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The Nuclear Option

Some Economic and Strategic Issues

T Krishna Kumar

How are social choices made on the nuclear issue? What is the information base on the costs and benefits of generating the nuclear capabilities required to be termed deterrence? Does the nuclear option itself increase the threat of aggression from neighbouring countries which may mean additional costs without yielding any benefits? Can there be any estimate of possible damage if the deterrence fails?

BEFORE examining the nuclear option we need to have a working definition of what is meant by it. I define the nuclear option as: (i) a nuclear technological capability, supported by a sustained R and D effort, in the field of nuclear power generation; (ii) a capability to indigenously produce and process nuclear weapons material so that the country can be completely self-sufficient and self-reliant in producing the nuclear weapons; (iii) a capability to produce nuclear weapons of a type and intensity that can be regarded as at least equivalent or superior to what our neighbouring countries, which are presumed to pose us a nuclear threat, have; (iv) a surveillance and protection system to defend our defence installations and the densely populated areas from a possible first nuclear attack by our neighbours; (v) capability to deliver the nuclear weapons to the target sites in our neighbouring countries, and this needs to be done accurately and swiftly through surface-to-surface missiles, weapons-carrying aircraft, and submarines. These capabilities are implied by our country's pronounced policy of no first use of the nuclear weapons. Whether one adopts a first use or no first use policy the capabilities required seem to be almost the same.

These capabilities depend crucially on who our enemies are, from whom we fear a nuclear threat or a general threat of aggression. I therefore assume that these neighbouring countries from which we fear such threats are China and Pakistan. The first cited capability is a prerequisite for other capabilities. But it is also a capability that we need in order to be self-reliant in generating nuclear power for peaceful uses. Hence while examining the costs and benefits of such nuclear R and D one must note that benefits accrue to the peaceful uses of nuclear power as well. Of course, there is the tricky question of how to allocate the total cost of joint R and D effort between the peaceful purpose and defence purpose.

Our country exercises the nuclear option by our union government incurring huge military expenditure towards activities that are supposed to generate these capabilities. One of the basic principles of economics is that an activity should be undertaken if the economic benefits outweigh the economic costs. This principle applies equally whether one is considering a private expenditure or government expenditure. The only difference is that the problem of calculating the economic costs and benefits of public or government expenditure is somewhat messy. In addition, one must examine how the social choices are made regarding public or government expenditure on the nuclear issue. The calculation of benefits and costs at the individual level involves a high degree of personal and / or subjective judgment. Individuals have independent perceptions of these costs and benefits, and thus could take different positions on the nuclear issue. Then the question is how a social choice is made on this nuclear issue.

It is on this issue of mechanisms of reaching a social choice based on individual choices that our recent Indian Nobel laureate Amartya Sen worked. The majority decision, which is the hallmark of a democratic political system, can lead to some absurd results, called intransitivity of social preferences, unless some conditions are imposed on the preference structure of individuals. For instance, it is possible that one majority might prefer 20 per cent increase in defence expenditure to 10 per cent increase in expenditure on power, while another majority may prefer 10 per cent increase in expenditure on power to 10 per cent increase in expenditure on poverty alleviation, and yet another majority may prefer 10 per cent increase in expenditure on poverty alleviation to even 20 per cent increase in expenditure on defence. Sen showed that under certain reasonable conditions on preferences of people the majority decision rule will not admit such pathologies and that it would satisfy various conditions that a social choice must satisfy.[1]

It does not necessarily mean that the BJP, which enjoys a majority, is justified in its decision to follow the nuclear option. People may have different perceptions on the threat and costs associated with the nuclear option. These perceptions are based on insufficient and manipulated information available. The perceptions are also unclear and are quite uncertain and vague. It is not clear, for example, what the impact of increased defence expenditure is on the general price level, and on the level of poverty. When government resources are scarce and they are needed both for defence expenditure and also for an alternative such as poverty alleviation, one needs to know the trade-off between poverty alleviation and increased defence expenditure. It is therefore possible that with better and more information people may modify their perceptions. The social decision based on majority under that revised situation may or may not be in favour of the nuclear option. A nationwide debate on the issue may enable us to make informed and better social decisions through the majority rule of our democratic system. This is again one of the major conclusions reached by Sen: In a good democracy in which people have concern for one another, particularly for the poorest of the poor, in which there is freedom of speech and expression, and where people exercise their opinion through the vote, the social decisions will maximise the social welfare which includes protection of individual's rights and social justice.

We need to know what it costs in rupee terms to finance the activities that will generate the nuclear capabilities described above. Similarly, it is also necessary to know what is a reasonable estimate of the benefits associated with that expenditure in terms of rupees. While it is easy to obtain reasonable estimates of what it costs to pursue the nuclear option, the estimated benefits depend on the threat perceptions and how effectively the outcomes of the

expenditure eliminate or reduce the severity of those threats. At one extreme, if the threat perception is purely a myth then the benefits are zero; at the other extreme, if the threat perception is real and certain then the benefits can be enormous, provided that we assume that these capabilities that we develop do serve as deterrent to such a threat. I shall share with you my perception that this assumption may be wrong. As I will argue later the nuclear option can also increase the threat of aggression from our neighbouring countries which may mean costs, in addition to the expenditure on the nuclear option, without yielding any benefits whatsoever.

While the rupee value of expenditure on the nuclear option is known with some degree of accuracy and certainty, the rupee value of the outcomes of that expenditure is not so tangible. These outcomes are not goods and services traded in a marketplace having a rupee value. These outcomes will have greater value if there are threats of greater intensity and frequency, if the threats have greater certainty of occurring, and if the defence expenditure results in outcomes which will reduce the threats or reduce the probability of realising those threats. There are a few questions that we have to pose: (i) What are the threats from our neighbours? (ii) Is the nuclear option a deterrent to those threats, as it is made out to be? (iii) How is the nuclear option a deterrent to those threats? (iv) Are there other less expensive ways of diffusing those threats or dealing with them?

The threats are: (i) Border disputes and border encounters with our neighbours; (ii) terrorist activity supported by the enemies, such as what we are experiencing with the ISI of Pakistan; (iii) a traditional war of aggression from one of the neighbours, or from both of them jointly, which does not use the nuclear weapons; and (iv) a threat of first use of the nuclear weapons by one of the neighbours or from both. One might argue that the first three threats do not relate to the issue of using the nuclear option. I am assuming that one of the reasons we wish to follow the nuclear option is to create a perception among our adversaries that we are capable of using it and thus create a deterrence among them with regard to the first three threats as well.

These are potential threats. There are different probabilities with which these threats may be realised at any future point in time. The greater these probabilities the greater is the potential threat. The next question is how do we estimate the social cost of these threats. One way of estimating the total cost of these potential threats is to quantify the damage caused by them and put a rupee value on that damage. Since the threats are uncertain and occur with certain probabilities the estimated cost of damages will have a probability distribution. We would then be able to calculate the mean or average rupee value of the probability distribution of such damage. The mean or average cost of damage does not adequately distinguish between a colossal damage, albeit with a very small probability and an equivalent moderate damage with high probability. Sometimes it is not possible to identify the extent of damage and to estimate its rupee value. In that case one standard suggestion made by economists is to take as a lower bound of such cost the value of social goods and services that are foregone (the cost of the next best alternative).

Threat Perceptions

What does the nuclear option do to the threat perceptions? One might expect that pursuing the nuclear option will either reduce the intensity of the type of threats that were listed above, or it will reduce the probability of realising those threats. In either case the mean or average cost of the damage due to those threats is reduced. This reduction in the average cost of damages may be taken as the benefit associated with the pursuit of the nuclear option.

Most countries today assume that nuclear weapons will not actually be used by the governments of other countries. This is due to social, political, and economic ostracising which it entails from the comity of nations. It may only serve the purpose of creating an atmosphere of deterrence. In other words, one might say that the threat of the first use of nuclear weapons by any country has a very small probability. By pursuing the nuclear option we are only reducing marginally an already small probability of the first nuclear attack by our adversary. Hence the reduction in the average or mean or expected cost of damage which can be attributed to the nuclear option is likely to be very small. Ultimately the estimate of the benefits is purely an empirical issue that requires information on the extent of threats, their likelihood and the damages caused by them, both with and without the nuclear option. Unfortunately we have very limited or no information on these aspects.

One might even argue that exercising the nuclear option would worsen the already hostile attitude our neighbouring countries have towards us. Hence it might provoke them to use other less severe threats than a nuclear attack from our neighbours; the latter being not an alternative at all for reasons just described. While the nuclear option might reduce very marginally the threat associated with a nuclear attack, it might increase the threat of less severe attacks by a much greater degree. The net result could be an increase in the cost of damage than a decrease, as advocated.

The deterrent theory, which is often advanced for following the nuclear option, is based on a fallacious premise. It assumes that the threat perception is based on the present situation and it also assumes that while we follow a strategic decision our adversary does not have a counter strategy. Game theory and strategic behaviour constitute some of the most commonly used concepts in economic theory. As an economist I wish to apply these to the nuclear issue. If we take a strategic position we must grant our adversary also a strategic response. If we produce nuclear weapons we must assume that our adversaries also either produce or procure nuclear weapons of equivalent or superior quantity and quality. Hence our initiative in producing the nuclear weapons will undoubtedly trigger a nuclear arms response from our adversaries. This situation would work like a sequential or a dynamic game between us and our neighbours and lead to an arms race.

A country like Pakistan that cannot match India in its resources will have to depend on military support from other nations. The geopolitical situation in this region will thus be seriously altered. At a time when we need to reduce tension and promote co-operation between us and our neighbouring countries, instead of going in that direction we are following the

Table: Capital Costs of a Nuclear Weapons Programme

		Rs Crore
One reactor to produce plutonium		700
One missile production facility		500
Cost of 150 nuclear bombs of 15-20 kilo tonne capacity		600
Cost of missiles		4,025
55 Prithvis	385	
30 Agnis	1,500	
25 Agni -IIs	1,500	
16 Sagarikas	640	
Cost of fitting one IAF squadron		60
Cost of three nuclear submarines		12,000
Cost of C^3I		3,525
Cost of two satellites		2,000
Cost of radar, missiles, etc, to protect airbases/launch sites		5,000
Total		28,000

nuclear option. The consequences are quite clear in a world with only one superpower, after the dissolution of the USSR. We are prompting our neighbouring countries to either collude against us or to have an alliance with the superpower. This strategy is bound to isolate India from several countries which are looking for India's leadership in the non-aligned movement to restrain the use of power by the superpower. Instead of prompting the nuclear powers to follow the policy of nuclear disarmament, the Indian move is likely to isolate India, as it already has, with no change in the nuclear disarmament situation. Our country's position in the international context is likely to become weaker than stronger.

As an isolated country we have to depend on ourselves in this game of arms races. A poor country like ours cannot afford to devote increasing resources year after year for such activities at the expense of the growth of the real economy. It may be recalled that it is this kind of arms race and the diversion of resources to defence expenditure that had destroyed the USSR. Another major concern expressed by some industrially developed countries, such as the US, is that nuclear proliferation might make misuse of the nuclear weapons easy. This point must be taken seriously given the degree of international terrorism today. A country like ours which cannot catch an alleged outlaw Veerappan with the support of the police of two states and that of the border security force, may not be able to ensure the safety of nuclear weapons once they are created.

If our main objective is to reduce the potential of threats from our neighbouring countries there may be other alternative approaches available. We do not seem to have explored all the other alternatives. Transactions between neighbouring countries, whether such transactions are political, economic, social, or cultural could be based on co-operation or conflict. We may say that such transactions are outcomes of a game repeatedly played by these neighbouring countries. Economists have demonstrated that in repeated games of this nature it is quite often advantageous to play it co-operatively than non-co-operatively. It is also shown that the scope for co-operation increases if there are more transactions. Hence one of the options we should follow is to increase the co-operation between neighbouring countries and ours by increasing the economic, social and cultural transactions between us.

Finally there is another important aspect associated with the choice of the nuclear option: India had earned a name as a peace-loving country that was the abode of a Mahatma who preached 'Ahimsa'. India is also one of the founders of the principle of non-alignment. Should we lose such an identity with our decision to pursue the nuclear option? This is also a decision that was taken by the present government in secrecy without having a prior nationwide debate. By following the nuclear option we as a nation are earning a bad name of initiating nuclear proliferation among developing countries that cannot safeguard nuclear weapons from being misused by terrorists. Having seen what the nuclear bomb had done to thousands of people in Hiroshima and Nagasaki it is hard to understand how our country can adopt a policy of triggering the use of such weapons of mass destruction. One argument often presented is that the nuclear powers have such weapons and have not disarmed themselves. It does not call for further production of nuclear weapons; instead it calls for a move towards a peaceful pressure on those countries to seek nuclear disarmament. One must distinguish between the historical context in which such weapons were produced and are being stockpiled from any new moves to produce them. It is this distinction that underlies the Comprehensive Test Ban Treaty (CTBT) and Nuclear Proliferation Treaty (NPT).

Now let me return to the basic economic issues and present some rudimentary economic statistics. These estimates are based on those by a fellow economist C Rammanohar Reddy in a series of three articles published in *The Hindu*. It is estimated that in 1955-64 when China was quite active in building its nuclear capability it spent on its nuclear programme about US $28 billion (1996-97 prices). Of course as Rammanohar Reddy correctly states this expenditure was incurred by China when it developed the technology in isolation and when the base knowledge was still under-developed. In our case the cost could be much less. Further our space programme, which has produced Prithvi and Agni I and Agni II missiles already, incurs some of the cost for the delivery system, and hence these are what economists call sunk costs.

General K Sundarji states that a minimum deterrent effect will be achieved by an arsenal of 150 nuclear bombs, each of 15-20 kilo tonne capacity of the kind dropped on Hiroshima and Nagasaki, that could be delivered by the already existing aircraft and missiles. He puts the cost as Rs 2,760 crore in 1996-97 prices. This would be approximately US $ 0.7 billion (1996-97 prices), which is only two and a half per cent of what China spent in building its programme between 1955-64. But Sundarji's estimate did not include command, control, communication and intelligence system (C^3I) that is absolutely necessary for ensuring the deterrent effect. Nor did it consider using submarines for carrying the nuclear weapons. Brigadier Vijay K Nair gives an independent estimate of Rs 6,835 crore. This estimate includes C^3I and a nuclear submarine. This would be around US $ 1.7 billion, which is only about 6 per cent of China's expenditure on the programme spent between 1955-64 (1996-97 prices).

Rammanohar Reddy gives a detailed break-up of the estimate of capital costs of Indian nuclear weapons programme that can serve as a nuclear deterrent (see table). His estimate of capital cost in Rs 28,000 crore. This figure does not include the R and D cost for nuclear power generation capability that I would put at the top of the list of capabilities. But if one adds the operating costs, wages and salaries, fuel costs, transportation costs, R and D for C^3I, etc, this estimate rise go to Rs 40,000 crore to Rs 50,000 crore, over a period of 10 years, or about Rs 5,000 crore per year. This estimate does not take into account the hazards and environmental impact of the nuclear wastes. There is a recurring cost associated with safeguards against hazards. In addition one may assume that nuclear plants have a lifetime of about 100 years, and after that they have to be decommissioned ensuring safe disposal of nuclear material. This decommissioning of the nuclear plants involves some additional costs. It is suggested that these costs would be several times that of other costs. Even if one assumes that they are twice the other costs it would amount to Rs 1,00,000 crore. The annualised cost would be Rs 1,000 crore. Thus, the annual cost of the nuclear option is about Rs 6,000 crore.

How do these figures compare with other transparent numbers? Our country's gross domestic product (GDP), is of the order

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of Rs 1.25 million crore (1996-97 prices). The annual additional defence expenditure is about one half of 1 per cent of our GDP. Our tax revenues are of the order of 10 per cent of our GDP. The additional defence expenditure is therefore of the order of 5 per cent of our tax revenue, which is already quite low and quite inadequate to even for the several important government programmes. Comparing the additional defence expenditure with the next best alternatives foregone, viz, expenditures on various social services, with Rs 6,000 crore one can run 15 lakh primary health centres, by spending that amount the government can have a two-fold increase in its expenditure on primary education and meet the entire cost of universal primary education.

To give another illustration. We have a foreign debt of US $ 90 billion. Assuming an average interest of 8 per cent per year the annual interest payments are about Rs 28,800 crore. The annual cost of the nuclear option is therefore a little more than one-fifth of this annual interest burden on our foreign debt. This is a very important comparison in the context of increasing trade deficit and increasing foreign debt. It is the imprudent handling of foreign exchange situation in the 1980s that resulted in the financial crisis of 1991. One may recall that during Indira Gandhi's regime as a political strategy the soft IMF loan was prematurely paid back in two years just prior to the general elections. This forced the government to borrow at higher commercial rates of interest. Rajiv Gandhi soon thereafter liberalised the economy allowing imports liberally when the exports did not register much growth. The increasing trade deficit and the high interest burden lead our country to a foreign exchange crisis in 1991. It is this crisis that made us dependent on the IMF and the World Bank which imposed conditions for giving loans. It is these conditions which almost eliminated our autonomy in choosing our economic policies. All this happened when our economy was doing very well internally with a two-digit growth rate. It is therefore very important that we manage our foreign exchange very carefully.

One must recognise the futility of pursuing an arms race when the country does not have enough resources. This is made amply evident by the arms race policy of former USSR and the US. The dissolution of the USSR was due to its failure to meet the basic needs of its people as result of diversion of sizeable resources to the arms race with the US. A country can compensate for its military weakness by making its economy strong. This is made evident by Japan's economic hold on the US economy. Let us put first things first and take care of our foreign exchange situation, primary health, primary education, and poverty alleviation before we gamble with a possibly futile nuclear programme.

Note

[Based on a talk delivered to an informal gathering of scientists at the Raman Research Institute, Bangalore on November 14, 1998. The author thanks Alladi Sitaram, Vinod Vyasulu, and the participants at the informal gathering for their comments. The author alone is responsible for any errors.]

1 The condition is that given any three alternatives there is a consensus on at least one of them as the least preferred, most preferred, or with median preference. Such a condition will be satisfied if people communicate with each other and show concern for each other. This situation may be expected to prevail in a good democracy.

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