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**Using a Pigouvian Tax to Reduce Incarceration**

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## **Abstract**

The incarceration rate is a function not only of criminal behavior but of decisions made by police officers, prosecutors, and judges. These local actors have considerable discretion whether to conduct a search, make an arrest, charge a person with a crime, classify a crime as a misdemeanor or felony, or issue a lengthy prison sentence. While these local-level decisions affect the number of people sent to prison, the cost of prison is borne primarily at the state level. This could result in a higher rate of incarceration than is socially optimal if local actors derive benefit from incarceration yet only consider their private cost, ignoring costs to the state. One way to correct this negative externality is with a Pigouvian tax. Charging local governments on a per-prisoner basis for the cost of incarceration could induce local actors to internalize the externality and reduce the number of prison admissions. This study uses a two-agent, partial equilibrium model to illustrate how a Pigouvian tax could achieve the socially optimal level of incarceration.

## **Introduction**

The unprecedented incarceration rate in the United States has prompted calls for criminal justice reform. Advocates for reducing the prison population have proposed changes in sentencing, increased reliance on community policing, and an end to the war on drugs (Alexander, 2010). Some have even suggested relying on increased surveillance to reduce incarceration (Doleac, 2016). One policy that has not been discussed, however, is the implementation of a Pigouvian tax.

The incarceration rate is not simply a function of crime (Aizer & Doyle, 2015). Decisions made by police officers, prosecutors, and judges have a substantial effect on the number of people entering state prisons (Kelly, 2015; Raphael & Stoll, 2009). These local actors gain utility from incarceration by removing problematic individuals from the local community or appearing tough on crime (Raphael & Stoll, 2013). Local governments, however, do not bear the full cost of incarcerating these individuals; the cost of prisons is borne by the state. Because local actors gain utility from incarcerating offenders but incur little of the cost, local officials may make decisions that result in a level of incarceration that is higher than that which is socially optimal. In so doing, local officials impose costs on state governments without reimbursing them. A Pigouvian tax, such as a per-prisoner charge for incarceration, could correct this negative externality by setting the marginal cost of incarceration at the local level equal to the marginal social cost of incarceration. As noted by Raphael and Stoll (2013), “if counties were made to face some portion of the marginal costs generated by each prison admission, we might expect local officials to be more selective in who they send to prison and for how long”

(p. 258). Forcing counties to internalize the externality could influence the decisions of local actors and move the incarceration rate closer to that which is socially optimal.

Addressing the size of the prison population is important because the imprisonment rate in the United States nearly quintupled from 1975 to 2007 (Raphael & Stoll, 2013). This occurred despite the fact that the crime rate was declining throughout the latter half of this period (Western, 2006). Research suggests the marginal benefit of incarceration diminished as the prison system expanded to contain more low-level offenders (Johnson & Raphael, 2012). Harsher sentencing and the war on drugs received the brunt of the blame as the number of convictions and average prison spell length increased markedly (Alexander, 2010; Clear, Reisig, & Cole, 2016; Raphael & Stoll, 2013). The increase in imprisonment has drawn attention from both prison officials and academics, with individuals from across the political spectrum united in the call for reform (Kelly, 2015). There is less agreement, however, regarding the mechanisms through which the prison population should be reduced (Clear, Reisig, & Cole, 2016).

This study applies the concept of a Pigouvian tax to examine how a per-prisoner charge levied at the local level could affect hyperincarceration trends in the United States. Pigouvian taxes are a market-based mechanism that facilitate the socially efficient production of an externality-generating good (Pigou, 1918). Setting a tax equal to the per-unit external cost induces the party responsible for the externality to produce at a level where the marginal social cost equals the marginal social benefit. Pigouvian taxes have been used to decrease smoking, traffic congestion, and pollution (Lindsey, 2009; Mankiw, 2011; Viscusi, 1995). A Pigouvian tax could be useful in achieving the optimal level of incarceration in the United States because the size of the prison population

suggests the marginal cost of incarceration may exceed the marginal benefit (White House Council of Economic Advisers, 2016). This is occurring because local actors make decisions that affect prison admissions without considering the cost of incarceration at the state level. A Pigouvian tax could correct this by forcing local actors to internalize all social costs, including those costs incurred at the state level.

### **Literature Review**

Local actors have considerable discretion in deciding whether to conduct searches, make arrests, and charge individuals with crimes (Fallik & Novak, 2012; Gershman, 2011; Novak, Frank, Smith, & Engel, 2002). They also decide which type of charge to bring against an individual, whether that charge is later moved to a lesser charge, and the sentence length of persons who are convicted (Bushway & Piehl, 2001; Crane, 2016; Wright & Engen, 2007). These local-level decisions affect the number of people entering state prisons and the length of time they stay there. Thus, decisions made at the local level generate costs at the state level.

The influence of local decisions on the prison population begins when an individual interacts with law enforcement. Police officers conduct a search during 4.8% of traffic stops (Fallik & Novak, 2012). While some of these searches are nondiscretionary because they occur pursuant to an arrest, other searches are discretionary. Conducting a discretionary search increases the probability that a crime will be discovered and that the individual will face prison. Police officers also wield considerable discretion when determining whether to make an arrest. Officers weigh legal variables (e.g., the use of a weapon) and extralegal variables (e.g., race, gender, age) when deciding whether to arrest a person (Novak, Frank, Smith, & Engel, 2002). Making

an arrest increases the likelihood that the person will be sent to prison. Thus in deciding whether to conduct a search and/or make an arrest, police officers have a significant influence on the number of individuals who enter the criminal justice system and are ultimately sent to prison.

Local prosecutors have significant discretion in determining whether to charge a person with a crime. The charging decision is fundamental to the prosecutor's role (Gershman, 2011). Assuming the prosecutor decides to bring charges against a person, the prosecutor may also have discretion over the nature of the charge. A felony charge is more likely to result in a prison sentence than a misdemeanor charge if the defendant is convicted (Crane, 2016). Prosecutors frequently move charges as well, with felonies becoming misdemeanors or charges being dropped pursuant to plea agreements (Wright & Engen, 2007). All of this takes place at the discretion of the prosecutor and is unreviewable (Gershman, 2011).

After an individual has been arrested, charged, and successfully prosecuted local actors continue to exert influence over the probability and length of an incarceration spell. Judicial discretion has diminished over time due to an increase in structured and determinate sentencing (Raphael & Stoll, 2013). However, differences in sentence length for similar offenses persist and may be attributable to extralegal factors such as race (Bushway & Piehl, 2001; Kelly, 2015). Whether an individual is sent to prison or placed on probation may hinge on a decision made by a judge, a sentencing recommendation made by a prosecutor, or the findings of a presentence investigation report.

A substantial body of research thus suggests that decisions made by police officers, prosecutors, and judges affect the number of people sent to prison and the time

those people spend in prison. The cost of prison, however, is borne by state governments. Police officers, prosecutors, and judges gain utility from removing problematic individuals from the community but do not incur the state-level costs of incarceration. Thus, local actors might continue making decisions that increase the incarceration rate even if the marginal social cost of incarceration exceeds the marginal social benefit. This occurs because local actors only consider their private costs and benefits. If the marginal private cost of incarceration is lower than the marginal social cost, local actors might continue to supply prisoners beyond the point where it is socially efficient to do so. A Pigouvian tax could correct this.

Pigouvian taxes were introduced by Arthur Pigou, a British economist who noticed that firms produce output at a socially inefficient level when their marginal private cost is lower than the marginal social cost (Pigou, 1918). Pigou's idea of setting a tax equal to the marginal external cost was later challenged by Coase, who argued that taxes are inferior to bargaining (1960). The Coase Theorem asserts that parties can negotiate a mutually agreeable arrangement, assuming property rights are clearly defined and transaction costs are low (Stiglitz & Rosengard, 2015). Bargaining leads to a socially efficient outcome, but the assumptions of the Coase Theorem are not always met (Mas-Colell, Whinston, & Green, 1995). Thus, the Pigouvian tax remains a useful tool in correcting negative externalities.

While some economists have championed the use of Pigouvian taxes, others have noted that its applicability may be limited (Baumol, 1972; Varian, 1992). If the amount of harm caused by the negative externality is not constant per unit of output, then the socially efficient level of output will not be reached unless a Pigouvian tax is

accompanied by a lump-sum tax subsidy (Carlton & Loury, 1980). Implementing a Pigouvian tax may be difficult because it requires the calculation of the marginal external cost at the optimal level of output (Varian, 1992). If the optimal level of output is indeed known, one could set the level of output and create a system of marketable permits in lieu of a Pigouvian tax (Mas-Colell, Whinston, & Green, 1995). This is the rationale for cap and trade, which has been successful in limiting the sulfur dioxide emissions that cause acid rain (Stiglitz & Rosengard, 2015). Marketable permits have their challenges, however, and require the creation of a market where permits can be exchanged. This introduces the possibility of market manipulation and political corruption, to say nothing of the difficulty in deciding how the permits are initially allocated.

The Pigouvian tax continues to be promulgated as a solution for a number of social problems, including capital flow volatility, environmental degradation, and road usage (Jeanne & Korinek, 2010; Lindsey, 2009). Gasoline is highly taxed in a number of countries to address three negative externalities: traffic congestion, vehicle fatalities, and pollution (Mankiw, 2011). Absent a corrective tax, the competitive market for gasoline results in overconsumption of fuel. This leads to excessive traffic, accidents, and emissions. Increasing the price of gasoline sets individuals' marginal private cost of gasoline equal to the marginal social cost, thereby shifting the quantity of gasoline used to the socially efficient level.

In an ideal scenario, one would tax the externality-generating activity rather than output itself (Mas-Colell, Whinston, & Green, 1995). When it comes to traffic congestion, for example, a better outcome might be achieved by taxing miles driven rather than gasoline consumption. This is because a consumer might respond to a



gasoline tax by purchasing a vehicle that does not use gasoline and continuing to drive the same number of miles. In such a case, the gasoline tax would have no effect on traffic congestion. Taxing miles driven instead could lead to a socially efficient outcome. This is the rationale behind the carbon tax, which taxes carbon emissions rather than production output (Marron & Toder, 2014). Taxing output directly does lead to the socially optimal outcome, however, when there is a fixed, monotonic relationship between output and the negative externality (Mas-Colell, Whinston, & Green, 1995).

Incarceration is a case in which taxing output (prison admissions) directly may lead to a socially efficient outcome. When local actors make decisions that result in the incarceration of an additional individual, this imposes a cost on the state government (Raphael & Stoll, 2013). The number of prisoners is directly related to the cost of prisons; in fact, high incarceration rates have created fiscal distress for a number of states (Clear, Reisig, & Cole, 2016). A Pigouvian tax could correct this by forcing local actors to internalize the total social cost of their actions, which would shift the incarceration rate toward the socially efficient level.

### **The Model**

The decisions that affect the number of admissions to state prisons are made at the local level (Figure 1). The process begins when local law enforcement decides whether to conduct a search and/or make an arrest. If an arrest is made, the case is handed off to the county prosecutor's office. The prosecutor decides whether to charge the individual with a felony, a misdemeanor, or nothing at all. After being charged, the individual is given the opportunity to defend him or herself in court—although in the majority of cases a plea agreement is reached in lieu of a trial (Clear, Reisig, & Cole, 2016). A conviction

at trial or a guilty plea triggers the creation of a presentence investigation report, which is presented to the judge for purposes of sentencing. The prosecution and defense attorneys have the opportunity to make arguments regarding the sentencing, but the decision is ultimately made by the judge—subject to any constraints imposed by sentencing guidelines. If the sentence includes a term of imprisonment, the individual is remitted to the custody of the state where he or she is incarcerated. Each decision in this process is made at the local level and is subject to discretion on the part of local actors (Raphael & Stoll, 2014). Thus, the number of people admitted to state prisons each year is not merely a function of criminal behavior, but the result of a series of decisions made by local officials who have no incentive to consider the cost of imprisonment.

In some cases, local actors have little discretion. Serial killers must be caught, charged with murder, and sentenced to imprisonment upon conviction. Many cases are not so straightforward, however. A large number of cases are wobblers—borderline crimes that could be charged as a felony or misdemeanor (Raphael & Stoll, 2014). In these cases, the prosecutor’s charging decision determines whether a person faces the prospect of prison time or probation. Other local-level decisions determine whether individuals have any contact with the criminal justice system at all. Setting up a roadside check, for example, may result in individuals becoming incarcerated for petty crimes that would not have otherwise come to the attention of law enforcement.

While the decisions that drive prison admissions are made at the local level, the cost of the prison is incurred at the state level. The average daily jail population is substantial—731,352 in 2013—but it is dwarfed by the 1,362,552 inmates housed in state prisons (Epperson & Pettus-Davis, 2015). The states have the responsibility of

imprisoning individuals who have been sentenced; states thus bear nearly three-quarters of state and local incarceration costs (Clear, Reisig, & Cole, 2016). Because local governments do not bear the total social cost of incarceration, local actors have an incentive to shift the burden of dealing with troublesome individuals to the state. As noted by Raphael and Stoll (2013), “at the county level, a criminal offender is a nuisance local resident who, when convicted, is sent off to state prison to become someone else’s problem” (p. 258). The local government gains utility by ridding itself of a troublemaker—a benefit known as incapacitation (Yezer, 2014). Local officials do not weigh this benefit against the cost to incarcerate the offender, however, because the cost of incarceration is paid by the state. The marginal private cost to the county government of incarcerating an additional individual is lower than the marginal social cost. This incentivizes local officials to oversupply prisoners.

This relation can be formally represented as a two-agent partial equilibrium model (Mas-Collel, Whinston, & Green, 1995). Let Agent 1 represent a county (local actors) and let Agent 2 represent the state within which the county is located. This study assumes the actions of each agent do not affect price,  $P \in R^Z$ , with  $Z$  goods available to be traded. An agent’s wealth is represented as  $W_i$ . The agents’ preferences for  $Z$  goods can thus be modeled as  $(X_{1i}, \dots X_{Zi})$  where  $X$  represents public safety, justice, or some other good the county and state are charged with providing. Agent 1 can take some action  $K \in R_t$  that affects the utility of both agents, with  $K$  being the number of people the county forwards to the state for incarceration. Thus, agent  $i$ 's utility function is  $U_i (X_{1i}, \dots X_{Zi}, K)$ . This study assumes that:

$$\frac{\partial U_2(X_{12}, \dots, X_{Z2}, K)}{\partial K} \neq 0$$

The agents' utility functions are as follows:

$$\text{Utility of the county: } U_1(X_{11}, \dots, X_{Z1}, K)$$

$$\text{Utility of the state: } U_2(X_{12}, \dots, X_{Z2}, K)$$

An externality exists because the utility of the state is a function of  $K$ , which is chosen by the county. When the county chooses  $K$ , it considers only its own utility. This is problematic because the utility of the state also depends on the county's choice of  $K$ .

Yet, the county has no incentive to choose a  $K$  that jointly maximizes the utility of both the county and the state. This creates a negative externality. The maximization problem faced by each agent is:

$$v_i(P, W_i, K) = \max U_i(X_i, K) \text{ subject to: } P * X_i \leq W_i$$

Assuming the agents' utility functions are quasilinear with respect to a numeraire commodity, the utility function can be rewritten as follows:

$$v_i(P, W_i, K) = \Psi_i(X_i, K) + W_i$$

Having already assumed that the price of the  $Z$  goods is unaffected by the agents' actions, the price vector can be suppressed to yield  $\Psi_i(K)$ . The county chooses its level of  $K \geq 0$  to maximize the function  $\Psi_1(K)$ . The competitive equilibrium produces a level of incarceration  $K^*$ , which satisfies the first-order condition:  $\Psi'_1(K^*) \leq 0$ . This means that the county will continue to increase the number of prison admissions until its marginal benefit of doing so reaches zero. This decision does not take into consideration the cost to the state. The optimal allocation,  $K^0$ , would be one that maximizes the joint utility of

the county and the state:  $\max \Psi_1(K) + \Psi_2(K)$ . This would result in the first-order condition:  $\Psi'_1(K^0) \leq -\Psi'_2(K^0)$ . At this level of incarceration, the marginal benefit to the county of incarcerating an individual is equal to the marginal social cost and the social surplus is maximized (Figure 2).

Because the county's marginal private cost of incarceration is lower than the marginal social cost, the number of prison admissions produced by the competitive market is higher than the number which is socially efficient ( $K^* > K^0$ ). Requiring the county to pay a Pigouvian tax,  $T_K$ , that is equal to the external cost for each unit of  $K$  would cause the county to internalize the externality, shifting the level of incarceration to  $K^0$  and increasing the social surplus. The county would then choose the  $K$  that maximizes its utility as follows:

$$\max \Psi_1(K) - (T_K * K)$$

with the first-order condition:  $\Psi'_1(K) \leq T_K$ . Provided the tax is set equal to the marginal external cost at  $K^0$ , the socially optimal level of incarceration would be achieved (Figure 3).

### **Limitations**

A significant drawback to a Pigouvian tax is the difficulty in measuring the social cost of incarceration. Clearly the social cost is not zero and local entities should be charged something for the people they send to the state for incarceration. But calculating the precise cost is problematic because the social cost of incarceration exceeds the amount state governments spend on prisons. To set the tax rate at a level that will yield the socially optimal outcome, one must have an accurate estimate of the total social cost of incarceration—and this includes costs borne by offenders, families, children, and

communities (Clear, 2007; Holzer, 2009). A Pigouvian tax would also need to account for interstate spillover effects, which are commonly ignored by states (Boadway & Shah, 2009). One state's decision to change its incarceration rate could affect the people living in a bordering state; if these effects are not considered when a state is measuring the social cost of incarceration a negative externality would be created.

A Pigouvian tax could also lead to fiscal inequity. County governments that are experiencing financial distress might object to paying for the incarceration of a convicted murderer. Clearly it would be better for society if convicted murderers did not evade prison time merely because a county government is having budgetary difficulties. This problem could be solved by providing a subsidy to financially-distressed governments in cases where local actors have little discretion (e.g., a serial killer convicted of first-degree murder). Funding for the subsidies could come from the revenue generated by the Pigouvian tax. The Pigouvian tax provides a double-dividend—not only does it correct an externality but it also generates tax revenue for the state (Figure 4). Tax revenues from wealthier county governments could be used to subsidize fiscally-constrained county governments when it comes to paying for the incarceration of offenders who pose a significant threat to society.

This study assumes that charging local governments for each prisoner supplied to state prisons will affect the decisions made by local actors. However, charging local governments does not directly force police officers, prosecutors, and judges to internalize the external costs of incarceration to the state and taxpayers. Yet, it is unlikely that these local actors could or would be able to continue oversupplying prisoners if their local government became substantially burdened by the cost. County government officials

might pressure local actors to alter their behavior to avert a drastic reduction in local government services. Evidence from a juvenile justice reform bill in California suggests this is the case. After the state increased the per-juvenile charge to counties, the number of juvenile admissions plummeted (Raphael and Stoll, 2013).

A change in the incarceration level will create policy winners and losers. Although a Pigouvian tax could lead to a socially efficient level of incarceration, this does not mean the policy would be welcomed with open arms. Private prisons could be hurt by a reduction in the incarceration rate—a reduction in the number of prisoners and length of prison spells would reduce profitability—and might have a strong incentive to resist a Pigouvian tax. Detractors might also express fear regarding an increase in crime, even though the socially optimal level of incarceration is the level that maximizes the social surplus after having weighed the costs and benefits of factors including the crime rate. A Pigouvian tax might indeed leave some people worse off, but it could meet the Hicks-Kaldor criterion by ensuring that the gains of the policy winners are sufficient to compensate the policy losers and still leave the winners better off.

## **Conclusion**

While sentencing reform, community policing, and other efforts may be critical to reducing the number of prisoners in the United States, the incentive for local actors to oversupply prisoners is important and has not been rigorously examined (Alexander, 2010; Clear, 2007; Raphael & Stoll, 2013; Western, 2006). State prison admissions are driven by decisions made at the local level but the costs of imprisonment are borne at the state level. This leads local actors to supply prisoners beyond the point which is socially optimal and creates a negative externality for state governments. Charging local

governments a per-prisoner tax equal to the marginal external cost of imprisonment could correct this and achieve a socially efficient level of incarceration in the United States.

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Figure 1

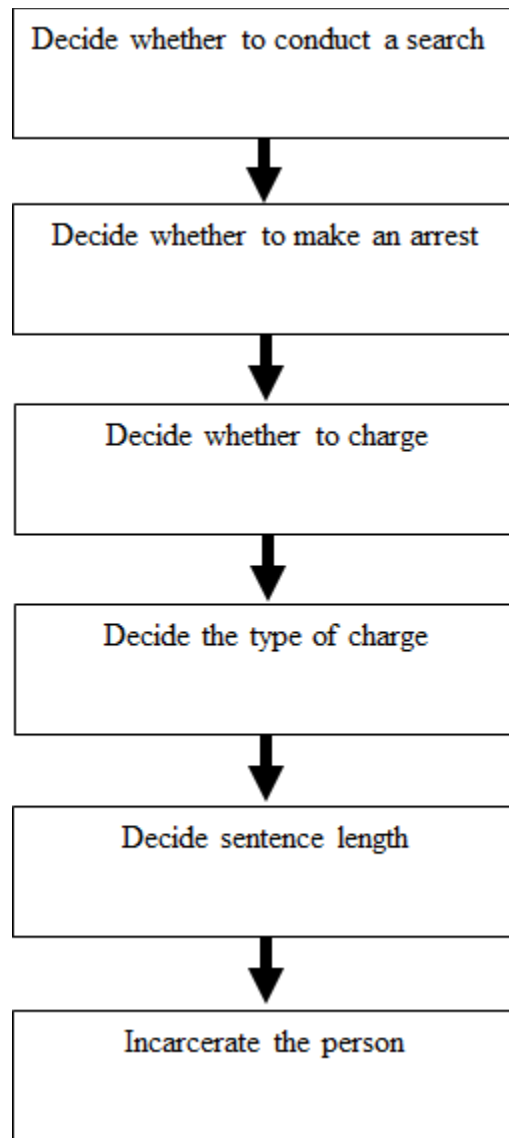


Figure 2

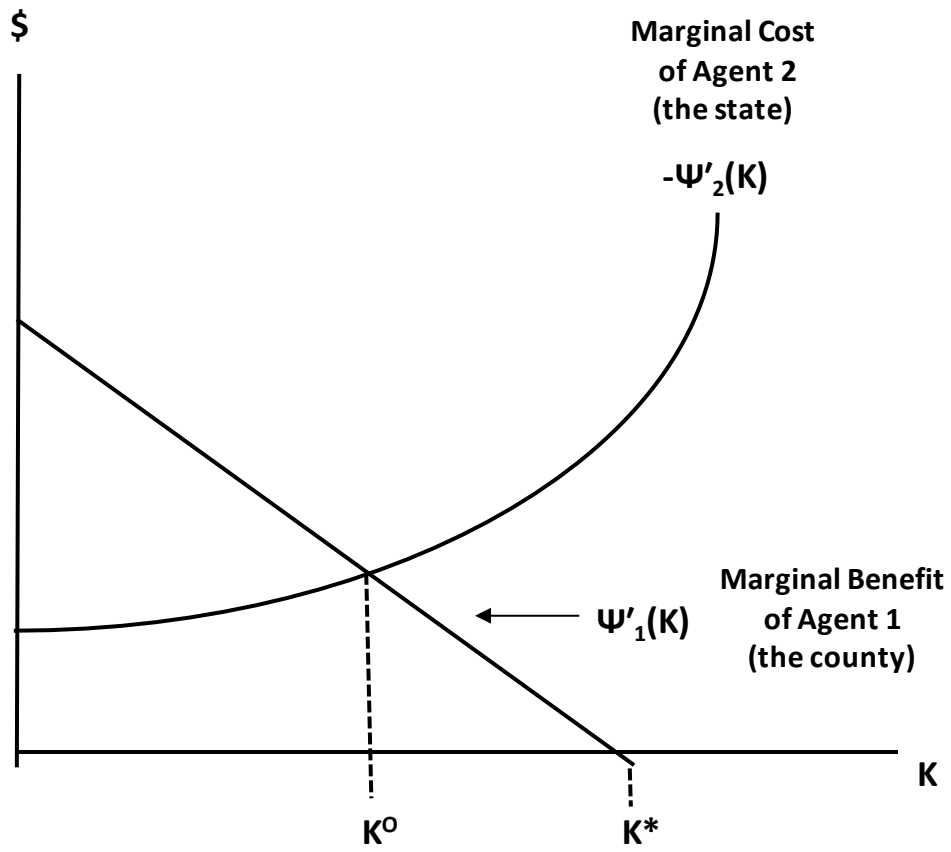


Figure 3

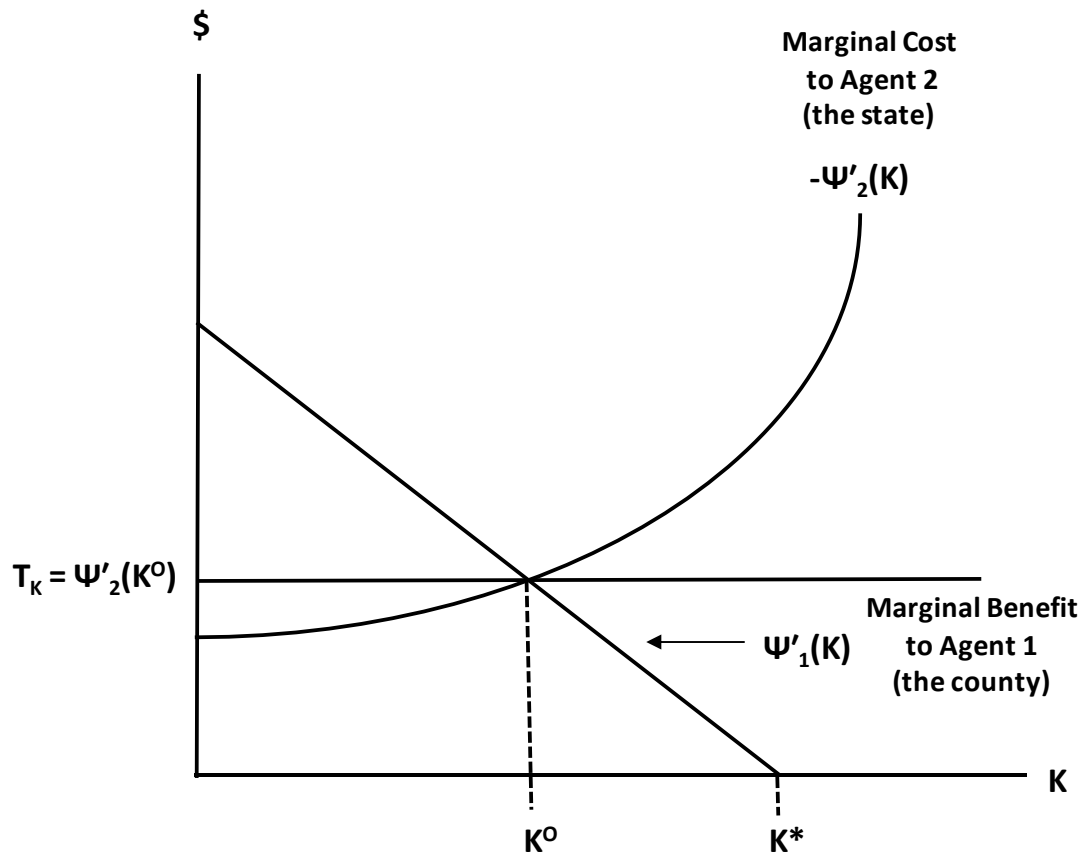


Figure 4

