

Dual Vocational Education and Crime — Extended Abstract

Based on: Daniel Montolio, Juan Pascual, and Jenifer Ruiz-Valenzuela, “Dual Vocational Education and Crime” (draft).

Background and motivation. Youth crime imposes large social costs and tends to peak in late adolescence, a period that coincides with the transition out of compulsory schooling. Early justice-system involvement can hinder human capital accumulation, reduce later employment and earnings, and reinforce intergenerational disadvantage. Educational policy is therefore a plausible crime-prevention instrument, yielding social returns beyond wages and productivity. Prior research documents that extending time in school can lower offending through short-run incapacitation and long-run increases in the returns to legal work. Far less is known about whether reforms that raise the quality and labor-market relevance of vocational education—without necessarily increasing time in education—can generate comparable crime-reduction externalities at the neighborhood level. This paper examines that question in the context of Catalonia, leveraging the introduction of a firm-centered vocational modality to estimate causal effects on local crime.

Institutional context and the reform. The study focuses on Catalonia’s adoption of Dual Vocational Training (DVT), an apprenticeship modality that reorients vocational instruction toward firm-based learning. In Spain, compulsory education ends at age 16; afterward, students may pursue an academic pathway or vocational training, typically organized into two-year intermediate and higher cycles. Historically, vocational education was mainly school-based and included a relatively short internship that was often unpaid and carried limited weight in graded coursework. DVT was enabled by national legislation that created a contractual framework for training and apprenticeship programs, allowing schools to combine classroom instruction with substantial workplace training. In the dual modality, workplace hours expand markedly (often around 1,000 hours, compared with the sub-500-hour internships common in regular vocational tracks), and apprenticeships are typically remunerated under subsidized training contracts. A distinctive feature is the firm tutor, a designated workplace mentor who supervises the student, evaluates competency acquisition, and provides an assessment that feeds into the student’s grading. Importantly, the overall duration and workload of vocational programs do not increase; DVT reallocates time from center-based to firm-based training within the same degree requirements.

Research question and hypothesized channels. The paper asks whether expanding DVT reduces local crime in the neighborhoods surrounding vocational centers, and whether the pattern of effects is consistent with incapacitation, incentive, and human-capital channels. The authors emphasize three mechanisms. First, incapacitation: workplace training, commuting, and related obligations structure students’ daytime schedules and reduce idle time when opportunistic offenses are feasible. Second, income and opportunity costs: because DVT apprentices are paid and the program is designed to strengthen employability, it may increase the expected returns to legal work and raise the opportunity cost of crime, particularly for economically motivated property offenses. Third, socialization and peer environments: closer

attachment to firms and mentors, exposure to workplace norms, and changes in daily routines may improve non-cognitive skills and reduce criminogenic peer interaction. These channels predict heterogeneous effects by time of day and by offense type, and they allow for dynamics in which effects strengthen as cohorts move further into the dual modality and habits and expectations adjust.

Data. The empirical analysis links two administrative sources. Education records from the Catalan Government's Department of Education provide exhaustive information on vocational programs from 2012 onward, including center location, public or private ownership, and the availability of regular and dual tracks. At the student level, the data include internship start and end dates, hours worked, and host-firm characteristics, along with demographics such as age, gender, migrant status, residence postal code, and special education needs. Crime data come from the Mossos d'Esquadra and consist of daily geocoded police reports from 2008 to 2018. Each report includes the date and coordinates of the incident, the offense category, and characteristics of offenders and victims such as age, gender, and nationality. The spatial and temporal granularity allows the authors to construct annual crime measures for small geographic units and to examine heterogeneity by time of day and crime type.

Unit of analysis and estimation sample. The unit of observation is the census section (census tract), a small geographic unit with roughly 1,000 inhabitants on average. The sample includes census sections that contain exactly one vocational education center, ensuring that each area maps cleanly to a single center's adoption decision. Treatment is defined as the introduction of any DVT position in the local center; the treatment indicator turns on in the first year the center offers at least one dual slot and remains on thereafter. Control areas are census sections hosting centers that offer only regular vocational training during the analysis window. For comparability, the sample excludes centers that adopt DVT and subsequently stop offering it and excludes census sections hosting more than one vocational center. The resulting panel contains treated and control center-years that span the pre- and post-adoption periods and supports both binary and continuous measures of treatment exposure.

Empirical strategy and identification. Identification exploits the staggered rollout of DVT across centers beginning in 2014. The main specification is a staggered Difference-in-Differences (DiD) event-study design in which crime outcomes are regressed on indicators for event time (years relative to adoption), with census-tract fixed effects and calendar-time fixed effects. This framework estimates dynamic average treatment effects while accommodating heterogeneous treatment timing. Time-varying covariates include tract population and the share of foreign residents, and some specifications additionally control for school-level composition (such as the shares of female and migrant students, the share enrolled in higher-level vocational cycles, and average student age). Standard errors are clustered at an appropriate geographic level to account for spatial correlation. To address concerns that adoption timing might be endogenous to local conditions, the authors test whether pre-treatment changes in tract and school characteristics predict the first year of DVT adoption. The results indicate little systematic relationship between pre-treatment changes and adoption timing, lending support to the view that rollout was driven largely by institutional and administrative

factors rather than by differential pre-trends in crime.

Main results. The event-study estimates indicate that DVT adoption is followed by a statistically significant decline in local crime in the census sections hosting adopting centers. Pre-treatment coefficients are close to zero, suggesting no differential pre-trends between eventual adopters and controls. Post-adoption effects emerge gradually and become more pronounced in the second and third years after implementation, a pattern consistent with persistent behavioral change rather than a purely contemporaneous mechanical effect. In magnitude, the paper reports that a 1 percentage-point increase in the share of vocational students enrolled in the dual track reduces reported youth crime by roughly 13 percent. The timing and persistence of the estimated effects remain similar when adding demographic controls at the tract level and compositional controls at the school level, suggesting that the results are not driven by changes in who lives in treated neighborhoods or who enrolls in treated centers.

Treatment intensity. Because DVT exposure varies substantially across centers, the authors also estimate two-way fixed-effects models using the fraction of vocational students in DVT as a continuous treatment measure. These estimates reveal that higher DVT intensity is associated with larger reductions in crime, reinforcing the interpretation that the reform's impact scales with the share of students engaged in apprenticeships. The relationship holds when outcomes are measured in levels or logs and when population controls and fixed effects are included. This intensity-based evidence complements the binary adoption event study by exploiting within-center variation in the extent of dual implementation and by linking crime reductions to the depth of workplace engagement.

Spatial displacement test. A key alternative explanation is spatial displacement: if students spend less time near their vocational center and more time at host firms, offenses might shift from school neighborhoods to firm neighborhoods. The paper directly examines this possibility by conducting a parallel event-study on census sections containing firms that host DVT students, using geocoded firm locations for the majority of hosts. The estimated post-treatment effects around hosting firms are statistically indistinguishable from zero. The absence of a detectable increase suggests that the declines around adopting centers are not merely reallocated offenses and instead reflect net reductions in local crime. This finding strengthens the interpretation that DVT generates genuine externalities rather than moving criminal activity across space.

Mechanisms: time of day and crime type. Two heterogeneity exercises are particularly informative about mechanisms. First, the authors split incidents into daytime and nighttime crimes. If DVT reduces offending by occupying students during business hours through workplace training, coursework, and commuting, then effects should be concentrated in daytime incidents. The estimates show declines concentrated during daytime hours, whereas nighttime incidents do not exhibit a comparable reduction and may show small, statistically imprecise increases. This pattern is consistent with incapacitation operating when apprentices are engaged at firms. Second, the authors examine effects by offense category. The overall decline is driven primarily by economically motivated property crimes, especially theft. Reductions in other categories are smaller and less precisely estimated. The concentration in theft aligns with

incentive-based explanations: paid apprenticeships and improved labor-market attachment raise the opportunity cost of illegal income generation. Together, these patterns suggest that both structured time allocation and improved economic prospects contribute to the observed crime reductions, with the strongest effects where theory predicts the largest behavioral response.

Contribution and policy implications. The paper contributes to the education-crime literature by evaluating a qualitative upgrade within vocational education rather than changes in compulsory schooling duration. It provides causal evidence that apprenticeship-style vocational reforms can generate sizable neighborhood-level externalities in the form of reduced crime. The integration of universal vocational student records with daily geocoded police reports enables precise measurement of localized impacts, dynamic adjustment, and heterogeneity by time of day and offense type. From a policy perspective, the findings imply that vocational systems that embed students in firms, combine mentorship with curriculum integration, and provide paid training contracts can deliver social benefits beyond labor-market outcomes. Because DVT does not extend program length, the implied social return arises from reconfiguring learning venues and incentives rather than simply increasing educational time. The results are especially relevant for places concerned with youth delinquency and with improving school-to-work transitions for students at risk of labor-market disconnection.

Limitations and planned extensions. The authors describe the current version as preliminary and outline extensions to strengthen robustness and clarify external validity. One prominent next step is to vary the geographic definition of exposure by estimating effects for alternative radii around adopting centers (for example, the same census section, 1 km and 2 km buffers, and donut bands) to test how rapidly impacts decay with distance and whether spillovers extend beyond the host tract. Additional work aims to integrate continuous treatment intensity within the staggered DiD framework more fully, to examine crime around students' residential postal codes, and to explore further heterogeneity across offense types and age groups. These extensions would help distinguish the relative importance of incapacitation at the place of training versus broader changes in criminal propensity and would provide additional evidence on whether crime reductions are tightly localized or diffuse across urban space.

Conclusion. Overall, the staggered diffusion of Dual Vocational Training across Catalonia is associated with meaningful reductions in local crime, especially youth crime and theft-related offenses. Effects appear after adoption and strengthen over subsequent years, consistent with a mix of mechanisms: immediate reductions in daytime opportunities to offend as students are engaged in firm-based training, and longer-run incentive and human-capital changes linked to paid apprenticeships and improved labor-market attachment. The lack of evidence for displacement to hosting-firm neighborhoods further supports the interpretation of net crime reductions. The results suggest that apprenticeship-style vocational reforms can deliver substantial non-pecuniary social returns and can be considered as part of broader strategies to improve youth outcomes and enhance neighborhood safety.