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ON RATIONAL CHOICE THEORY AND THE STUDY OF TERRORISM

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Abstract

When rational choice theory is applied to the study of terrorism, it is important that attention be given to the derived principles of constrained utility maximization. Particularly useful is the Slutsky equation, which rigorously analyzes the quantity response in one activity to a price change in another. By directing attention to assumptions and/or information about compensated cross price elasticities, expenditure shares, and income elasticities, the Slutsky equation can provide critical guidance in both theoretical and empirical analysis.

Keywords:

Terrorism | Rational choice | Deterrence | Income and substitution effects | Slutsky equation | Composite good

INTRODUCTION

The theme of this paper is that rational choice theory, when rigorously applied, can help clarify and discipline the study of terrorism. Much of what follows is a review, or perhaps better, a reminder of principles generated by the basic model of utility maximization subject to a budget constraint. We assume a modest degree of familiarity with the model. Textbook presentations of the model are legion; particularly useful for this paper are Henderson and Quandt (1980) and Silberberg (1990).

We take as our starting point the interesting article by Frey and Luechinger (2003), who contrast the potential benefits of 'benevolence' versus 'deterrence' strategies to dissuade terrorists from violent activities. A deterrence strategy raises the opportunity cost of terrorist activities by defending potential targets, hitting terrorist training centers, infiltrating terrorist groups, and so on. Deterrence strategy is fundamentally confrontational and thus zero-sum. A benevolence strategy also raises the opportunity cost of terrorist violence, but it does so by reducing the cost of non-violent activity, or what Frey and Luechinger call 'ordinary activity'. Unlike a deterrence strategy, however, a benevolence strategy can improve the well-being of terrorists (if they have more ordinary goods) and the public (if less terrorism occurs). In this way, a benevolence strategy has the potential to achieve a positive-sum outcome.1

We begin by reviewing Frey and Luechinger's (2003) model of benevolence strategy and their claim that 'a reduction in the costs of all other activities … reduces the amount of terrorism' (Frey and Luechinger, 2003: 241). We show that the claim does not follow generally from the rational choice model. Rather, the statement relies implicitly on assumptions about particular underlying demand elasticities and budget shares. Especially helpful to the analysis is the well-known but perhaps underutilized Slutsky equation of the rational choice model.

DETERRENCE VERSUS BENEVOLENCE APPROACHES TO TERRORISM

In Frey and Luechinger's (2003) geometric model, terrorists choose between terrorism and 'all other activities'. Following standard practice, we assume that other activities refer to the composite good Y, defined as the expenditures on all other goods valued at

initial prices of the $n-1$ ordinary activities $X_2, \ldots, X_n$. According to the composite good theorem due to Hicks (1946), as long as the prices of the component goods change by the same factor of proportionality t, then comparative-static analysis can be completed as if choice is over two commodities T and Y. Define the price of the composite good to be $P_Y = t$, where at base prices $= 1$. Then Y and tY can be interpreted respectively as real and nominal expenditures on all other goods.

Following Frey and Luechinger (2003: 242), Figure 1 compares and contrasts deterrence and benevolence policies to reduce terrorism. Terrorist activity T is measured on the horizontal axis and the composite good Y on the vertical axis. Assume that the initial budget constraint available to the terrorists is aa. According to Figure 1, the terrorists consume T_1 in terrorist activity and Y_1 of the composite good. A deterrence policy raises expected costs of terrorist activity and hence increases the price of terrorism P_T. This causes the terrorist budget constraint to rotate along the T axis to budget line ab. The steeper budget line reflects the higher opportunity cost of terrorism. In accordance with the law of demand, terrorist activity is reduced to some lower level T_2 along budget line ab. Hence, the deterrence policy reflected in Figure 1 can be expected to reduce terrorist activity for given preferences.

Figure 1 Deterrence and benevolence strategies to reduce terrorism.


Figure 1 Deterrence and benevolence strategies to reduce terrorism.

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A benevolence policy also raises the opportunity cost of terrorism, but it does so by increasing terrorist access to the composite good by lowering the price of the composite good P_Y. This is shown in Figure 1 by budget line ca. The steeper budget line reflects the higher opportunity cost of terrorism. According to Frey and Luechinger (2003: 241), terrorists choose a level of terrorism less than T_1, which for convenience is drawn here equal to T_2, the same level as under deterrence policy. Based on this analysis, Frey and Luechinger (2003: 241) conclude that benevolence policy reduces terrorism:

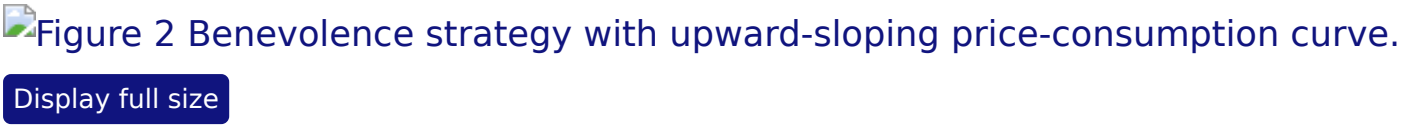
> Higher opportunity costs reduce the willingness of a potential terrorist to commit terrorist activities. An increase in the opportunity costs or

equivalently, a reduction in the costs of all other activities, therefore reduces the amount of terrorism.

THEORETICAL CONSIDERATIONS

Careful consideration of the rational choice model used in Figure 1 shows that Frey and Luechinger's claim about the terrorism-thwarting effect of benevolence is not general. In Figure 1, the decrease in the price of other goods reduces terrorism from T_1 to T_2 . However, an alternative outcome is consistent with the rational choice framework. As illustrated in Figure 2, a decrease in P_Y can have the opposite effect, increasing terrorism from T_1 to T_4 , for example. Note that the comparative-statics in Figure 2 is neither illogical nor extraordinary. Hence, the rational choice model, without more specificity, is agnostic about the terrorism-reducing potential of a benevolence strategy. Further review of the model shows that the additional information required to distinguish between the two outcomes can be traced to certain underlying demand elasticities.2

Figure 2 Benevolence strategy with upward-sloping price-consumption curve.



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The Price-Consumption Curve and the Elasticity of Other Goods

The fundamental contrast between Figures 1 and 2 is captured in the slopes of the respective price-consumption curves, which in turn are linked to different values of the own price elasticity of the composite good ϵ_{YY} . In Figure 1, a decrease in the price of Y leads to a new optimum along a negatively-sloped price-consumption curve and thus decreased terrorism. This occurs if and only if the own price elasticity of the composite good is greater than one in absolute value (i.e., the composite good is price elastic). In Figure 2, a decrease in the price of Y leads to a new optimum along a positively-sloped price-consumption curve and thus increased terrorism. This occurs if and only if the price elasticity of the composite good is less than one in absolute value (i.e. the

The relationship among the slope of the price-consumption curve, the level of terrorism, and the price elasticity of the composite good follows from the expenditures test of elasticity together with the budget constraint. When the price of the composite good is lowered in Figure 1, the terrorist group spends less of its fixed income on terrorism, since P_T is unchanged and T has decreased in accordance with the negatively-sloped price-consumption curve. This implies that nominal expenditures on other goods increase when the price of Y falls. Because price and nominal expenditures move in opposite directions, Y is price elastic. Hence, a negatively sloped price-consumption curve with decreased terrorism implies elastic demand. A simple reversal of the argument establishes that elastic demand implies a negatively sloped price-consumption curve with decreased terrorism. Similar logic applied to Figure 2 shows that the price-consumption curve is positively sloped with increased terrorism if and only if demand for Y is price inelastic.

To summarize, a reduction in the prices of other goods will decrease (increase) terrorism if and only if the composite good is price elastic (inelastic). Hence, we would like to know the elasticity of the composite good. It can be shown that the elasticity of the composite good is equal to a weighted average of the own and cross price elasticities of the component goods included in Y. More formally, given that the prices of all component goods change by the same proportion, then:

(1)

where s_i is the expenditure on component good X_i as a share of expenditures on all component goods, and ϵ_{ij} is the elasticity of demand for component good X_i with respect to the price of component good X_j .3 An implication of equation (1) is that if the cross-elasticities are small, then the elasticity of the composite good will tend to reflect the own price elasticities of the component goods. Unfortunately, the empirical evidence that now exists on elasticities is of little help establishing the composite good's elasticity. While rigorous studies are available, their elasticity estimates are derived from aggregate spending patterns that might not be representative for terrorists. Moreover, studies to date have not separated out terrorism activity from all other goods. This suggests that it might be better to shift attention from the composite good directly to the responsiveness of terrorism to changes in P_Y .4

The Slutsky Equation and the Cross Price Elasticity of Terrorism

The question raised by Frey and Luechinger's (2003) article is whether terrorism will decrease or increase in response to a lowering of prices of other goods. The answer is determined by the algebraic sign of the cross price elasticity ϵ_{TY} , that is, the elasticity of terrorism with respect to the price of the composite good. If the cross price elasticity is positive, then terrorism and other goods are gross substitutes, and a benevolence policy will indeed reduce terrorism; if the cross price elasticity is negative, then they are gross complements, and a benevolence policy will instead increase terrorism. As noted before, the rational choice model cannot by itself provide an unambiguous answer. It can, however, provide helpful guidance.

The help lies in the Slutsky equation, a central and well-known result in microeconomic theory. In terms of elasticities, the equation can be formally stated for the present case as:

(2)

where σ_{TY} is the compensated cross price elasticity of terrorism, α_Y is the budget share of the composite good, and η_T is the income elasticity of terrorism.

The Slutsky equation thus decomposes the cross price elasticity into two parts called, respectively, the substitution and income effects. Speaking generally, the substitution effect is positive if and only if the compensated cross price elasticity is positive, in which case the respective goods are net substitutes; the substitution effect is negative if and only if the compensated cross price elasticity is negative, in which case the goods are net complements. In the present case, however, terrorism and the composite good must be net substitutes, meaning that the substitution effect is necessarily positive. This follows from the homogeneity of compensated demand, which can be shown to imply that not all goods can be net complements. Hence, in the case of only two goods, here T and Y, they must be net substitutes.

Turning to the income effect, the minus sign on the second term in equation (2) indicates that a decrease in the price of Y causes an increase in real income. The larger the budget share of the composite good, the larger is the increase in real income. As a consequence of the minus sign, the sign of the income effect will be opposite that of the income elasticity of terrorism. Hence, the income effect will be positive if and only if the income elasticity is negative, in which case terrorism is an inferior good; it will be negative if and only if the income elasticity is positive, in which case terrorism is a

Because the income effect can be either negative or positive, the sign of the cross elasticity ϵ_{TY} in equation (2) can be negative despite the positive substitution effect. This is not a mere theoretical possibility, like the logical existence of a Giffen good that violates the law of demand. Rather, there is good reason to believe that the sign of ϵ_{TY} is in fact negative. Working back through equation (2) from right to left, the strong presumption is that terrorism is a normal good. Terrorism does not fit the usual characterization of an inferior good as being narrowly defined within a broader category of higher quality, more costly goods (e.g. bus travel within the larger category of transportation services). Moreover, implicit in anti-terrorism policy is the belief that terrorism is a normal good: reduced resources are expected to reduce terrorism. If, on the contrary, terrorism was an inferior good, then the obvious policy prescription would be to provide cash grants to terrorists. Turning next to the budget share of the composite good, presumably α_Y is large, even for terrorists. Hence, the income effect is likely to be negative and substantial. Lastly, it is not unreasonable to believe that the positive substitution effect is comparatively small, reflecting the lack of ease in substituting terrorism for the composite good, which consists largely of ordinary goods like food, clothing, and housing. Putting these considerations together means there is a strong likelihood that the positive substitution effect is more than offset by a negative income effect, with the serious implication that a benevolence policy could actually increase terrorism.

Extensions Using the Slutsky Equation

Although Frey and Luechinger (2003) frame their model in terms of terrorism and all other activities, they suggest policies directed at lowering the price of a single specific activity, such as foreign visits, discussion processes, or political participation. Here, too, the Slutsky equation can be helpful. Denote terrorism again as $T = X_1$ and consider a policy designed to lower the price of some individual activity X_j ($j = 2,3, \ldots, n$). Then the Slutsky equation in this case is:

(3)

where ϵ_{Tj} , σ_{Tj} and η_T are the cross price elasticity, compensated cross price elasticity and income elasticity of terrorism, and α_j is the budget share of activity X_j .

Discussion of equation (3) follows that for equation (2) except for two changes. First, in contrast to the composite good's budget share, here the budget share α_j for a single

Second, because other individual activities besides X_j exist in the model, the homogeneity condition does not guarantee a positive substitution effect. These two changes cut in opposite directions for advocates of a benevolence policy. A benevolence policy directed at an individual alternative activity is more likely to be successful because the income effect will tend to be smaller. At the same time, however, whether the alternative activity is in fact a net substitute as supposed becomes an empirical question. The cautionary note here is that intuitions – for example, that democratic participation is a net substitute for terrorism – might be wrong.5

While we have focused on the issue of benevolence policy to this point, it should be clear that the Slutsky equation can be similarly applied to other terrorist choice problems. For example, Enders and Sandler (1993, 1995) have studied the effects of policies directed at inhibiting attacks on particular targets. Among their stronger empirical results, Enders and Sandler show that the installation of metal detectors at US airports in 1973 decreased skyjackings but also increased hostage taking and assassinations, consistent with their conjecture that these activities generate very similar political characteristics. In terms of the Slutsky equation, the empirical results indicate large positive substitution effects and at most only partially offsetting income effects associated with the increased price of skyjackings.

CONCLUDING REMARKS

In the study of terrorism, it is well known that a price change of one activity can generate a quantity change in the same direction for a related activity. For example, a decrease in the price of ordinary activities might generate a decrease in the level of terrorism (Frey and Luechinger, 2003). This quantity response in a related good is often called the substitution principle. Our purpose has been to remind social scientists that the substitution principle is formally derived from the underlying model of constrained utility maximization. Particularly important in the model is the Slutsky equation, which rigorously analyzes the quantity response in one activity to a price change in another. By directing attention to assumptions and/or information about compensated cross price elasticities, expenditure shares, and income elasticities, the Slutsky equation can provide critical guidance in both theoretical and empirical analysis.

Rational choice theory can be useful to the study of other issues of terrorism, including, for example, the formation of preferences. Scholars from a variety of disciplines have delved into why terrorists exist and how they are motivated (e.g. Hoffman, 1998 (Political Science), Lewis, 2003 (History), and Stout, 2002 (Psychology)). More attention needs to be given to terrorist preference formation within the rational choice framework. An excellent example is Arce and Sandler's (2003) evolutionary game model that shows conditions under which moderates within a society adopt extremist preferences in order to fit within the extremist group. Another topic is the relationship between normal income opportunities and the tendency to become a terrorist (see, for example, Frey and Luechinger, 2003: 242). Empirical evidence to date is mixed on the issue (Berrebi 2003, Krueger and Malečková 2003, Yom and Saleh 2004). Careful modeling of the supply of terrorists is needed. If the unit of analysis is an individual, then a labor supply model of the choice between market and terrorist activities would be appropriate. Higher market wages might cause an individual to supply more time to market activities and less time to terrorism or vice versa depending on income and substitution effects. If the unit of analysis is a terrorist organization, then terrorist labor supply could be embedded in a consumption choice model. If market wages rise, then a terrorist organization would have to pay more to recruit terrorists, which in turn would raise the price of terrorism and reduce the quantity of terrorism via the law of demand.

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Notes

[1] For the purpose of this paper, we follow Frey and Luechinger (2003) in using the term deterrence to refer to actions that directly raise the cost and hence price of terrorist activity. This contrasts with Schelling (1966), who uses deterrence to refer to threats of retaliatory action that alter preferences.

[2] Figures 1 and 2 depict interior solutions. As Frey and Luechinger (2003: 244–245) recognize, a decrease in the price of other activities can leave terrorism unchanged in

the case of a corner solution. For a discussion of suicide attacks interpreted as corner solutions, see Sandler (2003).

[3] A proof of equation (1) is available from the authors upon request.

[4] Alpay and Koc (1998) use data on household spending in Turkey to empirically estimate own and cross price elasticities and expenditure shares for nine commodity groups such as food, clothing, housing, and transportation. These estimates would appear to provide the information required to estimate ϵ_{YY} in equation (1) for Turkey. However, because Alpay and Koc's commodity categories include all goods, and terrorism is not separated out as a product category, the weighted sum of their matrix of elasticities necessarily sums to -1.0, except for a small rounding error. Furthermore, the spending patterns in Alpay and Koc's study presumably reflect the behavior of typical households in Turkey, not terrorists.

[5] Relevant to some extent on this issue are empirical studies of democracy and civil war. Examples include MacCulloch and Pezzini (2002), who find increased political freedom reduces revolutionary support; Hegre et al. (2001), who show an inverted U-shaped relationship between the level of democracy and the likelihood of civil war; and Collier and Hoeffler (2004), who find an insignificant relationship between democracy and civil war. Terrorism, however, is distinct from civil war and is believed by many scholars today to be primarily a phenomenon of religious extremism (Enders and Sandler, 2000; Hoffman, 1998; and Juergensmeyer, 2000). Lewis (1996: 54) maintains that the so-called neo-Islamic fundamentalists ‘regard liberal democracy with contempt as a corrupt and corrupting form of government’. See also, for example, Sivan (1995).

Source: Journal of Conflict Resolution

Chapter 9 Terrorism: Theory and applications

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The Effectiveness of Antiterrorism Policies: A Vector-Autoregression-Intervention Analysis

Source: American Political Science Review

Toward a Democratic Civil Peace? Democracy, Political Change, and Civil War, 1816–1992

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