Implications of an Economic Theory of Conflict: Hindu-Muslim Violence in India

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Violence

Why talk of Violence?

- Lowers productivity
- Causes political instability which reduces investments
- Goes against the concepts of right to life, equality etc thus entering policy decisions of the government.

Internal Violence

- Can income affect violence?
- Can government curb violence by using observables such as incomes?
- Can we separate more belligerent groups in violent altercations when there are reporting biases?

Emperical Analysis

Data set for violence:

- compiled by S. Wilkinson and A. Varshney based on Times of India reports on Hindu-Muslim conflicts in India post-1950. Using 1979-2000 in this study.
- No information on who initiated the conflict or identified the groups to which the casualties belonged to.
- Between 1950-1995 almost 1,200 riots were reported. 7000 individuals were reportedly killed.
- Between 1984-1995 there were 674 riots reportedly claiming 5000 lives. This is also the period of greater economic growth for India.

Data set for incomes and religion

- NSS data collected at thick rounds (1983, 1987-8, 1993-4) for 55 "regions".
- Religious affiliations of these households recorded (household heads).

OLS regression function:

$$ln(count_{it} + 0.01) = \gamma_i + \tau_t + \mathbf{X_{it}}'\beta + error_{it}$$

$\mathbf{X'_{it}}$ contains the variables, per capita expenditure, inequality, religious polarization etc. γ_i is the region fixed effects and τ_t is the time fixed effects.

Empirical Analysis:Statewise riots

State	1984-88			1989-93			1994-98		
	Casualties	Killed	Outbreak	Casualties	Killed	Outbreak	Casualties	Killed	Outbreak
Andhra Pradesh	320	48	14	226	165	11	141	8	2
Bihar	62	18	4	647	485	29	187	42	6
Gujarat	1932	329	97	1928	557	75	639	2	3
Haryana	0	0	0	6	4	2	0	0	0
Karnataka	300	38	19	430	82	32	235	39	7
Kerala	17	0	2	42	5	3	0	0	0
Madhya Pradesh	139	17	8	794	174	12	22	2	1
Maharashtra	1250	333	57	2545	808	29	238	9	11
Orissa	0	0	0	62	16	6	0	0	0
Punjab	13	1	1	0	0	0	0	0	0
Rajasthan	14	0	4	302	75	15	66	6	3
Tamil Nadu	21	1	1	125	12	5	67	33	5
Uttar Pradesh	963	231	38	1055	547	48	217	50	22
West Bengal	71	19	7	148	59	12	0	0	0

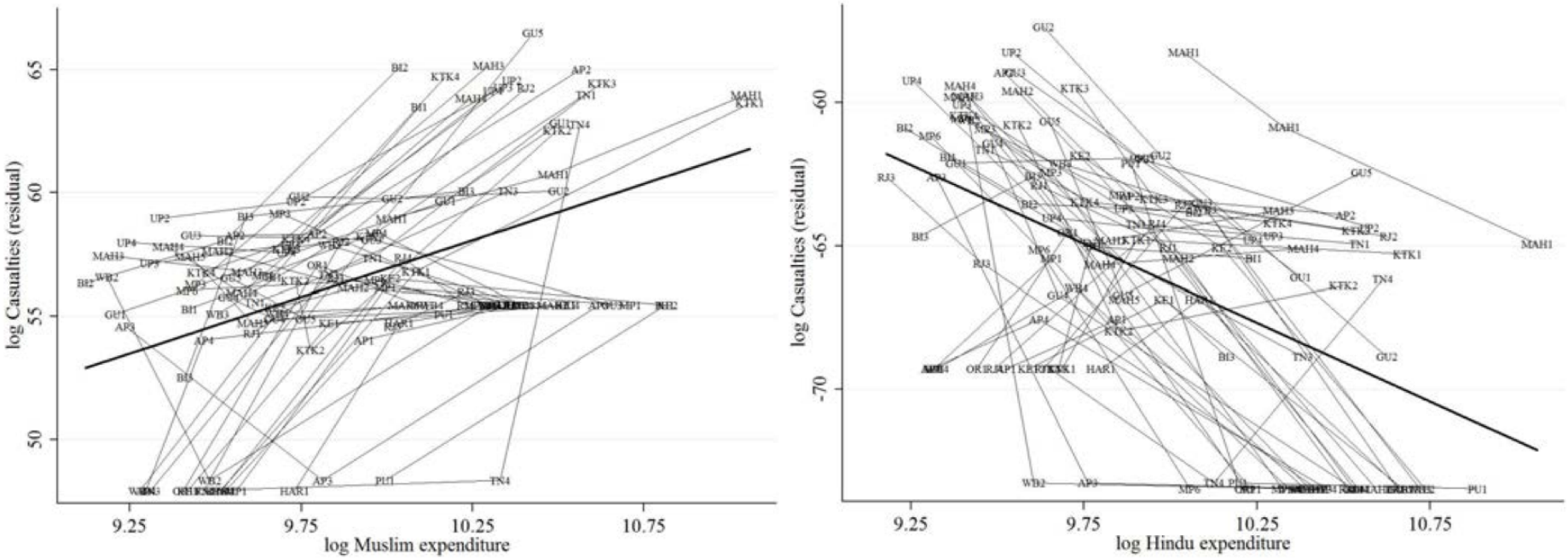
Table 1. Descriptive Statistics: Conflict. *Sources and Notes.* Varshney-Wilkinson dataset on religious riots. "Conflict" is measured by aggregates of casualties (killed + injured), killed and outbreaks over a five-year period.

Empirical Analysis: Statewise Hindu-Muslim pce

	1983			1987-8			1993-4		
State	H-M exp. ratio	Min	Max	H-M exp. ratio	Min	Max	H-M exp. ratio	Min	Max
Andhra Pradesh	0.99	0.96	1.09	0.99	0.92	1.17	0.99	0.84	1.16
Bihar	0.98	0.88	1.12	1.07	1.02	1.12	1.03	0.93	1.16
Gujarat	1.02	0.89	1.19	0.98	0.78	1.14	1.06	0.88	1.13
Haryana	1.20	1.07	1.53	0.96	0.85	1.05	1.60	1.39	1.93
Karnataka	0.98	0.84	1.19	1.00	0.83	1.07	1.01	0.69	1.15
Kerala	1.10	1.07	1.19	1.15	1.15	1.16	1.01	0.92	1.16
Madhya Pradesh	0.92	0.78	1.38	0.86	0.71	1.04	0.88	0.62	1.16
Maharashtra	1.04	0.97	1.25	1.04	0.74	1.29	1.12	0.87	1.42
Orissa	0.69	0.36	1.04	0.85	0.58	0.93	0.96	0.73	1.13
Punjab	0.86	0.75	1.15	1.21	1.19	1.22	1.18	1.08	1.34
Rajasthan	0.97	0.43	1.18	1.02	0.46	1.19	1.22	1.06	1.35
Tamil Nadu	1.06	0.82	1.44	0.88	0.80	0.94	0.98	0.85	1.05
Uttar Pradesh	1.12	1.01	1.23	1.11	0.95	1.54	1.08	0.93	1.31
West Bengal	1.18	1.05	1.26	1.21	1.05	1.31	1.25	1.07	1.38

Table 2. Descriptive Statistics: Economic Data. *Sources and Notes. National Sample Survey* 38th, 43rd and 50th rounds. H-M exp. ratio = Hindu per-capita expenditure/ Muslim per-capita expenditure, average value for the state. The range for the state comes from the constituent regions of the state.

Empirical Analysis: Correlation of pce and conflict



(a) Conflict and Muslim Expenditure

(b) Conflict and Hindu Expenditure

Figure 4. CONFLICT AND PER-CAPITA EXPENDITURE. Each panel plots the residual of casualties after region and time effects have been removed, in the 5-year period following expenditures. Each line segment connects three data points for a region.

Empirical Analysis: Regression Results

	Poisson [1]	Poisson [2]	Poisson [3]	Neg. Binom. [4]	OLS [5]
Hindu per-capita expenditure	***-8.325	***-7.869	***-6.824	-3.310	*-8.462
	(0.005)	(0.005)	(0.003)	(0.131)	(0.085)
Muslim per-capita expenditure	***5.627	***5.103	***4.670	**3.872	***9.523
	(0.000)	(0.000)	(0.001)	(0.023)	(0.009)
Population	3.353	4.280	3.914	0.744	-1.230
	(0.554)	(0.468)	(0.496)	(0.132)	(0.877)
Religious Polarization	5.103	*5.552	*5.566	1.094	6.860
	(0.104)	(0.054)	(0.056)	(0.715)	(0.408)
Literacy Rate		0.021	0.023	-0.015	-0.043
		(0.298)	(0.242)	(0.525)	(0.552)
Urbanization Rate		-0.020	-0.017	0.015	-0.055
		(0.258)	(0.354)	(0.405)	(0.371)
Gini: Hindu per-capita exp.			-5.426	4.121	-14.473
			(0.317)	(0.521)	(0.342)
Gini: Muslim per-capita exp.			3.399	-5.952	-11.073
			(0.497)	(0.362)	(0.451)
1% rise in Hindu exp. reduces conflict by	8.0%	7.6%	6.5%	3.2%	8.1%
1% rise in Muslim exp. raises conflict by	5.7%	5.2%	4.8%	3.9%	9.9%
Log-Likelihood/Adjusted R^2	-3,468	-3,416	-3,357	-302.20	0.348
Observations	129	129	129	129	129

Empirical Analysis

	Poisson		Negative Binomial		OLS	
	[1] Killed	[2] Outbreak	[3] Killed	[4] Outbreak	[5] Killed	[6] Outbreak
Hindu per-capita expenditure	-0.073	-2.122	-2.249	*-5.369	-4.267	**-6.304
	(0.976)	(0.393)	(0.293)	(0.069)	(0.339)	(0.019)
Muslim per-capita expenditure	0.852	*2.493	**3.692	**4.158	**6.415	***6.421
	(0.636)	(0.067)	(0.030)	(0.016)	(0.043)	(0.006)
1% rise in Hindu exp. reduces conflict by	0.1%	2.1%	2.3%	5.2 %	4.2%	6.0%
1% rise in Muslim exp. raises conflict by	0.9%	2.5%	3.7%	4.2%	6.6%	6.6%
Log-Likelihood/Adjusted R^2	-730.84	-149.57	-193.27	-128.76	0.402	0.435
Observations	126	132	126	132	126	132

Empirical Analysis: Controlling for Political Funding

	[1] Exp. Ratio	[2] Politics	[3] Urban	[4] Urban	[5] Urban
Hindu per-capita expenditure		***-6.825	**-5.096		
		(0.003)	(0.024)		
Muslim per-capita expenditure		***4.668	*3.617		
		(0.001)	(0.056)		
Muslim-Hindu exp. ratio	***4.783			**3.772	*2.521
	(0.000)			(0.042)	(0.090)
Per-capita expenditure	-3.356			-2.477	-2.911
	(0.208)			(0.182)	(0.167)
% Lok Sabha held by BJP		-0.030	0.915	0.928	0.118
		(0.965)	(0.144)	(0.152)	(0.878)
Literacy rate	Y	Y	N	N	Y
Primary education completion rate	N	N	Y	Y	N
Urbanization rate	Y	Y	N	N	N
1% rise in Muslim-Hindu exp. ratio raises conflict by	4.9%			3.8%	2.5%
1% rise in Hindu exp. reduces conflict by		6.5%	4.9%		
1% rise in Muslim exp. raises conflict by		4.8%	3.7%		
Log-Likelihood/Adjusted R^2	-3,318.69	-3,357.20	-3,064.43	-3,028.97	-3,735.57
Observations	129	129	123	123	123

Empirical Analysis: Religious rioting and General rioting

	A. Addressing Endogeneity				B. Placebo Tests, All Riots		
	[1] 2-SLS	[2] GMM	[3] GMM	[4] OLS	[5] Poisson	[5] Neg Bin	[5] OLS
Muslim-Hindu exp. ratio	***26.831	*8.587	**11.518	**7.122			-0.056
	(0.004)	(0.085)	(0.035)	(0.034)			(0.696)
Past Casualties			-0.107				
			(0.416)				
First Stage							
Muslim index/Hindu index	***0.782						
	(0.001)						
F-statistic	10.63						
Hansen J test, $P > \chi^2$			0.537				
R^2	0.056			0.346			0.028
Overall fit, $P > \chi^2$		0.000	0.000				
Observations	129	129	86	129			165
1% rise in ratio changes conflict by	26.8%	8.6%	11.5%	7.1%			-0.06%

Empirical Analysis

Results:

- Increase in per capita expenditure of Hindus decreases conflict
- Decrease in per capita expenditure of Muslims increases conflict
- What is the story behind these results?

Theory: Set up

- Two groups (group 1 and 2) and two types of people: victims and aggressors.
- Each group has a propensity to attack given by ρ_i.
- Nature picks victims with probability $1 - \rho_i$ and an aggressor with probability ρ_i in group i. An individual can either be an aggressor or a victim. He *cannot* be both.
- Note that in a group there can be both aggressors and victims. We assume aggressors only target victims.
- The outcome of being a victim or aggressor is independent of the income of that individual, though this is not to say that the decision to actually attack someone will be independent of income as we will see later.

Theory: Set up

- Let n_i denote the number of individuals that group i has.
- As we are studying "between-group" violence we assume a group j victim will only be attacked by a group i aggressor and a group i aggressor will attack only a group j victim.
- As Srinivas pointed out there is an explicit assumption that the number of aggressors in a group is lesser than the number of victims that they can *possibly* attack (i.e. $\rho_i n_i > (1 - \rho_j) n_j$).
- Thus, the probability that a typical person of a group $j \neq i$ is victimized is $\rho_i n_i / (1 - \rho_j) n_j$. This can also be thought of as the probability that a victim of group j is attacked by an aggressor of group i.

Theory: Set up

- Each individual has an expected payoff that he tries to maximize against his alternatives or through his choice variables.
- Victims and aggressors have different choice variables, exogenous variables and payoff functions.
- In the next few slides we try to set up conditions for the equilibrium level of violence against the individuals of a particular group with income y.
- W.l.o.g let us assume we are considering the violence faced by group j with income y. Thus, we are evaluating the equilibrium violence on group j victims with income y by all group i aggressors.

Theory: Set up

Victim Variables:

- A victim of group j with income y perceives a probability of attack α by group i aggressors.
- He cannot observe the income of the attacker
- He has the decision over the amount of defence, d, he will invest
- The prob. of a success of an attack, $p(d)$, is a continuous decreasing function of d.
- Putting up d defence costs $c(d)$ which is an increasing continuous function of d.
- Let μ be the loss if attack is successful and β be the loss if the attack is not successful ($0 \leq \beta \leq \mu \leq 1$).
- We assume that the utility of consumption for the victim is linear.

Theory: Set up

Victim's Maximizing problem

- Thus the victim's expected payoff is given by:

$$(1-\alpha)y + \alpha\{p(d)(1-\mu)y + [1-p(d)](1-\beta)y\} - c(d)$$

- We have the following optimization problem:

$$\begin{aligned}\underset{d}{\text{argmax}} \quad & (1-\alpha)y + \alpha\{p(d)(1-\mu)y + [1-p(d)](1-\beta)y\} - c(d) \\ = \underset{d}{\text{argmin}} \quad & \alpha(\mu-\beta)p(d) + c(d)/y \qquad (1) \\ = \; & d_j(\alpha, y)\end{aligned}$$

Thus the optimal probability of success of attack for a victim in group j is a function of α and y. Lets call this function $p_j(\alpha, y)$

Theory: Set up

Aggressor's Variables and optimization problem

- Aggressor of group i perceives probability of success of attack, p, on group j with income y.
- She has the decision to attack a victim of income y or not. She has complete information about her victim's income.
- If attack is successful she will get extra λy where $\lambda \in [0, 1]$.
- Income earned per unit time is z, and fraction of time taken to attack is given by t.
- Given linear preferences of consumption an aggressor will attack a member of the other group if

$$(1-p)(1-t)z + p([1-t]z + \lambda y) > z$$

$$\implies z < (\lambda p/t)y$$

Theory:Set up

Aggregate impact of aggressor decision

- The probability of an attack, $\alpha_j(y, p)$ depends on the number of aggressors that decide to attack and the probability that the two groups will confront each other, $\pi(= \rho_i n_i/(1-\rho_j)n_j)$.

$$\alpha_j(p, y) = \pi A[(\lambda p/t)y] \tag{2}$$

- Where A(.) is the cumulative distribution of income of the aggressors.

Theory: Best Responses and Equilibrium

- Call the best response function of victims with income y which yields the map on (α, p) plane the protection function. The function can be obtained by $p_j(\alpha, y)$.
- The best response functions of aggressors which yields probability of attack on victims with income y as a function of p on the plane (α, p) is called the attack function. The function can be obtained by $\alpha_j(p, y)$.

Observation

For every y, the protection function generates success probabilities p that weakly decrease in α, while the attack function generates attack probabilities α that strictly increase in p. There is a unique equilibrium.

Theory: Proof of Observation

- We skip the proof of existence but know that if the the equilibrium does exist, it is enough to prove that the protection function is decreasing and the attack function is increasing for there to be a unique equilibrium.
- The **attack function** is given by (2) which is an increasing function of p as $A(.)$ is an increasing function (by virtue of being the cumulative distribution of group i aggressors with incomes z).
- The **protection function** for victims of income y is decreasing in p.

Theory: Proof of Observation

Proof.

Let d_1 and d_2 be the minima that satisfy (1) for perceived probabilities of attack α_1 and α_2 respectively. Then,

$$\alpha_1(\mu-\beta)p(d_1)+c(d_1)/y \leq \alpha_1(\mu-\beta)p(d_2)+c(d_2)/y$$

and

$$\alpha_2(\mu-\beta)p(d_2)+c(d_2)/y \leq \alpha_2(\mu-\beta)p(d_1)+c(d_1)/y$$

Adding the equations and re-arranging the terms we get

$$(p(d_1)-p(d_2))(\alpha_1-\alpha_2) \leq 0$$

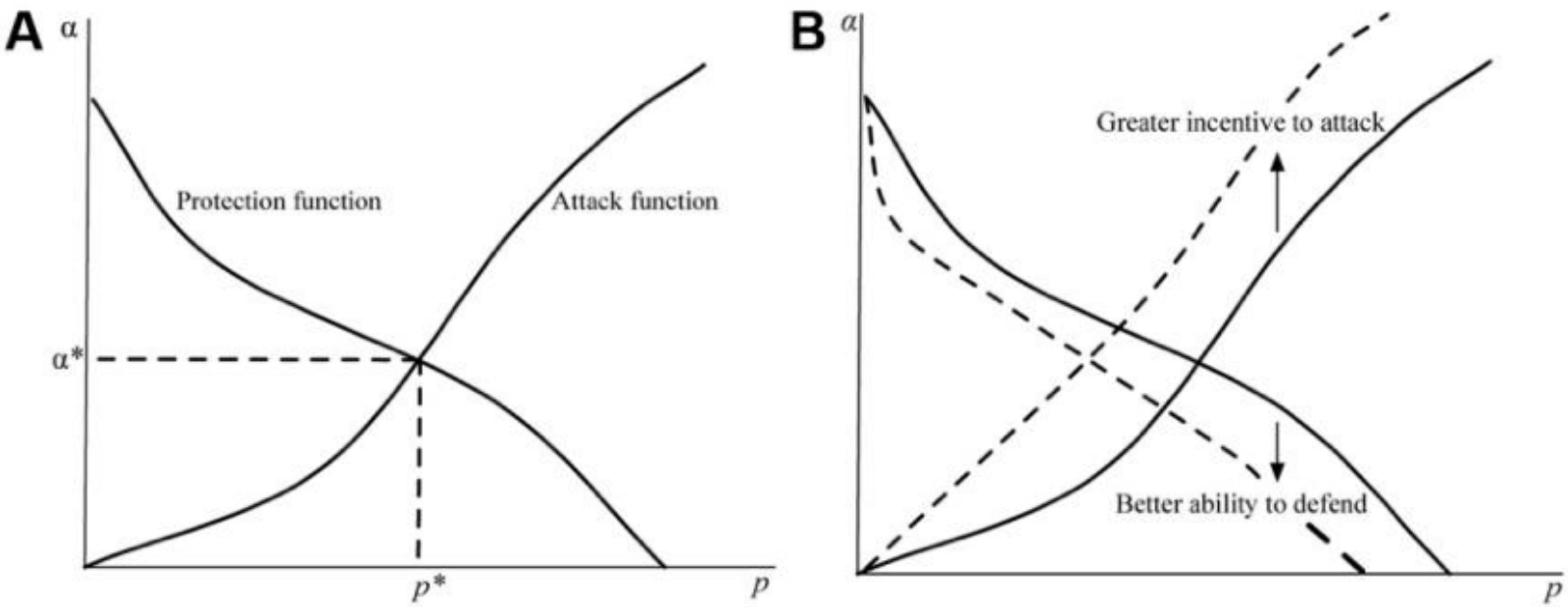
If $\alpha_1 > \alpha_2$, $p(d_1) \leq p(d_2)$. ■

Theory: Equilibrium and different values of y

- For an increase in y for group j there is a leftward shift in the attack function since for every perceived success of an attack the number of group i aggressors with incentive to attack victims of group j will increase thus increasing the probability of attack on group j.
- For the protection function there is a leftward shift as y increases. The formal proof is similar to the proof which shows that the protection function is a decreasing function in p (replace α_1 and α_2 with y_1 and y_2 respectively).
- The intuition behind this is that as y increases for a group j victim, the loss on the success of an attack is greater resulting in a greater investment in defence.
- The equilibrium violence against group j victims with income y changes ambiguously.

Theory: Equilibrium and different values of y

- Below there is an illustration of the equilibrium values of violence on group j victims with income y given by the probability of attack $\alpha_j(y)$.
- However, notice that the changes of the cost of defence with respect to changes in y can affect the amount of shift of the protection function with changes in y.



Theory: Cost of defence

- Defence with human protection (he relies on help from other members from the group)
  - Cost incurred by reciprocal protection of others
  - Cost is proportional to the average income of the group, $\bar{y}$, as opportunity cost of reciprocal protection would increase with average group income (more victims who will be attacked).
  - Cost is given by wd. Thus, $w(\bar{y}) = \phi\bar{y}$ where ϕ is some positive constant.
- Defence with capital
  - Fixed capital F, lower variable cost $w^* \leq w$ where w^* is independent of group income.
- cost of defence $c(d) = min\{wd, F + w^*d\}$

Theory: Aggregates

- Remember that we have looked at the equilibrium violence ($\alpha_j(y)$) toward group j victims that have income y.
- As we are interested in the *total* violence against a group we are interested in the proportion of victims who choose different optimal strategies.
- Since each victim has only one income total violece is given by:

$$\alpha_j = \int_0^\infty \alpha_j(y) v(y) dy$$

  where v(y) is the probability that a group j victim has an income y.
- In the next few slides we are concerned with the total violence against a group.

Theory: Changes in income

Proposition 1: Assume w is proportional to average group incomes. Then

- There exists a threshold income y^* such that an equiproportionate increase in group incomes that keeps all incomes below y^* increases the probability of attack on a group.
- An equiproportionate increase in the incomes of a group unambiguously lowers attacks instigated by members of that group

For very low values of income, an increase in victim income is not sufficient to change the choice of d. So there is unambiguous increase in $\alpha_j(y)$. This is primarily because an equiproportionate increase of incomes in a group means

$$w(\bar{y})/\bar{y} = w(\bar{y})/y = \phi$$

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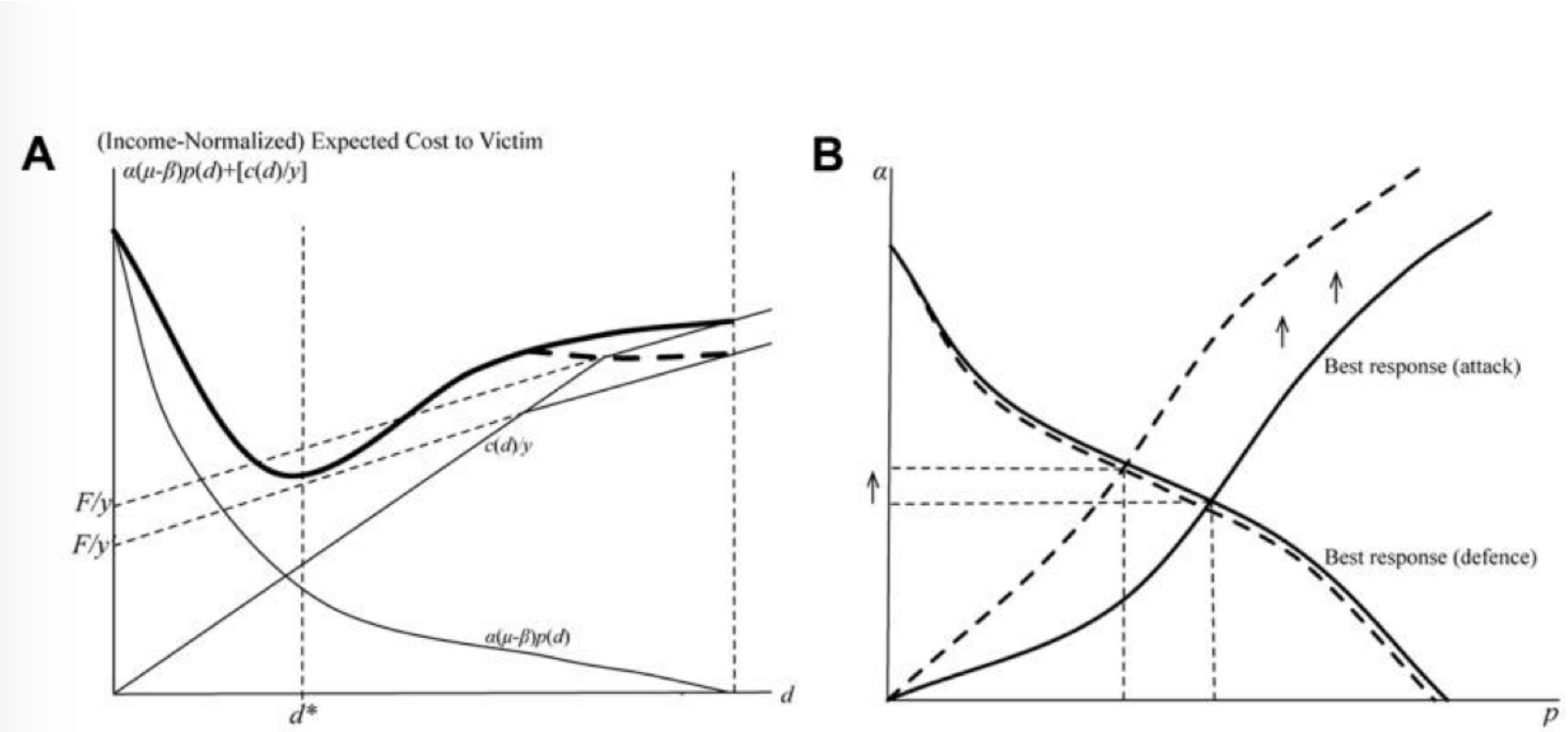


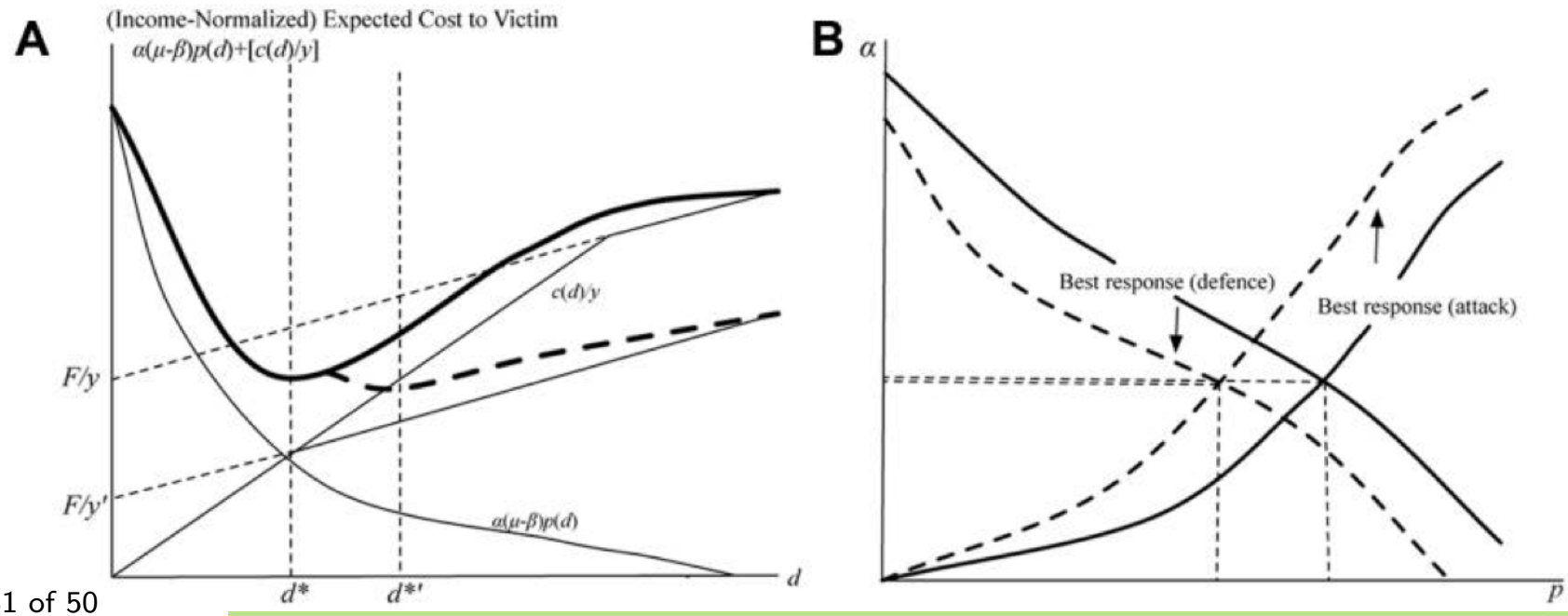
Theory: Change in incomes

- Suppose all victims had very low values of income, then they would all depend on social protection. For small increases in income the drop in (1) by investing in defence with capital is not enough for victims to shift to defence with capital.
- This means for a small enough shift in low enough overall incomes, victims will continue to use the same amount of defence for all perceived probabilities of attack, resulting in *no* shift in the protection function for *all* incomes.
- However, as we observed earlier, an increase in the victim's income will shift the attack function to the left.
- Hence there will be an unambiguous increase in total violence against group *i* victims.

Theory: Change in incomes

- Notice that the a bound to the probability attack is π. Thus, given an equiproportionate increase Δy there is a threshold initial income level $\hat{y}(\Delta y)$ below which group j victims will unambiguously face higher violence.
- Conversely, if all group j victims are sufficiently poor, there is a threshold increase in y, Δy, such that violence increases unambiguously for *all* group j victims.

- For income levels that cross the threshold income, there is ambiguity in whether there is increase in overall violence.
- This is because there is a much greater amount of defence (through defence by capital) used by victims resulting in lower success of attacks.
- If $v(\hat{y}(\Delta(y))$ is a small proportion of the total group j victim population then α_j (total violence against j) might still increase.



Theory: Changes in Income

- Consider the equation (2). As z increases the incentive to attack a victim with an unchanged income decreases.
- Thus, group i *attackers* who are indifferent to attacking and not attacking group j victims do not attack when z increases for all group i *aggressors*.
- This results in a rightward shift of the attack function for all victim income groups.
- Since victims cannot observe aggressor incomes, there is no change in the protection function when aggressor incomes change.
- Thus, an equiproportionate increase in aggressor incomes unambiguously decreases the equilibrium violence against *all* group j income groups. So, α_j decreases.

Reconciling Theory with Empirical results

- Remember in our regression results there we do not know which side committed more violence.
- However, assuming this theory is complete we can say
  - Since violence decreases when Hindus' income increase, the number of attackers from Muslim community that attack do not out weigh the number of attacks reduced by Hindus. This indicates that there are more aggressors in the Hindu community.
  - Since violence increases when Muslims' incomes increase, this indicates that most of the Muslim population lives below a threshold level of income.

Other explanations for Empirical Results?

- There is reason to believe this theory is incomplete.
- What if Muslims are inherently more violent, and get encouraged to do more violence with higher income?
- Muslims reportedly have greater losses than Hindus. Muslims' Greater belligerence through greater income, having no effect on the belligerence of Hindus with greater destruction of Muslim property seems contradictory.
- However, it is possible that funding violence is beneficial instead of actively participating in violence. The next section deals with this question.

Theory: Funded violence

Let us assume that we have a utility function with constant elasticity i.e

$$u(x) = x^{1-\sigma}/(1-\sigma)$$

with $\sigma \in (0,1)$. An aggressor has the option of physically participating in the violence or funding it. Aggressor's participation in violence condition:

- The payoff for participatory violence is

$$P(z) = (1-p)u((1-t)z) + pu((1-t)z + \lambda y)$$

- The payoff for funded violence is

$$M(z) = (1-p)u(z-f) + pu(z-f+\lambda y)$$

- In order for violence to occur $M(z) > u(z)$ or $P(z) > u(z)$.
- We assume there are no shortage of aggressors to choose from for the sponsor.
- The payoff of sponsored party is

$$m(z) = u((1-t)z + f)$$

.

Theory: Funded Violence

Proposition 2: A balanced increase in group incomes that causes both the funding requirement f and all aggressor incomes z to rise in equal proportion must reduce attacks perpetuated by members of that group.

- We know that an increase in incomes reduces participatory violence.
- If funding is happening to the same aggressors in the group then to induce participation, the funding f must increase in roughly the same proportion as z has risen.
- So, to the individual who is funding violence, the ratio of the opportunity cost of funding to her new income remains the same.
- Thus an increase in her income will make her less likely to fund.

Theory: Funded Violence

Formally we have the following proof of Proposition 2.
Proof we have for participatory violence:

$$[1-p]\frac{[z(1-t)]^{1-\sigma}}{1-\sigma}+p\frac{[z(1-t)+\lambda y]^{1-\sigma}}{1-\sigma}>\frac{z^{1-\sigma}}{1-\sigma}$$

Dividing by $[z(1-t)]^{1-\sigma}$ we have

$$\frac{[1-p]}{1-\sigma}+p\frac{\{1+\lambda y/[z(1-t)]\}^{1-\sigma}}{1-\sigma}>\frac{1/(1-t)^{1-\sigma}}{1-\sigma}$$

Now if z increases then the LHS will fall, and the attackers on the borderline will stop indulging in participatory violence and participatory violence will decrease.

Theory: Funded Violence

For funded violence within the group i the sponsor will have to ensure that to whoever she is funding has

$$m(z) \geq u(z)$$

. As she wants to reduce her costs of funding (her expected utility is a decreasing function of f, the payoff to the sponsored party is:

$$\frac{[z(1-t)+f]^{1-\sigma}}{1-\sigma} = \frac{z^{1-\sigma}}{1-\sigma}$$

$$\implies \frac{\{1+f/[z(1-t)]\}^{1-\sigma}}{1-\sigma} = \frac{(1/(1-t)^{1-\sigma}}{1-\sigma}$$

$$\text{Since arguments are positive}$$

$$\implies [1-f/z] = (1-t)$$

$$\implies f/z = t$$

- Since all agents are utility maximizers at equilibrium the sponsor has optimally picked her sponsored party. Thus, a balanced increase in the income of all possible sponsored parties will not allow the sponsor to change the sponsored party. In order to get the current sponsored party to continue attacking victims, f should increase proportionately with z.
- We know the relationship between f and z is given by: $f/z = t$, and so the proof for decrease in funded violence follows as in the proof for decrease in participatory violence with increase in income.
- Thus, participatory violence and funded violence decrease simultaneously when there is a balanced increase in the incomes of aggressors. ■

Theory: Funded Violence

- So, according to this model, within-group funding is not a possible explanation of the hypothesised increase in violence by Muslims.
- However, it is still possible that the aggressors fund individuals outside the group to attack victims of group i.
- In this case the funding costs will be independent of the incomes of the group i.

Theory: Funded Violence

Proposition 3: Suppose that both funding and direct participation can be used to generate a violent attack and that f does not change with z. Then

1. if funded violence is preferred to participatory violence at income z, the same preference is maintained for all $z' > z$;
2. if funded violence is preferred to peace at income z then it is preferred for all higher incomes.
3. if participatory violence is preferred to peace at income z, then it is preferred for all lower incomes.

Theory: Funded Violence (Prop 3)

Comparing participatory and funded violence:
An aggressor takes up participatory violence if:

$$P(z) > M(z)$$

The only difference between the payoff of participatory violence and funded violence is their individual cost to the aggressor. Thus, participatory violence will prevail if $f/z > t \implies f/t > z$. Since f and t are not determined by the income levels of the aggressors in group i, there is a threshold income level for participatory violence. If income is greater than f/t then funding violence is more beneficial. The intuition behind this is that for large aggressor incomes the opportunity cost of participating (in the form of forgone wages) is higher than incurring a fixed cost.

Theory: Funded Violence (Prop 3)

Comparing peace and funded violence:

Note that funded violence is a more risky investment than peace. If aggressors have decreasing absolute risk aversion with respect to income then a risky bundle preferred at a some income z will be preferred at an income $z' > z$. Since we have a function whose second derivative exists we can calculate the coefficient of absolute risk aversion:

$$\begin{aligned} \text{CARA} &= -u''(z)/u'(z) \\ &= -(-\sigma)\frac{z^{-1-\sigma}}{z^{-\sigma}} \\ &= \frac{\sigma}{z} \end{aligned}$$

Thus, risk aversion decreases with income and if funded violence is preferred by an aggressor then it will be preferred by her at all greater incomes.

Theory: Funded Violence (Prop 3)

Comparing peace and participatory violence:
We have already proved this case in proposition 2 so we will skip the proof here.

Muslim Funding of Violence?

- The implication of the proposition is shown graphically in the left figure in the next slide. The figure on the right regresses the effect of expenditure on violence on the 'income bracket' of the region. There is negligible difference to be found.

Theory: Funded Violence

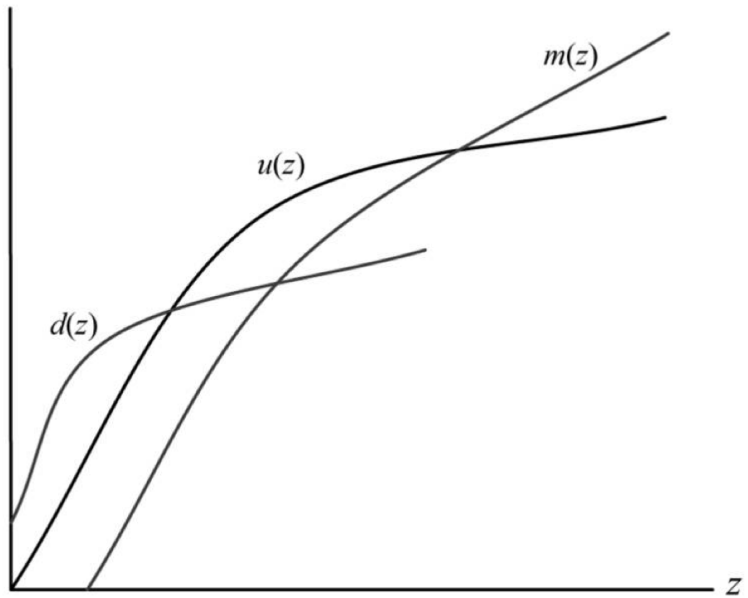


FIG. 6.—Participation and funding: low and high incomes

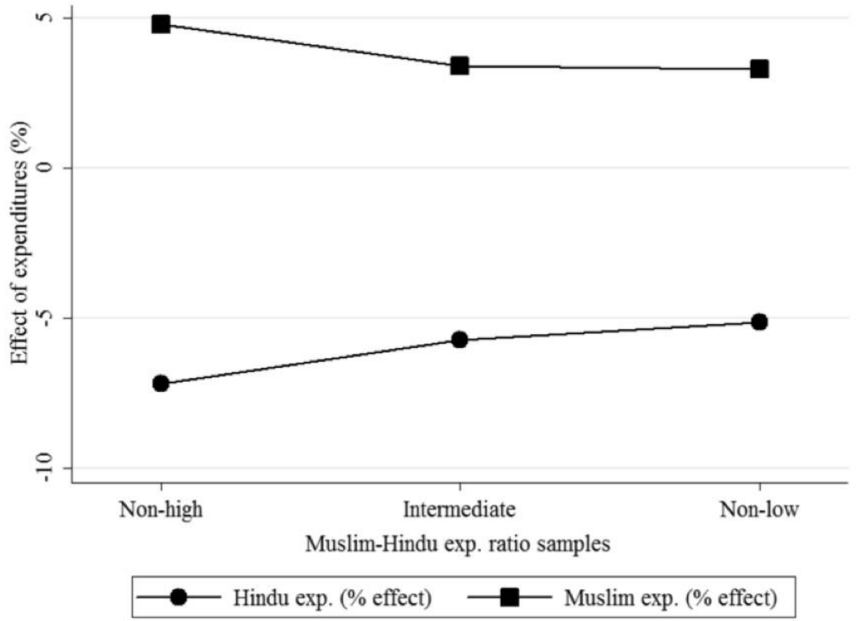


FIG. 7.—Different regional samples. The (percentage) effects on conflict of a 1 percent change in Hindu and Muslim per capita expenditures have been plotted on the vertical axis for three different regional samples: all "nonhigh" regions, all "intermediate" regions, and all "nonlow" regions. A region is "low" if Muslim/Hindu expenditure ratios in that region are systematically lower than the national average for every one of the three time periods, and "nonlow" otherwise. "High" and "nonhigh" are defined analogously. A region is "intermediate" if it is neither high nor low.

Theory: Funded Violence not supported

- If we go by theory and the hypothesis that Muslims fund violence with increases in income:
  - In very high income areas by hypothesis the effect of increase in income on violence will be high (increase in incomes takes aggressors from being peaceful to funding violence).
  - Increase in incomes will lead to decrease in incidence violence for very low income areas by theory (increase in aggressor incomes decrease participatory violence)
- However there are no significant differences in the effects of non-high income areas and non-low income (refer to Fig 7 above) areas, thus nullifying the hypothesis that Muslims indulge in funded violence.

Conclusion

- An increase in Hindu pce increases violence and an increase in Muslim pce decreases violence.
- Theory supports this result by hypothesizing that Hindus are more prone to attack Muslims than Muslims are to Hindus.
- Theory also says that Muslims are too poor to protect themselves adequately in order to decrease the success of an attack.
- Data and theory do not seem to support the hypothesis that increase in Muslim incomes results in an increase in the funding of violence in a community.
- It must be stressed that the authors themselves do not make these claims in so many words and take great pains at not taking strong stances.
- They acknowledge the difficulties in modeling such a difficult topic saying that it this model doesn't encapsulate the dynamism of violence perpetrated by religious groups

- In their words: " No incident can be viewed in isolation, and it is easy enough to argue that a particular episode has roots that have been conveniently ignored by the ethnographer"
- At the same time they say: "To understand whether one group has done (violence) so 'more systematically' than the other is not just important from a policy perspective; it is crucial to our intellectual understanding of the politics of a society and to the policies that one must adopt"
- " It is also important to note that we uncover an asymmetry in the sensitivity to or response of violence to economic change."
- They end by reiterating what their model assumes: "Finally, we do not believe that a particular religious group is intrinsically more predisposed to the use of violence. In a parallel universe or in another country with a different social history and a different demog- raphy, the outcomes may well have been very different."

Note about Presentation

- I have used some notation and mathematical formulation that is not in the paper. This has been done solely for the purpose of being more clear.
- If there are any queries feel free to ask me as I realize the arguments given here are very wordy. They are best explained on board.
- Best of Luck for the Exams!

End