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### Heroin prohibition and the incentive for collusion

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## **HEROIN PROHIBITION AND THE INCENTIVE FOR COLLUSION**

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# **HEROIN PROHIBITION AND THE INCENTIVE FOR COLLUSION**

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## **ABSTRACT**

The market for heroin is modelled as a simple Cournot game between two players, one of whom is dominant, and where information concerning police activities is asymmetric. It is shown that under these conditions the dominant player has a unilateral incentive to encourage increased harassment of the other player. Within this framework, a policy of increased seller harassment reduces heroin consumption in the current period. However, if the policy is only temporary, then the long-term results could include an increase in the consumption of heroin if the dominant player employs its enhanced capacity for future heroin marketing and police-corrupting activities.

## 1. Introduction

The current New South Wales state election campaign has once again highlighted the apparent abhorrence with which, according to the politicians, the public at large views commercial traffickers of 'hard' drugs such as heroin. The opposition leader has pledged that his party, if elected to government, will define such trafficking activities, along with other crimes such as murder, as 'horrific' crimes, punishable by up to life imprisonment. This current pre-occupation with heroin-seller harassment is simply a continuation of the predominant emphasis which Australian heroin-control policy has had since heroin was first declared a prohibited substance in Australia in the 1950s. Not surprisingly, Australian law-enforcement officials have not been the only ones to target heroin suppliers more intensely than consumers. It seems that at least the United States and Britain have followed similar enforcement policies (for a more detailed discussion of the history of Australian, United States and British heroin law enforcement policy see Neri 1990, chapter 1).

According to Becker (1968), the gains from collusion in an illicit industry such as that for heroin are, *ceteris paribus*, greater the smaller the costs of enforcing the collusive agreement (p. 206). Applying Becker's model to the heroin industry, Eatherly (1974, p. 213) argues that enforcement policies directed against sellers furnish colluding sellers with a cheap means of enforcing collusion and of preventing entry into the industry.

One way to view police policies of harassing sellers is as establishing a nonpecuniary 'licence fee'. Those who are relatively efficient in converting arrest and other harassment into pecuniary terms will 'pay the fee' and sell; others will be barred from the trade. *The sellers who succeed have an interest in enforcement of the law to prevent entry by others* (p. 213, italics mine).

The objective of this paper is to present a simple model of a heroin industry in which increased seller harassment results in increased profits for the dominant firm or cartel. The market is modelled as a Cournot duopoly with one player being dominant in the sense of having the greater market share and inside information on future enforcement activities. With such asymmetries, the dominant player has a unilateral incentive to encourage increased harassment of the other entrant.

Within this framework, a policy of increased seller harassment reduces heroin consumption in the current period and, if permanent in the sense of Becker (1988), could also do so in the long run. However, if the policy is only temporary then the long-term results could include an increase in the consumption of heroin if the dominant player employs its enhanced capacity for future heroin marketing and police-corrupting activities.

## 2. The Model

Suppose that a heroin market is supplied by two players who behave as Cournot duopolists. That is, each forecasts the other's output and then selects its own profit-maximising level of output. For the sake of simplicity assume that neither player consumes heroin, each takes existing levels of law enforcement activity as given and that player 1 supplies  $x$ , whilst player 2 supplies  $y$ . Law-enforcement activities increase the risks associated with the supply of heroin and result in a per-unit harassment premium of  $h_1$  for player 1 and  $h_2$  for player 2 over and above importation and distribution costs. Player 1 is assumed to be dominant with inside access to police information such that  $x > y$  and  $h_2 > h_1$ .

Player 1 aims to maximise its profits  $\pi$  where:

$$\pi(x,y,h_1) = xp(x+y)-c(x)-h_1x \quad (1)$$

and  $c$  is the per unit variable cost of player 1 and  $p$  the per unit price of heroin. Fixed costs are ignored for the sake of simplicity. The first-order condition for profit maximisation is:

$$\pi_x = xp' + p - c_x - h_1 = 0 \quad (2)$$

while the second-order condition is:

$$\pi_{xx} = xp'' + 2p' - c_{xx} < 0 \quad (3)$$

Derivatives are denoted by subscripts except for price whose derivative is denoted  $p'$ .

Player 2 also aims to maximise its profits  $\pi^*$  where

$$\pi^*(x, y, h_2) = yp(x+y) - c^*(y) - h_2y \quad (4)$$

and  $c^*$  is the per unit variable cost of firm 2. The first and second order conditions respectively are:

$$\pi^*_y = yp' + p - c^*_y - h_2 = 0 \quad (5)$$

$$\pi^*_{yy} = yp' + 2p' - c^*_{yy} < 0 \quad (6)$$

The following conditions are also assumed to hold:

$$\pi_{xy} \equiv xp'' + p' < 0 \text{ and } \pi^*_{yx} \equiv yp'' + p' < 0 \quad (7)$$

$$\pi_{xx} < \pi_{xy} \text{ and } \pi^*_{yy} < \pi^*_{yx} \quad (8)$$

Conditions (7) state that own marginal profits fall with an increase in the output of the other player as market price falls. Conditions (8) state that own output effects on marginal profit dominate cross output effects. These conditions imply the



following:

$$D \equiv \pi_{xx}\pi_{yy}^* - \pi_{xy}\pi_{yx}^* > 0 \quad (9)$$

Equations (2) and (5) are reaction functions for players 1 and 2 respectively. Given an output level for player 2, player 1 will maximise profits by setting its output level according to equation (2). Similarly, given an output level for player 1, player 2 will maximise profits by setting its output level according to equation (5). The simultaneous solution to equations (2) and (5) is the Nash equilibrium.

We are interested in the effects of increased seller harassment in the next period. It is likely that such a change would result in a higher harassment premium and thus a higher market price for heroin. Now suppose that player 1 can, via inside information, entirely shield itself from the increased harassment whilst player 2 can not. Thus  $dh_1 \equiv 0$  whereas  $dh_2 > 0$ .

Totally differentiating (2) and (5) we get the following:

$$\pi_{xx} dx + \pi_{xy} dy + \pi_{xh1} dh_1 = 0 \quad (10)$$

$$\pi_{yx}^* dx + \pi_{yy}^* dy + \pi_{yh2}^* dh_2 = 0 \quad (11)$$

Since  $dh_1 \equiv 0$  and  $\pi_{yh2}^* = -1$  we may rewrite these equations in matrix form and use Cramer's rule to solve yielding:

$$dx/dh_2 = -\pi_{xy}/D > 0 \quad (12)$$

$$dy/dh_2 = \pi_{xx}/D < 0 \quad (13)$$

$$dp/dh_2 = p'(dx/dh_2 + dy/dh_2) > 0 \quad (14)$$

That is, increased seller harassment with asymmetric effects

results in an increase in the output of the dominant player, a reduction in the output of the other player and an increase in the per unit market price of heroin. It follows that industry output falls as follows:

$$dx/dh_2 + dy/dh_2 = (\pi_{xx} - \pi_{xy})/D < 0 \quad (15)$$

Also of interest are the effects on player profits. These are determined as follows:

$$d\pi/dh_2 = (xp'\pi_{xx})/D > 0 \quad (16)$$

$$d\pi^*/dh_2 = -(yp'\pi_{xy})/D - y < 0 \quad (17)$$

In other words, the profits of the dominant player increase whilst those of the other player decrease. Industry profits in total decrease as follows:

$$d\pi/dh_2 + d\pi^*/dh_2 = (xp'\pi_{xx} - yp'\pi_{xy})/D - y < 0 \quad (18)$$

In summary then, a one-period increase in heroin-seller harassment which has asymmetric effects on the two suppliers increases the market price of heroin, reduces its consumption and industry profits as a whole. What is surprising, perhaps, is that within this overall result the dominant player enjoys increased profitability and thus has a unilateral incentive to encourage periodic police crackdowns on its rivals.

### 3. Concluding Comments

The model presented above is highly simplified. It is unlikely that a heroin market is inhabited by only two players and even more unlikely that increased seller-harassment effects accrue to one

player only. Despite these and other limitations, the model seems to imply an often observed characteristic of such illicit markets, that is, the incentive which exists for police corruption. The increased profits accruing to the dominant player may allow it to undertake more effective future marketing strategies such as offering free samples to potential consumers in discos etc. It seems to be the case that such episodes of increased seller harassment tend to be transient in nature, perhaps reflecting political considerations at the time of an election.

This model also lends support to Eatherly's contention noted above. With increased profits comes the potential for increased corruption and official complicity in heroin-supplying activities. Under these conditions, participating enforcement officials have a significant incentive to maintain the *status quo*.

Indeed [the police] could simultaneously serve their social mandate of reducing drug consumption and serve the interests of the colluding sellers by preventing ... new entrants from competing with established sellers (Eatherly 1974, p. 213).

The objective of this paper is not to argue for or against the existing policy of prohibition as a means of controlling the social costs of the consumption of heroin. Rather, it argues that where a significant demand for some commodity exists, prohibition, whilst restricting consumption, results in a more entrenched industry with large profits for those involved. It seems paradoxical that a policy designed to reduce, if not eliminate, the consumption of heroin may in fact guarantee the long-term survival of the industry.

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