Killing for Profit: a model of intrastate conflict

Aaron Cooke*

University of Connecticut

aaron.cooke@uconn.edu
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Abstract

There is no doubt that high levels of intrastate conflict are devastating for an economy. A clearer understanding of what attributes affect the level of violence that economies and societies endure could be a critical turning point in attempting to defuse future conflicts before they happen. Police actions, terror campaigns, ethnic cleansing, and civil war between opposed conflict groups leads to lives lost, increased medical costs, infrastructure destroyed, technological regression, lowered confidence, drops in foreign investment, population displacement, and permanent damage to individual quality of life. The main question this paper attempts to answer is: would rational actors engage in violent behavior, and if so, why? At the core of this approach to conflict is the understanding that violence happens or does not happen as a result of two opposing forces. First is the additional economic power that a conflict group can obtain through violence, through control of critical resources and governmental apparatus. Second is the asset destruction caused by intrastate violence.

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I. Introduction

One of the most important issues contemporary economists face is understanding the dynamics of intrastate conflict and its interaction with the economic systems of the society in which the conflict occurs. Around the world there are dozens of ethnic, social, and religious conflicts ranging from governmental discrimination to full-blown terrorism campaigns and civil war. While these conflicts have a variety of stated causes and grievances, the viability of a protest campaign or armed insurrection is a result of the underlying economic reality faced by the different participants (Collier and Hoeffler, 2004).

One of the major existing results in the field of intrastate conflict is that economic growth reduces the likelihood of conflict (Fearon and Laitin, 2003). Understanding what attributes affect the level of violence that economies and societies endure could be a critical turning point in attempting to defuse future conflicts before they happen. At the core of my approach to conflict is the understanding that violence happens or does not happen as a result of two opposing forces. First is the additional economic power that a conflict group can obtain through violence, or rapacity effect, through control of critical resources and governmental apparatus. Second is the asset destruction caused by intrastate violence. This can be both physical, evidenced in lives lost, increased medical costs, infrastructure destroyed, and technological regression; or economic, such as in lowered confidence, drops in foreign investment, and population displacement (Fiala and Skaperdas, 2011).

The opportunity cost effect occurs if diverting rents of resources from other groups through violent methods is heavily labor dependent. Higher wages for non-conflict related employment may lower the level of violence by diverting labor away from violent rent-seeking. Alternatively, the rapacity effect may overwhelm the opportunity cost effect if there exists greater gains from rent seeking, which would escalate violence. Data gathered in Colombia has revealed the effects of income shocks in different sectors of the economy using international price data and how these

impact conflict (Dube and Vargas, 2013). Opportunity costs impact the level of conflict, suggesting an economic motivation. Resources have been shown to increase economic growth and likelihood of conflict. However, this is only due to the increased wealth these resources bring, and resource dependence, when natural resources comprise the lion's share of economic assets, has shown to be related to lower growth and greater conflict (Brunnschweiler and Bulte 2008). The mechanisms explored in this model explains this result.

Most intrastate conflicts occur between two or more ethnic or religious groups. Ethnic delineations are a convenient way to sort combatants during the conflict and prevent post-conflict infiltration by the defeated group, rather than functioning as the sole instigator of the violence, as may be assumed at first glance (Caselli and Coleman, 2013). Religious conflict has a similar effect, although post-conflict conversion is easier and identification of opposing groups may be more difficult both during and after the conflict.

Although group rhetoric points to immutable theological or physiological differences between groups as the reason for violence, often the deeper cause for the conflict is an attempt to increase a group's share of society's wealth. Whether this is an oppressed group attempting to reach equal footing or a ruling group's attempt to maintain economic hegemony, a critical aspect of the conflict between ethnic, religious, or other types of conflict groups is their attempt to gain control over economic resources, whether directly or through governmental apparatus (Tache and Oba, 2009; Esteban and Ray, 2011). Ethnic differences have a significant impact on who is recruited into public administration and what ethnic groups receive government services. This causes the slighted group to act, often violently, to redress the grievance (Esman 1997).

Note that my definition of violence is not limited to group members physically attacking the other group's members. Intimidation and discriminatory policies are also part of this definition of violence. Cases exist without open civil war that nevertheless evince extremely high levels of violence embraced by an oppressive conflict group-controlled government and their opposition.

The American South during the Jim Crow period, China in Tibet, and South Africa during Apartheid are all examples of high violence societies without outright civil war.

Studying the links between control of economic rents and conflict has traditionally been done in a microeconomic setting, often utilizing game theory, or in macroeconomic studies using exogenous variables like rainfall, light pollution, or commodity world price shocks to proxy for the poor data that accompanies most studies of conflict (Miguel, Satyanath and Sergenti, 2004; Alesina, Michalopoulos, and Papaioannou, 2013; Dube and Vargas, 2013). While this has been a fruitful path of research, there are significant aspects of this subject that could benefit from analysis in a macroeconomic framework. Specifically, the interaction between conflict and the factors of production, the impact that conflict has on intertemporal consumption patterns, and the underlying affect of societal attributes on intensity of conflict âĂŞ these questions can be addressed in a well-crafted infinite horizon model. While this type of model may seem to incur unnecessary complexity, the conclusions that can be drawn from such a model, such as the impulse response to shocks over time, are unique to its structure and cannot be replicated in a simpler model.

This model will focus mainly on levels of violence and economic outcomes for the different groups. Using real world data, the model can then be used to broadly understand and predict existing conflicts and possibly be used in future policy prescriptions to lower the duration and negative impact of intrastate conflicts.

II. Model

The proposed model consists of a standard neo-classical macroeconomic model with heterogeneous infinitely-lived agents. Each conflict group has a number of identical consumers who gain utility based on consumption. The individuals obtain endowments (which can represent both governmental spending and natural resources) depending on the group's political and military sway. The endowments are determined for each period of the economy by the size of the group

and how much violence they embrace.

The conflict function I propose adapts and expands an existing conflict success function (Hirshleifer 2000): a group's share of overall violence increases the ability of a group to appropriate public goods and natural resources. The total level of conflict destroys capital, to account for destruction caused by fighting between groups. The level of conflict follows Grossman (1991), in which conflict is proportional to the amount of time spent by members of opposing groups in conflict-related activities and Esteban and Ray (2011), in which the level of conflict is proportional to the number of militants from both contesting parties, that may include national armies and police forces if these become dominated by one or more conflict groups.

Each group is heterogeneous in number of members, choice of violence levels, and per capita asset holdings. They have identical utility functions, and choose their levels of violence before each time period.

I. Preferences

A representative member of each conflict group's consumption is c_t^i. The utility function takes the Stone-Geary form (Alvarez-Pelaez and Diaz, 2005), so the allocation of choice variables are consumption c_t^i, saving for next period's assets a_{t+1}^i, and violence ψ_t^i.

The consumer's problem is to maximize:

$$U(C) = \sum_{t=1}^{\infty} \beta^t \frac{c_t^{1-\sigma}}{1-\sigma}$$

Where σ is the coefficient of relative risk aversion and β is the subjective discount factor. Let w_t denote the wages for labor (L), r_t^n denote the return on natural resources (Z) and r_t^k denote the return on capital (K). Then the budget constraint facing an individual can be written as:

(1)

$$c_t^i + a_{t+1}^i = w_t^i + a_t^i(1 + r_t^k - \phi_1(\psi_t^i)) + \phi_2(\psi_t^i) r_t^n Z_t$$

and given a_0 and taking as given prices $[w_t, r_t^k, r_t^n]_{t=0}^{\infty}$. ϕ_i are conflict functions defined later. Agents

in the economy are not able to borrow, and have no access to insurance markets. The liquidity constraint they face is $a_t \geq 0, \forall t$.

II. Technology

The production function is a modified Cobb-Douglas, to include natural resources. It is additively separable because natural resources are not substitutable for capital and labor, and natural resouces increase production linearly. It shows constant returns to scale, so there will be no profit. θ_i are weights on each production input. Total production is Y_t.

$$Y_t = A_t(K_t^{\theta_1} L_t^{\theta_2} + \theta_3 Z_t)$$

Where A_t is production augmenting technology level that follows the growth path:

$$A_{t+1} = A_t(1 + g^A)$$

Firms are homogeneous, profit maximizing, and competitive, so that a representative firm can be used. Wages and the rental price of capital and natural resources are therefore their respective marginal products in equilibrium. Individuals take wages and the rental price of capital and natural resources as given.

The representative firm's problem is to maximize:

$$\Pi_t = Y_t - w_t L_t - r_t^k K_t - r_t^n Z_t$$

This will lead to prices:

$$w_t = F_L(L_t, K_t, Z_t)$$

$$r_t^n = F_Z(L_t, K_t, Z_t)$$

$$r_t^k = F_K(L_t, K_t, Z_t)$$

III. Violence and Appropriation

Ψ_t is the total level of violence at time t, which is the sum of each individual's chosen level of violence.

$$\Psi_t = \sum_{i=1}^{N} \psi_t^i$$

if

$$\sum_{i=1}^{N} \psi_t^i > \bar{\Psi}$$

and

$$\Psi_t = 0$$

if

$$\sum_{i=1}^{N} \psi_t^i \leq \bar{\Psi}$$

Where $\bar{\Psi}$ is a minimum threshold for violence to become destructive. N is the total population, which is the sum of each group's population n^i. Individuals are homogeneous except for their conflict group membership and initial assets. Q is the number of groups. The population grows at

a constant rate g.

$$N_t = \sum_{i=1}^{Q} n_t^i$$

Z is total natural resources.The amount of natural resources each group controls increases with their share of the violence, so more violent groups can control more resources, and thereby earn greater rents through violence-based political authority.

The capital destruction function increases with the level of violence per person and decreases with the size of the individual's assets relative to the total capital within the economy, allowing that richer groups are less affected by conflict. Specifically the function increases when the asset share exceeds population share, and decreases when the population share exceeds asset share, showing that a small, wealthy group can protect themselves more ably than a large poor group. Note that these groups are still affected by violence, and indeed can suffer massive losses as violence increases, but their rate of capital destruction is lesser than the lower class conflict groups who cannot purchase effective protection, such as gated communities, control of elections, or superior weaponry. Violence at time t destroys capital after the capital has received a return at time t.

$$\phi_1(\psi_t) = \frac{\Psi_t}{1 + \frac{a_t^i}{\sum_{i=1}^{N} a_t^i} - \frac{N^i}{\sum_{i=1}^{N} N^i}}$$

I assume that each society contains a set of natural resources extracted each period for which the different conflict groups compete. Z is total natural resources. The share an individual can obtain is in direct relation to her level of violence compared to the level of violence in the economy. If violence does not meet the minimum threshold, the share of natural resources is evenly shared by every citizen.

$$\phi_2(\psi_t) = Z_t(\frac{\psi_t^i}{\Psi_t})$$

Population grows at a constant rate g, and declines at the rate of other ethnic groups' violence levels. Violence therefore destroys capital and labor at the same rate, which means that prices are unaffected in the context of a Cobb-Douglas production function. So ethnic group i's population evolves according to:

$$N_{t+1}^i = N_t^i(1 + g - \psi_t^j), i \neq j$$

IV. Equilibrium

A competitive equilibrium in this economy consists of a sequence of allocations $[c_t^i, a_{t+1}^i, \psi_t^i]_{t=0}^{\infty}$, aggregate inputs $[K_t, L_t, \Psi_t]_{t=0}^{\infty}$ and prices $[w_t, r_t^k, r_t^n]_{t=0}^{\infty}$ such that the allocations solve each individual maximization problem subject to prices and their budget constraint, the inputs solve each firm's problem given prices and the capital and labor markets clear.

The level of capital in an economy is the sum of each individual's assets when the capital market clears.

$$\sum_{i=1}^{N} a_t^i = K_t$$

Labor is inelastic and there is no leisure in the utility function. The amount of labor is equal to the population when the labor market clears.

$$L_t = N_t$$

III. Results

Set up the Lagrangian:

$$\Lambda = \sum_{i=1}^{\infty} (\beta^t \frac{c_t^{1-\sigma}}{1-\sigma} + \lambda_t(-c_t - a_{t+1} + w_t + a_t(1 + r_t^k - \phi_1) + r_t^n Z\phi_2)$$

First order conditions:

$$\frac{c_t}{c_{t+1}}^{-\sigma} = \beta(1 + r_{t+1}^k - \phi_1)$$

and

(2)

$$\psi_t^i = \sum_{i=1}^{N} \psi_t^i - \frac{k_t^i(1 + \frac{a_t^i}{\sum_{i=1}^N a_t^i} - \frac{N^i}{\sum_{i=1}^N N^i})(\sum_{i=1}^N \psi_t^i)^2}{r_t^n Z}$$

The Euler equation:

(3)

$$\frac{c_{t+1}}{c_t} = (\beta(1 + r_{t+1}^k - \phi_1))^{1/\sigma}$$

(1), (2), (3) and prices w_t, r_t^k, r_t^n, characterize a complete dynamic system.

The equilibrium total level of violence in an economy will be the sum of each individual's optimal

level of violence:

$$\sum_{i=1}^{N} \psi_t^i = \frac{N-1}{\sum_{i=1}^{N} \frac{a_t^i r_t^k}{r_t^n Z(1+\frac{a_t^i}{\sum_{i=1}^{N} a_t^i} - \frac{N^i}{\sum_{i=1}^{N} N^i})}}$$

The takeaway from this model is that the effect violence has on intertemporal consumption decisions through depreciation of capital and increased endowment share depends on three things. The first is the level of resources that are fought over, Z. Violence increases the more valuable the prize of government outlays, natural resources, or any other national endowment. The second is the level of capital. The higher the level of capital, the lower the level of violence because the costs of fighting, represented by assets and labor destroyed, are higher. This helps explain why as countries get wealthier they experience reduced levels of violence. The final piece is the standard deviation of assets per person among groups, or intergroup inequality. Inequality between regions or groups, known as horizontal inequality, is what matters for violent conflict. If there is large level of inequality between conflict groups, violence will increase (Humphreys 2003). This may have much to do with how these groups are organized. Elites within the groups may have great sway over how much violence the group embraces, as well as how assets are distributed within the group. As long as the group as a whole has enough to keep its members happy, the precise level of inequality within a group will depend on the group's own structure and will not impact the violence decision.

This shows a clear recommended policy result: raise the amount of capital, lower the prize of economic endowment and the variance of conflict group inequality. Reducing the amount of government funds that can be targeted directly or indirectly at specific conflict groups, and ensuring that natural resource rents are to be shared equally by every conflict group will reduce the levels of violence within a society. This is much easier said than done, as it would necessitate the governments of these countries sacrifice independence in their spending decisions to an independent technocrat, judicial court, or even a non-governmental organization, which is likely to be a very unpopular move, especially among the conflict group that has benefited from the

current levels of violence. However, it is only through reducing discrimination in governmental outlays that the causes of this violence can be addressed. The drop in violence in the developed world since the industrial revolution has seen a corresponding drop in the ability of bureaucrats and elected officials to target outlays towards specific ethnic and religious groups. It is to be hoped that this institution building takes fewer years in the currently developing nations.

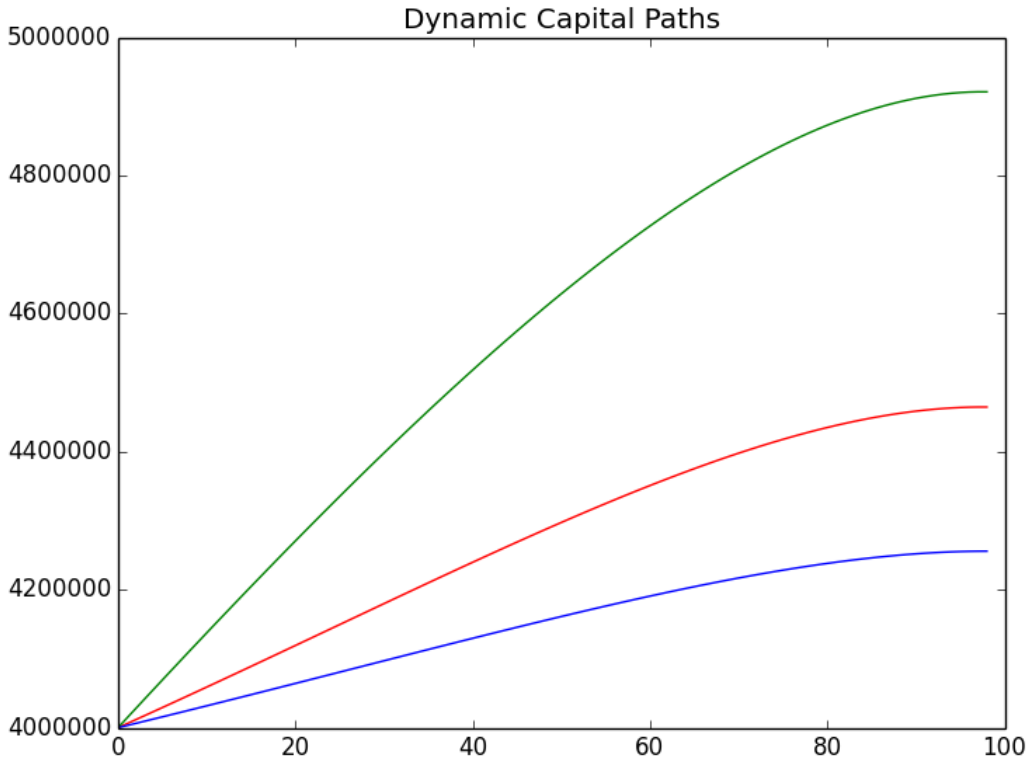
IV. Simulation

In order to ascertain the dynamic properties of this model, I created a simulation of this system, using a forward shooting method to reach a balanced growth path from an initial level of capital. The Fortran and Python code is available on request. I modeled an economy with two ethnic groups and fluctuated whether they had the ability to have violence greater than zero, whether they started with an equal endowment of capital, and how they reacted to an income shock. Since levels of violence can change so quickly, each time period represents one month. Coefficients are chosen to make the simulation well behaved on a balanced growth path.

Table 1: *Simulation Parameters*

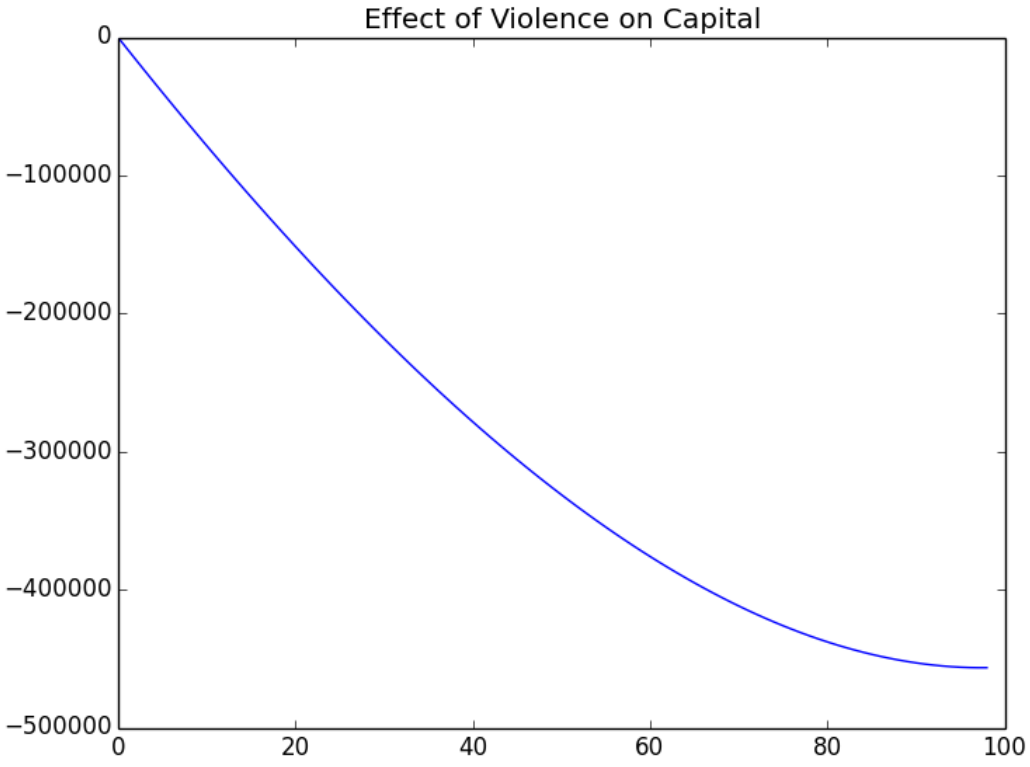
Variable	No Violence	Violent	Shock	Inequality
Beta	.99	.99	.99	.99
Sigma	2	2	2	2
$Theta_1$	.33	.33	.33	.33
$Theta_2$	.67	.67	.67	.67
$Theta_3$	0.000007	0.000007	0.000007	0.000007
g	.001	.001	.001	.001
a	.001	.001	.001	.001
$Capital_1$	100	100	100	150
$Capital_2$	100	100	100	50
Z	40000	40000	40000	40000
$Labor_1$	20000	20000	20000	20000
$Labor_2$	20000	20000	20000	20000

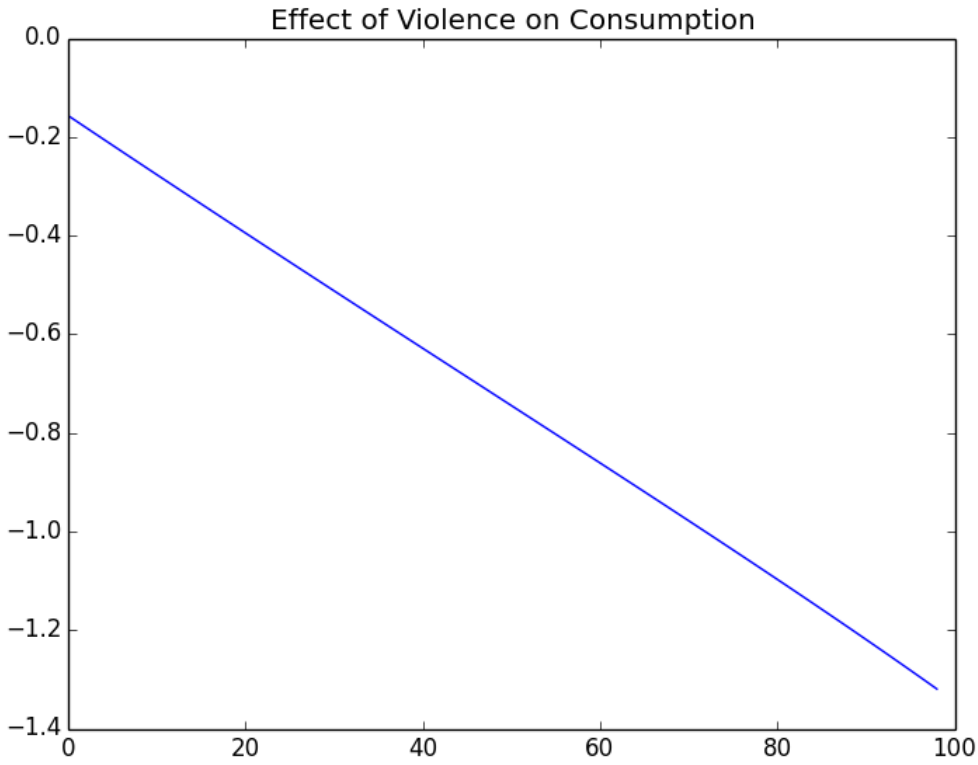
The green capital path is a non-violent society, the red is a violent society, and the blue is a violent and unequal society.

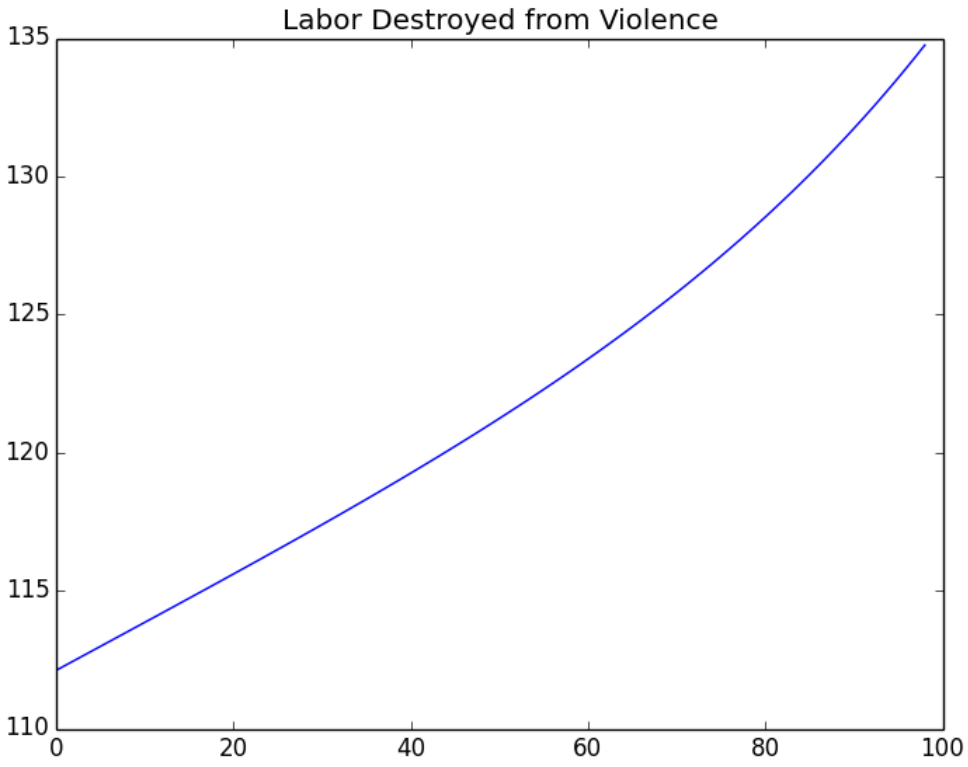


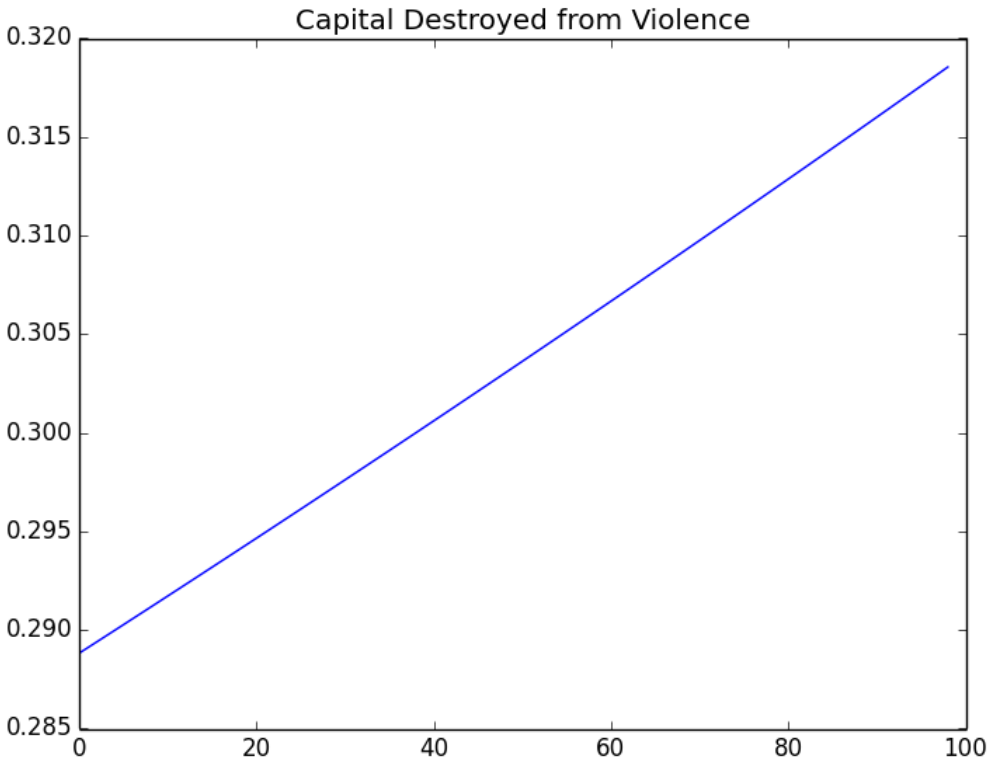
I. Violence

In a model with equal amounts of capital per capita, the introduction of violence severely decreases capital and consumption. The introduction of violence is unequivocally bad for both groups, due to higher depreciation of capital. Since the groups are identical this early in the model, their violence does not result in a net endowment gain. Completely rational play leads to a sub-optimal result with a Pareto improvement possible if violence is curtailed.



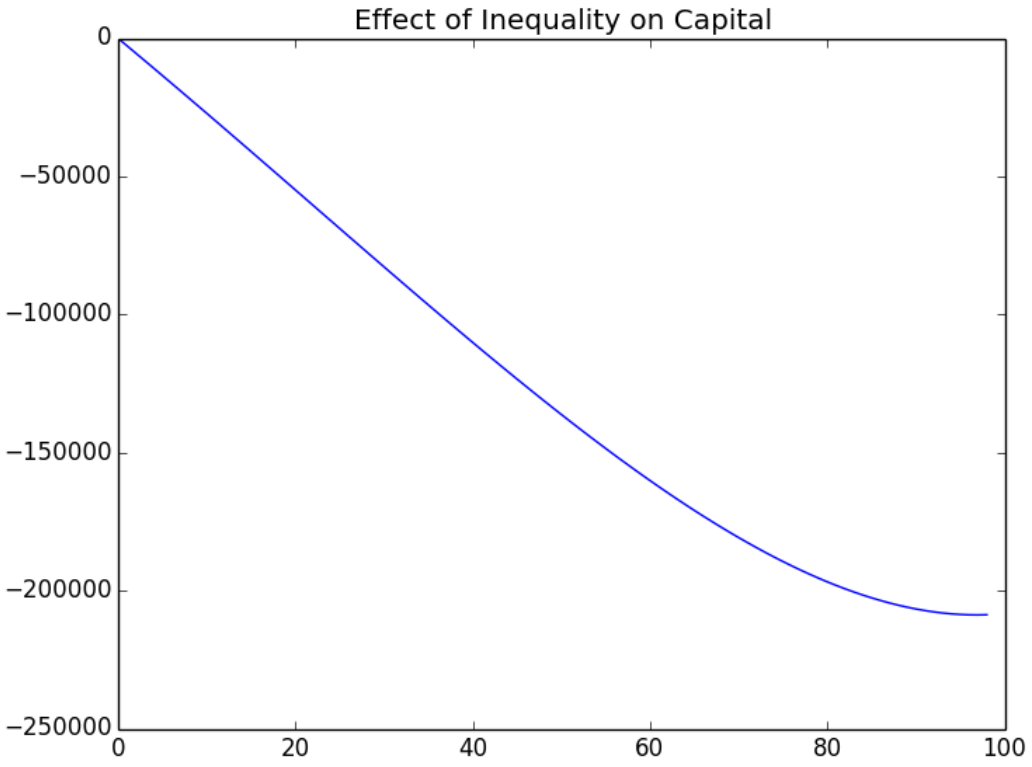

Effect of Violence on Consumption
0.0
−0.2
−0.4
−0.6
−0.8
−1.0
−1.2
−1.4
0
20
40
60
80
100

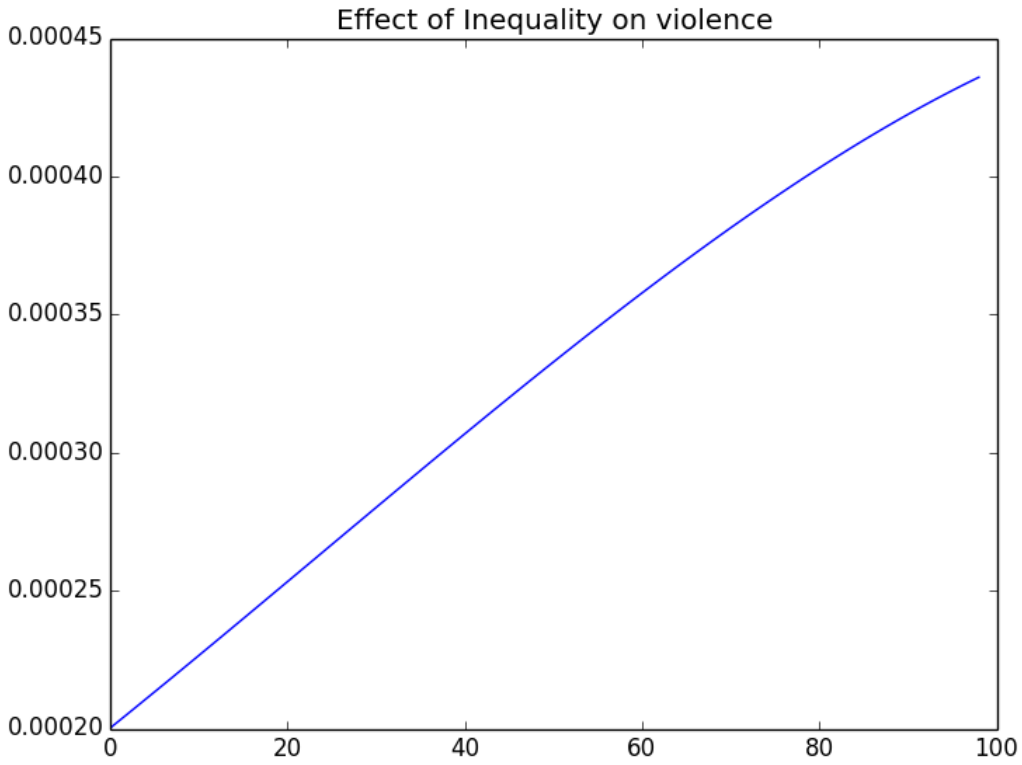

Labor Destroyed from Violence
135
130
125
120
115
110
0
20
40
60
80
100


Capital Destroyed from Violence
0.320
0.315
0.310
0.305
0.300
0.295
0.290
0.285
0
20
40
60
80
100

II. Inequality

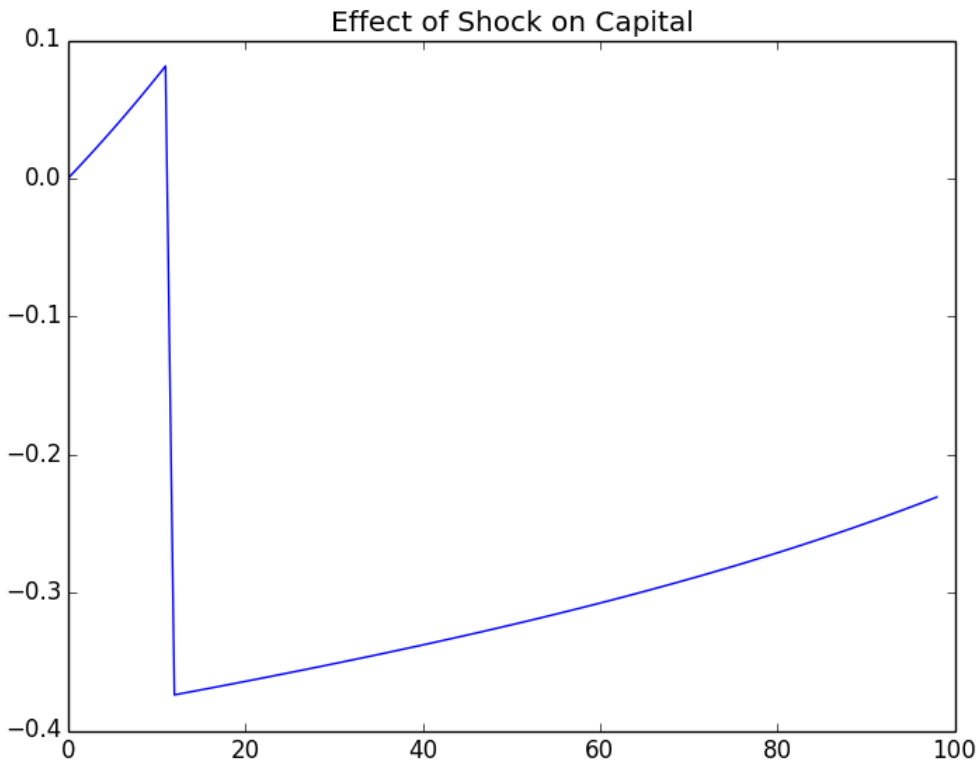
Introducing initial asset level inequality into the model leads to a higher level of violence and a higher level of asset destruction. This occurs because the initial inequality becomes larger over time. The larger inequality grows, the more violence will rise, and asset destruction will rise with it.

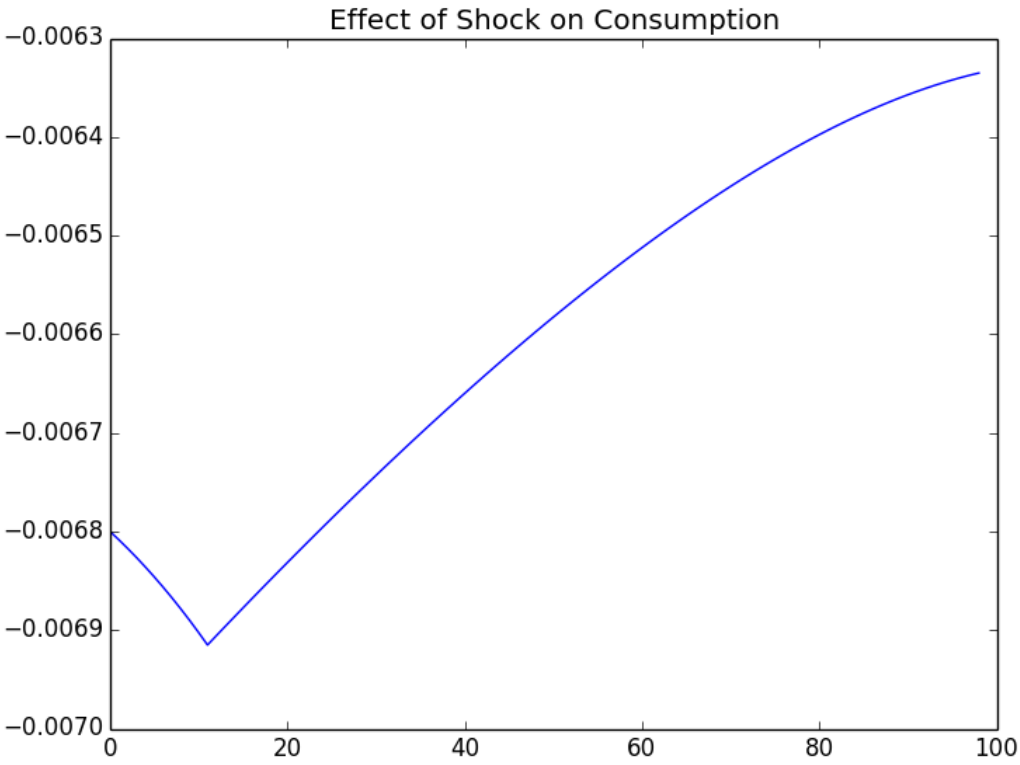



Effect of Inequality on violence
0.00045
0.00040
0.00035
0.00030
0.00025
0.00020
0
20
40
60
80
100

III. Income Shocks

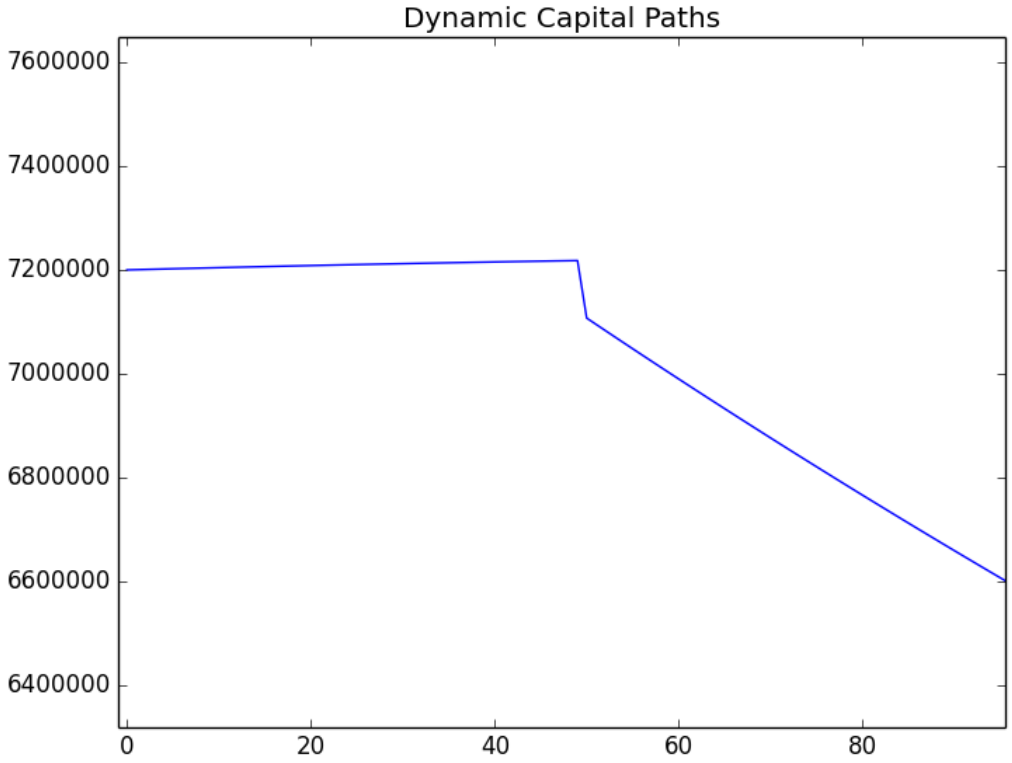
Introducing a labor and capital income shock of 10 percent into the economy has an interesting result. Violence spikes, leading to asset destruction, and never fully recovers to the pre-shock levels of violence. The shock has long, lasting effects on consumption. An initial income shock perpetuates a cycle of poverty reinforced by the recourse to violence pursued by the suddenly poorer groups. This is consistent with Satyanath and Sergenti (2004).

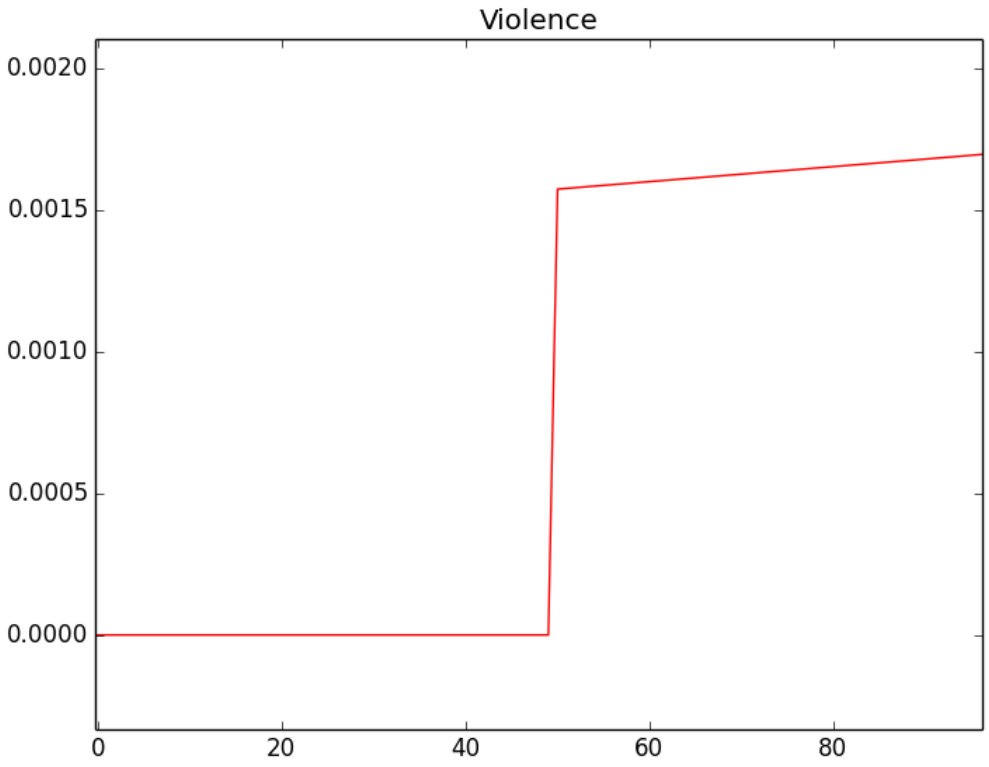



Effect of Shock on Consumption
−0.0063
−0.0064
−0.0065
−0.0066
−0.0067
−0.0068
−0.0069
−0.0070
0
20
40
60
80
100


Effect of Shock on Violence
0.000012
0.000010
0.000008
0.000006
0.000004
0.000002
0.000000
−0.000002
−0.000004
0
20
40
60
80
100

Showing a major, extreme income shock of 50 percent to an economy in a long run balanced growth path has an interesting non-monotonic effect: Violence, which was quiescent due to being below the threshold is activated, leading to a cycle of increasing violence and diminishing capital. Many bloody civil wars evince this vicious cycle of violence.




Violence
0.0020
0.0015
0.0010
0.0005
0.0000
0
20
40
60
80

V. Econometric Analysis

Within my model, the predictors of the total level of violence within an economy are governed by this relationship:

$$\sum_{i=1}^{N} \psi_t^i = \frac{N-1}{\sum_{i=1}^{N} \frac{a_t^i r_t^k}{r_t^n Z(1+\frac{a_t^i}{\sum_{i=1}^{N} a_t^i} - \frac{N^i}{\sum_{i=1}^{N} N^i})}}$$

Using cross-sectional data, I have attempted to determine whether the purported relationship between the level of intergroup wealth inequality, size of capital, and violence is reflected in available data.

$$F(violence_{t+5}^i) = \gamma_1 + \gamma_2(ethineq_t^i) + \gamma_3(phcap_t^i) + \chi_t^i + \mu_t^i$$

for country i and time t.

Where χ are control variables and μ is an error term.

I. Dependant Variable

Political Instability and Violence/Terrorism (Source: Kaufmann, Daniel, Aart Kraay and Massimo Mastruzzi, 2010).

Political Stability and Absence of Violence/Terrorism captures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism. The estimate was reversed, so a higher number means more violence and vice versa. I have data for 2000, 2005, and 2010.

II. Variables of Interest

Produced Capital (Source: The World Bank, Wealth of Nations) Produced capital is sum of physical capital and urban land, which is valued at 24 percent of physical capital across all countries.

Produced capital is defined as accumulation of investment series (gross capital formation), taking into account depreciation at the rate of 5 percent. 20 years is the service lifetime assumption. I have data for 1995, 2000, and 2005.

Ethnic Inequality (Source: Alesina, Michalopoulos, and Papaioannou, 2013). The most accurate measure of group inequality that I have found uses the innovative approach of satellite images of light pollution to proxy for wealth, compared with the ethno-linguistic Narodov Mira Atlas, excluding groups smaller than 1 percent of the population. Using this measure, I can see what the effect of ethnic inequality (but not religious or social inequality) between groups has on violence. I have data for 1992, 2000, and 2006.

III. Control Variables

Total natural resources rents (percent of GDP) (Source: Estimates based on sources and methods described in "The Changing Wealth of Nations: Measuring Sustainable Development in the New Millennium" (World Bank, 2011), accessed through the World Bank)

The amount of the prize of endowment often comes from natural resource rents and weak governance that allows for a single group to sway government spending through violence. There has been a bevy of past scholarship that finds that higher natural resource wealth leads to higher levels of violence (Ballentine and Sherman, 2003; Klare 2001). Total natural resources rents are the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents. I have data for 1995, 2000, and 2005.

GDP (constant 2005 US dollars) (Source: World Bank national accounts data, and OECD National Accounts data files, accessed through the World Bank) GDP at purchaser's prices 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 deductions for depreciation of fabricated assets or for depletion and degradation of

natural resources. The data is in constant 2005 U.S. dollars. Dollar figures for GDP are converted from domestic currencies using 2000 official exchange rates. For a few countries where the official exchange rate does not reflect the rate effectively applied to actual foreign exchange transactions, an alternative conversion factor is used. I have data for 1995, 2000, and 2005.

Minerals (Source: World Bank staff estimates using data from GEM Commodities database and US Geological Survey Mineral Commodity Summaries, accessed through the World Bank)

Mineral wealth is calculated as present value of rents from extraction of minerals, discounted at 4 percent, and over the exhaustion time of the resource. There are ten minerals covered: bauxite, copper, lead, nickel, phosphate, tin, zinc, gold, silver, and iron ore. Exhaustion time = Min (25 years, Reserves/Production). I have data for 1995, 2000, and 2005.

Oil (Source: World Bank staff estimates using data from GEM Commodities database, IMF World Economic Outlook, International Energy Agency, Organization of the Petroleum Exporting Countries, United Nation's Monthly Bulletin of Statistics, British Petroleum (BP) and International Petroleum Encyclopedia (IPE), accessed through the World Bank)

Oil wealth is calculated as present value of rents from extraction of oil, discounted at 4 percent, and over the exhaustion time of the resource. Exhaustion time = Min (25 years, Reserves/Production). I have data for 1995, 2000, and 2005.

Natural Gas (Source: World Bank staff estimates using data from GEM Commodities database, IMF World Economic Outlook, International Energy Agency, Organization of the Petroleum Exporting Countries, United Nation's Monthly Bulletin of Statistics, BP and IPE, accessed through the World Bank)

Natural gas wealth is calculated as present value of rents from extraction of gas, discounted at 4 percent, and over the exhaustion time of the resource. I have data for 1995, 2000, and 2005.

Population, total (Source: United Nations Population Division. World Population Prospects, United Nations Statistical Division. Population and Vital Statistics Report, Census reports and

other statistical publications from national statistical offices, Eurostat: Demographic Statistics, Secretariat of the Pacific Community: Statistics and Demography Programme, and U.S. Census Bureau: International Database, accessed through the World Bank)

Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship–except for refugees not permanently settled in the country of asylum, who are generally considered part of the population of their country of origin. The values shown are midyear estimates. I have data for 1995, 2000, and 2005.

Armed forces personnel (percent of total labor force) (Source: International Institute for Strategic Studies, The Military Balance, accessed through the World Bank)

Armed forces personnel are active duty military personnel, including paramilitary forces if the training, organization, equipment, and control suggest they may be used to support or replace regular military forces. Labor force comprises all people who meet the International Labour Organization's definition of the economically active population. I have data for 1995, 2000, and 2005.

The data will generate three cross-sectional regressions. I lag the dependent variable and match it with variables that are as near to five years previous as there is data available. The data set contains 152-154 countries depending on the year. All standard errors are robust to correct for heteroskedasticity. I have data for 1995, 2000, and 2005.

Table 2: *Violence Levels*

Violence	Inequality	Physical Capital
2000	1.597225***	-.0056793***
	(.3285043)	(.0018564)
2005	1.746887***	-.0045778***
	(.3447875)	(.0015077)
2010	1.812854***	-.0023844*
	(.2773427)	(.0014522)

*** significant at 1 percent, * significant at 10 percent

A major issue encountered in this type of regression is data availability. The most violent societies lacked data, leading to serious attenuation bias in my results. The coefficients are as expected, with negative values for physical assets, and positive values for ethnic inequality. Of course this regression should not be taken too strongly considering the assumptions required, but it is an encouraging result as to the viability of the model.

VI. Conclusion

When trying to explicitly model the complex relationships between wealth, production, and resource rents, there will always be a question of how wrong the resulting model inevitably is. I have tried throughout this process to be conservative with my estimates and assumptions. Personally I feel that most conflict-prone societies have a much lower discount rate than the one I have chosen. Violence likely has an exponential effect on depreciation rather than a linear one. In poor countries a higher endowment from natural resources leads to lower rents from capital (Birdsall, Pinckney, and Sabot, 2000) and the endowment is a much larger share of income than I have modeled here. However, it is best to err on the side of caution, which I have tried to do.

Further extensions of this model would be to add uncertainty about opposition strategies and depreciation functions to reflect what has been found with game theory in the literature: that uncertainty increases the likelihood of rational conflict (Bester and Warneryd, 2006). Further, the wage rate offered to members of a conflict group could be dependent upon whether an individual is in the dominant conflict group (determined by size and violence level). A model incorporating these extensions would be a useful future exploration.

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