What Drives Youth to Violent Extremism? Evidence from the Islamic State Group's Foreign Recruits*

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Abstract

Trans-national terrorist organizations such as the Islamic State Group (a.k.a. ISIS/ISIL or Daesh) have claimed responsibility for a large number of terrorist attacks across the world in recent years, showing an ability to attract radicalized youth from numerous countries to join its ranks. Using a novel and detailed dataset on the group's foreign recruits, we are able to see the extent to which economic opportunities —as measured by unemployment and wages— in a given country and for a given level of education explain foreign enrollment in the terrorist organization. We indeed find that higher unemployment is significantly associated with higher numbers of individuals joining Daesh, the effect being stronger for countries that are closer to Syria.

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1 Introduction

The world has witnessed a dramatic increase in the number of terrorist attacks since 2000 and especially since 2011, with 4 countries – Iraq, Afghanistan, Nigeria, and Pakistan– accounting for 57 percent of all terrorism-related deaths since 2000. Furthermore, 2014 has witnessed a global expansion of terrorism with 93 countries affected and OECD countries experiencing their worst year since the 9-11 attacks (Institute for Economics and Peace 2016). Accordingly, opinion polls captured an increased concern among the U.S. population, 51 percent of which declared themselves in 2016 to be very or somewhat worried that they or a family member will become victim of terrorism, the highest level since 2002 (Gallup 2017). Recently, an organization has largely been associated with global terrorism: the self-proclaimed Islamic State also known as ISIL/ISIS or by its Arabic acronym, Daesh. We will henceforth use Islamic State group, ISIL, ISIS, and Daesh interchangeably. The reach of the terrorist group goes far beyond the borders of Syria and Iraq. It has claimed responsibility for terrorist attacks perpetrated across the world. Institute for Economics and Peace (2016) puts Daesh among the deadliest terrorist groups alongside Nigeria's Boko-Haram, Al-Qaeda, and the Taliban. It has raised further concerns due to its ability to attract radicalized Western youth among its recruits.

What are the factors that push individuals to join a terrorist organization? To contribute to this debate, we use a unique dataset of Daesh human resource files that is believed to be coming from a leaked cache; it contains information on 3,965 foreign recruits including their age, education, countries of residence, and self-reported knowledge of Islam. The data is estimated to capture around 20 percent of the Islamic State group's total foreign contingent at some point in time between 2013 and 2014.[1] Without any indication suggesting otherwise, the data is deemed representative of the terrorist organization's foreign workforce. It otherwise correlates well with other existing estimates of enrollment broken down by country of origin. With information about each individual's country of residence and education level, we can then compare the average foreign recruit with the average male –all individuals in the dataset are male– in the country of origin.

The crux of our analysis consists of comparing Daesh recruits to the population in their home countries and examining the correlation between the size of a cohort from a given country and with a given reported education level with country characteristics disaggregated or not by education levels. We then conduct fixed effect regressions in which we estimate unemployment on

[1] Dodwell, Milton and Rassler (2016b) report that the cache contains roughly 31 per cent of the total number of foreign fighters who entered Syria in the same period.

the propensity to join the terrorist group, holding country and education-level characteristics constant. We find that unemployment is a push factor but mostly for countries at a shorter distance to Syria. Finally, we examine in cross-country regressions the correlation between country-level characteristics and a country's likelihood of supplying Daesh recruits.

Our paper contributes to the literature on the determinants of radicalization into violent extremism and terrorism (see Krueger and Malečková (2003) for a review) and provides results that are consistent with earlier findings (Krueger and Malečková 2003, Krueger 2007, Krueger and Laitin 2008, Abadie 2006, Benmelech and Klor 2016). Our data however allow us to go further than existing studies by enabling us to control for country characteristics, both observable and unobservable. The lack of within-country variation has plagued most earlier studies, making causal interpretations difficult. Krueger and Malečková (2009) is however one exception as the authors make use of a dyadic dataset whereby information on country of origin of the terrorist and country where the attack is perpetrated are both known. In our case, we can construct, for each country, the gradient of unemployment with respect to education and relate it to the education composition of Daesh enrollment.

The larger literature to which these studies belong analyses the proximate causes of violent conflict (see Blattman and Miguel (2010) for a review). While the conflict literature has focused on convincingly establishing a causal link between socio-economic conditions and conflict by the use of rainfall shocks (Miguel, Satyanath and Sergenti 2004) or commodity price shocks (Bazzi and Blattman 2014), comparatively less progress has been made in the elucidation of the underlying mechanisms. On the one hand, Collier and Hoeffler (1998) view the observed negative relationship between wealth and conflict as evidence of a supply channel, whereby wealth shocks change the intrinsic or extrinsic motivation of individuals to become insurgents, i.e. grievance and greed, respectively. On the other hand, Fearon and Laitin (2003) interpret the negative wealth-conflict gradient as due to variations on the demand side, i.e. the presence of government forces or state capacity more generally speaking (Sanchez de la Sierra 2017). The empirical benefit of studying a global phenomenon such as cross-border terrorism lies in the geographical separation between demand and supply. Thus, to the extent that the results in this paper also speak to the question of participation in civil conflicts, our paper provides conclusive empirical evidence for greed or grievance being factors underlying violent conflicts.

The rest of the paper is organized as follows. In section 2, we discuss our empirical methodology and describe the data used in the analysis. Results are presented in section 3. Section 4

concludes with a discussion on what our results mean for labor market policies.

2 Data and Methodology

2.1 Methodology

The main objective of our analysis is to look at the extent to which higher levels of unemployment are conducive to the radicalization of individuals who then join terrorist organizations.

We propose a stylized occupational choice model, which will guide our analysis. We adopt the grievance/opportunity cost view of conflict participation (Collier and Hoeffler 1998), whereby the average earnings among individuals in the segment of the labor force of country c that has education e determines both their levels of discontent and hence propensity to radicalize, and their opportunity cost of joining the terrorist organization.

Participation of individual i is ruled by inequality $B_{ice} \geq C_{ice}$, where benefits are given by

$$B_{ice} = \Theta_{ice}^{B} \cdot [w_{ce}(1 - U_{ce})]^{-\beta^B}$$

and the cost function is set to be equal to

$$C_{ice} = \Theta_{ice}^{C} \cdot [w_{ce}(1 - U_{ce})]^{\beta^C}$$

Both benefits and costs have an idiosyncratic component (Θ_{ice}^{B} and Θ_{ice}^{C}, respectively) and a measure $w_{ce}[1 - U_{ce}]$ of the prevailing average earnings, i.e. the product between wage w_{ce} and the probability $1 - U_{ce}$ of being employed – U_{ce} is the unemployment rate among workers with education e in country c. The average earnings term is meant to capture a grievance effect in the benefit function and an opportunity-cost effect in the cost function. We assume that the elasticity of the benefit (resp. cost) function with respect to average earnings is a constant β^B (resp. β^C).

The participation constraint can then be written as follows, after denoting as x the log values of X and adopting notations $\theta = \theta^B - \theta^C$ and $\beta = \beta^B + \beta^C$:

$$\theta_{ice} \geq \beta \left[\ln w_{ce} + \ln(1 - U_{ce})\right]. \tag{1}$$

We next assume that θ_{ice} had a country-education level fixed component and a random component, so that $\theta_{ice} = \alpha + \eta_{ce} + \varepsilon_{ice}$, where ε_{ice} is an i.i.d. idiosyncratic term which is exponentially

distributed with a rate normalized to one. We can then rewrite equation (1) as

$$\varepsilon_{ice} \geq -\alpha + \beta \left[\ln w_{ce} + \ln(1 - U_{ce})\right] - \eta_{ce}. \tag{2}$$

The number N_{ce} of terrorist recruits of education level e coming from country c is then given by

$$N_{ce} = LF_{ce} \cdot \left[1 - F\left(-\alpha + \beta \left[\ln w_{ce} + \ln(1 - U_{ce})\right] - \eta_{ce}\right)\right], \tag{3}$$

where LF_{ce} is the size of the labor force with education e in country c. With $F(.)$ being an exponential distribution, we can rewrite (3) as

$$N_{ce} = LF_{ce} \cdot \exp\left[-\left(-\alpha + \beta \left[\ln w_{ce} + \ln(1 - U_{ce})\right] - \eta_{ce}\right)\right],$$

which becomes, after taking logarithmic values,

$$\ln N_{ce} = \ln LF_{ce} + \alpha - \beta \left[\ln w_{ce} + \ln(1 - U_{ce})\right] + \eta_{ce}. \tag{4}$$

We further decompose the error term η_{ce} into a set of country and education fixed-effects and a vector of observables Z_{ce} that includes $\ln LF_{ce}$ so that $\eta_{ce} = Z_{ce} \cdot \delta + \mu_c + \zeta_e + \nu_{ce}$. We can then rewrite equation (4) as

$$\ln N_{ce} = \alpha + \beta \cdot U_{ce} - \beta \cdot \ln w_{ce} + Z_{ce} \cdot \delta + \mu_c + \zeta_e + \nu_{ce}. \tag{5}$$

Note that we linearized $\ln(1-U) = -U$ in equation (5). Equation (5) is our main empirical specification. The impact of unemployment on terrorist recruitment is measured by β, which combines both grievance and opportunity-cost effects. In this specification, we can control for observed and unobserved predictors of terrorist recruitment that are constant across education-levels within a country, and those that are constant within education-level categories across countries.

2.2 Data

The analysis conducted in this paper combines a unique dataset on Daesh foreign recruits and socio-economic information about the countries of origin of these individuals.

Daesh foreign recruits The administrative personnel records on Daesh recruits we use have been described in detail in World Bank (2016). The data is believed to have been leaked by a defector and made available to many institutions including various news organizations such as Syria's Zaman al Wasl (which in turn shared the data with our team), Germany's Süddeutsche Zeitung, WDR, and NDR, Britain's Sky News, and U.S.-based NBC News. Besides, World Bank (2016) undertakes a comparison of the various sources of information on Daesh foreign workforce and find them broadly consistent. In particular, our data is identical to Dodwell et al. (2016b) who have access to the same Daesh leaked files as us, and our data closely match Benmelech and Klor (2016). Their data contains experts estimates of Daesh recruits, from two reports issued by the Soufan group which are based on information gathered from social media, investigations and community sources. As illustrated in Figure 1, log expert estimates and our administrative data are positively correlated with a correlation of 0.77.

Our dataset comprises 3,965 unique observations on Daesh's foreign recruits. The data are a cross-section of the group's foreign workforce during a time period stretching from early 2013 to late 2014 (Dodwell et al. 2016b). The records include information on a recruit's country of residence, citizenship, education, age and marital status. They also contain information on self-reported knowledge of Sharia, desired role in the terrorist organization and previous jihadist experience. We exclude 418 cases lacking information on country of residence.

Macroeconomic and opinion data To address the main research questions in this paper, namely characterizing Daesh' foreign labor supply curve, we combine the dataset on Daesh recruits with country-level macroeconomic data.[2] Using the reported country of residence, we match our data with datasets that contain variables typically used in similar settings, i.e. total population, Muslim population, per capita GDP, unemployment statistics, political freedom measures, along with corruption index and distance to Syria. Relevant to our context, we also add measures of a country's total labor force in each education level. Detailed variable definitions and their sources are provided in the Annex.

A disaggregated dataset In contrast to previous studies on terrorism (see e.g. Abadie (2006) and closer to ours, Benmelech and Klor (2016)) or on civil conflicts more generally speaking (see survey from Blattman and Miguel (2010)), we are able to have more disaggregated information

[2]We use macro data from 2013 to best match the Daesh foreign fighters database. If data from 2013 is missing, we use the nearest available year.

on terrorist recruits. In particular, using their reported levels of education, we can construct recruitment statistics by country of residence and level of education, distinguishing primary education and below, secondary, and tertiary. Our analysis is thus based on a sample of 2,987 recruits as 560 observations do not have information on education. We also have education-level-specific data on unemployment for most countries. The Daesh data spans 61 countries and with three education levels being considered (primary or below, secondary, and tertiary) yields a 183 country*education-level dataset. Augmenting the data with observations from 107 countries that do not supply Daesh recruits leads to a final dataset that consists of 504 country*education-level observations.

Table 1 gives a breakdown of records by country of last residence. Daesh's labor supply spans all continents across the globe. Saudi Arabia, Tunisia, Morocco, Turkey and Egypt are the top five countries of foreign fighters to Daesh by country of residence. These five countries alone account for 59 percent of the total number of Daesh recruits in our database. Among the non-Muslim-majority countries, Russia, France, and Germany supply 12 percent of Daesh's foreign workforce.

Once we normalize these numbers by the size of the Muslim community in the country of residence, we find seven European countries (including Denmark, Germany, France, and Belgium) among the first ten suppliers of Daesh recruits, with between thirty and seventy-five fighters per million Muslims. Tunisia and Saudi Arabia also feature in the top ten countries by that metric. Other large contributors in absolute terms, such as Morocco, Turkey and Egypt, are low in relative terms given the large Muslim population in these countries.

3 Results

3.1 The Islamic State group's foreign recruits: descriptive statistics

As a way to provide context for our main results, it is useful to document the individual characteristics that are available in our data. Existing micro-empirical studies have either resorted to small-samples to study individuals involved in acts of violence (Jenkins (2011), Hegghammer (2006))[3], or exploited larger, representative samples but then had to focus on expressions of radical opinions (Bhatia and Ghanem March, 2017, Kiendrebeogo, Ianchovichina et al. 2016) rather than actual commitment to the use of violence. In contrast, we are able to describe a large sample

[3]Jenkins (2011) examines 176 Americans who have been indicted, arrested, or otherwise identified as jihadist terrorists or supporters between September 11, 2001 - December 2010. Hegghammer (2006) analyzes 240 biographies of Saudi militants who took part in the terrorism campaign that started in Saudi Arabia in May 2003.

of several thousand individuals who have acted on their radical beliefs. While basic descriptive statistics of sociodemographic characteristics of the individuals in this data set are already documented in (Dodwell, Milton and Rassler 2016a), here we present the data in a way that speaks to the empirical strategy we adopt in the following sections. Specifically, we present averages broken down by country x schooling level, and use distance to Syria as a natural a priori organizing variable. To minimize noise, we focus on countries with at least 20 fighters. This leaves us with 60 cells spanning 20 countries accounting for 90.9 percent of our sample of recruits.

Schooling attainment of Daesh recruits Figure 2 compares the distribution of schooling attainments among ISIL's recruits and in the labor force of their country of origin. These recruits are more likely to have attained secondary or tertiary schooling and less likely to have only attained primary schooling relative to the labor force in their country of origin. This pattern is consistent to an existing body of evidence from different contexts that terrorists often come from middle-class or even college-educated backgrounds (Krueger 2007).

Age and marital status Figures 3 and 4 show the average age of fighters in a given country x schooling attainment cell and the fraction that reports being married. Those averages are plotted against the distance to Syria of the country of origin. Most of the cells exhibit average ages between 25 and 30 and there is no clear pattern whereby more educated recruits tend to join the Islamic State group at a younger or older age. However it appears that recruits from countries that are more distant to Syria tend to be older and more likely to be married.

Religious knowledge Figure 5 shows the fraction of recruits who report an intermediate or high knowledge of Sharia among those for whom that response is available (note that 21.7 percent of observations are missing for this question). Knowledge of Sharia is clearly correlated with schooling attainment. In particular, individuals with tertiary education are much more likely to be knowledgeable about Islamic law while the reverse is true of individuals with only primary education. There is a slightly positive association with distance to Syria which appears to come mostly from primary and secondary educated individuals.

Desired role in the organization For 31 percent of our sample, we have the role that the recruit would like to have within the organization, which we classify into "Administrative", "Fighter" and "Suicide" (the latter category includes "Suicide fighter" and "Suicide bomber") . Figures 6,

7 and 8 show the fraction of recruits reporting each aspiration. The probability of responding "Administrator" is much higher among highly educated individuals. It also appears to increase with distance to Syria, possibly reflecting efforts by the organization to recruit rarer skills globally. Once again, however, this relationship is not statistically significant. Other aspirations are more evenly distributed across educational groups.

Previous experience of Jihad Figure 9 shows the fraction of recruits who were involved in Jihad before joining Daesh. There is no clear difference on that dimension based on attained schooling. However the proportion appears to go down for countries that are further away from Syria, which could simply reflect the geographical distribution of Jihad.

3.2 Economic opportunities and Daesh recruits: non-parametric evidence

Next we show that the relative unemployment rates at different schooling levels in different countries can be related graphically to the corresponding relative number of Daesh recruits. To do so, we first normalize the number of Daesh recruits in each country-schooling level (N_{ce}) by the proportion of the country population with that schooling level (P_{ce}).

$$\widetilde{N_{ce}} = log(N_{ce}) - log(P_{ce})$$

Then we subtract schooling and country averages in the spirit of a "fixed effects" regression with country and schooling dummies, to obtain the relative supply of Daesh recruits for each country and schooling level combination. In this context, "relative" means in comparison to the average number of fighters in a given country across schooling levels and in comparison to the average number of fighters in a schooling level across countries.

$$\begin{aligned}\overline{\widetilde{N_{ce}}} &= \widetilde{N_{ce}} - \frac{1}{E}\sum_{e}\widetilde{N_{ce}} \\ \overline{\overline{\widetilde{N_{ce}}}} &= \overline{\widetilde{N_{ce}}} - \frac{1}{C}\sum_{c}\overline{\widetilde{N_{ce}}}\end{aligned}$$

Similarly, we take out schooling and country averages from log unemployment to obtain a

relative unemployment rate:

$$\begin{aligned}
\widetilde{UR_{ce}} &= log(UR_{ce}) \\
\widetilde{\overline{UR_{ce}}} &= \widetilde{UR_{ce}} - \frac{1}{E}\sum_{e}\widetilde{UR_{ce}} \\
\widetilde{\overline{\overline{UR_{ce}}}} &= \widetilde{\overline{UR_{ce}}} - \frac{1}{C}\sum_{c}\widetilde{\overline{UR_{ce}}}
\end{aligned}$$

Figure 10 plots the relative supply of Daesh fighters against the relative unemployment rate. The first panel shows all countries and schooling levels for which these numbers can be calculated.[4] Figures 11, 12 and 13 restrict the sample to larger suppliers of Daesh fighters to reduce the noise inherent to small cells. The graphs show a clear positive association between the two variables, which becomes larger and statistically significant as we restrict to countries with more fighters. This association means that countries where unemployment is particularly high among, say, primary educated workers will send relatively more primary educated fighters and conversely. It is interesting to note that the slopes we obtain are informed both by cross-country variation within one schooling level, and by cross-schooling levels within a country. Notably, these two sources of variation appear to identify similar slopes. This is easier to see in figure 13, which has fewer points: each one of three education-level-specific clouds of points (triangles, squares and circles) line up individually along the same slope. Similarly, the within-country variation also identifies a similar slope, as can be seen by looking at the alignment of the three points for specific countries such as Saudi Arabia, Germany or the Russian Federation.

3.3 Who joins ISIL? Regression results

In the previous section, our results corroborated the view that terrorists are typically educated (Krueger and Malečková 2003). However, the question whether lack of economic opportunities plays a role in the radicalization of youth remains unanswered. We look specifically at this issue. To that end, we estimate equation (5). The variables used in the regressions are summarized in Table 2.

We use the International Income Distribution Data Set (I2D2) to compute median wage and unemployment rate by education level for each country. The dataset is a global harmonized house-

[4]Unlike in the previous section, we now use the full sample of countries with Daesh recruits, except 13 countries with fighters in only one schooling category (for a total of 22 fighters), to which the de-meaning procedure cannot be applied.

hold survey database. It includes a basic set of harmonized variables that are comparable across countries and time. We compute wage and unemployment variables for adult males and for the male population between 18 and 36. We construct both wage and unemployment data for 75 countries, for primary, secondary and tertiary education.

Given the lack of sufficient overlap between the unemployment and wage variables (see Table 3, we proceed in two steps. First, we will estimate equation (5) with the unemployment variable only, hence omitting the wage variable. Under the assumption that

$$Cov(U_{ce}, \ln w_{ce} | Z_{ce}, \mu_c, \zeta_e) = 0$$

, OLS still gives a consistent estimate of β. We indeed find that the residuals of unemployment and wages after partialling out country and education fixed-effects are uncorrelated as illustrated in Figure 14. We can then, on the smaller set of countries where we have both wages and unemployment data by education categories, see whether our results are robust to the inclusion of the wage variable.

Table 4 reports the result of the regression. Since the left-hand side of the equation is the logarithm of the number of Daesh recruits, it is only defined when such number is strictly positive. We end up with a sample of 44 countries and a regression that consists of 105 observations. Cells that do not have at least one foreign recruit are thus dropped from the regressions. We henceforth apply Moulton's parametric correction to re-compute the standard errors (Moulton 1986). Column 1 displays the bivariate relationship and does not show any correlation between unemployment and cohort size. When controlling for the size of the labor force at the country-education level and country-level characteristics such as distance to Syria, its wealth, population size or Muslim population size, and some measures of the quality of its institutions, we do not find any correlation between unemployment and Daesh enrollment either (column 2). Similarly, column 3 adds country fixed-effects and education dummies, and the relationship between unemployment and enrollment remains flat.

The lack of an association between economic opportunities and enrollment might hide significant heterogeneity across countries. As indicated earlier, the physical cost of joining Daesh differs across country; for far-away countries, radicalized individuals might prefer local activism rather than traveling all the way to Syria and Iraq. We just expect the elasticity of enrollment with respect to unemployment to be heterogeneous. In column 4, we explore whether the effect of unemploy-

ment on ISIL enrollment differs by education levels and whether a country is far or close to Syria. We indeed find that countries bordering Syria, the elasticity is almost unity (and significant at the 5 percent level), and that it decreases as one moves further away from the Levant. In column 5, we test whether the effect of distance on the elasticity is actual distance or is instead driven by country characteristics such as wealth, population, and institutions that are also correlated with a country's distance to Syria. We find this not to be the case as controlling for these interactions, the interaction term with distance is unaffected – or slightly larger – and so is the main effect. As discussed earlier, an important omitted variable in the regressions presented so far is wage levels. To the extent that wages are correlated with unemployment (Blanchflower and Oswald 1994), OLS would produce biased coefficients. In column 6, we add wages (log) as additional regressors. While the coefficient on the wage variable itself is not significant, the impact of unemployment on Daesh enrollment remains similar. The differences between column 4 and 6 are mostly due to changes in the underlying sample given that the availability of country*education level variables on wages limits the number of observations at hand. Nonetheless, when running the same specification as 4 on the restricted sample yields almost identical estimates (see column 7). Finally, in column 8, we use an alternative wage variable that takes the median value of wages for males aged 18-36, which is the appropriate comparison group for ISIL foreign recruits. Here again, the results are consistent with column 4 and 6.

In Table 5, we tackle the issue of selection. Our main specification sample is mechanically censored at 0 fighters. In column 1, we use only countries with more than 33 recruits overall. This threshold is the lowest country-level threshold such that no country-education cell is empty. Because this cutoff is applied at the country level, rather than the country-education level, and because we have country fixed-effects mitigate, bias cannot arise from that censoring. This restriction, however, lowers the number of countries under consideration to 12 and the total number of observations to 36. The result is displayed in column 1, which runs the same specification as Table 4 column 4 does. The results are in line with the ones shown in Table 4 column 4: the effect of unemployment is slightly lower (the point estimate is equal to .8) but highly statistically significant, and so is the interaction between unemployment and distance.

We also decrease the cutoff by restricting to countries that have at least 10 Daesh recruits. This increases the sample to 28 countries. Column 2 shows results consistent with earlier findings. In column 3, we instead consider countries that have at least one fighter with any of the three education levels being considered. This selection leads to a regression based on 25 countries.

Once again, the results seem not to depend on the inclusion criteria.

In columns 4-6, we look at additional sources of heterogeneity. For the sake of clarity, instead of interacting independent variables, we cut the sample along several dimensions. In column 4, we restrict to countries with a majority of Muslims and find similar patterns for that sample, which now consists of 21 countries. A similar results holds if we instead restrict to countries such that Muslims account for at least 1 percent of their entire population. There are 41 such countries in our sample (results unreported). Finally, it could be argued that the drivers are likely different between OECD and non-OECD countries. One reason might be that social safety nets more prevalent in OECD countries might mitigate the effect on unemployment. Columns 5 and 6 show the regression results for OECD and non-OECD countries, respectively. In the former group, which comprises 40 countries, we indeed do not find the overall patterns found for the entire sample. Unemployment does not seem to have any explanatory power: the coefficient of the main effect is both smaller (and the sign flips) and is measured with a lot of noise. Column 5 seems to suggest that non-OECD countries (65 countries in our sample) are driving the effect documented in Table 4.

3.4 A look at the extensive margin

Our main analysis above looks at the intensive margin of Daesh recruitment. We focus on variation in foreign cohort sizes conditional on the number of fighters of a given education level and from a given country being positive. In this section, we look at country characteristics that explain why some countries might send more or less fighters *overall*. This exercise is in all respect similar to earlier analyses (Abadie 2006, Krueger and Malečková 2003, Krueger and Laitin 2008). In particular, this section can be viewed as a replication of Benmelech and Klor (2016), who similarly look at the extensive margin of Daesh recruitment across countries. Their analysis differs from the one conducted here only by the source of the data used. We use a sub-sample of actual Daesh administrative data, while Benmelech and Klor (2016) rely on expert opinions.

Table 6 reports the results of the extensive margin analysis. The outcome is a dummy variable that takes value 1 if country c provides at least 1 foreign recruit to Daesh and 0 otherwise. Our right-hand side variables include a set of socio-economic characteristics (unemployment, per capita GDP, population, Muslim population), indices of institutional quality (corruption index, political rights), as well as some Gallup poll measures of religious freedom. All regressions include a set of regional variables where a region is a set of countries as defined by the World Bank.

In the annex, Table 2 shows descriptive statistics for the variables used for the analysis. The results shown in each of the 6 columns in Table 6 differ by the independent variables used in the regressions. Overall, some patterns are robust across all specifications. First, as expected, the proportion of Muslims in a given country is a positive predictor of the probability a country sends a Daesh recruit to Iraq or Syria. Moreover, although weak, a country's wealth – whether measured by its per capita GDP or using the Human Development Index in column 2 – is *positively* correlated with the likelihood of being the country of origin of a Daesh recruit. We also find, like other studies earlier, that political rights are negatively associated with Daesh participation (columns 3-6); note that a larger Political Rights index indicates worse conditions. Finally and worth noting since it is a newly constructed variable, columns 5-6 points at interesting patterns, the underlying mechanisms of which deserve to be further analyzed with micro data: when more individuals in a country report that religion takes a large place in their life, such country is *less* likely to be the origin of a Daesh recruit. The coefficient is however measured with too much noise to offer a conclusive verdict. However, if we turn to a variable measuring the extent of government regulation of religion, column 6 suggests that heavier government involvement is associated with a higher probability of sending an ISIL recruit.

Our cross-sectional results are broadly consistent with earlier results in the literature (Abadie 2004, Krueger and Malečková 2003) and especially the more recent Benmelech and Klor (2016) who use a different dataset of Daesh recruits and nonetheless find similar patterns of significance among the independent variables.

4 Conclusion

We use a unique dataset on the Islamic State Group's human resources that provide information on the organization's foreign recruits. Beyond information on the country of origin for each individual, it also records self-reported education information. That unique feature allows constructing a disaggregated dataset measuring Daesh foreign cohort sizes by country of origin and level of education. The analysis can then go a step further compared to previous work in that we can look at the effect of unemployment on Daesh enrollment both *between* and *within* countries. Our findings suggest that the lack of economic opportunities seem to be a driver of youth radicalization. Yet, this does not necessarily imply that financial incentives play a direct role in individuals' choices to join the terrorist organization. First, we do not have information on the recruits own labor market

participation status prior to joining so to distinguish individual versus national circumstances, but more importantly, when economic opportunities, social inclusion, and identity go hand in hand, both extrinsic and intrinsic motives are at play.

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A Figures

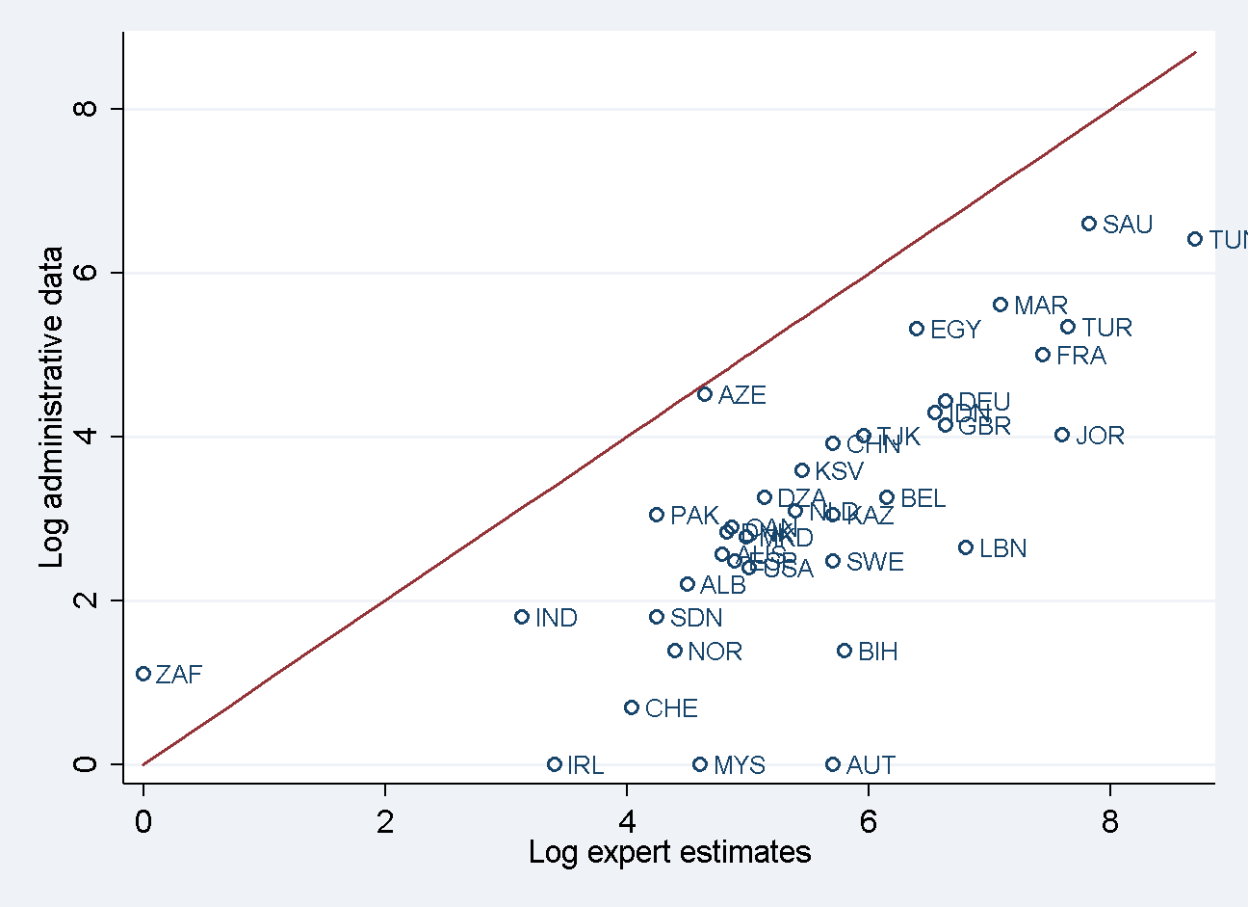

Figure 1: Comparison between leaked data and expert opinions

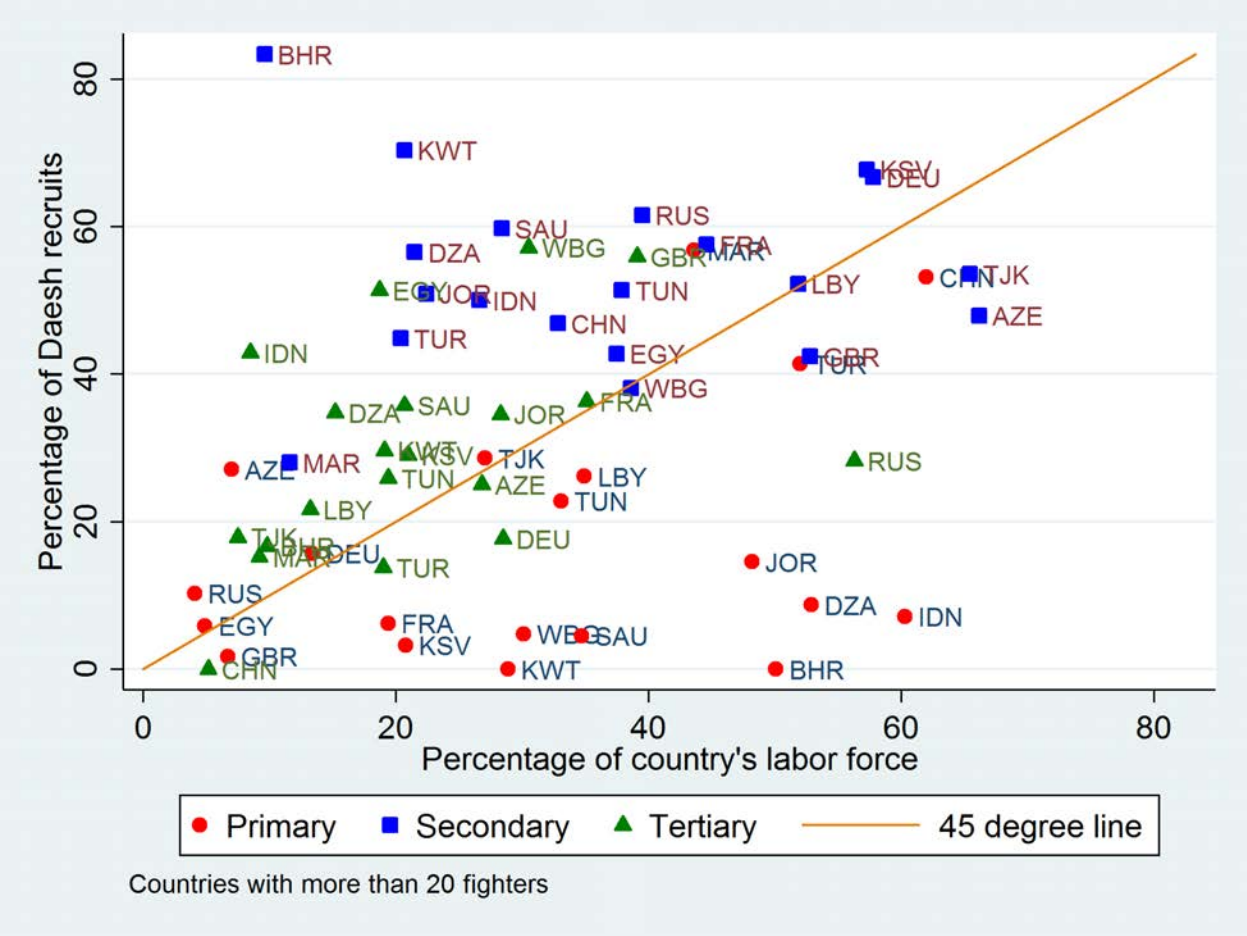

Figure 2: Schooling attainment among Daesh recruits relative their country of origin

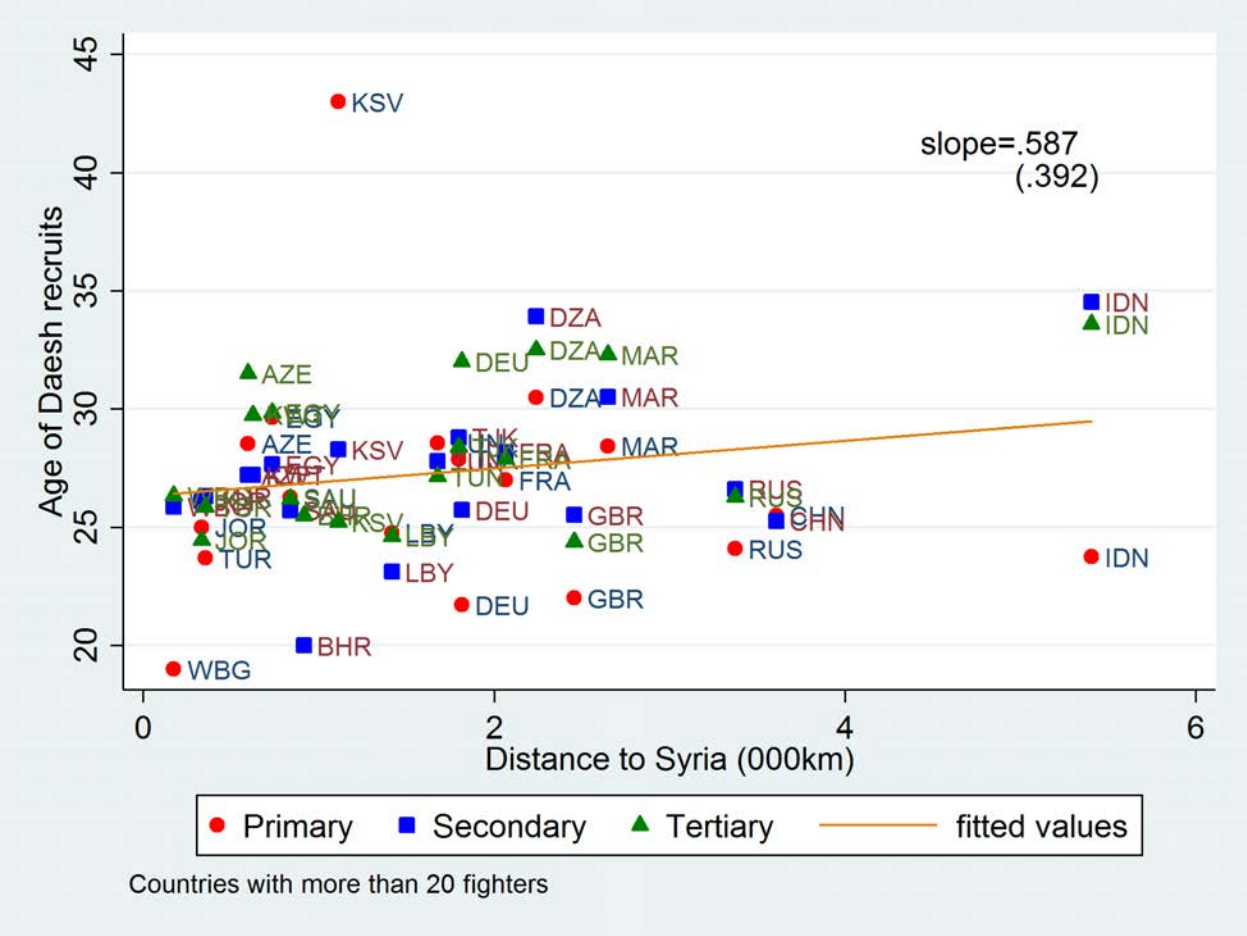

Figure 3: Average age of Daesh recruits by country and schooling level

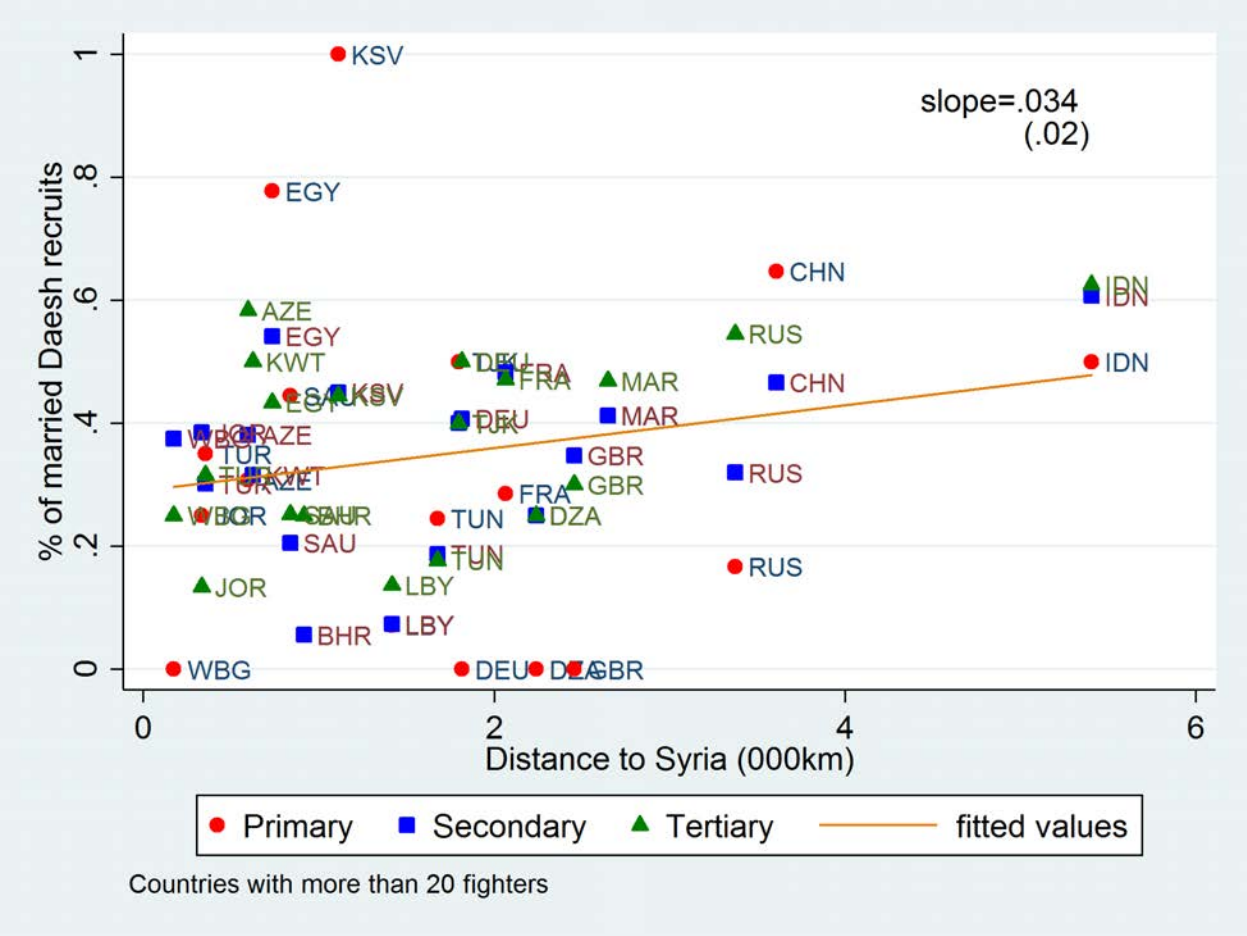

Figure 4: Marital status of Daesh recruits by country and schooling level

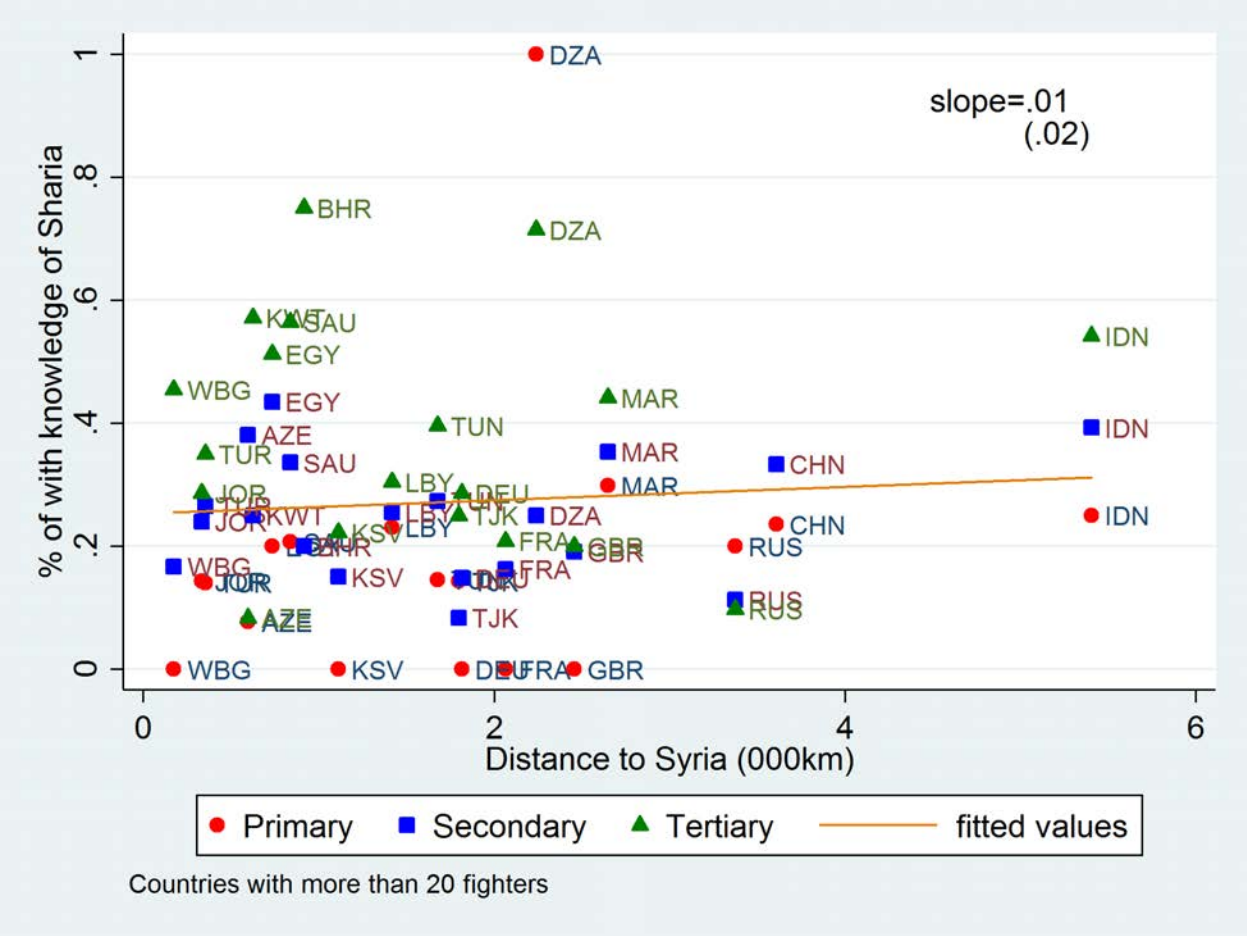

Figure 5: Religious knowledge of Daesh recruits by country and schooling level

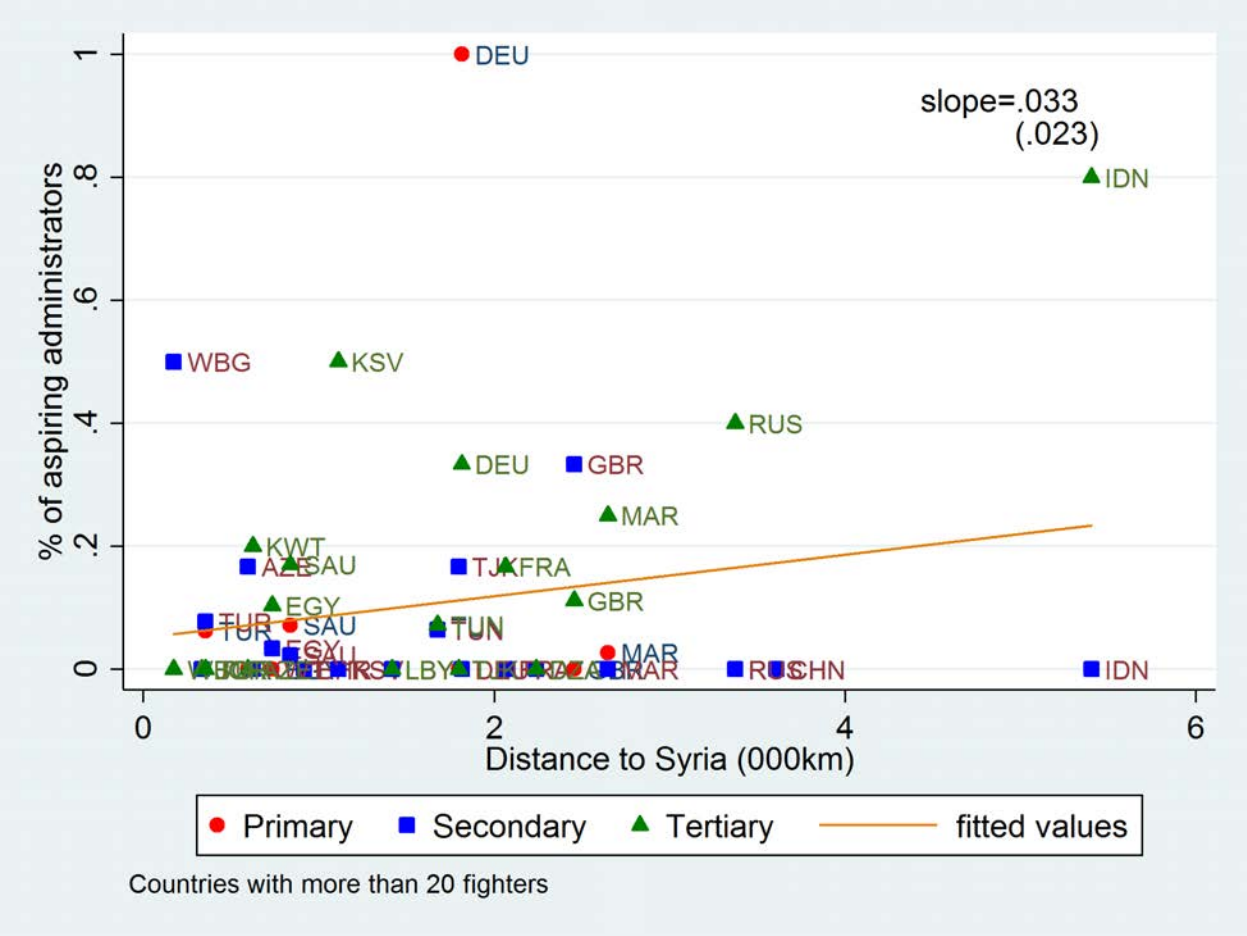

Figure 6: Aspirations reported by Daesh recruits - Administrator

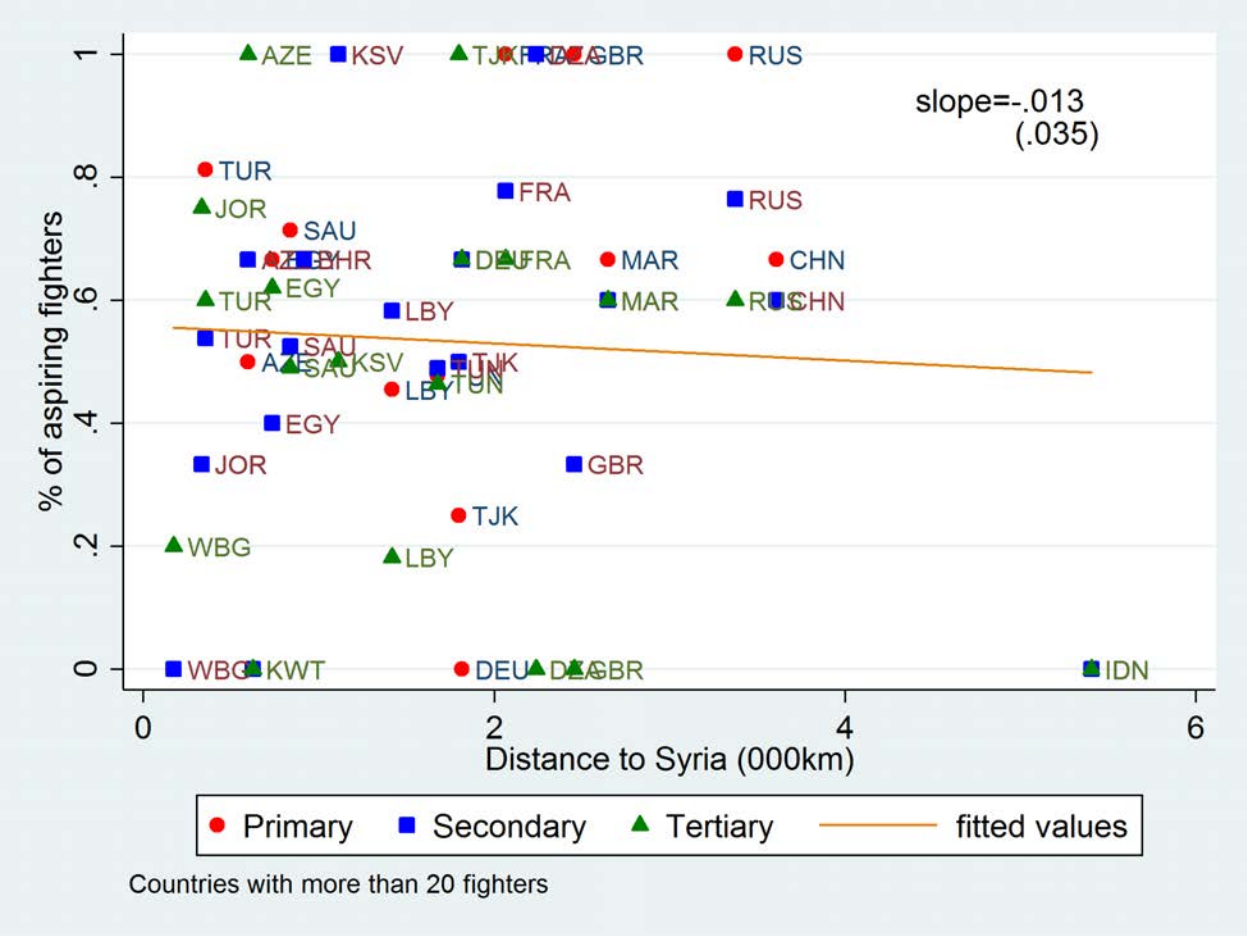

Figure 7: Aspirations reported by Daesh recruits - Fighter

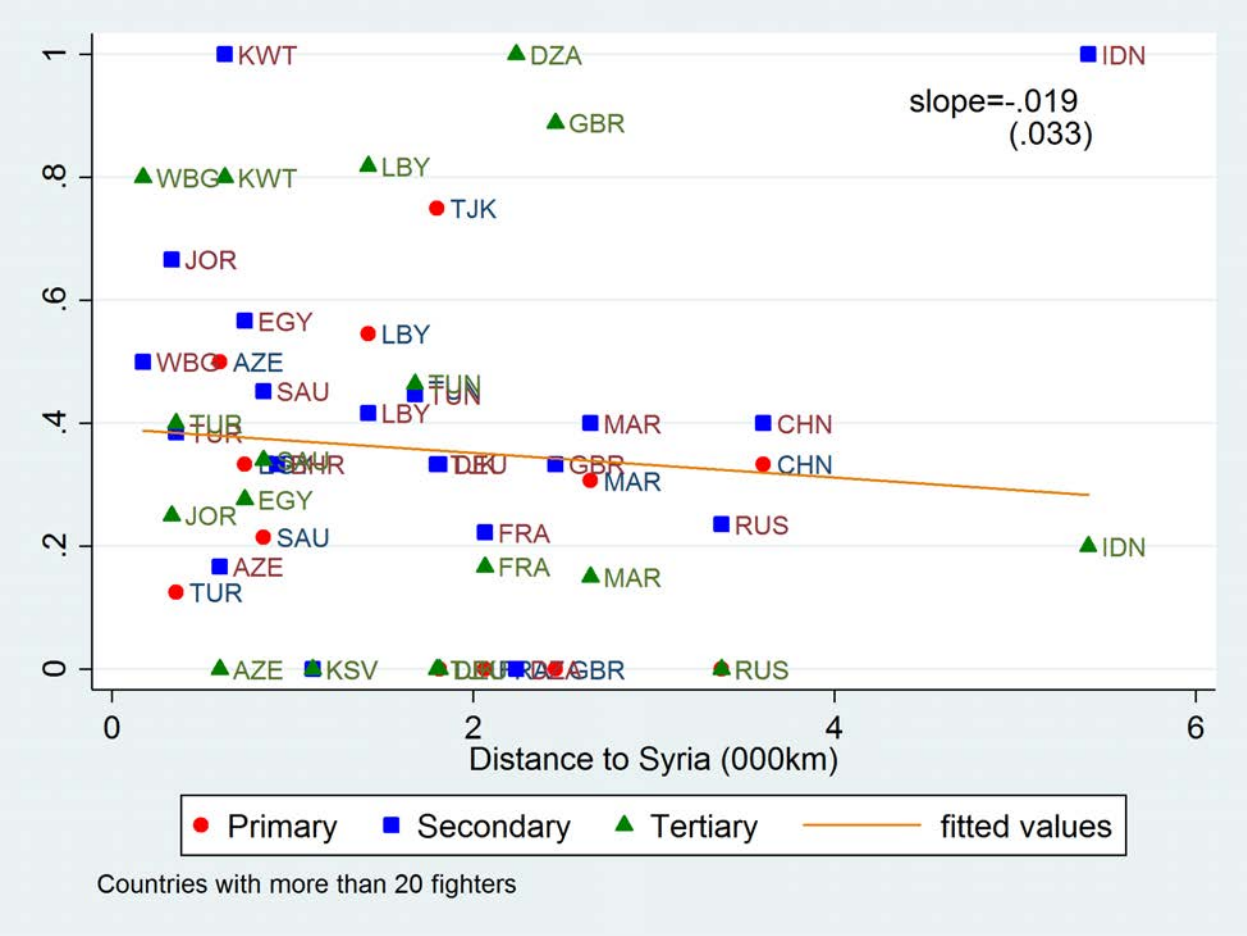

Figure 8: Aspirations reported by Daesh recruits- Suicide fighter

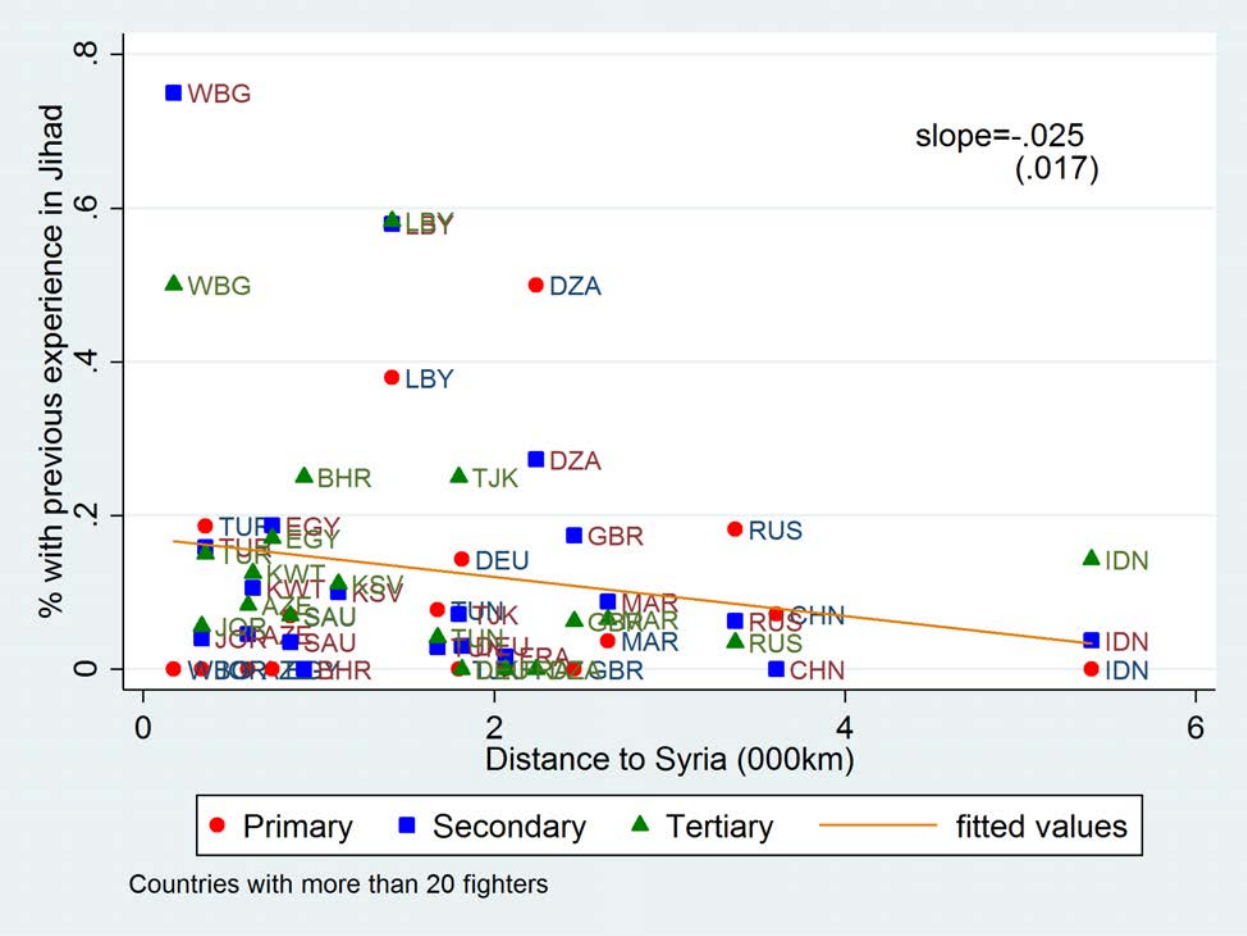

Figure 9: Fraction of recruits who have previously been involved in Jihad

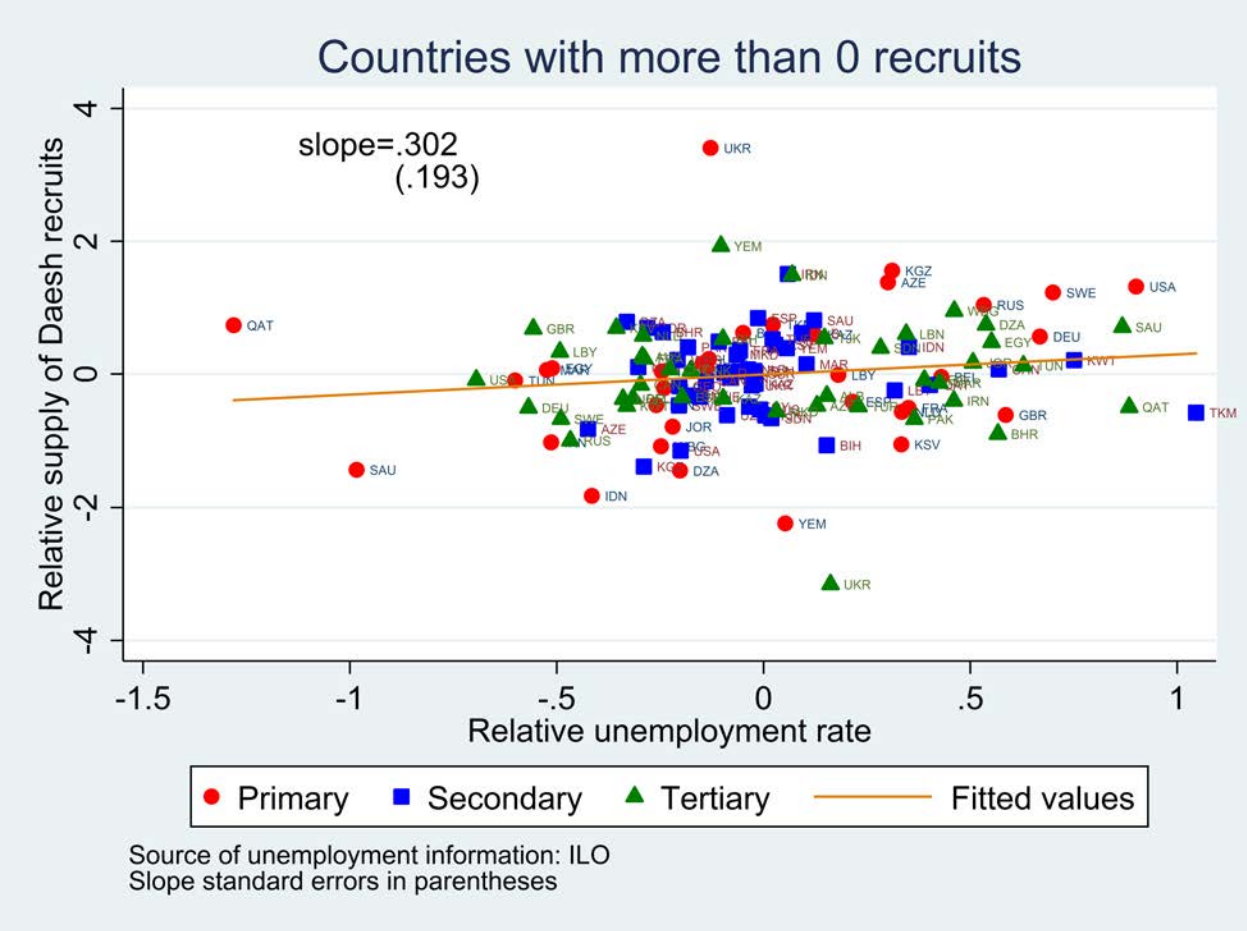

Figure 10: Relative supply of Daesh recruits and relative unemployment rate

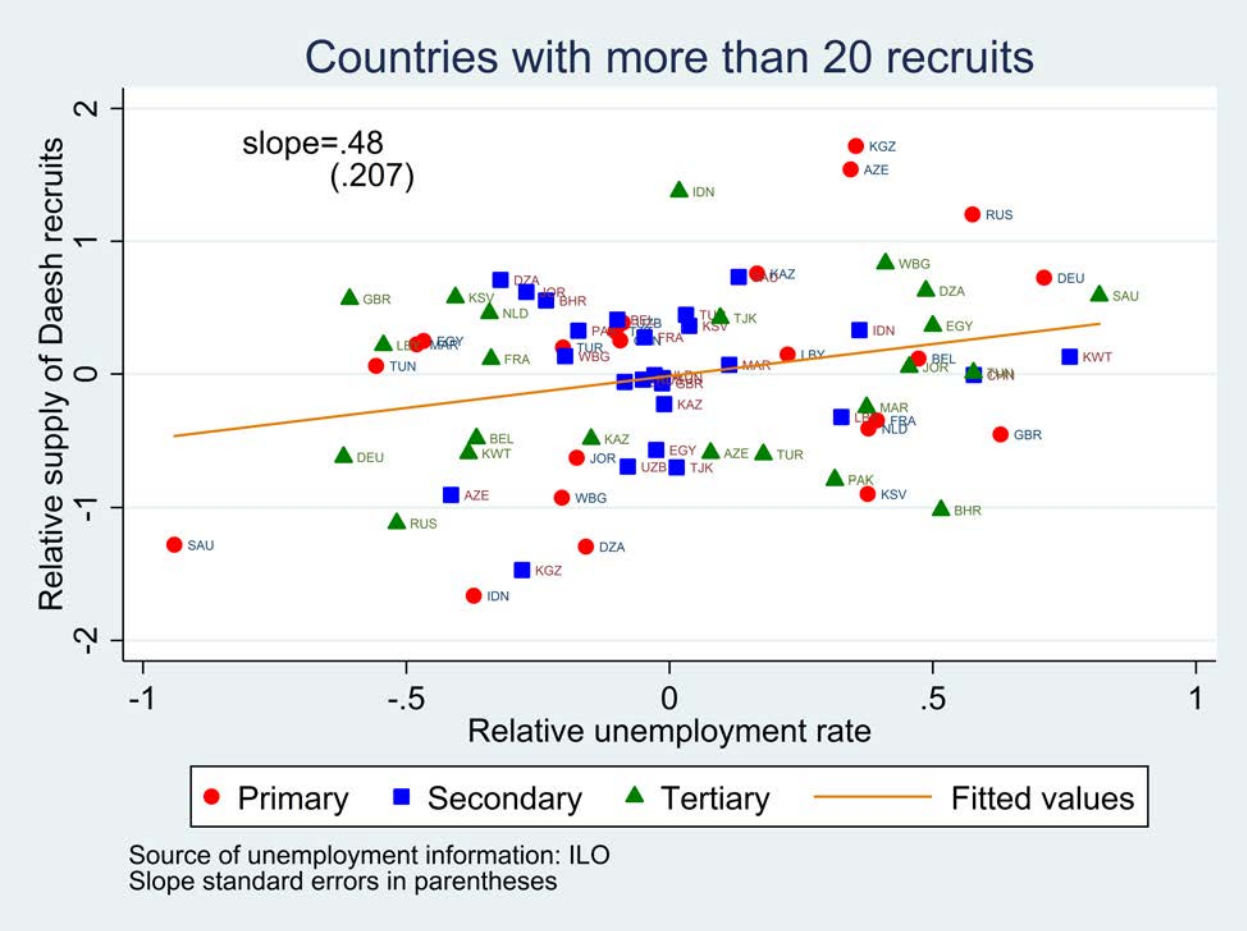

Figure 11: Relative supply of Daesh recruits and relative unemployment rate

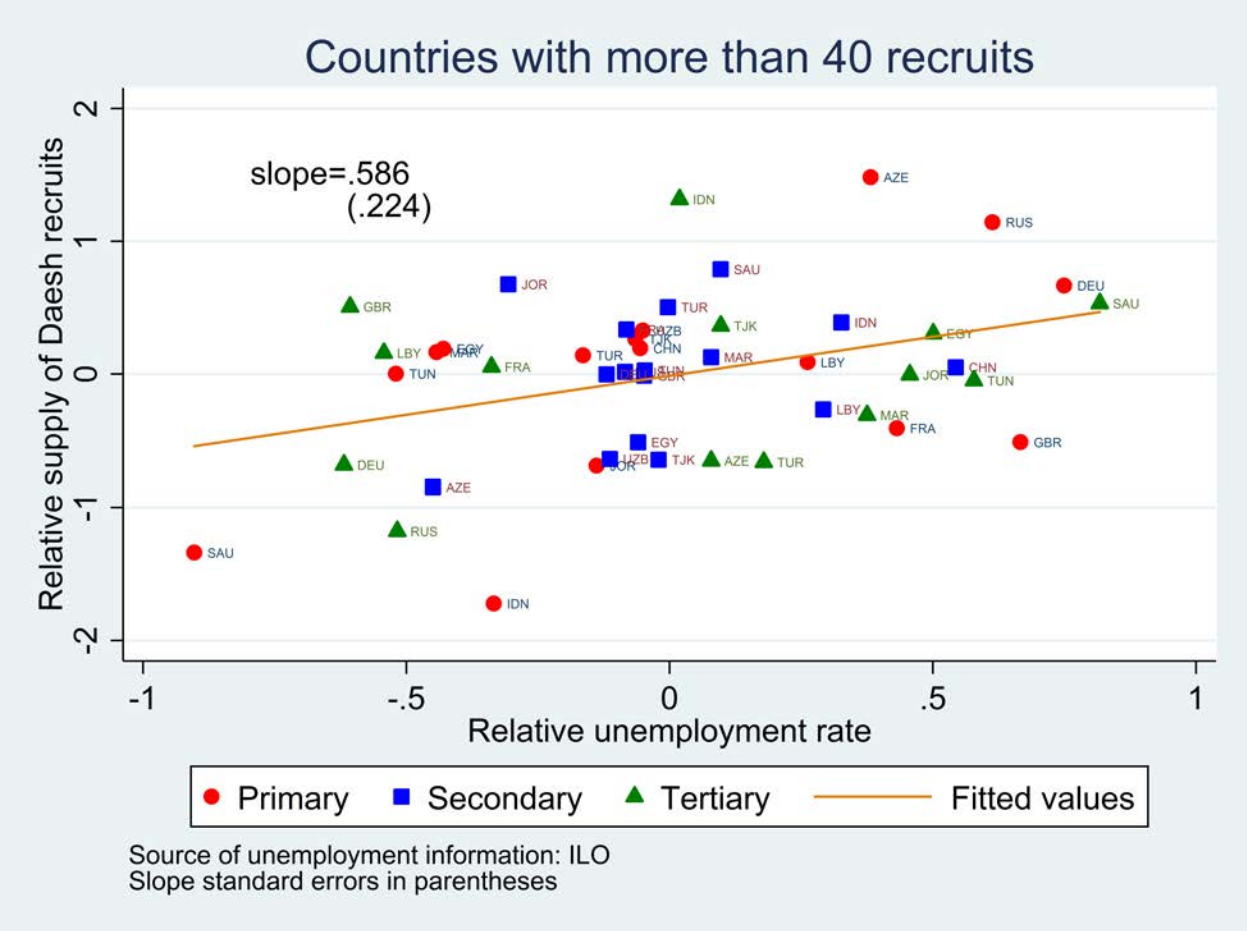

Figure 12: Relative supply of Daesh recruits and relative unemployment rate

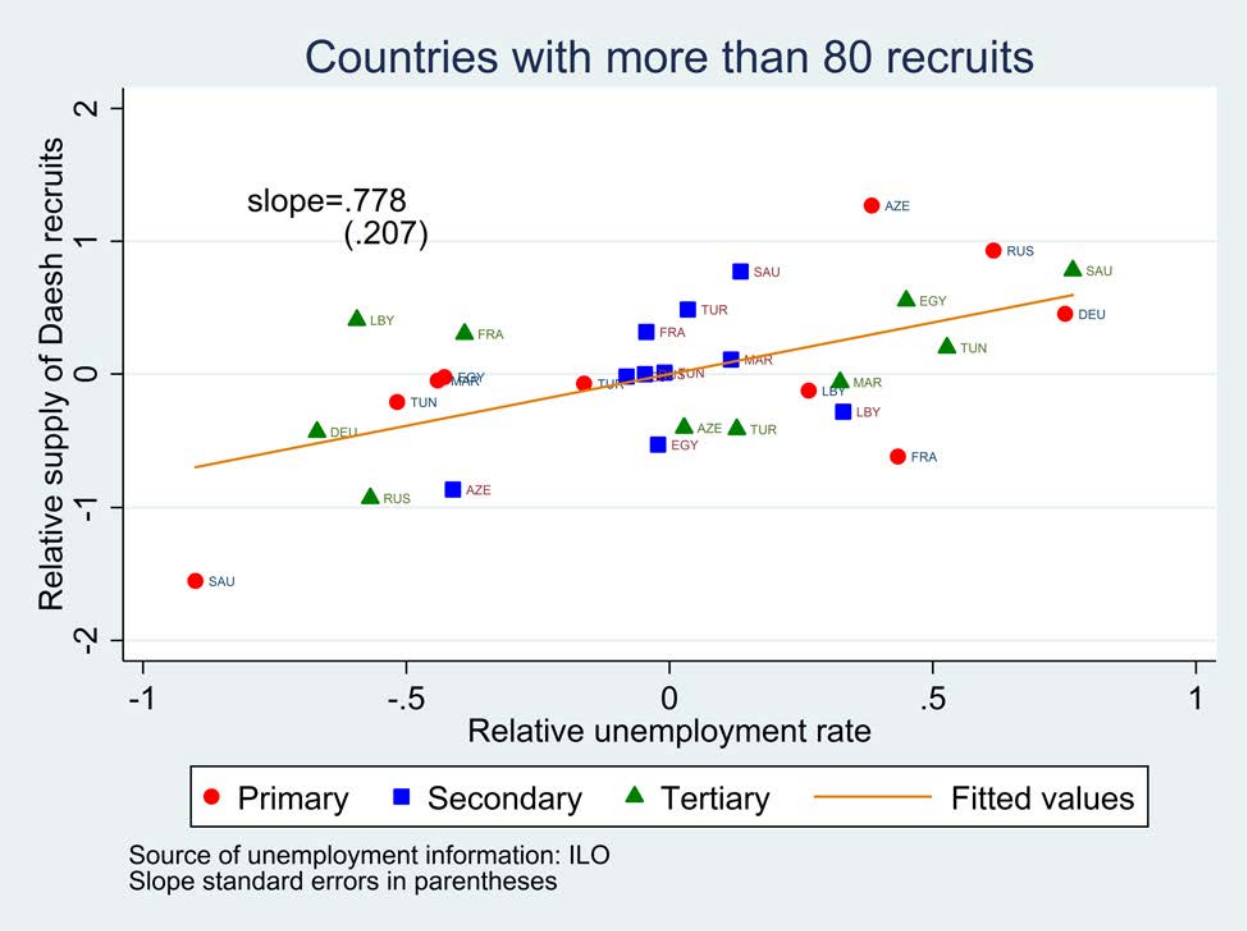

Figure 13: Relative supply of Daesh recruits and relative unemployment rate

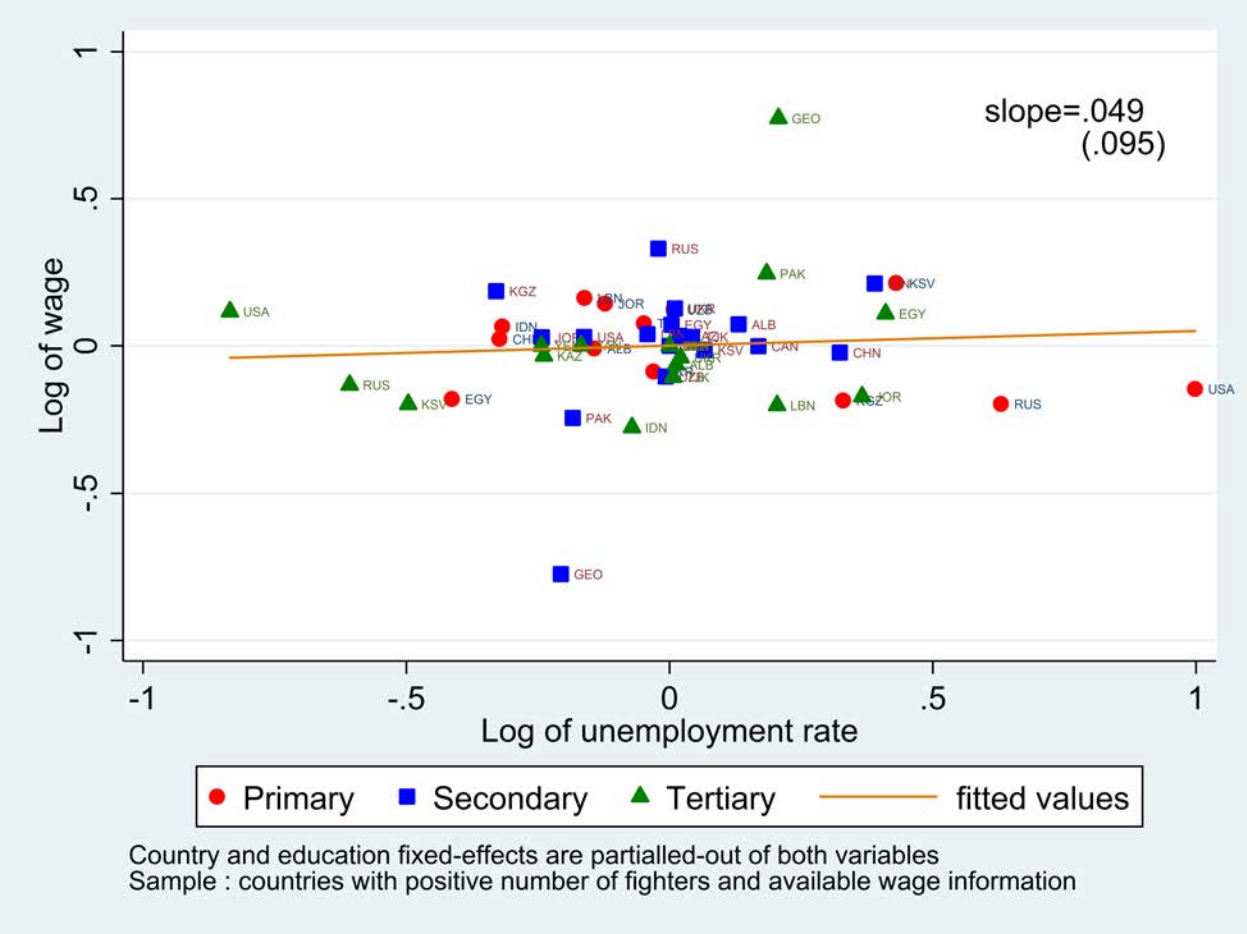

Figure 14: Wage vs. unemployment correlation

B Tables

Table 1: Fighters by country

Country of Residence	Number	Percentage	Number of recruits/million Muslims
Saudi Arabia	717	21	28
Tunisia	605	18	54
Morocco	269	8	8
Turkey	205	6	3
Egypt	201	6	3
Russia	170	5	18
France	151	4	30
Libya	121	4	19
Azerbaijan	92	3	11
Germany	84	2	53
Indonesia	74	2	0
United Kingdom	62	2	20
Jordan	56	2	9
Tajikistan	55	2	8
Uzbekistan	41	1	2
Kyrgyzstan	37	1	8
Kosovo	36	1	23
Kuwait	34	1	13
Algeria	26	1	1
Belgium	26	1	40
Bahrain	24	1	28
Netherlands	22	1	27
Kazakhstan	21	1	2
Pakistan	21	1	0
Palestine	20	1	5
Canada	20	1	17
China	18	1	1
Denmark	17	1	74
Macedonia	16	0	32
Yemen	16	0	1
Lebanon	14	0	6
Iran, Islamic Rep. of	13	0	0
Australia	13	0	27
Sweden	12	0	27
Spain	12	0	6
United States	11	0	4

Country of Residence	Number	Percentage	Number of recruits/million Muslims
Albania	9	0	5
Qatar	9	0	8
Sudan	6	0	0
Turkmenistan	5	0	1
India	5		0
Norway	4	0	25
Bosnia	4	0	2
Ukraine	3	0	8
Trinidad	3	0	39
South Africa	3	0	5
Kenya	3	0	1
Georgia	3	0	7
Cameroon	2	0	0
Switzerland	2	0	5
Somalia	1	0	0
Serbia	1	0	4
Poland	1	0	50
Mauritania	1	0	0
Malaysia	1	0	0
Ireland	1	0	14
Bulgaria	1	0	1733
Austria	1	0	2
Afghanistan	1	0	0

[a] Percentages rounded up to the closest integer

Table 2: Descriptive Statistics and Correlations for Variables

Panel A: Descriptive Statistics Country level

Variable	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**N**
Total Labor force (log)	15.401	1.565	11.916	20.502	163
Distance to Syria (log)	7.811	0.816	5.163	9.213	168
Per capita GDP (log)	8.597	1.526	5.558	11.642	164
Muslim population (log)	1.046	1.312	0.001	5.327	166
Total population (log)	2.57	1.351	0.28	7.214	165
Index of political rights	3.543	2.124	1	7	162
Corruption Index	41.79	19.725	8	91	162
Average religiosity(self-reported)	0.743	0.244	0.142	0.998	162
Government Restrictions Index	3.352	2.199	0.2	9.1	164
Social Hostilities Index	2.659	2.494	0	9	164

Panel A: Descriptive Statistics Country-Education level

Variable	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**N**
Relative wage	0.70	0.54	0	5.20	229
Relative unemployment rate	1.21	0.96	0	9.33	308

[1] Footnote : Wage and unemployment rate are relative to tertiary education level values.

Table 3: Wages, Unemployment and ISIS fighters data

	Wages	Unemployment	ISIS fighters
AFG	□	■	■
ALB	■	■	■
ARM	■	■	□
AUS	□	□	■
AUT	□	□	■
AZE	□	■	■
BEL	□	□	■
BEN	■	■	□
BFA	■	■	□
BGD	■	■	□
BGR	□	□	■
BHR	□	□	■
BHS	■	■	□
BIH	□	■	■
BWA	■	■	□
CAF	■	■	□
CAN	■	■	■
CHE	□	□	■
CHL	■	■	□
CHN	■	■	■
CIV	■	■	□
CMR	■	■	■
COM	■	■	□
DEU	□	□	■
DJI	■	■	□
DNK	□	□	■
DZA	□	□	■
EGY	■	■	■
ESP	□	□	■
ETH	■	■	□
FRA	□	□	■
FSM	■	■	□
GAB	■	■	□
GBR	□	□	■
GEO	■	■	■
GHA	■	■	□
GIN	■	■	□
GMB	■	■	□
IDN	■	■	■
IND	■	■	■
IRL	□	□	■
IRN	□	■	■
IRQ	■	■	■
JOR	■	■	■
KAZ	■	■	■
KEN	■	■	■
KGZ	■	■	■
KHM	■	■	□
KSV	■	■	□
KWT	□	□	■
LAO	■	■	□
LBN	■	□	■
LBR	■	■	□
LBY	□	□	■
LKA	■	■	□
MAR	□	■	■
MDG	■	■	□
MDV	■	■	□
MKD	□	■	■
MLI	■	■	□
MNE	■	■	□
MOZ	■	■	□
MRT	■	■	■
MUS	■	■	□
MWI	■	■	□
MYS	□	□	■
NER	■	■	□
NGA	■	■	□
NLD	□	□	■
NOR	□	□	■
NPL	■	■	□
PAK	■	■	■
PHL	■	■	□
PNG	■	■	□
POL	□	□	■
PRI	■	■	□
PSE	□	□	■
QAT	□	□	■
RUS	■	■	■
RWA	■	■	□
SAU	□	□	■
SDN	□	■	■
SEN	■	■	□
SLE	■	■	□
SOM	□	□	■
SRB	■	■	■
STP	■	■	□
SWE	□	□	■
SYC	■	■	□
SYR	■	■	■
TCD	■	■	□
TGO	■	■	□
THA	■	■	□
TJK	■	■	■
TKM	□	□	■
TMP	■	■	□
TTO	■	■	■
TUN	□	■	■
TUR	□	■	■
TZA	■	■	□
UGA	■	■	□
UKR	■	■	■
UNK	□	□	■
URY	■	■	□
USA	■	■	■
UZB	■	■	■
VNM	■	■	□
YEM	■	■	■
ZAF	■	■	■
ZAR	■	■	□
ZWE	■	■	□

Table 4: Impact of unemployment on supply of foreign fighters to Daesh (All countries)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	$logN_{ce}$	$logN_{ce}$	$logN_{ce}$	$logN_{ce}$	$logN_{ce}$	$logN_{ce}$	$logN_{ce}$	$logN_{ce}$
Unemployment rate	-0.024	0.001	0.000	0.803***	0.583	0.782*	0.782*	0.812*
	(0.016)	(0.020)	(0.024)	(0.150)	(0.385)	(0.401)	(0.378)	(0.399)
Total Labor force(log)		0.243*	0.083	-0.038	-0.003	-0.083	-0.082	-0.066
		(0.138)	(0.122)	(0.088)	(0.096)	(0.118)	(0.108)	(0.114)
Distance to Syria (log)		-0.066						
		(0.252)						
Per capita GDP (log)		0.026						
		(0.273)						
Muslim population (log)		0.482**						
		(0.199)						
Total population (log)		-0.226						
		(0.214)						
Index of political rights		0.345**						
		(0.154)						
Corruption Index		0.030*						
		(0.016)						
Median wage (log)						0.003		
						(0.485)		
Median wage among 18-36 old (log)								-0.192
								(0.263)
Interaction between Unemployment and								
Secondary education				-0.008	-0.033	-0.034	-0.034	-0.019
				(0.028)	(0.020)	(0.087)	(0.081)	(0.085)
Tertiary education				-0.041	-0.071**	-0.153	-0.153*	-0.130
				(0.026)	(0.027)	(0.088)	(0.079)	(0.080)
Distance to Syria (log)				-0.107***	-0.074	-0.090*	-0.090*	-0.095*
				(0.020)	(0.051)	(0.048)	(0.046)	(0.048)
Per capita GDP (log)					-0.012			
					(0.043)			
Muslim population (log)					0.004			
					(0.033)			
Total population (log)					-0.001			
					(0.030)			
Index of political rights					0.025			
					(0.022)			
Corruption Index					0.001			
					(0.003)			
Observations	114	102	105	105	102	28	28	29
Country FE	N	N	Y	Y	Y	Y	Y	Y
Number of countries	47	43	44	44	43	12	12	12
Education Dummies	N	N	Y	Y	Y	Y	Y	Y
Adj. R-squared	-0.004	0.263	0.801	0.835	0.832	0.723	0.754	0.717

Note: Standard errors in parentheses, clustered at the country level and corrected for small number of clusters (<40) using Moulton correction factor. ***, **, and * indicate statistical significance at the 1, 5, and 10 percent level, respectively. Column 6,7 and 8 include only those countries for which data on wages, unemployment and at least one Daesh fighter was available.

Table 5: Robustness checks

VARIABLES	(1) $logN_{ce}$	(2) $logN_{ce}$	(3) $logN_{ce}$	(4) $logN_{ce}$	(5) $logN_{ce}$	(6) $logN_{ce}$
Country-education level variable						
	(0.445)	(0.247)	(0.238)	(0.305)	(0.617)	(0.256)
Unemployment rate	1.090**	0.717***	0.734***	0.683**	-0.082	0.808***
	(0.445)	(0.247)	(0.238)	(0.305)	(0.617)	(0.256)
Total Labor force(log)	0.072	0.051	-0.009	-0.017	0.555	-0.064
	(0.244)	(0.157)	(0.112)	(0.195)	(0.487)	(0.113)
Interaction between Unemployment and						
Secondary education	-0.080	0.011	-0.011	-0.028	0.045	-0.022
	(0.093)	(0.035)	(0.030)	(0.041)	(0.070)	(0.036)
Tertiary education	-0.031	-0.032	-0.031	-0.029	-0.031	-0.046
	(0.082)	(0.035)	(0.032)	(0.043)	(0.108)	(0.038)
Distance to Syria (log)	-0.148**	-0.096***	-0.099***	-0.087**	0.010	-0.105***
	(0.059)	(0.033)	(0.032)	(0.042)	(0.084)	(0.035)
Observations	36	76	75	55	40	65
Country FE	Y	Y	Y	Y	Y	Y
Number of countries	12	28	25	21	17	27
Education Dummies	Y	Y	Y	Y	Y	Y
Adj. R-squared	0.716	0.796	0.834	0.832	0.733	0.859
Sample	All countries w/ $N_c > 33$	All countries w/ $N_c > 10$	All countries w/ atleast 1 nonempty cell	Muslim majority	OECD	Non-OECD

Note: Standard errors in parentheses, clustered at the country level and corrected for small number of clusters (<40) using Moulton correction factor. ***, **, and * indicate statistical significance at the 1, 5, and 10 percent level, respectively. In column 1, 33 represents the lowest threshold for Daesh fighters ensuring that all countries above it have fighters of all three schooling levels.

Table 6: Impact of unemployment on supply of fighters to Daesh, extensive margin

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Daesh dummy	Daesh dummy	Daesh dummy	Daesh dummy	Daesh dummy	Daesh dummy
Total population (log)	0.043	0.042	0.023	0.040	0.033	0.037
	(0.029)	(0.029)	(0.032)	(0.030)	(0.032)	(0.035)
Muslim population (log)	0.142***	0.138***	0.157***	0.145***	0.146***	0.118***
	(0.034)	(0.035)	(0.040)	(0.035)	(0.036)	(0.038)
Unemployment rate	0.919*	0.857	0.905	0.996*	0.980*	1.020*
	(0.505)	(0.555)	(0.581)	(0.559)	(0.557)	(0.541)
Distance to Syria (log)	0.034	0.043	0.045	0.024	0.027	0.049
	(0.066)	(0.065)	(0.075)	(0.072)	(0.072)	(0.075)
Per capita GDP (log)	0.055**		0.077**	0.066*	0.068*	0.064
	(0.028)		(0.031)	(0.034)	(0.041)	(0.040)
Human Development Index		0.549*				
		(0.280)				
Index of political rights			0.027	0.036*	0.038*	0.004
			(0.017)	(0.020)	(0.021)	(0.026)
Ethnic fractionalization			0.351*			
			(0.187)			
Linguistic fractionalization			-0.271			
			(0.194)			
Religious fractionalization			0.232			
			(0.152)			
Corruption Index				0.002	0.002	0.001
				(0.003)	(0.003)	(0.004)
Average religiosity(self-reported)					-0.180	-0.178
					(0.194)	(0.192)
Government Restrictions Index						0.054**
						(0.024)
Social Hostilities Index						-0.011
						(0.022)
Observations	162	159	149	157	151	151
Adjusted R-squared	0.451	0.452	0.451	0.449	0.448	0.458
Region FE	Y	Y	Y	Y	Y	Y

Note: Heteroskedasticity robust standard errors in parentheses. ***, **, and * indicate statistical significance at the 1, 5, and 10 percent level, respectively.

C Data sources

Time Frame - All variables are from the year 2013 unless otherwise noted. If there was a missing value for the year 2013, we replace it with the closest year available.

- **Country-education level Variables**

  $LogN_{ce}$ Log of number of fighters to Daesh from country c by education categories: No education/Primary, Secondary and Tertiary level. Authors calculation. Year: 2013-2014. Source: Daesh fighter database

  Unemployment rate Number of unemployed persons as a percentage of the total number of persons in the labour force by education categories: No education/Primary, Secondary and Tertiary level. Education categories are based on the International Standard Classification of Education (ISCED). Source: ILOSTAT

  Total Labor force (log) Log of sum of the number of persons employed and the number of persons unemployed. Source: ILOSTAT

- **Country level Variables**

  Distance to Syria (log) Log of air (flying) distance between centroid of a country and centroid of Syria in miles. Source: DistanceCalculator.net

  Per capita GDP (log) Log of Gross Domestic Product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars. Source: The World Bank Database

  Muslim Population (log) Log of Muslim population in a country divided by (1000000+1). Year: 2010. Source: Pew Research Center's Forum on Religion and Public Life. The future of global Muslim population, January 2011.

  Total Population (log) Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. The values are midyear estimates and are logged. Year: 2014. Source: The World Bank Database

  Human Development Index

Index of political rights Political rights enable people to participate freely in the political process, including the right to vote freely for distinct alternatives in legitimate elections, compete for public office, join political parties and organizations, and elect representatives who have a decisive impact on public policies and are accountable to the electorate. The specific list of rights considered varies over the years. Countries are graded between 1 (most free) and 7 (least free). Source: Freedom House

Corruption Index The corruption perception index focuses on corruption in the public sector and defines corruption as the abuse of public office for private gain. The surveys used in compiling the CPI tend to ask questions in line with the misuse of public power for private benefit, with a focus, for example, on bribe-taking by public officials in public procurement. The sources do not distinguish between administrative and political corruption. The CPI Score relates to perceptions of the degree of corruption as seen by business people, risk analysts and the general public and ranges between 100 (highly clean) and 0 (highly corrupt). Source: Transparency International

Ethnic fractionalization Probability that two randomly selected people from a given country will not share a certain ethnicity, the higher the number the less probability of the two sharing that ethnicity. The definition of ethnicity involves a combination of racial and linguistic characteristics. The higher the number, the more fractionalized society. Source: (Alesina, Devleeschauwer, Easterly, Kurlat and Wacziarg 2003)

Linguistic fractionalization Reflects probability that two randomly selected people from a given country will not belong to the same linguistic group. The higher the number, the more fractionalized society. Source: (Alesina et al. 2003)

Religious fractionalization Reflects probability that two randomly selected people from a given country will not belong to the same religious group. The higher the number, the more fractionalized society. Source: (Alesina et al. 2003)

Average religiosity (self-reported) Proportion of people who agree that religion is an important part of their daily life. Source: Gallup World Poll

Government Restrictions Index The Government Restrictions Index (GRI) measures on a 10 point scale - government laws, policies and actions that restrict religious beliefs or practices. The GRI is comprised of 20 measures of restrictions, including efforts by governments to ban particular faiths, prohibit conversions, limit preaching or give preferential treatment to one

or more religious groups. Higher numbers imply more restrictions. Source: Pew Research Center's Global Restrictions on Religion study

Social Hostilities Index The Social Hostilities Index (SHI) measures on a 10 point scale - acts of religious hostility by private individuals, organizations and social groups. This includes mob or sectarian violence, harassment over attire for religious reasons and other religion-related intimidation or abuse. The SHI includes 13 measures of social hostilities. Higher numbers imply more restrictions. Source: Pew Research Center's Global Restrictions on Religion study