CRIME INDUCED POVERTY TRAPS

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Abstract

Crime generated externalities may play a decisive role for the growth of developing countries. In our model the impact of crime varies with the level of development. At a low level of development capital accumulation of individual firms generates increased crime that reduces the profitability of all producers. At a higher stage of development capital accumulation lowers crime and enhances the profitability for all firms. The changing sign of the externality may generate a poverty trap. The existence of a poverty trap has important policy implications. A reform, intended to improve efficiency, may throw the economy into a vicious circle of increasing crime and stagnation.

**Keywords:** Weak property rights, crime, multiple equilibria, economic reform, and growth

**JEL Classification Numbers:** O11, P20, K00
Crime induced poverty traps

Leave fewer occasions to idleness; let agriculture be set up again, and the manufacture of the wool be regulated, that so there may be work found for those companies of idle people whom want forces to be thieves, or who now, being idle vagabonds or useless servants, will certainly grow thieves at last.

(Thomas More to the Archbishop of Canterbury John Morton in Utopia, 1518)

1 Introduction

Poverty makes thieves. Sociologists and criminologists have long emphasized that poverty and idleness explain high crime rates (Allan and Steffensmeier 1989 and Currie 1997). In cross country comparisons bad economic performance is found to be one of the main causes of growth in violent crime (Fajnzylber et al. 1998). Violence and crime may further create major obstacles to development objectives. According to EIU

²Crime and violence lower business profitability, reduce the effectiveness of the

¹The Economist Intelligence Unit’s South Africa country report for 1998.
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Economy and therefore reduce economic growth.

- Economic stagnation implies decreased labor demand and increased poverty leading individuals into crime as a way of survival.

Each of the two mechanisms can be seriously damaging on their own. Put together they may generate a vicious circle that results in a poverty trap. Economic stagnation explains rising crime and rising crime, in turn, explains the economic stagnation. Some countries may therefore end up in an equilibrium state characterized by persistently low or negative growth rates and high or rising crime levels. Other countries, where crime is prevented and labor demand is not allowed to plummet, may take off on a sustainable path of social and economic development where high growth produces low crime rates, which leads to further economic growth and development.

These linkages are also evident from cross-country data. We have combined data from the World Bank (1998) on economic growth with crime data from United Nations (1999) in the period 1986 to 1994. Figure 1 illustrates the relationship between annual economic growth and changes in crime for 39 countries. The figure also includes a fitted regression line for the relationship. There exists a distinct correlation between economic stagnation and increased crime. Countries that experience low economic growth tend to be countries where crime rates are

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2The 39 countries selected are all the countries that had sufficient information of the crime development over the specified time span. The countries are: Bermuda (BMU), Bulgaria (BGR), Spain (ESP), Jordan (JOR), Madagascar (MDG), Singapore (SGP), Philippines (PHL), Malaysia (MYS), Malta (MLT), India (IND), Chile (CHL), Latvia (LVA), Jamaica (JAM), Hong Kong (HKG), Italy (ITA), Canada (CAN), Finland (FIN) Mauritius (MUS), Japan (JPN), Sweden (SWE), Switzerland (CHE), Rep Of Korea (KOR), Egypt (EGY), Hungary (HUN), Cyprus (CYP), Israel (ISR), Austria (AUT), Slovakia (SVK), Australia (AUS), Denmark (DNK), Turkey (TUR), Greece (GRC), Romania (ROM), Kazakhstan (KAZ), Russian Federation (RUS), Lithuania (LTU), Syrian Arab Rep (SYR), Ukraine (UKR), Kyrgyzstan (KGZ).
increasing and countries where crime rates are decreasing tend to be countries that enjoy economic growth. What is more, the cluster of countries that perform particularly bad are countries that recently have been through economic reform (Russia, Lithuania, Kazakhstan, Ukraine, and Kyrgyzstan).³

Logically, of course, the negative correlation does not indicate anything about causation. To better understand the correlation we explore the linkages between growth, poverty, and crime within a simple model. Our aim is two-fold. First, we want to demonstrate how endogenous crime significantly modifies well-known growth mechanisms. Second, we want to study how the policy implications of models that incorporate crime may be qualitatively different from those that follow from

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³In several countries stagnation and rising crime can be attributed to failing economic reform programs. In other countries, such as those in Africa, the causes are more diverse, although some common features emerge. Azam et al. (1996), Easterly and Levine (1997), Temple (1998), and Collier and Gunning (1999) investigate the causes of growth in Africa and all find that violence and unrest affect growth negatively. Ayres (1998) reports similar results for Latin America and concludes that “Crime and violence have emerged in recent years as major obstacles to development objectives in Latin American and Caribbean countries”.
more partial approaches. For instance, with endogenous crime, policies that transfer benefits to the worst off group is not necessarily a drag on business profitability, but may on the contrary enhance profits and economic growth. Moreover, we investigate how a reform program that implies a downsizing of the public sector should best be designed when those who are laid off may become involved in socially disruptive activities.

The mutual dependence between crime and development has attracted more interest in the past than in the present. Already in 1518 Thomas More discussed the relationship between economic hardship and crime. In the late 1860s Georg von Mayr pointed out how crime depended positively on rye prices in Bavaria in the period 1835-1865 (von Mayr 1917). Later, Michael von Tugan-Baranowsky (1901) documented the connection between crime and industrialization in 19th century England. The original diagrams presented by von Tugan-Baranowsky are reproduced in Figure 2.

The two lower diagrams plot the development of crime (verbrechen) as the percentage deviation from its average within each period. As seen, during the 19th century industrialization, the crime rate in England first rose and subsequently fell. Hence, there was a hump-shaped relationship between economic development and crime.

Among the more recent contributions our paper is related to Gordon (1971) who points out the two way relationship between social conditions and economic performance, to Skaperdas (1992) who study economic interactions when property rights are absent, to Murphy et al. (1993) who study how rent seeking behavior may crowd out legal activities, and to Glaeser et al. (1996) who provide theory and
Figure 2: The development of crime in England according to von Tugan-Baranowsky
evidence for why seemingly identical cities (in the US) may have very different crime levels.

Our paper is also inspired by Bourguignon (1999) who points out that inequality and poverty may have substantial costs through crime and the development of illegal activities, and asks (p. 2): “...are the economies caught in some kind of vicious circle whereby violence undermines the social and economic climate, and weakens economic incentives and development factors, which in turn leads to more violence?”

Finally, our paper is related to Sala-I-Martin (1997) who provides an alternative rationale for the existence of public welfare programs and their relationship to economic growth. According to him (p. 83) “transfers and other social safety net mechanisms are a means to buy social peace, a way to reduce social unrest. They are a way to bribe poor people out of activities that are socially harmful, such as crimes, revolutions, riots and other forms of social disruption.”

Our paper is organized as follows: Section 2 sets out a simple growth model where workers operate within a dual labor market and have the additional possibility to become thieves, Section 3 derives some policy implications, and Section 4 concludes.

2 The model

Workers may be employed in the formal sector, public or private, receiving the real wage \( w \), or they can work in the subsistence sector where they earn a fixed income equal to \( q \). In addition they can become thieves with an expected return equal to \( p \). A return to criminal activity higher than the best legal opportunity may not be sufficient to go into crime. Workers may have moral costs or perceive a chance of being caught and punished. The expected value of costs like these is denoted \( m \geq 0 \)
implying that the net return to crime is \( p - m \). In the following \( m \) is given and assumed to be equal for all. Yet none of the conclusions change if we instead assume that \( m \) is distributed over the workforce.

Each private firm produces \( X \) using capital \( K \) and labor \( L \). Normalizing the price level to one, profit \( \Pi \) equals total production minus costs. The costs consists of the wage bill \( wL \) and taxes paid, where we assume that profit earners are taxed by a proportional production tax \( t \). Finally, as profit earners are the target of thieves, there are costs associated with guarding and stealing. Criminal activity implies two types of costs for the profit earners. First, a fraction \( z \) of the firm’s production is in the form of guarding services and, second, the stealing \( S \) in itself represents a cost. Thus we have

\[
\Pi = X - wL - tX - zX - S \quad (1)
\]

Each criminal takes a fraction \( \alpha \) of the production. This fraction is decreasing in the firms own guarding. The number of criminals approaching the firm is \( \phi C \), where \( C \) is the criminal intensity (total number of criminals divided by the number of firms). The factor \( \phi \) decreases with the firms own guarding, \( z \), relative to the average guarding for all the firms, \( \bar{z} \), but at a decreasing rate. When average guarding of other firms is \( \bar{z} \), a firm with guarding \( z \) attracts \( \Phi (z/\bar{z}) C \) criminals, each of whom
steals $\alpha (z) X$. The cost associated with stealing is thus

$$zX + S = zX + \alpha (z) X\phi (z/\bar{z}) C$$

$$\alpha' < 0, \quad \phi' < 0, \quad \phi'' > 0$$

We assume that the marginal productivity of guarding is constant

$$\alpha (z) = A - az \quad 0 < a \leq A \leq \phi$$

where the parameter restrictions follows from the natural requirement $\alpha \phi \in (0, 1)$ for all possible levels of guarding, $z \in (0, 1)$. Each firm chooses the extent of guarding to minimize the cost of crime. Combining the first order condition and the fact that in equilibrium all firms choose the same extent of guarding, yields

$$z = \frac{-A\phi'C}{1 - aC(\phi + \phi')}$$

which is increasing in the criminal intensity $C$. To make the model as simple as possible, we assume that the elasticity $\phi'/\phi = -1$ in the equilibrium $z = \bar{z}$. Then the optimal level of guarding simplifies to $A\phi C$. In equilibrium all firms get the same share of the criminals $\phi (1)$. Without loss of generality we set $\phi (1) = 1$. Thus, the optimal choice for each firm is

$$z = AC$$

$$\alpha = A (1 - aC)$$

When each firm optimizes its guarding, the amount of stealing becomes $\alpha CX$ which
can be expressed as

\[ S = A (1 - aC) CX \quad (6) \]

The return from being a criminal is \( S/C \), or simply

\[ p = A (1 - aC) X \quad (7) \]

This completes the description of the micro level. Next we move to the aggregates.

With a unit mass of firms, \( X \), \( L \), \( K \), \( C \), and \( S \) all correspond to their aggregate values. In equilibrium the total use of labor equals total supply, normalized to unity. Labor is either employed in the private sector \( L \), the subsistence sector, \( F \), they are criminals \( C \), or employed in the public sector \( gL \). Here \( g \) denotes the fraction of public to private employment. Hence,

\[ 1 = L (1 + g) + F + C \quad (8) \]

The real wage and the level of crime are determined simultaneously. Equilibrium in the labor market requires that the return in all sectors currently employing workers must be equal. In an equilibrium state with crime, the real wage is equal to the expected return for a criminal. If the real wage exceeds the return to crime, however,
there can be no crime. Hence,

\[ w = p - m = A (1 - aC) X - m \quad \text{when } C > 0 \]

\[ w > p - m = AX - m \quad \text{when } C = 0 \]

Similarly, in an equilibrium where workers find it worthwhile to work in the subsistence sector, the real wage must be equal to the subsistence pay \( q \). If subsistence sector employment is zero, however, it implies that the real wage is above the subsistence pay

\[ w = q \text{ when } F > 0 \]

\[ w > q \text{ when } F = 0 \]

Four regimes emerge (See Table 1): In the first regime the production is so low that stealing is not attractive even without guarding. There is no crime and the real wage is determined by the subsistence pay, since formal labor demand is not sufficient to employ the whole labor force. Regime two starts where production has reached the level where crime starts to pay off. This threshold level of production is \( X = (q + m) / A \). In regime two the number of criminals adjusts such that the net return to crime remains equal to \( q \). Regime two ends and regime three starts when there is no more workers in the subsistence sector. In regime three production is so high that the only attractive alternatives are crime and formal sector employment.

<table>
<thead>
<tr>
<th>Regime</th>
<th>labor market condition</th>
<th>wage condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Subsistence</td>
<td>( C = 0, F &gt; 0 )</td>
<td>( w = q &gt; AX - m )</td>
</tr>
<tr>
<td>2: Low income</td>
<td>( C &gt; 0, F &gt; 0 )</td>
<td>( w = q = A (1 - aC) X - m )</td>
</tr>
<tr>
<td>3: Medium income</td>
<td>( C &gt; 0, F = 0 )</td>
<td>( w = A (1 - aC) X - m &gt; q )</td>
</tr>
<tr>
<td>4: High income</td>
<td>( C = F = 0 )</td>
<td>( w &gt; AX - m &gt; q )</td>
</tr>
</tbody>
</table>
In regime four all available labor is employed in the private sector and the real wage must be bid up above the expected return of being a criminal. Thus, the poorest and richest regimes have no crime, while the low and medium regimes have crime.

The government revenue is used to finance public employment, which for simplicity is assumed to be unproductive. A balanced budget implies

$$tX = wgL$$

(9)

In order to close the static part of the model we must specify the production function in the private formal sector. To clarify the new effects in our model, we choose the simplest possible case of a Leontief production function. With an appropriate choice of units we have

$$X = L = K$$

(10)

The allocation of labor in the four different regimes are shown in Figure 3. Starting from the left formal sector employment grows one to one with the capital stock. When the levels of capital and production are low, crime is zero and formal sector employment is recruited from the subsistence sector. When regime two starts, the subsistence sector releases labor both to the formal sector and the crime sector as formal sector production increases. In regime three the subsistence sector has no more workers. Thus, in this regime, higher formal employment pushes the number of criminals down. Finally, in regime four there is no crime. All available labor

\footnote{We comment on the consequences of allowing for factor substitution in footnote 7.}
is employed either in the formal private sector \((1 - g/(1 + g))\) or in the public sector \((g/(1 + g))\). A transition through the four regimes produces a hump-shaped relationship between economic development and crime as in the charts for 19th century England, presented by Tugan-Baranowsky. The hump-shaped relationship is due to poverty generated crime. At the early stage of industrialization (regime two) becoming a thief is an attractive opportunity for the poor. A a later stage (regime three) labor becomes scarce and crime decreases as the modern sector employs more workers. The critical question is whether the economy goes through all the different phases or is interrupted along the way, due to high crime. To answer this question we include capital dynamics in the model.

In line with a simple version of Tobin’s \(q\)-theory the investment function takes the form

\[
\dot{K} = h (r - r^*), \quad h' > 0
\]
where $r$ is the marginal return to capital and $r^*$ is the return to capital on the world market. The speed of adjustment may depend on implementation costs or other frictions, but is for simplicity taken as given here.$^5$

With a constant return to scale production function, the marginal return to capital is equal to the average return

$$r = \frac{\Pi}{K} = \frac{X - wL - tX - zX - S}{K} \quad (11)$$

Inserting from (4), (6), (9), and (10) in (11) the return to capital can be expressed as

$$r = 1 - (1 + g) w - (2 - aC) AC \quad (12)$$

The return to capital is reduced when either the wage or the level of government employment increases. The value of $r$ also declines as the number of criminals increases $\partial r / \partial C = -2A (1 - aC) < 0$. The relationship between $r$ and $C$ is affected not only by stealing in itself but also by the increased guarding. By combining (12) with equilibrium conditions in Table 1 the return to capital is given in Table 2.

The return to capital in the different regimes is illustrated by the bold curve in Figure 4. In regime one the return to capital is constant as workers are recruited from the subsistence sector at fixed wage. In regime two crime pays and increased

$^5$Note that in a model with multiple equilibria, as the present one, the reduced form investment function above may be in conflict with rational expectations. It might not be rational to invest even when the marginal return to capital exceeds the required return if $r$ falls short of $r^*$ at a later stage. As will be seen, this problem does not arise in the present model since the transitional dynamics never produce a situation where the marginal return to capital is first above and then below $r^*$, or the opposite (given the usual assumption that private agents can not predict the extent and timing of eventual future policy reforms).
Table 2: The return to capital

<table>
<thead>
<tr>
<th>Regime</th>
<th>( r )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Subsistence</td>
<td>( r_1 = 1 - (1 + g)q )</td>
</tr>
<tr>
<td>2: Low income</td>
<td>( r_2 = 1 - (1 + g)q - A/a + (q + m)^2 / (aAK^2) )</td>
</tr>
<tr>
<td>3: Medium income</td>
<td>( r_3 = 1 - 2A + aA + (1 + g)(m + (1 - a)AK) )</td>
</tr>
<tr>
<td>4: High income</td>
<td>( r_4 = r^* )</td>
</tr>
</tbody>
</table>

Figure 4: The marginal return to capital as a function of the aggregate capital stock

production in one firm increases the number of criminals and imply a negative externality for all firms. Thus the return to capital declines. In regime three the subsistence sector is no longer employing workers and higher production therefore lowers the number of criminals. This effect represents a positive externality for the other firms and the return to capital increases. In the fourth regime the wage is bid up until the return to capital reaches \( r^* \), as no more workers are available.

Note that the reason for the increasing marginal return in the third regime is different from other recent theories. In growth theory, economic geography, and the “Big push” literature increasing returns play an important role.\(^6\) In these theories

\(^6\)See the special issue of the Journal of Development Economics (Bardhan ed. 1996), for many interesting contributions.
positive externalities at the micro level produce an aggregate production function with increasing returns to scale. In our model, unlike in these theories, we have an aggregate production function with constant returns to scale. The return to capital rises with the aggregate capital stock solely as a result of the criminal behavior.

With endogenous crime, a higher labor demand generates a positive externality. A higher employment within the firm reduces the number of criminals, but the firm is too small to take this into account. This makes the marginal return to capital an increasing function of the aggregate capital stock. Thus, socioeconomic interactions rather than properties of the aggregate production function generates the result.\(^7\)

Generally, the moral cost \(m\) varies across individuals. Some individuals are less restrained towards crime than others and have a lower \(m\). Those with the lowest \(m\) are the first to enter into crime and \(m\) increases with the number of criminals, \(\partial m/\partial C > 0\). Taking account of this heterogeneity effect reduces the steepness of the \(r\)-curve in regimes two and three, lifting the bottom of the U-shaped \(r\) curve, but does not alter the qualitative features. Another possible determination of \(m\) follows by incorporating mechanisms of social interaction as discussed for example in Glaeser et al. (1996 p.508). “When one agent’s decision to become a criminal positively affects his neighbors decision[...]” then \(m\) is a decreasing function of \(C\).

This interaction effect works in the opposite direction of the heterogeneity effect and lowers the bottom of the U-shaped \(r\) curve. Finally, there may be hysteresis effects whereby the moral cost is an decreasing function of the historic crime levels. In that

\(^7\)A sufficient condition for the positive externality in regime three is that employment in the formal sector increases as the capital stock grows. Allowing for substitution between labor and capital weakens the externality, since firms substitute away from labor as the real wage goes up with production. When the elasticity of substitution is sufficiently high the positive externality in regime three disappears and the \(r\) curve is declining throughout.
case the $r$-curve shifts down given a history of high crime. In the following we stick
to the assumption of a stable $r$-curve.

We can now characterize the long run equilibria in the model. In Figure 4 there
are three equilibria: A, B, and $K^*$. Here A and B are stable equilibria while $K^*$
is unstable equilibrium. If the economy starts out with a level of capital below $K^*$
it ends up at the low income equilibrium B. If it starts out above $K^*$ it ends up
at the high income equilibrium A. Hence, $K^*$ is the threshold level of capital that
determines whether the economy ends up in the poverty trap B or enters into a
growth process that ends with high income and no crime in A.

Whether there exists a threshold level of capital $K^*$ or not depends on the $r$
curve relative to $r^*$. With a sufficiently low $r^*$ an economy may grow continuously
without being trapped at intermediate levels of industrialization. England is one of
the countries that went through an uninterrupted development and thus experienced
the Tugan-Baranowsky hump in the crime path. Like many other rich countries,
England is today in a regime four like situation where absolute poverty is no longer
the main cause of crime.

Removing all OECD countries from Figure 1 does not alter the general picture
of a negative correlation between robbery growth and GDP growth. After removing
OECD countries we are left with roughly two groups of countries; one in quadrant IV
with declining crime and a growing economy, and one group of countries in quadrant
II, with negative growth and increasing crime. The two groups of countries both
fit the dynamics of regime three of our model. With this interpretation, the group
in quadrant IV is to the right of $K^*$ in Figure 4 while the group in quadrant II is
to the left of $K^*$ and on their way into the poverty trap. In Figure 4 there are no
countries in quadrant III; with declining crime and negative growth as regime two of our model would predict. The reason may simply be that such poor countries are not likely to collect statistics on robberies.

3 Policies

In this section we consider the impacts of better law enforcement, increasing $m$, policies that improve conditions in the subsistence sector, increasing $q$, and public sector downsizing, reducing $g$. These policies all affect the return to capital and the possibility of a poverty trap.

Let us first consider an increase in $m$, which captures the cases of an more efficient law enforcement and harsher punishment, in addition to the case of improved morale. A positive shift in $m$ is illustrated by the dashed curve in Figure 4, where the shifts follows from Table 2. Increasing $m$ has no effect in regimes one and four, as there are no criminals in these regimes. In regimes two and three, however, a higher $m$ shifts the $r$ curve up. As a result the low level equilibrium $B$ in Figure 4 moves to the right as a higher level of capital and production is required before people turn into criminal activity. For each amount of capital there are fewer thieves when $m$ is higher. As law enforcement gets more efficient, output growth induces a smaller increase in the number of criminals. For a sufficiently high $m$ the poverty trap disappears. Thus, increasing $m$ may move the economy, initially stuck in $B$, to a sustainable growth path.

Next we consider an increase in the subsistence pay $q$ that may result from foreign assistance or a land reform. Increasing $q$ improves the outside option for the worker, which in turn increases $w$ in regimes one and two. In regimes three and
four, however, a rise in $q$ has no effect as the real wage exceeds $q$ anyway. The shift in $r$ following from the higher $q$ is illustrated by the dotted curve in Figure 4. In regime one the curve shifts down as the higher wage lowers the return to capital. In regime two a higher $q$ not only raises the real wage but also improves the opportunity wage for the criminals. Thus, crime declines and the return to capital goes up. The simultaneous increase in wage and capital return is possible due to the reduction both in guarding and stealing. Formally the effect is seen by differentiating $r_2$ in Table 2, using the labor market condition from Table 1.

\[
\frac{\partial r_2}{\partial q} = \frac{(1 - g) aK + 2(1 + aF - a)}{Ka} > 0
\]

Increasing the subsistence pay lifts the bottom of the U-shaped $r$ curve in Figure 4 and may therefore remove the poverty trap. This illustrates the important point that the lack of attractive legal opportunities for the workers are costly for the firms due to crime. Better opportunities for the poor can therefore be beneficial for private business even though it also represents an increased wage bill.

Public employment is another way of generating attractive legal opportunities for the workers, preventing high crime rates. Yet many countries tries to downsize their public sector by firing surplus labor, reducing $g$. The consequences of such a reform policy is illustrated by the dashed curve $r'$ in Figure 5 where $g$ is reduced all the way to zero. In the two first regimes a reduction in public employment gives an equal increase in the number of subsistence workers. Taxes are reduced, crime is constant, and hence the return to capital increases. In regime three, however, lowering public employment has a double effect. On the one hand, the lower taxes
Figure 5: The marginal return to capital as a function of the aggregate capital stock

contribute to a higher return to capital. On the other hand, the number of criminals rises, increasing the costs associated with crime. Taking the derivative of \( r_3 \) in Table 2 with respect to \( g \), we see that the latter effect dominates

\[
\frac{\partial r_3}{\partial g} = m + (1 - a) AK > 0
\]

Hence, in regime three the return to capital goes down as public employment is reduced. The explanation is as follows: In regime three, the number of criminals is determined residually by the equation \( C = 1 - L - gL \). The capital owners “pay” the public employees in the form of taxes and “pay” the criminals through the costs of stealing. A criminal earns at least the same income as a public employee. In addition stealing represents extra costs through guarding. Hence, reducing the number of public employees leads to an equal increase in the number of criminals and therefore lowers the return to capital. In regime four the return to capital is by definition equal to \( r^* \) irrespective of the level of public employment. Yet, it should
be noted that the level of production in regime four increases as $g$ is reduced. Hence the no crime equilibrium moves to the right from $A$ to $A'$ in Figure 5 as public sector surplus labor is set to zero. On this basis, a reform that moves the economy from $A$ to $A'$ would make everyone better off. However, with endogenous crime the transition to the efficient steady state is not straight forward and may derail. The success of the reform depends on how it is implemented.

First, we consider a reform where all public sector surplus labor is fired at once. This shifts the return to capital down as depicted by the curve $r'$ in Figure 5. This may or may not bring $r$ below the critical level $r^*$. In the present example the downward shift is sufficient to bring $r$ below $r^*$ at $A$. Thus, the cost of crime has increased to an extent that brings the economy on to a negative growth path with disinvestment and rising crime rates, mimicking the tragic development in eastern European countries after their reforms. Instead of improving efficiency the economy ends up in a crime induced poverty trap. In Figure 1 most countries in quadrant II have gone through considerable reform of the public sector ending up with increasing crime and negative GDP growth just as our model predicts.

The outcome is different, however, if the reform program is carried out with a gradual reduction in the public sector surplus labor. In Figure 5 we illustrate a gradual reform in two equal steps. The first stage is illustrated by the dotted curve (where we have only drawn the curve in regimes three and four). In this case the downward shift in is sufficiently small, and $r$ remains above $r^*$ in this first stage. Capital accumulates until an intermediate equilibrium is reached. At this point the second and final stage can be implemented, shifting the return to capital from $r''$ to $r'$ inducing a second round of capital accumulation. This growth process takes the
economy all the way up to $A'$. Thus a reform program of several stages guarantees a favorable outcome, while a big bang reform may throw the economy into a crime induced poverty trap.

4 Conclusion

In 1901 Tugan-Baranowsky showed that the relationship between industrialization and crime was not monotonic but hump-shaped. What he did not emphasize, however, was that the social forces that produce the hump under some circumstances can lead to a poverty trap long before full industrialization is reached. Depending on the stage of development capital accumulation may have negative or positive externalities via criminal behavior. At a low stage of development capital accumulation by one producer generates increasing crime that reduces the profitability of all producers. At a higher stage of development, when labor has become more scarce, capital accumulation (and increased employment) of one producer reduces crime, enhancing the profitability of all producers. It is the changing sign of the externality at different stages of development that can generate a poverty trap.

The possibility of being caught in a trap have implications for economic policies and the design of reform programs. First, policies that improve law enforcement and raise the expected costs of being criminal, not only reduce crime rates but may also trigger a sustainable economic take off. Second, improving the conditions of the worst off group may have similar growth inducing effects. Third, downsizing the public sector may generate higher crime levels. In general, a temporary fall in labor demand may kick off social reactions that lead the economy into contraction.
Hence, a “big bang” reform intended to improve the efficiency may actually end up as a reverse “big push” into a poverty trap.

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