

# "IS NORTH INDIA VIOLENT BECAUSE IT HAS A SURPLUS OF MEN?"\*

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## Sex Ratios and Security

### *India's Falling Sex Ratios*

#### Causes

Scholarly interest in the social causes of unequal sex ratios is probably as old as the study of demography itself.<sup>1</sup> It is, as well, a topic which receives continuing scholarly and media attention. In mid-June 2008, for example, the British development NGO ActionAid released a report into India's missing girls, blaming falling numbers on the growing use of ultrasound to determine the sex of a foetus (2008; see also Dugger, 2001; Special Correspondent, 2008).

When the British first began to undertake systematic investigation of village populations in the late 18<sup>th</sup> and the first half of the 19<sup>th</sup> centuries, they discovered north Indian villages in which there were no living girls among some of the highest castes, a fact which they attributed to infanticide.<sup>2</sup> The Census of India conducted in 1871 reported that in British India there was an excess of 5.5 million men, corresponding to a male: female sex ratio of 100:94 (Natarajan, 1972, p. 10).

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<sup>1</sup> As the Indian evidence indicates, interest in the sex ratio of human populations preceded by many decades the scholarly study of sex ratios in plants and animals (see Godfray and Werren, 1996).

<sup>2</sup> Panigrahi, for example, cites Moore's finding in 1845 that the "Harra Rajputs of Gorakhpur had no daughters at all. It seems a marriage procession had never entered the village to take away the bride" (Panigrahi, 1972, p. 23). See also Gait's summary given in the 1911 Census (quoted in Natarajan, 1972, p. 73).

Concern about the continually declining proportion of females grew after Independence where it came increasingly to be seen as an index of India's failure to raise the status of women and a voluminous literature has grown up around the question of India's declining sex ratio (For a summary of some of the literature, see Mayer, 1999). The publication of Amartya Sen's provocative article "More Than 100 Million Women are Missing" did much to intensify scholarly focus on sex ratio questions (Sen, 1990).

The focus of the contemporary search for explanations for masculine bias in the Indian population has shifted to new variables. Dyson and Moore have pointed to regional patterns which reflect very ancient cultural differences between North and South India (Dyson and Moore, 1983). A number of scholars including Amartya Sen and Barbara Harriss White have presented contemporary evidence of nutritional bias against girls (Sen, 1989; Harriss and Watson, 1987). Others such as Das Gupta have identified the role of medical neglect in excess female mortality (Das Gupta, 1987; Dandekar, 1975; Vlassoff, 1990).

Another major focus of contemporary discussion has been the economic value of women as workers, especially in agriculture (Bardhan, 1974; Bardhan, 1984; Miller, 1981; see also Gupta and Attari, 1994). The remarkable Report of the Committee on the Status of Women in India noted that women's participation in the workforce had declined consistently from 1921 (Committee on the Status of Women in India, 1975) which others such as Mies saw as confirmation of the link between economic value and survival (Mies, 1980). Others have argued that the evidence does not support the link (Gulati, 1975; Reddy, 1975, Harriss and Watson, 1987).

The 1991 Census provoked a debate whether the continuing decline in the percentage of women should be attributed to the rise of the use of amniocentesis and ultrasound examination to determine the sex of a foetus and thus to the abortion of female foetuses (Kundu and Sahu, 1991; Rajan, *et al.*, 1991; Raju and Premi, 1992; Rajan, *et al.*, 1992). If that debate remained unresolved, there is clear evidence that-despite being made unlawful-selective abortion is increasingly available in many parts of India (see for example Vasudev, 2003; Balakrishnan, 1994; Correspondent, 2004; Kaur, 2005; Patel, 2007; Parikshit, 2006; Murthy, 1996).

## **Consequences**

Relatively less attention has been devoted to the consequences of different population ratios of females to males. In a path-breaking book Guttentag generalised that:

[In societies where women are scarce they] would be highly valued,...they would occupy and be satisfied with traditional roles such as wife and mother, that men would be committed to their families over long periods of time, and that sexual morality would be imposed upon women. [Societies where men are scarce] would be sexually permissive for both men and women, women would be less valued, and men would have multiple or successive relationships with different women, either in marriage or out of it. (Guttentag and Secord, 1983, p. 24).

## **Security implications of high sex ratio societies**

While Guttentag's book focuses on the social consequences of unequal sex ratios, especially of an excess of females, the publication by Hudson and den Boer in 2004 of *Bare Branches* marked the introduction of a novel dimension – security - to the study of the question (Hudson and Boer, 2005; see also Hudson and Boer, 2002).

The most significant and important section of Hudson and den Boer's work is their survey of the past consequences in societies in which a significant number of males could not secure marriage partners because of the severely unbalanced sex ratio. The Chinese refer to such men as 'bare branches' or 'bare sticks' because they "are males who will never have

families because they cannot find spouses” (Hudson and Boer, 2005, pp. 187-8). There is an identifiable syndrome which characterises these young adult bare branches:

- ∞ They come from the lower classes,
- ∞ They are more likely to be under- or unemployed and lack access to land or other assets,
- ∞ They are frequently transient and marginal,
- ∞ They tend to live and socialise with other bare branches.

It is these characteristics, especially their predisposition to use violence, which give rise to the behaviours which are likely, in the judgement of Hudson and den Boer, to affect the security of the societies in which they live. Amongst these potentially dangerous traits are:

- ∞ A tendency to engage in violent crimes including murder, rape, armed robbery and assault.
- ∞ They are physically more aggressive and more violent in their social relations
- ∞ They are more likely to commit violence under the influence of alcohol
- ∞ They are hypersensitive to insult
- ∞ They are predisposed to risk taking

Thus the societies with many young adult bare branches will experience “a significant increase in societal, and possibly intersocietal, violence. Crime rates tend to be higher...Moreover, the increase in violence will be at both the individual and collective levels” (Hudson and Boer, 2005, pp. 200-201, Hudson and Boer, 2002, pp. 24-5).

Two major security consequences flow from these conditions of social violence. First, it is difficult to maintain order in such societies; as a consequence “high-sex-ratio societies are governable only by authoritarian regimes capable of suppressing violence at home and exporting it abroad through colonization or war” (Hudson and Boer, 2005, p. 202). Secondly, “high-sex-ratio societies that are ethnically heterogeneous are likely to experience civil strife directed against minority ethnic groups, which the government...may seek to encourage” (Hudson and Boer, 2005, p. 202). Hudson and den Boer conclude that the first outcome is valid for China, the second for India (Hudson and Boer, 2005, p. 202).

These are striking predictions and have brought a new and important dimension to the discussion of sex ratios. The arguments of Hudson and den Boer have linked long-established concerns about the status and treatment of women in Asia to much broader concerns about governance, crime and security.

They also have the commendable virtue of being, at least in part, testable ideas.

## **India**

In a chapter devoted to India, Hudson and den Boer recount the familiar history of increasingly masculinisation of the Indian population and note the concentration of the most extreme aspects of the problem in north and northwest India with the greatest numbers of missing females concentrated in UP (24.99%), Maharashtra (11.02%), West Bengal (7.75%), Madhya Pradesh (7.12%), Rajasthan (6.44%), the Punjab (4.61%) and Haryana (4.42%) (Hudson and Boer, 2005, p. 95). (See also Figure 18 below)

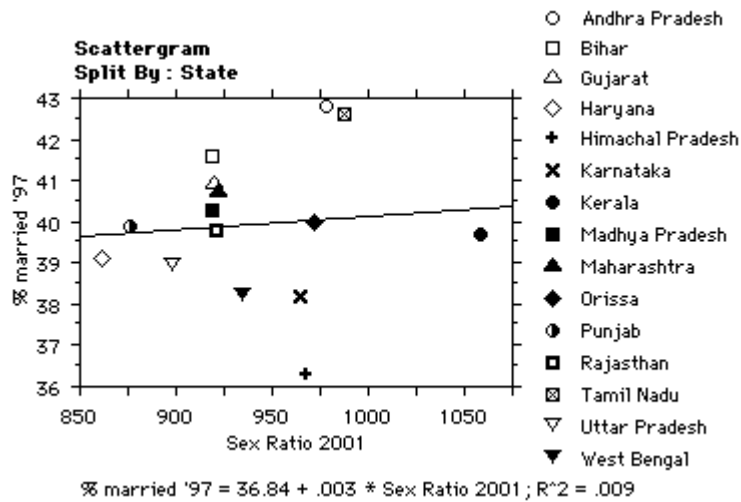
The cumulative impact of the trends they identify lead them to conclude that in 2020 India’s population will become yet further masculinised and that, depending upon the assumptions one makes, India will have a surplus of between 28 and 32 million men in the age group 15-35. This group is the most significant for their analysis of the security implications of severe gender imbalance.

In what follows we report on the test of a number of Hudson and den Boer’s general propositions using data for India.

### Bare Branches?

Let us begin with a very fundamental question? *Are the branches barer in India where sex ratios are higher? Is a higher percentage of the male population without partners?* Figure 1 shows the relationship between the sex ratio and percentages of the population who are married.<sup>3</sup> *Contrary to the prediction, there is no relationship between more masculine sex ratios (= fewer females per males) and the percentage of the population who are estimated to have been married in 1997 (based on the 1991 Census of India) (r = .10; not sig.).* The lowest percentage of married population were in Himachal Pradesh which has a relatively even female:male sex ratio.

Figure 1

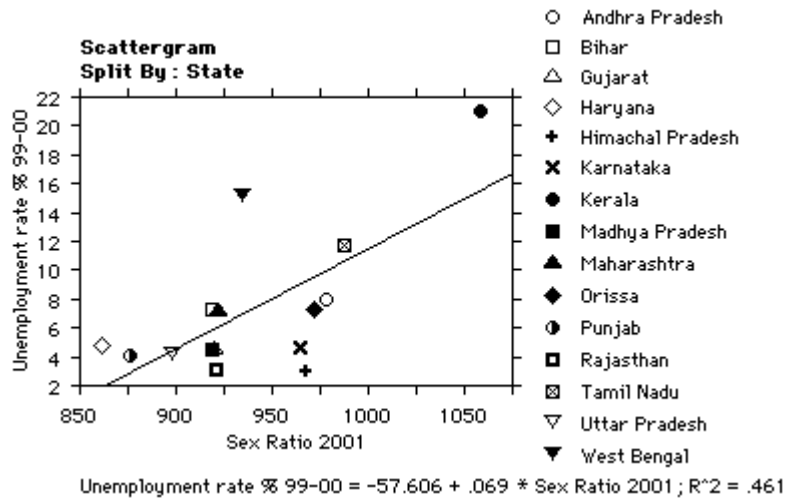


### Bare Branches are more likely to be under- or unemployed

Hudson and den Boer observe that in market economies “bare branches are more likely to underemployed or unemployed. They are also more likely to be chosen for low-status jobs that are dangerous, menial, labor intensive or seasonal” (Hudson and Boer, 2005, p. 189). Indian data do not permit us to directly test this proposition. We can, however, test whether reported rates of unemployment are higher in states where populations are more masculine. This is less than an ideal means to confirm the proposition, given the imperfections of Indian data on unemployment. The results presented in Figure 2 show that, *contrary to the relationship predicted by Hudson and den Boer, unemployment rates are lowest where sex ratios are most masculine.* This is a reasonably strong relationship (r = .68; sig @ .004). In highly masculine UP, Haryana and the Punjab, unemployment rates are the lowest in India. In Kerala, by contrast, where the ratio of females to males is highest, so are rates of unemployment.

<sup>3</sup> The bi-variate scattergrams and regressions which follow cannot assist us to untangle the multiple causes which may contribute to particular sex-ratio patterns. We include them here to illustrate results which bear on specific predictions made by Hudson and den Boer.

Figure 2



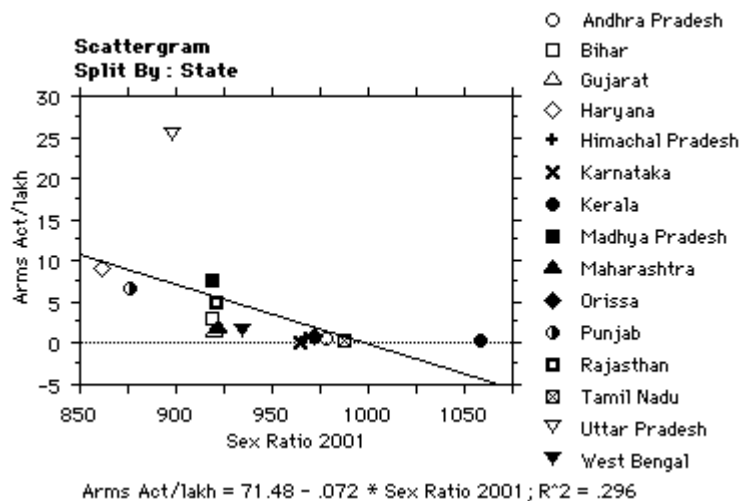
**Bare Branches are more likely to turn to violence and anti-social behaviour**

At the core of the argument that bare branches pose a threat to society is their propensity to engage in acts of violence and illegality. “Typically, bare branches are more likely than other males to turn to vice and violence. Unable to achieve satisfaction in socially approved ways, they spend their meagre wages on gambling, alcohol, drugs, and prostitution in short (but intense) sprees” (Hudson and Boer, 2005, p. 192). There are many actions which may be grouped under the headings of violence and vice, not all of which can readily be determined from Indian data.

**Interpersonal violence**

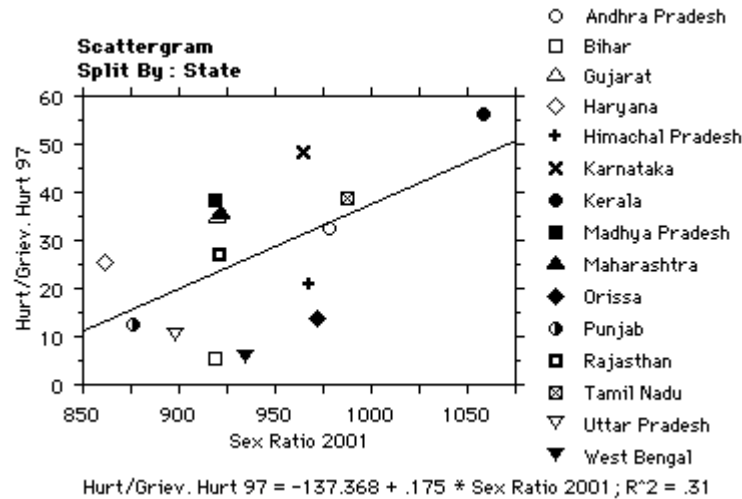
Let us begin with an indication of intended violent anti-social behaviour, possession of an illegal fire arm. We can see in Figure 3 that there is a strong relationship between masculine sex ratios and the rate of arrests for violations of the Arms Act. (r = -.54; sig @ .03). As the number of females per 1000 males falls below 970 the rate of arrests rises somewhat. In this case, though it did not have the most masculine population in 2001, Uttar Pradesh is a obvious outlier, with an extreme value in which has more than two and one half times the rate of the next nearest state, Haryana.

Figure 3



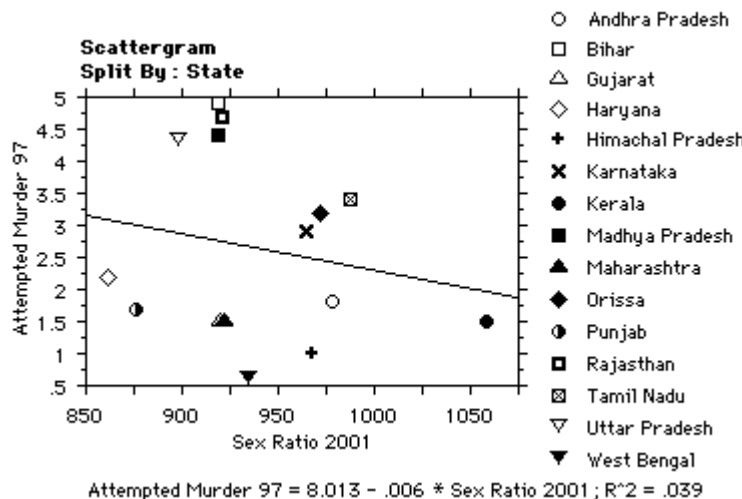
Let us now consider arrests for acts of Hurt or Grievous Harm. This relationship (Figure 4) is unexpected: *rates of conviction for acts of hurt or grievous harm are lowest in the most masculine states and increase steadily as sex ratios become more equal.* This is a reasonably strong relationship ( $r = -.56$ ; sig @ .03) but is quite contrary to the predictions of Hudson and den Boer.

**Figure 4**



If we now step up the scale of violence, we can consider convictions for attempted murder. The results (Figure 5) are contradictory. In some states - UP, Bihar, Rajasthan and MP – high rates of masculinisation *are* associated with high rates of conviction for attempted murder. Against that result are states with greater –Haryana, Punjab - or equal - West Bengal and Maharashtra -masculine population biases, with attempted murder rates equal to the lowest in India. Given these divergent results, it is not surprising that the correlation coefficient is quite low ( $r = -.20$ ; not sig).

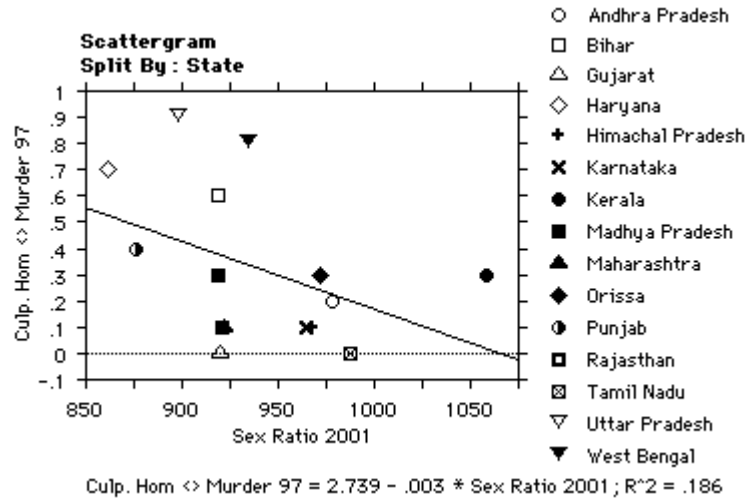
**Figure 5**



A somewhat stronger and clearer pattern, which conforms to the prediction can be seen when we look at Culpable Homicide not amounting to Murder in Figure 6 ( $r = -.43$ ; not sig). As with Arms Act violations, there is an increase in convictions for Culpable Homicide as the ratio of females to 1000 males falls below 970. Once more UP is clearly the most violent state

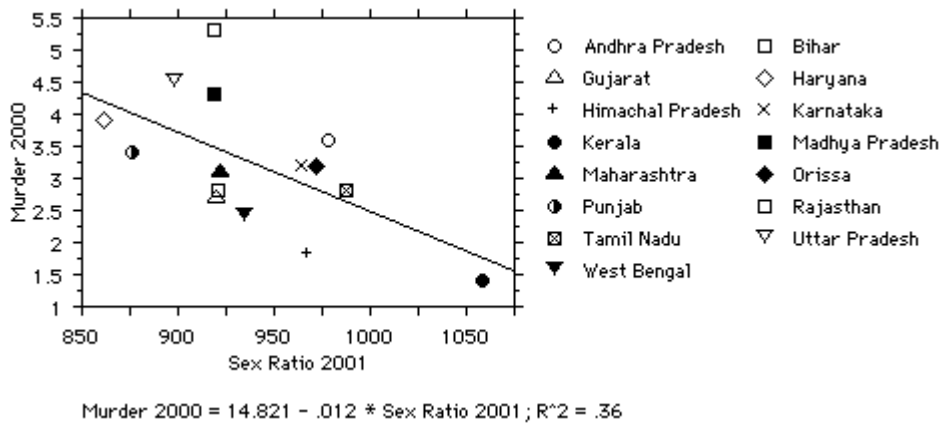
in terms of culpable homicides. It is worth pointing out that Culpable Homicides are no higher in the Punjab, the second most masculine state, than they are in Kerala, the least masculine.

**Figure 6**



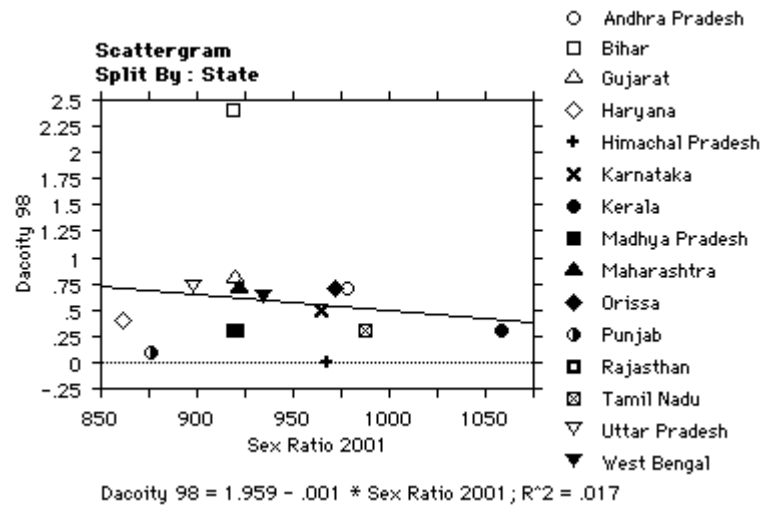
Finally let us consider the extreme case of personal violence, homicide (Figure 7). While homicide rates are clearly higher where males predominate, the relationship is strongly influenced by three high homicide states- UP, Bihar and Madhya Pradesh – and one low homicide state – Kerala ( $r = -.60$ ; sig @ .02). The homicide rates for 10 other states seem largely independent of sex ratio. As in some earlier scattergrams, we can see that included in that generalisation are the Punjab and Haryana, the two most masculine states.

**Figure 7**



Hudson and den Boer also suggest that because of their predisposition to violence and their outcaste status, bare branches “may turn to appropriation of resources, using force if necessary” (p. 207) forming gangs or engaging in “organized social banditry” (p. 207). India collects data on arrests for participation in armed criminal gangs, a crime known by its traditional name “dacoity”. It is clear (Figure 8) that there is no relationship between arrest for dacoity and sex ratio ( $r = -.13$ ; not sig). The crime exists in an extreme degree in one state, Bihar.

Figure 8



### Alcohol and Risk-taking Behaviour

Two causal factors identified by Hudson and den Boer with higher levels of violence committed by bare branches are indulgence in alcohol (p. 197) and a higher propensity to engage in generally risky behaviour (p. 199). We can explore the significance of these two factors in at least an indirect fashion by considering the pattern of alcohol consumption and one of the consequences of risky behaviour, *viz.* death by accident.

It can be seen (Figure 9) that there is little systematic relationship between sex ratio and per capita consumption of alcohol ( $r = .10$ ; not sig). In some masculine states, such as Punjab and Bihar, consumption levels are high; in other highly masculine states, such as U.P. consumption levels are quite low.

Similarly, there is no apparent relationship (Figure 10) between rates of accidental death and sex ratios ( $r = -.01$ ; not sig). Maharashtra stands out here as an outlier with rates of accidental death considerably above those of other states.

Figure 9

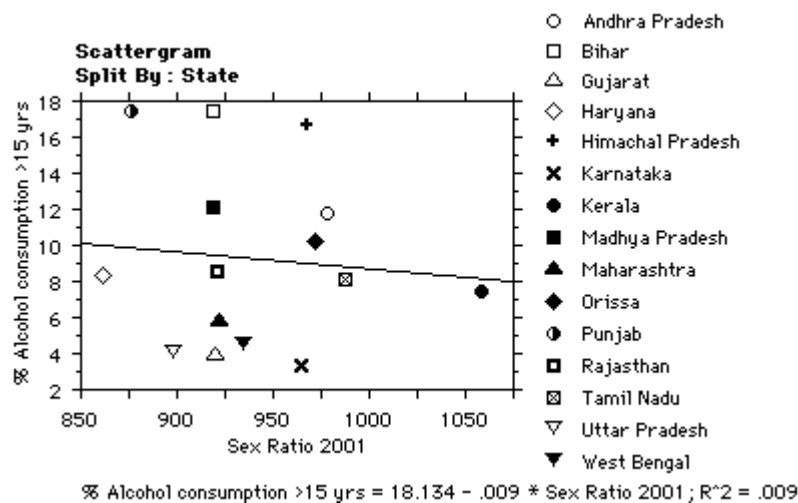
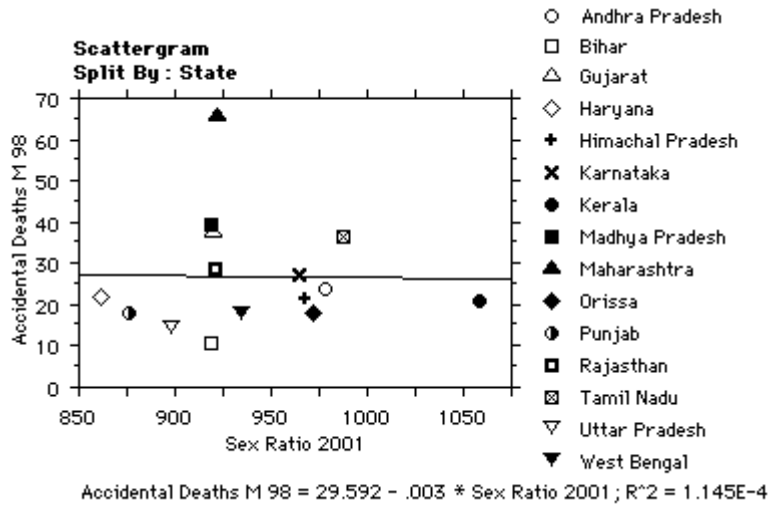


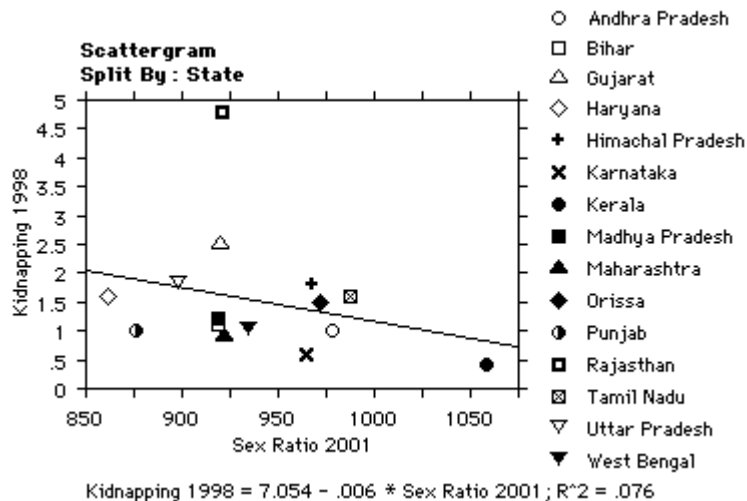
Figure 10



### Violence against Women

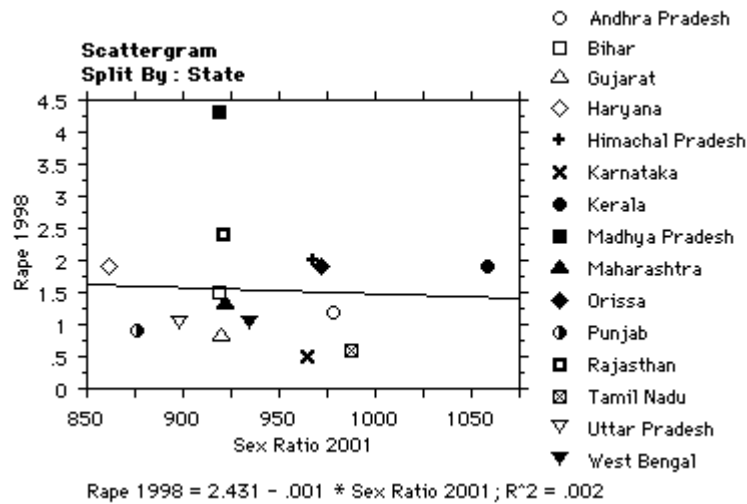
Another aspect of interpersonal violence is that specifically directed against women. Hudson and den Boer specifically note that in China, kidnapping of women is likely to increase as society becomes more masculine (p. 203), but it seems equally likely to expect that rape and molestation may also be associated with more masculine sex ratios. There appears to be no relationship (Figure 11) between sex ratio and the incidence of kidnapping ( $r = -.28$ ; not sig). With the exception of Rajasthan which reports rates of kidnapping far higher than any other state, there is little apparent difference in rates between states.

Figure 11



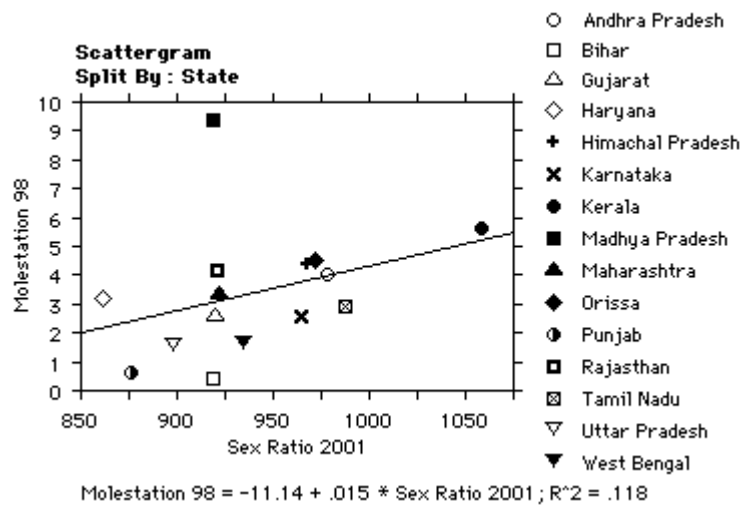
When we look at the pattern of reported rapes (Figure 12), we can again see that there is little difference between state rates ( $r = .05$ ; not sig). Once again there is one conspicuous outlier, in the case of rape it is Madhya Pradesh which has rates well above those of the rest of the nation.

Figure 12



Lastly, when we examine the pattern of reports of molestation (Figure 13) we find that on the whole it runs in a direction contrary to that predicted since rates rise slightly as populations become more equal ( $r = .34$ ; not sig). Madhya Pradesh is, again, a conspicuous outlier with strikingly higher rates of reported molestation.

Figure 13

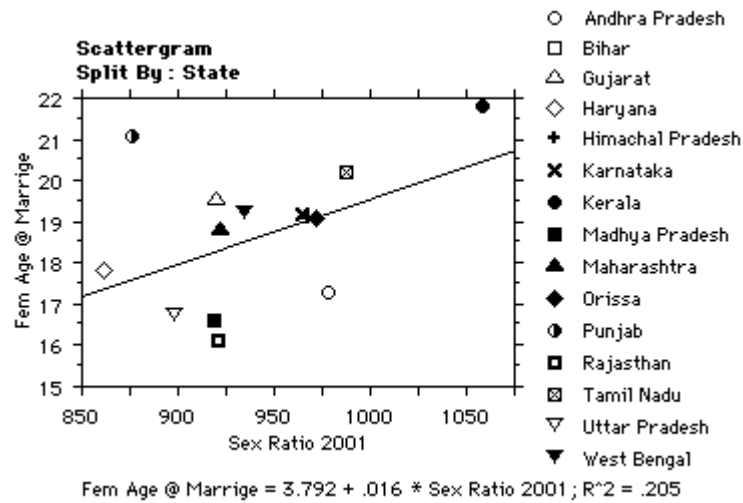


### *Other Impacts on Women*

There are other social characteristics, other than violent crime, which affect women. These include: a reduction in the age at marriage (p. 204), increased population growth (p. 205), increased migration of women from other cultures (p. 206) and higher suicide rates for young women (p. 205). We will wish to return to the discussion of these characteristics shortly.

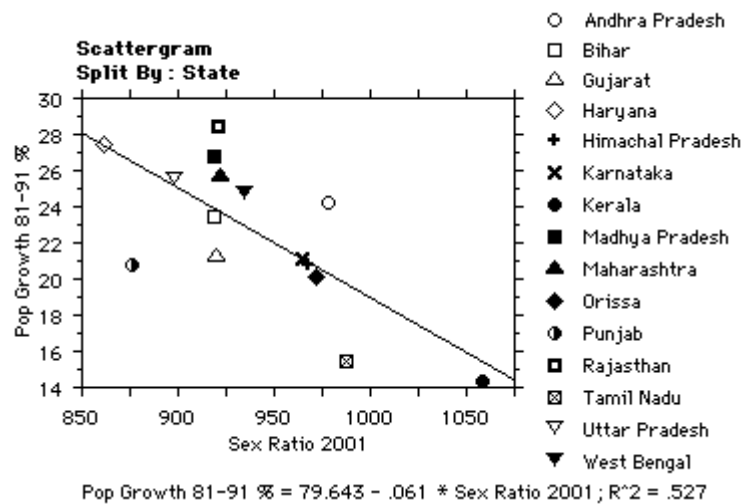
It is evident from Figure 14 that, in general, age at marriage is slightly lower where sex ratios are more masculine. Ages are lowest in UP, Rajasthan and Haryana. The Punjab stands out as a clear exception with the second highest average age at marriage in the nation ( $r = .45$ ; sig @ .09).

Figure 14



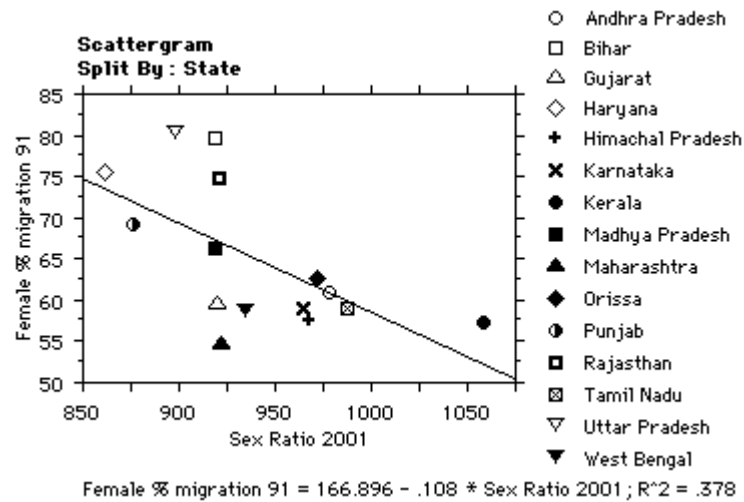
There is a very strong relationship (Figure 15) between the rate of population growth and the degree of masculine bias in the sex ratio ( $r = -.73$ ; sig @ .001).

Figure 15



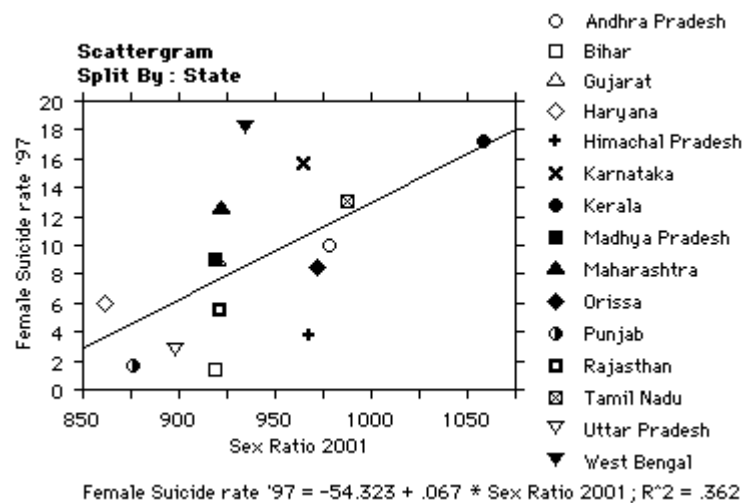
Equally, there appears to be a strong relationship (Figure 16) between the extent of migration of females from other districts (a weak proxy for Hudson and den Boer's 'other cultures') and the degree of masculine bias in the sex ratio ( $r = -.61$ ; sig @ .01).

Figure 16



The prediction that female suicide rates will be highest where populations are most masculine is emphatically not sustained; as inspection of Figure 17 makes clear, female suicide rates are lowest in those most masculine states ( $r = .60$ ; sig @ .02). The three states with the highest female suicide rates are West Bengal, Kerala and Karnataka, the first and third of which are in mid-level in masculine bias.

Figure 17



## Discussion

### The 'Role of Violence' Hypothesis

The data from India appear to present us with a complex pattern of confirmations and rejections of the striking arguments advanced by Hudson and den Boer. How are we to make sense of this odd assortment of results? In what follows we pursue an alternative line of interpretation which, we believe, better explains the pattern of relationships between violence and sex ratios, at least in India.

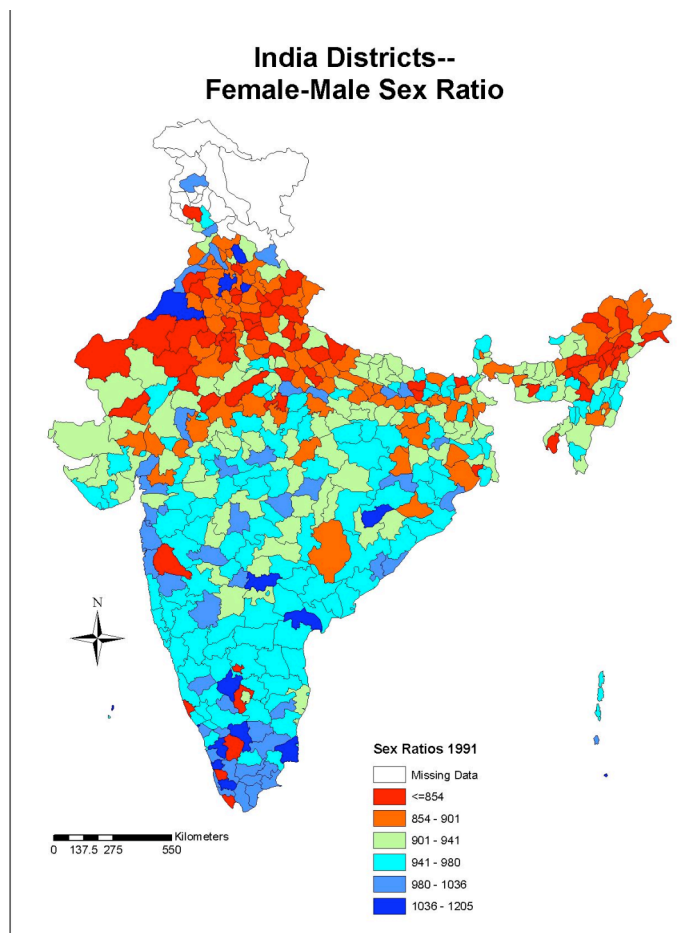
Let us begin by returning to one of the apparently established facts in the study of that relationship: that there is a strong correlation between sex ratios and the homicide rate. Oldenburg reported a strong correlation ( $r = -.0.72$ ) at the district level in Uttar Pradesh and

also in the major Indian states, between murder rates in the early 1980s and sex ratios (Oldenburg, 1992, pp. 2659-2660).<sup>4</sup> Figure 18, based on the 1991 Census of India, shows that India's highly masculine districts are concentrated in the Indo-Gangetic plain, especially the region immediately to the east of New Delhi, which Oldenburg in a memorable phrase described as the "Bermuda Triangle for girls" (Oldenburg, 1992, p. 2658). He argued that the importance of political factors in creating a preference for sons has been neglected.

I would like to propose as one factor among many, but one that has not been often cited, the perception of a need for sons to uphold, with violence, a family's power *vis-a-vis* neighbours (not infrequently including kinsfolk). (Oldenburg, 1992, p. 2658)

[M]y hypothesis [is] that families in west central UP want (or need) more sons than families elsewhere *because additional sons enhance their capacity literally to defend themselves or exercise their power...* (Oldenburg, 1992, p. 2659).

**Figure 18: Sex Ratios, Census of India 1991**



This region and the adjoining districts of Pakistan were a traditional 'shatter' zone, which bore the brunt of the periodic invasions of the sub-continent which swept down over the

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<sup>4</sup> Arup Mitra published a brief critique of Oldenburg's article without, however, undertaking any empirical testing of his own (Mitra, 1993).

centuries from highlands of Afghanistan. And, as Oldenburg indicates, there is ample evidence to indicate that there has been over centuries a need to defend possessions with physical power. The burden of the anthropological evidence also suggests that conditions of village anarchy are a major influence on aspects of culture, including preferred kinship forms. Joyce Pettigrew, for example, vividly described the preoccupation with political power she found in Punjab villages in the 1960s (Pettigrew, 1975):

The capacity of a family to dominate depended on control of men, economic resources and political institutions. In this struggle, violence was taken for granted....

Violence had always been the traditional accompaniment of dominance in a village or small local area and in the state. Moreover, the security achieved by dominance was conceived to be, and in fact often was, only temporary, and therefore required permanent guarding. This led to further violence. In my fieldwork area killing and violence were facts of existence that had to be lived with. (Pettigrew, 1975, p. 59)

Anthropologists have also argued that one of the closely linked cultural components of the need to have male agnates to defend one's possessions is the custom of village exogamy (Mandelbaum, 1970, pp. 101-103). Village exogamy, which requires women to leave their natal villages and move to a household in which her family has no previous connection, explains why we find a reasonable correlation between masculine sex ratios and female migration from adjacent districts.

### **The “Patriarchy Effect”**

Drèze and Khera replicated Oldenburg's study for 319 Indian districts using 1981 data. They report finding a robust correlation between sex ratios and murder rates, even when possibly confounding variables are included (Drèze and Khera, 2000, p. 342). On the basis of an instrumental variable procedure they concluded that homicide levels do not influence sex-ratios and that consequently, the flow of causality must move from sex ratios to homicide (Drèze and Khera, 2000, p. 345).

Drèze and Khera also consider whether the masculine bias found in North India is the result of sharp gender inequalities, what they term the “patriarchy effect” (Drèze and Khera, 2000, p. 346)

When they attempt to test for this possibility, using male-female child mortality ratios to correct for the effect of net male in-migration, they find that the correlation between murder and sex ratio persists even when an attempt is made to control for the “patriarchy effect”.

We undertook a parallel investigation of the factors associated with homicide rates in 1998-9 using district-level data from four states: Andhra Pradesh, Tamilnadu, Uttar Pradesh and Bihar.

As can be seen in the principal multiple regression, the second-left column in Table 2, there is a strong and statistically significant correlation between district-level homicide rates and the female-male sex ratio. This finding holds for the subsequent alternative models as well.

Other variables not explored by Drèze and Khera are also strongly associated with homicide rates. These are: the percent of the population enjoying a medium standard of living (a measure of standard of living equality in the region), the percent of Backward and Scheduled Castes in the low standard of living group (a measure of the caste composition of the poor and hence a possible measure of caste tension in that group), the percent of male literates and a dummy variable for districts in Uttar Pradesh. It was expected that homicide rates would be higher where income equality was lower and where there were larger numbers of Backward and

Scheduled Castes among the poor. It was also predicted that with greater income equality and higher levels of literacy, homicide rates would be lower. It was also expected that homicide rates would be higher in the two northern states, UP and Bihar.

**Table 2 Least squares regression estimates of murder and robbery rates for 36 districts of Andra, Bihar, Tamil Nadu and UP, 1998-9**

Dependent Variable	Murder/ total pop. rate. 1.	Murder/ total pop. rate. 2.	Murder/ male pop. rate. 3.	Robber y/ total pop. rate. 4.
Explanatory Variables				
Constant:	203.4**	148.0	376.2***	119.5
coefficient	.010	.134	.007	.114
p-value				
% medium standard of living	1.678***	1.437***	3.159***	1.668*
		.007	.003	*
	.004			.017
% backward and scheduled castes in low standard of living group	-0.528**		-1.023**	-0.339
	.042		.029	.183
Caste ratio in low standard of living group		36.57*		
		.082		
Female/male ratio	-253.5***	-237.6**	-	-175.9*
	.005	.023	466.97***	.053
			.004	
Urban percentage	-0.252	-0.097	-0.496	0.163
		.614	.233	.600
	.248			
% male literacy	0.748**	0.704***	1.437***	0.173
	.010	.004	.009	.532
Bihar indicator variable	1.31	3.26	2.29	31.87*
	.866	.664	.875	**
				.000
UP indicator variable	-33.47**	-20.45*	-	-9.34
	.011	.076	66.20***	.571
			.006	
Tamil Nadir variable	-5.42	-18.73	-8.88	-9.94
	.615	.105	.664	.536
R <sup>2</sup> adjusted for degrees of freedom	0.394	0.363	0.390	0.476

**Notes:** The table reports coefficient estimates and heteroskedastic-consistent p-values (using White's, 1980, method) for four regressions. In some regressions, tests indicated a small, but significant, degree of heteroskedasticity in the disturbances. \* indicates significant at the 10% level, \*\* at the 5% level and \*\*\* at the 1% level.

The results did not support many of our hypotheses. Murder rates were lower where there were more Backward and Scheduled Castes among the poor. The percentage with a medium standard of living, and the percent of male literates were positively, not negatively, correlated with homicide rates. Finally, the UP dummy variable was also negatively correlated, again falsifying our prediction. These results were unexpected and *prima facie* are difficult to explain using a model which assumes homicide is the result of antecedent social forces. We will consider the implications of challenging that assumption in the next section of the paper.

Similar results were found when an alternative measure of caste tension was tested (column 3) as well as an alternative measure of homicide (homicide per male population) (column 4). When an alternative measure of violence, the robbery rate, was tested (Column 5) the only change in result worth noting is the positive and statistically significant correlation with the Bihar dummy variable.

### **An Alternative Explanatory Model**

In what follows, we return to the hypothesis suggested by Oldenburg and the anthropological and historical literature and take violence as measured by murder rates to be an independent variable. Given the possibility of ‘overidentification’ in the use of the instrumental variable approach, it seems preferable to utilise path analysis (Asher, 1976, pp. 31-32). When we do so using more recent state-level data, we find that it is not possible to reject the possibility that a complex cluster of regional and cultural factors are strongly associated with the sex ratios we observe.

The data used in the analysis presented below are from the 2001 Census of India and Crime in India 2000. Other data are for the preceding decade.

The recursive model presented below is a simplified form of principal elements of the model proposed by Hudson and den Boer, save that we assume the homicide is a potential causal influence on sex ratios. We have introduced two additional variables. One is a dummy variable which codes for the ‘Hindi belt’ which we include as a proxy which captures some of the deep historical and cultural aspects of the “patriarchy effect” assumed to operate in much of north India. The second is Total Fertility, a logical intermediate variable between Age at Marriage and Population Growth rates.

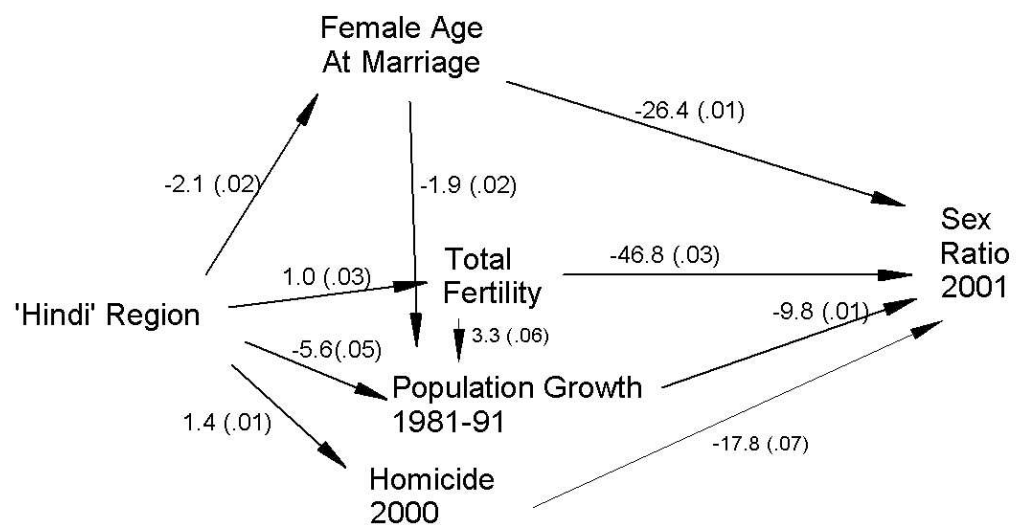
We may note, initially, that the full multiple regression model is highly satisfactory, predicting 88% of the variance (82% on an adjusted basis, sig @ .0006). In the broadest terms, we can see two lines of apparent causality. These broadly offer support for *both* the ‘patriarchy effect’ thesis and the ‘violence’ thesis.

The first set of influences appears to work both directly and indirectly through factors affecting age at marriage, fertility and population growth. Where women marry younger, population growth is more rapid and sex ratios are more masculine. The model thus appears to offer strong evidence for the significance of the broad cultural factors embodied in ‘region’ as approximated by our ‘Hindi’ region variable (for an extended discussion of the significance of these regional differences see Dyson and Moore, 1983). The Hindi region is associated with lower ages at marriage, higher levels of fertility and of homicide as well as higher levels of fertility. The one unexpected association is with the rate of population growth, which was also predicted to be positive. (We may note that the first-order correlation *is* positive).

**Table 3: Multiple Regression Coefficients of Homicide 1997 for 14 Indian States**

	Homicide 2000	Female Age at marriage	Total Fertility Rate '93	Population Growth 1981-91	Sex Ratio 2001
Constant	2.9 (<.0001)	7.51 (.004)	5.6(.04)	51.2 (.007)	1853.2 (<.0001)
'Hindi Belt'	1.4 (.01)	-2.1 (.02)	-99 (.03)	-5.7 (.05)	42.7 (.18)
Homicide 2000		-.56 (.15)	.23 (.17)	-.77 (.41)	-17.8 (.07)
Female Age at marriage			-.18 (.15)	-1.9 (.02)	-26.4 (.01)
Total Fertility 1993				-3.3 (.06)	-46.8 (.03)
Population Growth 1981-91					-9.8 (.01)
Adjusted R <sup>2</sup>	.33	.60	.80	.71	.82

**Figure 19: Causal Model of Sex Ratios in the Indian States, 2001**



The second, weaker, path appears to operate independently on sex ratios through levels of social violence as measured by homicide rates.

### Conclusion

The striking predictions by presented Hudson and den Boer in *Bare Branches* that highly masculine sex ratios tend to have violent consequences find, at best, mixed confirmation in the available Indian data which we have examined. Many of the predicted relationships are too weak to pass the test of statistical significance. A few, most notably the correlation with homicide, *are* strong and in the predicted direction. Others of nearly equal strength, most notably female suicide rates, are lowest in the most masculine states, the opposite of what was

predicted. On the whole, then, the Indian evidence does not support the strong claims that highly masculine sex ratios pose major threats to state security which Hudson and den Boer advance.

In addition, we have offered evidence, historical, anthropological and statistical which has led us to see merit in the argument that political insecurity and the exercise of violence are more reasonably seen as *causes*, rather than *effects*, of North India's masculine sex ratios. In other words, in India at least, it seems to make better sense to invert the causal sequence proposed by Hudson and den Boer and argue that it because of a deeply embedded history and culture of violence in North India that there is an excess of males, rather than the reverse.

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