total* conflict score, our dependent variable, is the sum of all conflicts a country is involved in over a calendar year. This delineation is particularly helpful when considering the political unrest and violence that is attributable to youth because it covers a much broader range of conflict than just civil war.

As an example, we will demonstrate how we coded Uganda's conflict score for 2009. HIIK discusses three internal conflict disputes as well as three external conflicts. The Ugandan government was involved in an active but non-violent dispute with the puritanical Muslim Allied Democratic Forces over the legitimacy of the government's rule, which received a score of two. Simultaneously, the Buganda kingdom, a southern region claiming autonomy, opposed the authority of the Ugandan government over their territory and a series of occasionally violent conflicts erupted in September 2009. The most violent day was September 11 with twenty-seven protester deaths and eight hundred arrests, causing the conflict to receive a score of three. Earlier in 2009, the Lord's Resistance Army (LRA), now famous because of Joseph Kony's leadership, entered northern Uganda and spent almost six months in an ongoing struggle with Ugandan government forces, which caused the conflict to receive a conflict score of four because of the high death tolls and sustained conflict. As for interstate conflicts, Uganda was involved in minor disputes with Sudan in the north and Rwanda in the south over natural resources that each received the designation of latent conflict and the score of one. Lastly, Uganda entered into several heated diplomatic exchanges with the DR Congo over Lake Albert, creating an additional conflict that was scored as a two. Therefore, Uganda's conflict score for 2009 was thirteen (2+3+4+1+1+2). We chose Uganda as an example to demonstrate the varieties of conflict as well as the comprehensive coverage by the *Conflict Barometer*. We used a similar coding technique for all countries from 1996 through 2010 to form the dependent variable.

1.3. Model Specification

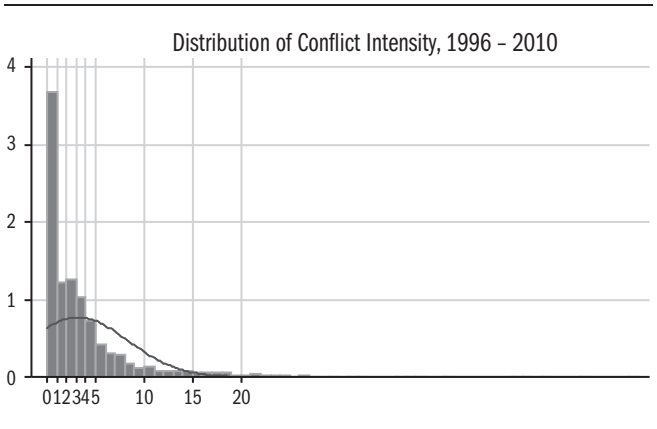
Given that the dependent variable takes on a value of 0 for many of the country-year observations, we estimate random effects Tobit models of the following form:

$$Conflict^{*}_{it} = \gamma_1 YouthRiskFactor_{it} + \gamma_2 YouthBust_{it} + x'_{it}\beta + \alpha_i + \varepsilon_{it}$$

and $Conflict_{it} = max(0, Conflict^{*}_{it})$

where i indexes countries and t indexes years, $\alpha_i \sim N(0,\sigma^2_\alpha)$ are country random effects, and idiosyncratic error $\varepsilon_{it} \sim N(0,\sigma^2_\varepsilon)$. The index $Conflict^{*}_{it}$ may be thought of as a latent variable measuring the propensity for conflict in a country. Observed level of conflict, $conflict_{it}$, takes on non-negative values. Figure 1 indicates that in approximately 36 percent of country-year observations there is no conflict, with positive values roughly following a normal distribution.

Figure 1: Distribution of conflict intensity, 1996–2010



The primary coefficients of interest are γ_1 and γ_2 which capture the effects of the demographic ratios, Youth Risk Factor and Youth Bust, on conflict. Youth Risk Factor is related to similar variables in prior work, but different as explained above. Following prior research, Youth Bust is the ratio of the number of 0 to 14 year olds divided by the number of 15 to 24 year olds. It is sometimes also referred to as the Relative Youth Cohort. The vector of covariates x_{it} includes variables to control for the effects of technological development (number of telephone lines), macroeconomic situation (GDP per capita, GDP growth rate, inflation, trade openness), country characteristics (total population, number of ethnic groups, number of bordering countries, length of borders, land area, and natural resource rents), opportunity cost of engaging in conflict (gross enrollment rate in secondary education), a measure of the rule of law, and prior level of conflict.

Several variables in our model are new to demographic conflict research, and thus deserve further discussion. We introduce three control variables neglected in prior conflict literature. First, trade openness has been shown to reduce intrastate conflict and, in certain conditions, reduce interstate conflict as well (Barbieri 1996). The logic behind the reduction in intrastate conflict is the rise in opportunity cost of unrest if substantial revenue comes from trade with multiple other countries or just strong bilateral trade relations. Leaders know this revenue will most likely be lost upon entering into substantial conflict, so they hesitate to initiate conflict, especially if they are part of the ruling group. The reduction in interstate conflict follows much the same logic suggesting that countries strongly connected to bordering nations through trade agreements will suffer more economically from conflict with those nations (Martin, Mayer, and Thoenig 2008).

Next, we add a variable for natural resource dependence because of recent evidence indicating a "Natural Resource Curse" whereby natural resources actually hurt growth and increase the likelihood of violence (Auty 2007). The theory cites a number of different possible motivations for the Paradox of Plenty, but ultimately concludes that extensive natural resources hurt long-term economic growth because of internal disputes over rents that create further conflict.

Lastly, we include a variable to control for education, gross enrollment rates in secondary education, which is absent from some studies but the main focus of others (Barakat and Urdal 2009; Marcus, Islam, and Moloney 2008). We use two additional measures of educational attainment, and these variables also cause significant changes in the size and sign of the coefficients of the traditional youth bulge variable.

2. Data Description

As reported in Table 1, the average level of the conflict, ConflictSum Index, is 3.16 but there is extensive variation around this mean indicated by the large standard deviation of 5.19. The average Youth Risk Factor is 0.44, which indicates that the 17 to 26 age group is approximately equal to 44 percent of the total labor force, a large percentage. The data sources are listed in the Annex.

There are several points to make beyond the summary statistics in Table 1. First, we provide more information about the population data from the International Data Base (IDB) of the U.S. Census Bureau because of the central role it plays in our dataset. The IDB data is quite detailed, with populations broken down into narrowly defined age cohorts as well as gender. It is also accurate because of their population cohort method, which incorporates exogenous factors that influence demographics into their projections. They account for the timing and demographic impact of certain events like wars, famine, immigration, and natural disasters, which often change the demographics of a country but are rarely accounted for in population data. Furthermore, the U.S. Census Bureau updates the information twice each year and is often cited by policymakers and researchers who utilize international demographic data. They work "with a precision exceeding that of other online resources for international demographic data" (U.S. Census Bureau).

Table 1: Summary Statistics

Variable	Mean	Standard deviation	Min.	Max.
Conflict Dummy (dumSII)	0.511	0.499	0	1
ConflictSum Index	3.163	5.194	0	61
GDP Growth	4.316	5.915	-41.3	106.279
GDP per Capita	9.954	16.800	0.072	138.774
ICRG Rule of Law	0.632	0.221	0.08	1
Inflation	22.35	510.328	-16.117	24411.03
Lag of Conflict Dummy (dumSII)	0.503	0.500	0	1
Lag of ConflictSum	3.027	4.983	0	61
Land Area	7.241	19.130	0.0002	163.768
Length of Borders	2.783	3.433	0	22.117
Natural Resource Rents as percent of GDP	9.830	18.537	0	214.49
Number of Bordering Countries	3.468	2.625	0	14
Number of Ethnic Groups	3.576	1.818	1	10
Number of Telephone Lines per 100	19.703	20.101	0.0057	90.366
Total Population	35.133	128.629	0.0311	1330.141
Trade Openness	88.365	50.589	14.932	445.911
Traditional Youth Bulge	0.272	0.081	0.109	0.418
Youth Bust	1.686	0.407	0.791	2.750
World Bank Gross Enrollment Rates	73.624	31.356	5.168	162.348
World Governance Indicators Rule of Law	-0.073	1.001	-2.21	2.01
Youth Risk Factor	0.444	0.143	0.166	0.908

3. Results

Table 2 presents the regression results. Model 1 is representative of work by Marcus, Barakat, Urdal, and Bloom, which utilized fewer countries and worked with data in five-year increments. In this model, the youth bulge, as traditionally defined, has a significant positive effect on conflict, although the standard error is relatively large. Additionally, the youth bust does not have a statistically significant effect in this model, although some research and a few of our subsequent models found a significantly negative effect. Several other variables are significant determinants of conflict and have the expected signs. Total population and number of bordering countries increase the intensity and likelihood of conflict. However, the magnitude of both variables is fairly small and suggests that small-scale changes will have a relatively small impact on overall conflict. Rule of law, as measured by the World Governance Indicators, and GDP growth are significantly negative, as expected, and diminish a country's conflict score. These signs match previous findings in the literature. The only unexpected sign is the positive significance of telephone lines per 100 people, which we would expect to be negative. However, Model 1 is the only model with this result.

In Model 2, we apply our expanded dataset to Model 1 and the significance of the traditional youth bulge variable vanishes, although the significance of the other main variables holds. This loss of significance shows the high sensitivity of the traditional youth bulge variable and the weakness of its prior significance. Model 3 includes three important control variables that have typically been left out of previous literature: trade openness, gross secondary enrollment rate, and natural resource rents. All have the expected signs, but are insignificant in this model. Youth bulge remains insignificant, actually changing sign, which calls into question earlier theories that the mere presence of large youth cohorts incites conflict. Additionally, the argument supplied in earlier literature, that older populations help temper the strong emotions of youth and prevent violence from occurring, does not to hold for our larger sample and time period, suggesting the causal roots of youth violence lie elsewhere.

Table 2: Youth Demographics and Violent Conflict Regression Results

Dependent variable is:	Model 1 ConflictSum	Model 2 ConflictSum	Model 3 ConflictSum	Model 4 ConflictSum	Model 5 ConflictSum
Explanatory Variables					
Traditional Youth Bulge	3.766*	0.966	–0.0284		
	(2.021)	(1.513)	(1.888)		
Youth Risk Factor				1.489**	1.833**
				(0.652)	(0.744)
Youth Bust	–0.537	–0.186	–0.301	–0.419	–0.594*
	(0.300)	(0.211)	(0.305)	(0.285)	(0.331)
Total Population	0.00217**	0.00253***	0.00309***	0.00318***	0.00273***
	(.000849)	(0.000557)	(0.000687)	(0.000690)	(0.000725)
Number of Ethnic Groups	0.0613	0.0687**	0.0828**	0.0958**	0.0836*
	(.0414)	(0.0325)	(0.0391)	(0.0396)	(0.0476)
GDP per Capita	0.00608	0.00181	0.00160	0.00465	0.00656
	(.00853)	(0.00500)	(0.00591)	(0.00601)	(0.00761)
GDP Growth	–0.0367**	–0.0223**	–0.0118	–0.0123	0.00188
	(0.0171)	(0.0111)	(0.0152)	(0.0154)	(0.0188)
Telephone Lines	0.0150**	0.00281	0.00129	0.00336	0.00109
	(0.00767)	(0.00598)	(0.00683)	(0.00649)	(0.00702)
Rule of Law – WGI	–0.390***	–0.205**	–0.171	–0.129	
	(0.146)	(0.104)	(0.136)	(0.138)	
Rule of Law – ICRG					(0.00702)
					(0.492)
Total Land Area	(0.146)	0.00864*	0.00968*	0.00907*	0.00815
	(0.00750)	(0.00460)	(0.00552)	(0.00554)	(0.00591)
Length of Borders	–0.00379	0.00815	–0.0209	–0.0110	0.00753
	(.0472)	(0.0367)	(0.0430)	(0.0435)	(0.0468)
Bordering Countries	0.0882**	0.0152	0.00974	0.00491	–0.00637
	(0.0389)	(0.0291)	(0.0348)	(0.0348)	(0.0377)
Gross Enrollment Rates			–0.00359	–0.00342	–0.00575
			(0.00438)	(0.00432)	(0.00509)
Natural Resource Rents			0.00460	0.00313	–3.41e-05
			(0.00523)	(0.00529)	(0.00590)
Trade Openness			–0.00236	–0.00253*	–0.00234
			(0.00154)	(0.00155)	(0.00171)
Inflation	6.69e-05	–3.08e-05	–0.000116	0.000145	0.000451
	(0.00271)	(8.95e-05)	(0.00187)	(0.00189)	(0.00196)
Lag of ConflictSum	0.909***	0.937***	0.951***	0.948***	0.958***
	(0.0236)	(0.0117)	(0.0152)	(0.0154)	(0.0167)
Constant	–0.545	0.106	1.048	0.487	0.895
	(0.588)	(0.451)	(0.897)	(0.810)	(0.982)
Observations	650	1.715	1.270	1.250	1.034
Countries	134	166	159	157	128
Chi squared value	2570	11176	7589	7451	6479
Log-likelihood	–1281	–3769	–2831	–2794	–2350

***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

Model 4 replaces the traditional Youth Bulge measure with the Youth Risk Factor variable. Youth Risk Factor is positive and statistically significant with a p-value of 0.022. This strong result supports our argument that the real impetus for conflict in societies with large youth cohorts is the frustration that results from the pressure exerted on the labor force by the rising generation.[3] Larger youth cohorts relative to the labor force are associated with significantly higher conflict scores.[4] Interestingly, education is insignificant in all variants of our model, including in later robustness checks, supporting our hypothesis that education does not change the plight of youth entrants to the labor force. An interaction effect between education and Youth Risk Factor was not significant in any model, indicating that the effect of Youth Risk Factor does not change with increased enrollment rates.

To assess the magnitude of the Youth Risk Factor effect, a 0.1 unit increase raises conflict on average by 0.15 units of the HIIK conflict index. There are several countries that are more than two standard deviations away from the mean Youth Risk Factor of 0.44. Thus, for these countries, demographic change of the Youth Risk Factor can lead to nearly a half point change in conflict on an annual basis. This magnitude shows the importance of demographics in the study of conflict.

Trade openness is significant in Model 4 and its inclusion lowers the point estimates for rule of law and GDP growth, which were significant in the prior Model 3. Finally, gross secondary enrollment rate and natural resource rents maintain the expected sign yet remain insignificant.

3.1. Robustness and Subsequent Observations

To further validate our findings, we did extensive robustness testing. In Model 5 (see Table 2), we substituted the International Country Risk guide's measurement of rule of law for the World Governance Indicator's measurement. The results did not change substantially, with the significance and size of Youth Risk Factor actually increasing. In addition, using primary enrollment rate or primary education completion rate as the measure of education did not alter the main results. Like gross secondary enrollment rate, these coefficients were insignificant, while the Youth Risk Factor remained significant. An interesting result of our robustness testing is the negative and significant effect of youth bust in Model 5. This indicates that more youth under age 14 is associated with less conflict.

Table 3 reports results for models where the dependent variable is a dummy indicating a conflict score above 1. We chose 1 as the dividing line because there are numerous cases in the data of a country receiving a conflict score of 1. In other words, such "minor" conflicts are common.[5] In logit, probit, and generalized least squares estimations, the youth bust variable is strongly significant in all three.

We also investigated how the coefficients of interest changed as the time period changed. Marcus, Islam, and Moloney (2008) utilize data from 1998 to 2005. Our dataset includes 1996 to 2010. The Youth Risk Factor remains significant if the years are restricted to 1997 to 2005 and also if they are restricted to 2006 to 2010. The traditional measure of youth bulge was not significant when estimated using data that included the years 2006 to 2010, as reported in Model 2 (see Table 2).

3 This result is not a function of the time period, as it is statistically significant when the sample is restricted to 1997–2005, as in prior literature, and also for the 2006–2010 subperiod.

4 With regard to the type of conflict, it is possible to identify whether a conflict is inter- or intra-state. The results do not differ markedly when the dependent variable is based solely on intra or solely on inter-state conflicts. Furthermore, the results are not driven by a series of small conflicts. In our dataset, only five observations have more than three level 1 conflicts in a given year.

5 The results hold if the dependent variable is alternatively defined as a dummy indicating conflict greater than 2, or greater than 3. If the dummy indicates conflict greater than 4, then the magnitude of the coefficient is similar, but not significant at the 0.10 level.

Table 3: Regression Results for Binary Indicators of Conflict

	(1)	(2)	(3)
Dependent variable is 1 if ConflictSum exceeds 1	Logit	Probit	FGLS
Explanatory Variables	dumSII2	dumSII2	dumSII2
Youth Risk Factor	3.589**	1.966**	0.199**
	(1.420)	(0.782)	(0.0913)
Youth Bust	-1.676***	-0.935***	-0.0844**
	(0.602)	(0.331)	(0.0400)
Total Population	0.0170***	0.00917***	0.000939
	(0.00587)	(0.00314)	(.000865)
Number of Ethnic Groups	0.156*	0.0864*	0.00777
	(0.0871)	(0.0479)	(0.00545)
GDP per Capita	0.0142	0.00836	0.000838
	(0.0109)	(0.00597)	(0.000838)
GDP Growth	-0.00963	-0.00708	-0.00108
	(0.0238)	(0.0131)	(0.00215)
Telephone Lines	0.0207	0.0111	0.00173*
	(0.0133)	(0.00731)	(0.000906)
Rule of Law – WGI	-0.987***	-0.547***	-0.0767***
	(0.280)	(0.156)	(0.0194)
Total Land Area	0.0136	0.00803	0.000643
	(0.0140)	(0.00768)	(0.000772)
Length of Borders	-0.0789	-0.0459	5.89e-05
	(0.0904)	(0.0496)	(0.00606)
Bordering Countries	0.0649	0.0401	0.00266
	(0.0755)	(0.0413)	(0.00487)
Gross Enrollment Rate	-0.00951	-0.00507	-0.000556
	(0.00816)	(0.00449)	(0.000603)
Natural Resource Rents	0.0119	0.00638	0.000119
	(0.00974)	(0.00522)	(0.000739)
Trade Openness	-0.00471	-0.00261	-0.000552**
	(0.00333)	(0.00180)	(0.000216)
Inflation	0.00130	0.000870	1.52e-06
	(0.00469)	(0.00267)	(0.000263)
Lag of Conflict Dummy	3.143***	1.818***	0.681***
	(0.251)	(0.143)	(0.0201)
Constant	-0.584	-0.360	0.253**
	(1.549)	(0.858)	(0.114)
Observations	1.250	1.250	1.250
Countries	157	157	157
Chi squared value	308.5	371.3	1843
Log-likelihood	-408.4	-407.9	-332.2

***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

4. Case Studies: Arab Spring Focus

The significant coefficients for Youth Risk Factor support our theory that the causal root of youth violence arises from the stress placed on the labor force to absorb relatively large youth generations. To further illustrate this point, we discuss several countries that have high Youth Risk Factor values in 2010, the last year of our data, and have also experienced political unrest and violence in 2011 and 2012, as part of the Arab Spring.

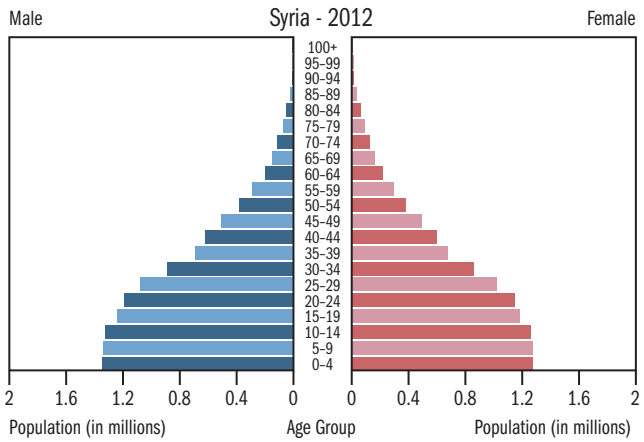
Tunisia, the first country to experience tumult in the Arab world, had an average Youth Risk Factor value of 0.60 over the last decade, with the highest value reaching 0.63, which is nearly one and one-half standard deviations above the Youth Risk Factor mean of 0.44. These relatively high scores indicate the Tunisian labor force was under considerable pressure to absorb young workers. And in 2011, considerable unrest rocked the country with the Jasmine Revolution. The United Nations estimates more than three hundred individuals died and close to seven hundred were injured during the month-long uprising from December 2010 to January 2011 (Zagger 2011). In comparison, Tunisia's youth bulge score is 0.27 over the last decade, equal to the cross-country mean, indicating the mere presence of young people or the size of older populations was not a main reason for the unrest.

Egypt's figures look similar, if not more pronounced, over the last decade. The average Youth Risk Factor value for Egypt is 0.68, with several values around 0.72 in the late 2000s that are fully two standard deviations above the Youth Risk Factor mean. We believe this high Youth Risk Factor value is consistent with recent events where approximately 850 people died in the Egyptian uprisings (El Deeb 2012). The average traditional youth bulge value is only 0.32, well within one standard deviation of the mean of 0.27, once again indicating the importance of the size of the labor force in determining levels of youth frustration and subsequent violence.

The story extends to one of the most violent conflict areas in the world, Syria where death estimates are as high as eighty thousand (Associated Press 2013). Syria posts several of the highest Youth Risk Factor values in our sample.

Syria's average Youth Risk Factor score over the last three years of our data is an astronomically high 0.85 with its highest score coming in 2010 at 0.88, more than three standard deviations above the mean. Syria averaged a Youth Bulge value of 0.34 over the same time period, less than a one standard deviation above the mean. To give a sense of scale, in 2010 the 17 to 26 population group was the equivalent of 88 percent of the labor force. Figure 2 shows the absence of a traditional "youth bulge" in Syria's population pyramid.

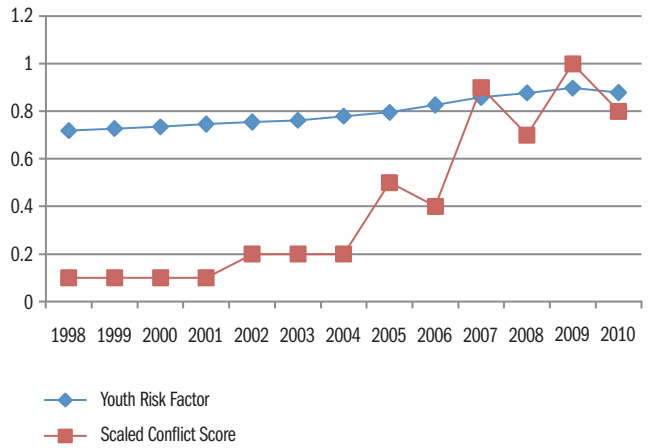
Figure 2: Syrian Population Pyramids by Gender



Source: International Data Base, U.S. Census Bureau.

The demographic impact on conflict is illustrated in Figure 3, which plots the Youth Risk Factor value against conflict. As the Youth Risk Factor value ascends, the conflict score also rises and rather radically at that. Although these values are not holding constant the control factors as in a regression model, they do illustrate the basic positive correlation between Youth Risk Factor and conflict.

Figure 3: Youth Risk Factor and Scaled Conflict Score for Syria 1998–2010



In addition, the reverse relationship appears to hold. For example, Morocco and Qatar are two states that have stayed relatively calm with limited violence while having Youth Risk Factors comfortably within one standard deviation of the mean, even though Morocco has traditional youth bulge values similar to the other countries experiencing unrest. The correlation appears not to apply only to the onset of violence either. Over the last decade Iraq, for example, has only been about one standard deviation above the mean for the traditional Youth Bulge but has the highest Youth Risk Factor score in our sample at 0.91, showing the possible importance of demographics on the conflict in Iraq.

Numerous other factors have played important roles in these uprisings. Such things as police brutality, important historical events, new social media, and social tensions have all been important at times. However, the Youth Risk Factor is a potentially key determinant of subsequent violence.

5. Conclusion and Policy Implications

Following these case studies, the logical question is where conflict will strike next. Several countries yet to experience conflict are more than two standard deviations above the mean Youth Risk Factor value of 0.44, which places them in a range of high risk. Other countries in the Middle East appear to be in jeopardy, most notably Jordan and Algeria.

Both have seen an uptick in their Youth Risk Factor score with values hovering above 0.8 for Jordan and above 0.7 for Algeria, which are more than two standard deviations above the mean. Two other countries that score highly are Swaziland in southern Africa and Iran. Both have experienced relatively little violence but have Youth Risk Factor scores above 0.7 over the last decade. Several other countries like Pakistan, Nigeria, and Sudan have high scores, but continued violence in those nations would not be surprising.

For nations currently experiencing or sure to face large youth cohorts in the future, the Youth Risk Factor measure shows the importance of labor market reform and creating effective ways for youth to be absorbed into labor markets. Potential policy options for these nations would be to subsidize and invest in apprenticeships, trade schools, and internship systems to help make the transition into the labor force more gradual and less frustrating for youth. Even if they are not highly paid, making a path to future work might be enough to ease frustration and build the labor force, while avoiding violence. Also, the significantly negative effect of rule of law shows the importance of protecting intellectual property rights and allowing entrepreneurial gains to be safe from government appropriation. Additionally, the insignificance of education in all of our models and secondary regressions shows that blanket increases in access to education do not consistently lead to reduced conflict. More emphasis can be placed on helping youth make a successful transition into the labor force, regardless of their educational backgrounds,. While the developed world devotes at least marginal attention to the transition into the labor force, much more extensive work is required on the transitions taking place in the developing world.

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Noah Q. Bricker
nobricker@davidson.edu

Mark C. Foley
mafoley@davidson.edu

Annex

Description of Variables and Data Sources

Variable Description	Data Source
Conflict Dummy (dumSII) – binary dummy indicating whether a country had conflict (ConflistSum score>1) or no reported conflict	Heidelberg Institute for International Conflict (HIIK) Research, Germany
ConflictSum – a composite index formed as the sum of interstate and intrastate scores formulated from HIIK Conflict Barometers 1996–2010	Heidelberg Institute for International Conflict (HIIK) Research, Germany
GDP Growth – annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2000 U.S. dollars	World Development Indicators – World Bank
GDP per Capita – gross domestic product divided by midyear population	World Development Indicators – World Bank
Rule of Law (PRS)	International Country Risk Guide
Inflation – measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services	World Development Indicators – World Bank
Land Area – land area is the aggregate of all surfaces delimited by international boundaries and/or coastlines, excluding inland water bodies	The World Factbook – CIA
Length of Borders – length of all land boundaries	The World Factbook – CIA
Natural Resource Rents as percent of GDP – the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents	World Development Indicators – World Bank
Number of Bordering Countries	The World Factbook – CIA
Number of Ethnic Groups – number of major ethnic groups within a country	The World Factbook – CIA
Number of Telephone Lines per 100 people	World Development Indicators – World Bank
Total Population	International Data Base – U.S. Census Bureau
Trade Openness – the sum of exports and imports of goods and services measured as a share of gross domestic product	World Development Indicators – World Bank
Traditional Youth Bulge – age group 15–24 divided by Population>15	International Data Base – U.S. Census Bureau
Youth Bust – age group 0–14 divided by age group 15–24	International Data Base – U.S. Census Bureau
Gross Enrollment Rates – the total enrollment in secondary education, regardless of age, expressed as a percentage of the population of official secondary education age	World Development Indicators – World Bank
Primary Education Completion – total enrollment in primary education, regardless of age, expressed as a percentage of the population of official primary education age	World Development Indicators – World Bank
World Governance Indicators Rule of Law – captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence	World Governance Indicators
Youth Risk Factor – age group 17–26 divided by size of total labor force	International Data Base – U.S. Census Bureau