IMPRISONMENT AND OPPORTUNITY STRUCTURES: A BAYESIAN HIERARCHICAL ANALYSIS*

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ABSTRACT

Comparative sociologists mostly ignore wide differences in criminality and incarceration rates among modern western societies; with notable exceptions, students of the prison take scant notice of research comparing political economies, welfare regimes, and patterns of inequality. This article outlines an opportunity structures model of imprisonment that bridges this gap by treating incarceration trends as byproducts of the institutional organization of opportunities over the life course. Using a sample of 15 rich democracies observed over four decades, empirical attention focuses on three levels of analysis: the capacities of alternative life course paths, the distribution of political power, and institutional differences in state structures and policy regimes. Hypothesized cross-level interactions call for the specification of a hierarchical model to be estimated within a Bayesian framework. Results conform to the expectations of the opportunity structures model and support many of its specific predictions.
Law making and law enforcement are central functions of the modern nation state, and the wide variation in crime rates and levels of incarceration among industrialized democracies presents an attractive set of puzzles for comparative analysis. But these issues are largely ignored in the literatures on comparative politics, socioeconomics, and social policy. The focus of this paper is on incarceration, and while the number of cross-national analyses in this area is growing, further development requires scholars to overcome two significant challenges. The first is the theoretically promiscuous quality of the imprisonment literature. Recent accounts have drawn links between punishment practices and social welfare regimes (Garland, 1985), structures of domination and the production of criminological knowledge (Savelsberg, 1994), patterns of inequality (Jacobs and Kleban, 2003; Sutton, 2004; Western, 2006), cultural transformations (Foucault, 1979; Garland, 1992, 2001), the global diffusion of neoliberal ideology (Wacquant, 2001, 2009), and partisan politics (Jacobs and Helms, 1996; Sutton, 1987, 2000; von Hofer, 2003). The task now is to pull these strands together into a coherent theoretical and empirical account.

A second challenge to comparative research, particularly involving quantitative data, is the difficulty of comparing punishment practices across nation states. Research on welfare, education, labor markets, and macroeconomics benefits from the rough isomorphism in institutional forms in these domains, and the fact that, thanks to the homogenizing influence of IGOs like UNESCO, the ILO, the OECD, and the World Bank, data are reported in consistent ways across the developed democracies. By contrast, comparability across modern systems of criminal law is problematic because of their disparate and remote historical origins, the tendency of national legal institutions toward self-referentiality and inertia, the lack of internationally valid conventions for recording data, and wide cross-national variation in the structure of institutional fields assigned jurisdiction over
criminal behavior. This is not just a measurement problem. The more fundamental issue is that causal processes determining forms and rates of incarceration may vary in different institutional contexts. Given this possibility, it is reasonable to ask whether any single model can reasonably be applied across a range of societies.

This article attempts to meet both challenges. First, in a bid for theoretical synthesis, I outline and test an opportunity structures model that aims on the one hand to weave together strands from the new research on penality, and on the other to integrate the analysis of imprisonment with recent macrosociological research on mobility regimes, life-course institutions, and social policy. A preliminary version of the opportunity structures model was described in an earlier study of five Common Law democracies [identifying cite]; the version presented here is considerably more detailed. The orienting assumptions of this approach are that criminality is an achieved status, not a particular form of behavior; and that criminal punishment is one among many institutionalized means of sorting individuals into socially meaningful categories and instilling categorically appropriate identities. My argument, in brief, is that criminal punishment is a form of negative social mobility, and that punishment trends are a byproduct of the social organization of the life course and the resulting distribution of life-course opportunities.

Second, this emphasis on context suggests an analytical strategy that not only acknowledges cross-national causal heterogeneity, but seeks to take advantage of it. I argue that social policies in different countries—including penal regimes—are influenced by historically rooted and relatively stable institutional structures that vary widely among the developed democracies. In making this argument I borrow freely from the comparative welfare state literature, which has demonstrated that institutional differences in state structures (Evans et al., 1985) and policy regimes (Esping-Andersen, 1990, 1999) are fateful for social policies and their outcomes. I emphasize neocorporatism and political centralization as key factors that shape the exercise of political power, and ultimately the
regulation of the life course. To forecast my argument, democracies with tightly regulated labor markets and bureaucratically powerful national states are more assertive in regulating the distribution of life-course opportunities, with consequences for penal policy directly, and for the political opportunities available to non-state interest groups seeking to influence social policy. An adequate test of this argument requires both a broader range of data and a more sophisticated modeling strategy than was used in the earlier five-country study. This study uses data from 15 rich democracies observed over 40 years to capture wide variation in institutional regimes, and a multilevel modeling approach that can analyze complex interactions between relatively stable institutional structures and more fluid dimensions of the opportunity space within each country, and the consequences of both for incarceration rates. I motivate hypotheses and describe my modeling strategy in more detail in the sections that follow.

**Background and Hypotheses**

The opportunity structures model of punishment rests on four basic sociological insights:

1. The moral order arises from a primarily cognitive process of social classification (Douglas, 1970; Durkheim and Mauss, 1963). This process is shaped by institutions that provide naturalized schemas used by official actors to sort people into various developmental pathways, track their progress, and certify their achievement of appropriate institutionalized identities.

2. The sifting of criminals from noncriminals is a special case of this generic sorting process. The production of official criminality is, as Durkheim (1933) recognized, fundamental to the moral ordering of society, but it is not an *analytically* unique process. Incarceration is a punctuating event in the life course that confers a new and fateful identity. The identity of “criminal” implies a status that is less reputable than, but
otherwise not qualitatively different from, the status of welfare recipient, homeless person, factory worker, or college graduate. Thus, borrowing from Wilkins (1991; Wilkins and Pease, 1987), incarceration is a “negative reward” that is allocated in the same ways as positive rewards like income, educational and occupational credentials, and health care.

3. Just as criminality is a particular achieved status, criminal justice agencies form a special case of a much broader array of institutional fields that manage individuals’ movement through the life course (Pettit and Western, 2004; Western, 2006). Since crime and incarceration primarily involve young males, attention focuses on institutions that govern the transition from youth to adulthood—especially labor markets, schools, the military, and social welfare. Modern societies vary widely in the arrangements they make for this crucial transition, and these differences are consequential for the production of particular reputable or disreputable selves (Breen and Buchmann, 2002; Mayer, 1997; Meyer, 1988).

4. Given finite resources, institutional fields must compete for jurisdiction over the life course, and the dynamic equilibrium among fields determines societal capacities for producing different kinds of selves. The breadth of any particular life-course path depends on the allocation of resources, which in turn is influenced by higher-order cultural and political dynamics. For example, the production of sociology PhDs is dependent on the encouragement of deans, the financial health of universities, the legitimacy of the discipline, and the politics of higher education, among other things. This implies that, net of the supply-side effects of actual criminal behavior, incarceration rates should be powerfully influenced by demand-side factors—what Wilkins and Pease (1987) have called “public demand for punishment.”
Building on this foundation, the model focuses empirical attention on three levels of social organization: on life course patterns that indicate the flows of persons along alternative developmental pathways and opportunities for mobility; on the distribution of political power, which influences how life course opportunities are apportioned; and on institutional structures that determine the state’s capacity for robust social policymaking.

The Organization of the Life-Course and Inequality

A life course perspective implies that opportunities for incarceration will vary inversely with opportunities for other, more legitimate, outcomes. Attention here focuses on opportunities available to young males, who commit a disproportionate share of personal and property crimes (Cohen and Land, 1987; Gartner and Parker, 1990; Hirschi and Gottfredson, 1983; Pampel and Gartner, 1995), and who therefore make up a preponderant share of prison inmates (Berk et al., 1983). It is consistent with the literature to assume that young men in modern societies face a limited set of broad life-course alternatives: if they are not in prison, they are likely to be in school, at work, or in the military. The implication at the aggregate level is that as opportunities for legitimate attachments expand, rates of crime and incarceration will tend to decline. The first hypothesis deals with the pressure placed on the life-course system as successive male cohorts approach adulthood:

\[ H_1: \text{The greater the proportion of young males in the population, the higher the rate of imprisonment.} \]

Three more hypotheses predict negative associations between rates of legitimate life-course transitions and rates of incarceration:

\[ H_2: \text{Higher unemployment rates lead to higher rates of imprisonment.} \]
\[ H_3: \text{Expansion in school enrollments reduces the rate of prison growth.} \]
\[ H_4: \text{Expansion in military enlistments lowers imprisonment rates.} \]
The analysis of life-course patterns is supplemented with two hypotheses concerning aggregate economic opportunity. First, the effects of limited opportunity may be offset by countercyclical spending on social welfare. The close historical association between prisons and welfare, at least in the Anglo-American world, has been established by Garland (1985) and Sutton (1987, 1988). Wacquant (2009) has updated this idea by arguing that the diffusion of American-style neoliberalism—involving, among other things, more stringent restrictions on aid to the poor and unemployed—has driven the growth of prisons in many countries since the 1970s. This argument is corroborated by quantitative research on the Common Law countries [identifying cite]. I predict that, across the countries in the present sample, incarceration rates are inversely associated with welfare spending. Second, I predict a negative association between incarceration and inflation. This may be counterintuitive, since inflation makes people in general poorer by eroding the value of money (hence wages). In fact, however, inflation tends to reduce inequality by shifting wealth from creditors to debtors (Dimelis and Livada, 1999; Dornbusch et al., 1998: 518-21; Johnson and Shipp, 1999). Conversely, disinflation has profound adverse consequences that hit hardest on low-income persons. This occurred, for example, in the early 1980s, when the U.S. and other rich countries adopted tight-money policies that brought on a deep recession. One recent study (Sutton, 2004) found a negative effect of inflation on imprisonment that was stronger and more robust than that of unemployment or economic growth. Thus:

\[ H_5: \text{Higher welfare spending lowers imprisonment rates.} \]

\[ H_6: \text{Higher inflation reduces imprisonment rates.} \]

**Political Power**

Life course outcomes are proximally related to incarceration rates, but they are not exogenous. They are themselves the products of institutional arrangements that prescribe the normative sequence of
life events, establish links among nodes in the sequence, and define criteria for successful transitions from one life stage to another. Western democracies vary widely in the opportunities available for individuals to pursue alternative pathways (Breen and Buchmann, 2002; Mayer, 1997) because of differences in the capacities of states to regulate the life course and manage inequality (Mayer and Schoepflin, 1989). Relevant empirical work has focused on the determinants of welfare effort and labor market performance, but it is reasonable to extend the same logic to the analysis of imprisonment. This analysis focuses on two sources of variability in the distribution of power. First, strong unions enhance the collective power of workers to influence wage-setting and conditions of work, but also other policies that are friendly to workers and their families. For example, stronger union sectors are associated with higher levels of redistributive social spending (Boreham et al., 1996) and lower levels of inequality (Garrett, 1998). More recent work suggests that strong unions drive down imprisonment rates as well (Sutton, 2004), presumably as a byproduct of organized labor’s preference for redistributive policies over punitive ones.

A second and related factor is partisan politics. Comparative research shows that left parties encourage more redistributive social policies (Garrett, 1998; Hicks and Misra, 1993; Hicks and Swank, 1992; Korpi, 1989), tighter regulation of labor markets (Garrett, 1998; Hicks, 1988), and a preference for inflation over unemployment (Hibbs, 1997), so there is good reason to suspect that they exert an antecedent influence on factors that are likely to affect imprisonment rates. There may be direct effects as well: comparative research has shown that dominance by right parties tends to drive imprisonment rates up, at least among the Anglo-American democracies (Jacobs and Helms, 1996; Sutton, 1987, 2000); there is also good reason to expect negative effects of left-party dominance across a broader range of countries (Sutton, 2004). This discussion yields two hypotheses:

\[ H_8: \text{Stronger union movements are associated with lower imprisonment rates.} \]
Hypothesis 1: Imprisonment rates are lower when left parties are in power than when parties of the right and center are in power.

Institutional Foundations of Political Domination

Politics is a contest, and the distribution of power is fluid. But political contests occur in relatively stable institutional contexts that define the rules of the game, and these rules vary considerably, even among advanced democratic societies. In the social policy arena the key issue is political closure: Who has access to centers of authority? To what degree are these centers insulated from local and particularistic interests? The expectation is that where decisionmaking is monopolized by bureaucratic élites, the result is more universalistic, and therefore less punitive, social policies. Conversely, porous institutional structures are vulnerable to particularist groups that are inclined to frame issues in zero-sum terms; in these settings policy debates are easily politicized, leading to more invidious social policy in general and harsher responses to crime in particular (Christie, 1994; Garland, 2001; Savelsberg, 1994).

One way modern states achieve closure is through neocorporatist labor market regulation. In corporatist regimes, wage rates, work rules, and policies concerning employment security and social protection are set by negotiations among “peak associations” comprising union federations, industry associations, and the state. In liberal democracies like the U.S. and the U.K., social policy is deferential to the market; interest groups are powerful, but they play no formal role in social policymaking. More than just labor market policies, corporatism and neoliberalism are alternative institutional logics—one emphasizing cooperation and the other competition—that shape social policy across a wide range of domains (Hicks and Kenworthy, 2003). Research shows that corporatism encourages higher spending on social welfare (Hicks and Misra, 1993; Hicks and Swank, 1992), and it is likely to have implications for imprisonment as well, since penal policy has
historically been tied to the fate of liberal ideology (Bentham, [1789]1996; Foucault, 1979). Classical penology and liberalism were eclipsed in the mid-20th century by the rise of the Keynesian welfare state and rehabilitative penal ideology, but, as Garland (2001) and Wacquant (2009) have argued, market liberalism has roared back in the U.S. and the U.K., this time tied to a neoconservative moral agenda and a punitive approach to crime. But corporatist institutions remain strong in many democratic societies (Garrett, 1998), and previous research suggests that they may act as a breakwater against the punitive tide (Greenberg, 1999; Jacobs and Kleban, 2003; Sutton, 2004). Thus:

\[ H_{10} \text{: Imprisonment rates are lower in countries with neocorporatist bargaining regimes.} \]

Political closure is also more likely where national governments monopolize political authority, and there are a number of reasons to think that state centralization is fateful for incarceration trends.\(^1\) Centralized bureaucratic states are inclined to generate universalistic policies in response to problems of public welfare, and they are aided in doing so by their superior revenue-generating abilities and capacity to monopolize functional and administrative expertise. Centralization encourages “wholesale” politics in which political parties and labor unions are nationally organized and cohesive, and compete for power in broad ideological terms. By contrast, politics in decentralized states is retail: the definition of public welfare is a zero-sum game in which competition is driven by demands for patronage and influence by local and single-issue constituencies. Thus social policies in centralized states tend to be more universalistic and redistributive than those in decentralized states (Hicks and Misra, 1993; Hicks and Swank, 1992; Huber et al., 1993; Orloff and Skocpol, 1984; Weir and Skocpol, 1989). It is easy to extend this argument to the case of imprisonment, perhaps the ultimate anti-distributive social policy. As Christie (1994) and Savelberg (1994) have argued, criminal justice policy in decentralized

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\(^1\) The following argument draws from a number of sources in both the pluralist and “state-centered” traditions. See, in particular, Dahl (1982), Lijphart (1984), Orloff and Skocpol (1984), Skocpol (1989), and Weir and Skocpol (1989).
democracies is likely to be made in the media and at the ballot box, and in more centralized democracies in under-the-radar consultations among legislators, bureaucrats, and academic experts. The result for the former is more punitive policies:

\[ H_1: \text{Mean imprisonment rates are lower in centralized states than in federal states.} \]

The hypotheses so far suggest that the effects of political power and institutional structure are convergent and additive. I argue further that causal processes at the two levels interact with each other: specifically, that the influence of unions and left parties is contingent on levels of corporatism and polity centralization. Research and theory suggests two possible kinds of contingencies. First, neocorporatist bargaining arrangements and polity centralization may amplify the impacts of labor unions and left parties by buffering social policy negotiations from local influences and encouraging national-level mobilization. By contrast, neoliberal economic institutions and federalized polities encourage fissiparous politics that would likely weaken the influence of national interest groups by forcing them to accommodate diverse local constituencies. But this scenario may go too far in treating the state only as what Hicks and Swank (1992) call an “infraresource” for interest groups in civil society, rather than as a collective actor with interests of its own. An alternative scenario is suggested by Weber’s (1978: 212-226, 956-1005) discussion of the modern bureaucratic state. Both neocorporatism and polity centralization imply a state with robust and comprehensive bureaucratic authority. The specific strength of bureaucratic administration is that it is “domination through knowledge” (1978: 225)—indeed, as Savelsberg (1994) argues, bureaucracies have the authority to define what is canonical knowledge. Strong bureaucracies crowd out partisan influence because, to the degree that the bureaucrat is an expert, the politician is a dilettante. From this perspective, centralized bureaucratic administration will buffer the impact of short-term changes in union strength and partisan alignments. In formal terms, this suggests a negative interaction:
neocorporatist bargaining arrangements and polity centralization will tend to weaken the marginal influence of nonstate political actors.

**Sample and Data**

The data for this study comprise time-series for 15 large, wealthy democracies observed from 1960 to 2000. The sample includes five Anglo-American liberal democracies (Australia, Canada, New Zealand, the United Kingdom, and the United States), four Scandinavian social democracies (Denmark, Finland, Norway, and Sweden), and six conservative corporatist democracies (Austria, Belgium, France, Germany, and the Netherlands).

The dependent variable is imprisonment rates, measured as a ratio of the number of inmates per 100,000 population. This measure combines inmates who are remanded pending trial and those who are serving sentences. Given ideal data, we might prefer to distinguish between these groups; there are two justifications for the aggregate measure used here. The first is data availability: separate counts of remand populations are not available at all for Canada, and are only partial for two other countries. Second, even if the data could be gathered, the distinction between sentenced and remand populations would be meaningless, and probably fatally biased, because of differences in national legal conventions. Unlike Common Law systems, continental European countries count convicted prisoners as being on remand until all of their appeals are exhausted, making cross-national distinctions between sentenced and remand populations impossible (Pease, 1994). Wilkins (1991), whose “market model” of imprisonment informs my own approach, uncomplicates the issue nicely: “The incarceration rate represents the proportion of individuals who have lost their liberty by reason of the deployment of the criminal law. The incarceration rate is an excellent proxy for many other

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2 Prison admission rates provide a more sensitive measure than population rates, but are wholly unavailable for five of the countries in the sample and only spottily available for three more.
measures of societies’ responses to acts defined as crimes; moreover it is generally available, simple, and highly variable” (Wilkins and Pease, 1987: 20).

Independent variables are measured in standard ways and come from standard international sources, country yearbooks, and specialized data sets. Taking first the life-course indicators, the relative size of the young male population is calculated as the number of males age 15-24 as a percentage of the population; unemployment is the percentage of the labor force that is unemployed; the male school enrollment rate is the number of males enrolled in secondary and tertiary education as a percentage of males age 15-24; and military enlistments are measured as the number of persons in active military service as a percentage of the population. The indicator of welfare effort is total spending on social benefits as a percentage of GDP. Inflation is calculated as the proportional annual change in within-country GDP deflators, from the Penn World Tables data (Heston et al., 2006). Union strength is measured in terms of union density, the number of members as a percentage of the active labor force; and left-party dominance is the proportion of cabinet seats held by social democratic and labor parties in each year. The indicator of neocorporatism used here is taken from a composite measure compiled by Hicks and Kenworthy (2002). In its original form this is a time-varying measure; I treat it as time-invariant by taking country means. This entails an inconsequential loss of sensitivity, since with the present sample 97 percent of the variance is cross-national. As an indicator of state centralization, I use the factor scale derived by Hicks and Swank (1992). This is a synthetic measure that combines revenue centralization, unitary rather than federal government, and early consolidation of key social welfare policies. A scatterplot showing country scores on neocorporatism and state centralization appears in figure 1, with lines in the graph showing means on each axis. Clearly these are independent measures ($r = -0.20$), and the present sample captures a good range of high and low values on both axes.

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3 For descriptions and source citations see appendix table A.
Two additional variables complete the model. I use homicide rates, measured as the number of homicides per 100,000 population, to control for the effect of crime on imprisonment. Homicide is a far from perfect indicator of crime in general (Zimring and Hawkins, 1997), but there are no better alternatives. The virtues of homicide data are that they are reliably recorded (Monkkonen, 1989), and because of their conspicuousness they are likely to have an exaggerated influence on public perceptions of crime and thus on crime-control policies (Zimring and Hawkins, 1997). A second issue to be dealt with is race and interracial conflict. The “racial threat” hypothesis—which originated with Blalock (1967) and was developed in a somewhat different direction by Blau and Blau (1982)—holds that the larger the minority population, the greater the potential for conflict in the form of violent crime and legal repression. It has received support from several studies, mostly using local-level data from the U.S., and more recently Jacobs and Kleban’s (2003) analysis of cross-national data showed minority threat effects on incarceration trends. It is reasonable to suspect that if minority presence influences criminal punishment, it is also likely to affect other aspects of the opportunity structure that are of interest here, especially employment, access to education, and the extent of welfare support. If so, models that exclude it may yield spurious results. There are two caveats to keep in mind, however. First, the best available indicator of minority presence, from the Minorities at Risk data (2005), varies across countries but is constant over time; thus it is insensitive to changes due to differential fertility and patterns of migration. Second, this indicator is highly (inversely) correlated with the measure of neocorporatism ($r = -.82$), requiring separate models to gauge their effects, and raising interesting problems of interpretation.

Some variables include missing observations, and missing data are dealt with in different ways. A very small number of missing values on the dependent variable are filled in with linear interpolation, as are occasionally missing counts of male secondary and tertiary students. Counts of
young males in the population are available only at five- or ten-year census intervals, depending on
the country; estimates for intervening years are interpolated as well. More serious problems arise
with welfare spending, which is missing for Austria prior to 1970, and union density, which is
missing for New Zealand prior to 1978. For these observations, I impute values as part of the
estimation routine. This strategy is described more fully below.

Model Specification and Estimation

Regression analysis of data from a sample of countries observed over time requires attention to the
problem of nonhomogeneity, the biasing effect of stable but unmeasured differences between
countries. Conventional fixed- and random-effects estimators correct for nonhomogeneity by
allowing either the intercept or the error term to vary cross-sectionally (Greene, 1997; Halaby, 2004).
Both approaches treat heterogeneity as a nuisance to be swept out of the model. Thus they beg the
question of why the intercept or the error varies, and they ignore the issue of causal heterogeneity—
that is, variability in the effects coefficients—entirely. Following Western (1998, 1999) and Beck and
Katz (2007), I use the hierarchical model (HM) as a means to rescue information that FE and RE
models throw away. The HM estimates causal heterogeneity explicitly by partitioning the variance
into two (or more) levels: the micro level comprises individual observations (in this case, annual
observations of countries), and the macro level comprises the contexts in which those observations
occur (in this case, countries that vary on neocorporatism, state centralization, and minority
populations). The micro-level model used in this analysis can be written as

\[ y_{jt} = \beta_{jk} x_{jk} + \epsilon_{jt}, \]

where \( y \) is the incarceration rate in country \( j \) at year \( t \), \( \beta_{jk} \) is a matrix of coefficients for variable \( k \) in
country \( j \), \( x \) is a matrix of predictors with ones in the first column but otherwise varying over time
and space, and \( \epsilon \) is a matrix of random disturbances. The feature that distinguishes the HM from
standard time series-cross section estimators is that the $\beta_j$—the intercept and the effects estimates—are allowed to vary cross-sectionally, opening up the opportunity to model them as outcomes. I model the intercept and the coefficients for union density and left party strength with two country-level predictors:

$$\hat{\beta}_k = \gamma_{k0} + \gamma_{k1} \zeta_1 + \gamma_{k2} \zeta_2 + \eta_k, \text{ for } k = 0, 1, 2.$$ 

In the macro-model for the intercept, $\zeta_1$ is either neocorporatism or minority population share, and $\zeta_2$ is state centralization; corporatism and centralization only are in the models for union density and left party strength. Other effects are treated as random, with no systematic macro-level influence:

$$\hat{\beta}_k = \gamma_k + \eta_k, \text{ for } k = 3, \ldots, 9.$$ 

The model is estimated within a Bayesian framework, for several reasons. Classical methods assume that data are generated by a repeatable mechanism with a known probability process (Berk et al., 1995; Western and Jackman, 1994). This is inappropriate in this case because the present sample of countries is not random, and the post-World War II period is not likely to recur; standard test statistics such as confidence intervals are therefore meaningless. Bayesian methods assume that the coefficients—not the data—are drawn from a shared distribution, and yield probabilistic inferences about their true values (Western, 1999). Further, because complex hierarchical models require estimation of numerous coefficients—in this analysis, 125 $\beta$ coefficients and 16 $\gamma$ hyperparameters, plus country and parameter variances—they can easily overwhelm small data sets (Seltzer et al., 1996). In a Bayesian framework it is the coefficients, not the data, that are sampled. Modern Bayesian methods use Markov chain Monte Carlo (MCMC) simulation, usually implemented using the Gibbs sampler, to draw parameter estimates randomly from some more-or-less restrictively defined parameter space, compare it to the observed data, then update the estimates (Gelman and
Hill, 2007: ch.18; Seltzer, Wong and Bryk, 1996; Western, 1998). These iterations can be repeated as many times as necessary to allow the sampler to explore the parameter space and converge on a stable set of estimates. Finally, classical methods applied to multilevel models may underestimate parameter variances. Bayesian estimates are more conservative because they explicitly incorporate prior uncertainty about the distribution of the hyperparameters (Western, 1999: 23).

Estimation requires clear statements of distributional assumptions. At the micro level, I assume that $y_i$ is normally distributed with heteroskedastic variance $\sigma_i^2$, and that it is linearly dependent on a set of predictors $x_i$:

$$y_i \sim N(\hat{y}_i, \sigma_i^2),$$

$$\hat{y}_i = x_i' \beta_i.$$

In the macro model, the micro-level $\beta$ coefficients are normally distributed across countries:

$$\beta_j \sim N(\hat{\beta}_j, \tau^2)$$

The $\gamma$ coefficients are normally distributed with zero means and large variances:

$$\gamma \sim N(0,1000).$$

These are “skeptical priors” (Weiss et al., 1999), so called because they tug against the data to yield conservative estimates. The country-level variances $\sigma_j^2$ and the coefficient variances $\tau^2$ are given uniform distributions with a generous range $(0,50)$: $\sigma_j^2 \sim U(0,50)$, $\tau^2 \sim U(0,50)$. Covariates were centered at their grand means and divided by two standard deviations. This form of centering has several advantages: it aids convergence by lowering correlations among the $\beta_j$; the posterior estimate of $\gamma_{00}$, the mean of the cross-sectional intercepts, can be interpreted as the estimate of the adjusted mean (log) imprisonment rate; and effects
estimates can be read conveniently as the percentage change in incarceration rates associated with a
two standard deviation shift in the independent variable.\textsuperscript{4}

Bayesian estimation offers a convenient method for imputing missing values for welfare
spending and union density (Gelman and Hill, 2007: ch. 25). The only necessary assumption is that
data are missing at random. Randomness here has the very specific interpretation that observations
are missing for reasons that are unrelated to the variable’s value—or more concretely, for example,
that the OECD did not neglect to record welfare spending in Austria for some years because
spending was especially high or low. Based on this assumption, fully Bayesian imputation proceeds
by specifying a distribution based on nonmissing values, contingent on other variables from the
model of interest. In this case, preliminary analysis showed that welfare spending is reasonably well
estimated by percent young males, unemployment rates, school enrollments, and left party
dominance; and union density by young males, inflation, left party dominance, and homicide rates
(note that the goal is not causal inference, but accurate prediction). Likelihoods for welfare spending,
union density, and incarceration rates are then estimated jointly and iteratively.

Results

Summaries of the posterior distributions from two models of imprisonment rates appear in table 1.
Model 1 includes neocorporatism in the macro-equation for the intercept, and model 2 substitutes
the minority population share. For each model, the table shows the means of the posterior
distributions and the proportion of the posterior that falls above or below zero. This proportion is a
precise estimate of how much confidence is warranted in a true—i.e. non-zero—association.

\begin{table}[h]
\centering
\caption{Summary of posterior distributions for imprisonment rates.}
\begin{tabular}{|c|c|c|}
\hline
Model & Mean & Proportion Above Zero \\
\hline
Model 1 & 0.34 & 0.75 \\
Model 2 & 0.28 & 0.60 \\
\hline
\end{tabular}
\end{table}

\textsuperscript{4} Models were estimated with the WinBUGS program (Lunn \textit{et al.}, 2000), using the R2WinBUGS interface in R (Sturtz \textit{et al.}, 2005). I ran two parallel sequences of simulations for a burn-in of 45000 samples, followed by an additional 5000
samples, of which 1000 were retained for analysis. Convergence was monitored using the $\hat{\gamma}$ statistic (Gelman \textit{et al.},
2004: 269-97), and all reported coefficients were at the optimal 1.0 level.
First compare the models for the intercept. The mean intercepts are of course almost identical, showing that the adjusted mean incarceration rate overall is $e^{4.23} \approx 68.7$ per 100,000 population. Model 1 shows, as expected, a negative impact of neocorporatism: for countries that are two standard deviations above the mean on the neocorporatism measure, predicted incarceration rates are about ten percent below average, or $e^{4.23 - 0.105} \approx 61.9$. In model 2, the mean estimate for minority population share is positive, also as expected. For countries that are two standard deviations above the mean, incarceration rates are predicted to rise by about twelve percent, to $e^{4.23 + 0.12} \approx 77.3$. These estimates warrant only moderately low certainty—below 70 percent in both cases. State centralization shows the anticipated negative effect in both models, with fairly strong certainty.

Remaining results are almost identical across models. Observed mean effects of the political influence variables ($\gamma_{10}$ and $\gamma_{20}$) are consistent with the respective hypotheses, and the associations are credible: countries with stronger labor movements and stronger left parties experience lower rates of imprisonment. However these effects differ in strength and in how they interact with fixed institutional factors. The impact of union density is substantial. In Sweden, for example, union membership peaked at about 87 percent of the workforce in 1993 and 1994, or 2.28 standard deviations above the mean; this corresponds to a predicted drop of 35 percent in incarceration rates. By contrast, France’s union density in 2000 was 8.3 percent, the lowest in the sample; the prediction here is incarceration rates 44 percent higher than the norm. The negative effect of left party cabinet share is substantively weaker. In countries and years where left parties hold 100 percent of cabinet seats—say, Denmark in 1978—the predicted impact on incarceration is about minus one percent.

These predictions are only illustrative, since they assume that all other variables in the equation are set at their means, which for any particular country they are not.
The models yield interesting results concerning the interactions of political power with institutional structures. Recall that hypotheses in this regard are two-sided: one scenario predicts that the effects of union and left party strength will be amplified when structural arrangements encourage political closure; the other predicts that political closure, by strengthening the national state’s bureaucratic authority over social policy, will reduce the influence of interest groups. Results regarding the union density effect emphatically support the second scenario. The distributions of the neocorporatism and centralization parameters $\gamma_{11}$ and $\gamma_{12}$ lean strongly positive, counteracting the negative influence of union strength. Contingencies involving left party dominance are quite different. The posterior mean for neocorporatism ($\gamma_{21}$) is negative, indicating that left party effects are amplified in countries with highly regulated labor markets. The posterior mean for state centralization ($\gamma_{22}$) lies close to zero, indicating no effect. These findings leave a bit of a puzzle. It is reasonable to find that unions, which are nonstate actors, are crowded out by the concentration and centralization of political authority, and that left parties, as direct auxiliaries of the state, become more potent under the same conditions. But why neocorporatism affects partisan influence, and polity centralization does not, is by no means clear.

Estimates for life-course effects are mostly as anticipated, but the models contain a few surprises. One surprise is the unequivocally negative impact of young male populations. Furthermore male school enrollments and homicide rates appear unrelated to incarceration rates. Effects of unemployment rates are positive, showing as expected that incarceration grows in recessionary economies. Confidence in this association is 100 percent. Evidence is strong also that higher rates of military enlistment discourage incarceration: when enlistment rates are two standard deviations above the mean, incarceration rates are reduced on average by about 14 percent. Welfare
effort and inflation have negative impacts, and while these effects may be substantively small they are between 89 and 94 percent certain.

We can use the posterior summaries to draw out the substantive implications of the macro-level effects. Drawing on model 1 in table 1, thus setting aside for the moment the possible influence of minority populations, figure 2 shows predicted mean (log) rates of imprisonment (country intercepts) and effects of union density and left party strength for four countries. These countries are chosen to represent the quadrants in figure 1: in Belgium, labor market regulation and state centralization are both above their means; New Zealand has unregulated labor markets and a highly centralized polity; Austria scores high on neocorporatism, but has a federalized polity; and Canada is low on both dimensions. The first panel shows that both macro-variables influence country means to some degree, but the impact of polity centralization dominates: net of other measured covariates, countries in the low/low quadrant (Canada) have the highest predicted rates of incarceration, and those in the low/high quadrant (New Zealand) or the high/high quadrant (Belgium) yield notably lower predicted rates. The second panel shows that the union density effect is contingent primarily on neocorporatism. The strongest negative effects of union membership are found in New Zealand and Canada, which share very weakly regulated labor markets but have widely differing polities. The predicted effects for Belgium and Austria are nil. Effects of left party strength, shown in the third panel, are clearly contingent on neocorporatism. A negative effect appears both powerful and credible in Austria and Belgium, the more corporatist countries; the plot suggests net positive effects in most liberal market economies, but that is hard to credit. Referring back to figure 1, a safer conclusion is that left party dominance inhibits incarceration everywhere but in the Anglo-American democracies.

— Figure 2 about here —
Sensitivity Analyses

In further tests I explored the sensitivity of these results to distributional assumptions and alternative measures. In one such test I estimated a model that is otherwise identical to model 1 in table 1, but under the prior expectation that the $\beta_j$ are Student’s-t distributed, $\beta_j \sim t(\hat{\beta}_j, \tau^2, 5)$.

Compared to the normal model, the model using the fatter-tailed $t$ distribution may yield more robust estimates by downweighting the contribution of countries with extreme parameter values (Seltzer, Wong and Bryk, 1996). This respecification made no difference in the results. In a cruder attempt to address the same issue, I omitted all observations from the U.S., which are most likely to have idiosyncratic influences. Again, results were consistent with those reported above.

Other models tested additional hypotheses that have been of interest in previous cross-national research. One set of tests attempted to push farther on the minority conflict argument by using two indicators of political discrimination against minority groups, one from the Minorities at Risk data and the other from Wimmer and Minn (2006). These measures are arguably more germane than the simple measure of minority population size, and because they are time-varying they are also more sensitive. Both showed clear associations with incarceration rates, but the associations are negative, suggesting that higher degrees of minority oppression yield lower levels of imprisonment. This is surely not a causal association; more likely it is an artifact of coincidental time trends: formal political discrimination declined in the latter half of the 20th century (Asal and Pate, 2005), even as incarceration rates rose in several countries in the sample. In any event, these findings cast some doubt on whether the minority population variable used here is a valid indicator of intergroup conflict. A final test involved partisan political effects. Some analyses of welfare spending suggest that center parties—particularly Christian Democratic parties that are prominent in

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6 Tables showing unreported results are available from the author.
7 I am grateful to Brian Min for sharing a copy of the Wimmer and Min data with me, and to Victor H. Asal for his advice on using the MAR data.
European countries with substantial Catholic populations—may play an important ancillary role to left parties in shaping a wide range of social policies (Esping-Andersen, 1990; Hicks and Misra, 1993; Hicks and Swank, 1992; Huber, Ragin and Stephens, 1993; Wilensky, 1981). I tested an indicator of the share of cabinet seats held by Christian Democratic parties (from Swank, 2002), and found no effect on imprisonment rates.

**Summary and Discussion**

The central theme of the opportunity structures model of imprisonment is that punishment practices are embedded in a wider array of institutional mechanisms that structure the allocation of life-course opportunities in modern societies. More specifically and substantively, I have argued that incarceration, like education and employment, is both a product of inequality and a means by which inequality is reproduced. Incarceration rates will therefore vary in accordance with the breadth and range of legitimate life-course opportunities, and more generally with societal capacities for managing inequality.

Empirical results support most, but not all, of the model’s predictions. Of the life-course variables, unemployment and military enlistments show strong effects, supporting the expectation that legitimate and illegitimate opportunities are inversely related. That argument is undercut somewhat by the finding that educational opportunity—arguably the most important source of mobility and legitimate identities—is unrelated to incarceration. The negative effects of welfare spending and inflation give added evidence that prisons are embedded in webs of social and macroeconomic policy. Given these demonstrated influences, it is interesting that the two supply-side variables in the model—the size of the young male population and homicide rates—show in one case a counterhypothesised effect, and in the other no association at all. The negative coefficient estimate for young males can probably be accounted for in terms of within-country demographic
trends: with the maturation of the post-WWII baby boom cohort, countries in the sample grew on average older at the same time prison populations were stable or rising. The null effect of homicide rates is not the last nail in the coffin of realist accounts of prison expansion, since it is always possible that better crime data would show different results. Still, to the degree that prison expansion is fueled by harsher punishment of victimless crimes, particularly drug offenses—as it surely has been in the U.S. and the Netherlands, two countries where growth has been most conspicuous—we should look to changing policies rather than changing criminal behavior for an explanation.

Finally, macro-level institutional effects operate in multiple ways. Neocorporatist labor market regulation and political centralization encourage political closure, enhancing the state’s ability to balance competing interests and resist populist demands for harsher and more exclusionary social policies. Results yield weak evidence of a negative main effect of neocorporatism, but stronger evidence that more centralized polities incarcerate their citizens at lower rates. Contrary to arguments that see the state primarily as a resource for non-state actors, political closure seems not to amplify the voices of labor unions; on the contrary, it reduces their leverage on social matters by strengthening the state’s policy monopoly. Findings are the opposite with regard to left parties: their influence seems to reach critical mass only under some degree of neocorporatist labor-market regulation.

This article began by identifying two challenges to research on incarceration trends in modern societies: the first is to synthesize a diverse array of arguments, many of which speak past each other, into a coherent theoretical account; the second is to apply an analytical model that attends to the profound cross-national differences among polities and criminal justice institutions, but is nonetheless capable of yielding general inferences. My theoretical strategy was to locate criminal punishment in the n-dimensional opportunity space through which individuals wend their
lives, and to offer hypotheses about how the relative distribution of legitimate and illegitimate opportunities within that space affects rates of punishment. The result is not, except in this application, a model of punishment; it is rather a model of social organization that is animated by quite general ideas about the interplay of demography and institutions. Because the model emphasizes the reciprocal interdependence of institutional fields and of the life paths under their jurisdiction, it implies also that criminal punishment is consequential for education and labor markets. If that is so, comparative research on inequality and the life course ignores the prison at its peril.

The analysis conforms to the expectations of the opportunity structures model and supports many of its specific predictions. But important questions remain, and here I will mention two that seem most pressing. First, it is important to ask whether changes in the global political economy have led to a temporal shift in the causal logic of imprisonment. Many scholars have argued that globalization has undermined Keynesian regimes of economic regulation and social protection (see Garrett, 1998 for a review and critique), and some research finds epochal social policy realignments after the 1973-74 oil shock (Hicks and Misra, 1993; Hicks and Swank, 1992). Wacquant (2001, 2009) has argued more specifically that globalization has encouraged the export of American-style penal policy since the 1970s. These arguments imply shifts in penal regimes—causal heterogeneity operating over time rather than across countries—a problem that can be addressed using Bayesian change point methods (Western and Kleykamp, 2004). A second question is whether the status of subaltern groups—immigrants, native populations, and other racial-ethnic minorities—affects incarceration trends in ways that are not apparent from the rough measures used here. Available evidence suggests that such groups are overrepresented among prison inmates in all Western countries.\footnote{This is based partly on my own reading of published statistics. See Wacquant (1999) for a more systematic discussion.} Blau’s (1994) theory of opportunity structures suggests that majority-minority relations
are more likely to lead to conflict—including, perhaps, higher incarceration rates—when outsider status is coincident with high levels of segregation and concentrated disadvantage. Presently available cross-national data do not permit systematic comparative analysis of this issue, but detailed analysis within one or a few countries would likely be fruitful.
References


Figure 1. Countries in the Sample by Neocorporatism and State Centralization
Figure 2. Predicted Mean Imprisonment Rates and Effects of Union Density and Left Party Strength for Four Countries, Conditional on Neocorporatism and State Centralization

a. Mean (log) Imprisonment Rate

b. Union Density

c. Left Party Strength
Table 1. Hierarchical Model Results: Bayesian Estimates of the Effects of Selected Variables on Imprisonment Rates

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th>p &lt; / &gt; 0</th>
<th>Model 2</th>
<th>p &lt; / &gt; 0</th>
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</thead>
<tbody>
<tr>
<td>( \gamma_{00} ) Intercept</td>
<td>4.226</td>
<td>1.000</td>
<td>4.227</td>
<td>1.000</td>
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<tr>
<td>Neocorporatism</td>
<td>-0.105</td>
<td>0.670</td>
<td></td>
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</tr>
<tr>
<td>( \gamma_{01} ) Minority population share</td>
<td></td>
<td></td>
<td>0.118</td>
<td>0.690</td>
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<tr>
<td>State centralization</td>
<td>-0.192</td>
<td>0.780</td>
<td>-0.183</td>
<td>0.780</td>
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<td>Union density</td>
<td>-0.372</td>
<td>0.980</td>
<td>-0.376</td>
<td>0.980</td>
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<tr>
<td>Neocorporatism</td>
<td>0.696</td>
<td>0.960</td>
<td>0.669</td>
<td>0.950</td>
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<td>State centralization</td>
<td>0.426</td>
<td>0.870</td>
<td>0.396</td>
<td>0.850</td>
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<tr>
<td>Left party cabinet share</td>
<td>-0.008</td>
<td>0.730</td>
<td>-0.007</td>
<td>0.720</td>
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<tr>
<td>Neocorporatism</td>
<td>-0.047</td>
<td>0.940</td>
<td>-0.051</td>
<td>0.940</td>
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<tr>
<td>State centralization</td>
<td>-0.005</td>
<td>0.530</td>
<td>-0.010</td>
<td>0.590</td>
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<tr>
<td>Percent young males</td>
<td>-0.081</td>
<td>0.900</td>
<td>-0.082</td>
<td>0.920</td>
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<tr>
<td>Unemployment rate</td>
<td>0.121</td>
<td>0.990</td>
<td>0.119</td>
<td>1.000</td>
</tr>
<tr>
<td>Male 2(^{\text{a}}) and 3(^{\text{a}}) enrollment rate</td>
<td>0.011</td>
<td>0.570</td>
<td>0.013</td>
<td>0.600</td>
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<td>Military enlistments</td>
<td>-0.143</td>
<td>0.980</td>
<td>-0.148</td>
<td>0.980</td>
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<tr>
<td>Welfare effort</td>
<td>-0.065</td>
<td>0.930</td>
<td>-0.063</td>
<td>0.890</td>
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<td>Inflation</td>
<td>-0.026</td>
<td>0.940</td>
<td>-0.026</td>
<td>0.940</td>
</tr>
<tr>
<td>Homicide rate</td>
<td>0.024</td>
<td>0.600</td>
<td>0.029</td>
<td>0.610</td>
</tr>
<tr>
<td>Variable</td>
<td>Description</td>
<td>Source</td>
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<td></td>
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<tr>
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<td>-----------------------------------------------------</td>
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<tr>
<td>Imprisonment rates</td>
<td>Inmates per 100,000 population</td>
<td>Various (see text)</td>
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<td>Unemployment rates</td>
<td>Unemployed persons as percent of total working population</td>
<td>OECD (1999, 2001)</td>
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<td>Welfare effort</td>
<td>Social expenditure as percent of GDP</td>
<td>OECD (2004)</td>
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<td>Inflation</td>
<td>Proportional change (from t-1 to t) in GDP deflator</td>
<td>Heston, Summers, and Aten (2006)</td>
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<td>Male school enrollments</td>
<td>Males enrolled in secondary and tertiary schools as percent of male population 15-24</td>
<td>UNESCO (1955-90), UNESCO Institute for Statistics Data Centre (2009)</td>
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<td>Military enlistments</td>
<td>Active-duty military personnel as percent of total population</td>
<td>Faber (1989), IISS (1983-2001)</td>
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<td>Union density</td>
<td>Union members as percent of total labor force</td>
<td>Visser (2009)</td>
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<td>Left party dominance</td>
<td>Proportion of total cabinet seats held by left parties (average from t-2 to t-1)</td>
<td>Swank (2002)</td>
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<td>Neocorporatism</td>
<td>Hicks-Kenworthy wage coordination measure</td>
<td>Hicks and Kenworthy (2002)</td>
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<td>State Centralization</td>
<td>Hicks-Swank factor scale</td>
<td>Hicks and Swank (1992)</td>
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<td>Minority population share</td>
<td>Percent minority</td>
<td>Minorities at Risk Project (2005)</td>
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<tr>
<td>Homicide rates</td>
<td>Number of homicides per 100,000 population</td>
<td>World Health Organization (1951-64, 1962-88), WHO Regional Office for Europe (2009)</td>
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