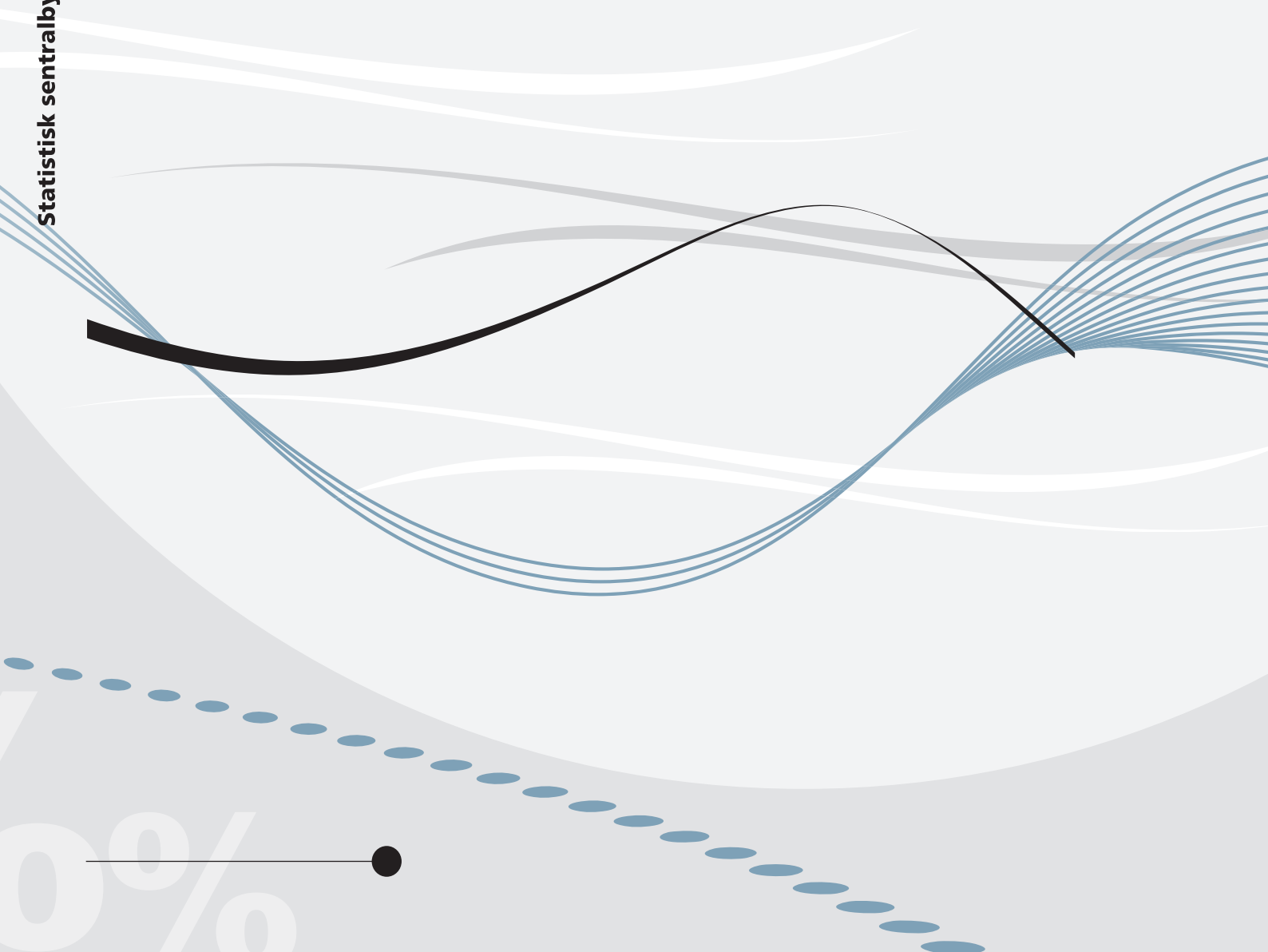Statistics Norway

Statistisk sentralbyrå

Torbjørn Skardhamar and Jukka Savolainen

Does employment contribute to desistance?

Offending trajectories of crime-prone men around the time of job entry

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Abstract:
Influential perspectives in life course criminology maintain that transitions to adult social roles play an important role in the termination of criminal careers. Along with marriage, employment is frequently associated with potential to assist in the desistance process. At this time, the empirical status of these claims remains contested. Although several studies report negative associations between within-individual changes in employment and offending, the evidence regarding time-order remains limited to anecdotal observations from qualitative data. The present investigation took advantage of administrative data sources available in Norway. Focusing on a sample of criminally active males who became employed during 2001-2006 (n=1,063), general and group based estimation techniques were used to examine monthly changes in offending trajectories around the point of job entry. Results show that most offenders had desisted prior to the employment transition, and that employment entailed marginal to no further reductions in criminal behavior. We were able to identify a group of offenders who became employed during an active phase of the criminal career; and these individuals did experience substantial reductions in criminal offending following job entry. However, this trajectory describes only about 2% of the sample. Overall, the pattern observed in this research suggests that employment, as a naturally occurring event, is best viewed as a consequence rather than a contributing cause of criminal desistance.

Keywords: Desistance from crime, employment, turning points

Address: Torbjørn Skardhamar, Statistics Norway, Research Department. E-mail: ska@ssb.no

Jukka Savolainen, University of Omaha, Nebraska, School of criminology and criminal justice. E-mail: jsavolainen@unomaha.edu

| **Discussion Papers** | comprise research papers intended for international journals or books. A preprint of a Discussion Paper may be longer and more elaborate than a standard journal article, as it may include intermediate calculations and background material etc. |

Sammendrag

Toneangivende perspektiver i kriminologisk teori innebærer at overganger til sentrale statuser i voksen alder spiller en viktig rolle i å endre en påbegynt lovbruddskarriere. Særlig giftermål og sysselsetting er ofte satt i sammenheng med reduksjon i lovbruddsaktivitet. Selv om det er en negativ sammenheng mellom sysselsetting og kriminalitet er årsaksretningen kontroversiell, og blant annet hva som skjer først er lite belyst. Denne studien benytter norske registerdata til å fokusere på et utvalg menn med en ikke uvesentlig lovbruddshistorie bak seg og som får en jobb i perioden 2001-2006 (N=1,063). Resultatene viser at det var en vesentlig reduksjon i kriminalitet blant disse personene i perioden *før* de fikk jobb, og at det skjedde lite endring i kriminalitet etterpå. Ved bruk av latent-klasse modeller fant vi en sub-populasjon av personer som fikk jobb i en aktiv periode i sin lovbruddskarriere, men denne gruppen utgjorde kun to prosent av utvalget. Dette indikerer at sysselsetting i hovedsak er mer en konsekvens av redusert kriminalitet enn en årsak til det.

Introduction

The relationship between employment and offending is an enduring topic in sociological and economic investigations of crime (Bonger 1916; Bushway 2011; Cantor and Land 1985; Fagan and Freeman 1999). The focus of the present study is on the role of employment in criminal desistance, defined as the process whereby active offenders reduce and eventually terminate their criminal careers. Sociological literature on life course transitions suggests three plausible ways in which getting a job might be related to declining rates of offending.

First, the *turning point hypothesis* treats employment as an exogenous event with the potential to set in motion the process of desistance (Sampson and Laub 1993; Laub and Sampson 2003). According to this hypothesis, desistance is viewed as an inadvertent response to objective changes in one's life situation. Laub and Sampson (2003: 278-9) use the term *desistance by default* to describe this outcome: "Many men made a commitment to go straight without even realizing it. Before they knew it, they had invested so much time in a marriage or a job that they did not want to risk losing their investment." Although Laub and Sampson recognize the role of individual agency, they maintain that "most offenders desist in response to structurally induced turning points that serve as the catalyst for sustaining long term behavioral change" (Laub and Sampson 2003: 147).

Second, the turning point hypothesis has been qualified by scholars who view subjective change as a precondition for successful exit from a criminal lifestyle (Giordano, Cernkovich, and Rudolph 2002; LeBel et al. 2008; Maruna 2001). For example, Bushway and Reuter (1997) have argued that employment is unlikely to trigger desistance in the absence of true commitment to "go straight." Giordano and colleagues have proposed a theory of cognitive transformation which – extending the investment analogy – argues that "actors themselves must recognize the need to start saving and develop a high level commitment to the plan" (Giordano, Cernkovich, and Rudolph 2002: 1056). According to this framework, life course transitions are unlikely to result in *lasting* changes in behavior without strong personal desire to undertake a conversion effort. However, in order for these intentions to materialize it may be important to find tangible "hooks for change" in the everyday environment. Thus, under this theory, employment has the potential to sustain and reinforce a process of desistance already in progress.

Third, employment may be conceived as a *consequence* of desistance rather than its cause; an adult transition that follows the normal but age-varying process of "settling down and aging out" (Massoglia and Uggen 2011). Adults who persist in offending face serious obstacles in the labor market as a result

of their criminal lifestyle (Pager 2003). Moreover, as observed by Massoglia and Uggen (2011), active offenders are unlikely to regard themselves as capable of taking on social roles associated with mature adulthood. The settling-down perspective goes one step further from the hooks-for-change hypothesis in that it requires sustained behavioral transformation, not mere psychological readiness, as a precondition for successful labor market transition.

Each of these pathways assumes a negative longitudinal association between employment and offending: the average rate of offending is assumed to be higher during the pre-employment period under each trajectory. As described in Figure 1, the main point of contention has to do with the *timing* of employment in this process. The turning point hypothesis predicts reductions in offending following employment. The hooks-for-change hypothesis predicts that employment follows the onset of desistance but may further contribute to the process. Finally, the settling-down hypothesis predicts that employment follows a period of sustained desistance with no appreciable consequences for the offending rate.

Figure 1 Three ideal-typical trajectories derived from theory
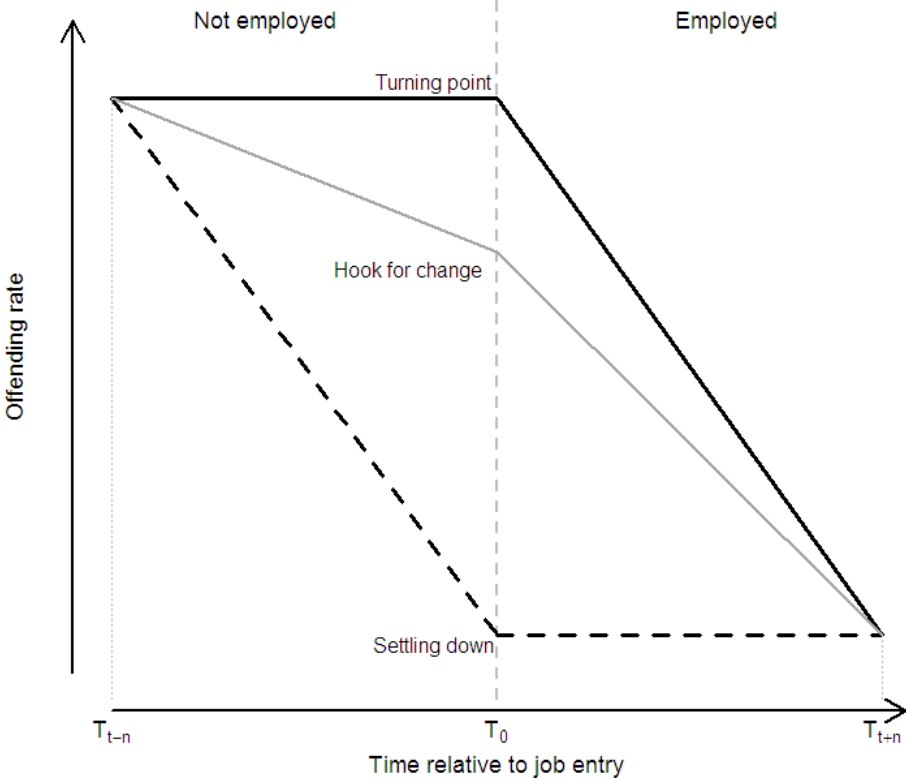
Although there is ample (albeit inconsistent) evidence regarding the *association* between employment and desistance, as we will show below, evidence on *time order* is lacking, limited mostly to

conflicting accounts from qualitative studies of retrospective narratives. The purpose of the present investigation is to examine this topic quantitatively using administrative data on monthly offending and employment rates from Norway. Specifically, we address two critical issues that have received limited attention in prior studies of criminal desistance: (1) the timing of employment entries in the criminal trajectory and (2) the shape of the criminal trajectory following the point of transition to employment.

Prior research

The turning point hypothesis was introduced in the monograph *Crime in the Making* as part of the age-graded theory of informal social control (Sampson and Laub 1993). The empirical research presented in this study is based on secondary analysis of males born in Boston around The Great Depression and followed through age 45 ("The Glueck Men"). The sample consists of delinquent boys from reform schools and a control group representative of public school students. The primary goal of the study was to demonstrate the continued salience of social bonds across the adolescent and adult life course. Thus, Sampson and Laub (1993) report results showing that, for example, having a stable job at ages 17-25 reduced the risk of criminal offending at ages 25-32. To minimize heterogeneity in criminal propensity, the analyses were conducted separately for the delinquent and the control groups. Second, the effects of adult life circumstances were estimated in the presence of rigorous controls for cognitive ability, anti-social traits, adolescent delinquency and arrest frequency, and young adult socio-economic risk profile. The fact that *job stability* predicted desistance over and above these antecedents was interpreted as support for the salience of labor market bonding.

A critical examination of Sampson and Laub's (1993) job stability index suggests that it may not qualify as a pure measure of labor market bonding. One of three items included in this construct is called "work habits". It indicates the level of reliability and effort in job performance and the degree to which the subject was considered "an asset to the organization" according to the employer (Sampson and Laub 1993: 144). A proponent of propensity-based explanations might argue that this is essentially an adult measure of individual traits. As noted by Uggen (2000, 531): "If employment effects are conditional on good work habits, the putative "job effects" are tainted by "person effects" or pre-existing worker characteristics" (see also Wright and Cullen 2004).

Subsequent efforts to replicate employment effects with similar methods have produced mixed results. Using contemporary data on juvenile offenders in the United States, Giordano, Cernkovich, and

Rudolph (2002) find no association between job stability and offending rates. This observation has led them to question the degree to which Sampson and Laub's conclusions can be generalized beyond their sample of white males maturing during the post-war period (Giordano, Cernkovich and Rudolph 2002: 990-1064). On the other hand, studies using nationally representative data from contemporary United States (Wright and Cullen 2004) and Finland (Savolainen 2009) report longitudinal evidence of reduced offending as a function of labor market attachment.

Studies of within-individual change

Growing recognition of the limits associated with standard regression techniques has resulted in the proliferation of studies focused on within-individual changes over the life course (Siennick and Osgood 2008). Comparing person-specific offending rates before and after employment transitions is a powerful way to reduce spuriousness because, under this design, each subject essentially serves as his or her own "control case." Of course, the problem of unobserved heterogeneity is still present with respect to *time-varying* characteristics, such as cognitive transformation and openness to change.

Horney, Osgood, and Marshall (1995) used the life history calendar method to measures monthly changes in the "local life circumstances" in a sample of recidivistic offenders over a period of three years. In this research, within-individual change in employment status was unrelated to all measures of criminal activity except one. Contrary to expectations, the odds of property crime were *higher* during periods of employment. The authors note that their measure of employment covers jobs of any variety, including temporary employment in part-time work. It is possible that for crime-prone individuals these settings present superior opportunities for theft and other property offenses.

Another study examined a sample of male parolees using archival data covering a period of seven years (Piquero, MacDonald, and Parker 2002). Across most model specifications, full-time employment was unrelated to the risk of arrest. As the only exception, employment was found to reduce the risk of arrests for violent crime among white parolees. Following a similar approach, Griffin and Armstrong (2003) examined a sample of drug-abusing female probationers. The results from this analysis indicate substantial inhibiting effects of employment on drug dealing but not on other criminal activities.

Ten years after *Crime in the Making*, Laub and Sampson (2003) published a follow-up study of the Glueck men. The quantitative part of this research estimates the effects of life course transitions following a methodology similar to the one used by Horney, Osgood, and Marshall (1995). In order to

enable repeated measurements of life circumstances, Laub and Sampson (2003) treat marriage and employment as dichotomous time-varying states. This is a notable change from their original study in that the new results ignore variation in the quality of social bonds. Some of the analyses are based on data collected with retrospective life-history calendars collected from 52 individuals. This source, which covers ages 17-70, is supplemented by an analysis of the delinquent subsample (n=419) from the original Glueck data file (ages 17-32). In each type of analysis, the results show systematic and strong evidence of reduced offending during periods of employment.

Finally, a recent study by van der Geest, Bijleveld, and Blokland (2011) examined delinquent offenders released from juvenile facilities in the Netherlands, and followed them through early adulthood. The results show evidence of reduced offending during periods of employment. Moreover, the strength of the association was found to depend on employment quality: individuals hired directly by the employer reduced their offending levels more than those hired through an agency. According to the authors, this refers to a distinction between regular vs. temporary/seasonal employees. Interestingly, job stability – measured as the number of years employed without interruptions – was unrelated to desistance.

Experimental evidence

By failing to adjust for unobserved heterogeneity in *time varying* characteristics, observational studies of within-individual change leave open the possibility that a personal decision to "go straight" *precedes* change in labor market status. A research design where randomly selected offenders are provided with employment opportunities is an effective way to overcome this limitation. Moreover, an experiment that delivers "good things" (Laub, Nagin, and Sampson 1998) through an exogenous process seems particularly faithful to the notion of turning points as chance events.

In general, results from employment experiments have been disappointing: "the most defensible conclusion from experimental evaluations of work programs is that the programs have a dismal record of jointly improving employment outcomes and of lowering recidivism" (Bushway and Apel 2012: 28). Visher, Winterfield and Goggeshall (2005) conducted a meta-analysis of the effects of community-based employment programs on recidivism. Following the protocol endorsed by the Campbell Collaboration, they identified eight studies with appropriate samples, measures, and a sufficiently rigorous experimental design. The mean effect size calculated from this set of studies was very small (.03) and statistically not significant, suggesting that employment programs do not reduce

recidivism. Indeed, only one of the studies included in the meta-analysis reported a statistically significant negative effect on recidivism (Uggen 2000).

Uggen's (2000) analysis of data from the National Supported Work Demonstration Project suggests that employment may serve as turning point among individuals matured above the peak ages of criminal offending. Although he did not find evidence of an employment effect in the sample at large, in the age group 27 or older the rate of recidivism was substantially lower in the treatment vs. the control group. The age-specific nature of this effect appears most compatible with the hooks-for-change concept described in the theory of cognitive transformation (Giordano, Cernkovich, and Rudolph 2002). Older offenders may respond more positively to employment because they have reached a point where they are more open and motivated to change (Bushway and Reuter 1997; Siennick and Osgood 2008).

Qualitative research

Laub and Sampson (2003) argue that most men in the Glueck sample desisted as an inadvertent and gradual response to changes in objective life circumstances ("desistance by default"). The specific evidence in support of this claim comes from life history narratives provided by 52 men traced from the original sample of delinquent boys who were interviewed around age 70. These accounts suggest that stable employment is one key characteristic that distinguished desisters from those who persisted in crime. As one of the Glueck men explains: "Being able to go to the store and buy something and not have to steal it … that's important in life … what changed my life is work" (Laub and Sampson 2003: 139). While some of the men pointed to stabilizing influence of a "steady pay check", others encountered pro-social co-workers or supervisors who acted as effective agents of social control. Shover's (1996) research on persistent thieves offers independent corroboration of the capacity of work to serve as a turning point: "The guy liked me from the jump. And that's when I hooked up with him. And I went straight a long time *without the intentions* of going straight" (Shover 1996: 127; emphasis in original).

Other studies of qualitative life-history data have challenged the turning point hypothesis (Carlsson 2012; Farrall and Bowling 1999; Maruna 2001). Operating from the cognitive transformation framework, Giordano, Cernkovich, and Rudolph (2002: 1033) report that both male and female respondents "were very unlikely to build a story of change around the development of a rewarding career, and only a few focus heavily on stable employment". Thus, employment does not even qualify as a salient hook-for-change, let alone a turning point in the sense of the age-graded theory. Maruna's

(2001: 25) ethnographic research on socio-economically marginalized recidivists in England concludes that it would be unrealistic to expect employment to trigger self-transformation among most addicts and offenders.

Timing is everything

Across each methodological approach, studies of employment and desistance yield mixed results. First, the evidence regarding the longitudinal *association* between employment and offending is inconsistent. Although several studies find strong evidence of a negative association, other studies report either limited or no association; and one study found a *positive* association between employment status and property crime (Horney, Osgood, and Marshall 1995). The evidence regarding the *causal ordering* of employment and desistance is particularly limited. In terms of analytic rigor, experimental research offers the most stringent test of causality. However, from the perspective of the hypothesized processes, employment programs targeting offenders may have low external validity: instead of delivering realistic opportunities for sustained behavioral change, these jobs may be perceived as short-term punishments by the client populations (Maruna 2001; Uggen and Wakefield 2008).

The evidence in support of "desistance by default" is limited to qualitative analysis of life-history narratives (Laub and Sampson 2003; Shover 1996). While informative, such studies are less inter-subjective than results based on, say, quantitative analysis of independently validated statistics. For example, Carlson (2012) suggests that Laub and Sampson's findings may be an artifact of demand bias, i.e., the result of asking the questions in a manner geared towards eliciting recollections of "turning points." Moreover, other qualitative studies following the same approach have not embraced the causal interpretation proposed by the turning point hypothesis (Giordano, Cernkovich & Rudolph (2002); Maruna 2001). As a major shortcoming in the literature, we are not aware of a single quantitative study that explicitly models the time-order between employment, as a naturally occurring life event, and criminal desistance.

In terms of causal analysis, methods that focus on within-individual change represent a major improvement over regression based adjustments. However, it is important to understand that, at the very best, these models can establish a *contemporaneous* association between the state of employment and the rate of criminal offending. A negative association of this description is open to multiple interpretations. To appreciate this point, consider the trajectory presented in Figure 2. It reflects the life history of the eponymous subject of the book *The Other Wes Moore* (Moore 2010). Worn down by a long and intense career in drug dealing and violent crime, Wes enrolled in *Job Corps*, one of the employment programs

included in the meta-analysis by Visher, Winterfield and Goggeshall (2005). During this time, he leaves his criminal ways behind and completes the program with honors. After a relatively short spell working in menial secondary-sector jobs, he grows frustrated with his economic prospects and decides to go back to cooking and selling crack cocaine – a path that eventually led to imprisonment.

Figure 2 Hypothetical trajectory suggested by "The Other Wes Moore"

In this situation, transition to employment is best understood as a *consequence* of an individual's decision to go straight, and is clearly not contributing to desistance. However, from a point of view of within-individual change, this trajectory generates a strong negative association between employment and crime because the post-employment period is associated with a major reduction in the *average rate* of offending. Thus, although the shape of this trajectory contradicts the turning point hypothesis (see Figure 1), the *magnitude* of average individual change is compatible with that interpretation. The purpose of this illustration is to show that *strong evidence of within-individual decline does not qualify as critical support for the employment effect on desistance*. An empirical result of this kind can disguise a variety of criminal trajectories, including ones that are inconsistent with a causal interpretation. This observation underscores the need to pay close attention to the timing of change in offending vis-à-vis the employment transition.

The present study

Research questions

Given our interest in the timing of employment in the criminal trajectory, the sole focus of the present investigation is on *criminally active individuals who end up becoming employed* at some point in their criminal career. Specifically, we address two critical issues that have received limited attention in prior research on criminal desistance: (1) the timing of employment transitions in the criminal trajectory and (2) the shape/direction of the criminal trajectory following the employment transition.

We examine these topics in two complementary ways. First, we estimate the average criminal trajectory around the point of job entry. These results capture *the general pattern* observed in the sample as a whole. Second, we use *group-based* modeling techniques to decompose the average trend into a set of trajectories representing the more commonly occurring pathways. Allowing for heterogeneity in the relevant processes, the purpose of this approach is to tease out evidence that might correspond to the theoretically proposed patterns. For example, informed by the turning point hypothesis, we seek to determine how typical it is for active offenders to become employed *before* measurable signs of decline in their criminal trajectories. As to the consequences of employment, we examine if the impact of employment on desistance depends on its timing in the criminal trajectory. The hooks-for-change argument suggests that employment is unlikely to promote enduring desistance unless preceded by an identifiable reduction in offending – understood as a signal for readiness to change.

Data and measures

We use data from administrative registers provided by Statistics Norway. This source permits creation of data files for research purposes through merging individual-level information from a large variety of interlinked government data bases. We combine the following administrative registers: From the crime statistics on investigated offences we get information on all solved cases with a legal decision against a perpetrator which includes information on each single offence and the date committed, and information on employment spells are gathered from the employer registry. To handle censoring we gather information on deaths and emigration. For our study, these data sources cover the period 1992 through 2009. In addition, we collect information from the crime statistics on all imprisonment spells (including remand), but the imprisonment records were only available from 2001 through 2008. For the period before 2001, imprisonment spells are approximated by data on unconditional prison sentences.

Although the resulting data are limited to what is available in these records, this approach has important advantages over survey based panel data (Lyngstad and Skardhamar 2011). First, access to *total populations*, as opposed to samples, makes it possible to study marginal and hard-to-reach subpopulations without compromising statistical power. Second, as these sources cover the entire resident population, problems with *missing data* are minimal. In particular, attrition is limited to migration and death, events than can be easily controlled in the data. Finally, because these sources track population events *continuously*, the measures are not limited to subjective information provided at discrete intervals as is typical in standard panel designs. This property of the data is particularly valuable in efforts to study short-term changes in individual outcomes (Siennick and Osgood 2008, 167-8).

Sample characteristics

Adhering to the scope conditions of the turning point hypothesis, this investigation is limited to individuals "who reach some reasonable threshold of frequent and serious offending" (Laub and Sampson 2003, 22). Thus, as the first criterion, our sample consists of men convicted of a serious (felony level) criminal offense a *minimum of five times* during the period 1992-2000, with the additional requirement that *at least one* of these incidents must have occurred later than 1998. Second, in order to capture criminal trajectories before and after the employment event, we focused on offenders with marginal labor market status prior to a transition to more stable employment. Accordingly, we selected individuals who (*a*) had not been employed for more than six months in *any* of the years in the period 1998-2000, and (*b*) were jobless in December 2000 (the month before we start tracking new employment events). Of this group of crime-prone men with unstable employment history (n=6,016), we qualified for *the final analytic sample* those who became employed in a job lasting six months or longer between January 1, 2001 and December 31, 2006 (n=1,063).[1]

To clarify our research design, Figure 3 presents a visual summary of the sampling criteria and observational period. In basic terms, the sample consists of socioeconomically marginalized men who become employed for a period of six months or longer following a lengthy criminal career. The purpose of the analysis is to examine monthly changes in the criminal behavior of these individuals, both before and after the employment transition.

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[1] The age-graded theory of social control assigns transformative potential to "stable" employment (Sampson and Laub 1993). Although the meaning of this term remains vague, it is clear that a job lasting a very short time – say, less than a month – is not expected to serve as a turning point. On the other hand, we find it problematic to define stable employment as a long-term job, i.e., something that that lasts for several years. It would seem that a sample of that description would include very few non-desisters *by design*.

Figure 3 Summary of the sampling criteria and the observational period
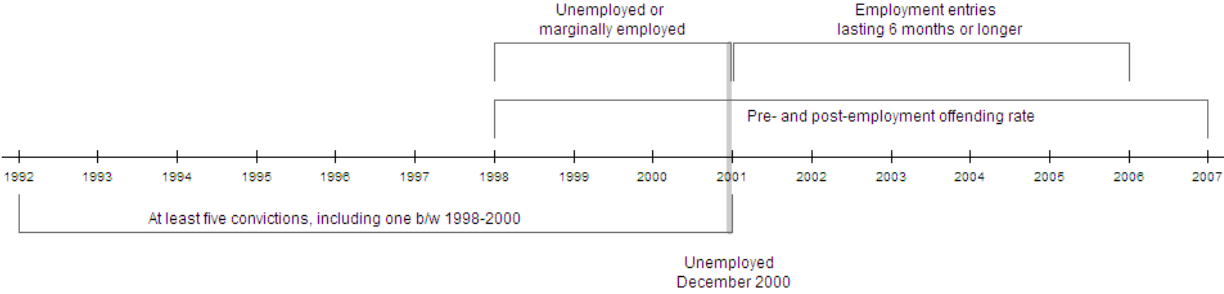
We realize this design involves a series of somewhat arbitrary decisions. For example, one may question our operationalization of "frequent and serious offending" or "stable employment." In order to ensure our findings are not sensitive to these decisions, we re-examined the data using several alternative specifications. Thus, we considered transitions to employment lasting a minimum of 3 as well as 12 months, and considered sample definitions based on criminal histories of varying intensity. These decisions influence the sample size, but substantive results (see appendix C) remained the same across each specification.

Measures

Criminal behavior is measured with a dummy variable indicating whether at least one offense was recorded as committed in a given month (1=yes, 0=no). We included incidents classified as felonies, leaving out misdemeanor level offenses consisting primarily of shoplifting and traffic violations. Although these data reflect offenses resulting in a criminal justice sanction, the information on timing is based on the date of the offense, not date of conviction.

The monthly data on employment status were obtained from the national employee registry. This source documents all employer-employee relationships in the private and public sector but does not include data on self-employed individuals.[2] Although this is a limitation, we believe the rate of self-employment to be exceedingly low in this high-risk sample. As with offending, monthly employment status is measured as a dichotomy (1=yes, 0=no) on the first day of each month.

Our control variables include age at job entry, period (in annual units), and season of the year (winter, spring, summer, and fall). Fluctuations in the job market are captured by the period and season variables.

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[2] Self-employed can be identified through the tax register, but then only as yearly measures.

Censoring

Individuals who died or emigrated during the observational period were censored from the data following these events. Periods of incarceration are excluded from the calculations of time-at-risk.[3] To ensure that each subject contributed observations to pre- and post-employment trajectories, the sample was limited to individuals residing in Norway for a minimum of 12 months before and after the employment transition.

Methods of estimation

General patterns

The data conform to a panel structure in which persons are observed up to 36 months *before* and 36 months *after* the employment transition. In order to capture changes in the offending rate relative to the point of job entry, we created a variable TIME to denote the number of months before/after the month of the employment event. Depending on the date of job entry during the observational period, TIME ranges from -36 to +36. Those who became employed in December 2006 contribute a maximum of 12 months to the post-employment period, as 2007 is the final year of tracking.

The parameters of the TIME variable capture the probability of offending in that particular month. In order to estimate changes in monthly offending levels with maximum accuracy, we did not want to impose a particular functional form (e.g., linear or curvilinear) on the TIME variable. Accordingly, TIME is specified as a nonparametric smoothing spline in the framework of generalized additive models (GAM), an extension of generalized linear models where the linear predictor involves a sum of smooth functions of covariates (Wood 2006). Appropriate for the present study, GAM extends to random effects models for panel data where the outcome for person *i* at time *t* is expressed as:

$$(1) \qquad g\left(\mu_{it}\right) = \eta_i + X_{it}^{*}\theta + f\left(TIME_{it}\right),$$

where *X* represents a vector of parametric terms with corresponding parameters *θ, which in our case is calendar age, calendar year and the season of the year*, *f* is a smoothing function over the covariate

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[3] The accuracy of the records measuring the length of incarceration varies over the observational period. Exact information on the number of days spent in prison is not available until 2001 (see appendix for details). To examine the consequences of this limitation, we re-examined the data excluding individuals receiving a sentence of incarceration during 1998-2000, and focused on employment events taking place in 2002 or later. The results from these analyses replicated the pattern observed in the full sample (available from authors).

TIME,[4] and the outcome variable μ_{it} follows some exponential family distribution (Wood 2006). In our case we specify a linear probability model, but checks using logit models yielded substantively identical results.[5] The parametric terms behave as in ordinary regression models. The term η_i refers to the individual-specific intercept following a normal distribution with variance σ_i to be estimated.[6] Our analysis is focused on estimating the TIME function. The results are presented as plots of predicted values at the sample mean for all covariates.[7]

Group-based patterns

The general patterns observed in the data may conceal substantial heterogeneity in levels of criminal activity preceding the employment transition. In particular, it is possible for each of the theoretically proposed trajectories to command significant presence in the data. In order to allow for evidence of this kind to emerge, we examined changes in *post-employment* offending rates among different *pre-employment* criminal trajectory groups. We identified the pre-employment trajectories using semi-parametric group-based modeling (SPGM) to construct latent trajectory groups for the 36 months *preceding* the employment event. In SPGM, the time-related variable is typically specified as a polynomial up to a fourth degree, and this polynomial varies over the latent classes so that the model can be written as:

$$(2) \qquad \mu_{it} = \beta_0^g + \beta_1^g TIME_{it} + \beta_2^g TIME_{it}^2 + \beta_3^g TIME_{it}^3 + \beta_4^g TIME_{it}^4,$$

where the superscript *g* denotes the latent classes. The number of latent classes is determined by comparing alternative models using the Bayesian information criterion (BIC), and the assignment of individuals in latent classes is based on posterior probabilities obtained from the best-fitting model (Nagin 2005).

Note that, in departure from standard applications of this method, we use SPGM only as a heuristic device to identify the most common patterns of criminal trajectories *prior to job entry*.[8] To examine

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[4] The type of smooth base is thin plate splines (Wood 2006: 154).

[5] Although the outcome is a dummy variable, we specified a linear model for practical reasons. GAM with logit-link and random effects are computationally intensive and therefore burdensome to estimate with standard computers. In our data, this option failed to converge when applied to our most complex model (presented in Figure 6). For all the other models, the linear and logit models yielded almost exactly identical predicted values. We report the linear models throughout.

[6] The models are estimated using *R* (R Development Core Team 2012) and the package gamm4 (Wood 2011).

[7] The nonparametric smoothing does not have a simple functional form with parameters to interpret. For example, there are no slope parameters to indicate average change in the outcome by a one unit change in the predictor. Results from GAMs are usually presented as plots of predicted values, and we follow this convention here (Wood 2006).

[8] Moreover, we make no claim that these groups represent truly distinct groups and the true latent distribution might very well be continuous.

group-level differences in the consequences of the employment transition, we allow post-employment trajectories to vary by pre-employment group assignment.
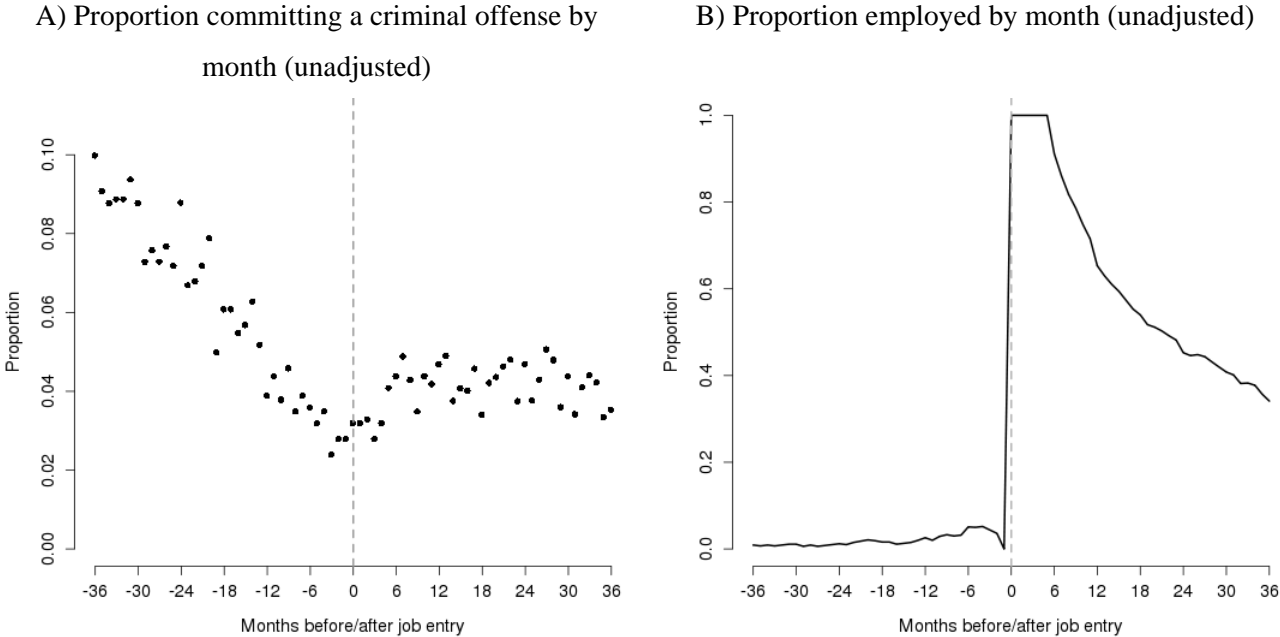
We then estimate the GAM model (1) as before, but letting the TIME function vary by latent class so that the model becomes: $g\left(\mu_{it}\right) = \eta_i + X_{it}^{*}\theta + f\left(TIME_{it}\right)G_g$, where G is the assigned latent class from the SPGM analysis. Using this strategy, the 36 months leading up to employment will be determined mainly by the latent classes generated by the group-based model, while the post-employment criminal trajectories are estimated without parametric constraints. In short, this approach yields the average trajectory for the entire observational period conditional upon a person's criminal career *prior to* job entry.

Findings

Descriptive statistics

At the point of employment transition, the average age of the men in this sample was 34.6 years (SD=4.6). The dates of job entry were evenly distributed over the observational period. The average number of felony convictions was 24.4 (SD=49.9; median=14) in the period 1992-2000 and 9.5 (SD=41.4, median=5) in 1998-2000.

Figure 4 Descriptive statistics of offending and employment outcomes

A) Proportion committing a criminal offense by month (unadjusted)　　　B) Proportion employed by month (unadjusted)

Note: The vertical dotted line at TIME=zero indicates the month of job entry.

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Panel A of Figure 4 describes the unadjusted (except for time-at-risk) monthly offending rates before and after the employment event for the sample as a whole. Although we observe monthly fluctuation in the offending rate, the overall trend shows systematic decline prior to job entry, followed by a leveling-off during the post-transition period. Panel B of Figure 4 describes the monthly employment rate. As "job entry" was defined as becoming employed for a minimum of six consecutive months, shorter employment spells may (and do) occur prior to the transition of analytic interest. Statistics pertaining to the post-employment period (TIME>0) indicate that most subjects lose their jobs shortly after the 6-month period. By the end of tracking (TIME=36), 38% of the men remain employed. Note that these statistics are not limited to employment in the initial job at TIME=0 but include any changes to new jobs as long as these changes do not disrupt one's employment status.

## Changes in the average offending trajectory

Figure 5 presents the results from the generalized additive model adjusting for the influence of age and period, and corrected for correlated observations. The results are presented as predicted monthly offending probabilities at the mean of all covariates. Sensitive to the fact that a large number of subjects became jobless following the required six month employment period (see Figure 4), Figure 5 presents results reflecting two alternative model specifications for the post-employment period. Model 1 describes the average trend for the entire group with no assumptions about continued employment. This trajectory reflects the fact that a decreasing number of individuals remained employed beyond the initial 6 months. By comparison, Model 2 presents estimates under the assumption of continued employment over the entire observational period (36 months).

The results from Model 1 are consistent with the unadjusted pattern observed above (Panel A, Figure 4): a gradual decreasing trend up to the point of job entry and no discernible change in the offending rate thereafter. Thus, although the post-employment offending rates are clearly lower on average than the pre-employment rates, the entire decrease in offending appears to be related to processes that have taken place prior the point of job entry. Any changes in offending following the employment transition are minor at best.

By design, Model 2 is identical to Model 1 with respect to the pre-employment period, but includes a dummy for becoming unemployed during the tracking period (i.e., sometime after the required 6-month period of employment; 0= employed, 1=unemployed). Figure 5 presents the results from Model 2 in terms of predicted probabilities conditional upon staying employed through month 36. The declining curve for those who stay employed is consistent with the assumption that employment may

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entail further gains for criminal desistance. The parameter estimate for job loss (β=.024, SE=0.003) implies that becoming unemployed following a period of stable employment is associated with a 2.4 percentage point increase in the monthly risk of offending.

Figure 5. Predicted average monthly offending rates relative to time at job entry. Smoothed curves from two model specifications.
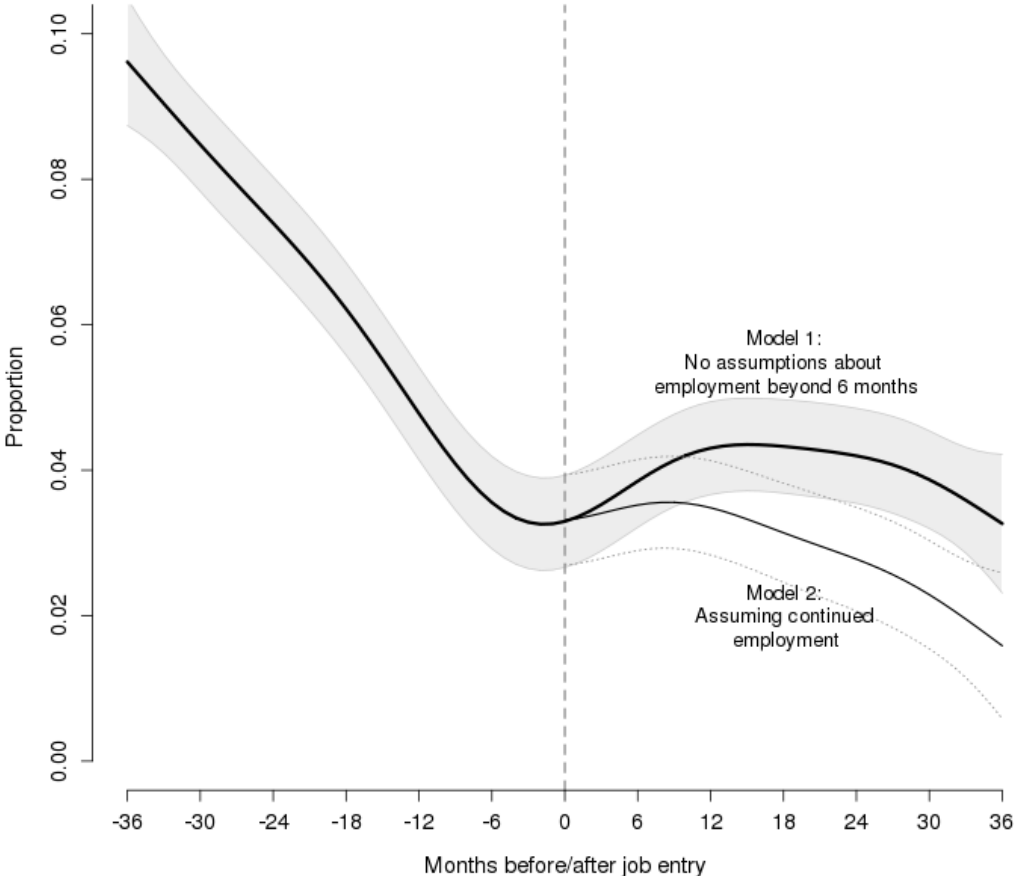
Note: The vertical dotted line at TIME=zero indicates the time of job entry.

Variety in patterns of change

Due to the way in which group based methodology was employed, only the pre-employment period is determined by the latent classes; the rates of *post-employment* offending are free to vary by latent class. The purpose of this approach is two-fold: (1) to examine variation in pre-employment criminal trajectories, and (2) to find if the consequences of employment for desistance differ depending on the timing of employment in the criminal career. Figure 6 shows the results from the best-fitting model, which involves a four-group solution (see Appendix A for details).

Figure 6.   Predicted monthly offending rates relative to time at job entry. Smoothed trajectories from a 4-group SPGM-model
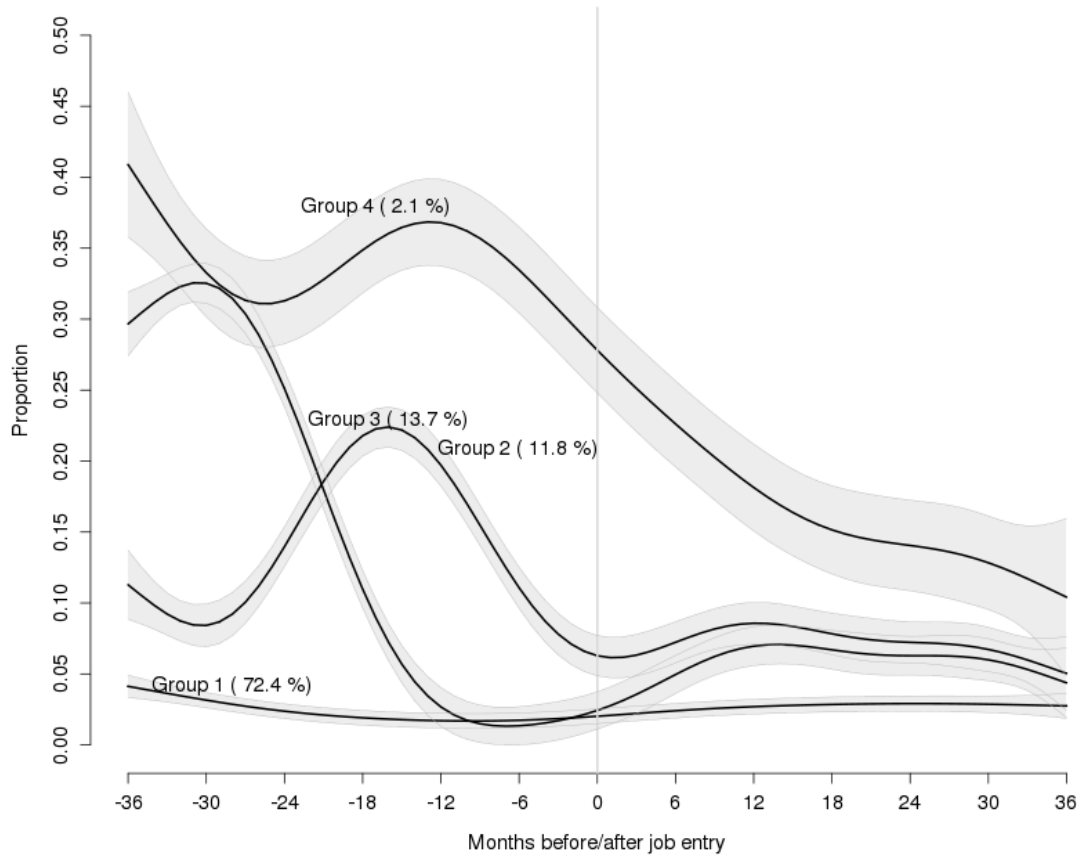
Note: The vertical dotted line at TIME=zero indicates the time of job entry. The shaded areas around each trajectory represent the 95% confidence intervals. The group sizes reflect empirical proportions after group assignments (see appendix A).

Covering 73% of the sample, Group 1 represents the most typical pattern by far. The relatively flat trajectory describes low offending levels before and after the employment transition. It appears that individuals in this group have desisted well ahead of job entry. The slight decline observed during the first half of the pre-employment period may capture the tail end of this process.

Groups 2 and 3 are of roughly equal magnitude, and together cover about 25% of the sample. The two groups are variations on a theme: In each situation, the initial pre-employment offending rate is characterized by fluctuation at a relatively high level; and in both cases the employment transition is preceded by a sharp and steady decline in criminal activity. In Group 3, the downward slope is somewhat steeper and starts earlier than in Group 2. Notably, we observe a slight uptick in offending in both groups following the point of job entry. However, this increase is short-lived; by the end of tracking, both trajectories approach low levels similar to Group 1.

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Finally, Group 4 represents a more distinct and rather marginal pattern (only 2% of the sample). This group is associated with the highest offending rates during the pre-employment period, and although we do observe a clear reduction in criminal activity prior to job entry, the level of offending remains relatively high. Moreover, in a departure from the other groups, the post-employment period is characterized by robust continuation of the declining trend. Overall, the pattern associated with Group 4 is consistent with the trajectory proposed by the hooks-for-change hypothesis.

Discussion

The research program launched by Sampson and Laub (1993) has lifted the topic of desistance from relative obscurity into one of the more vibrant areas of criminological inquiry. As a formal acknowledgement of this influential work, Sampson and Laub received the 2011 Stockholm Prize in criminology. Reading from the statement by the international jury, the prize was awarded "for research showing why and how criminals stop offending"; more specifically: "Laub and Sampson discovered that even very active criminals can stop committing crimes for good after key turning points in their lives" (The Stockholm Prize in Criminology 2011: 5). As a modification of the turning point hypothesis, the theory of cognitive transformation argues that objective changes in life circumstances may contribute to desistance as long as they are preceded by a personal commitment to change (Giordano, Cernkovich, and Rudolph 2002). The general purpose of the present study was to evaluate the capacity of employment, as a naturally occurring event, to exert influence consistent with these perspectives.

Extensive prior research has focused on documenting average offending rates before and after the employment transition. Although the evidence is mixed, a number of sophisticated studies report reduced levels of offending during states of employment. As an important shortcoming, those studies do not address the critical issue of time order with sufficient precision. In order for employment to influence offending, changes in offending must occur after the employment event. If desistance from crime has occurred *prior to* job entry, employment should not be treated as a causal factor but as a consequence of "going straight".

Using monthly data from Norway, this research examined criminal trajectories of a large sample of serious repeat offenders who became employed in a job lasting a minimum of 6 months. Results from the analyses show that, for an overwhelming majority of the offenders, job entry is preceded by significant declines in criminal activity. In light of these data, it seems extremely rare for offenders to

transition to stable employment during an active phase of the criminal career. The most typical path to employment involves a period of criminal inactivity lasting two years or more.

The observed patterns contradict the turning point view of employment as a triggering event in the desistance process. Instead, results support the assumption that an observable reorientation in life priorities is a necessary precondition for voluntary job entry among men with an extensive history of criminal offending. In this regard, our results are consistent with the aging-out perspective but also the hook-for-change hypothesis, both of which assume individual change prior to job entry. The main difference between these two accounts has to do with the *consequences* of employment for the criminal trajectory: the hook-for-change hypothesis predicts further reductions in offending whereas the aging out perspective does not.

Results from the general analysis of post-employment offending rates showed that the shape of the trajectory depends on whether the individuals remained employed or not. The trajectory for the full sample, in which most individuals became unemployed during the observational period, shows no change beyond the point of job entry. Meanwhile, those who remained connected to the labor market did experience additional reductions in criminal activity. Although the latter pattern is consistent with the hook-for-change hypothesis, our research cannot rule out unobserved heterogeneity (systematic selection) as the explanation. In other words, we cannot tell why some offenders remained in the workforce while the others did not. It could be that the nature of the employment experience explains the difference, but it is also possible that men who kept their jobs were further along in the desistance process prior to job entry. It should be noted, however, that even if we assume that most of the difference is attributable to employment, the magnitude of this effect was quite small.

The results from group-based models present a more nuanced picture of post-employment criminal trajectories. In light of these patterns, most individuals experience no meaningful reductions in criminal activity following employment. The evidence consistent with causal influence is limited to a group of offenders that represents only 2% of the sample (Group 4). This result further supports the conclusion that to the extent employment contributes to criminal desistance this effect is of marginal magnitude.

Perhaps our failure to find more substantial support for the employment effect has to do with the inability of the data to distinguish between "good" jobs and "bad" jobs. After all, the age-graded theory does not claim that *any* job will automatically serve as a turning point (Sampson and Laub

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1993). Like marriages, jobs are expected to assist in the desistance process only insofar as they build stakes in conformity and assist in the formation of pro-social identities (Laub and Sampson 2003). In our defense, the theory does not provide clear guidelines for measuring job characteristics. "Stability" is the most common attribute used to identify jobs with potential to reorient criminal trajectories. Qualitative case studies also highlight the importance of a steady pay check. Our decision to focus on jobs lasting for a minimum of six months was informed by these specifications. In addition, key studies in this literature, including recent research by Laub and Sampson (2003), focus on within-individual changes in states of employment, ignoring variation in job characteristics (Horney, Osgood, and Marshall 1995; Piquero, MacDonald, and Parker 2002; Uggen 2000; van der Geest, Bijleveld, and Blokland 2011). As our main purpose was to contribute to this literature, it seems appropriate to use comparable measures.

Perhaps the pattern of results observed in this research is unique to Norway or, more generally, Nordic welfare states. The presence of a strong social safety-net and comparatively lenient treatment of convicted offenders (Pratt 2008) may reduce incentives for employment among individuals drawn to a criminal lifestyle. The low likelihood of job entry before the decision to stop offending may reflect this macro-social context. Thus, it is possible that the processes described in the turning point hypothesis are more common in countries like the United States where socio-economically marginalized men do not have the "luxury" of prolonged disengagement from the labor market (unless thy remain active in the illegal economy). In a social system of the latter variety, crime-prone men may be more likely to accept jobs at initial stages of criminal desistance because they need the money to survive or because it is a required condition of parole.

The only way to address this issue is to replicate the analysis with data from other countries. While waiting for such contributions, we find it reassuring that our data behave consistently with patterns observed in prior research conducted in a variety of national settings, including Finland (Savolainen 2009), the Netherlands (van der Geest, Bijleveld, and Blokland 2011), and various jurisdictions of the United States (Laub and Sampson 2003; Wright and Cullen 2004). Similar to those studies, we find average offending rates to be lower in the post-employment period. Our findings are also consistent with qualitative and experimental studies showing no support for the assumption that employment plays a major role in triggering desistance from crime (Giordano, Cernkovich & Rudolph, 2002; Maruna 2001; Bushway and Apel 2012).

As the sole focus of this research was on employment, the results cannot be generalized to other changes in life circumstances, including marriage, parenthood, or residential change (Kirk 2012; Kreager, Matsueda, and Erosheva 2010; Sampson, Laub, and Wimer 2006). Thus, it remains possible that many of the men in our sample were able to capitalize on any number of "tangible hooks" as a part of the desistance process. As an advanced welfare state, Norwegian society provides comprehensive systems of support for socio-economically marginalized individuals. Although outside the scope of the present study, we find it reasonable to hypothesize that reliance on non-punitive penal policies, universal access to high-quality treatment services, and the omnipresence of opportunities for adult educational and training programs make it easier for crime-prone men in Norway to reintegrate into the economic mainstream. It is up to future research to examine if any of these factors play a role in redirecting lives away from criminal activity and towards stable employment. In short, our research does not explain why these men desisted from crime; only that employment, as a naturally occurring event, does not appear to have played a meaningful causal role in this process.

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Appendix A. Model selection for SPGM

According to Nagin (2005) model selection should be based on best relative fit according to the BIC criterion. However, he also suggests four additional diagnostic criteria. First, the average posteriori probability of group assignment should be at least .7 for all groups. Second, the odds of correct classification (OCC) should be larger than 5 for all groups. Third, the difference between the estimated group probabilities and the proportion of the sample assigned to the group should be as small as possible. Fourth, the confidence intervals for the estimated group probabilities should be as small as possible.

The BIC values are shown in Table A.1, and the additional diagnostics for the 4-group and the 5-group models are shown in Table A.2 and A.3. Comparison of BIC values suggest that either a 4-group or a 5-group model is the best fitting one depending on whether one calculates BIC based on persons or observations. The expected trajectories from these two model specifications are plotted in Figure A.1.

Nagin (2005) emphasizes that substantive and theoretical knowledge should inform decisions about model specification. In our case, the 5-group model yields an additional group shifted slightly to the right from one of the groups included in the 4-group model. In terms of substance, this group adds very little to the information provided by the 4-group model. We therefore report the results for the 4-group model in the remaining analysis. The 4-group model also meets the other fit criteria suggested by Nagin (2005). The parameter estimates from the 4-group model are shown in Table A.4 with the mixture probabilities in Table A.5.

Table A.1 Model selection

Groups	BIC (N=37130)	BIC (N=1004)	Difference BIC (N=37130)	Difference BIC (N=1004)
1	-8329.1	-8320.1		
2	-7756.0	-7736.2	573.1	583.9
3	-7698.5	-7667.8	57.6	68.4
4	-7692.7	-7651.2	5.7	16.6
5	-7687.2	-7634.8	5.6	16.4
6	-7703.8	-7640.6	-16.7	-5.8

Table A.2 Summary of diagnostics for 4-group model

	N	$AvePP_j$	Pi_j	OCC_j	Proportion assigned to the group
Group 1	727	0.9407799	0.7045222	6.7	0.724
Group 2	118	0.7801198	0.1314100	23.5	0.118
Group 3	138	0.8085127	0.1392249	26.1	0.138
Group 4	21	0.9041515	0.0248429	370.3	0.021

Table A.3 Summary of diagnostics for 5-group model

	N	AvePP$_j$	Pi$_j$	OCC$_j$	Proportion assigned to the group
Group 1	717	0.9193787	0.6771880	5.4	.714
Group 2	129	0.7538930	0.1419054	18.5	.129
Group 3	79	0.7782787	0.0943421	33.7	.079
Group 4	56	0.7872320	0.0610972	56.9	.056
Group 5	23	0.8923932	0.0254674	317.3	.023

Table A.4 Parameter estimates from SPGM model with 4-groups

Group	Parameter	Estimate	SE	t-value	Pr(>t)
1	Intercept	-3.993	0.227	-17.592	0.000
	Linear	0.499	0.883	0.565	0.572
	Quadratic	0.494	0.991	0.498	0.618
	Cubic	0.155	0.404	0.383	0.702
	Quartic	0.022	0.054	0.398	0.691
2	Intercept	-2.950	0.328	-8.992	0.000
	Linear	-0.930	1.242	-0.749	0.454
	Quadratic	0.990	1.385	0.715	0.475
	Cubic	0.836	0.569	1.469	0.142
	Quartic	0.142	0.077	1.838	0.066
3	Intercept	-3.567	0.464	-7.691	0.000
	Linear	2.741	1.536	1.785	0.074
	Quadratic	3.672	1.549	2.371	0.018
	Cubic	1.138	0.586	1.942	0.052
	Quartic	0.107	0.075	1.434	0.152
4	Intercept	-1.025	0.413	-2.486	0.013
	Linear	0.107	1.534	0.070	0.944
	Quadratic	0.944	1.820	0.519	0.604
	Cubic	0.601	0.764	0.787	0.432
	Quartic	0.101	0.104	0.971	0.332

Table A.5 Estimated mixture probabilities

Group membership	Percent	SE	t-value	Pr(>t)
1	70.5	2.2	31.49	0.00
2	13.1	2.2	5.97	0.00
3	13.9	2.0	6.99	0.00
4	2.5	0.8	3.22	0.00

Note: One might adjust the model further and remove parameters that are redundant. For example, group 1 has a flat trajectory, and only an intercept term would be sufficient for this group. As we are not concerned with the parameter estimates per se, we do not consider overfitting the model to be a problem.

Figure A.1 Predicted trajectories for a 4-group and a 5-group model
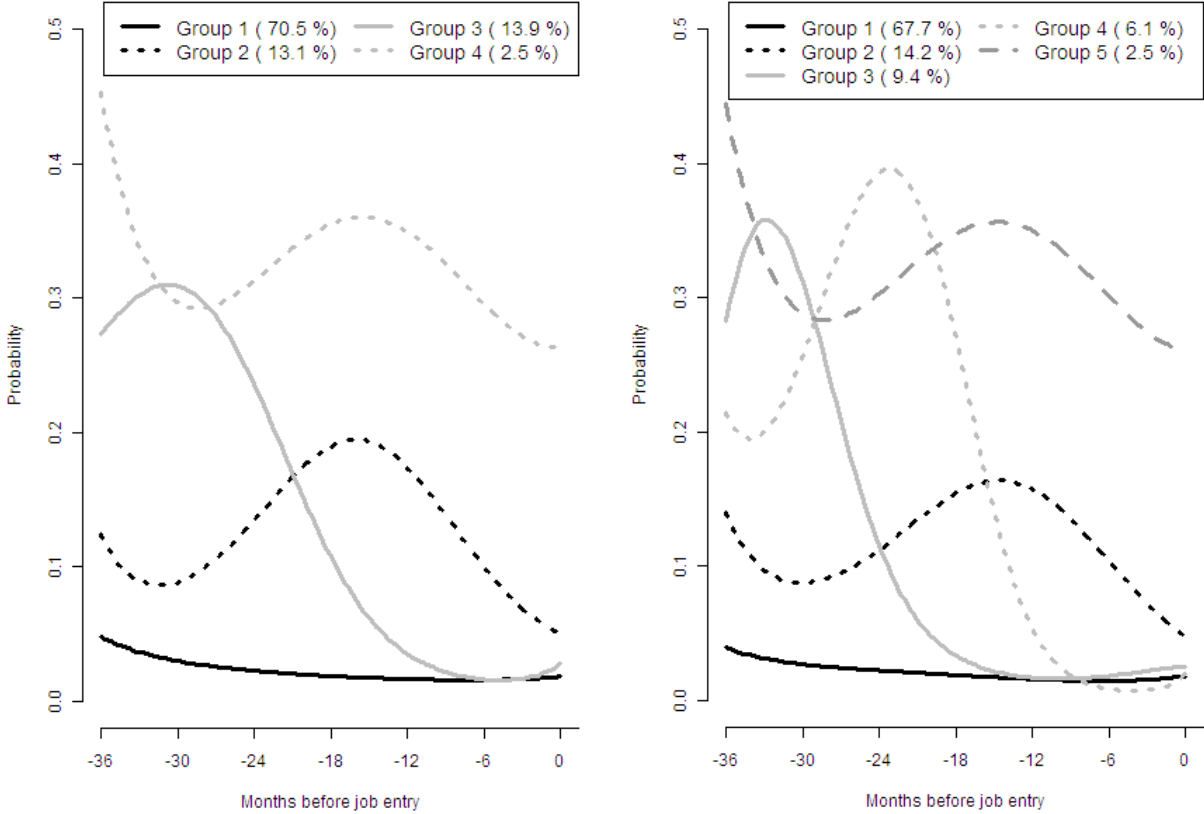
Appendix B. Parameter estimates from GAMs

Table B.1 Parametric coefficients from GAM model presented in figure 5, model 1

	Estimate	Std.Error	t-value	Pr(>t)
Intercept	0.094	0.107	0.882	0.378
Age	-8.41E-04	6.14E-03	-0.137	0.891042
Age squared	-2.92E-06	8.65E-05	-0.034	0.973055
Year of job entry (ref=2001)				
2002	0.004	0.006	0.757	0.449
2003	-0.016	0.007	-2.475	0.013
2004	-0.025	0.007	-3.430	0.001
2005	-0.027	0.008	-3.598	0.000
2006	-0.022	0.007	-2.993	0.003
Season of job entry (ref=Quarter 1)				
Quarter 2	0.003	0.005	0.533	0.594
Quarter 3	-0.003	0.005	-0.527	0.598
Quarter 4	-0.008	0.006	-1.359	0.174

```
p < 0 *** p < 0.001 ** p < 0.01 *

Approximate significance of smooth terms:
        edf Ref.df   F p-value
(TIME) 6.194  6.194 88.87  <2e-16 ***
R-sq.(adj) =  0.0116lmer.REML score = -16990  Scale est. = 0.04465   n = 69913
```

Table B.2 Parametric coefficients from GAM model presented in figure 5, model 2

	Estimate	Std.Error	t-value	Pr(>t)
Intercept	0.088	0.105	0.836	0.403
Age	-7.24E-04	6.05E-03	-0.120	0.905
Age squared	-5.25E-06	8.52E-05	-0.062	0.951
Year of job entry (ref=2001)				
2002	0.004	0.006	0.731	0.465
2003	-0.015	0.006	-2.399	0.016
2004	-0.023	0.007	-3.273	0.001
2005	-0.026	0.007	-3.453	0.001
2006	-0.020	0.007	-2.890	0.004
Season of job entry (ref=Quarter 1)				
Quarter 2	0.002	0.005	0.436	0.663
Quarter 3	-0.003	0.005	-0.556	0.578
Quarter 4	-0.009	0.006	-1.400	0.162
Loosing the job	0.026	0.003	8.870	<2e-16

```
p < 0 *** p < 0.001 ** p < 0.01 *

Approximate significance of smooth terms:
        edf Ref.df   F p-value
s(TIME) 5.793  5.793 108.4  <2e-16 ***
R-sq.(adj) =  0.0147lmer.REML score = -17058  Scale est. = 0.044621  n = 69913
```

Table B.3 Parametric coefficients from GAM model presented in figure 6

	Estimate	Std. Error	z-value	Pr(>z)
Intercept	0.081	0.073	1.103	0.270
Latent class (ref=group 1)				
Group 2	0.082	0.004	19.000	<2e-16
Group 3	0.081	0.004	19.875	<2e-16
Group 4	0.236	0.010	24.653	<2e-16
Age	-2.20E-03	4.20E-03	-0.525	0.600
Age squared	2.10E-05	5.92E-05	0.354	0.723
Year of job entry (ref=2001)				
2002	0.003	0.004	0.869	0.385
2003	-0.004	0.004	-0.997	0.319
2004	-0.007	0.005	-1.500	0.134
2005	-0.009	0.005	-1.723	0.085
2006	-0.009	0.005	-1.737	0.082
Season of job entry (ref=Quarter 1)				
Quarter 2	-0.004	0.004	-1.089	0.276
Quarter 3	0.000	0.004	-0.025	0.980
Quarter 4	-0.008	0.004	-1.872	0.061

```
p < 0 *** p < 0.001 ** p < 0.01 *

Approximate significance of smooth terms:
                        edf Ref.df  Chi.sq p-value
s(TIME):factor(GROUP)1 4.356  4.356   9.811 1.89e-08 ***
s(TIME):factor(GROUP)2 8.454  8.454  41.999  < 2e-16 ***
s(TIME):factor(GROUP)3 8.455  8.455 282.548  < 2e-16 ***
s(TIME):factor(GROUP)4 6.345  6.345  38.077  < 2e-16 ***
R-sq.(adj) =  0.0888lmer.REML score = -20234  Scale est. = 0.042995  n = 69913
```

Appendix C. Sensitivity analysis

Given that some of the decisions in the main analysis might appear somewhat arbitrary, the goal of the sensitivity analysis is to check whether the results would be substantively altered if changing these parameters. Here, we present the results if changing each of the these parameters in the following way:

A) **Incarceration**
   We have incomplete information on imprisonments before 2001, but we have to some extent managed to take long-term imprisonments into account for the period 1998-2000 from records on convictions. After 1th January 2001, we have exact measures of time in prison, including remand. Thus, setting the start of tracking to 1th January 2002 would allow exact control for imprisonments at least 12 months before job entry. If lack of control for time spent in prison is important for our results, repeating the analysis only for job entries between 2002 and 2007 should alter the results.

B) **Follow-up time**
   A related potential problem is that there might be larger time-lag in reporting of offences than already accounted for in the main analysis. We have included crimes committed until the end of 2007 and solved by the end of 2009. Some investigations take longer time, so allowing one more year of time lag might affect the results for the post-job criminal trajectory. We check whether shortening the observation window to only 2006 would alter the conclusions.

C) **Definition of previous criminal career**
   The main analysis select a sample who have committed at least five felony level offences since 1992 of which at least one must be between 1998 and 2000. This definition is somewhat arbitrary, and the results might depend on it. We check this by requiring that all the five felony offences were committed after 1998, making the criminal history more recent.

D) **Definition of "marginal on the labor market"**
   The results might depend on our definition of being marginal on the labor market. The main analysis allows some labor market participation, but maximum 5 months employment each year since 1998. To check this, we restrict this criterion to maximum 1 month each of these years.

E) **Definition of "job entry" - short**
   The main analysis defines a job entry as getting a job and staying employed for six subsequent months. We repeat the analysis setting the length of job period to 3 months.

F) **Definition of "job entry" - long**
   For the same reason as (E), we repeat the analysis setting the length of job period to 12 months.

G) **Definition of high-risk sample**
   The main analysis defines the sample based on their criminal records. One might argue that our sample consist of persons too heavily involved with crime to respond to employment. We therefore change the sample definition to include less high-risk individuals of having only at least one felony offence since 1992

H) **Definition of high-risk sample**
   For the same reason as (G), but with the addition of removing the most active offenders, we repeat the analysis defining the sample as having committed only between one and five felony offences between 1998 and 2001.

In sum, we repeat the analysis eight times, varying one definition at a time while holding the other variables constant as in the main analysis. Table C1 gives an overview of how the sample sizes of target population (marginalized offenders) and final analytical sample (those who get a job) changes. Figure C1 shows the unadjusted crime rates for each sensitivity check, and Figure C2 shows the raw

job rates. Figure C3 shows the predicted probabilities from regression analyses. These plots are produced in exact same way as in the main analysis except from changes in the relevant definition.

Table C1. Summary of sample sizes for the sensitivity analysis

	Number of marginalized offenders	Number of these who got a employed (final analytic sample)
Main analysis	6 216	1 004
A) period 2002-2007	6 632	896
B) period 2001-2006	6 216	862
C) 5 felony offences 1998-2000	3 722	512
D) max 1 month employed/year	5 161	756
E) job entry 3 months	6 216	1 194
F) job entry 12 months	6 216	734
G) more then 1 offence since 1992	11 582	1 972
H) min 1 and max 5 offences since 1998	6 350	1 261

Note: Sample sizes for the main analysis is included as reference.

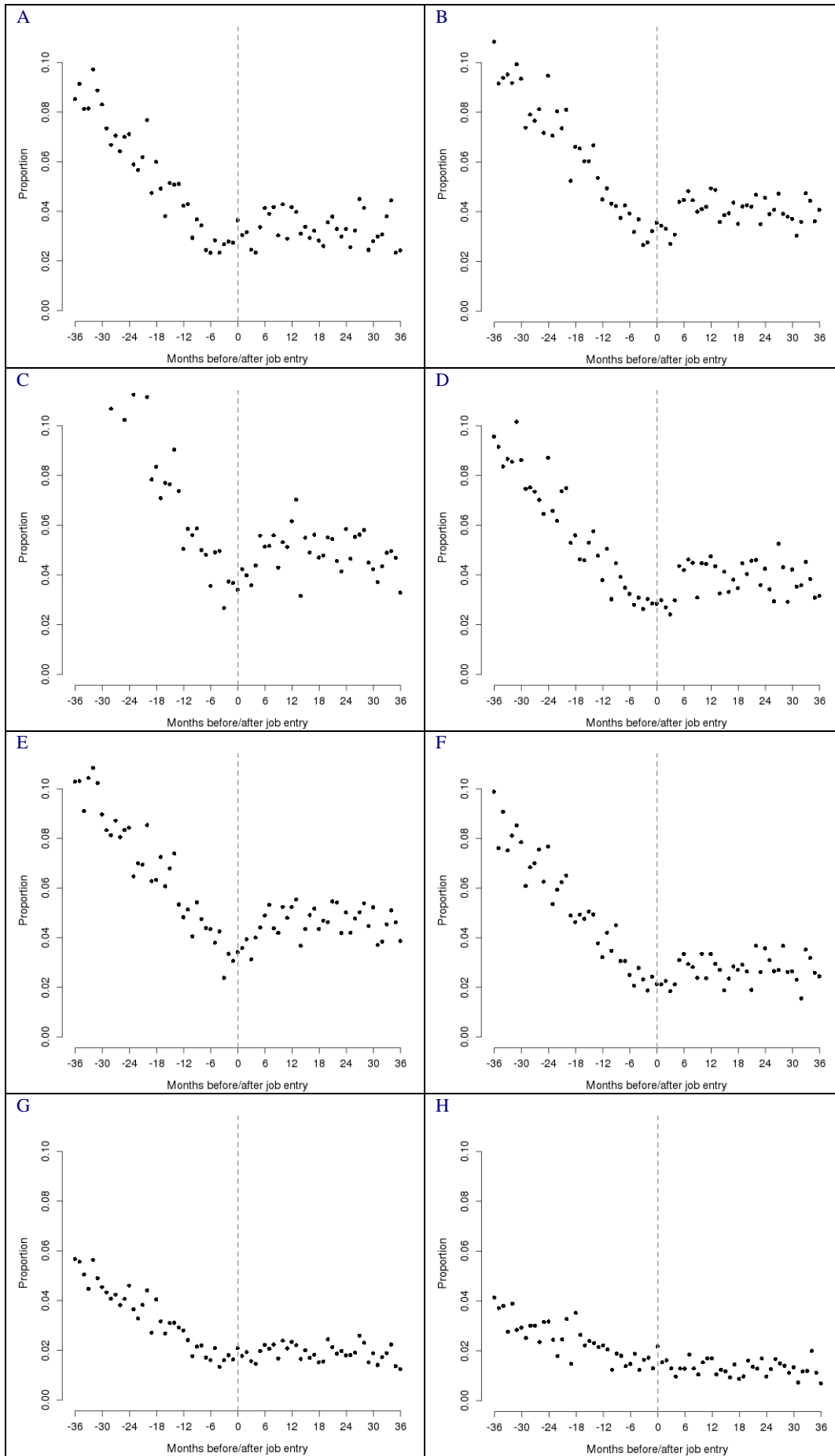**Figure C1. Unadjusted monthly crime rates**
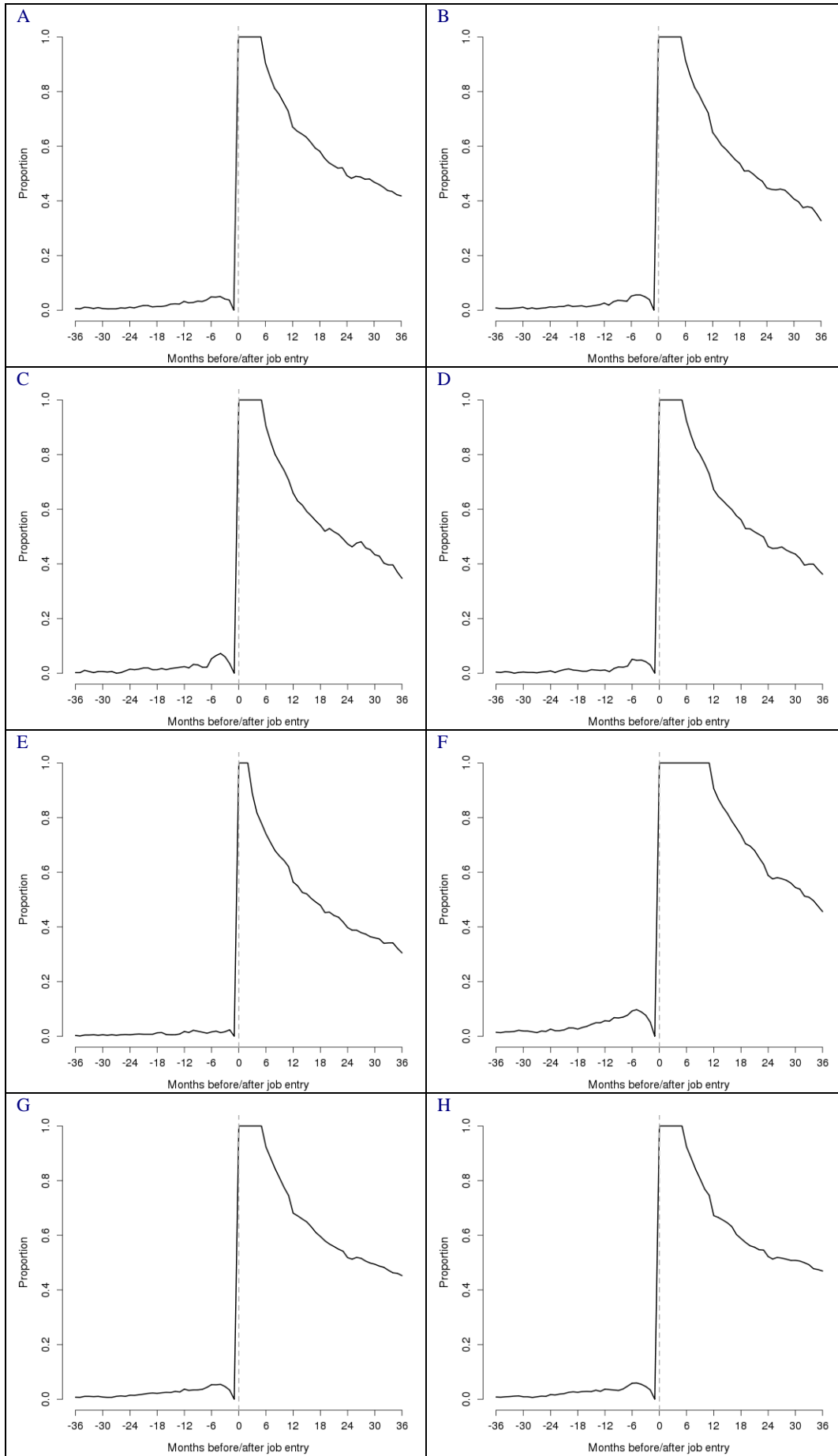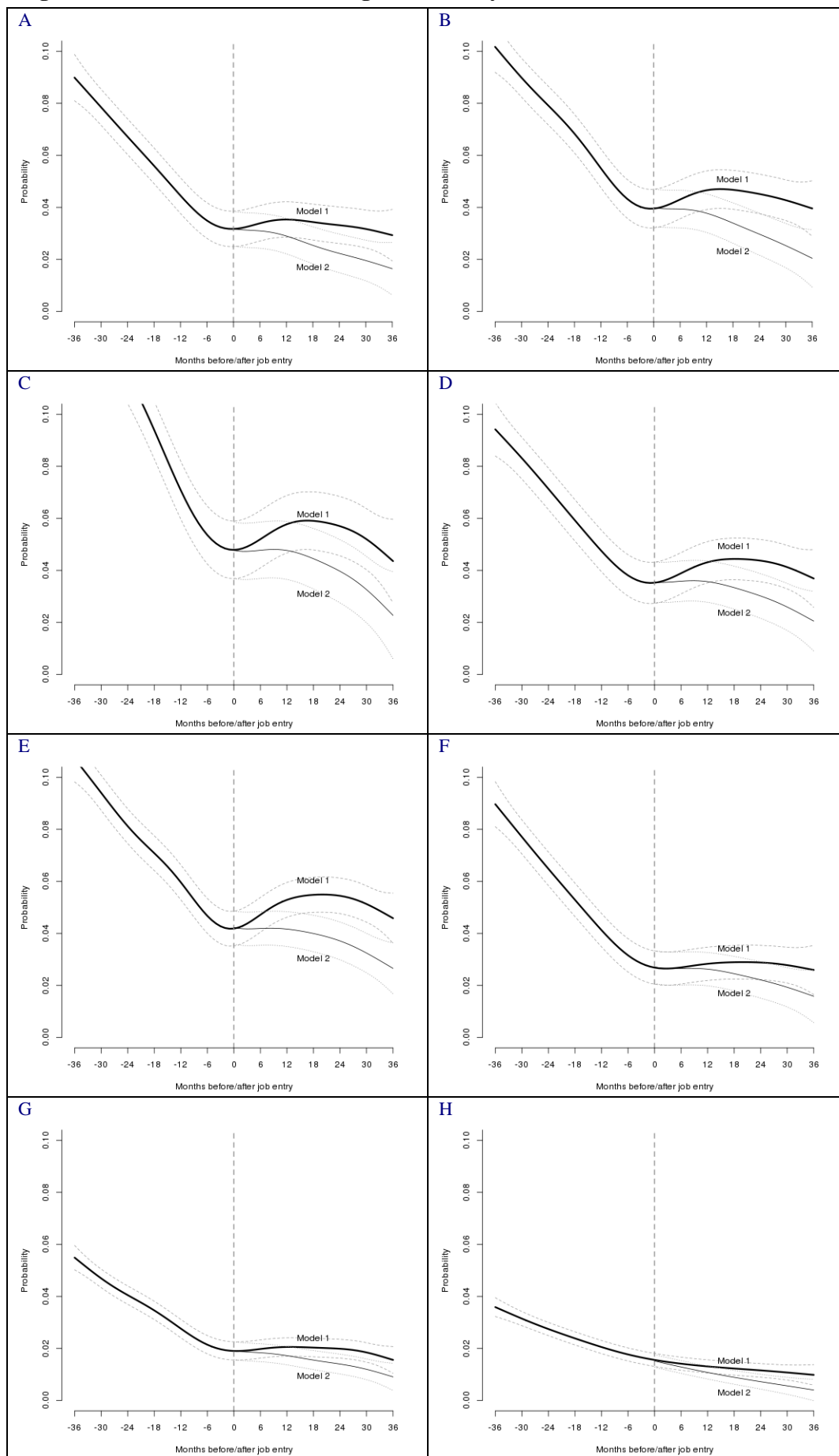
Figure C2. Unadjusted monthly job rates

Figure C3. Point estimates from regression analysis

Note: the y-scale is held constant across plots to ease comparisons

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