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We construct a game theoretic model of an oligarchic economy that potentially could be targeted by smart international sanctions. Oligarchs in this economy provide support for their leader, a strong man and potentially an autocrat, in return for favors that results in having income higher than the average income in the country. We derive the conditions under which smart sanctions lead to compliance by the target country. Moreover, we draw some comparison between the effectiveness of smart and dumb sanctions for these economies.

JEL: F1, F5

Keywords: Economic sanctions, oligarchic economies

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On Smart Sanctions

Abstract

We construct a game theoretic model of an oligarchic economy that potentially could be targeted by smart international sanctions. Oligarchs in this economy provide support for their leader, a strong man and potentially an autocrat, in return for favors that results in having income higher than the average income in the country. We derive the conditions under which smart sanctions lead to compliance by the target country. Moreover, we draw some comparison between the effectiveness of smart and dumb sanctions for these economies.

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1 Introduction

The history of international economic sanctions is long. The effectiveness of sanctions as a policy instrument in international relations has been in dispute. Nevertheless, international sanctions have been continuously used over the past hundred years. The literature on sanctions both in economics and political science is somewhat rich. However, the literature is also inconclusive on the effectiveness of sanctions and the extent of its success on changing the behavior of the target countries (for example, see Eaton and Engers (1992), Kaempfer and Lowenberg (1988), Elliott and Hufbauer (1999) and Beladi and Oladi (2009)). These studies have considered economy-wide sanctions on target countries (i.e., dumb sanctions), whereby the nature of restrictions is usually indiscriminate and would affect all residents of the target countries. While smart sanctions have been addressed in political science literature (for example, see Cortright and Lopez (2002), Tostensen and Bull (2002) and more recently Drezner (2011), among others), economic theory of such type of sanctions is absent from economics literature. A new wave of smart sanctions imposed in recent years has motivated us to fill this important gap in this note.

This note formulates a theory of international smart sanctions, whereby the sender imposes sanctions on influential individuals in the target country. This new wave of imposing sanctions on a target country intends to force these influential individuals to use their leverage to change the behavior of the target government.

These sanctions are fundamentally different from the way sanctions are formulated in economic literature, where a sender country imposes country-wide restrictions including asset seizure on targets. The long history of ineffective dumb sanctions has motivated the sender countries to revisit the nature of sanctions. This note is an attempt to show the economics of these new types of sanctions.

We consider an oligarchic economy where oligarchs support the strong man in a country in return for being given economic favors. Through these favors, the oligarchs will earn income that is substantially higher than the average income in the country. We formulate the interaction between the strong man leader and the oligarchs by a sequential-move game. The leader of this oligarchic country moves first and chooses the extent of his efforts (i.e., using his political capital) toward a particular policy option which concerns international community and toward the well-being of his citizens. Through smart sanctions, the sender tries to use the relationship between the oligarchs and the leader of the target country to influence the behavior of the autocratic leader, which can be any undesirable choice he makes from the sender's perspective. We analyze the condition under which such type of sanctions can be effective. In addition, we revisit the theory of dumb sanctions using our framework for oligarchic economies and draw a comparison between the effectiveness of smart vs. dumb sanctions for these economies.

Following this short introduction, we setup our model in Section 2. Section 3 analyzes the effectiveness of smart sanctions. Section 4 compares smart vs. dumb sanctions and Section 5 draws some concluding remarks.

2 Model

Consider a target country that possibly faces international economic sanctions. The political and economic system of this target country suffers from corruption. A strong man leads this country either through a authoritarian political regime or through a quasi-democracy. Moreover, there are influential agents within this economy, "the oligarchs," whose support for the strong man is important. These agents' economic interests are closely tied with the support they provide to the leader of target country. Let the utility function of the leader be:

$$u = (\nu^{\alpha} + \rho^{\alpha} + y^{\alpha})^{\frac{1}{\alpha}} \tag{1}$$

where $\nu \geq 0$ is the noncompliance level of the target. Although this can be viewed as any undesirable activity level from the sender's perspective, throughout the rest of this note we assume it to be the level of

autocracy. Moreover, $\rho \geq 1$ denotes the level of supports that the oligarchs provide to the leader and y is a per capita income. Finally, we assume $\alpha \leq 1$. Recall that $\sigma = 1/(\alpha - 1)$ is the elasticity of substitution. As is well-know, the use of C.E.S. utility function provides extensive functional form flexibility depending on α.[1] C.E.S. utility functions have been extensively used in economics literature (for example see Krugman (1979)). The leader uses its political capital toward advancing autocracy level ν and to improve public well-being represented by per capita income. Thus, his resource constraint is given by: $a_\nu \nu + a_y y = P$ where a_ν and a_y are political capital requirement of ν and y, respectively, and P is his stock of political capital. The leader's choice variables are the level of per capita income and autocracy level ν.[2]

Consider next a representative oligarch. His corruption technology is represented by corruption production function $x = \rho^\gamma$ where $\gamma \in (0,1)$. Providing support to the leader is the input in this corruption production process, whereas favoritism (i.e., corruption) is a consequence of supporting the leader which will result in income for the oligarch. However, apart from sanctions costs, supporting the leader will also have a direct cost for the representative oligarch. The net benefit of supporting the leader is therefore given by:

$$\pi = (1-s)xy - c\rho \tag{2}$$

where $s \in (0,1)$ is the level of sanctions imposed by the sender on the oligarch and $c > 0$ is the unit (direct) cost of supporting the leader. Recall that y is the per capita income in the target country. Therefore, xy is the oligarch's gross income. Note that $x \geq 1$, given our assumption on corruption technology. That is, corruption allows the oligarch to obtain an income level beyond the per capita income due to his corruption rent. Note also that sanctions are "smart" as they target economic interests of specific individuals rather being broad based. Clearly, this is in contrast to the common formulation of economic sanctions in the literature (see for example Beladi and Oladi, 2009).

A two-stage game is played between the leader and the representative oligarch in the country that is potentially a target of economic sanctions. The leader chooses a per capita income level *objective* as well as his level of autocracy in the first stage. Then, the representative oligarch chooses how much support he

[1] When α approaches 1 the policy options for the leader are perfect substitute while when α approaches $-\infty$ these policy options are perfect complement (i.e.., Leontief functional form).

[2] While we admit that no leader (within autocratic or democratic systems) can choose per capita income, their policy objectives may be growth oriented. We can add another level of complexity to our model to take care of this issue. For example, we could consider a per capital national income function such as $y = f(p,.)$ where p is the leader's choice of political capital used in growth promotion. With this alternative formulation, the leader choice variables would be p and d. However, this does not add any more insight as our object is sanctions and compliance rather than economic growth.

provides the leader at any given level of sanctions.

To find the unique subgame perfect equilibrium of this game, we solve the representative oligarch's optimization problem that gives us the equilibrium support level $\hat{\rho} = (\gamma(1-s)y/c)^{1/(1-\gamma)}$. Turning next to the leader's problem in the first stage, we solve $max_{v,y} u(v,\rho,y) \quad s.t. \quad a_v v + a_y y = P$ and $\rho = \hat{\rho}$ to obtain the following first order conditions:

$$v^{\alpha-1}\Omega - \mu a_v = 0 \tag{3}$$

$$\left(\frac{\Delta}{1-\gamma} y^{\frac{\alpha+\gamma-1}{1-\gamma}} + y^{\alpha-1}\right)\Omega - \mu a_y = 0 \tag{4}$$

$$P - a_v v - a_y y = 0 \tag{5}$$

where $\Delta \equiv (\gamma(1-s)/c)^{\alpha/(1-\gamma)} > 0$ and $\Omega \equiv \left(v^\alpha + \Delta y^{\alpha/(1-\gamma)} + y^\alpha\right)^{(1-\alpha)/\alpha}$. Moreover, μ denote the Lagrange multiplier, i.e., the shadow price of leader's political capital. Equations (3)-(5) as well as the unique best response of the oligarch, denoted by ρ, fully determine our unique subgame perfect equilibrium of this game. We will analyze this equilibrium in the proceeding section.

3 Analysis of Smart Sanctions

We can now analyze how smart sanctions can effect the behavior of an autocratic leader. By differentiation equations (3)-(5) and solving the resulting system of equations we obtain:

$$\frac{dv}{d\Delta} = -\frac{v y^{\frac{\alpha}{1-\gamma}}}{\Psi(1-\gamma)} \tag{6}$$

where $\Psi \equiv a_y(1-\alpha)\left(v^\alpha + y^\alpha + [\Delta/(1-\gamma)]y^{\alpha/(1-\gamma)}\right) - [a_v \alpha\gamma\Delta/(1-\gamma)]v y^{(\alpha+\gamma-1)/(1-\gamma)}$. It follows from equation (6) that $dv/d\Delta > 0$ if and only if $\Psi < 0$. Recall also that Δ is strictly decreasing in s. Hence, smart sanctions will result in compliance of the leader in the target country (i.e., $dv/ds < 0$) if and only if $\Psi < 0$. What is interesting is that smart sanctions do not necessarily achieve the desired outcome from the sender's perspective since the sign of equation (6) is not determinate. That is, imposing smart sanctions may not result in compliance of the leader of the target country. We shall next characterize the conditions under which such type of sanctions are effective.

It follows from equation (6) that elasticity of substitution σ (i.e., parameter α) plays a crucial role in

sign of dv/ds. Evidently, $dv/ds < 0$ as α approaches unity. That is, when the elasticity of substitution σ approaches negative infinity which implies that pairwise policy objectives are perfect substitutes, smart sanctions will achieve its desirable outcome of leader's compliance. Recall that under this scenario the utility function for the leader is linear. At the other extreme case where σ approaches zero, smart sanctions will have the opposite effects since various objectives for autocratic leader are perfect complements. In fact this counterproductive scenario occurs even if α approaches zero (i.e., unit elasticity of substitution). More generally, the higher the elasticity of substitution is, the more likely smart sanctions will result in target's compliance. The intuitive explanation is that the leader would more readily substitute non-compliance with income policy objective. In contrast, if elasticity of substitution is sufficiently low, then the leader is less willing to substitute away from noncompliance. Therefore, the core message of this result is that it is more likely that smart sanctions will work in cases where the strong man preference allows for high substitutability of non-compliance with other policy objectives such as higher per-capita income for citizens. In cases where such substitutability is absent or limited such North Korea, it is less likely that such type sanctions lead to compliance.

It is also notable that these types of smart sanctions will have the opposite effects when γ approaches zero. In this case, the level of supports that the leader receives from the oligarchs approaches zero and corruption is almost absent from the target economy anyway. Hence, these type of smart sanctions will be ineffective. It should also be noted that a necessary condition for this type of sanctions to be effective in general is that the sender must be able to affect the oligarchs interests as is evident from equation (2). Paradoxically, the more integrated into world economy oligarchs are, the more likely this necessary condition would be met since the sender will have more leverage over the oligarchs.

4 Smart vs. Dumb Sanctions

In this section we reconsider the so called *dumb sanctions* using our framework with the intent to compare the effectiveness of these two forms of sanctions.[3] In contrast to the preceding sections, suppose the sender imposes economy wide sanctions on target. Let $y = (1-\delta)z$ be the post sanctions income where $\delta \in (0,1)$ is the rate of dumb sanctions and z denotes the gross income chosen by the ruler. The representative oligarch's payoff function is now $\pi = xy - c\rho$. The leader's utility is as before but he faces an additional constraints

[3] We are grateful to an anonymous referee for making this suggestion.

that $y=(1-\delta)z$ and his policy choices are v and z. As in the preceding sections, we start by finding the representative oligarch's equilibrium choice of $\tilde{\rho}=(\gamma y/c)^{1/(1-\rho)}$. Turning next to the ruler's problem, he will face problem $\max_{v,z} u(v,\rho,y) \quad s.t. \quad a_v v + a_z z = P$, $\rho=\tilde{\rho}$ and $y=(1-\delta)z$ where a_z is defined as before. We leave most of the analysis of the game of the section to the reader and restrict ourselves to the effectiveness of this type of sanctions. It can be readily shown that:

$$\frac{dv}{d\delta}=\frac{\alpha a_v}{\tilde{\Psi}}\left(\frac{\gamma}{c(1-\gamma)^2}\left[\frac{\gamma(1-\delta)}{c}\right]^{\frac{\alpha+\gamma-1}{1-\gamma}}+(1-\delta)^{\alpha-1}z^{\alpha-1}\right) \tag{7}$$

where $\tilde{\Psi}\equiv(1-\alpha)\left(a_z^2 v^{\alpha-2}+a_v^2(1-\delta)^{\alpha}z^{\alpha-2}\right)-a_v^2[(\alpha+\gamma-1)/(1-\gamma)^2][\gamma(1-\delta)/c]^{\alpha/(1-\gamma)}z^{(\alpha+2\gamma-1)/(1-\gamma)}$. Given our assumptions, it is evident from equation (7) that $dv/d\delta<0$ if and only if $\tilde{\Psi}<0$.

As in the case of smart sanctions, elasticity of substitution plays a crucial role. Considering the limiting cases, it follows from equation (7) that dumb sanctions induce compliance of the ruler in the target country as α approaches unity. On the other hand, for sufficiently small α, sanctions will have the opposite effect on target behavior. In particular, if $\alpha<1-\gamma$, then $dv/d\delta<0$. As α approaches zero, $dv/d\delta$ approaches zero. Here, the intuition is similar to the case smart sanctions.

We now turn to comparison of the extent of effectiveness of these two types of sanctions. While comparison of equations (6) and (7) seems difficult at the first glance as it involves many parameters and moving parts, we can gain some insights by comparing the limits of these two equations as the elasticity of substitution changes (i.e, parameter α). Using, equation (6), it can be shown that $\lim_{\alpha\to 1}=-a_y y/[a_v(1-s)]$. Interestingly, this states that smart sanctions are more effective for high income target countries given high elasticity of substitution. Similarly, $\lim_{\delta\to 1}=-(1/a_v)\left([(1-\gamma)^2/a_v][c/\gamma(1-s)]^{1/(1-\gamma)}+ca_z/(1-s)\right)z^{-\gamma/(1-\gamma)}$. Notably, this implies that the effectiveness of dumb sanctions in decreasing in income of the target. For the sake of comparing, suppose $s=\delta$ and $a_y=a_z$. Suppose also that α is sufficiently large so that both types of sanctions lead to compliance. Then at low income levels smart sanctions are less effective that the dumb sanctions whereas the opposite is true at higher levels of income in the target country. Then one can envisage a threshold income level above which smart sanctions are more effective than the dumb sanction. One can readily verify that such threshold income level is $\xi\equiv\left(c\left[(1-\gamma)^2/a_v a_z\left(c^{\gamma}/\gamma(1-s)\right)^{1/(1-\gamma)}+1\right]\right)^{(1-\gamma)/(1+\gamma)}$. That is, at sufficiently high income levels in the target countries, smart sanctions are more effective in inducing compliance of the ruler of the target. In fact, the higher the degree of corruption (measured by γ), this lower the threshold income level will be.

5 Conclusion

In this note we construct a game theoretic framework to study the effects of international smart sanctions, whereby a sender country impose economic sanctions on particular individuals in the target country in order to influence the behavior of its government. We assume that the target country is oligarchic in that few powerful individuals have significant influence, perhaps through their wealth or political power, on the country's governance. As it is usually with oligarchic systems, corruption is commonplace in the target country. The leader of the target country seeks supports from the oligarchs and the oligarchs will enhance their income by providing such supports. In particular, when the leader chooses its policies, he takes into account how oligarchs react. We have shown how international smart sanctions can be effective in this kind of environment. Interestingly, we demonstrate that the higher the elasticity of substitution of the leader is between income objective and the degree of autocracy, the more likely he would comply in the face of smart sanctions.

We also consider the mechanics of dumb sanctions for these oligarchic economies. We show that the elasticity of substitution also plays a crucial role in effectiveness of dumb sanctions. More importantly, we draw a comparison between the effectiveness of smart and dumb sanctions. We indicate that the effectiveness of smart (dumb) sanctions is increasing (decreasing) in income level of the target country assuming that the elasticity of substitution is sufficiently large, implying that smart sanctions are more effective than dumb sanctions for high income targets.

The model developed in this note can be extended in the following ways. First, it can be extended by assuming endogenous level of political capital. Second, our model can be extended to incorporate legal institutions and restrictions in the target countries. Clearly, this note is an attempt to provide a theoretical treatment of smart versus dumb sanctions. A more detailed and extensive of analysis of smart sanctions is the objective of our own future research.

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