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Youth Bulges, Insurrections, and Politico-Economic Institutions

Theory and Empirical Evidence

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Abstract

We develop a model of insurrection markets and integrate the youth bulge as measured by the relative youth cohort size. Apart from certain spontaneous outbreaks of violence or riots we find youth bulges alone to be no proper predictor for political violence. However, deliberate insurrection activities that aim at changing political and economic power positions are nevertheless affected by youth bulges, but only when interacted with characteristics of the respective underlying set of politico-economic institutions. We test these implications of our theory in an empirical model based on cross-country panel data and find the effect of the relative youth cohort size on insurrection outbreaks to be moderated by changes in the underlying institutional setting, particularly changes in the labor-market conditions as approximated by unemployment rates.

JEL-Codes: H56; J10; J22; P16

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University of Münster
CIW – Center for Interdisciplinary Economics
Scharnhorststrasse 100
D-48151 Münster

phone: +49-251/83-25329 (Office)
e-Mail: clementine.kessler@uni-muenster.de
Internet: www.wiwi.uni-muenster.de/ciw

1 Introduction

When watching news reporting insurrection activities, riots, or demonstrations, one is hardly ever surprised to see most activists to be particularly young, and whenever violence is associated with the respective scenery, it also comes as no surprise that most activists are male. It hence appears straightforward when (Goldstone 2002) claims historical periods of political violence to have always been closely related with periods of demographically young societies. Nevertheless, a large youth share in the population has only recently become under somewhat closer inspection in the social sciences. Since Graham Fuller used the term "youth bulge" in 1995 in a CIA conference report (Fuller 1995; see also Fuller 2003; Niang, no year, 8) in order to pinpoint a potential demographic source of conflict, the phenomenon has been picked up by newspaper commentators (Heinsohn 2007, 2009; Caldwell 2007; Whelton 2007), and, somewhat hesitantly, by scholarly researchers as well (see overviews by Goldstone 2002; Urdal 2006; Niang, no year).

But no earlier than in 2006, a first systematic empirical investigation of the demographic impact of the youth bulge on political violence has been published (Urdal 2006; see also Urdal 2004). And up to then, sophisticated speculation rather than scholarly theorizing has dominated the search for theoretical answers to the question as to what the causal relations between youth bulges and political conflict may be. While economic explanations have been part of many, if not most, of these sophisticated speculations, there has as yet no consistent theory been provided that captures the main ideas, systematically relates them and works out testable empirical implications. In particular, there is a lack in a theory explaining why young people in a youth-bulge situation should be particularly prone to political violence in general and to insurrection activities in particular.

When it comes to political violence, it makes sense to distinguish spontaneous outbreaks of violence or riots on the one hand from deliberate insurrection activities that aim at changing political or economic power positions on the other hand. In this paper, we are interested in the latter and we will generally refer to them as insurrection activities. In order to become convincing, then, a theory of insurrections and the youth bulge needs to provide for a link between a youth-bulge phenomenon with collective-action problems of insurrection activities.

Since insurrection activities as defined here aim at shifting economic and/or political power, they direct collective action to a certain, and at least allegedly common, goal.

A theory of youth bulges and insurrections, then, needs to show how the existence of a youth bulge affects the difficulties in the formation and effectiveness of insurrection groups with respect to the (alleged) common goal in a consistent manner. This is how this paper aims at adding to the literature. It develops a theoretical framework in the tradition of Grossman (1991, 1999; see also Wall 2006) that integrates the most important characteristics of youth bulges into a theory of insurrection activities.

Our common goal is derived by the assumption of a kleptocratic society to start with. This kleptocratic society presumably forms the basis for potential grievances by those who do not belong to the kleptocratic elite in general and by the respective youth cohort in particular. We then introduce a demographic factor, representing the youth bulge as well as two hypothesized characteristics of relatively young persons, namely a certain attitude to risk and a relation of their productivity on "insurrection markets" on the one hand and that on traditional labor markets on the other.

We then empirically test our theory by help of a cross-country panel data set and find our theoretical predictions confirmed: A youth bulge impacts on insurrection onsets in interaction with the underlying institutional setting of the official labor market as measured by changes in overall as well as specific male youth unemployment rates.

In the following section, we briefly clarify some fundamental definitions and concepts and we relate them to the literature. Based on this groundwork we develop our theoretical model in section 3. In section 4, we test our theoretical conclusions in a logistic regression model based on a broad cross-country panel data set. In section 5 we discuss the implications of our results, suggest further empirical and theoretical research and conclude.

2 Some basic concepts and definitions

Urdal (2004, 2006) as well as Staveteig (2006) claim that simply relating the size of some youth cohort to the total population may be misleading since, in their view, a youth bulge has broader implications than a specifically flat form of the population pyramid. To be precise, a youth bulge represents no less than a historical transition phenomenon of a society on its path into a modern society. At a certain point in time, both dropping mortality rates and rising per-capita income tend to drive down birth rates, which leads to a long tail of adult and older people on the one hand and

to dropping sizes of succeeding children cohorts, so that the respective youth cohort tends to form a bulge in the overall age structure of the respective society on its way of modernization. Over time, then, this bulge works itself all the way through the age structure until it eventually disappears.

Viewed in that way, it makes sense to follow Urdal (2006) by measuring a youth bulge by the relative youth cohort size ($RYCS$) rather than simply by the share of the youth cohort in total population. Hereby, the $RYCS$ is defined as the youth cohort in percent of the respective older cohorts of the economically active population. Hence, the $RYCS$ is what we refer to in the rest of this paper when dealing with the size of a youth bulge.

A youth bulge may have its merits for a society, as it can, for example, be associated with Samuelson's (1958) biological interest rate. Hence, relatively low per-capita contributions of the youth cohort to common-pool consumption loan systems like social security are associated with relatively high per-capita allowances to older cohorts which lead to particularly wealthy cohorts of pensioners in some industrialized countries.

However, for the respective youth-bulge cohorts themselves, these advantages do hardly materialize. To the contrary, forming a demographic bulge implies a relative abundance of the respective cohort's members, which starts at birth and works its way through the life cycle. At some time, then, the "bulge" cohort forms a youth bulge, and here it potentially faces bottlenecks (Urdal 2006, 615) in search for opportunities in education and on job markets. Depending on the characteristics of the respective economic and political institutions, this tentatively leads to either real-wage drops or underemployment as well as to general lacks in career opportunities (Easterlin 1987). What is more, in light of rising competition by members of the succeeding youth cohort, the older cohorts might be inclined to limit the access to economic positions and possibly also to political participation and the like. Depending on the institutional background, this implies potentials for grievances on the side of such a youth cohort's member, and it might, once again depending on the underlying institutional setting, turn out to be a supporting factor for political violence (Niang, no year, 12; Staveteig 2006, 7).

To put it in economic terms: While the bottleneck hypothesis of youth bulges implies an abundant youth cohort to face dropping relative prices for whatever its members supply to the society they live in, the resulting economic and political effects are manifold but obviously dependent on numerous determinants within the politico-institutional setting of a society. A flexible, market oriented setting in some ideal form that does not privi-

lege incumbent persons in both political and economic positions of all sorts whatsoever would, as far as such a society ever existed, have implications particularly different from a society that systematically privileges persons that have already been successful in occupying such positions in the past. As a result, if young potential successors in political and economic positions face open markets but falling supply prices they may still find taking opportunities relatively advantageous as compared to organizing themselves in insurrection organizations that aim at breaking up power positions in both economic and political terms.

This is different when a relatively abundant youth cohort faces closed shops in that both economic and political positions are occupied by members of older cohorts and defended by them by administrative means. In such a case intruding into the sphere of these privileges by simply working hard, by being better as well as by providing better ideas and services to society may not be of much help for the youth cohort's members. Still, while the ensuing grievance may be a necessary condition for the youth cohort for proceeding to insurrection activities, it is not a sufficient condition, and the reason is the collective-action problem of revolutions (Tullock 1971; Lichbach 1998; Apolte 2012). Hence, while spontaneous outbursts of political demonstrations and even of riots and violence might be explained by the development of a youth bulge in a closed-shop society alone (Kuran 1989), deliberate activities that aim at changing political power positions call for more than just that, namely for an integration of the determinants discussed so far in a more comprehensive approach, and such an approach has to take collective action into account.

In order to fix ideas, we assume a society that is characterized by a particularly privileged politico-economic elite that controls both the political and the economic sphere. While markets are used to a certain extent in order to coordinate economic activities, all productive assets are finally owned and conducted by members of this particular elite. It is then hypothesized that such an underlying setting may induce potential political entrepreneurs to enter the market for economic and political power by way of forming insurrection groups. These entrepreneurs, then, provide solutions for the collective-action problem of insurrection activities, but they are of course driven by personal interests and that is by the motive to redistribute power and wealth away from the incumbent elite to themselves. In doing so they hire young potential insurrection activists, and here is where the effects of the youth bulge step in.

3 An economic model of insurrections and the youth bulge

3.1 Basic Model

Consider a society consisting of a ruling elite, which we refer to as the government elite G or simply the government, a competing elite, which we refer to as the revolutionary elite R, and a group of citizens. Both elite groups consist of some leading individuals plus a relatively narrow clientele. G is modeled as a kleptocratic elite that not only runs the government but that also owns the shares of the entirety of the economy's productive assets. Hence, while these assets are formally in private hands, the private owners stem from group G, and all formal profits flow into their purse. Finally, the government elite imposes labor-income taxes on the citizens which their members also use for own consumption.

The revolutionary elite R seizes resources from that part of the economy that it has informally brought under its control; it uses these resources for own consumption as well as for hiring insurgents which they compensate for their activities on the basis of a broadly understood compensation rate w_I, paid either in cash or in kind. Finally, we have a number N of citizens that are neither part of G nor of R.

While governmental control over all economic activities formally rests with the government elite, this group has effective control only over those parts of the economy that are not under the informal control of the revolutionary elite. To be precise, we model the respective control capacities of the government and the revolutionary elite as shares A^G and A^R of the total productive assets in the economy. We normalize the total value of productive assets to unity, so that $A^G + A^R = 1$. While the share A^G is formally as well as effectively under the control of the government, the share A^R is only formally under the control of the government but effectively controlled by the revolutionaries.

There are two income-generating activities available for the citizens, one is work on the regular labor market and the other is insurrection. We normalize the time each individual citizen devotes to each of the income-generating activities to unity. Hence, we assume the citizens to allocate a fraction l to labor and another fraction i to insurrection, such that the disposable time is $l + i \leqslant 1$ on the level of a representative individual, and $L + I \leqslant N$ with $L = lN$ and $I = iN$ on the level of the society as a whole. As the

full-time portfolio of the citizens is, in principle, devoted to either work or insurrection, any situation $l + i < 1$ would be due to some sort of involuntary unemployment.

Labor time is supplied to a private firm that utilizes all assets A. The private firm is run by a management that is appointed by members of the government elite and that is itself part of the government elite. Insurrection activities are supplied to the members of the revolutionary elite R.

At this point, we build the youth bulge into our model, considering the following aspects:

- Employees between 15 and 24 years of age have, on average, not yet reached the level of productivity that employees of an age above 24 years have. While a part of the 15 to 24 year old may have already run through some sort of a formal education, all of them will at best be in the beginning of a process of gathering professional experience, and that will drive up their productivity over a longer time to come. We hence assume employees between 15 and 24 to be, on average, less productive on the labor market than employees above 24.
- Young people are typically more volatile in their judgments and attitudes in general and in their judgments and attitudes toward governments and potential revolutionaries in particular.
- Young people are typically less risk averse than older people.

In order to consider these aspects within the structure of our model, we define a youth-bulge ratio $r \epsilon [0, 1]$ as the share of those who belong to the potential of economically active young persons that are between 15 and 24 years of age to those who are still active, but older than 24.

The private firm utilizes all productive assets A as well as labor L as inputs and maximizes profits under conditions of perfect competition. We assume a production function $F(L^e, A)$ with L^e being effective labor supply. The production function is assumed to satisfy the *Indada* conditions in the two arguments L^e and A. In order to consider the productivity effect of the youth bulge, we define effective labor supply as $L^e = \delta r^{-1} L$ with $\delta \epsilon (0, 1)$. The economy's output Y is then:

$$Y = F(\delta r^{-1} L, A) \tag{1}$$

Next, we model A^R as being linearly dependent on the total time I that the citizens allocate to insurrection activities:

$$A^R = \beta I \qquad with \ \beta > 0. \tag{2}$$

We assume the government to tax labor income by a nominal tax rate t^G on the wage sum. However, as the government's effective control over the economy is limited by the revolutionaries' share in power, the government can effectively tax only that part of labor income that is generated under both its formal and its effective control. Since we assume a homogenous production technology, the share A^G in the assets effectively controlled by the government is, at the same time, the share in both employment and the part of the wage sum that is effectively under the government's control. The government's effective labor-income tax rate is hence $A^G t^G$. As we focus our attention on the citizens' allocation of time between labor and insurrection and in order to keep the analysis simple, we assume the government's decision on the tax rate t^G as exogenous. On top of the unequal distribution of property rights, the tax rate t^G is an indicator of how the government oppresses the citizens. The income Y^G of the government's elite is hence:

$$Y^G = \pi + t^G A^G w_L L \tag{3}$$

were π are profits of the firm since they are assumed to stream into the purse of the share owners who are in their entirety members of the government's elite, w_L is the wage rate on the labor market, and L is total labor employed.

The revolutionary elite, in turn, "asks" the management of the share A^R of capital that is under its effective control for contributions t^R on the basis of the capital value, which is also A^R. The revolutionaries' incomes can thus be written as:

$$Y^R = t^R A^R - w_I, \qquad with \quad t^R A^R \leqslant \tau^R A^R Y, \qquad or \quad t^R \leqslant \tau^R Y, \tag{4}$$

where w_I is the compensation rate for insurrection activities, and $\tau^R \in (0, 1)$ is an upper bound of what can maximally be taxed away from the capital owners under the power of the revolutionary elite, determined by formal or, obviously more important, informal institutions. The private firm's profit π is:

$$\pi = F(\delta r^{-1} L, A) - w_L L \tag{5}$$

Utility U of an individual and representative citizen depends on effective net labor income as well as on the compensations for insurrection activities. We assume an additively separable utility function where regular net effective labor income [1] adds one-to-one to total utility U. For reasons of simplicity, we ignore utility or disutility from regular work, but not from insurrection activities.

We are particularly interested in both the compensations the citizens receive from the revolutionary elite and in the differences in the way insurrection activities affect their personal utility level. For that matter, we introduce a variable μ that captures the properties of the citizens' relation to both the government and the revolutionary elite by measuring two interacting aspects. One is the degree of grievance against or loyalty to the government; and the other aspect is the degree of credibility of the revolutionary elite with respect to the promised compensations for insurrection activities. The latter is important since there is naturally no formal institutional setting that enforces promised payments by the revolutionary elite (Gates 2002). Hence, a value of $\mu = 0$ indicates either perfect loyalty to the incumbent government or zero credibility of the revolutionary elite's compensation payment promise.

Finally, we assume younger people to have more pronounced attitudes toward both grievance against the government and trust in a revolutionary group than have older people. Moreover, we assume them to be less risk averse. We capture these aspects by weighting the variable μ with the youth-bulge ratio r in order to measure the total effect of grievance and trust on the extent to which compensations for insurrection activities enter the citizens' utility function. Summing up, the citizens maximize the following utility function:

$$U = (1 - A^R t^R) w_L l + ((1 + w_I)^{r\mu} - 1) i. \tag{6}$$

Note that, for $\mu = 0$, we get $(1 + w_I)^{r\mu} - 1 = 0$, so that insurrection activities do not yield any utility to the citizens in such a case. For insurrection activities to generate utility to the citizens, we will need to have both some degree of grievance against the

1. That is gross labor income $w_L l$ minus effective labor income tax, defined by the effective tax rate $t^G A^G$.

government and some credibility of the revolutionary elite. Given both, the value of a positive μ will be magnified by rises in the youth-bulge ratio r. Note further that (6) implies some risk aversion with respect to the compensation rate w_I, where $r\mu$ gives the degree of risk aversion in the way that higher values of the youth-bulge ratio are associated with lower degrees of risk aversion.

The final element of our model is a simple labor-market imperfection. In particular, we assume a restriction on the side of the labor suppliers in the form of a probability ε of being unemployed. Since each citizen's time devoted to either work or insurrection is normalized to unity and since the only legal way of spending time for income generation is labor on the regular labor market, the official level of full employment on the labor market is simply N. Our relevant labor-market restriction will hence be $L \leqslant \varepsilon N$. On the individual citizen's level, then, labor supply will be restricted by a demand restriction $l \leqslant \varepsilon$. Within the framework described above, the firm, the revolutionary elite, and the citizens will maximize their respective objective functions.

The management of the firm takes $F(\delta r^{-1}L, A)$ and w_L as given and maximizes net profits. Given (5), the first-order condition is:

$$w_L^* = \delta r^{-1} F'(L). \tag{7}$$

As we assume competition on both the labor market and the market for insurrection activities, the revolutionary elite maximizes $t^R A^R - w_I I$, subject to $t^R \leq \tau^R Y$. Given (2) and (4), the Kuhn-Tucker conditions[2] for a maximum of Y^R with respect to L imply:

$$w_I^* = t^R\beta \;\; for \;\; I > 0; \qquad w_I^* \geqslant t^R\beta \;\; for \;\; I = 0; \qquad and \;\; t^R = \tau^R Y \;\; for \;\; \lambda > 0 \tag{8}$$

The condition $w_I^* \geq t^R\beta$ for $I = 0$ is of no relevance for both the citizens and the revolutionaries, so that we do not need to consider that case any further. The condition $t^R = \tau^R Y$ for $\lambda > 0$ simply says that the revolutionaries will take whatever the upper bound τ^R allows them whenever the restriction $t^R \leq \tau^R Y$ is binding.

Finally, the citizens maximize (6) subject to their time restriction $l + i \leq 1$ and subject

2. See the appendix for details.

to the labor-market restriction $l \leq \varepsilon$. The Lagrangian, then, is as follows:[3]

$$\Im = (1 - t^R A^R) w_L l + ((1 + w_I)^{r\mu} - 1) i + \lambda_1 (1 - l - i) + \lambda_2 (\varepsilon - l). \tag{9}$$

If both restrictions in (9) were non-binding, so that $\lambda_1 = \lambda_2 = 0$, then this would imply (by equation (27) in the appendix) that either $w_L = 0$ or $l = 0$ since both are nonnegative. Note, however, that $l = 0$ is ruled out by the *Inada* conditions for the production function, while $w_L = 0$ is ruled out by both the *Inada* conditions and by $\delta r^{-1} > 0$ in combination with the firm's first-order maximization condition (7); this is at least true as long as the effective tax-rate is not fully confiscatory, i.e. as long as $t^G A^G < 1$. A non-binding time restriction of the citizens, i.e. $l + i < 1$ and hence $\lambda_1 = 0$, is nevertheless possible, but that presupposes the labor-market imperfection to induce a binding constraint, so that $\lambda_2 > 0$. Both restrictions to be non-binding, however, is not possible as long as $t^G A^G < 1$.

Given $\lambda_2 > 0$, however, a non-binding time constraint of the citizens remains possible, but this would, according to equation (28) in the appendix, be associated with either $i = 0$, or with $(1 + w_I)^{r\mu} - 1 = 0$, or both. The implication is this: Should $\lambda_2 > 0$, so that the citizens are rationed in their labor-market supply, and should the marginal utility from insurrection activities $(1 + w_I)^{r\mu} - 1$ be zero, then the citizens are unable to fully employ their disposable time for income generation: On the market for insurrection, they have no incentive for being active because of $(1 + w_I)^{r\mu} - 1 = 0$; and on the labor market, they would want to be active to the full extent of their time devoted for income-generating activities, but they cannot do so because of the positive chance $\varepsilon > 0$ of being unemployed.

Finally, combinations of $\lambda_1 > 0$ with $\lambda_2 = 0$ or with $\lambda_2 > 0$ are also possible. In the former case, we have a cleared labor market, whereas in the latter case all unemployed time left from the labor market will be supplied to the revolutionary elite.

3.2 Equilibria

In what follows, we focus on two cases: In case A, the time restriction is non-binding (i.e. $\lambda_1 = 0$) while the labor-market restriction is binding (i.e. $\lambda_2 > 0$); and in case B,

3. The full set of the *Kuhn-Tucker* conditions is given in the appendix.

the time restriction is binding (i.e. $\lambda_1 > 0$) while the labor-market restriction may or may not be binding, so that $\lambda_2 > 0$.

Case A: $\lambda_1 = 0; \lambda_2 > 0$

From equation (27) and from $\lambda_1 = 0$, we have $l((1 - t^G A^G)w_L - \lambda_2 = 0$. Since the *Inada* conditions of the production function $F(\delta r^{-1} L, A)$ rule out $L = lN = 0$, we have $(1 - t^G A^G)w_L = \lambda_2 > 0$. The non-negativity of $(1 + w_I)^{r\mu} - 1$ in combination with equation (23) in the appendix implies $(1+w_I)^{r\mu} - 1 = 0$ because of $\lambda_1 = 0$. Substituting the compensation rates w_L and w_I by the marginal productivities from (7) and (8), and considering the labor-market restriction in (30) as well as the assumption of case A that $\lambda_2 > 0$, the equilibrium in case A is:

$$(1-t^G A^G)\delta r^{-1} F'(L) - \lambda_2 = (1+t^R\beta)^{r\mu} = 0; \quad or \quad (1-t^G A^G)\delta r^{-1} F'(L) - \lambda_2 > 0 \quad (10)$$

Note that, because of $\lambda_2 > 0$, employment L in equilibrium is lower than N and the wage rate in equilibrium $w_L = \delta r^{-1} F'$ is higher than its market-clearing value. We define the latter as $w_L^e = w_L(L = N)$.

Figure 1 depicts case A. $\delta r^{-1} F'(L)$ represents marginal productivity on the regular labor market and at the same time marginal utility of regular work derived by the citizens. The prevailing net wage rate $w_L > w_L^e$ determines an employment level $L \leqslant N$, while the market-clearing wage rate w_L^e would lead to full employment if it were not for the labor-market restriction. Because of the latter, however, employment falls short of N, leaving an amount $(1 - \varepsilon)N$ of labor unemployed. However, as long as $(1 + t^R\beta)^{r\mu} = 0$, so that there is no utility that the citizens could generate by insurrection activities, the $(1 - \varepsilon)N$ unemployed labor will not be reallocated to the market for insurrections.

Case A is a very simple case in which the citizens supply labor only on the regular labor market, either because marginal productivity on the market for insurrections is zero, or the promise of the revolutionary elite to compensate citizens for insurrection activities is not credible, or because the citizens are fully loyal to the government. For the latter cases, $\mu = 0$ applies. However, the labor-market imperfection in combination with the lack of opportunities on the market for insurrection activities deters the citizens from allocating their entire time designated for income generation into either regular work or insurrection activities. The latter is different in case B.

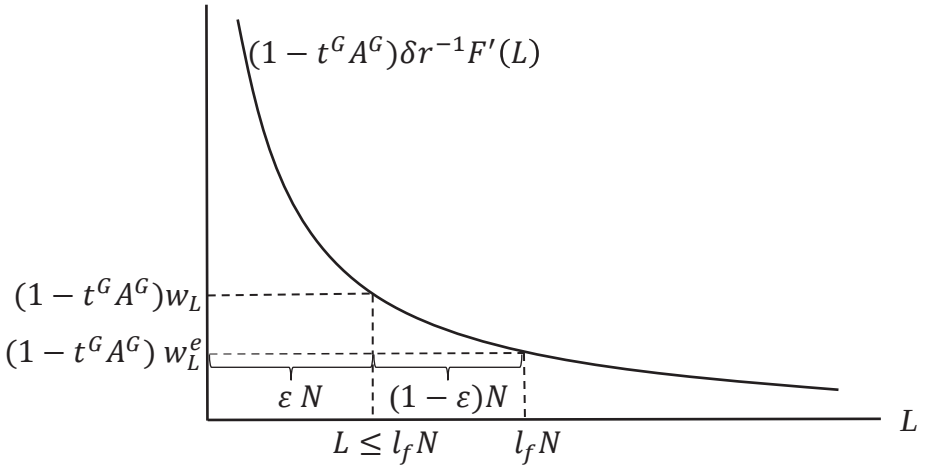

Figure 1: Case A

Case B: $\lambda_1 > 0; \lambda_2 \geqslant 0$

From (29) in the appendix and from the assumption $\lambda_1 > 0$ in this case, we get $1 = l + i$. Furthermore, from condition (27), $\lambda_1 > 0$, and $l > 0$, we get $(1 - t^G A^G)w_L - \lambda_2 = \lambda_1$. Combining this with condition (23) leads to $(1 - t^G A^G)w_L - \lambda_2 \geqslant (1 + t^R\beta)^{r\mu} - 1$. After having inserted the marginal productivities from (7) and (8), we can finally consider two subcases B1 and B2. We define subcase B1 as:

$$(1 - t^G A^G)\delta r^{-1}F'(L) - \lambda_2 > (1 + t^R\beta)^{r\mu} - 1 \tag{11}$$

which, according to (28), is associated with $i = 0$,[4] as in case A. This case, however, requires $\lambda_2 = 0$, since any $\lambda_2 - 1 > 0$ would make the labor-market restriction binding, so that $l < 1$, which would, in combination with $i = 0$, violate $1 = l + i$. The reason is straightforward: If the citizens were restricted in their labor supply to $l < 1$, and if the supply of insurrection activities could yield any additional utility, then the citizens would take that opportunity, given their utility function (6) and given that $(1+t^R\beta)^{r\mu}-1 > 0$. But this, in turn, would be incompatible with $1 > l + i$. Hence, $i = 0$ requires the effective net wage to be higher than the utility of insurrection activities even in a case of full employment on the regular labor market. As a result, there is no supply of insurrection activities in case B1 since the utility derived from insurrection activities is

4. This is so since i=0 whenever $(1+t^R\beta)^{r\mu} - 1 = 0$, since insurrection would not yield any utility in that case. If, however,$(1 + t^R\beta)^{r\mu} - 1 > 0$, then condition (28) in the appendix directly requires $i = 0$.

simply too low, as compared to the utility derived by regular work. By contrast, we define case B2 as:

$$(1 - t^G A^G)\delta r^{-1} F'(L) - \lambda_2 = (1 + t^R \beta)^{r\mu} - 1 \tag{12}$$

which, according to (28), is associated with $i \geq 0$. Subcase B2 is the basis for cases A and B1 since it gives the condition for an optimal time allocation for all situations where the marginal utility from insurrection activities is sufficiently attractive for the citizens in order to set $i > 0$ and hence for allocating at least some time into these activities. The difference between cases A and B1 is that in case A, any positive marginal utility of insurrection activities is sufficient for allocating time away from regular labor and into insurrection activities because of the labor-market restriction; in case B1, by contrast, there is no labor market restriction and marginal utility of insurrection activities is strictly below the net effective wage rate even with full employment on the regular labor market, so that it never pays for the citizens to allocate time into insurrection activities. Hence, whenever the labor-market restriction is binding and/or whenever marginal utility of insurrection activities climbs to a level above the net effective wage rate at full employment, insurrection activities become paying to the citizens; and that is what case B2 is about.

There are hence two major driving forces for insurrection activities that both directly stem from the official labor market: One is the effective net wage rate as compared to marginal utility derived from insurrection activities, and the other is a binding labor-market restriction with $\lambda_2 > 0$, and hence unemployment.

Case B2 is depicted in figure 2. It shows the marginal utility lines of the citizens for labor-market activity (i.e. $(1 - t^G A^G)\delta r^{-1} F'(L)$) on the one hand and for insurrection activities (i.e. $(1 + t^R \beta)^{r\mu} - 1$) on the other. Insurrection activities i and labor-market activities l always add up to one for each citizen in case B2, so that we have $L + I = N$ on the macro level. If the labor-market restriction were non-binding, that is if $\lambda_2 = 0$, an equilibrium were reached at L^{**}, I^{**}, where the marginal utility levels derived from the respective activities are equal. With a binding labor-market restriction, though, that is with $\lambda_2 > 0$, the activity levels on the respective markets in equilibrium are L^*, I^* with lower regular work and higher insurrection activities as compared to L^{**}, I^{**}, although marginal utility of insurrection activities falls short of the net effective wage rate on the regular labor market. Note that an increase in the youth-bulge rate r shifts the

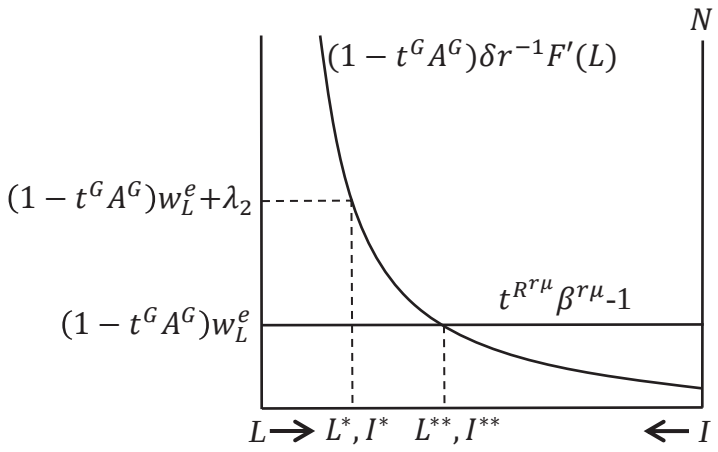

Figure 2: Case B

marginal-utility line of the labor market downwards and the marginal-utility line of the market for insurrections upwards. Hence, an increase in the youth bulge will reallocate time away from work on the regular labor market and into insurrection activities.

Case B2 can be used for directly fixing the central empirical implications of our model. Assume, for simplicity, a *Cobb-Douglas* production function on the labor market with α as the production elasticity. Then the equilibrium condition (12) turns into $(1 - t^G A^G)\delta r^{-1}\frac{\alpha}{L^{1-\alpha}} - \lambda_2 = (1 + t^R\beta)^{r\mu} - 1$ and, because of $N = L + I$, into:

$$I = N - \left(\frac{(1 - t^G A^G)\delta\alpha}{r((1 + t^R\beta)^{r\mu} - 1) + r\lambda_2}\right)^{\frac{1}{1-\alpha}} \tag{13}$$

Generally speaking, the term in brackets on the right-hand side indicates the opportunity costs of working time on the regular labor market in terms of foregone utility from insurrection activities. As these opportunity costs rise, insurrection activities will rise, too.

4 Empirical Evidence

The model presented in the previous section has a number of empirical implications both in general and with respect to the youth bulge. The general implications are:

1. Productivity on the regular labor market, relative to productivity of insurrection activities, is a key factor for the allocation of time between regular labor and insurrection. Consequently, a decrease in either δ or α or both and an increase in $t^R\beta$ tend to raise insurgence activities. Hence it is not low productivity or, for that matter, low wages and poverty as such that drive people into insurrection activities, but it is the ratio of utility between the two income-generating activities labor or insurrection that counts. This is very much in line with now established findings of the economic theory of terrorism according to which terrorist activists are by no means recruited from groups of persons with low income and poor education (Krueger 2008). What rather counts for potential insurrection activities is the relative attractiveness of activities in the official or in the insurrection sector (Collier and Hoeffler 2004; Sageman 2004; Krieger and Meierrieks 2011).

2. Unemployment is another key factor for the allocation of time between insurrection and work on a regular labor market. An increase in the labor-market restriction, as indicated by λ_2, raises insurgence activities simply by restricting career options in the official labor market.

3. The degree of oppression exercised by the government, as indicated by the government's effective tax rate $t^G A^G$, lowers the opportunity costs of insurrection activities and hence raises their level. Note that for this effect to materialize, no irrationality with respect to the production of the (perceived) public good associated with insurrections is necessary. Rather, oppression changes the opportunity costs of one activity in terms of the other, and that changes the citizens' allocation of time.

With respect to the youth bulge, we have further implications. Formally, it can easily be shown from (13) that $l'(r) > 0$, so that a rise in the youth-bulge ratio tends to drive people away from the regular labor market into insurrection activities. There are three main effects behind that:

1. The youth-bulge ratio changes the degree of risk aversion with respect to the utility derived from insurrection activities via $r\mu$ in (13).

2. The youth-bulge ratio changes the relation between the utility derived from work on the one hand and from insurrection activities on the other. This is given by the first r below the fraction bar in (13).

3. Finally, the youth-bulge ratio directly interacts with the labor-market restriction, as can be seen by the term $r\lambda_2$ in (13). Hence, a rise in the youth bulge, in combination

with poor perspectives on the labor market, once again lowers the opportunity costs of insurrection activities.

The labor-market restriction appears to be of particular importance. It suggests that it is not the youth bulge as such that magnifies the threat of insurrection activities. It is rather the interaction of a high share of the youth cohort—and in societies with a traditionalist division of sexes, the share of young male people—in percent of the rest of the economically active population, with poor perspectives on the labor market. If the official labor market does not offer opportunities for young (male) citizens, and if there are non-official groups in search of people that support them in their extra-constitutional activities, then it is not particularly astonishing when young people allocate their time budget accordingly. Our empirical implications are thus not that the youth bulge as such counts for insurrection activities. What rather counts is the youth bulge in interaction with the underlying politico-economic structure, in particular the labor-market conditions.

4.1 Data and Empirical Strategy

In the following section, we focus on the empirical implications regarding the interaction between youth bulges, the labor-market constraint and insurrection activities. To this end, we develop an empirical framework that aims at explaining the likelihood of a country to experience an insurrection onset taking into account the demographic structure as well as the official labor-market prospects of the country. Our analysis is based on an asymmetric panel data set with the country-year as the unit of analysis, including all independent countries recognized in the international system with at least 500,000 inhabitants and covering a maximum period from 1951 to 2012.

Following existing studies on civil war (Fearon and Laitin 2003; Collier and Hoeffler 2004; Urdal 2006), data on internal conflicts are drawn from the Uppsala/PRIO armed conflict data set (Themnér and Wallensteen 2011). Accordingly, our dependent variable refers to the outbreak of a "contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle-related deaths per year" (Gleditsch et al. 2002)[5]. The binary variable is coded one in that year where the threshold of

5. The Uppsala/PRIO data set differentiates between four types of conflict: internal armed conflict, internationalized armed conflict (intervention or support from abroad), extrasystemic or colonial con-

25 battle-related deaths is reached for the first time during the conflict episode, given that there is no other conflict ongoing in the previous or current year[6]. All country-years that do not experience any type of conflict activity are coded zero, while country-years of ongoing conflict or with overlapping conflicts are coded missing. The chosen procedure controls for potential endogeneity problems that might stem from feedback effects of ongoing insurrection activities on the economic and demographic variables included in the model.

With regard to the youth-bulge ratio we define the relative youth cohort size *(RYCS)* by calculating the ratio of the male youth cohort (men aged between 15 and 24) to the total working population (men and women aged between 15 and 64). This approach appears justified on theoretical grounds because young men entering the labor market compete with the total working population for available job positions. From an empirical perspective we acknowledge that ratios including total population might be distorted due to changes in fertility rates as argued by Urdal (2004, 2006). Population data is taken from the UN World Population Prospects (UN WPP 2014).

In order to investigate the interaction between the youth-bulge ratio and the labor-market constraint, we rely on employment data as provided by the World Bank (World Development Indicators (WDI) 2014). In particular, we focus on the overall unemployment rate and the specific male youth unemployment rate defined as the number of unemployed males aged between 15 and 24 relative to the total male working population of that age group. Referring back to our theoretical model, we compute annual *changes* in unemployment rates as our indicator for a binding labor-market constraint. We rely on changes in, rather than levels of, unemployment since we aim to explain violent insurrection outbreaks rather than ongoing conflicts. However, in order to observe the transition from a conflict-free situation to an insurrection onset at the aggregate country level, there must be some triggering event that changes the initial labor-market equilibrium in such a way that a latent conflict potential is transformed into an effective insurrection movement that has the capacity to erode existing power relations (Acemoglu

flicts and interstate conflicts (see Themner and Wallensteen 2011). Since our approach focuses on the determinants of *internal* violent conflicts, we only include internal as well as internationalized armed conflicts. While our theoretical predictions could be applied to insurgencies against colonial powers as well, we exclude these conflicts due to data problems and consider only sovereign country-years.

6. Even though the Uppsala/PRIO project sets a relatively low violence threshold of 25 battle-related deaths per year we argue that this threshold is sufficiently high in order to capture only insurrection onsets that are the result of a deliberate organization of activities aimed at changing political power positions rather than spontaneous outbursts of political demonstrations and riots (see Gleditsch et al. (2002) and Sambanis (2004) for a discussion of different definitions and thresholds of internal conflicts).

and Robinson 2001; Apolte 2012).

According to our model, an increase in unemployment will force people out of the official labor market and at the same time make it more difficult especially for young people to enter this market. This will induce individuals to reallocate their disposable time away from official work and towards insurrection activities. At the aggregate level, the increase in unemployment (translating into a larger labor market constraint λ_2) will shift the labor-market equilibrium as indicated in figure 2, thereby raising the aggregate labor supply for insurrections, all else being equal. Overall, changes in the unemployment rate can be assumed to translate into changes of the allocation of labor supply between labor markets and insurrection activities on the level of the society as a whole, thereby triggering the occurrence of violent conflict onsets.

In contrast, with regard to youth bulges we include the levels of the relative youth cohort size. As depicted in figure 2, youth bulges influence the position of the marginal-utility lines of both, the labor market and insurrection activities. Since the demographic structure changes slowly over time, we should assume that youth bulges influence the general disposition of a society to supply a larger share of disposable time to insurrection activities. Hence, the relative values of the youth cohort size appear to be the appropriate measure of demographic pressures.

Based on these considerations, our logistic regression model is specified as follows:

$$\begin{aligned} p(insurstart_{it} = 1|\mathbf{x}) = \Lambda(&\beta_0 + \beta_1 ptc_{it-1} + \beta_2 lnpop_{it-1} + \beta_3 imr_{it-1} + \beta_4 anoc_{it-1} \\ &+\gamma_1 RYCS_{it-1} + \gamma_2 \Delta UE_{it-1} + \gamma_3 (RYCS_{it-1} * \Delta UE_{it-1}) + \boldsymbol{z\beta_z}) \end{aligned} \tag{14}$$

where Λ is the standard logistic cumulative distribution function:

$$\Lambda(\boldsymbol{x\beta}) = \frac{exp(\boldsymbol{x\beta})}{[1 + exp(\boldsymbol{x\beta})]}$$

Following Hegre and Sambanis (2006), our model incorporates four main determinants of internal armed conflict onset that are always included in the regressions, namely the natural logarithm of total population (*lnpop*), infant mortality (*imr*) as a proxy for the overall level of development and a measure of political instability that is based on Fearon and Laitin (2003): *anoc* takes the value one for all country-years for which the composite

polity2-score of the Polity IV Project lies between -5 and +5 (Mashall, Gurr, and Jaggers 2014). The theoretical rationale is that while both, consolidated democracies and strong autocracies, have the capacity to ensure a high level of political stability that renders internal unrest less likely, political systems in the intermediate range of the polity-scale, so-called "anocracies", should be expected to face higher levels of internal instability since neither democratic institutions nor autocratic suppression are fully effective. In addition, proximity to conflict (*ptc*) measures the number of years without violent activity that have passed since the last conflict, which is discounted by the factor four. The formula is $exp[(-\text{years in peace})/4]$ following Urdal (2006) and Hegre et al. (2001). We assume that the risk of an insurrection outbreak is high immediately after a conflict episode, but diminishes as time passes and is halved approximately every 3 years[7].

Our explanatory variables of interest are the relative youth-cohort size $RYCS$, which we refer to as the *youth-bulge ratio*, changes in the (male youth) unemployment rate reflected by ΔUE and the interaction of these two variables[8]. Moreover, the vector $\boldsymbol{z}$ includes further control variables that might be associated with both, insurrection onsets as well as our demographic and economic covariates. Except for time-invariant regressors, all explanatory variables are lagged by one year in order to account for potential reversed causality. An overview of all variables and data sources as well as descriptive statistics is given in the appendix (see tables A.1, A.2 and A.3).

Our baseline model includes 169 countries that have experienced 224 insurrection onsets according to the above specified criteria (see table 1, model 1). This corresponds to 3% of all observations. Since employment data is available only from 1992 onward, the sample size is approximately reduced to one third upon the inclusion of unemployment rates.

4.2 Results

The results of our baseline pooled logit estimation are consistent with the findings of Urdal (2006) and others (see column 1, table 1). We find that *proximity to conflict* is an important determinant of the propensity of an insurrection onset. The positive and significant coefficient suggests that conflict-specific capital depreciates over time thereby

7. Regressions with alternative discount rates for *ptc* do not change the results substantially.

8. We will denote changes in total unemployment rates by ΔUE_{tot} and changes in male youth unemployment rates by ΔUE_{ym}.

reducing the opportunity for insurrection activities (Fearon and Laitin 2003). A larger total population increases the likelihood of insurrection activities. On the one hand, a large population size might be associated with ethnic and religious heterogeneity that could spur grievances among the members of (discriminated) minorities (Collier and Hoeffler 2004). On the other hand, a large population (density) might be associated with institutional crowding, especially when urbanization takes place. We follow Urdal (2006) and choose infant mortality as our proxy for the level of development in order to avoid potential confusion of the effects of a more direct economic measure like GDP per capita and our unemployment variables. The positive and significant coefficient of *infant mortality rate* confirms that the threat of an armed conflict is higher in countries with lower levels of socio-economic development. With regard to the impact of political instability on insurrections the results also confirm that *anocracies* are confronted with a higher risk of insurrection activities, presumably due to a lack of institutional capacities to either efficiently suppress political unrest or provide non-violent channels of political participation like free elections.

Finally, when it comes to our central explanatory variable of interest, the *youth-bulge ratio*, we find that larger youth cohorts indeed change the relation between utility derived from work and from insurrection activities. As a result, (young male) people reallocate time away from the official labor market toward insurrection activities. On the aggregate country-level, this effect materializes into a higher risk of internal armed conflict onsets as reflected by the positive and significant coefficient.

Though the reasoning of institutional bottlenecks imposed by large youth cohorts is present in the literature, only few studies have attempted to integrate labor-market indicators directly in an empirical framework aimed at testing the demography-insurrection nexus (e.g. Campante and Chor 2012). One reason apparently concerns data constraints since estimates for employment indicators are available only since 1990 at a broad cross-country level. A second concern relates to the quality of unemployment data in developing countries. Official statistics there tend to underestimate unemployment in countries with large agricultural and informal sectors where the labor force is largely self-employed and underemployment is prevalent (Fields 2012; ILO 2013). These problems are, however, of limited relevance for our approach since we use annual changes rather than the level of unemployment rates.

The inclusion of unemployment in table 1 (column 2 to 5) reduces the sample size to 2,757 observations and spans a period from 1993 to 2012. Three percent or 87 of all

Table 1: Baseline Results

Dep. Variable: Insurrection onset	(1)	(2)	(3)	(4)	(5)
proximity to conflict	1.125***	1.410***	1.410***	1.411***	1.416***
	(0.203)	(0.312)	(0.315)	(0.311)	(0.315)
total population (ln)	0.270***	0.387***	0.393***	0.384***	0.402***
	(0.046)	(0.081)	(0.082)	(0.081)	(0.082)
infant mortality rate	0.005***	0.012***	0.013***	0.012***	0.013***
	(0.001)	(0.004)	(0.004)	(0.004)	(0.004)
anocracy	0.617***	0.590**	0.586**	0.592**	0.602**
	(0.148)	(0.250)	(0.252)	(0.250)	(0.252)
youth bulge ratio	13.464***	7.180	7.138	7.123	8.355
	(3.053)	(5.149)	(5.270)	(5.154)	(5.367)
post 1990 dummy	0.245				
	(0.160)				
change in total unemployment rate		0.123	-0.986**		
		(0.082)	(0.394)		
youth bulge ratio x change in total unemployment rate			6.360***		
			(2.206)		
change in male youth unemployment rate				-0.002	-0.683***
				(0.057)	(0.184)
youth bulge ratio x change in male youth unemployment rate					4.274***
					(1.109)
Constant	-9.052***	-9.461***	-9.555***	-9.399***	-9.865***
	(0.711)	(1.150)	(1.173)	(1.149)	(1.204)
Observations	7,088	2,757	2,757	2,757	2,757
Log likelihood	-903.006	-325.289	-321.544	-326.255	-320.607
LR chi^2	182.455	121.989	129.480	120.058	131.353
Prob.	0.000	0.000	0.000	0.000	0.000
Pseudo R^2	0.092	0.158	0.168	0.155	0.170

Notes: All columns are logit regressions with logit coefficients reported. The time-varying explanatory variables are lagged by one year. Standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

observations contained in the sample are insurrection outbreaks which is proportional to the larger benchmark model. In order to account for the different time periods covered, we include the dummy variable *post*90 in our benchmark specification without unemployment (column 1, table 1). Yet, the insignificant coefficient does not indicate

that there are structural differences in the occurrence of conflict onsets that can be related to the different time spans covered.

The stepwise inclusion of either changes in total or male youth unemployment rates leads to comparable results. The parameter estimates of the main effects of the youth-bulge ratio and unemployment are not significant in column 2 and 4. Even though collinearity among socio-economic covariates could always be an issue in empirical research, the correlation table does not indicate that it should be a severe problem in this context (see table A.3). Rather, the results support our theoretical prediction that neither a large youth bulge nor high unemployment *per se* are sufficient to explain internal conflicts. Rather, when we include the product of both variables in columns 3 and 5, the interaction effect of the relative youth cohort size and changes in (male youth) unemployment is highly significant with a large positive coefficient. Hence, only a combination of both, demographic pressures *and* a labor-market shock in terms of rising unemployment actually translates the violent potential of a youth-bulge phenomenon into an increased likelihood of political violence.

In addition, while the parameter coefficients of $RYCS$ are not significant when including unemployment in table 1, the marginal effects of the youth-bulge ratio are significant but depend on the magnitude of changes in unemployment (see table 2). In particular, the effect of a marginal increase in the relative youth cohort size is positive and significant only in the presence of negative labor-market shocks, in other words rising unemployment. In contrast, a reduction in unemployment neutralizes the violent potential of a higher youth bulge and leads to insignificant marginal effects of $RYCS$ (except for very high cuts in male youth unemployment rates, showing the expected negative sign). Similarly, a worsening in the labor-market situation leads to a higher propensity of violent conflict outbreaks only in the presence of high youth bulges of 18% and more.

Overall, the results confirm our theoretical predictions: It is not the demographic structure as such that supports insurrection outbreaks but whether large youth cohorts are confronted with a decline in income prospects in the official labor market that aggravate existing institutional bottlenecks and render alternative activities like insurrections more attractive. In other words, an increase in unemployment will hit young males disproportionately, driving them toward insurrection activities and triggering the outbreak of internal political violence.

Table 2: Marginal Effects

(1)		(2)		(3)	
at	ME of $RYCS$	at	ME of $RYCS$	at	ME of ΔUE_{tot}
ΔUE_{tot}=-4.4	-0.365	ΔUE_{ym}=-8.3	-0.551*	$RYCS$=0.08	-0.00462*
	(0.276)		(0.284)		(0.00265)
ΔUE_{tot}=-0.4	0.0728	ΔUE_{ym}=-0.8	0.0763	$RYCS$=0.12	-0.00283
	(0.0815)		(0.0804)		(0.00179)
ΔUE_{tot}=0.0	0.112	ΔUE_{ym}=0.0	0.126	$RYCS$=0.16	0.000532
	(0.0796)		(0.0766)		(0.00132)
ΔUE_{tot}=0.3	0.141*	ΔUE_{ym}=0.7	0.166**	$RYCS$=0.18	0.00304**
	(0.0791)		(0.0746)		(0.00139)
ΔUE_{tot}=4.8	0.524***	ΔUE_{ym}=9.3	0.514**	$RYCS$=0.21	0.00817***
	(0.186)		(0.215)		(0.00315)
Observations	2,757		2,757		2,757

Notes: Marginal effect of the focal variable conditional on the moderating variable. Column (1) displays the effect of a marginal change in $RYCS$ *conditional* on the 1., 25., 50., 75., and 99. percentile of the distribution of changes in the total unemployment rate (ΔUE_{tot}). Column (2) displays the marginal effects of $RYCS$ *conditional* on corresponding changes in the male youth unemployment rate (ΔUE_{ym}). Column (3) shows the marginal effects of changes in the total unemployment rate conditional on $RYCS$. All other covariates are set to their means. Standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

4.3 Sensitivity of Results

There are several relevant concerns related to the robustness of our results. First, the pooled logit approach does not account for unobserved heterogeneity across countries such as geographic location, ethnic diversity or historical background. We therefore apply a conditional logit fixed effects estimation based on our preferred specification from model 3 (table 1) including changes in the total unemployment rate[9]. The results are presented in table 3. Overall, the parameter estimates are robust to the inclusion of country and year fixed effects. In particular, the interaction term of youth bulges and unemployment is highly significant across specifications.

9. Even though male youth unemployment is likely to reflect the effective labor-market constraint of young people more adequately than overall unemployment and collinearity does not appear to be an obvious problem here, we still seek to minimize potential confusion between the relative youth cohort size and unemployment measures. Therefore, we rely on the more general measure of total unemployment as our preferred proxy for a binding labor-market constraint.

Table 3: Sensitivity Analysis

Dep. Var.: Insurrection onset	(1)	(2)	(3)	(4)	(5)	(6)
proximity to conflict	-2.227***	-2.248***	1.682***	1.478***	1.176***	1.031*
	(0.539)	(0.544)	(0.304)	(0.319)	(0.386)	(0.587)
total population (ln)	0.738	-0.671	0.374***	0.331***	0.533***	0.613***
	(1.336)	(2.485)	(0.089)	(0.082)	(0.111)	(0.172)
infant mortality rate	0.021*	0.022*	0.011***		0.018***	0.033**
	(0.012)	(0.012)	(0.004)		(0.005)	(0.014)
anocracy	0.965**	1.036**	0.247		0.875***	0.426
	(0.389)	(0.412)	(0.266)		(0.304)	(0.445)
youth bulge ratio	15.131	18.571	9.907*	8.353*	5.614	1.458
	(17.915)	(20.325)	(5.489)	(4.824)	(6.835)	(11.700)
change in total unemployment rate	-0.767*	-0.813*	-0.315	-0.845**	-1.085**	-0.579
	(0.454)	(0.442)	(0.580)	(0.403)	(0.475)	(0.906)
youth bulge ratio x change in total unemployment	5.474**	5.657**	1.392	5.215**	6.825**	3.484
	(2.781)	(2.773)	(3.388)	(2.306)	(2.728)	(5.767)
Regime type				-0.006		
				(0.023)		
Regime type squared				-0.022***		
				(0.005)		
GDP p.c. growth rate				2.526**		
				(1.060)		
Islam dummy					0.007*	0.010
					(0.004)	(0.006)
ethnic fractionalization					6.675**	12.956**
					(2.757)	(5.057)
ethnic frac. squared					-6.999**	-14.991***
					(2.783)	(5.595)
military expenditure (% of GDP)					0.072**	0.013
					(0.029)	(0.102)
former British colony					-0.698*	-0.463
					(0.382)	(0.579)
former French colony					-0.176	-0.252
					(0.380)	(0.726)
oil exports						0.006
						(0.008)
secondary schooling						-0.002
						(0.017)
dependency ratio						-0.656
						(2.495)

Table 3: Sensitivity Analysis (continued)

Dep. Var.: Insurrection onset	(1)	(2)	(3)	(4)	(5)	(6)
Constant			-9.774***	-7.408***	-12.519***	-13.519***
			(1.278)	(1.283)	(1.726)	(3.969)
Observations	713	713	2,486	2,540	2,273	1,479
Country FE	YES	YES	NO	NO	NO	NO
Time FE	NO	YES	NO	NO	NO	NO
Lags	1 YEAR	1 YEAR	3 YEARS	1 YEAR	1 YEAR	1 YEAR
Log likelihood	-169.633	-165.191	-284.600	-299.754	-233.886	-118.475
LR chi^2	35.306	44.191	117.482	118.047	136.471	71.689
Prob.	0.000	0.014	0.000	0.000	0.000	0.000
Pseudo R^2	0.094	0.118	0.171	0.165	0.226	0.232

Notes: All columns are logit regressions with logit coefficients reported. In model (3), the time-varying covariates are lagged by three years; in all other models, 1-year-lags are included. Information on definitions and data sources of the additional control variables are given in table A.1. Standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

A second concern regards the potential problem of reversed causality. We account for the fact that internal armed conflicts will influence both, economic as well as demographic factors due to economic devastation, deaths and refugees, by omitting all country-years of ongoing conflict episodes. Still, identifying the exact start date of a conflict onset can be difficult (Sambanis 2004). If insurrection activities started before the recorded year in our sample, there is still the possibility that causality runs in the opposite direction. In order to account for this potential caveat, we test higher lags of our explanatory variables in column 3 of table 3. All coefficients display the expected signs. However, whereas our interaction term is no longer significant, the youth-bulge ratio becomes marginally significant.

In column 4 to 6, we compare different estimations with additional determinants that have been discussed in the literature on internal armed conflicts (Hegre et al. 2001; Fearon and Laitin 2003; Collier and Hoeffler 2004). Again, our main result regarding the moderating role of unemployment is robust to the inclusion of alternative measures of political instability or level of development, and when we account for further control variables such as religion, ethnic fractionalization or military expenditure. Given the limited sample size and rising correlations among the covariates when adding further socio-economic factors such as secondary school enrollment or oil exports, most explanatory variables loose statistical significance, including our interaction effect (column 6, table 3).

A final concern regards the definition of our dependent variable, *insurrection onset*. Sambanis (2004) discusses several limitations regarding the coding rules of armed conflicts applied in the PRIO data set such as the battle-related death-threshold, finding the precise start and end date of a conflict, and problems related to the distinction between intrastate, interstate and extrastate conflicts. For our research purpose, the third aspect is of particular relevance for two reasons: First, it is generally difficult to identify the origin of recruited rebels when armed disputes concern border areas and opposition groups belong to ethnic minorities spread across various countries. Second, we observe rising activity of rebel groups that operate in different countries such as al-Qaida, the Islamic State or Boko Haram. If the rebels involved in an insurrection are largely recruited from foreign countries rather than the domestic society, the ascribed relationship between cohort sizes, labor markets and conflict potentials will not suffice to explain the occurrence of internal armed conflicts. In such cases, we would question the purely internal dimension of a conflict. As a consequence, the lack of statistical significance of the youth-bulge ratio might be driven by those conflicts that mainly involve internationally recruited rebels among the opposition side.

Indeed, when investigating potential outliers we find that most of these observations reflect a specific type of conflict concerning border areas and/or involving internationally active opposition groups. In table 4 we therefore exclude those countries that fulfill two criteria, namely very high standardized Pearson residuals[10] and the involvement in violent disputes that have an obvious international dimension as in the case of the terrorist attacks in the U.S. in 2001 and/or because conflicts concern territorial sovereignty in border areas where the domestic origin of recruitment is highly questionable (e.g. Azerbaijan 2005, 2012). The analysis of the specific outlier cases leads to the exclusion of six countries, namely Azerbaijan, Eritrea, Georgia, Macedonia, Serbia and the U.S.[11]. The results confirm our suspicion that the effect of the youth-bulge ratio might be blurred by some few conflicts with distinct characteristics that cannot be explained based on our theoretical framework. Upon the exclusion of these cases the signs and magnitudes of the explanatory variables do not change, but the youth-bulge ratio as well as unemployment changes become statistically significant in all specifications.

Again, the results point to the need of a deeper understanding of the interdependence of

10. The standardized Pearson residuals measure the (weighted) deviation of the estimated probability that y=1 from the actual observation of y. The formula is: $stdresid_k = \frac{y_k - p(y_k=1)}{\sqrt{p(y_k=1)*(1-p(y_k=1))}}$

11. Table A.5 in the appendix gives a detailed explanation of the exclusion decisions.

Table 4: Outlier Analysis

Dep. Variable: Insurrection onset	(1)	(2)	(3)	(4)	(5)
proximity to conflict	1.121***	1.413***	1.396***	2.504***	2.552***
	(0.208)	(0.333)	(0.336)	(0.382)	(0.389)
total population (ln)	0.284***	0.442***	0.450***	0.765***	0.776***
	(0.048)	(0.090)	(0.091)	(0.118)	(0.120)
infant mortality rate	0.005***	0.013***	0.014***	0.025***	0.026***
	(0.001)	(0.004)	(0.004)	(0.005)	(0.005)
anocracy	0.671***	0.757***	0.751***	1.133***	1.146***
	(0.151)	(0.272)	(0.273)	(0.320)	(0.325)
youth bulge ratio	15.296***	10.654*	10.932*	14.554*	14.304*
	(3.273)	(6.013)	(6.192)	(7.924)	(8.256)
post 1990 dummy	0.133				
	(0.164)				
total unemployment rate (annual change)		0.153*	-1.105**	0.319***	-1.605***
		(0.084)	(0.448)	(0.087)	(0.621)
youth bulge ratio x total unemployment (annual change)			7.044***		10.638***
			(2.468)		(3.379)
Constant	-9.507***	-10.893***	-11.063***	-16.501***	-16.681***
	(0.756)	(1.356)	(1.391)	(2.042)	(2.108)
Observations	6,939	2,653	2,653	2,702	2,702
Outliers excluded	AZE, ERI, GEO, MKD, SRB, USA			1st and 99th percentile of std. Pearson residuals	
Log likelihood	-857.174	-277.981	-274.416	-191.478	-186.437
LR chi^2	189.067	133.853	140.982	192.591	202.673
Prob.	0.000	0.000	0.000	0.000	0.000
Pseudo R^2	0.099	0.194	0.204	0.335	0.352

Notes: In column (1) to (3) outliers are identified based on two criteria: First, standardized Pearson residuals of 7 or higher, and second, the type of conflict has a dominant international dimension concerning territorial sovereignty in border areas with heavy intervention from abroad, and/or where we suspect that rebel recruiting has predominantly taken place in foreign countries. For consistency, we exclude all observations of the suspicious countries from our sample. In column (4) and (5) we exclude all observations that fall in the 1st or 99th percentile of the distribution of the standardized Pearson residuals. Standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

demographic factors and the politico-institutional setting not only at the national level but also at a regional and global scale. This becomes even more important in the presence of internationally operating terrorist networks. To this end, taking into account regional rather than national measures of socio-economic and demographic pressures might be a

promising research agenda.

5 Conclusions

This paper provides a theoretical and empirical analysis of how the interplay of a youth bulge and basic politico-economic institutional structures impact on the risk of insurrection activities. We have developed a theoretical model of insurrection markets and integrated the relative youth cohort size as a measure of the youth bulge. Moreover, we have tested the empirical implications of our theory by help of a cross-country panel data set. Our empirical model confirms the hypothesized causality between a binding labor-market constraint in interaction with a youth bulge on the one hand and the probability of insurrection onsets at the aggregate country level on the other.

While our empirical investigation has focused on unemployment as an indicator for a binding labor-market constraint, further determinants of the politico-economic structure should also be tested. These may range from education opportunities and indicators of institutional barriers to entry into economic and political markets to the extent of informal sector employment. Indicators of political competition, fiscal oppression, red tape and the distribution of wealth may also be related to insurrection onsets in interaction with a youth bulge.

Further theoretical work may expand on commitment problems of political entrepreneurs who hire insurrection activists since, different from official-sector employers, they do not have access to legal systems (Gates 2002).

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A Appendix

The revolutionary elite's maximization problem

Considering (4) in combination with (2), the maximization problem of the revolutionary elite is:

$\Im = t^R \beta I - w_I I + \lambda(\tau^R Y - t^R)$.

The *Kuhn-Tucker* conditions are then:

$$\Im_I = t^R \beta - w_I \leqslant 0; \tag{15}$$

$$\Im_{t^R} = \beta I - \lambda \leqslant 0; \tag{16}$$

$$\Im_\lambda = \tau^R Y - t^R \geqslant 0; \tag{17}$$

$$I, t^R, \lambda \geqslant 0; \tag{18}$$

$$I\Im_I = I(t^R \beta - w_I) = 0; \tag{19}$$

$$t^R \Im_{t^R} = t^R(\beta I - \lambda) = 0; \tag{20}$$

$$\lambda \Im_\lambda = \lambda(\tau^R Y - t^R) = 0. \tag{21}$$

The citizens' maximization problem

Given the Lagrangian in equation (9), the Kuhn-Tucker conditions of the citizens' maximization problem are:

$$\Im_l = (1 - t^G A^G) w_L - \lambda_1 - \lambda_2 \leqslant 0; \tag{22}$$

$$\Im_i = ((1 + w_I)^{r\mu} - 1) - \lambda_1 \leqslant 0; \tag{23}$$

$$\Im_{\lambda_1} = 1 - l - i \geqslant 0; \tag{24}$$

$$\Im_{\lambda_2} = \varepsilon - l \geqslant 0; \tag{25}$$

$$l > 0; i, \lambda_1, \lambda_2 \geqslant 0; \tag{26}$$

$$l\Im_l = l((1 - t^G A^G) w_L - \lambda_1 - \lambda_2) = 0; \tag{27}$$

$$i\Im_i = i((1 + w_I)^{r\mu} - 1) - \lambda_1) = 0; \tag{28}$$

$$\lambda_1 \Im_{\lambda_1} = \lambda_1(1 - l - i) = 0; \tag{29}$$

$$\lambda_2 \Im_{\lambda_2} = \lambda_2(\varepsilon - l) = 0; \quad hence: \ \ \lambda_2 \Im_{\lambda_2} = \lambda_2(\varepsilon N - N) = 0. \tag{30}$$

Table A.1: Variable Description and Data Sources

Variable Name	Description	Source
Insurrection onset	= 1 if an internal armed conflict starts in country i in year t, given that there is no conflict ongoing in the previous or current year.	UCDP/PRIO, version 4-2013
Youth bulge ratio	Relative youth cohort size. Proportion of young males aged between 15 and 24 relative to the total working population (15-64, both sexes).	WDI (2014)
Total unemployment rate (annual change)	Annual change in share of unemployed persons to total labor force.	WDI (2014)
Male youth unemployment rate (annual change)	Annual change in male youth unemployment rate. The male youth unemployment rate is measured as the number of unemployed males aged 15 to 24 relative to the total male working population of that age group.	WDI (2014)
proximity to conflict	Years passed since the end of the last internal conflict in country i, weighted according to $exp[(-\text{years in peace})/4]$.	UCDP/PRIO, version 4-2013
total population (ln)	Natural logarithm of total population.	UN WPP (2014)
Infant mortality rate	Infants dying before reaching one year of age (both sexes combined) per 1,000 live births.	WDI (2014)
Anocracy	= 1 if the combined POLITY2-score for country i in year t is in the range between -5 and +5.	Polity IV Project (2014)
Regime type	Score of combinded POLITY2-indicator for country i in year t, ranging from +10 (full democracy) to -10 (full autocracy).	Polity IV Project (2014)
GDP p.c. growth rate	GDP per capita growth rate, converted to purchasing power parity (PPP) levels at 2005 constant international dollars per person.	Penn World Tables, version 7.1

Table A.1: Variable Description and Data Sources (continued)

Variable Name	Description	Source
Islam dummy	Percentage of Muslims in total population (time invariant).	Fearon and Laitin (2003)
Ethnic fractionalization	Share of population belonging to the largest ethnic group (time invariant).	Fearon and Laitin (2003)
Military expenditure	Military expenditure as % of GDP	WDI (2014)
former British colony	= 1 if the country is a former British colony.	Fearon and Laitin (2003)
former French colony	= 1 if the country if a former French colony.	Fearon and Laitin (2003)
Oil exports	Fuel exports as % of total merchandise exports.	WDI (2014)
Secondary schooling	Ratio of total secondary school enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown.	WDI (2014)
Dependency ratio	Sum of dependent persons aged between 0 and 14 and aged 65 or older relative to total working population aged between 25 and 64.	UN WPP (2014)
post90	= 1 if the year of observation is 1990 or later.	

Table A.2: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Baseline model					
insurrection onset	7088	.032	.175	0	1
youth bulge ratio	7088	.158	.033	.074	.262
Unemployment model					
insurrection onset	2757	.032	.175	0	1
youth bulge ratio	2757	.15	.038	.074	.226
Unemployment variables					
total unemployment rate (annual change)	2757	-.022	1.485	-12.4	18.2
male youth unemployment rate (annual change)	2757	.087	2.823	-19.1	24.5
Control variables					
proximity of conflict	7088	.107	.243	0	1
total population (ln)	7088	8.872	1.53	4.871	14.135
infant mortality rate	7088	64.46	54.837	1.813	367.199
anocracy	7088	.214	.41	0	1
regime type	2540	3.47	6.645	-10	10
GDP p.c. growth rate	2404	.027	.069	-.35	1.154
Islam dummy	2273	24.262	35.885	0	100
ethnic fractionalization	2273	.452	.26	.004	1
military expenditure (% of GDP)	2221	2.25	2.525	.001	39.615
former British colony	2273	.291	.454	0	1
former French colony	2273	.153	.36	0	1
oil exports	1440	14.021	23.304	0	99.657
secondary schooling	1332	83.081	28.898	6.051	160.619
dependency ratio	1479	.439	.216	.192	1.053

Table A.3: Correlation Matrix

v	Variables	v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11	v12	v13	v14	v15	v16	v17	v18
v1	insurrection onset	1.000																	
v2	youth bulge ratio	0.083	1.000																
v3	total unemployment rate (change)	0.002	-0.030	1.000															
v4	male youth unemployment rate (change)	-0.000	-0.054	0.799	1.000														
v5	proximity to conflict	0.671	0.233	-0.008	-0.018	1.000													
v6	total population (ln)	0.070	-0.133	0.003	0.000	0.286	1.000												
v7	infant mortality rate	0.071	0.521	-0.007	-0.030	0.126	-0.121	1.000											
v8	anocracy	0.103	0.255	0.001	-0.018	0.194	-0.002	0.142	1.000										
v9	Regime type	-0.047	-0.462	-0.002	0.016	-0.068	0.105	-0.510	-0.049	1.000									
v10	GDP p.c. growth rate	-0.042	-0.078	-0.125	-0.119	-0.051	0.017	-0.074	-0.017	0.031	1.000								
v11	Islam dummy	0.074	0.347	-0.001	-0.012	0.151	-0.042	0.292	0.050	-0.404	-0.025	1.000							
v12	ethnic fractionalization	0.086	0.409	-0.010	-0.024	0.210	-0.080	0.386	0.182	-0.222	-0.087	0.251	1.000						
v13	military expenditure	0.060	0.105	-0.002	-0.016	0.118	-0.071	0.021	0.004	-0.299	-0.044	0.245	0.035	1.000					
v14	former British colony	-0.014	0.180	-0.020	-0.022	0.041	-0.106	-0.005	0.020	0.052	0.005	0.150	0.227	0.109	1.000				
v15	former French colony	0.038	0.256	-0.014	-0.018	0.042	-0.146	0.272	0.121	-0.280	-0.052	0.230	0.216	-0.028	-0.305	1.000			
v16	oil exports	0.052	0.156	-0.017	-0.026	0.084	-0.060	0.056	0.049	-0.274	0.022	0.294	0.097	0.271	0.014	0.091	1.000		
v17	secondary schooling	-0.103	-0.758	0.009	0.029	-0.248	0.085	-0.852	-0.218	0.536	0.055	-0.280	-0.493	-0.082	-0.085	-0.395	-0.055	1.000	
v18	dependency ratio	0.098	0.855	-0.012	-0.037	0.239	-0.151	0.689	0.254	-0.490	-0.092	0.309	0.443	0.097	0.122	0.314	0.105	-0.859	1.000

Table A.4: Conflict List

Country	Start-year of conflict period	End-year of conflict period	Baseline model	Unemployment model
Afghanistan	1978	2001	*	
Afghanistan	2003	?	*	*
Algeria	1991	?	*	
Angola	2004	2004	*	*
Angola	2007	2007	*	*
Angola	2009	2009	*	*
Argentinien	1955	1955	*	
Argentinien	1963	1963	*	
Argentinien	1974	1977	*	
Azerbaijan	2005	2005	*	*
Azerbaijan	2012	?	*	*
Bangladesh	1975	1991	*	
Bangladesh	2005	2006	*	
Bolivia	1952	1952	*	
Bolivia	1967	1967	*	
Burkina Faso	1987	1987	*	
Burundi	1965	1965	*	
Burundi	1991	1992	*	
Burundi	1994	2006	*	*
Burundi	2008	2008	*	*
Cambodia (Kampuchea)	1967	1975	*	
Cambodia (Kampuchea)	1978	1998	*	
Cameroon	1984	1984	*	
Central African Republic	2001	2002	*	*
Central African Republic	2006	2006	*	*
Central African Republic	2009	?	*	*
Chad	1966	1972	*	
Chad	1976	1984	*	
Chad	1986	1987	*	
Chad	1989	1994	*	
Chad	1997	2003	*	*
Chad	2005	2010	*	*
Chile	1973	1973	*	
China	1950	1950		
China	1956	1956	*	

Table A.4: Conflict List (continued)

Country	Start-year of conflict period	End-year of conflict period	Baseline model	Unemployment model
China	1959	1959	*	
China	2008	2008	*	*
Colombia	1964	?	*	
Comoros	1989	1989	*	
Comoros	1997	1997	*	*
Congo	1993	1993	*	*
Congo	1997	1999	*	*
Congo	2002	2002	*	*
Croatia	1995	1995	*	*
Cuba	1953	1953	*	
Cuba	1956	1958	*	
Cuba	1961	1961	*	
Djibouti	1991	1994	*	
Djibouti	1999	1999	*	
Dominican Republic	1965	1965	*	
DR Congo (Zaire)	1964	1965	*	
DR Congo (Zaire)	1967	1967	*	
DR Congo (Zaire)	1977	1978	*	
DR Congo (Zaire)	1996	2001	*	*
DR Congo (Zaire)	2006	2008	*	*
DR Congo (Zaire)	2012	?	*	*
Egypt	1993	1998	*	*
El Salvador	1972	1972	*	
El Salvadir	1979	1991	*	
Eritrea	1997	1997	*	*
Eritrea	1999	1999	*	*
Eritrea	2003	2003	*	*
Ethiopia	1960	1960	*	
Ethiopia	1964	1996	*	
Ethiopia	1998	?	*	*
France	1961	1962	*	
Gabon	1964	1964	*	
Gambia	1981	1981	*	
Georgia	2004	2004	*	*
Georgia	2008	2008	*	*
Ghana	1966	1966	*	
Ghana	1981	1981	*	
Ghana	1983	1983	*	
Guatemala	1954	1954	*	
Guatemala	1963	1963	*	
Guatemala	1965	1995	*	
Guinea	2000	2001	*	*

Table A.4: Conflict List (continued)

Country	Start-year of conflict period	End-year of conflict period	Baseline model	Unemployment model
Guinea-Bissau	1998	1999	*	*
Haiti	1989	1989	*	
Haiti	1991	1991	*	
Haiti	2004	2004	*	*
India	1956	1959	*	
India	1961	1971	*	
India	1979	?	*	
Indonesia	1953	1953	*	
Indonesia	1958	1961	*	
Indonesia	1965	1965	*	
Indonesia	1967	1969	*	
Indonesia	1975	1992	*	
Indonesia	1997	2005	*	*
Iran	1966	1968	*	
Iran	1979	1988	*	
Iran	1990	1993	*	
Iran	1996	1997	*	*
Iran	1999	2001	*	*
Iran	2005	2011	*	*
Iraq	1958	1959	*	
Iraq	1961	1970	*	
Iraq	1973	1996	*	
Iraq	2004	?	*	*
Ivory Coast	2002	2004	*	*
Ivory Coast	2011	2011	*	*
Kenya	1982	1982	*	
Laos	1959	1961	*	
Laos	1963	1973	*	
Laos	1989	1990	*	
Lebanon	1958	1958	*	
Lebanon	1975	1976	*	
Lebanon	1982	1986	*	
Lebanon	1989	1990	*	
Lesotho	1998	1998	*	*
Liberia	1980	1980	*	
Liberia	1989	1990	*	
Liberia	2000	2003	*	*
Libya	2011	2011	*	*
Macedonia, FYR	2001	2001	*	*
Madagascar (Malagasy)	1971	1971	*	
Malaysia	1963	1966	*	
Malaysia	1974	1975	*	

Table A.4: Conflict List (continued)

Country	Start-year of conflict period	End-year of conflict period	Baseline model	Unemployment model
Malaysia	1981	1981	*	
Mali	1990	1990	*	
Mali	1994	1994	*	*
Mali	2007	2009	*	*
Mali	2012	?	*	*
Mauritania	1975	1978	*	
Mauritania	2010	2011	*	*
Mexiko	1994	1994	*	*
Mexiko	1996	1996	*	*
Morocco	1971	1971	*	
Morocco	1975	1989	*	
Moldova	1992	1992	*	*
Mozambique	1977	1992	*	
Myanmar (Burma)	2005	?	*	*
Nepal	1960	1962	*	
Nepal	1996	2006	*	*
Nicaragua	1977	1979	*	
Nicaragua	1982	1990	*	
Niger	1991	1992	*	
Niger	1994	1995	*	*
Niger	1997	1997	*	*
Niger	2007	2008	*	*
Nigeria	1966	1970	*	
Nigeria	2004	2004	*	*
Nigeria	2009	2009	*	*
Nigeria	2011	?	*	*
Oman	1957	1957	*	
Oman	1969	1975	*	
Pakistan	1971	1971	*	
Pakistan	1974	1977	*	
Pakistan	1990	1990	*	
Pakistan	1995	1996	*	*
Pakistan	2004	?	*	*
Panama	1989	1989	*	
Papua New Guinea	1989	1990	*	
Papua New Guinea	1992	1996	*	*
Paraguay	1954	1954	*	
Paraguay	1989	1989	*	
Peru	1965	1965	*	
Peru	1982	1999	*	
Peru	2007	2010	*	*
Philippines	1969	?	*	

Table A.4: Conflict List (continued)

Country	Start-year of conflict period	End-year of conflict period	Baseline model	Unemployment model
Romania	1989	1989	*	
Russia (Soviet Union)	1990	1991	*	
Russia (Soviet Union)	1993	1996	*	*
Russia (Soviet Union)	1999	?	*	*
Rwanda	1990	1994	*	
Rwanda	1996	2002	*	*
Rwanda	2009	?	*	*
Saudi Arabia	1979	1979	*	
Senegal	1990	1990	*	
Senegal	1992	1993	*	*
Senegal	1995	1995	*	*
Senegal	1997	1998	*	*
Senegal	2000	2001	*	*
Senegal	2003	2003	*	*
Senegal	2011	2011	*	*
Serbia (Yugoslavia)	1998	1999	*	*
Sierra Leone	1991	2001	*	
Somalia	1982	1984	*	
Somalia	1986	1996	*	
Somalia	2001	2002	*	*
Somalia	2006	?	*	*
South Africa	1966	1988	*	
Spain	1978	1982	*	
Spain	1985	1987	*	
Spain	1991	1992	*	
Sri Lanka	1971	1971	*	
Sri Lanka	1984	2001	*	
Sri Lanka	2003	2003	*	*
Sri Lanka	2005	2009	*	*
Sudan	1963	1972	*	
Sudan	1976	1976	*	
Sudan	1983	?	*	
Suriname	1987	1987	*	
Syria	1966	1966	*	
Syria	1979	1982	*	
Syria	2011	?	*	*
Tajikistan	1992	1996	*	*
Tajikistan	1998	1998	*	*
Tajikistan	2010	2011	*	*
Thailand	1951	1951	*	
Thailand	1974	1982	*	
Thailand	2003	?	*	*

Table A.4: Conflict List (continued)

Country	Start-year of conflict period	End-year of conflict period	Baseline model	Unemployment model
Togo	1986	1986	*	
Trinidad and Tobago	1990	1990	*	
Tunisia	1980	1980	*	
Turkey	1984	?	*	
Uganda	1971	1972	*	
Uganda	1974	1974	*	
Uganda	1979	1992	*	
Uganda	1994	2011	*	*
United Kingdom	1971	1991	*	
United Kingdom	1998	1998	*	*
United States of America	2001	2002	*	*
United States of America	2004	?	*	*
Uruguay	1972	1972	*	
Uzbekistan	1999	2000	*	*
Uzbekistan	2004	2004	*	*
Venezuela	1962	1962	*	
Venezuela	1982	1982	*	
Venezuela	1992	1992	*	*
Yemen	1994	1994	*	*
Yemen	2009	?	*	*
Zimbabwe (Rhodesia)	1967	1968	*	
Zimbabwe (Rhodesia)	1973	1979	*	

Notes: Start-year (*end-year*) refers to the first (last) year of a conflict period in which at least 25 battle-related-deaths occur given that there is no violent activity in the previous (subsequent) year of observation. A question mark for *end-year* indicates that the conflict period was still ongoing in the last year of observation. The column *baseline sample* shows whether a conflict period is included in the baseline estimation (column 1, table 1). In contrast, *unemployment model* refers to the specifications including our unemployment variables that cover a shorter time horizon.

Table A.5: List of Excluded Outliers

Country	Year	$RYCS$	ΔUE_{tot}	Std. Residual	Case Description
Azerbaijan	2005	0.152	-0.1	7.974	Incident in the context of the enduring conflict between Armenia and Azerbaijan over Nagorno-Karabakh. Secession aspirations of the region are heavily supported by Armenian forces. Dominant cross-border dimension of conflict identified, national origin of recruits unclear.
Azerbaijan	2012	0.141	-0.2	7.85	See above.
Eritrea	1997	0.196	0	7.212	Internal conflict between government and opposition groups is dominated by interstate conflict between Eritrea and Ethiopia.
Georgia	2004	0.121	-1.1	7.696	Georgian-Ossetian conflict. Ossetian separatists are heavily supported by Russian forces. Dominant cross-border dimension identified, national origin of separatists unclear.
Georgia	2008	0.123	-0.3	8.846	Georgian-Ossetian conflict culminates in Russo-Georgian war. Interstate character of conflict.
Macedonia	2001	0.122	-0.2	15.251	Conflict between Macedonian government and Albanian minority taking place mainly in regions near the border with FR Yugoslavia (Kosovo). Internal tensions and a downturn in economic development are largely influenced by preceding Kosovo conflict.
FR Yugoslavia	1998	0.12	0.6	10.37	Kosovo war. Border lines and recruitment of Albanian and Serb militant groups not clear. Regional dimension of conflict dominates.

Table A.5: List of Excluded Outliers (continued)

Country	Year	$RYCS$	ΔUE_{tot}	Std. Residual	Case Description
United States of America	2001	0.109	-0.2	6.347	Terrorist attacks by the Islamic terrorist group al-Qaeda. Recruited rebels are citizens of Saudi Arabia, United Arab Emirates, Egypt and Lebanon. International dimension of conflict dominates.

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University of Münster
CIW – Center for Interdisciplinary Economics
Scharnhorststrasse 100
D-48151 Münster

phone: +49-251/83-25329
fax: +49-251/83-28429

www.wiwi.uni-muenster.de/ciw