

Switching Costs, Grassroots Support of Terrorism and the Escalation of Conflict

Peter J Phillips

*Corresponding Author, School of Accounting
Economics and Finance, Faculty of Business and Law
University of Southern Queensland, Toowoomba, Queensland, Australia
E-mail: phillips@usq.edu.au
Tel: 617 46 315490*

Abstract

The purpose of this paper is to investigate the relevance of ‘switching costs’ to the problem of terrorism and grassroots support of terrorism. Grassroots supporters that choose between the terrorist organisation and the government may face considerable costs in switching their support after their initial decision has been made. This paper presents an analysis of competition between the terrorist organisation and the government for grassroots support within a two-period economic setting. If grassroots supporters face costs, which may be either tangible or psychological costs, in switching to the government if they initially supported the terrorist organisation (and vice versa), economic theory produces results that have important policy implications. Of most importance, it can be shown that when grassroots supporters have switching costs there is more intense competition between the terrorist organisation and the government for grassroots support. Also, when grassroots supporters have switching costs, the terrorist organisation and the government must invoke more extreme measures in order to win supporters away from the other party.

Keywords: Terrorism, switching costs, grassroots support, terrorist organisation, government, competition, conflict, extreme, supporters

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This paper examines the competitive-strategic interaction between the terrorist organisation and the government in vying for grassroots support. Siqueira and Sandler (2006) presented a game-theoretic economic analysis of this interaction. It is the purpose of this paper to re-cast and extend the Siqueira and Sandler analysis in an alternative economic framework and incorporate grassroots supporters’ ‘switching costs’, which may include transactions costs, learning costs, artificial or contractual costs and psychological costs (Klemperer 1987), into the analysis. Where Siqueira and Sandler concentrate on the dynamics of an initial time period during which grassroots supporters make a choice between the terrorist organisation and the government, this paper generates additional insights by analysing the two-period dynamics of competition between the terrorist organisation and the government for

grassroots support and the significance of grassroots supporters' switching costs in shaping the intensity of the conflict.

Taking up the logical next steps in the analysis presented by Siqueira and Sandler (2006), this paper begins with the scenario in which the terrorist organisation and the government compete for grassroots support in an initial time period in a manner that will maximise two-period utility when period two utility is increasing in the grassroots support secured in period one. The objective of the analysis is to examine the implications for two-period competitive interaction between the terrorist organisation and the government when grassroots supporters have positive switching costs. If, in a two-period setting, the terrorist organisation and the government vie for grassroots support, the costs that confront grassroots supporters who switch from the terrorist organisation to the government (or vice versa) play a significant role in shaping the dynamics and intensity of the competitive interaction between the terrorists and the government. Of particular interest is the fact that when grassroots supporters have positive switching costs, competition between the terrorist organisation and the government will be more intense than would be predicted by a single-period model. Furthermore, pulling supporters away from the opposing party will require 'more extreme measures' than would be the case if supporters could switch their support with zero cost.

By extending Siqueira and Sandler's analytical framework whilst retaining some of its important features, this paper presents a model in which the terrorist organisation escalates its terrorist activity to augment its level of grassroots support. The government, on the other hand, increases its level of expenditure on providing goods and services. Once a particular level of support has been acquired in period one, the terrorist organisation and the government must entice grassroots supporters to switch their support. In the absence of switching costs, there will be an incentive for the terrorist organisation to slightly increase its terrorist activity to lure supporters away from the government and there will be an incentive for the government to slightly increase its public projects expenditures to lure supporters away from the terrorist organisation. When grassroots supporters face switching costs, the situation is markedly different and more pernicious. There is no incentive for *slight* increases in terrorist activity or public projects expenditures. However, much larger augmentations in terrorist activity or public projects expenditure will help each party gain supporters. Although intense rivalry between the terrorist organisation and the government in the initial stages of the conflict may be subject to some diminution in the subsequent period because of the enhancement of the 'inelasticity of support' brought about by the presence of switching costs, there lingers the potential for a significant escalation in terrorist-initiated violence.

This paper is organised as follows. The first section contains a brief review of the relevant literature and theoretical work. This includes an overview of the mainstream economics treatment of switching costs. The second section addresses the objective of the paper: to investigate the implications of the switching costs faced by grassroots supporters (in an extension and re-casting of a Siqueira and Sandler (2006) type analysis). The third section presents a discussion of the implications of the analysis for governments and their security agencies. The fourth section concludes the paper.

A Survey of the Literature

Within the defence economics literature, the analysis of terrorism has not usually taken grassroots support into account. A survey of the literature that deals with this problem can therefore be presented in a very concise manner. Because this paper will re-cast and expand the Siqueira and Sandler (2006) analysis by incorporating grassroots supporters' switching costs into the analysis, the economic literature that deals with switching and substitutions costs is relevant. Although this literature is relatively large, there are a small number of critical or seminal contributions that furnish the requisite theoretical concepts with which to fulfil the main objective of this paper. The literature survey will concentrate more attention on these investigations.

Grassroots Support and the Economics of Terrorism

Grassroots support has not usually been incorporated into economic models of terrorism. When it is treated, it is usually treated jointly with the problem of terrorist recruitment. Faria and Arce M. (2005) construct a dynamic model in which the 'bridge' between terrorist activities and terrorist recruitment is popular support. The model presented by Faria and Arce M. becomes more a model of recruitment (from a pool of supporters) than a model of the dynamics of grassroots support for terrorism. This paper does, however, represent some of the first steps towards incorporating those aspects of popular support into economic models of terrorism that had been incorporated into models of guerrilla warfare and civil war (Intriligator and Brito 1988; Azam 2002; Grossman 1995; Mason 1996). The Faria and Arce M. analysis is similar to Rosendorff and Sandler (2004) where popular opinion and support for terrorism also operates as a factor that influences terrorist recruitment. It was not until Siqueira and Sandler (2006) that an economic analysis of popular support was undertaken that did not treat this variable as an intermediate step to terrorist recruitment and, in addition, economic analysis was applied to a rigorous investigation of the general idea that government counter-terrorism measures may win or lose grassroots support.

Siqueira and Sandler's (2006) analysis of the competition between the terrorist organisation and the government for grassroots support stands as the main extant contribution to this problem. Siqueira and Sandler examine two scenarios: (1) a scenario where the terrorist organisation has a fragile supporter base that reduces support for the terrorist organisation when the government mounts a counter-terrorism offensive; and (2) a scenario where the terrorist organisation builds its grassroots support by undertaking terrorist operations that follow government actions that have caused disaffection among the populace. In general, the terrorist organisation attracts supporters by expanding its terrorist activities while the government attracts supporters by providing goods and services. The competition is examined game-theoretically. The Nash equilibrium in each of the two scenarios generates insights into the strategic competition between the terrorist organisation and the government for grassroots supporters. When the terrorists have a fragile supporter base, both the terrorist organisation and the government are better off when the terrorist organisation deescalates its operations. When the terrorists have a strong supporter base, the government escalates its counterterrorism measures and avoids an escalation by the terrorists but, in so doing, augments the terrorist organisation's grassroots support.

Siqueira and Sandler's (2006) model is a model of competition between the terrorist organisation and the government for grassroots support. Depending on whether this grassroots support for the terrorist organisation is fragile or strong, the terrorist organisation and the government may find it better to undertake some actions rather than others. In each case, the weaker of the two parties finds it advantageous to take a leadership position and in each case there is a decrease in terrorist activity. The main focus of the model is the augmentations and diminutions in either party's grassroots support. Incorporating grassroots support into an economic model of terrorism generates a deeper analysis where the actions of the terrorist organisation and the government are formed in a manner that not only considers the political advantages, for example, of terrorism and counter-terrorism but the effect of such actions on grassroots support when grassroots support confers positive utility to each party. Now that the initial steps have been taken towards incorporating grassroots support directly into an economic model of terrorist-government interaction and competition, it is time to explore further extensions to the analytical environment constructed by Siqueira and Sandler.

One opportunity is explored in this paper. Whereas Siqueira and Sandler concentrate on terrorist-government competition for grassroots support within a simultaneous-move game theoretical framework, the analysis presented in this paper concentrates on what happens within a two-period setting. The terrorist organisation and the government compete for grassroots support because the grassroots support has a future value to each side. The higher the future value of grassroots support, the more intensely it will be competed for. In reality, grassroots supporters are unlikely to be able to switch their support without incurring some sort of cost. The switching costs need not be tangible. There need

only be ‘psychological costs’ incurred by grassroots supporters if they decide to switch their support to the other side. The purpose of this paper is to explore terrorist-government competition for grassroots support when grassroots supporters have positive switching costs. When the grassroots supporters have switching costs, this competition between the terrorist organisation and the government is more intense.

The Economics of Switching Costs

The switching costs literature is quite large but it has been comprehensively reviewed by Farrell and Klemperer (2006). Switching costs are important in economics because they influence firms’ competitive behaviour both in and for a market. Among other things, there are implications for pricing strategy, economies of scope and entry into the market. Because of the importance of switching costs in shaping firms’ strategic interactions with other firms and consumers, there is also a significant policy dimension to switching costs that incorporates issues such as consumer protection, predation and monopolisation (Farrell and Klemperer 2006, p.12). Because the economic literature that covers switching costs deals with the strategic interactions among economic agents and because some of these interactions deal specifically with competition for market share over time, the switching costs literature provides a wealth of analytical work that can be usefully deployed to solve problems of interest to the defence economist. Of special interest are those parts of the switching costs literature that deal with the ways in which switching costs shape competition for market share. The terrorist organisation and the government, in competing for grassroots support, can be thought of as doing just that.

There are several things that may cause switching costs in orthodox economic scenarios (consumer markets). First, there may be a need for compatibility with existing equipment. Second, there may be transactions costs involved in switching one’s custom. Third, there may be learning costs. Fourth, there may be uncertainty about the alternatives. Fifth, there may be implicit or explicit contracts in place that reward individuals for continuing the economic relationship. Finally and probably most relevant to the present paper are psychological costs that may derive from ‘non-economic loyalty factors’ (Klemperer 1995, pp.517-518). Although there may be tangible switching costs involved in switching support from the terrorist organisation to the government, intangible or psychological switching costs will almost certainly manifest themselves in this scenario as they do in other economic scenarios. If grassroots supporters are initially indifferent between supporting the terrorist organisation or the government, once a supporter has aligned with one side or the other, the allegiance changes supporters’ relative utilities for the two parties such that there is a perceived cost of switching sides (Klemperer 1995, p.518). Even if the two parties are *ex ante* homogenous—potential supporters are indifferent between the terrorist organisation and the government—the presence of switching costs introduces *ex post* heterogeneity between the terrorist organisation and the government. In vying for supporters in subsequent periods, the switching costs of grassroots supporters are likely to play a very considerable role in shaping the nature of the competition for ‘market share’ and its likely outcomes.

The economics of switching costs and its role in competition for market share have been refined considerably over the past two decades. There are two points of interest: (1) competition for market share in an initial period (starting from a situation where no firm has consumers); and (2) competition for market share in a subsequent period (after consumers, who have switching costs, have decided which firm to direct their custom towards). Firms compete on price or quantity to secure market share. In markets where consumers have switching costs, the firm’s market share is of critical importance. Consequently, firms in these markets engage in strategic competitive behaviour to secure an optimal outcome. If the future value of the market share is large, firms will engage in strong and aggressive competition during the initial period because consumers with switching costs will not easily switch between firms in a subsequent period. When competition for market share persists into a subsequent period, the strategic-competitive behaviour continues as firms weigh the benefits and costs of competition and its potential consequences. In particular, taking market share from rivals may

provoke very aggressive responses and, possibly most importantly, because of the enhanced difficulty of acquiring customers who have switching costs, taking market share from rivals in the presence of switching costs necessitates aggressive competitive behaviour. These results are due to von Weizsäcker (1984), Klemperer (1987, 1995), Farrell and Shapiro (1988) and Beggs and Klemperer (1992).

The most common analytical setting in which to analyse the effects of switching costs on the behaviour of economic agents is a two-period model such as the one deployed by Klemperer (1987). Although the analysis can be extended into a dynamic setting and, in doing so, generate important additional insights, the two-period models capture most of the elements of the basic structure of the problem (Farrell and Shapiro 1988, p.124)¹. The basic structure revolves around the future value of the market share secured in the first period. The greater the future value of the market share, the more intense and aggressive the competition will be in the initial period. In the second period, a number of outcomes are possible all of which hold great interest for us. First, switching costs may reduce rivalry between economic agents vying for market share because switching costs effectively segment the market into submarkets. Second-period competition may be feeble and the non-cooperative equilibrium may resemble a collusive solution in an otherwise identical setting with no switching costs (Klemperer 1987, p.377; Farrell and Shapiro 1988, p.124). Second and more perniciously, although switching costs may provide incentives for a de-escalation of competition in the second period, switching costs remove the incentive for *small* amounts of competitive behaviour. To take market share from a rival will necessitate a significant escalation in competition to first offset the effect of the switching costs of the rivals' supporters and then take them away (Klemperer 1987, p.386).

Competition for Grassroots Support

Obviously, securing grassroots support has a value for both the government and the terrorist organisation. There will be competition for it. Siqueira and Sandler (2006) examine this competition in a single initial period. If grassroots supporters have switching costs, this first-period may be characterised by aggressive competition for the grassroots supporters. Moving beyond the first period, the second period may be characterised by (1) reduced rivalry and segmentation of the grassroots supporters into government supporters and terrorist organisation supporters because switching costs reduces the elasticity of grassroots supporters' support functions; and (2) a reduced incentive for small-scale rivalry because either the government or the terrorist organisation would need to engage in larger-scale rivalry to first offset grassroots supporters' switching costs before taking them away from the other party. There is, therefore, a lingering incentive for an escalation of rivalry and conflict. This possibility is usually passed over in orthodox economics because firms can monitor attempts to engage in large-scale competition (on price or quantity) and formally or tacitly agree to avoid such confrontations (Klemperer 1987, p.386). There may be no such behaviour in terrorist-government competition for grassroots supporters.

Conclusions from the Literature

The defence economics literature has only rarely directly addressed the importance of grassroots supporters. Siqueira and Sandler (2006) are the only authors to directly incorporate grassroots support into a model of terrorist-government strategic interaction. Other authors, if they treat the matter formally, have only addressed grassroots support indirectly or as an intermediate step influencing the recruitment of new terrorists by terrorist organisations. Siqueira and Sandler's model of terrorist-government competition for grassroots supporters yields some important insights but extensions in a number of directions are possible. The model is a single period model and implicitly assumes that grassroots supporters do not have switching costs. The economic theory that has been developed to provide a framework for the analysis of markets with switching costs may be deployed as the

¹ A more dynamic model is useful when the market is changing its constituency over time (new consumers entering and old consumers leaving) (Klemperer 1995, p.525).

foundation for an extension of the Siqueira and Sandler model. The first step is to recognise that grassroots support has value for the terrorist organisation and the government. Given this, there will be competition for it (Klemperer 1995, p.520). Now, if grassroots supporters have switching costs (which may be psychological), the nature of this competition between the terrorist organisation and the government for 'market share' is shaped in certain ways. The higher the future value of the grassroots support, the more intense will be the competition for it. Strong and aggressive competition for grassroots support may be expected in an initial period. Within a standard two-period model, the second period may be characterised by a reduction in rivalry when grassroots supporters have switching costs. This is due to the effective segmentation of support, the difficulty of taking supporters away from the other party and the reduced incentive of small-scale competition. However, there remains the lure of enhanced grassroots support to be gained by very aggressive behaviour. There is the lingering incentive for an escalation of competition between the terrorist organisation and the government².

Competition for Grassroots Support (With Switching Costs)

By applying the microeconomic theory that underlies the analysis of switching costs and competition among firms for market share in consumer markets to the study of competition between the terrorist organisation and the government for grassroots supporters, a simple yet rich analytical framework can be developed that captures a number of key structural elements of this particular example of economic behaviour. The starting point is the assumption that grassroots support has value for the terrorist organisation and the government. Because of this, there will be competition between the terrorist organisation and the government for grassroots support. Starting from this position, it is possible to take a simpler path than that followed by Siqueira and Sandler. Rather than construct, as Siqueira and Sandler do, a rather complex game-theoretical model of the scenario, it is possible to proceed in a more direct way straight to the heart of the relevant competitive-strategic behaviour. Nothing more is needed as a starting point than the assumption that grassroots support (just like market share in a consumer market) has a value that will be competed for.

Setting up the Model

The objective of the model is to capture important elements of the competition between the terrorist organisation and the government for grassroots support. There are two competitors (the terrorist organisation and the government) and there are grassroots supporters which, like Siqueira and Sandler, may be thought of as being uniformly distributed along $[0, 1]$ with the terrorist organisation at 0 and the government at 1. The terrorist organisation and the government compete for grassroots support in a two-period setting. A two-period model generates deeper insights than a single-period model because it is clearly the case that grassroots support has future value to both the terrorist organisation and the government that influences behaviour in the first period. The terrorist organisation attracts supporters by undertaking terrorist operations but has to be careful not to provoke government counter-terrorist measures. The government attracts supporters by providing goods and services. The government can engage in counter-terrorist military operations but would prefer not to do so. While counter-terrorism reduces the effectiveness of the terrorists' activities in attracting grassroots supporters it simultaneously reduces the effectiveness of the government's efforts by taking resources away from goods and services provision. This trade-off is a key feature of Siqueira and Sandler's (2006) model³. These ideas can be formally stated as a series of assumptions.

² This might be especially the case if the terrorist organisation or the government holds a small amount of grassroots support. There will be a lot to gain and not much to lose (Klemperer 1995, p.520).

³ We resist the temptation to assume a zero-sum outcome and no net effect of counter-terrorism on either side's support. This could simplify matters but would reduce the depth of the analysis.

Assumption 1 There are N grassroots supporters who support either the terrorist organisation or the government. The supporters always support one side or the other.

Assumption 2 Competition for grassroots support takes place between the terrorist organisation and government in a two-period setting.

Assumption 3 The grassroots supporters do not have switching costs in the first period but they do have positive switching costs in the second period.

Assumption 4 The terrorist organisation attracts supporters by engaging in terrorist operations. The government attracts supporters by providing good and services. The government can engage in counter-terrorist operations and reduce the effectiveness of the terrorists' activities but only at the expense of providing goods and services.

Assumption 5 Share of grassroots support, σ , contributes positively to the terrorist organisation and the government's utility. The terrorist organisation and the government both attempt to maximise total two-period utility:

$$U_t = u_t + \delta u_{t+1}(\sigma_t) \tag{1}$$

Equation (1) is a utility function that both the terrorist organisation and the government have in common. Either party's total utility U_t , is a function of utility at time t , u_t , and the discounted utility—discounted by the discount factor of δ —of period $t + 1$, which is a function of share of grassroots support (see Klemperer 1995, p.520). It is possible to determine the first order condition for the terrorist organisation and the government that identifies the optimal choice of (1) terrorist activity; and (2) goods and services provision. From the equilibrium that emerges, more insights into the nature of competition for grassroots support can be generated. We now turn our attention to this task.

Competition: Analytical Results for Period 1

The terrorist organisation chooses its strategic level of terrorist activity and the government chooses its strategic level of goods and services provision in period one. Let the strategic variable that the terrorist organisation and the government choose be denoted by x . Given equation (1), each party's first order condition for the optimal choice of x (terrorist activity on the one hand and goods and services provision on the other) is (following Farrell and Klemperer (2006, p.33)):

$$0 = \frac{\partial U_t}{\partial x_t} = \frac{\partial u_t}{\partial x_t} + \delta \frac{\partial u_{t+1}}{\partial \sigma_t} \frac{\partial \sigma_t}{\partial x_t} \tag{2}$$

A result emerges immediately. If grassroots support has value for the terrorist organisation and the government, they will compete for it. The nature of this competition is revealed starkly by the analysis. First, the period 2 utility, u_{t+1} , of each party depends on the amount, σ_t , of grassroots support that they establish in the first period. Formally, $\partial u_{t+1} / \partial \sigma_t > 0$. Second, the trade-off that the terrorist organisation faces in attempting to attract grassroots support without provoking government counter-terrorist operations is captured by $\partial u_t / \partial x_t < 0$ and $\partial \sigma_t / \partial x_t > 0$. Period 1 utility is decreasing in x (because of potential provocation of counter-terrorism) but period 1 grassroots support is increasing in x and period 2 utility is increasing in grassroots support. There is a trade-off. The government faces a similar trade-off. Period 1 utility is decreasing in x (because it must give away some of its resources in the provision of goods and services) but period 1 grassroots support is increasing in x and period 2 utility is increasing in grassroots support. Again, there is a trade-off. A third result follows from the first two. There is more terrorist activity in period 1 and more provision of goods and services by the government in period 1 than the level that would maximise first-period utility for either side.

Result 1 The period 2 utility, u_{t+1} , of each party depends on the amount, σ_t , of grassroots support that they establish in the first period: $\partial u_{t+1} / \partial \sigma_t > 0$. The larger the utility, u_{t+1} , conferred in the future by the share of grassroots support secured in period 1, the more intense will the competition be in terms of terrorist activity (from the terrorist organisation) and goods and services provision (from the government).

Result 2 $\partial u_t / \partial x_t < 0$ since $\partial \sigma_t / \partial x_t > 0$ and $\partial u_{t+1} / \partial \sigma_t > 0$ (this is a re-working of Farrell and Klemperer 2006, p.33). The terrorist organisation and the government face a trade-off. Period 1 utility is decreasing in competitive behaviour (terrorist activity and goods and services provision) but period 2 utility is increasing in such behaviour because of share of grassroots support it enables either side to secure.

Result 3 Because of the value of grassroots support to future utility, the value for x —terrorist activity when considering the terrorist organisation and goods and services provision when considering the government—will be higher than the level that would maximise either party's first-period utility. That is, x is higher than the level of x at which $\partial u_t / \partial x_t = 0$ (see Klemperer 1995, p.521). A single-period analysis understates the intensity of competition between the government and the terrorist organisation.

Result 4 When grassroots supporters have positive switching costs, there will be more intense competition for their support than would be predicted by a model without switching costs and which only considered a single time period. The intensity of competitive-strategic behaviour increases as the (discounted) value of the grassroots support to second-period utility increases.

By casting the competition for grassroots support in these terms, the nature of the competition between the terrorist organisation and the government emerges quite clearly. It follows logically from the analysis that first-period competition will be intense (more intense than without switching costs or when only a single period is considered) and that the intensity of competition increases as the value of grassroots support to either party increases. There may be situations where grassroots support has a higher value than it does in other situations. The analysis captures this possibility. We may conclude that when grassroots supporters have switching costs, there will be a higher level of terrorist activity and a higher level of goods and services provision than would be expected from either the terrorist organisation or the government if only single-period utility were considered. Intense competition becoming more intense as the value of grassroots support increases are the main conclusions from this part of the analysis. We turn now to the second period.

Competition: Analytical Results for Period 2

In the second period, the analysis points towards a diminution in the intensity of competition between the terrorist organisation and the government. This is due to the fact that value (or utility) is extracted from the grassroots supporters with lower levels of x . The switching costs of the supporters ensure that grassroots support is essentially segmented in period 2. Klemperer (1995, pp.521-522) provides a proof that may be utilised to support the proposition that $x_2 < x_1$ for the terrorist organisation and the government. The switching costs, which may be psychological, that come into play once grassroots supporters have aligned with either side effectively increase the inelasticity of the grassroots supporters' demand for either terrorist activity or goods and services provision (see Klemperer 1987, p.377). Interestingly, the way in which rivalry appears to subside may resemble collusive behaviour between the terrorist organisation and the government in the same way that non-cooperative behaviour may resemble collusive behaviour in consumer markets with switching costs. Like Siqueira and Sandler's model, there is a 'natural' damping mechanism in the structure of the competitive-strategic behaviour between the terrorist organisation and the government. There remains, however, the lingering incentive for an escalation of conflict.

The Importance of the Discount Rate

The discount rate, δ , that is embedded within the model has important implications and economic meaning. It is, in a sense, a 'catch-all' variable for anything that happens to alter the present value of the share of grassroots support. If either the terrorist organisation or the government apply a higher (lower) discount rate in optimising equation (2), the present value of share of grassroots support will decrease (increase). From the point of view of the terrorist organisation, a higher (lower) discount rate

will mean less (more) terrorist activity in period 1. From the point of view of the government, a higher (lower) discount rate will mean less (more) provision of goods and services. A higher (lower) discount rate means a lower (higher) $\partial u_t / \partial x_t$ (Farrell and Klemperer 2006, p.34). A number of important factors may lead to a higher discount rate:

- A perception of increased risk of divergence of the value of grassroots support from its expected value.
- A constraint on the resources which leads the terrorist organisation or the government to apply a high discount rate to future payoffs accruing to the utilisation now of relatively scarce resources (see Farrell and Klemperer (2006, p.34)).
- An increase in the level of risk aversion (a diminution in the risk seeking behaviour) of the terrorist organisation or the government.

The benefit of the grassroots support that is so fiercely contested in period one is harvested in period two. The future is far from certain and a discount rate is applied to uncertain or risky future payoffs. An increase in the risk that is perceived to characterise a conflict setting may lead either side to discount the value of grassroots support more heavily. This will lead to a corresponding diminution in period one competition for grassroots support and an attendant decline in terrorist activity and goods and services provision. Of course, the opposite may occur with the consequence of an escalation in competitive-strategic behaviour. Many possibilities are captured by the discount rate embedded in the model.

The Lingering Incentive for Escalation of Conflict

The model contains within it the seeds for an escalation of conflict between the terrorist organisation and the government. Already the model provides a reason for terrorist organisations and the government seeking to secure grassroots support through aggressive competitive-strategic behaviour. Although the grassroots support becomes segmented and less sensitive to incentives to change allegiances, there remains the incentive for an escalation of conflict. Importantly, the escalation must be of a very much larger scale than would be the case in the absence of switching costs. Again, the costs that grassroots supporters face if they were to change their allegiance from one side to the other have ramifications. The key point is that the terrorist organisation and the government must overcome the grassroots supporters' switching costs before the supporters can be taken away from the other side. There is no incentive for small increases in either terrorist activity or goods and services provision (Klemperer 1987, p.386). Larger-scale operations are necessary.

The model that we have constructed treats x_{t+1} as being independent of σ_t . This approach is the one that is usually taken (see Klemperer (1995, p.523)). Although it can be formally extended, the model can be augmented with logical argument. As explained above, switching costs faced by grassroots supporters in the second period must be overcome first before any effort by the terrorist organisation or the government to take supporters away from the other side will be effective. This may tend to dampen rivalry in the second period for the reasons explained previously. However, the party that has attracted a smaller share of grassroots support will always be interested in increasing x . The extent to which this interest is held in check by the economic behaviour and conditions that are embedded in the scenario is simply not determinable. Destructive behaviour can always potentially emerge. The analysis does lead us to expect, however, that if it does emerge, such behaviour must necessarily be of a relatively large scale in order to overcome the costs that grassroots supporters face in switching their allegiances.

There is a lingering incentive for an escalation of conflict, particularly for the side that has obtained a lower share of grassroots support. This incentive is counter-balanced by the optimising behaviour of both the terrorist organisation and the government. Intense competition is expected in period 1 but is likely to be dampened in period 2 for the reasons given. A re-emergence of intense competition may be destructive to the side that initiates it. This does not mean that the incentive is

removed or that such circumstances cannot arise. It always sits in the background as a possibility. The temptation to increase x is also counter-balanced by the possibility that the retaliation from the other side is so aggressive that $\partial u_{t+1} / \partial \sigma_t < 0$. This expectation will reduce the intensity of the competitive-strategic behaviour in the first period. In this case, terrorist activity or provision of goods and services will be lower in period 1 than if grassroots supporters faced no switching costs (Klemperer 1995, pp.523-524). On the balance of probabilities, it is likely that early and fierce competition for grassroots supporters in period 1 will subside into a reduced-rivalry state in period 1. The incentive for an escalation of conflict remains but is counter-balanced by a number of elements of the structure of economic behaviour under analysis.

Predictions and Policy Implications

By extending the Siqueira and Sandler model into two periods and by recasting the relevant economic behaviour within a simpler economic-analytical framework, the analysis generated a number of predictions with policy implications or, at least, factors that the government and its security agencies must be aware of. First and foremost, the analysis provides a rationale for competition for grassroots support. Because the two-period utility of the terrorist organisation and the government is increasing in grassroots support, there will be competition for it. It is the incorporation of grassroots supporters' switching costs that help to explain why the terrorist organisation and the government care about securing a share grassroots support. If grassroots supporters faced no costs, there would less incentive for either side to aggressively pursue their support. Second, the competition between the terrorist organisation and the government will be intensified as the value of grassroots support increases. Third, the intensity of the competition between the terrorist organisation and the government will be greater than a single-period model would predict and will be greater than the level that would maximise either side's first-period utility. This will likely subside in the second period. Fourth, there is a lingering incentive, especially for the party holding the lesser share of grassroots support to escalate its competitive behaviour in the future. This escalation is expected to be of a large scale because switching costs remove the incentive for smaller-scale competition.

Prediction 1 The terrorist organisation and the government will compete for grassroots support. Grassroots support has a value to both sides and grassroots supporters' switching costs play a key role in facilitating the extraction of that value.

Prediction 2 The greater the value of the grassroots support, the more intensely the terrorist organisation and the government will compete for it. There are situations in which defence analysts may be able to identify, albeit imprecisely, the relative importance of grassroots support. When this importance is expected to be greater than on other occasions, more intense competitive-strategic behaviour from the terrorist organisation and the government is expected.

Prediction 3 An intense level of competition—more terrorist activity from the terrorist organisation and more goods and services provision by the government—in period one is expected to subside somewhat in the second period once a share of grassroots support has been secured. The intensity of competition is higher than the level that would be predicted by a model that did not account for the switching costs of grassroots supporters.

Prediction 4 There is a lingering incentive, especially for the party holding the lesser share of grassroots support, to initiate an escalation in conflict in the future. When grassroots supporters have switching costs, this escalation must necessarily be of a large scale. This incentive is counter-balanced by other elements within the structure of the model but certainly cannot be ignored by the government and its security agencies. Indeed, if the government has fared poorly in securing grassroots support, the model implies that it will need to expend considerable resources to remedy the situation.

The model is relatively rich given its relative simplicity. It need only be recognised that grassroots supporters, in all likelihood, face costs in switching their allegiance from the terrorist organisation to the government (or vice versa), for a rationale for aggressive competition between the

terrorist organisation and the government for grassroots support to emerge. Intense competition with more terrorist activity and more government provision of goods and services is expected to prevail in a setting where grassroots support has value and grassroots supporters have switching costs. The intensity of this competition is likely to be more severe than the level that would be predicted by a single-period model. Indeed, the intensity of competition is likely to generate terrorist activity (from the terrorist organisation) and goods and services provision (from the government) that exceeds the level that would maximise either party's first-period utility. Intense and aggressive competition in period one is likely to subside, however, in period two because of the effective segmentation of grassroots support that is established by the presence of switching costs. There remains the incentive for the party with the lesser share of support to re-engage in competitive behaviour. Whilst there are counter-balances to this possibility it is clear that any such return to competitive behaviour must necessarily be of a large order of magnitude. Once the government has secured a large share of grassroots support, it must remain very wary. Conversely, if the government loses in the competition for grassroots supporters it must take extraordinary lengths to win them back.

Conclusions

Grassroots support has usually not been incorporated into economic models of terrorism and terrorist behaviour. Siqueira and Sandler have taken the first significant steps towards rectifying this state of affairs. In this paper, Siqueira and Sandler's work is extended and cast in an alternative analytical framework. The framework is simpler but contains all of the structural elements of the economic behaviour under consideration. The key feature of the analysis contained herein is the incorporation of grassroots supporters' switching costs into a model in which the terrorist organisation and the government compete for grassroots support. Switching costs help to strengthen the economic rationale for competition between the terrorist organisation and the government for grassroots support and incorporating switching costs into a model of terrorist-government competition helps to bring out some important features concerning the nature and intensity of this competition. Although there are a number of analytical results, the most important appears to be the implication that competition between the terrorist organisation and the government for grassroots support will be more intense the greater the value of the grassroots support and, what is more, competition will exceed the level that would maximise either side's utility if only one period were considered.

Apparently irrational single-period behaviour becomes entirely rational utility maximising two-period behaviour. In this model, the switching costs faced by grassroots supporters if they change their allegiance to the other side essentially segments the grassroots support in period two. Because of switching costs, grassroots supporters are characterised by greater inelasticity (lower sensitivity) with regards to further competitive efforts by either side. The terrorist organisation and the government will compete aggressively for grassroots support in period one. The level of terrorist activity and the level of goods and services provision by the government will be higher than the level that would be predicted by a one-period model considering only first-period utility. The model predicts intense competition followed by a diminution of competitive behaviour in the future but there remains the incentive for the side with the lesser share of grassroots support to augment its competitive behaviour. This is counter-balanced by the predicted tendency towards two-period optimising behaviour and the possibility of strong retaliation by the opposition. The incentive for an escalation in conflict remains and the model predicts that attempts to capture a larger share of grassroots support after period one must be of a larger scale to first offset grassroots supporters' switching costs before taking their support away from the other party.

A government that competes for grassroots support with a terrorist organisation will find that it must compete very strongly during the initial period of competition. Indeed, governments have probably found this to be the case without identifying a precise source for the aggressive behaviour of its terrorist opponents. Terrorist opponents may have exhibited aggression that exceeded expectations

in terms of its hostility. Once the value of grassroots support is recognised and particularly once the costs that grassroots supporters face in switching allegiance are recognised, things become much clearer. Under such conditions, competition for grassroots support must be extremely intense in the initial stages of a conflict. This intensity increases as the future value of grassroots support increases. The terrorist organisation will, in all likelihood, engage in more terrorist activity than expected as it attempts to secure grassroots support which has a value in the future. The dynamics of grassroots support and the competition for it are important areas for research. The model presented in this paper provides a simple yet reasonably rich analytical framework with which to approach the problem. A number of extensions to the model are possible. An extension of the model to more than two time periods will generate insights into the nature of the competition for grassroots support in a more dynamic environment. Fully working out the implications of time-varying risk aversion or, perhaps more generally, time-variation in the discount rate applied in the utility function considered in the analysis is another prospect for future research.

References

- [1] Azam, J. 2002. Looting and Conflict between Ethno-Regional Groups: Lessons for State Formation in Africa. *Journal of Conflict Resolution* 46 (1): 131-153.
- [2] Beggs, A. and P. Klemperer. 1992. Multiperiod Competition with Switching Costs. *Econometrica* 60 (3): 651-666.
- [3] Faria, J.R. and D. Arce M. 2005. Terror Support and Recruitment. *Defence and Peace Economics* 16 (4): 263-273.
- [4] Farrell, J. and P. Klemperer. 2006. Coordination and Lock-In: Competition with Switching Costs and Network Effects. *CEPR Discussion Paper 5798*: Available at SSRN: <http://ssrn.com/abstract=936412>
- [5] Farrell, J. and C. Shapiro. 1988. Dynamic Competition with Switching Costs. *The RAND Journal of Economics* 19 (1): 123-137.
- [6] Grossman, H.I. 1995. Insurrections. In *Handbook of Defense Economics*, Vol. 1, edited by Keith Hartley and Todd Sandler, 191-212. Amsterdam: North-Holland.
- [7] Intriligator, M. and D. Brito. 1988. A Predator-Prey Model of Guerrilla Warfare. *Synthese* 76 (2): 235-244.
- [8] Klemperer, P. 1987. Markets with Consumer Switching Costs. *Quarterly Journal of Economics* 102 (2): 375-394.
- [9] Klemperer, P. 1995. Competition when Consumers have Switching Costs: An Overview with Applications to Industrial Organisation, Macroeconomics and International Trade. *Review of Economic Studies* 62 (4): 515-539.
- [10] Mason, T.D. 1996. Insurgency, Counterinsurgency and the Rational Peasant. *Public Choice* 86 (1-2): 63-83.
- [11] Rosendorff, B.P. and T. Sandler. 2004. Too Much of a Good Thing? The Proactive Response Dilemma. *Journal of Conflict Resolution* 48 (5): 657-71.
- [12] Siqueira, K. and T. Sandler. 2006. Terrorists versus the Government: Strategic Interaction, Support and Sponsorship. *Journal of Conflict Resolution* 50: 878-898.
- [13] Weizsäcker, C. Christian von. 1984. The Costs of Substitution. *Econometrica* 52 (5): 1085-1116.