People smuggling syndicates: An oligopoly analysis in context of the Söderköping process

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СИНДИКАТЫ КОНТРАБАНДЫ ЛЮДЬМИ - ОЛИГОПОЛЬНЫЙ АНАЛИЗ В КОНТЕКСТЕ СЕДЕРКОПИНГСКОГО ПРОЦЕССА PEOPLE SMUGGLING SYNDICATES - AN OLIGOPOLY ANALYSIS IN CONTEXT OF THE SÖDERKÖPING PROCESS

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Abstract. *В статье, развита модель олигополии (дуополии) синдикатов контрабанды людьми. Я рассматриваю случаи Cournot и Stackelberg. Сначала рассматривается детерминистический подход в котором я указываю условия, при которых два синдиката максимизировали бы их прибыль, и каковы будут рыночные результаты. Затем, модель со стохастическими распределениями вводится, в которой числа мигрантов являются случайными. Указано, что детерминистический подход - всего лишь специальный случай стохастического, когда распределение сконцентрировано в одной точке.*

Introduction

According to the ICMPD, more than 122.000 migration related border apprehensions were recorded in 2006 at the borders of those 18 Central and Eastern European countries and territories that were able to provide such an indicator. This represents a drop by 9% in comparison with the previous year [4:7]. There is a clear trend, according to which the number of recorded border apprehensions rose sharply for the region during the 90-ies, reached a peak in the year 2000, and has since then been dropping [4:16]. The number one country of origin of apprehended people was Ukraine, followed by Moldova [4:9].

One possible explanation for the falling number of apprehensions is that people smuggling today tends to be run by highly organised networks, or syndicates, operating on an international and very professional basis. This has been pointed out by a vast number of authors [1, 4, 5, 6, 11]. People smuggling has become an intermediary part of the global migration business [10].

In the following article I first present some stylised facts on illegal migration and people smuggling in two of the Söderköping process countries: Belarus and Ukraine. I then develop an oligopoly (duopoly) model of a general case, widely applicable to these countries, to show the conditions under which two people smuggling syndicates would maximise their profits, and what the market outcomes would be.

Stylised facts

In illegal migration, a similar pattern seems to appear for Belarus, Ukraine and Moldova: Foreign nationals and stateless persons enter these countries legally. They then change their status to illegal and try to enter the EU, often with the help of people smugglers [9:24].

In *Belarus,* during the first 10 months of 2003, the Ministry of Interior discovered 127 crimes related to illegal transporting of people across the state border. The activities of 14 criminal groups operating in the business were suppressed [2:83]. Recently, among those trying to cross the border illegally in order to reach the EU, there has been an increase in the number of apprehensions of CIS citizens, especially from Moldova, Central Asia, Ukraine and Russia [2:96]. At the same time, the general number of border apprehensions has gone down [2:23].

In the period 1999-2001, more than 300 organised groups of migrants trying to get to Poland or the Baltic states were apprehended in Belarus. Over 200 channels for people smuggling were neutralized [8:19].

In 2004, 24 organised crime groups, specialising in people smuggling, were discovered by Belarusian authorities [8:25].

For *Ukraine,* the number of illegal immigrants has been growing in recent years. The total number of illegal migrants detained by the Ministry of Internal Affairs and the State Border Service units was 25,539 in 2004 and 32,726 in 2005 [12:10]. IOM estimates that only 5 to 10% of all migrants illegally transiting through Ukrainian territory are detained by the Ukrainian government [ibid]. Whereas in 2003 most of the illegal migrants were Africans and Southeast Asians, today 70% come from other CIS countries [12:10-11].

In comparison with other countries in the region, the number of apprehensions taking place at the green border is very high for Ukraine. In 2004-2005, most illegal migrants avoided official checkpoints. In addition, 99% of apprehended migrants are smuggled by transnational organised crime groups [7:2]. There is a strong presence of networks backed up by funding and equipment from trans-border crime groups [9:8].

In the period of 2004-2006, 334 criminal organisations acting as channels of illegal migration were detected by Ukrainian authorities. The number of criminal organisations that were eliminated during the same time period was 240 [4:239].

People smuggling syndicates: Analytical model

There is evidence that syndicates are today the most common form through which the smuggling of migrants takes place [6:6-7]. Consequently, many authors have outlined how they work. Syndicates are, for example, very skilled at adapting their modus operandi [4, 10]. One explanation for the efficiency of people smuggling syndicates is their organisational structure. People smuggling syndicates are simply horizontal networks operating on an international basis [1, 6, 13]. Typically, these networks are star-shaped, i.e. there is a masterminding organiser in the centre who delegates functions to many different "arms". These arms, however, are independent and do not know about each other [6:7]. For a comprehensive overview of the division of labour in a people smuggling network, see [11].

Overall, there is reason to believe that these syndicates to a great extent resemble oligopolies [11]. For example, they tend to use product differentiation and charge different prices. However, when analyzing them, due to a lack of empirical data, it is difficult to say with certainty whether one duopoly model or another should be preferred. In the following model, I therefore consider both the Cournot and the Stackelberg case.

1 Deterministic approach

For the first people smuggling syndicate we have the following profit function:

$$\Pi_1 = [a - b(q_1 + q_2)]q_1 + \xi - a_2 q_1^2 - a_1 q_1 - a_0$$

where $a_i > 0$, $i = 1,2,3$. ξ is a random income variable that has been included in the function in order to reflect the fact that syndicates often, on a parallel basis, smuggle other commodities as well, such as narcotics [11:15]. We assume that the risk, i.e. the cost for the syndicate, increases jointly with q_i. In other words: The more migrants there are to be smuggled, the higher would be the risk (cost). Consequently, the cost function is quadratic and looks as shown in fig.1:

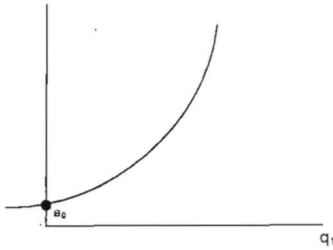

Fig.1

The profit for syndicate 1 is to be maximized by choice of q_1.
The first order condition for a maximum is

$$\frac{\partial \Pi_1}{\partial q_1} = [a - b(q_1 + q_2)] - bq_1 - b\frac{\partial q_2}{\partial q_1}q_1 - 2a_2 q_1 - a_1 = 0 \qquad (1)$$

The Cournot analysis of duopoly is based on the assumption that the conjectural variation $\frac{\partial q_2}{\partial q_1}$ is zero. The Cournot equilibrium is then defined to be that pair of (q_1, q_2) which is obtained under assumption of zero conjectural variation.

From the first condition we have

$$[a - b(q_1 + q_2)] - bq_1 - 2a_2 q_1 - a_1 = 0.$$

Solving this equation we obtain

$$q_1 = \frac{a - a_1}{3b + 2a_2}. \quad \text{By symmetry} \quad q_2 = \frac{a - a_1}{3b + 2a_2}.$$

The equilibrium market price is

$$p = \frac{ab + 2aa_2 + 2ba_1}{3b + 2a}, \quad \text{and industry output is} \quad q_i = \frac{2(a - a_1)}{3b + 2a_2}$$

The dynamics of the Cournot approach can be analysed by using reaction curves, showing the optimal output for each syndicate, given the output of the competitor. From the above equation for the Cournot equilibrium, assuming a one period lag, the reaction curves are

$$q_1(t+1)=\frac{(a-a_1-bq_2(t))}{2b+2a_2}, \qquad (2)$$

$$q_2(t+1)=\frac{(a-a_1-bq_1(t))}{2b+2a_2}. \qquad (3)$$

The reaction curves are shown in Fig.2.

Let us now consider the Stackelberg analysis of duopoly. Suppose that syndicate 1 believes that syndicate 2 would react along the Cournot reaction curve:

$$q_2=\frac{(a-a_1-bq_1)}{2b+2a_2}.$$

The conjectural variation is then

$$\frac{\partial q_2}{\partial q_1}=-\frac{b}{2b+2a_2}$$

so using (1)

$$\frac{\partial \Pi_1}{\partial q_1}=\left[a-b(q_1+q_2)\right]-bq_1+\frac{b^2}{2b+2a_2}q_1-2a_2q_1-a_1=0,$$

and the reaction curve for syndicate 1 is

$$q_1=\frac{a-a_1-bq_2}{2b+2a_2-\dfrac{b^2}{2b+2a_2}}.$$

The outcome for both syndicates depends on the behavior of syndicate 2. If syndicate 2 is using the Cournot reaction curve, as syndicate 1 believes, then the solution is the Stackelberg equilibrium for syndicate 1:

$$q_2=\frac{\left[\dfrac{(2b+2a_2)^2-b^2}{2b+2a_2}-b\right](a-a_1)}{(2b+2a_2)^2-2b^2},$$

$$q_1=\frac{(a-a_1)\left[(2b+2a_2)-\dfrac{b\left[(2b+2a_2)^2-b^2-(2b+2a_2)b\right]}{(2b+2a_2)^2-2b^2}\right]}{(2b+2a_2)^2-b^2}.$$

If we suppose that syndicate 2 is not using the Cournot reaction curve but is also using the Stackelberg reaction curve, so that each syndicate incorrectly believes that the other is using the naïve Cournot assumption, then the result is the Stackelberg disequilibrium

$$q_1=q_2=\frac{(a-a_1)(2b+2a_2)}{(2b+2a_2)^2-b^2+b(2b+2a_2)}$$

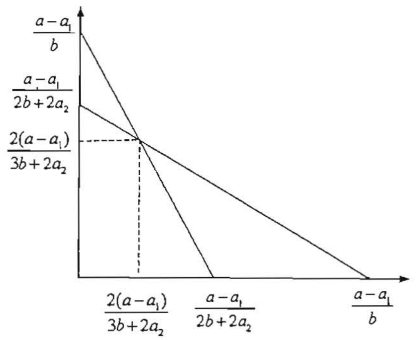

Fig.2

2. Random number of migrants.

In this section we assume that the numbers of migrants, i.e. the clients of the syndicates, are random variables with some probability distributions that have a known type. Let q_i, $i=1,2$, be a random number of migrants that will choose for their border crossing syndicate i. We suppose that q_i, $i=1,2$, has the probability distribution $p(x,\theta_i)$, where $\theta_i=(\theta_i^1,\theta_i^2,\ldots,\theta_i^m)$ is a vector of unknown parameters. Let

$$E\left[q_i\right]=m_i(\theta_i), \qquad (4)$$

$$Var\left[q_i\right]=D(\theta_i), \qquad (5)$$

denote the expectation and the variance of the random variable q_i, $i=1,2$. The syndicate i tends to maximise the expected profit

$$E\left[\Pi_i\right]=E\left[(a-b(q_1+q_2))q_i-a_2q_i^2-a_1q_i-a_0\right] \qquad (6)$$

We can believe that the competition between the syndicates establishes such values of the distribution parameters that the expected profits of both syndicates will be maximised. We would like to stress that the equilibrium in this case is the distribution. The previous deterministic approach is a special case of the stochastic one, when the distribution is concentrated in one point. Using (4-6) we can obtain the expected profit for the first syndicate

$$E\left[\Pi_1\right]=am_1(\theta_1)-bE\left[D(\theta_1)+m_1^2(\theta_1)\right]-bm_1(\theta_1)m_2(\theta_2)-$$
$$-a_2\left[D(\theta_1)+m_1^2(\theta_1)\right]-a_1m_1(\theta_1)-a_0$$

The first order condition for the first syndicate has the form

$$a\frac{\partial m_1}{\partial \theta_1^i}-b\frac{\partial D_1}{\partial \theta_1^i}-b\frac{\partial m_1^2}{\partial \theta_1^i}-a_2\frac{\partial D_1}{\partial \theta_1^i}-a_2\frac{\partial m_1^2}{\partial \theta_1^i}-a_1\frac{\partial m_1}{\partial \theta_1^i}=0,\quad i=1,2,\ldots,m. \qquad (7)$$

Solving (7) for θ_1^i we obtain the optimal solution.

Example 1. Let q_i, $i=1,2$ have Poisson distributions with the parameters λ_i

$$P(q_i=k)=\frac{\lambda_i^k}{k!}\exp(-\lambda), \qquad k=0,1,2,\dots .$$

Then

$$E[\Pi_1]=a\lambda_1-b(\lambda_1+\lambda_1^2)-b\lambda_1\lambda_2-a_2(\lambda_1+\lambda_1^2)-a_1\lambda_1-a_0.$$

In this case the conditions (7) take the form:

$$\frac{\partial E[\Pi_1]}{\partial\lambda_1}=a-2b\lambda_1-b-b\lambda_1\frac{\partial\lambda_2}{\partial\lambda_1}-b\lambda_2-2a_2\lambda_1-a_2-a_1=0. \qquad (8)$$

Under the assumption $\frac{\partial\lambda_2}{\partial\lambda_1}=0$, by symmetry, the analogue of the Cournot equilibrium is

$$\lambda_1=\lambda_2=\frac{a-b-a_2-a_1}{3b+2a_2}.$$

In comparison with the deterministic case, we can see the additional term in the numerator, $-b-a_2$, and the profit of the syndicates is lower.

"Average" reaction curves can be found from (8)

$$\lambda_1(t+1)=\frac{a-b-a_2-a_1-b\lambda_2(t)}{2b+2a_2},$$

$$\lambda_2(t+1)=\frac{a-b-a_2-a_1-b\lambda_1(t)}{2b+2a_2}.$$

They are shown in Fig.3

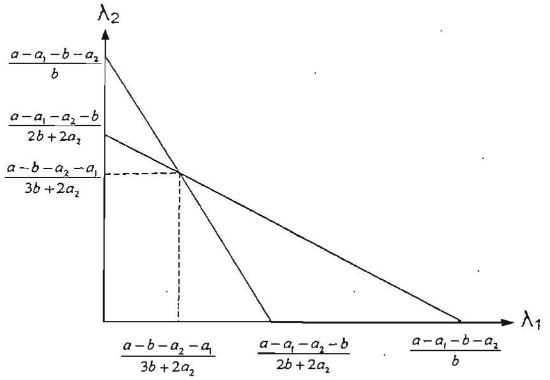

Fig. 3

Example 2. Let q_i, $i=1,2$ have binomial distributions with parameters n_i and p:

$$P(q_i=k)=C_{n_i}^k p^k(1-p)^{n_i-k}, \qquad k=0,1,2,\dots, n_i.$$

This assumption could be explained in the following way. There are n_1+n_2 migrants in the border area. Every migrant from the first n_1 uses syndicate 1 with the probability p independently of others, and every migrant from the second n_2 uses syndicate 2 with the probability p, also independently of others. Then q_i is the number of migrants using syndicate i, and obviously these numbers have binomial distributions. In this case the expected profit for the first syndicate is

$$E[\Pi_1]=an_1p-b(n_1p(1-p)+(n_1p)^2)-bn_1pn_2p-a_2(n_1p(1-p)+$$
$$+(n_1p)^2)-a_1n_1p-a_0.$$

The first order condition is

$$\frac{\partial E[\Pi_1]}{\partial n_1}=ap-bp(1-p)-2bn_1p^2-bp^2n_2-bn_1p^2\frac{\partial n_2}{\partial n_1}- \qquad (9)$$
$$-a_2p(1-p)-2a_2n_1p^2-a_1p=0$$

Then if $\frac{\partial n_2}{\partial n_1}=0$ we have, by symmetry

$$n_1=n_2=\frac{ap-bp(1-p)-a_2p(1-p)-a_1p}{3bp^2+2a_2p^2}=\frac{a-b(1-p)-a_2(1-p)-a_1}{3bp+2a_2p}$$

"Average" reaction curves can be found from (9)

$$n_1(t+1)=\frac{ap-bp(1-p)-a_2p(1-p)-a_1p-bp^2n_2(t)}{2bp^2+2a_2p^2},$$

$$n_2(t+1)=\frac{ap-bp(1-p)-a_2p(1-p)-a_1p-bp^2n_1(t)}{2bp^2+2a_2p^2}.$$

We find that under the condition $p=1$ we have a deterministic case.

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