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On the tradeoff between cultural sensitivity and aggregate size in population control policy

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Recently, Batabyal proposed an unconventional population control policy that is sensitive to the cultural desire for male progeny in many Asian nations. Although the proposed policy is culturally sensitive, a potential problem with this policy is that the aggregate size of the national population that is sought to be controlled may be quite high. Consequently, this note addresses the tradeoff between cultural sensitivity and aggregate population size. Specifically, the study analyses the properties of a modified policy that is desirable not only because it is culturally sensitive but also because it caps the aggregate size of individual families and thereby the size of the national population.

I. INTRODUCTION

It is now well known that the authoritarian population control policies that have been implemented in Asian countries such as India and China have not had the desired impact because the framers of these policies have tried unsuccessfully to circumvent a longstanding cultural desire for male children. Consider the case of India first. Even though population control policies in India today are largely voluntary, this was not always the case. Specifically, in the aftermath of the declaration of a state of emergency on 26 June 1975, the Congress government of Indira Gandhi began to execute its draconian population control policy with extraordinary fervor. In this regard, Gwatkin (1979) and Pai Panandiker and Umashankar (1994) noted that the number of sterilizations in India increased from 1.3 million in 1974–1975 to 2.6 million in 1975–1976 and then rose to 8.1 million in 1976–1977. The reader should understand that, in the coercive Indian setting, the ‘government focused almost entirely on use of sterilization to reduce fertility; IUD and condom use

showed little increase’ (Panandiker and Umashankar, 1994, p. 91). As a result of the ardent execution of sterilization targets, there was widespread unhappiness with the government’s policy and this unhappiness frequently led to large-scale violence. The net outcome of all this was that the Congress government of Indira Gandhi lost the next national election in 1977, the Janata Party came to power, and this party swiftly initiated a *voluntary* population control policy.

The Indian experience notwithstanding, it is fair to say that no contemporary population control policy has achieved as much infamy as has the Chinese ‘one child policy’. The quick population growth that occurred after the Communist Party came to power in China put a strain on the government’s efforts to aid its people. Therefore, with the twin aims of fighting ubiquitous poverty and ameliorating the quality of people’s lives, the one child policy was enacted in 1979. Critics of the one child policy have lambasted it as a tool for human rights abuses. In this regard, the work of Johansson and Nygren (1991) and Johnson (1996) is instructive. These researchers have

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persuasively argued that the one child policy has given rise to pervasive female infant abandonment, to female infanticide, and to the consequent problem of 'missing girls'.¹ In addition, Faison (1997) and others have observed that some Chinese couples have manipulated loopholes in the law and have, as a result, effectively broken the one child rule. To conclude this discussion, note that even though the one child policy has had some success in retarding population growth in China, the price of this success 'in China has indeed been high in recent years' (Johnson, 1996, p. 91).

The incomplete success of the earlier Indian and the later Chinese population control policies is explained in large part by the insensitivity of these policies to a central cultural factor, namely, the desire to have *male* children. In fact, the existence of this factor is not limited to India and China. As Johnson (1996, p. 79) has noted, in many Asian nations, and certainly in several parts of China, 'girls occupy a structurally marginal place in a patrilineal kinship and family system...'² As a consequence, in comparison with boys, it is much more likely that girls will be abandoned and even killed. This is a salient point and, today, there is a consensus among researchers that population control policies that fail to take pertinent cultural factors into account are certain to fail eventually.

Recently, Batabyal (2003) has proposed the following culturally sensitive policy that he calls Policy CS: permit any married couple to have children up to the first male child; at this point the couple in question must stop having children. Obviously, Policy CS is culturally sensitive because it explicitly accounts for the male child bias. Batabyal (2003) shows that Policy CS is desirable in two other ways. First, because this policy explicitly accounts for the cultural desire to have male progeny, it is likely to be very useful in combating the 'missing girls' problem. Second, this policy leads to an equal proportion of females and males in the overall population. In other words, the use of this policy will *not* result in a skewed sex ratio.

These desirable features notwithstanding, there is a potential downside to Policy CS and that downside is this: There is *no* ceiling on the number of children that individual families may have. Consequently, it is possible that the aggregate size of the national population that is sought to be controlled will be quite large when Policy CS is used. This suggests that population policymakers face the following tradeoff: if a fully culturally sensitive policy is implemented, then there is little control over the aggregate size of the pertinent national population. On the other hand, if an exclusively aggregate

population size oriented policy—such as the Chinese one child policy—is put in place, then there is little control over culturally sensitive factors such as the desire to have male progeny.

Given this state of affairs, the purpose of this note is to explore this tradeoff between cultural sensitivity and aggregate population size. Specifically, a modified culturally sensitive policy is proposed (hereafter Policy MCS). Policy MCS accounts for the male child bias and, at the same time, this policy caps the number of children that individual families may have. In other words, Policy MCS is a compromise policy. It is culturally sensitive, but not to the extent of Batabyal's (2003) Policy CS. In addition, Policy MCS is somewhat sensitive – not extreme like the Chinese one child policy in terms of its focus on the aggregate population size – to the need to control the total size of the national population. From a mathematical perspective, we wish to answer two basic questions about Policy MCS. First, what is the probability distribution for the number of children in a typical family? Second, what is the probability distribution for the number of boys in a typical family? In what follows, we first answer these two questions and then discuss our findings.

II. POLICY MCS AND ITS PROPERTIES

Preliminaries

In a certain country, population planners use Policy MCS to determine the number of children that married couples will have. Specifically, Policy MCS says the following for an arbitrary married couple wishing to have children: if the first child is a boy then this couple is allowed to have no more children. If the first child is a girl, then this couple is permitted to have a second child. If the second child is a boy, then this couple may not have any more children. However, if the second child is a girl then this couple is permitted to have exactly one more child.

In Batabyal's (2003) Policy CS, a married couple is allowed to have any number of children up to the first male child. On the assumption that all married couples will make the relevant number of attempts, this policy guarantees a son for all families. However, because Policy CS does *not* cap the size of individual families, it is possible that some families will have several girls before a boy is born. As a result, it is possible that the aggregate size of the national population will be unacceptably large. Our proposed Policy MCS corrects this potential problem because the number of children in any family is at least one and at most three. At the same time, all married couples are given three attempts to have a boy. In other words,

¹See Sen (1990), Agnihotri *et al.* (2002), and Klasen and Wink (2002) for additional discussions of this important problem.

²For more on this issue see Bardhan (1982) and Abeykoon (1995).

Policy MCS is culturally sensitive but in a limited way. The outstanding questions before us now are these: first, what is the probability distribution for the number of children in a typical family? Second, what is the probability distribution for the number of boys in a typical family? These two questions are now answered.

Two questions and two answers

In our subsequent analysis, following Batabyal (2003), it is assumed that the sexes are equally likely. In addition, we abstract away from twins, from illegal behaviour by married couples, and it is supposed that the sex of distinct children are independent random variables. Let us denote a female child by G and a male child by B . To answer the above two questions, it will be necessary to consider a characteristic distribution of family sizes under Policy MCS. Now, a typical distribution of eight families under Policy MCS would break down as follows:

Family	#1	#2	#3	#4	#5	#6	#7	#8	(1)
Children	B	B	B	B	GB	GB	GGB	GGG	(2)

Let N denote the number of children in a typical family. Then, the probability distribution for the number of children in a typical family can be inferred from Equations 1 and 2, and our earlier assumptions. One gets

$$\text{Prob}\{N = 1\} = \frac{1}{2}, \text{ and } \text{Prob}\{N = 2\} = \text{Prob}\{N = 3\} = \frac{1}{4} \quad (3)$$

Now, let X denote the number of boys in a typical family. Then, once again from Equations 1 and 2, one can deduce the probability distribution for the number of boys in a typical family. Specifically, one gets

$$\text{Prob}\{X = 0\} = \frac{1}{8} \text{ and } \text{Prob}\{X = 1\} = \frac{7}{8} \quad (4)$$

Discussion

Equations 3 and 4 give the answers to the two questions posed in this note. Inspecting Equation 3, it is seen that under Policy MCS, the probability that a typical family will have one child is 50%, the probability that this family will have two children is 25%, and the probability that this family will have three children is also 25%. This is the first desirable property of Policy MCS. Not only is the number of children that the typical family may have – and hence the size of the national population – capped at three, but the probability that the typical family will have either one or two children is $50\% + 25\% = 75\%$.

To see the cultural sensitivity aspect of Policy MCS, it is helpful to focus on Equation 4. This equation tells us

that the probability that the typical family will have a boy is 88%. Recall that Policy MCS is a compromise policy that trades off the cultural sensitivity aspect of population control policy with the aggregate size aspect. As such, even though the probability that the typical family will have a boy is not one as in Batabyal (2003), given the above mentioned tradeoff, it seems to us that the likelihood of 88% is a high enough probability.

Policy MCS clearly accounts for the desire to have male children. Therefore, on this ground, this policy is desirable. Further, as discussed in Section I, the ‘missing girls’ problem is a key current problem stemming from the cultural insensitivity of extant population control policies in countries such as China. In fact, in China and in some other countries as well, female children are routinely forsworn and even killed. As a result, although the ratio of women to men is typically around 1.05 or 1.06 in North America and Europe, this ratio has been as low as 0.94 in China (Sen, 1990). Because Policy MCS explicitly accounts for the cultural desire to have male progeny, this policy is likely to be effective in dealing with the ‘missing girls’ problem.

In this study, it was assumed that the sexes are equally likely and that the sex of distinct children are independent random variables. These are standard assumptions.³ In addition, the reader will note that the results obtained thus far are robust in the sense that their validity does *not* depend on any specific distributional assumptions about either the random variable N (describing the number of children in a typical family) or the random variable X (describing the number of boys in a typical family). As best as one can tell, Policy MCS has neither been proposed nor implemented by the framers of population control policy. Hence, for the reasons described in this study, we propose that this policy be used to combat inordinate population growth related problems.

III. CONCLUSIONS

In this study it was first observed that recently, Batabyal (2003) has proposed an unconventional population control policy that is sensitive to the cultural desire for male progeny in many Asian nations. It was then pointed out that although Batabyal’s (2003) proposed policy is culturally sensitive, a potential problem with this policy is that the aggregate size of the national population that is sought to be controlled may be quite high. Given this state of affairs, we addressed the tradeoff between cultural sensitivity and aggregate population size. In particular, the properties of Policy MCS were analysed. This policy is desirable not only because it is culturally sensitive but also because it

³ See Batabyal (2003) for more on this point.

caps the aggregate size of individual families and thereby the size of the national population. In addition, Policy MCS is worthwhile because it can be expected to notably ameliorate the 'missing girls' problem.

The analysis of this study can be extended in a number of directions. In what follows, we propose two potential extensions. First, in this study, we abstracted away from twins and from illegal behaviour by married couples. Consequently, it would be helpful to examine the properties of Policy MCS when one expressly allows for the possibility of unlawful behaviour such as the abandonment of one or more baby girls by individual families. Second, it would be useful to embed the present analysis in a broader theoretical setting in which a government uses population policy along with other policies – such as an educational policy that makes it compulsory for girls to be educated up to a certain minimum level – to maximize national welfare. An investigation of these aspects of the problem will allow richer analyses of the nexuses between cultural factors, population control policies, and the problems stemming from unchecked population growth.

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