Security is Like Oxygen: Evidence from Uganda

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ABSTRACT

Since the early 1990s, Uganda has been one of Africa's fastest growing countries. However, at the sub-national level, growth has been uneven due to civil conflict in the northern region. A unique panel data set of about 1,000 households in Uganda from 1991 to 1999 provides a natural experiment to examine the particular role of public security on growth dynamics. Building on the growth literature, the change in per capita consumption is modeled as a function of initial conditions and a set of shocks at both individual and aggregate levels that occurred between the two sample periods. Security is measured as the civil strife incidence at the community level. For the whole sample, security is the second most important variable after initial income in explaining the growth patterns and five types of infrastructure development are jointly significant. Infrastructure development has played an insignificant role in prompting consumption growth in civil strife stricken region. In regions where security is already in place, other factors, such as improvement in infrastructure, become more prominent. The results highlight the order of importance in economic development. Without security, economic development is hard to take place. However, economists and policy advisors living in peaceful countries often prescribe economic policies, such as the famous macro adjustment program in the 1980s, which hinge on the assumption of good security. In this manner, security, like oxygen, is taken for granted.

JEL Keywords: Security, civil strife, growth, poverty, Uganda, Africa.

Introduction

A large body of growth literature and cross-country empirics has highlighted some key correlates of economic growth, such as institutions, geography, finance, and trade (Temple, 1999). Global cross-country regressions impose a structural linear relationship on the available data and often use a dummy variable to control for outliers such as Sub-Sahara African countries (Collier and Gunning, 1999).[1] All countries, including the outlier countries, are assumed to share the same growth patterns except for differences in their intercept coefficients. As a result, the key explanatory variables have the same ubiquitous impact on growth across different development stages and across space, and policy sequencing does not matter. However, because of the diverse nature of countries, the relationships uncovered in the cross-country empirics may not always have the same importance. For example, in a country engaged in civil war, the public may more urgently demand the restoration of public order (and basic infrastructure, as in Iraq and Afghanistan) than market liberalization. Simply relying on the results generated from cross-country empirics and ignoring the order of importance of different policies at the individual country level may lead to improper policy advice, as was often the case with the macro adjustment programs in the 1980s.

Recognizing that general growth theories and development principles are not adequate for guiding developing countries, especially in those sub-Sahara African countries plagued by conflict, Collier and his coauthors (Collier, 1994; Collier, 1999; Collier and Hoeffler, 1998; Collier, Hoeffler, and Pattillo, 2001) have made seminal

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[1] Among the exceptions are the work by Durlauf and Johnson (1995) who identify multiple regimes and the parameters vary significantly across the regimes.

contributions in examining the nature and consequence of civil conflict, bringing research on civil strife into the agenda of development economists. Collier (1999) characterizes the four major effects of civil conflict on an economy --- destruction of physical capital, disruption of economic exchange, diversion of public expenditure from output-enhancing activities, and dissaving (capital flight). One implication of the study is that conflict-vulnerable countries have different features than peaceful countries and therefore more in-depth case studies of these countries are needed. However, due to lack of detailed within-country data, these studies still rely heavily on cross-country regressions and use a dummy variable to control for war or conflict. This implicitly assumes a linear relationship between key explanatory variables and growth regardless of the degree of insecurity.

Yet, a country's needs, like a human being's, do have an order of importance. As survival and security are of the utmost need for a human being, so too are they for a country. In this paper, we use Uganda as a case to demonstrate that security is a pre-condition for development. Only when security reaches a certain threshold, does improvement in infrastructure start to have an impact on growth. On the other hand, poverty and lack of economic development could be a root cause of disorder and conflicts. Without a panel data set, it is difficult to disentangle the two-way causal effects.

Uganda is particularly well suited for our analysis for several reasons. First, Uganda has experienced a prolonged civil conflict with the rebels of the Lord's Resistance Army (LRA), which has attacked civilians and abducted children for nearly two decades in the northern part of the country. Second, disagreement between donors

and the government over spending priorities is pronounced. Although the government gives high priority to eliminating the LRA, the government is constrained by lack of funds. President Yoweri Museveni has openly blamed the donors' restrictions on defense spending (Economist, 2004) for the continued violence. Third, high quality survey data has been collected at the household and community level over a rather long period, making it possible to control for institutional and cultural differences inherent in cross-country growth studies. Moreover, the household panel data set enables us to control for the possible endogeneity problem of civil strife.

Deininger (2003) has analyzed the causes and consequences of civil strife in Uganda. Similar to the cross-country empirics, he uses standard regressions to examine the correlates of civil strife based on official 1992 and 1999 survey data at the household and community levels. He finds that government provision of infrastructure has a clear conflict-reducing impact (page 580):

> "… lack of economic development is a key factor that increases the incidence of civil strife…. Government policies to raise the opportunity cost of labor, e.g. by improving education and infrastructure, would have a clear negative impact on the propensity toward civil strife…"

Following the demise of the era of repressive governments under Idi Amin and Milton Obote in the mid 1980s, Uganda has undergone a dramatic transformation that has seen it become one of the fastest growing economies in Africa. This growth has been driven in large part by rapid growth of government spending and donor support on education and infrastructure (Fan, Zhang and Rao, 2004). As shown in Table 1, the public investment in the four regions is rather even and there is no obvious discrimination

against the northern region. However, as indicated in Table 1 of Deininger (2003) and Table 2 of this paper, the incidence of civil strife has risen rather than declined. At least from these tables, the correlation between infrastructure development and civil strife is not strong.

In order to disentangle the puzzle, we look for the threshold effects of civil strife on economic growth by running two separate regressions for two types of regions, those without security problems and those subject to civil strife. The results show that the on-going local insurgency has disrupted long-term social and economic activities, diminishing the impact of infrastructure improvement and thwarting economic growth. Only when security exceeds a certain threshold, does infrastructure development become a key engine for economic growth.

The paper is arranged as follows. The next section describes the data used in analysis. The third section presents the model specification and estimation. The final section presents some concluding remarks.

Data

The data used in this analysis are taken from the 1992 Uganda Integrated Household Survey (UIHS) and the 1999 Uganda National Household Survey (UNHS). Both surveys included a household survey, a crop survey (agricultural enterprise survey in 1992-93) and a community survey. The household surveys include about 10,000 households. There are over 1,000 panel households, which have been surveyed in both years. The household surveys contain detailed information on expenditures and individual characteristics. The 1999/2000 household socio-economic surveys ask

households to report on the incidence of civil strife, theft, and interpersonal violence in 1992 and within the past year prior to interview.[2] Because the rich are more likely to be targeted for theft and other violence, using reported crime incidents at the household level might confound the measure of a broader security environment. We therefore use an aggregate measure calculated at the community level as described in footnote 2. The community surveys report infrastructure data in 1992 and 1999 including distance to roads, markets, clinics, and phone call boxes and the proportion of farmers visited by extension agents.

Table 2 reports civil strife, per capita consumption and household assets by region in 1992 and 1999. Several features are apparent from the table. First, the incidence of civil strife, theft, and physical attacks increased between 1992 and 1999 for most regions and for Uganda as a whole. Rapid economic development has not necessarily translated into less civil strife. Second, the regional growth patterns of per capita consumption and household assets are related to the level of civil strife. The northern region has the lowest growth rate in per capita consumption and household assets and the highest incidence of civil strife, theft and attack. In contrast, the central region has experienced the fastest growth in expenditure and asset while enjoying the lowest incidence of civil strife and

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[2] The three questions in section 11 of the 1999 UNHS are as follows: (1) "Has your production of crops/ cattle or livestock rearing/ trading activities been harmed by civil strife over the past 12 months? (2) "How many incidents of theft of property has the household suffered in the last 12 months and in 1992?" (3) "How many incidents of physical attack on members of the household have there been over the last 12 months and in 1992?" Deininger defines a community as affected by civil strife, theft, or attacks, if it is reported by at least one household. However, in so doing, the number of communities affected by civil strife exceeds 50%. As indicated in Table 1 of his paper, the incidence of civil strife in the western region in 1999 was higher at 69.7% than in the northern region (54.1%). This contradicts the fact that the northern region is widely perceived to be far more insecure than other regions. In this paper, we calculate the average incidence of civil strife at the community level based on the household surveys in 1992 and 1999 and weighted by sample multipliers (not just the panel component) and use it as a proxy for measuring civil strife.

crimes. The security environment does appear to be relevant for economic growth and asset accumulation.

Figure 1 plots the degree of civil strife and the growth of per capita consumption from 1992 to 1999 at the district level aggregated from the household surveys. The horizontal axis represents the incidence of civil strife, while the vertical axis measures growth rate of per capita consumption. The figure includes all the districts, clearly indicating a negative relationship between the two variables. However, if we look only at districts with civil strife incidence below a certain level, say 0.1, the correlation becomes much weaker. Figure 2 shows the level of per capita consumption at the district level instead of its growth rate on the vertical axis. Apparently, the level of consumption is negatively related to the degree of civil strife. The figure also reveals a possible threshold effect of security; only countries with a level of security of below 0.1 appear to achieve higher levels of consumption.

Figure 3 presents the correlation of civil strife with market participation for rural residents. The market participation variable is defined as the share of agricultural products sold to the market, which is aggregated from the crop surveys in 1992 and 1999. Figure 4 further graphs the relationship between the incidence of civil strife and changes in asset accumulation from 1992 to 1999. The vertical axis shows the average change in asset accumulation for a given incidence of civil strife at the community level. The data is aggregated from the entire 1999 household survey. Both figures highlight the negative association between civil strife and asset accumulation and participation in market exchange, which are two key factors for economic growth. In general, the findings support the argument articulated in Collier (1999) and the empirical evidence on Uganda

in particular (Deininger, 2003). The figures also review a possible threshold effect of civil strife on market development, asset assumption, and consumption growth, which might have been ignored in the literature.

Conceptual Framework

Following Barro and Sala-I-Martin (1995) on growth convergence and Dercon (2003) on shocks, we model the growth rate of per capita consumption as a function of its initial value and a set of other variables:

$$\log(y_{it}/y_{it-1}) = a + \beta \log(y_{t-1}) + \gamma Z + \delta D + \varepsilon_i \tag{1}$$

where y_{it} is per capita consumption in 1999 and y_{it-1} is per capita consumption in 1992. The subscripts t and $t-1$ refer to 1999 and 1992, respectively. The left-hand side variable represents the growth rate of per capita consumption in the period. The coefficient β stands for the speed of income convergence. A positive value for this coefficient indicates convergence while a negative value implies divergence. It provides useful information to understand how initial conditions contribute to long-term income growth and whether there is a convergence or not. Z is a vector of idiosyncratic and covariate shocks and γ is a vector of corresponding coefficients. D is a set of regional dummies and δ is a vector of coefficients for these fixed effects. The four regions are central, east, north, and west. We also add a dummy variable for rural resident status in the equation to control for the large rural-urban difference.

The Z vector includes idiosyncratic shocks at the household level and covariate shocks at the community level. Household shocks comprise: whether the household head

was sick during the one-month period before the 1999 survey, and having an orphan in the household. Because of the AIDS epidemic and the prevalence of tropical diseases, such as malaria, the mortality rate is rather high in our sample. About 40% of households include an orphan child. Therefore, these two variables to a large extent capture the degree of shocks related to health.

The aggregate shocks include civil strife, change in distance to the most common output market, change in distance to the nearest clinic, change in distance to the nearest feeder road, change in distance to the nearest phone call box, and change in the proportion of farmers visited by extension agents. We use these variables to capture the impact of civil strife and infrastructure development.

To identify the threshold of civil strife on growth, we first run separate regressions using each incidence of civil strife at the community level as a sample separator. Based on these regressions on the partial sample and the regression on the whole panel, we can calculate the F-test statistic for structural break at each incidence of civil strife. Figure 5 reports the log likelihood along different value of civil strife. The figure suggests that there are two possible thresholds, one at 0.057 and one at 0.167.

Table 3 presents the estimation results based on two different thresholds of civil strife. The first regression in the table is for the entire sample of panel households. The adjusted R-squared is 0.436, relatively high for a cross-sectional regression. It indicates a strong convergence in per capita consumption growth. However, some idiosyncratic and covariate shocks may affect the convergence effect. The coefficient for the civil strife variable is statistically significant and high at –0.683, in consistent with the findings by Deininger (2003). In addition, the coefficient for having an orphan is significantly

negative. As shown in the third and last regressions, the basic results still hold if we only look at the sample of no serious civil strife.

Among the five infrastructure variables, the coefficients for distances to clinic and feeder roads are negatively significant. The F-test shows that as a whole, the five variables are jointly significant in explaining income growth.

However, when repeating the regression using only the communities with serious civil strife problem, none of the infrastructure and personal shock variables remains statistically significant. The Chow-test further validates that there exists a significantly structural difference between the two samples and therefore pooling them together may overstate the impact of infrastructure development in civil strife-vulnerable regions. When a region suffers from civil strife, simply investing precious public resources on education and infrastructure may be a waste. Restoring social order and creating a secure environment are prerequisites for making further public investments productive.

In addition to per capita consumption, we also examine the impact of civil strife and infrastructure development on poverty dynamics by replacing the left-hand variable with a discrete 0,1 poverty dynamics variable. With respect to poverty estimation, we closely followed Appleton's method (2001) of estimating values of consumption per adult equivalent. Based on regionally specific poverty lines described in Appleton (2001), we then define the poverty status for each household.[3] If a household was poor in 1992 but not in 1999, we classify it into the category of "escaping from poverty" and assign a value of 1. The remaining households are assigned 0. Similarly, we can define those

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[3]Appleton (2001) has reported poverty rates at the regional level only.

households that were non-poor in 1992 but poor in 1999 as "falling into poverty" and create another pair of binary variables.

Table 4 shows the logit estimate on the impact of infrastructure development and civil strife on poverty dynamics from 1992 to 1999. The outcome variable in regressions (1)–(3) is "escaping from poverty" while the regressions in the last three columns are on "falling into poverty". Similar to the findings in Table 3, for the whole sample and the partial sample without serious civil strife, the infrastructure variables are jointly significant in explaining poverty dynamics. However, in regions plagued with civil strife, infrastructure development does not matter much to the outcome. Once again, the Chow-test shows a structural break when civil strife reaches a threshold.

This explains why Uganda has routinely spent more on defense than on other public sectors such as education, health, social security, and infrastructure. In large part due to donor pressures, the share of Uganda's defense spending in total government expenditures has declined from 42 percent in 1988 to 19 percent in 1997 (Fan, Zhang, and Rao, 2004). However, this level of defense spending is still relatively high when compared with other countries in Africa (11 percent), Asia (11 percent), or Latin America (6 percent). This share is almost twice the sum of Uganda's spending on agriculture, health, and infrastructure. But one should be aware that not many countries have such serious civil strife problems as Uganda. A continued cut in defense spending may further undermine security and make other types of public investment nonproductive. Certainly, the government should also actively seek other avenues such as dialogue and democracy in the war-torn region to solve the security problem.

Conclusions

Using household and community survey data in Uganda, the paper shows that there does exist a threshold effect of security on growth. Without minimal security, it is hard for economic exchange to take place and for agents to utilize existing or newly provided public infrastructure for productive activities. Only when security reaches to a certain level does infrastructure development start to prompt growth. In other words, the sequencing of certain public policies does matter. Since lack of public services is one of the key constraints facing Africa (Collier and Gunning, 1999), it is crucial to study the pre-conditions for making public investment successful.

The results also highlight that development trajectories may not be linear and 'one-size-fits-all' strategies do not work (Adelman and Morris, 1971; Easterly, 2002; Rodrik 2003). In the past, African countries have too often been treated as homogenous entities and the development process itself as a process that occurs along a linear continuum. Fafchamps, Teal, and Toye (2001) have advocated more research on identifying the pre-conditions for initiating growth in Africa. This paper has demonstrated security is one of these pre-conditions.

An implication of these findings is that countries ought to be granted some freedom for setting their own spending priorities. Economists sitting in the safe developed world may fail to appreciate the minimal requirement of security for economic development. They may tend to prescribe policies which often hinge on the assumption of good security. In this manner, security, like oxygen, is taken for granted. The economic means of investing in education and infrastructure may not be sufficient for reducing civil strife. As maintaining the rule of law is a pre-requisite for public

investment and economic development, without enough attention and good solutions to

civil strife, it would be difficult for many African countries to achieve the millennium

development goals (Stuart, 2003).

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Table 1 Public Investment by Region in Uganda in 1997/1998, million shillings

Region	Development budget	Fiscal transfer to local government for		
		Primary education	Healthcare	Feeder road maintenance
Central	26695	3772	2843	1210
Eastern	34138	3684	4361	1246
Northern	29002	2893	4088	1129
Western	30729	3792	3512	1405

Source: Fan, Zhang, and Rao (2004).

Table 2 Civil strife, Per Capita Consumption, and Household Asset by Region in 1992 and 1999

Region	Civil strife (%)	Theft (%)	Attack (%)	Per capita consumption	Asset
1992				1992 shillings	1999 thousand shillings
Central	2.2	14.1	3.0	25,256	5,764
East	8.5	13.4	5.8	15,205	2,161
North	12.9	19.6	5.5	12,566	1,230
West	5.1	14.1	4.4	15,778	3,386
Total	6.4	14.9	4.5	17,963	3,465
1999				1999 shillings (nominal growth rate)	1999 thousand shillings (nominal growth rate)
Central	4.9	24.3	4.7	39,441 (56.2%)	6,932 (20.3%)
East	11.5	26.6	8.5	22,770 (49.8%)	2,431 (12.5%)
North	12.9	25.1	9.5	16,764 (33.4%)	1,254 (2.0%)
West	12.6	19.4	5.4	28,477 (80.5%)	3,930 (16.1%)
Total	9.9	23.9	6.7	28,504 (58.7%)	4,050 (16.9%)

Note: The information on civil strife, theft, and attack are aggregated from the 1999 Uganda National Household Surveys (UNHS). Per capita consumption data for 1992 and 1999 are generated from the 1992 Uganda Integrated Household Survey and the 1999 UNHS. The asset data in 1992 is based on recall in the 1999 survey. The asset data at both 1992 and 1999 are from the 1999 UNHS. Respondents are asked to compare the 1992 asset level with that of 1999 in six categories --- about equal, somewhat more, somewhat less, none, much more, and much less. Following Deininger (2003), we assign the percentage increases corresponding to the above six categories as 0, 25%, -25%, -100%, 50%, and –50%, respectively, to calculate the 1992 asset.

Table 3 The Impact of Infrastructure and Civil Strife on Per capita Consumption Growth

	Whole panel	Threshold1		Threshold2	
		Serious civil strife	No serious civil strife	Serious civil strife	No serious civil strife
Initial value	-0.875	-0.887	-0.836	-1.011	-0.855
	(0.032)***	(0.057)***	(0.038)***	(0.107)***	(0.033)***
Rural resident	-0.194	-0.298	-0.163	-0.361	-0.152
	(0.062)***	(0.114)***	(0.074)**	(0.219)	(0.064)**
Sickness	-0.047	-0.001	-0.075	-0.065	-0.054
	(0.031)	(0.055)	(0.037)**	(0.096)	(0.033)*
Having an orphan	-0.059	-0.053	-0.061	-0.059	-0.059
	(0.021)***	(0.033)	(0.028)**	(0.059)	(0.023)***
Change in distance to market	-0.000	-0.003	0.000	0.002	-0.001
	(0.001)	(0.002)	(0.001)	(0.003)	(0.001)
Change in distance to clinic	-0.006	-0.001	-0.012	0.010	-0.008
	(0.002)***	(0.003)	(0.003)***	(0.008)	(0.002)***
Change in distance to feeder road	-0.003	-0.005	-0.002	-0.005	-0.002
	(0.001)**	(0.003)	(0.001)	(0.005)	(0.001)
Change in distance to phone booth	-0.001	0.001	-0.000	0.001	-0.001
	(0.001)	(0.002)	(0.001)	(0.004)	(0.001)
Change in extension visit	0.000	0.000	-0.000	0.001	-0.000
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Civil strife	-0.683	-0.651	-1.298	-0.795	-0.867
	(0.168)***	(0.271)**	(1.073)	(0.597)	(0.436)**
Observations	1052	436	616	172	880
Adjusted R-squared	0.436	0.421	0.465	0.389	0.456
p-value of *F* test: Infrastructure no impact	0.018	0.532	0.003	0.574	0.001
Chow Test *p*-value	0.0001	0.0001		0.0002	

Note: Standard errors in parentheses. The symbol * significant at 10%; ** significant at 5%; *** significant at 1%, respectively. The regional dummies are note reported here.

Table 4 The Impact of Infrastructure and Civil Strife on Poverty Dynamics

	Escape from poverty			Fall into poverty		
	(1) Whole panel	(2) No major strife	(3) Having strife	(4) Whole panel	(5) No major strife	(6) Having strife
Initial value	-2.969 (0.201)***	-3.075 (0.225)***	-2.588 (0.499)***	1.874 (0.208)***	1.650 (0.221)***	3.773 (0.789)***
Rural resident	-1.180 (0.277)***	-1.245 (0.304)***	-0.965 (0.808)	2.178 (0.488)***	1.825 (0.496)***	n.a.
Sickness	-0.190 (0.139)	-0.300 (0.160)*	0.054 (0.345)	-0.032 (0.180)	-0.042 (0.199)	0.218 (0.505)
Having an orphan	-0.060 (0.095)	-0.083 (0.107)	0.025 (0.214)	0.173 (0.105)*	0.244 (0.110)**	-0.349 (0.353)
Change in distance to market	0.007 (0.004)	0.007 (0.005)	0.004 (0.012)	0.012 (0.006)**	0.012 (0.006)*	0.012 (0.019)
Change in distance to clinic	-0.008 (0.011)	-0.019 (0.011)*	0.040 (0.030)	0.021 (0.012)*	0.028 (0.014)**	-0.016 (0.037)
Change in distance to feeder road	-0.008 (0.006)	-0.008 (0.006)	-0.009 (0.014)	0.006 (0.006)	0.007 (0.007)	0.013 (0.028)
Change in distance to phone booth	-0.001 (0.004)	-0.003 (0.005)	-0.002 (0.013)	0.002 (0.006)	0.004 (0.007)	-0.003 (0.020)
Change in extension visit	0.008 (0.003)**	0.010 (0.004)***	0.005 (0.008)	0.002 (0.004)	0.002 (0.004)	0.002 (0.010)
Civil strife	-1.430 (0.729)**	-2.320 (2.018)	-1.759 (2.162)	2.823 (0.824)***	5.617 (2.479)**	3.491 (2.787)
Observations	1052	880	172	1052	880	172
p-value of F test: Infrastructure has no impact	0.024	0.009	0.699	0.116	0.096	0.975
p-value of Chow Test	0.437			0.052		

Note: Standard errors in parentheses. The symbol * significant at 10%; ** significant at 5%; *** significant at 1%, respectively. The regional dummies are note reported here. In areas subject to civil strife, those falling into poverty are all in the rural area. Therefore, the dummy for 'rural resident' is dropped in regression (6).

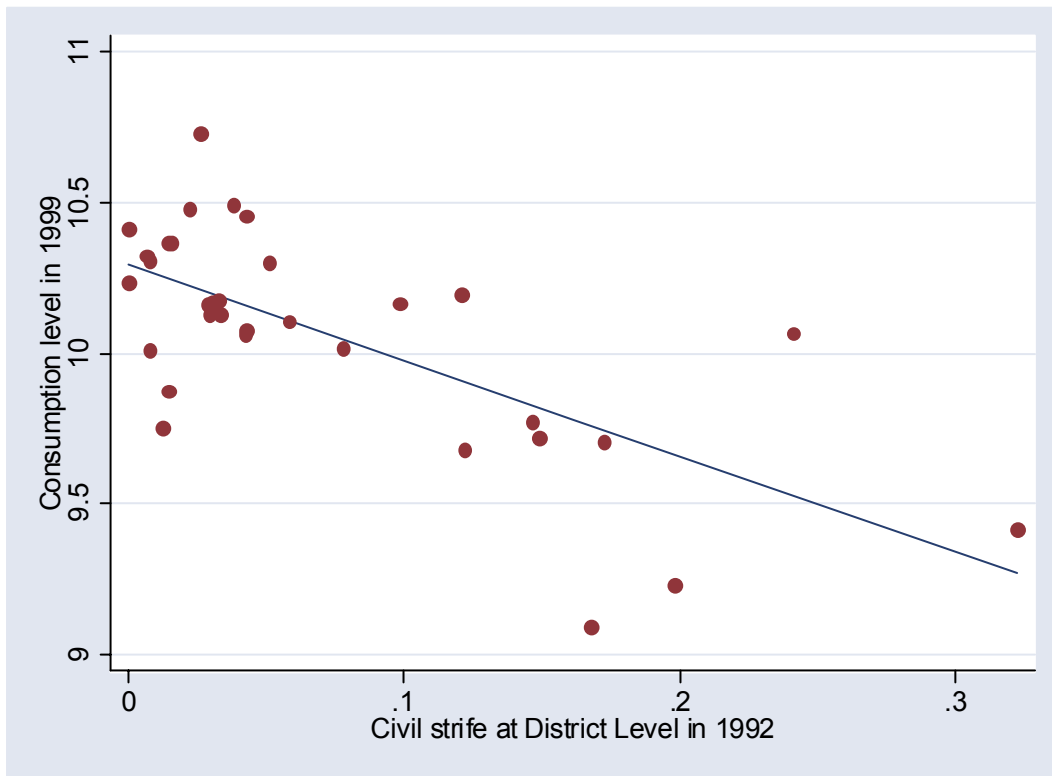Figure 1 Civil Strife and Per Capita Consumption Growth at District Level

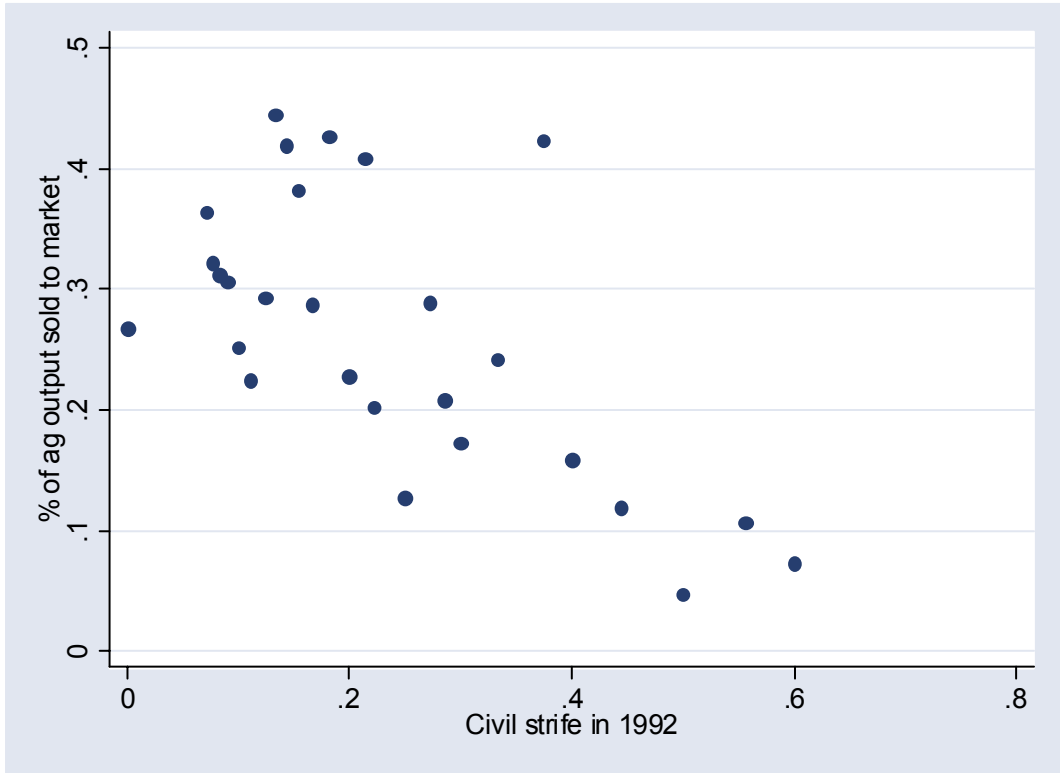Figure 2 Civil Strife and Consumption in 1999 at the District Level

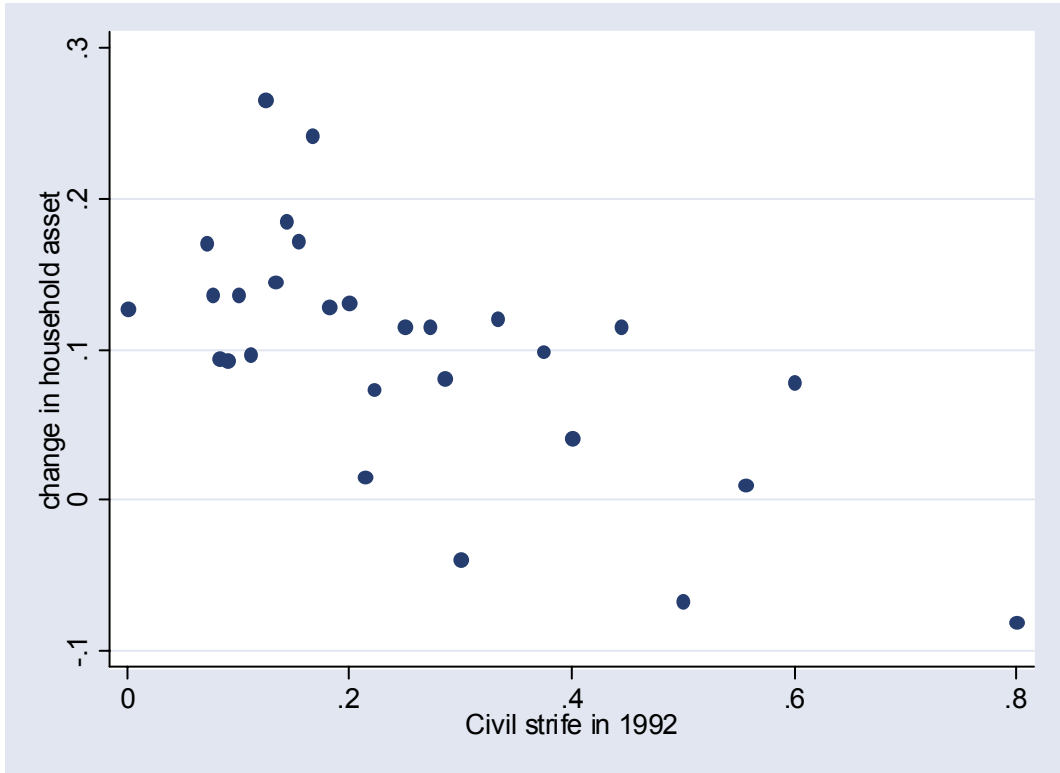Figure 3 Market Participation and Civil Strife
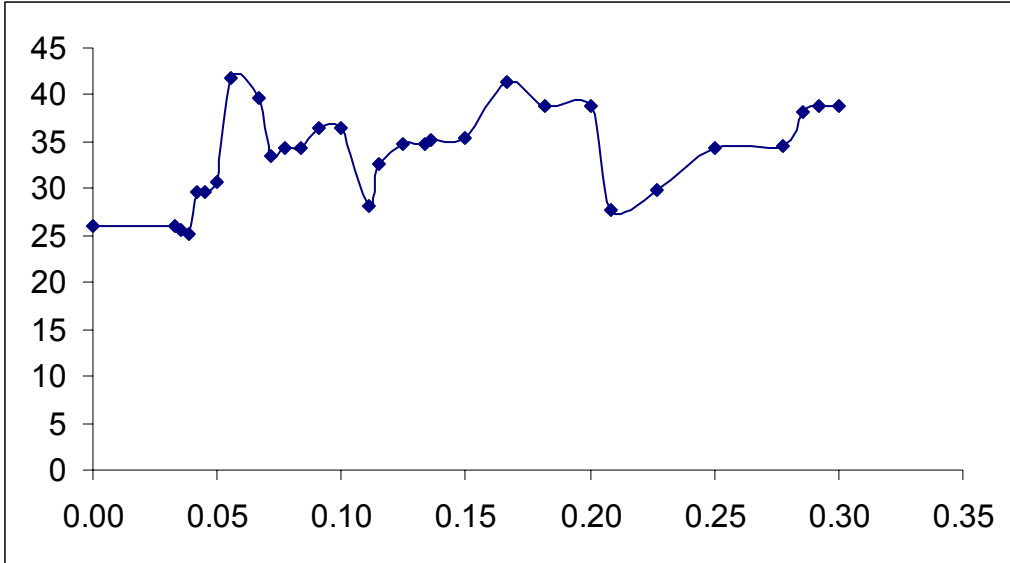
Figure 4 Civil Strife and Change in Asset Accumulation

Figure 5 Test for Threshold Levels of Civil Strife