Rebranding the Ex-convicts

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Section 1. Introduction
Increasing US Imprisonment Rate since 1980s

In 2007:
* 1.5m in prison
* 780,000 in jail
* 800,000 on parole
* 4.2m on probation
Total Population Under U.S. Adult Correctional Systems in 2000s

<table>
<thead>
<tr>
<th>Year</th>
<th>Total correctional population</th>
<th>Community supervision</th>
<th>Incarcerated</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Probation</td>
<td>Parole</td>
<td>Total</td>
</tr>
<tr>
<td>2000</td>
<td>6,467,800</td>
<td>4,564,900</td>
<td>3,839,400</td>
<td>725,500</td>
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<tr>
<td>2005</td>
<td>7,055,600</td>
<td>4,946,600</td>
<td>4,162,300</td>
<td>784,400</td>
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<tr>
<td>2006</td>
<td>7,199,700</td>
<td>5,035,000</td>
<td>4,236,800</td>
<td>798,200</td>
</tr>
<tr>
<td>2007</td>
<td>7,339,600</td>
<td>5,119,000</td>
<td>4,293,000</td>
<td>826,100</td>
</tr>
<tr>
<td>2008</td>
<td>7,313,600</td>
<td>5,094,400</td>
<td>4,270,100</td>
<td>828,200</td>
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<tr>
<td>2009</td>
<td>7,235,200</td>
<td>5,015,900</td>
<td>4,196,200</td>
<td>824,100</td>
</tr>
<tr>
<td>2010</td>
<td>7,086,500</td>
<td>4,886,000</td>
<td>4,053,600</td>
<td>840,700</td>
</tr>
<tr>
<td>2013</td>
<td>6,903,200</td>
<td>4,753,400</td>
<td>3,910,600</td>
<td>855,200</td>
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<td>2014</td>
<td>6,851,000</td>
<td>4,708,100</td>
<td>3,864,100</td>
<td>856,900</td>
</tr>
</tbody>
</table>

Average annual percent change, 2007–2014: -1.0% for Total, -1.2% for Probation, -1.5% for Parole, 0.5% for Total, -0.5% for Local jail, -0.7% for Prison, -0.3% for Percent change, 2013–2014: -0.8% for Total, -1.0% for Probation, -1.2% for Parole, 0.2% for Total, 0.1% for Local jail, 1.8% for Prison, -1.0% for Percent change.

Note: Estimates were rounded to the nearest 100 and may not be comparable to previously published BJS reports due to updated information or rounding. Counts include estimates for nonresponding jurisdictions. All probation, parole, and prison counts are for December 31; jail counts are for the last weekday in June. Detail may not sum to total due to rounding and adjustments made to account for offenders with multiple correctional statuses. See Methodology.

*aTotal was adjusted to account for offenders with multiple correctional statuses. See Methodology.
*bIncludes inmates under the jurisdiction of state or federal prisons or held in local jails.
*cIncludes some offenders held in a prison or local jail but who remained under the jurisdiction of a probation or parole agency.
*dMay differ from estimates reported elsewhere in this report. See Terms and definitions.

About 20 percent of All Blacks Imprisoned by early 30s

Men's Risk of Imprisonment by 30–34

![Bar chart showing the risk of imprisonment for different groups.](chart.png)
Key Concepts

- Develop a “model” explaining how the problem of poor labor market outcomes for ex-convicts might be alleviated.
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- An essential feature of the labor market for ex-convicts: the employers wish to avoid **associating with those who will end-up returning to crime**, but they cannot be certain from available information: the issue of **adverse selection**
- A government can nevertheless design **a costly, though on net socially beneficial, program** by means of which some ex-cons can credibly convey their good intentions.
- Such a program can facilitate **more ex-cons obtaining legitimate work**, and fewer electing to return to crime.
- Broader applicability other than the case of ex-cons.
Section 2. Basic Framework
Frameworks

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Employers make a wage offer to the prospective ex-con workers based on a test-inclusive assessment of the likelihood that this individual will return to crime.
Notations and Assumptions

- \( c \equiv \) value of criminal activity for an ex-con (\( c \geq 0 \))
- \( G(c) \equiv \) fraction of ex-con population with crime value no greater than \( c \)
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- Assumption (1): $G(c) = \text{Min}\{\frac{c}{2\mu}, 1\}$ for some $\mu > 0$, $c \geq 0$. (That is, ex-cons’ value of crime is uniformly distributed on the interval $[0, 2\mu]$, with mean $\mu$.)
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- $\pi \equiv$ fraction of ex-con population choosing to go straight $(0 \leq \pi \leq 1)$
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- Assumption (2): $\Pr\{ t = \text{pass} | \text{straight} \} = \Pr\{ t = \text{fail} | \text{crime} \} = p > \frac{1}{2}$  
  (Those going straight (returning to crime) pass (fail) an employer’s “test” of criminal intentions with the probability $p > \frac{1}{2}$).
Section 3. Labor Market Analysis
Employers' Wage Offers

**Offered Wages**

- $\omega \equiv$ productivity of the labor of an ex-con who goes straight.
- $0 \equiv$ productivity of the labor of an ex-con who returns to crime
Employers’ Wage Offers

Offered Wages

- $\omega \equiv$ productivity of the labor of an ex-con who goes straight.
- $0 \equiv$ productivity of the labor of an ex-con who returns to crime.
- Employers offer wages to individual applicants according to expected productivity:

$$W(\pi, t) = \omega \cdot \Pr\{\text{“straight”} \mid t, \pi\} + 0 \cdot \Pr\{\text{“crime”} \mid t, \pi\},$$
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\]

- Using Bayes’s Rule to compute conditional probabilities:

\[
W(\pi, \text{pass}) = \frac{\omega p\pi}{p\pi + (1 - p)(1 - \pi)}
\]

and

\[
W(\pi, \text{fail}) = \frac{\omega (1 - p)\pi}{(1 - p)\pi + p(1 - \pi)}.
\]
So, we may conclude that:

(i) \( W(\pi, \text{pass}) > W(\pi, \text{fail}) \), for all \( \pi \in (0, 1) \);

(ii) \( W(0, \text{pass}) = W(0, \text{fail}) = 0 \); and

(iii) \( W(1, \text{pass}) = W(1, \text{fail}) = \omega \).
Ex-cons’ Incentive to "Go Straight"

Expected Wages and Incentive

- Expected wage paid to an ex-con who “goes straight” is:
  \[ V_1(\pi) \equiv pW(\pi, pass) + (1 - p)W(\pi, fail), \]

- Expected wage paid to an ex-con who “returns to crime” is:
  \[ V_0(\pi) \equiv (1 - p)W(\pi, pass) + pW(\pi, fail). \]
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- The wage-offer-incentive for an ex-con to “going straight”:
  \[ R(\pi) \equiv V_1(\pi) - V_0(\pi) = (2p - 1) \cdot [W(\pi, pass) - W(\pi, fail)]. \]
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- \( R(\pi) \) is a concave function of \( \pi \), and that
  \[ R(0) = 0 = R(1), \]

- and that
  \[ R\left(\frac{1}{2}\right) = \omega(2p - 1)^2 \geq R(\pi), \text{ for all } \pi \in [0, 1]. \]
An ex-convict’ decision calculus:
“return to crime” is the rational choice if \( c > R(\pi) \),
while “go straight” is the rational choice if \( c < R(\pi) \).
Self-confirming Employer’s Belief

- An “equilibrium employer belief” is any number $\pi^* \in [0, 1]$ that solves the equation:

\[
\pi^* = G(R(\pi^*))
\]

- Employer’s belief about fraction of ex-cons who “go straight” = $\pi$
- Wage offered to individual ex-cons, given test = $W(\pi, t)$
- Employer belief confirmed whenever $\pi = \pi' = G(R(\pi))$
- Fraction of ex-cons “going straight” $\pi'$, where $\pi' = G(R(\pi))$
- Incentives for any ex-con to “go straight” = $R(\pi)$
Equilibrium in the Labor Market for Ex-Cons

Self-confirming Employer’s Belief

- There exists multiple equilibria without the following assumption:
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Assumption (3): \[ \frac{\omega}{\mu} \leq \frac{2p(1-p)}{(2p-1)^2} \] (That is, employers’ information is not “too accurate.” Specifically, we are assuming: \[ p \leq \left( \frac{1}{2} \right) \left[ 1 + \left( \frac{\mu}{\mu + 2\omega} \right)^{\frac{1}{2}} \right]. \)

\[ G(R(\pi)) \]
When $\pi^* = 0$ is the only value of $\pi$ which solves $\pi^* = G(R(\pi^*))$, we will say: “labor market for ex-convicts collapses due to the problem of adverse selection.” (by Assumption (3))
Section 4. Rebranding Program for the Ex-convicts
A certifiable and costly activity (hereafter “the program”) with no productive content (i.e., an ex-cons’ participation neither raises $\omega$ nor lowers $c$)
Rebranding Program

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Let $K$ denote the cost to an ex-convict for participating in this program: the program’s designers can choose the value of $K$ for which $0 < K < \omega$. 
Rebranding Program

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- Before going into the labor market, ex-convicts choose **whether to join this program or not**.
- Let $K$ denote **the cost to an ex-convict for participating** in this program: the program’s designers can choose the value of $K$ for which $0 < K < \omega$.
- Program participation is **verifiable by employers**. (E.g. a certificate is issued which cannot be forged.)
Program Participation

- Let $\pi'$ denote employers’ prior belief about the fraction of program participants who are “going straight.”
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So, $R(\pi') = V_1(\pi') - V_0(\pi')$ will now represent the value of going straight for program participants only.
Existence of Unique Equilibrium

**Proposition**

For every $K \in (0, \omega)$, there is an (essentially unique) equilibrium with positive program participation such that a positive fraction $\tilde{\pi}' \in (0, 1)$ of program participants elect to go straight, where:

$$K = V_0(\tilde{\pi}'), \text{ so } \tilde{\pi}' = V_0^{-1}(K), \ 0 < K < \omega.$$ 

Moreover, program participants who go straight are strictly better-off than they would have been in the absence of a program, while non-participants are no worse-off, implying that the introduction of a program induces a (weak) Pareto improvement over the status quo ante.
[Proof of Proposition]

First, suppose $K > V_0(\tilde{\pi}')$

- $\tilde{\pi}' = 1,$ $V_0(\tilde{\pi}') = \omega > K$
- : contradiction

Second, suppose $K < V_0(\tilde{\pi}')$

- $\tilde{\pi} = G(R(\tilde{\pi}')),$ then $\tilde{\pi}' = 0,$
- $V_0(\tilde{\pi}) = 0 < K$
- : contradiction
[Proof of Proposition]

Finally, suppose $K = V_0(\tilde{\pi}')$:

$G(R(\tilde{\pi}')) + \phi[1-G(R(\tilde{\pi}'))]$ join the program!

Then, there exists $\phi \in (0,1)$ such that $\tilde{\pi}' = G(R(\tilde{\pi}'))/\{G(R(\tilde{\pi}')) + \phi[1-G(R(\tilde{\pi}'))]\}$. 
Section 5. Socially Optimal Rebranding
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The introduction of the program changes the equilibrium payoff for only one group of agents – those with $c < R(\tilde{\pi}')$:

\[
\text{program utility} = V_1(\tilde{\pi}') - K = V_1(\tilde{\pi}') - V_0(\tilde{\pi}') = R(\tilde{\pi}'),
\]

while their payoff in the absence of any program is just $c$. 

NSS is maximized when $R(\tilde{\pi}')$ is maximized:

$\pi^{**} = \frac{1}{2}$. 

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- So, rebranding produces the overall net surplus for society:

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NSS is maximized when \( R(\tilde{\pi}') \) is maximized: \( \pi^{**} = \frac{1}{2} \).
The socially optimal rebranding program will be:

\[
K^{**} = V_0\left(\frac{1}{2}\right) = (1 - p)W\left(\frac{1}{2}, \text{pass}\right) + pW\left(\frac{1}{2}, \text{fail}\right) = 2\omega p(1 - p).
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- The size of the optimal program (in terms of the fraction of ex-convicts who participate in it), \( N(\pi^{**}) \), will be:

\[ N(\pi^{**}) = G\left( \frac{R(\pi^{**})}{\pi^{**}} \right) = 2 G\left( R\left( \frac{1}{2} \right) \right) = \left( \frac{\omega}{\mu} \right)(2p - 1)^2. \]
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The size of the optimal program (in terms of the fraction of ex-convicts who participate in it), \( N(\pi^{**}) \), will be:

\[ N(\pi^{**}) = \frac{G(R(\pi^{**}))}{\pi^{**}} = 2G(R\left(\frac{1}{2}\right)) = \left(\frac{\omega}{\mu}\right)(2p - 1)^2. \]

The program size \( N(\pi^{**}) \) is greater, (1) the higher is the value of legitimate work, (2) the smaller is the mean value of criminal participation and (3) the more accurate is the information available to employers.
Section 6. Concluding Remarks
While we have adopted Assumption (3) in order to be sure that the market collapses completely, our result that a **Pareto improvement is possible** here does not depend on that assumption.
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- by creating a “super-brand” that is costly to attain.
Thank You for Paying Attention!