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# Population Size, Per Capita Income, and the Risk of Civil War

## Regional Heterogeneity in the Structural Relationship Matters

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**Abstract**

A common finding in the empirical civil war literature is that population size and per capita income are highly significant predictors of civil war incidence and onset. This paper shows that the common finding of population size and per capita income having a significant average effect on civil war risk in a world sample breaks down once country- and year-specific unobservables are accounted for. However, for Sub-Saharan Africa there continues to be a highly significant average effect of population size and per capita income on civil war risk that is robust to the use of country- and year-fixed effects and instrumental variable techniques.

Keywords: population size, per capita income, civil war

JEL classification: O10, O55, P0, Q0



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## 1 Introduction

Civil wars bear an immense welfare cost—they kill and maim millions, displace many millions more, disrupt production, and destroy capital and infrastructure. Fearon and Laitin (2003) estimate that since the end of the Second World War civil wars have caused more than 16.2 million battle casualties. Many more people have been killed or disabled in civil war as a result of strategic violence against the civilian population and the spread of lethal diseases (Ghobarah, Huth and Russeth 2003; Montalvo and Reynal-Querol 2007). Beyond the immense humanitarian suffering, civil wars are a major stumbling block for economic growth—they destroy infrastructure, deter investment, debilitate social networks, and reinforce bad governance (World Bank 2003). Collier and Hoeffler (2004) estimate that seven years of civil war reduce total income between 41 per cent to 305 per cent of initial GDP and Bellows, and Miguel (2006) show that through the adverse effects on political institutions civil wars have potentially long-run implications for economic development.

Are a smaller country population size and/or higher per capita income levels the key to reducing the risk of civil war? Providing a satisfactory answer to this important policy question is unfortunately not easy because simple correlations between civil war, population size, and per capita income levels do not imply that there exists a causal effect of population size and per capita income on civil war. This is because country population size and per capita income are themselves a function of civil war. Moreover, there are many difficult-to-measure variables in the cross-section reflecting cross-country differences in social fragmentation, institutional quality, history, and culture that could easily be related to both civil war, country population size, and the level of per capita income.

This paper shows that indeed the positive relationship between low per capita income, large country population size, and a higher risk of civil war breaks down in a world sample once unobservable cross-country and year-specific heterogeneity is taken into account. Statistically, the implication of this negative result is that the relationship between a higher risk of civil war, a larger country population size, and lower per capita income could be driven entirely by (unobservable) cross-country differences, and thus could be possibly spurious due to neglected cross-country heterogeneity in the quality of (informal) institutions, social fragmentation, history, and/or culture.[1]

From a policy point of view it would be premature, however, to conclude from this negative result that the risk of civil war will not systematically decrease in countries that are at a high risk of suffering from civil war if their country population size decreases or the level of per capita income increases. This is because using in a world sample just the within-country variation in population size, per capita income, and the incidence and onset of civil war ignores the important cross-sectional information that rich OECD countries have not experienced a civil war since the end of the Second World War. While within-country variations in per capita income and population size may well have affected the risk of civil war in low-income regions, it may seem in a world sample as if

1 This resonates with Djankov and Reynal-Querol (2010) who also find that the relationship between civil war and per capita income disappears in a world sample once country-fixed effects are accounted for.

there is no average marginal relationship because rich countries were shielded from the incidence and onset of civil war. Moreover, using just within-country variation in population size, per capita income, and the incidence and onset of civil war, calls for appropriately dealing with the reverse effects of civil war incidence and the onset on the size of the country population and the level of per capita income.[2]

Several papers have shown that exogenous shocks to per capita income and population size do, in fact, significantly increase the risk of civil war incidence and onset in Sub-Saharan Africa (SSA). Miguel, Satyanath, and Sergenti (2004) in their seminal contribution to the civil war literature showed that negative, rainfall-driven income shocks significantly increased the risk of civil war in the Sub-Saharan region during the 1981–99 period. Their main message—that income shocks are a key determinant of African civil war—was recently confirmed by Brückner and Ciccone (2010) who showed that there is also a robust negative relationship between per capita income growth and civil war onset when using international commodity price shocks as instrumental variables for income growth. Extending the instrumental variables framework to deal with the endogeneity of population size to civil war, Brückner (2010) showed that both an increase in the population size as well as adverse shocks to the level of per capita income are significantly associated with a higher risk of civil war in SSA. Thus, instrumental variable regressions that account for unobservable cross-country and year-specific heterogeneity confirmed the link between larger population size, lower per capita income, and a higher risk of civil war, at least for SSA.

An important question that remains to be answered is whether the instrumental variable results are specific to the Sub-Saharan region. Clearly specific to the Sub-Saharan region is the vulnerability of many of these countries to drought and international commodity price shocks. The high poverty rates and lack of public insurance in many SSAn countries imply that slumps in the international prices of exported commodities and drought shocks substantially reduce incomes, and in the case of extremely harsh and long-lasting drought, also the population size.

To answer the question of whether the structural relationship between civil war, per capita income, and population size is different for SSA, I use in this paper a world sample of civil war country-years spanning the period 1945–99 from Fearon and Laitin (2003) to test whether the marginal effect of population size and per capita income on civil war is significantly different for the Sub-Saharan region. My main finding is that indeed the link between larger country population size, lower per capita income, and a high risk of civil war is particularly strong in the Sub-Saharan region. In the world sample, on the other hand, there is no significant link between population size, per capita income, and civil war risk when pooling over all countries. The important implication for empirical research is that more attention needs to be paid to regional heterogeneity in the structural relationship between population size, per capita income, and civil war risk. On the economic policy front, an important implication from the research is that in SSA population control and income growth promoting strategies have particularly high pay-offs in terms of reducing the risk of civil war.

2 See here also Blattman and Miguel (2009) who emphasize the same point in their review of the civil war literature.

The remainder of the paper is organized as follows. Section 2 provides a brief discussion of the literature on the link between population size, per capita income, and civil war. Section 3 discusses the estimation strategy. Section 4 presents the paper's main results and Section 5 concludes.

## 2 Literature overview

### 2.1 Per capita income and civil war

> 'No Society can surely be flourishing and happy, of which the far greater part of the members are poor and miserable'.Adam Smith (1776) in *The Wealth of Nations.*

In their sensitivity analysis of variables—identified in the empirical conflict literature as potential determinants of intrastate war—Hegre and Sambanis (2006) conclude that per capita income and population size are very robust and a significant predictor of civil war onset. The first to emphasize this negative relationship between income per capita and civil war were Collier and Hoeffler (1998) who argued that economic conditions which shape the viability of civil war trumph grievances because grievances, though being a necessary condition, are not sufficient for civil war to break out. This strong message by Collier and Hoeffler found itself later into the influential World Bank (2003) report *Breaking the Conflict Trap* and has since received also substantial attention by the academic conflict literature.

In an also influential study Fearon and Laitin (2003) confirmed the Collier and Hoeffler (1998) claim that per capita income is a key predictor of civil war onset. However, while Collier and Hoeffler (1998; 2004) argued that lower per capita income is a proxy for a lower opportunity cost of waging war, Fearon and Laitin argued that the channel through which lower per capita income increases the risk of civil war is weak state capacity.

On the theoretical front, another argument for why civil war is more frequent in countries with low per capita income is that per capita income may be a predictor for happiness and/or the willingness to participate in revolution. MacCulloch (2003) finds in an extensive microdata survey—taken randomly across 250,000 people in over 61 countries—that the tastes for revolt against the government are negatively correlated with individuals' income. MacCulloch (2003) argues that poor people have stronger preferences for rebellion because their expected income gain is higher. On the other hand as average per capita income rises the opportunity cost of rebellion increases due to the associated destruction of income. DiTella, MacCulloch and Oswald (2003) also find that at the macro-level GDP per capita is a strong predictor for the happiness of nations. Thus, there is evidence that low levels of GDP per capita give rise to motives among large parts of the population favouring political change, which may be associated with mass intrastate violence.

### 2.2 Population size and civil war

> 'The prodigious waste of human life occasioned by this perpetual struggle for room and food was more than supplied by the mighty power of population ...An Alaric, an Attila, or a Zingis Khan, and the chiefs

> around them, might fight for glory, for the fame of extensive conquests...but the true cause was a scarcity of food, a population extended beyond the means of supporting it'.Thomas R. Malthus (1798) in *An Essay on the Principal of Population.*

A natural starting point for a discussion of possible reasons for why increases in country population size may lead to an increase in the risk of civil war is the Malthusian theory of development. Resting on the notion that human life cannot be sustained without fulfilling basic alimentation necessities, the Malthusian theory argues that the population size of a country is limited by the total amount of output produced in an economy. Such a link between population size and output can be derived from postulating that the production function exhibits diminishing returns to scale in labour, which implies that there exists a uniquely determined level of subsistence per capita income below which the population size will shrink because total output is not sufficient to sustain life for the entire population. Within the Malthusian framework, conflict has its roots in population expansions that occur without being accompanied by a sufficient increase in output. At subsistence income levels such population expansions pose a real threat as total output will not be sufficient to guarantee alimentation requirements for the entire population. The Malthusian conflict theory predicts that violent conflict may occur as groups struggle to secure scarce resources.

A key reference on this Malthusian explanation of conflict is Homer-Dixon (1994; 1999) who studied the connection between environmental scarcity and conflict using case study analysis. Homer-Dixon classified environmental scarcity as encompassing: (i) environmental change, (ii) population growth, or (iii) unequal social distribution. Homer-Dixon's hypothesis was that while the first component would provoke primarily interstate resource wars the latter two would induce intrastate conflicts.

A striking example of population pressure induced conflict from the accounts of Homer-Dixon is the 1994 Rwandan genocide where over half a million Tutsi were slaughtered by Hutu militias. Although a popular explanation of the civil war has been ethnic hatred between two very polarized groups, Homer-Dixon points out that Rwanda was at the time of the conflict one of the most densely populated countries in the world. Moreover, fertile land was in extremely short supply due to a consistent degradation of the environment, making food an extremely scarce good. Interviews of Rwandan war casualties collected by Andre and Platteau (1998) echo the argument that overpopulation and scarcity played a major role in causing the Rwandan genocide.[3] Andre and Platteau report: 'The 1994 events provided a unique opportunity to settle scores, or to reshuffle land properties, even among Hutu villagers ... It is not rare, even today, to hear Rwandans argue that a war is necessary to wipe out an excess of population and to bring numbers into line with the available land resources'.[4]

It is also worth pointing out that there are alternative, non-Malthusian explanations for why increases in country population size increase the risk of civil war. Alesina and Spolaore (1997; 2003) in their theory of the optimal size of nations argue that when the country population size becomes too large, a sub-population will be better of forming a

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3 See also Verwimp (2005) who shows that people active in the land market, be it out of land scarcity or out of opportunity, had a higher probability of becoming perpetrators in the genocide.

4 Quoted from Diamond (2005: ch. 10)

new state. This argument rests on the trade-off that citizens face between the benefits of increasing returns to scale in public good provision and the costs of large political jurisdictions. As the distribution of preferences becomes more dispersed the government of a state will find it increasingly difficult to meet the demands of its citizens. With congestion effects and coordination problems limiting the benefits of scale a sub-population will be better off to press for secession and form a new state, reaping the benefits of self-determination over the allocation of resources and autonomy in the drafting of social policy. Increases in country population size can therefore be associated with secessionist pressures that may culminate in civil war.

## 3 Estimation strategy

I use the following econometric model to estimate the average marginal effect that per capita income and population size have on the risk of civil war in a world sample

$$War_{c,t} = \alpha_c + \gamma_t + \theta_1 PopSize_{c,t-1} + \theta_2 GDP_{c,t-1} + \Gamma X_c + \varepsilon_{c,t} \qquad (1)$$

where $war_{c,t}$ is an indicator function that is one in country c and year t in the event of civil war and zero else, $PopSize_{c,t-1}$ is the country population size, $GDP_{c,t-1}$ is real per capita GDP, and $\Gamma X_c$ is a vector of (time-invariant) control variables including dummy variables for SSA, Asia, Latin America, Eastern Europe, British colonial origin, French colonial origin, the log share of mountainous terrain, ethnic fractionalization, the share of Muslims in the population, as well as an indicator function for petro-states. Note that this vector of control variables $\Gamma X_c$ will be omitted when country-fixed effects $\alpha_c$ are included since the control variables $\Gamma X_c$ would be perfectly collinear with the country-fixed effects $\alpha_c$. Common year shocks, such as for example the end of the Cold War or global business cycle effects, are captured by the year-fixed effects $\gamma_t$. The error $\varepsilon_{c,t}$is clustered at the country-level to allow for arbitrary serial correlation within-countries across time.

I will estimate equation (1) using the logit model, and when including the country-fixed effects the conditional-fixed effects logit model, because fixed effects in non-linear probability models (such as probit or logit) lead to biased estimates due to the incidental parameter problem (Wooldridge 2002). To account for dynamics in civil war incidence and onset I will also run regressions that include the civil war indicator lagged one period on the right-hand side of the estimating equation. I will estimate the dynamic equation using both least-squares and system-GMM estimation (Blundell and Bond 1998), hence assuming a linear probability model.

Regional heterogeneity in the structural relationship is tested for by allowing the coefficient on population size and per capita income to be heterogeneous across regions. That is, the following model is estimated:

$$War_{c,t} = \alpha_c + \gamma_t + \sum_{r \in R} \theta_{1,r} PopSize_{c,t-1} + \sum_{r \in R} \theta_{2,r} GDP_{c,t-1} + \varepsilon_{c,t} \qquad (2)$$

where the θs, which capture the structural relationship between population size, income per capita, and the risk of civil war, can differ across regions.

## 4 Main results

### 4.1 World sample

Table 1, Panel A presents logit estimates of the average effect that population size and per capita income have on civil war incidence in a world sample.[5] In column (1) pooled panel data estimates are presented which use both cross-sectional as well as within-country time series variation to identify the effects that differences in population size and per capita income have on the risk of civil war. The main finding from the pooled panel data regression is that both per capita income and population size show up as having a highly significant effect on civil war incidence.[6] In column (2) country- and year-fixed effects are included. Now the coefficient on the population size variable becomes insignificant, while the coefficient on the per capita income variable remains significantly negative. Columns (3) and (4) repeat the exercise using a linear probability model, which produces very similar results to the non-linear logit model.[7]

To account also for dynamics in the incidence of civil war, columns (5) and (6) introduce the civil war incidence variable lagged one year as a right-hand-side regressor. As can be seen, there is clearly a lot of persistence in the incidence of civil war. Moreover, once this persistence is accounted for both the coefficient on the population size as well as the per capita income variable turn statistically insignificant and become quantitatively small. In Panel B the exercise for civil war onset is repeated, which produces the same results: including year- and country-fixed effects that account for unobservable cross-country heterogeneity (culture, history, social fractionalization, etc.) as well as common year shocks (end of the Cold War, independence waves, world business cycle, etc.) population size and per capita income are no longer statistically significant, and quantitatively their impact on civil war onset is very small.

Ignored by the country-fixed effects regressions is of course that many rich Western countries did not experience a civil war during the 1945–99 period. This important information is not used for computing the slope coefficients on the population and per capita income variable in the fixed effects regression. Ignoring this important information implies that the cards are stacked against finding a significant effect of per capita income and population size on civil war. The reason is that in rich countries changes in per capita income and population size will not have an effect on the incidence of civil war because these countries never experienced a civil war in any case (during the period of analysis).

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5 All data are from Fearon and Laitin (2003). The dataset is publically available at: www.stanford.edu/~jfearon.

6 The control variables (not shown) in this regression are indicator functions for SSA, Asia, Latin America, Eastern Europe, British colonial origin, French colonial origin, the log share of mountainous terrain, ethnic fractionalization, the share of Muslims in the population, as well as an indicator function for petro-states.

7 Note that the explanatory power of the model which includes the country- and year-fixed effects is substantially larger (R-squared 0.53) than the model that includes a set of cross-sectional control variables (R-squared 0.17). The larger R-squared confirms that there are important cross-sectional and year-specific variables omitted from the baseline model which are important in explaining the incidence of civil war.

To therefore examine what happens to the estimates when taking into account that the structural relationship between population size, income per capita, and civil war may differ across regions, I repeat the above fixed effects regressions allowing for a difference in the marginal effect of population size and per capita income on the risk of civil war for different regions. In Table 2, column (1) I do this by running an interaction model where population size and per capita income are interacted with an indicator variable that is one for all SSAn countries. As can be seen, the coefficient on population size in this fixed effects regression is now significant for the SSAn countries. And quantitatively the point estimate is now of similar magnitude as the point estimate obtained in the pooled panel regression of column (3) in Table 1. In addition, the coefficient on per capita income is also of equal or larger magnitude (in absolute terms) as in the pooled panel regression of column (3) in Table 1. Hence, the interaction regressions that allow for heterogeneity in the marginal effect of population size and per capita income on civil war show that indeed for SSA population size increases and per capita income decreases increase the risk of civil war.[8]

Importantly, the instrumental variable analyses in Miguel et al. (2004), Brückner and Ciccone (2010), and Brückner (2010) have shown that this relationship between larger population size, lower per capita income, and a higher risk of civil war in SSA prevails when accounting for the endogenous response of population size and per capita income to intrastate war. In fact, what the instrumental variable estimates show is that the effects of population size increases and per capita income decreases on the risk of civil war become quantitatively much larger than what least-squares (or SYS-GMM) regressions suggest.

### 4.2 Sub-Saharan Africa

SSA is one of the world's regions with the highest incidence of civil war. And, it is also the world's poorest region. The population size of the Sub-Saharan region has grown at a rate of about 2.5 per cent and is projected to double by 2036.[9] Table 3 shows that indeed lower per capita income and rapid increases in population size had contributed to significantly increasing in the past the risk of civil war in SSA. The estimates in Table 3 are based on the methodology developed in Brückner (2009) where both population size and real per capita income are instrumented to ensure that the obtained point estimates reflect the causal effect that within-country changes in population size and income per capita have on the risk of civil war. Columns (1) and (3) report instrumental variables estimates for civil wars that are over territory, columns (2) and (4) for civil wars that are over government. According to the UCDP/PRIO Armed Conflict Dataset v4-2009[10], a civil war over government is an incompatibility concerning the type of political system, the replacement of the central government or the change of its composition. A civil war

8 The estimates of the structural relationship for Latin America and Asia (columns (2) and (4)) are also quantitatively large and sometimes statistically significant, which may suggest that also for countries in these regions population size and per capita income are important determinants of civil war. Unfortunately, no instrumental variable approach has been developed yet that credibly shows that these correlations (for Asia and Latin America) really reflect a causal relationship.

9 web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/0,,contentMDK:21709116~menuPK:258659~pagePK:2865106~piPK:2865128~theSitePK:258644,00.html

10 Available at: www.prio.no/CSCW/Datasets/Armed-Conflict/UCDP-PRIO/

over territory is an incompatibility concerning the status of the specified territory, i.e. concerning secession or autonomy.[11]

The instrumental variable estimates yield that lower per capita income and a larger population size significantly increased the risk of civil war outbreak over government: a 5 per cent decrease in real per capita income was associated with an increase in the likelihood of civil war outbreak by over 7 percentage points. A 5 per cent increase in the population size increased the risk of civil war outbreak by almost 23 percentage points. These are very large effects that highlight the serious threat for intrastate stability in the Sub-Saharan region which arises from stagnation in per capita GDP growth or a continuation in the expansion of the population size. Interestingly, the instrumental variable estimates also show that increases in the population size had a significant positive and quantitatively large effect on the risk of civil war outbreak over territory. However, this was not the case for changes in per capita income which did not significantly affect the risk of civil war outbreak over territory.

## 5 Conclusion

The hypothesis that lower per capita income and larger country population size lead to an increase in the risk of civil war has received substantial attention by the empirical conflict literature. The immense material and humanitarian costs associated with civil wars are now well recognized (see for example World Bank 2003). It is therefore understandable that substantial reassurance is needed from empirical research that the relationship between larger country population size, lower per capita income, and a higher risk of civil war is really of causal nature. This paper showed that when using in a world sample just the within-country variation in population size, per capita income, and the risk of civil war it is crucial to allow for sufficient heterogeneity in the structural relationship for different regions. While on average there may be no significant effect once country- and year-fixed effects are accounted for in the world sample, for the SSA sample there continues to be a significant effect of population size and per capita income on the risk of civil war that is robust to the use of country- and year-fixed effects, and moreover to the use of instrumental variable techniques.

What implications do the results of this paper bear for policy? One possible policy implication is that strategies that keep a tab on population growth in SSA will have pay-offs that extent beyond a simple income effect—they reduce the risk of civil war. Fertility control, in particular, appears to be a very promising strategy. Also strategies that significantly reduce poverty and increase the level of education (especially among women) should significantly contribute to reducing population growth rates, and hence the risk of civil war.

It may also be tempting to conclude that partition could be a solution to African civil war. This would, however, be precipitous for two main reasons. First, partition will most likely create asymmetric pay-offs. If losers are not compensated sufficiently, then what was fought as an intrastate war may simply turn into an interstate war between two

11 While in Brückner (2009) instrumental variable estimates were shown when civil wars over territory are pooled with civil wars over government, this section of the paper sheds further light on the relationship by allowing for a potentially different effect depending on the underlying type of conflict.

new states. Second, there are other alternatives available that are less drastic and much more cost-efficient.

A further strategy that could be considered in the fight against civil wars in SSA is political and fiscal decentralization (for further reading see here Lake and Rothchild 2005; Sambanis 2008). This type of strategy would accommodate increases in the population size by decentralizing political and fiscal decision-making, and thus reduce conflict potential that arises from regional demands for greater self-determination over the allocation of resources and the drafting of social policy. While political and fiscal decentralization could be a solution in the medium to short-run, there are clearly limits to it. In the long run, ensuring that increases in per capita income are maximized while expansions in country population size are minimized appears a much more suitable strategy**.**

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Table 1: Population size, per capita income, and the risk of civil war

(Average marginal effect)

| | Panel A: Civil war incidence | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (5) | (6) | (7) |
| | Logit | FE Logit | LS | LS | LS | SYS-GMM |
| Population size | 0.525*** | -0.280 | 0.059*** | 0.009 | 0.012 | 0.036 |
| | (0.111) | (0.499) | (0.013) | (0.063) | (0.75) | (0.025) |
| Per capita income | -0.476*** | -1.468*** | -0.052** | -0.117*** | -0.007 | -0.022 |
| | (0.178) | (0.241) | (0.021) | (0.032) | (0.008) | (0.027) |
| Lagged civil war | | | | | 0.800*** | 0.753*** |
| | | | | | (0.016) | (0.037) |
| Country-fixed effects | No | Yes | No | Yes | Yes | Yes |
| Year-fixed effects | No | Yes | No | Yes | Yes | Yes |
| R-squared | . | . | 0.1714 | 0.5280 | 0.8259 | . |
| Observations | 6217 | 6250 | 6217 | 6250 | 6250 | 6250 |
| | Panel B: Civil war onset | | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | Logit | FE Logit | LS | LS | LS | SYS-GMM |
| Population size | 0.216*** | -0.302 | 0.005*** | -0.003 | -0.003 | -0.019 |
| | (0.058) | (0.840) | (0.001) | (0.011) | (0.012) | (0.020) |
| Per capita income | -0.451*** | -0.305 | -0.008*** | -0.003 | -0.004 | -0.037 |
| | (0.144) | (0.373) | (0.003) | (0.008) | (0.008) | (0.023) |
| Lagged civil war | | | | | -0.041*** | -0.043*** |
| | | | | | (0.011) | (0.012) |
| Country-fixed effects | No | Yes | No | Yes | Yes | Yes |
| Year-fixed effects | No | Yes | No | Yes | Yes | Yes |
| R-squared | . | . | 0.0120 | 0.0476 | 0.0493 | . |

| | | | | | | |
|---|---|---|---|---|---|---|
| Observations | 6217 | 6250 | 6217 | 6250 | 6250 | 6250 |

Note: The dependent variable in Panel A is civil war incidence, Panel B civil war onset. The method of estimation in columns (1) and (2) is maximum likelihood, columns (3) -(6) least squares, and in column (7) system-GMM (Blundell and Bond 1998). Huber robust standard errors (shown in brackets) are clustered at the country level. *Significantly different from zero at 90 per cent confidence, ** 95 per cent confidence, *** 99 per cent confidence.

Source: see text.

Table 2: Population size, per capita income, and the risk of civil war

(Regional heterogeneity)

| | Civil war incidence | | Civil war onset | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| | SYS-GMM | SYS-GMM | SYS-GMM | SYS-GMM |
| Population size | 0.018 | -0.003 | -0.020 | -0.022 |
| | (0.024) | (0.023) | (0.019) | (0.017) |
| Per capita income | 0.014 | 0.008 | 0.009 | 0.004 |
| | (0.025) | (0.024) | (0.021) | (0.023) |
| Population size*SSA | 0.072** | 0.078** | 0.058*** | 0.050** |
| | (0.031) | (0.033) | (0.018) | (0.022) |
| Per capita income*SSA | -0.074 | -0.054 | -0.052 | -0.036 |
| | (0.060) | (0.059) | (0.053) | (0.059) |
| Population size*Asia | | 0.144* | | 0.044 |
| | | (0.079) | | (0.047) |
| Per capita income*Asia | | -0.066 | | -0.041 |
| | | (0.044) | | (0.033) |
| Population size*Latin America | | -0.049 | | -0.033 |
| | | (0.032) | | (0.027) |
| Per capita income*Latin America | | 0.084* | | 0.049 |
| | | (0.045) | | (0.039) |
| Lagged civil war | 0.764*** | 0.757*** | -0.043*** | -0.044*** |
| | (0.035) | (0.031) | (0.012) | (0.012) |
| Country-fixed effects | Yes | Yes | Yes | Yes |
| Year-fixed effects | Yes | Yes | Yes | Yes |
| Observations | 6250 | 6250 | 6250 | 6250 |

Note: The dependent variable in columns (1) and (2) is civil war incidence, columns (3) and (4) civil war onset. The method of estimation is system-GMM (Blundell and Bond 1998). Autocorrelation and heteroscedasticity consistent standard errors are shown in parentheses below the point estimates. *Significantly different from zero at 90 per cent confidence, ** 95 per cent confidence, *** 99 per cent confidence.

Source: see text.

Table 3: Population size, per capita income, and the risk of civil war

(IV estimates, SSA sample)

| | Civil war incidence | | Civil war onset | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| | 2SLS War over territory | 2SLS War over government | 2SLS War over territory | 2SLS War over government |
| Population size | 2.788 | 7.411* | 2.398* | 4.587* |
| | (1.20) | (1.79) | (1.64) | (1.83) |
| Per capita income | -0.424 | -1.957*** | -0.180 | -1.573*** |
| | (-0.95) | (-2.63) | (-0.54) | (-2.76) |
| Country-fixed effects | Yes | Yes | Yes | Yes |
| Year-fixed effects | Yes | Yes | Yes | Yes |
| Observations | 888 | 888 | 888 | 888 |

Note: The dependent variable in columns (1) and (2) is civil war incidence, columns (3) and (4) civil war onset. The method of estimation is two-stage least squares. Huber robust standard errors clustered at the country level are shown in parentheses below the point estimates. *Significantly different from zero at 90 per cent confidence, ** 95 per cent confidence, *** 99 per cent confidence.

Source: see text.