

# Where versus What: College Value-Added and

## Returns to Field of Study in Further Education<sup>1</sup>

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### Abstract

We use administrative records on educational and labor market trajectories to estimate the value-added of English further education colleges in terms of educational and labor market outcomes and earnings returns to different fields of study taught at these colleges. We find that dispersion in college value-added in terms of labor market outcomes is moderate compared to differences in earnings returns across fields of study. We further show that value-added in labor market outcomes is correlated with value-added in academic outcomes. We conclude that in English further education, *what* one studies tends to matter more than *where* one does so.

*Keywords: Value-added, returns to education, returns to college, field of study, further education, vocational education and training*

# 1 Introduction

Technological progress is changing the nature of many occupations. Tasks that traditionally have been executed by workers are increasingly performed by robots. Moreover, the declining costs of automation have accelerated the decrease in the demand for low-skill and routine jobs.<sup>2</sup> Adapting to this new environment will require that many workers acquire new skills in post-secondary education programs (Stromquist, 2019). While universities can provide the skills the labor market demands, they are not a feasible option for a large fraction of the population. Many individuals do not have the academic prerequisites, time, or resources to pursue a university degree. Therefore, enrolling in vocational education and training (VET) programs constitutes a natural response to the current dynamics of the labor market for many young people and adults.

In this study, we assess the relevance of two important decisions that prospective students have to make when pursuing vocational studies: We analyze whether *where* one studies is more (or less) relevant for labor market outcomes than *what* one studies. To this end, we estimate how differences in the quality of further education (FE) colleges in England and returns to field of study taught at these colleges contribute to explaining labor market outcomes for young and adult learners. Further, we ask what mechanisms drive heterogeneity in college value-added.

We start by analyzing FE colleges' effects on student human capital accumulation and labor market outcomes by estimating institution's *value-added* (VA) in terms of academic performance, earnings, and employment status.<sup>3</sup> Next, to explore the mechanisms that might be driving heterogeneity in college quality, we correlate college inspection ratings, indicators of resources available to students, and learning formats (e.g., distance learning, in the classroom, etc.) with measures of FE college VA. Finally, we estimate returns to fields of study taught at FE colleges and compare them with our VA estimates.

In our empirical strategy, we follow two approaches shaped by the nature of the outcome variables under study. First, to estimate VA in educational outcomes, where no repeated measures over time of the dependent variable exist, we use a cross-sectional strategy where an unusually detailed set of control variables helps to account for many potential confounders. The identifying assumption for this type of empirical specifications is that, conditional on observable characteristics, students are randomly assigned to FE colleges. We discuss the plausibility of this assumption and provide robustness checks supporting it. Second, we implement lagged dependent variable and individual level fixed effects models to provide estimates of FE college VA in labor market outcomes and earnings returns to field of study. The fixed effects analysis corresponds to estimating a treatment-on-the-treated effect, where we compare average gains in the outcome variable after vocational education attendance across different colleges or after specializing in a given sector. This approach allows us to deal with any time-invariant unobserved characteristics that might be related to potential outcomes. We also discuss and address concerns related to potential time-varying selection.

To the best of our knowledge, this study is the first to provide rigorous measures of FE college VA in terms of labor market outcomes for a large set of vocational institutions. The closest studies to ours are Clotfelter et al. (2013), Carrell and Kurlaender (2020), and Kurlaender, Carrell, and Jackson (2016), who estimate VA for community colleges in North Carolina and California. However, their estimates are focused on college outcomes rather than labor market outcomes. Much research in the economics of education has focused on estimating *returns* to vocational degrees or on the returns to attending different *types* of institutions (e.g., public vs. for-profit, 4-year vs. 2-year colleges). For example, Jepsen, Troske, and Coomes (2014) use labor market information prior to and after enrolling in US community colleges in Kentucky to study the returns to different degrees. Cellini and Turner (2019) use a difference-in-difference strategy to analyze the returns to attending for-profit colleges in the US. Similarly,

Andrews, Li, and Lovenheim (2016) analyze the labor market returns to attending community colleges relative to high-quality four-year institutions in Texas.<sup>4</sup> However, none of these studies assesses the degree of heterogeneity in VA across different community colleges. Moreover, our analysis involves estimating VA measures across *all* FE colleges in England, providing a complete picture of this sector. Furthermore, while many papers have studied the mechanisms that make some vocational institutions successful in the US (Jacoby 2006; Bailey et al. 2006; Calcagno et al. 2008; Stange 2012; Carrell and Kurlaender 2020), most of these analyses relate success only to academic outcomes, while we extend this analysis to labor market outcomes.

Finally, we bring new insights into understanding the relevance of fields of study for labor market outcomes.<sup>5</sup> Our focus on the returns to the number of learning hours *enrolled* in qualifications associated with specific fields of study, rather than achieved hours or completed degrees, provides two main advantages. First, it helps to alleviate endogeneity concerns related to differential selection into completion and achievement of qualifications. Second, the fact that individuals enroll in multiple qualifications from different specializations (i.e., not necessarily their main specialization) implies that our identification of the returns to fields of study is also obtained from students specializing in other fields.<sup>6</sup> If instead, we were focusing on estimating returns to completing degrees in different fields of study, these would only be identified from individuals who completed their studies in the specific field as their major. Furthermore, this is the first study to provide rigorous estimates on the returns to a large number of detailed fields of study in vocational education, as opposed to higher education, in England.

We find substantial heterogeneity in FE colleges' contributions to their students' educational attainment. Compared to the mean in the population, a one standard deviation (SD) increase in college VA increases the number (share) of achieved learning hours by 8.1% (6.5%). We also find that a one SD increase in college quality increases the likelihood of obtaining a good upper secondary qualification - a pre-requisite for attending university in

England - by 4.4 percentage points, or 10.5% compared to the sample mean, and increases the likelihood of later attending university by nearly 4 percentage points, or 10% compared to the sample mean. These findings indicate that certain FE colleges are more effective than others at enhancing academic outcomes.

Our findings also indicate a relatively modest dispersion in FE college value-added in terms of earnings, especially for individuals who attend FE college later in life. We show that a one SD increase in FE college VA leads to an increase in daily earnings of around 3% for individuals first attending FE college between ages 18 and 20 (*young learners*) and by 1.6% for individuals attending FE college later in life, between ages 25 and 54 (*adult learners*). Differences in the dispersion of VA between young and adult learners are likely driven by the fact that young learners enroll in and complete substantially more learning hours than adults, making the intensity of the treatment very different between the two groups. To put these numbers into context, Broecke (2012) shows that a one SD increase in university selectivity in the UK leads to a rise in earnings of approximately 7%. Relating our findings to returns to associate degrees in the US, Jacobson, LaLonde, and Sullivan (2005b) find that an additional year of community college increases earnings by 9% for men and 13% for women, which is substantially larger than the gain that could be obtained from attending an FE college with a one SD higher VA. In summary, while the overall returns to vocational education can be large, the dispersion in FE college value-added in terms of earnings is much smaller. Regarding the effects of FE colleges on improving employment probabilities, we find that a one SD increase in FE college VA increases the likelihood of being employed more than 90 days in a given year by only about 1.7 and 1 percentage points for young and adult learners, respectively. This represents only a slight increase of 2.3% and 1.2%, respectively, compared to the mean employment rate in the sample.

The potential mechanisms that could be driving the variability in FE college VA in labor market outcomes include both student achievement at college and college inputs. Our findings suggest a significant correlation between FE college VA in academic outcomes and FE college VA in earnings. Learning modes also seem to play a role in explaining variation in VA, with colleges offering a larger share of their courses in the classroom having higher VA in earnings for young learners. However, we find no correlation between measures of college spending and FE college VA in either earnings or employment.<sup>7</sup> For adult learners, we do not find meaningful correlations between VA in labor market outcomes and characteristics of colleges, which is likely due to the little variation in VA in labor market outcomes across colleges for this subgroup of the population.

How does the moderate heterogeneity in value-added across colleges in terms of earnings compare to the importance of field of study when it comes to labor market outcomes? We find comparatively large variation in the returns to different fields of study, especially for young learners. For instance, the typical young male learner who chooses engineering and manufacturing technology as his main field of study experiences an increase in average post-FE college daily earnings of 7.7% five years after finishing college. In contrast, the typical young male student choosing preparation for life and work experiences negative earnings returns of on average approximately 2% five years post-FE, compared to pre-enrollment earnings.<sup>8</sup> These findings are consistent with the literature on returns to field of study in vocational education. According to a review by Belfield and Bailey (2017a), the returns to an associate degree in a STEM field tend to be larger than for other fields.

Disparities in returns to sector are also large among young female learners. Average earnings returns five years post-FE college graduation range from a substantial 16.4% for arts, media and publishing to a mere 0.8% for preparation for life and work. Finally, we also find

that many specializations present negative returns immediately after finishing VET education that turn positive five years later, indicating that it takes time for positive returns to emerge.

In summary, our results show that there is important variation in returns to field of study, and this variation plays a larger role in labor market outcomes when compared to variation in FE college quality measured by VA. If we order fields of study based on their returns for the typical young male (female) learner, then changing from a field that is in the 10th percentile to one in the 90th percentile would lead to an increase in returns that is approximately 84% (43%) larger than if we were performing the same exercise based on FE college value-added.

We believe that our findings have relevant practical implications for many students and policymakers. First, they allow prospective FE college students better to understand the variation in quality across different institutions and compare the returns to different fields of study.<sup>9</sup> This is particularly important in light of the evidence suggesting that students tend to be misinformed about the labor market returns of VET qualifications. Baker et al. (2018), for instance, find that only 13% of students in a sample of community college students in California correctly rank four broad categories of majors in terms of salary. Second, our findings on mechanisms can inform policymakers about plausible paths to enhance the efficiency of a sector that is facing significant challenges, such as a perceived decline in quality and student performance, growing demands on their mission, and financial pressures related to increased competition for students and shrinking further education budgets.<sup>10</sup>

The remainder of this paper is organized as follows: Section 2 gives an overview of the institutional setting. Section 3 describes the data. Section 4 presents the empirical strategies used. In Section 5, we present FE college VA estimates, as well as robustness checks and the analysis of potential mechanisms explaining differences in VA across institutions. In Section 6, we present results on the returns to field of study. Section 7 concludes.