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## Education and criminal behavior: Insights from an expansion of upper secondary school<sup>☆</sup>

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## ABSTRACT

We study the impact on long and short run criminal behavior from a large scale Swedish reform of vocational upper secondary education, extending programs and adding more general theoretical content. The reform directly concerns age groups where criminal activity is high and individuals who are overrepresented among criminal offenders. Using detailed administrative data we show that the reform led to a reduction in property crime, but no significant decrease in violent crime. The effect is mainly concentrated to the third year after enrollment, which suggests that being in school reduces the opportunities and/or inclinations to commit crime.

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### 1. Introduction

Education can generate large private and social gains in many dimensions. The literature not only documents strong associations with earnings, employment and other indicators of economic well-being, but also with health, family formation and crime (Oreopoulos and Salvanes, 2011). Having secured basic education for essentially all residents, many developed societies now focus reforms on how to extend and improve secondary education for broader groups of students than those historically targeted for advancement into higher education (see Benavot et al., 2006 for an overview).

A commonly held view is that students are not sufficiently prepared for higher education and lack the type of general knowledge typically required by the labor markets of today. Consequently, and perhaps mostly so for vocational education, there is a common trend toward secondary education curricula becoming more like primary school curricula with a broader range of subjects, less specialization and more integrated themes in order to provide all students with opportunities for tertiary education (Sahlberg, 2007).

But reforming secondary education in a way that satisfies these criteria may lead to externalities that have not been fully appreciated. In particular, such policies run the risk of also increasing dropout rates and raising youth unemployment by potentially making the school-to-work

transition more difficult.<sup>1</sup> This potential tradeoff is made particularly stark by the literature on the impact of education on criminal behavior.<sup>2</sup> Since crime typically has significant negative externalities, the social returns to education may be substantially higher than the private returns if education has crime reducing effects. On the other hand, dropouts from secondary education are highly overrepresented among those involved in criminal activities.<sup>3</sup> Likewise, it is intuitive that difficulties to transit from school to work may affect criminal behavior.

This paper studies the impact on crime by a major reform of Swedish upper secondary vocational education in the beginning of the 1990s. The reform extended vocational programs from two to three years and added more general theoretical content to the curriculum. The intervention took place for age groups where crime is

<sup>1</sup> Bishop and Mane (2001) and Goodman (2012) find that higher requirements can improve labor market outcomes while other studies find that they increase dropout rates (Dee and Jacob, 2007; Ou, 2009). Note that Clark and See (2011) do not find that tougher education standards have an impact, either on dropout rates or on earnings. Regarding the school-to-work transition, Hanushek et al. (2017) provide recent evidence on the trade-off between youth employment and long-term labor market flexibility by vocational and general secondary education.

<sup>2</sup> Hjalmarsson and Lochner (2012) provide a recent literature review.

<sup>3</sup> According to Harlow (2003), 75% of US inmates did not complete high school. Our own calculations for Sweden reveal that about 50% of the individuals who were sentenced to prison in 2005 had not completed high school.

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common, and primarily affected segments of the youth cohorts with particularly high crime risks. Our analysis is made possible by access to rich longitudinal population-wide micro data including details on all criminal convictions in Swedish courts. We take advantage of the fact that the reform was implemented gradually over time in different municipalities. According to Hall (2012), the reform increased average educational attainment, but also led to a substantial increase in dropout rates among low-performing students.

We complement and add to the existing literature in several ways. Most importantly, the nature of the reform and the richness of the data allow us to provide one of the first pieces of evidence on the causal effect on criminal activity of making secondary education more general. We thereby bring another piece of evidence to the discussion of the trade-offs involved when deciding between general and vocational secondary education. Our findings are therefore likely to be relevant outside the specific setting that we analyze. Our paper is also among the first to provide design based evidence on the consequences of education policy at a somewhat higher margin: the upper secondary level. In fact, the vast majority of previous studies concern reforms affecting compulsory school.<sup>4</sup> Moreover, we can study both long- and short-run effects on criminal behavior, as well as separate between crimes committed on school operating days and when the school is in recess. Also, we study asymmetric effects of the reform across different student characteristics, among them the predicted dropout risk and previous school performance. Taken together, these sources of variation enable us to shed light on the mechanisms through which education can affect crime.

There are several theoretical reasons as to why increased educational attainment could affect crime. First of all, education typically raises expected earnings from legitimate work, thereby making crime relatively less appealing (Lochner, 2004).<sup>5</sup> Second, one can hypothesize that education directly affects preferences, potentially making individuals more socialized, future-oriented, and risk-averse.<sup>6</sup> Åkerlund et al. (2016) show that individuals with high discount rates are more likely to engage in crime. These factors could then decrease the probability of crime. Third, merely being in school may in itself affect the risk of crime by incapacitation; i.e. by participating in education individuals have less time to engage in criminal activities (e.g. Luallen, 2006). If there is habit formation in crime, then such decreases in criminal involvement may lead to even larger crime reductions in the long run. On the other hand, schools also offer arenas potentially increasing contacts and thereby frictions between youth, thus triggering certain types of crime (a so-called concentration effect). Educational reform can also affect the peer composition for a given individual, meaning exposure to contexts with varying degrees of crime propensity. The incapacitation and human capital mechanisms suggest negative effects of education on crime, while peer influences are ambiguous in sign.

We find robust evidence that increased access to prolonged and more general education for male vocational students lead to a reduction in property crime by about 20%, but no significant decrease in violent crime.<sup>7</sup> These effects are concentrated among students in the lower half of the compulsory school GPA distribution. We also show that these

<sup>4</sup> One exception is the study by Machin and Marie (2012) who examine the consequences of the expansion of the UK post-compulsory schooling system in the 1980s and 1990s. Since the study compares the evolution of crime rates across birth cohorts it is essentially using a time-series research design.

<sup>5</sup> Several studies have shown that better labor market opportunities reduce crime (e.g. Grogger 1998; Gould et al., 2002; Machin and Meghir, 2004; Grönqvist, 2013). This effect is potentially counteracted if education raises the opportunities to commit crime and the returns to certain types of crime.

<sup>6</sup> In an influential study, Becker and Mulligan (1997) posit that people could learn to be more future-oriented. Perez-Arce (2011) demonstrates empirically that college students in Mexico who were randomly admitted from a pool of applicants were more patient than individuals in the control group, which indicates that education has an impact on time preferences.

<sup>7</sup> We follow the convention in the literature and focus on males because they are substantially overrepresented among criminal offenders. But note that we also present some results for females.

effects are present in the age interval 16–20 but not at higher ages, and are mainly concentrated during the added third year in school.<sup>8</sup> These findings suggest that incapacitation is the main mechanism behind the reduction in criminal behavior. However, since Hall (2012) does not find an impact on future earnings by the reform, the results should not be read as a refutation of the hypothesis that the alternative cost of crime is also relevant.

Having a degree from upper secondary school is negatively correlated with criminal behavior. But our results reveal no clear evidence that the increase in dropout rates induced by the reform increased crime. One possibility is that a decrease in crime by increased schooling is counteracted by an increase in crime due to the higher likelihood of dropping out of school. In line with this we find that among the students predicted to be most likely to drop out, the estimated reform impact is zero.

The quasi-experimental set-up of the reform allows us to deal with the challenge of disentangling the causal component of the association between crime and education. Obviously, a negative correlation may arise for several reasons, e.g. family background or innate abilities making education more (less) attractive/likely and working in the opposite direction for the probability of engaging in crime. Despite a voluminous multi-disciplinary literature (see Lochner, 2010 or Rud et al., 2013 for overviews), relatively few studies have been able to achieve credible causal identification. Lochner and Moretti (2004) is one exception, finding that schooling decreases the probability of incarceration using variation in compulsory schooling laws across US states. Machin et al. (2011) is another example, concluding that education can be an important measure for reducing crime, based on their UK study. Recent Swedish studies exploiting a compulsory school reform also find a negative impact of compulsory education on crime (Meghir et al., 2011; Hjalmarsson et al., 2015). These quasi-experimental studies have focused on compulsory schooling reforms or policies that affected the early stages of the educational system, while we consider upper secondary school. Further, these studies link educational expansion to adult crime while our study directly concerns age groups where criminal activity is relatively high, as well as the future criminal behavior of these groups. Our study bears similarities with the recent work on Norway by Brugård and Falch (2013). Using high school structure and geographic information in an IV setting they show that high school achievement decreases crime. Compared to our study, the data do not allow Brugård and Falch (2013) to study the time profile of criminal activity, hence making it difficult to draw conclusions concerning the mechanisms behind the decline.

A second strand of the quasi-experimental literature studies the contemporaneous link between education and crime among youths (Jacob and Lefgren 2003; Luallen 2006; Anderson 2014; Berthelon and Kruger 2011).<sup>9</sup> These papers conclude that education reduces crime by incapacitating individuals. This squares well with our analysis, which expands on this research by using more detailed data and studying the long-run consequences by following individuals for a period stretching at least 15 years.

The rest of the paper is outlined as follows. Section 2 gives some institutional background on crime and the criminal justice system in Sweden, and on the educational reform under study. Section 3 describes the data and the research design. Section 4 presents the empirical analysis, starting with the baseline results, then turning to investigate effects by background characteristics, and finally trying to disentangle the mechanisms at work. Section 5 concludes.

<sup>8</sup> We do however not find any clear differences in the effect of the reform on crime committed on weekdays versus weekends or for crime on school days compared to school breaks.

<sup>9</sup> Related is also Deming (2010) who finds that winners of school choice lotteries in middle or high school are less likely to be arrested and incarcerated seven years after the school assignment.

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