

Where versus What: College Value-Added and Returns to Field of Study in Further Education*

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Online Appendix

*The authors thank participants at the CEP (LSE) labor Market Workshop, the Royal Economic Society conference, the AEDE annual conference, FEDEA workshop, the Centre for Economic Performance Annual conference, the Southern Economic Association conference, and the UB (IEB), the UCL CEPEO, and CVER (LSE) seminar series for helpful suggestions and comments. The authors are grateful to the Department of Education and the SFA for providing the data and valuable background information. The latter bear no responsibility for the analysis or interpretation of these data.

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Online Appendix

A.1 Data Appendix

Data for Young Learners To estimate the value-added of FE colleges and study the returns to field of study at FE colleges for young learners, we create a dataset containing family background information, characteristics of the school attended during compulsory secondary education, information on the educational attainment during compulsory schooling, information on courses taken in FE colleges, information on subsequent enrollment in university and employment histories and earnings for four cohorts of school leavers completing compulsory schooling in the academic years from 2003/2004 to 2006/2007. Except for some publicly available datasets detailed below, most data are provided by the UK Department for Education and comes from the recently created Longitudinal Educational Outcomes (LEO) administrative database. This dataset combines several sources.

Data on students' background characteristics and prior attainment comes from the National Pupil Database (NPD) and include two sources: the pupil level census and the learning outcomes data. Information on ethnicity, gender, special educational needs, free school meal eligibility status while in compulsory schooling and eight different measures of neighborhood characteristics come from the pupil census.¹ Performance in math and English tests in Key Stages 2 to 4 come from the learning outcomes data. We add a quality measure of the KS4 secondary school attended to this data, which is publicly available from the UK Office for Standards in Education (Ofsted).

¹The eight covariates of neighborhood characteristics correspond to Income Deprivation, Employment Deprivation, Health Deprivation and Disability, Education Skills and Training Deprivation, Barriers to Housing and Services, Living Environment Deprivation, Crime and Income Deprivation Affecting Children.

Administrative data on further education comes from the Individualized Learner Record (ILR) database, and comprises all individuals in our cohorts who attended publicly funded vocational education and training between 2004 and 2014. The ILR includes extensive information on the FE college curricula undertaken by each learner, including the guided learning hours per course taken, the level of the courses, the field of study of each course, the type of qualification, the awarding body of the different qualifications and whether the learner attended the FE college on a full- or part-time basis. We construct a variable indicating the main field of study of the learner by computing the guided learning hours in each field, and designating the field where they undertake the highest overall share of their learning as their main field of study.²

Higher education data are provided by the Higher Education Statistics Agency (HESA) and comprises all individuals in our Key Stage 4 cohorts observed at a higher education institution in the UK. The data contains information on when a student first enrolled in higher education, the type of degree they enrolled in, the outcome of the degree and the major chosen. We observe higher education outcomes up until individuals in our sample are aged between 25 and 29, i.e. up to nine years after leaving compulsory education for the youngest cohort, and up to 12 years after leaving compulsory education for the oldest cohort.

Finally, these datasets are linked to labor market outcomes. Earnings data comes

²We follow the classification of specializations given by Sector Subject Areas (Tier 1). Sector Subject Areas (also called sector subject categories) are a single framework of sectors and subjects used to categorize qualifications, developed for use across relevant education agencies and bodies in England, Wales and Northern Ireland. The 15 categories are: 1) Health, Public Services and Care, 2) Science and Mathematics, 3) Agriculture, Horticulture and Animal Care, 4) Engineering and Manufacturing Technology, 5) Construction, Planning and the Built Environment, 6) Information and Communication Technology, 7) Retail and Commercial Enterprise, 8) Leisure, Travel and Tourism, 9) Arts, Media and Publishing, 10) History, Philosophy, and Theology, 11) Social Sciences, 12) Languages, Literature and Culture, 13) Education and Training, 14) Preparation for Life and Work, 15) Business Administration and Law. We exclude qualifications in the field called *Preparation for Life and Work* in the computation of the main field of study, unless the learner only takes qualifications in that field, as these qualifications are normally taken alongside other qualifications in sectors that would constitute the main field of study.

from Her Majesty’s Revenue and Customs (HMRC) records and data on employment and benefit records comes from the Department for Work and Pension (DWP). We observe employment spells (including start and end dates) and earnings for individuals of our cohorts of learners up to the tax year 2017, that is, for a minimum of 10 and a maximum of 13 years after leaving compulsory education, for the youngest and oldest cohorts, respectively. Given the panel nature of the earnings and employment dataset, we can observe many individuals both before, during and after attending FE colleges, providing us with a unique opportunity to assess returns to qualifications and FE college value-added using individual fixed effects models.

Our labor market outcomes of interest are log daily earnings, and daily earnings in levels (including zeros for non-employed individuals), log annual earnings and annual earnings in levels, and the probability of being employed for more than 90 days in a given year.³ We also look at academic outcomes, i.e. academic achievement while at FE colleges, and progression to higher education. In particular, the outcome variables of interest are the total number and the share of guided learning hours a student achieved (both measures of learning completion), whether they achieved at least one level 3 qualification (which is a measure of academic progression, since most students enter FE colleges with qualifications at level 2 or below). We also define a measure of progression to university, by creating a dummy variable indicating whether an individual was ever observed as enrolling in a bachelor’s degree in higher education.

Column 2 of Table A16 in Appendix A.2 shows the number of students in the cohorts of young learners we study, which range from about 570,000 in the academic year 2003/2004 to nearly 600,000 in 2006/2007. More than half of the students in each cohort choose

³As in ?, our measure of daily earnings in levels includes observations with zero earnings and therefore captures both employment and earnings effects, whereas the log specification captures only earnings for those who work.

qualifications at level 2 or 3 at further education providers (Column 3), and the majority of them studies in General FE colleges (Column 4). The last column shows the number of FE colleges (which decreases slightly over the period due to mergers among FE institutions).

To see how the population of young learners in FE colleges differs from the general population of school-leavers, Table [A17](#) in Appendix [A.2](#) compares summary statistics for our sample of interest of young learners enrolled at level 2 and above in FE colleges with the overall population of school leavers. Learners in further education colleges tend to be more disadvantaged, measured as having received free school meals (FSM) at some point during their compulsory schooling (14.1% versus 12.4%). In terms of educational attainment, students undertaking learning in FE colleges at levels 2 and above have lower prior attainment, with only about 33% achieving 5 GCSEs with grades between A* and C, including English and math, a commonly used measure of attainment in England. This compares to 44.5% on average among the overall cohort of learners. In terms of outcomes, the bottom Panel of Table [A17](#) in Appendix [A.2](#) shows that students in FE are 0.7 percentage points less likely to be employed for at least 90 days. This is measured in 2015, when students are between 24 and 27 years old. They also have lower median annual earnings (£14,149 versus £15,740).

Data for Adult Learners The data on learning undertaken by adults in General FE colleges comes from a version of the ILR dataset that allows identifying individuals over time. This dataset is available from the academic years 2003 to 2012. As is the case for young learners, this dataset includes information about the learners and about the different qualifications (i.e. courses) taken while in further education institutions. We use information on the level of learning and the number of guided learning hours in each of the qualifications, the field of study, the type of qualification(s) undertaken, and

the awarding body certifying those qualifications. With this information, we construct a variable indicating the main field of study for each adult learner following the same methodology as for young learners.

We merge information on earnings and employment records coming from the HMRC datasets to ILR records. The information on employment spells is available from tax years 2003 to 2017, whereas information on gross annual earnings by tax year is available from 2004 to 2017. Compared to the young learners dataset, we do not have prior attainment and lack some background characteristics, such as free-school meal eligibility.

Sample Selection Our group of learners of interest are those students observed in the ILR as being enrolled in General FE (or Tertiary) colleges, in either a level 2 or a level 3 course, which is equivalent to lower and upper secondary education, respectively. We focus on these learners to have a relatively homogeneous group of students. As ? show, vocational learning in England is extremely diverse and the different types of qualifications show very different progression patterns. We focus on young learners first enrolling in FE college between the academic years 2004/05 to 2009/10 and those who complete their FE college learning in the academic year 2015/16 or before, to ensure we have sufficient post-FE earnings and employment observations and a long enough time has passed to be able to observe them in higher education post-FE college. As seen in Table [A16](#) in the Appendix, in Column 4, there are more than 1 million young learners with these characteristics.

For young learners, we drop individuals from our sample who are not in year group 11 at age 16 (i.e., they have repeated or skipped at least one school year, which is rare in England), and who do not have at least one full GCSE entry and for whom a measure of the KS4 performance, the end of compulsory schooling exam in England, is missing.

We also cannot consider students that are not observed in the student census (i.e. with missing demographic data) and those observed in further education data for whom we do not have information on whether they attend FE on a full or part-time basis. We also drop individuals for whom we cannot identify the main field of study in the FE college, because data on the field of study of their qualifications is missing. Finally, we drop all institutions with less than 30 learners. After these steps, we are left with 85% of the initial group of interest.

A key feature of the VET sector is that a large proportion of individuals show some labor market experience before enrolling in FE colleges. For example, Tables ?? and ?? show that between 44% and 76% (71% and 78%) of young (adult) learners have worked at least 3 months within the three years before enrolling in FE education.⁴ This characteristic of the data will allow us to implement two different empirical strategies to estimate FE college value-added and the returns to different fields of study in vocational education.

Among the young learners, we focus our main analysis on those aged between 18 and 20 at the time they first enrolled in an FE college, to ensure that we have a relatively homogeneous sample with a large share of individuals with pre-FE college earnings and employment data. Our baseline sample comprises 130,009 individuals. We also perform robustness checks using the entire sample of young learners. Finally, for individuals that are observed in more than one college we only consider the institution in which they did most of the learning.⁵

Similar restrictions apply for adult learners. We additionally restrict the sample

⁴For young learners, this includes the two years prior to enrolling in an FE college for the first time, and the year of enrollment. For adult learners, this includes all three years prior to joining an FE college, and the year of enrollment.

⁵About 78% of young learners in the dataset only attend one college.

to those who first enrolled in an FE college between the academic years 2006/07 and 2009/2010. This is because we want to observe adult learners several periods before and after they first enroll in an FE college during the period of data availability. Moreover, given that we cannot link higher education data for adult learners, we restrict our sample of adults to those aged 25 to 59 when they first enroll in further education. This is because the majority of learners that start some type of learning in FE colleges after age 25 are very unlikely to be observed in higher education institutions afterwards.

We apply a series of other sample restrictions for the adult learner sample. Similar to young learners, for those individuals that are observed in more than one FE college, we only consider their main institution in terms of learning.⁶ In line with the restrictions applied for young learners, we focus our attention on individuals whose maximum level of learning observed at the FE college is level 2 or above. Finally, we drop all institutions with less than 30 learners. In total, we have a baseline sample of 803,939 adult learners.

Since not all learners have earnings and employment information available, the final sample for both value-added regressions and for estimating the returns to specializations will depend on the outcome measure considered.

⁶About 81% of adult learners in the dataset only attend one college.

A.2 Additional Tables

Table A1: Summary Statistics for Young Learners - Males

	(1)	(2)	(3)
	16-17	18-20	Total
Students	416,637	67,041	483,678
FE Colleges	258	255	260
Learner Characteristics			
Share max. level enrolled: 2	32.84	35.22	33.17
Share max. level enrolled: 3	56.07	50.89	55.35
Share max. level enrolled: 4	0.31	0.79	0.38
Share observed in HE after FE	28.29	33.66	29.03
Average guided learning hours enrolled	1,101	642	1,037
Duration of learning (days)	783	536	749
Average nb. of courses enrolled	5.35	2.81	5.00
Median distance KS4 school to FE college (km)	6.58	10.43	7.04
Labour market characteristics			
Share employed before FEC entry*	42	75	47
Earnings in FEC entry year	4,029	8,028	5,112
Earnings before FEC entry	3,619	7,292	5,705
Earnings 5 years post FEC	14,211	15,858	14,442

Source: NPD, ILR, HESA and LEO.

Notes: The table shows summary statistics for young learners aged 16 to 20, enrolled in a further education college at level 2 and above and first enrolling in an FE college between 2005 and 2010. FEC=Further Education College. Earnings are annual and reported in real terms (in 2015 £). *=Employed in at least one of the two years preceding college entry or in entry year.

Table A2: Summary Statistics for Young Learners - Females

	(1)	(2)	(3)
	16-17	18-20	Total
Students	422,302	62,968	485,270
FE Colleges	258	255	260
Learner Characteristics			
Share max. level enrolled: 2	26.34	32.64	27.16
Share max. level enrolled: 3	66.95	58.30	65.83
Share max. level enrolled: 4	0.39	1.12	0.48
Share observed in HE after FE	33.51	39.75	34.32
Average guided learning hours enrolled	1,129	601	1,061
Duration of learning (days)	751	474	715
Average nb. of courses enrolled	5.80	2.76	5.40
Median distance KS4 school to FE college (km)	6.28	9.07	6.56
Labour market characteristics			
Share employed before FEC entry*	46	76	50
Earnings in FEC entry year	3,493	7,147	4,499
Earnings before FEC entry	3,162	6,475	5,035
Earnings 5 years post FEC	12,294	13,151	12,408

Source: NPD, ILR, HESA and LEO.

Notes: The table shows summary statistics for young learners aged 16 to 20, enrolled in a further education college at level 2 and above and first enrolling in an FE college between 2005 and 2010. FEC=Further Education College. Earnings are annual and reported in real terms (in 2015 £). *=Employed in at least one of the two years preceding college entry or in entry year.

Table A3: Summary Statistics for Adult Learners - Males

	(1)	(2)	(3)	(4)	(5)
	25-29	30-39	40-49	50-59	Total
Learners	65,501	138,450	111,983	61,207	377,141
FE Colleges	255	255	255	255	255
Learner Characteristics					
Share max. level enrolled: 2	64.41	63.36	62.53	62.91	63.22
Share max. level enrolled: 3	28.21	29.21	30.72	31.76	29.90
Share max. level enrolled: 4	7.38	7.43	6.75	5.33	6.88
Average guided learning hours enrolled	240	195	147	99	173
Duration of learnings (days)	295	272	244	205	257
Average nb. of courses enrolled	2.31	2.14	1.96	1.78	2.06
Median distance to FE college (home)	12.07	12.60	13.67	13.87	13.02
Labour market characteristics					
Share employed before FEC entry*	71.95	71.43	73.11	76.44	72.83
Earnings in FEC entry year	9,280	11,787	14,393	15,211	12,681
Earnings before FEC entry	8,737	11,634	14,483	15,703	12,637
Earnings 5 years post FEC	22,719	24,512	25,735	23,810	24,474

Source: ILR and HMRC.

Notes: The table shows summary statistics for male adult learners aged 25 to 59, enrolled in a further education college at level 2 and above and first enrolling in FE college learning between 2007 and 2010. FEC=Further Education College. Earnings are annual and reported in real terms (in 2015 £). *=Employed in at least one of the two years preceding college entry or in entry year.

Table A4: Summary Statistics for Adult Learners - Females

	(1)	(2)	(3)	(4)	(5)
	25-29	30-39	40-49	50-59	Total
Learners	70,385	155,279	135,103	66,031	426,798
FE Colleges	255	255	255	255	255
Learner Characteristics					
Share max. level enrolled: 2	54.75	56.64	61.87	69.79	60.02
Share max. level enrolled: 3	35.83	35.18	30.19	23.74	31.94
Share max. level enrolled: 4	9.41	8.18	7.95	6.46	8.04
Average guided learning hours enrolled	255	225	170	112	195
Duration of learnings (days)	343	339	312	264	319
Average nb. of courses enrolled	2.26	2.20	2.00	1.77	2.08
Median distance to FE college (home)	6.93	7.33	8.95	10.91	8.25
Labour market characteristics					
Share employed before FEC entry*	69.71	71.75	76.41	79.98	74.16
Earnings in FEC entry year	7,651	7,885	9,630	11,602	8,974
Earnings before FEC entry	7,104	7,716	9,340	11,572	8,726
Earnings 5 years post FEC	17,187	16,971	17,730	17,146	17,291

Source: ILR and HMRC.

Notes: The table shows summary statistics for female adult learners aged 25 to 59, enrolled in a further education college at level 2 and above and first enrolling in FE college learning between 2007 and 2010. FEC=Further Education College. Earnings are annual and reported in real terms (in 2015 £).*=Employed in at least one of the two years preceding college entry or in entry year.

Table A5: Earnings correlations of individuals never attending FE

	Young Learners				Adult learners			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log daily earn. t-9	0.236*** (0.007)	0.195*** (0.007)	0.192*** (0.007)	0.170*** (0.007)	0.482*** (0.001)	0.442*** (0.001)	0.447*** (0.001)	0.444*** (0.001)
Male		0.364*** (0.007)	0.364*** (0.007)	0.406*** (0.007)		0.147*** (0.002)	0.149*** (0.002)	0.151*** (0.002)
FSM eligible			-0.116*** (0.010)	-0.070*** (0.010)				
KS4 score (std)				0.102*** (0.003)				
Age						0.064*** (0.001)	0.065*** (0.001)	
Age ²						-0.001*** (0.000)	-0.001*** (0.000)	
IDACI score						-0.093*** (0.005)	-0.084*** (0.005)	
<i>Prior attainment:</i>								
Level 1 or below								0.004 (0.004)
Full level 2								0.028*** (0.004)
Full level 3 or above								0.077*** (0.003)
Unknown								0.020*** (0.003)
Constant	3.018*** (0.025)	2.925*** (0.023)	2.951*** (0.024)	3.072*** (0.023)	2.032*** (0.005)	2.128*** (0.005)	1.146*** (0.018)	1.106*** (0.018)
Observations	22248	22248	22248	22248	432344	432344	432344	432344

Source: LEO. The table shows coefficients from regressing log daily earnings at age 27 (young learners, Columns 1-4) or in the year 2017 (adult learners, Columns 5-8) on log daily earnings of the same individual 9 years before. Sample restricted to individuals who never attended FE college or other post-secondary education (young) or who were observed in FE college or other VET for the last time in 2007 or before (adults). FSM eligible is a dummy equal to one for learners who received free school meals in the last year of compulsory schooling. The IDACI score is a measure of geographic deprivation (a higher score indicates higher deprivation, based on the postcode of residence). Level 1 or below, Full level 2, Full level 3 or above or unknown are dummies indicating the prior attainment (before FE college) of adult learners. The omitted category is not holding any qualifications.

Table A6: Value-Added in Academic Outcomes

	16-20 year olds			25-59 year olds		
	(1) All	(2) Male	(3) Female	(4) All	(5) Male	(6) Female
	<i>Total GLH achieved</i>					
SD Value-Added (A)	60.037	64.807	58.953	22.052	23.532	23.570
S.E.	(0.459)	(0.723)	(0.705)	(0.235)	(0.385)	(0.345)
Mean dep var (B)	726.618	706.500	746.966	120.115	107.896	130.257
(A)/(B)	0.083	0.092	0.079	0.184	0.218	0.181
Observations	696,171	349,770	346,373	627,193	284,471	342,722
Nb. of colleges	238	237	238	254	254	254
	<i>Share of GLH achieved</i>					
SD Value-Added (A)	0.046	0.052	0.043	0.053	0.061	0.053
S.E.	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Mean dep var (B)	0.687	0.680	0.694	0.721	0.715	0.726
(A)/(B)	0.067	0.077	0.062	0.074	0.085	0.074
Observations	695,828	349,571	346,229	617,786	280,217	337,569
Nb. of colleges	238	237	238	254	254	254
	<i>Achieved 1+ Level 3 Qualification</i>					
SD Value-Added (A)	0.039	0.043	0.039	0.057	0.076	0.055
S.E.	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Mean dep var (B)	0.484	0.434	0.534	0.301	0.301	0.301
(A)/(B)	0.081	0.099	0.074	0.191	0.254	0.182
Observations	696,171	349,770	346,373	627,193	284,471	342,722
Nb. of colleges	238	237	238	254	254	254
	<i>Entered Higher Education^A</i>					
SD Value-Added (A)	0.038	0.038	0.038			
S.E.	(0.000)	(0.001)	(0.001)			
Mean dep var (B)	0.329	0.300	0.359			
(A)/(B)	0.114	0.128	0.106			
Observations	696,171	349,770	346,373			
Nb. of colleges	238	237	238			

Notes: The table shows summary statistics of value-added measures based on estimations of Equation (??) (without lagged dependent variables). The reported standard deviations of value-added measures are adjusted for sampling error. A=Observed in a higher education institution at level of bachelor degree and above. **Estimates based on cross-sectional data for young learners** as defined in the notes to Table ???. **Estimates based on cross-sectional data for adult learners** include the following controls: Series of dummies for region where FE college is located, academic year first entered FEC, age first entered FE college, whether student attends full-time or part-time, ever entered apprenticeship, a series of dummies for main sector, gender, a series of dummies for ethnicity (White, Mixed, Asian/Chinese, Black), a set of dummies indicating learning difficulties (unknown, some learning difficulty), a series of dummies indicating prior attainment (No qualifications, Level 1 or below, Full level 2, Full level 3 or above, unknown), dummies indicating whether employed in the three years before FEC entry (Worked in year of entry, worked 1 year before entry, worked 2 years before entry, worked 3 years before entry), and a series of deprivation indicators (crime, employment, health, income) based on FE college postcode and based on learner's postcode coming from ILR.

Table A7: Value-Added in labor market outcomes for individuals never attending HE

	Cross-Section			Panel		
	(1) All	(2) Male	(3) Female	(4) All	(5) Male	(6) Female
	<i>Log daily earnings in 2017</i>					
SD Value-Added	0.040	0.035	0.049	0.026	0.031	0.028
S.E.	(0.003)	(0.003)	(0.004)	(0.002)	(0.003)	(0.003)
Observations	42,226	22,969	18,260	52,358	28,969	22,705
Nb. of colleges	224	202	200	246	230	227
	<i>Log annual earnings in 2017</i>					
SD Value-Added	0.039	0.038	0.050	0.038	0.051	0.039
S.E.	(0.005)	(0.006)	(0.008)	(0.003)	(0.004)	(0.004)
Observations	42,226	22,969	18,260	52,358	28,969	22,705
Nb. of colleges	224	202	200	246	230	227
	<i>Daily earnings in Levels in 2017 (incl. zeros for not employed)</i>					
SD Value-Added (A)	1.964	2.507	2.075	1.552	1.955	1.537
S.E.	(0.358)	(0.466)	(0.552)	(0.237)	(0.356)	(0.355)
Mean dep var (B)	41.716	48.285	33.786	40.901	47.356	32.969
(A)/(B)	0.047	0.052	0.061	0.038	0.041	0.047
Observations	56,316	30,644	25,170	70,632	38,693	31,400
Nb. of colleges	226	213	215	249	235	237
	<i>Employed > 90 days in 2017</i>					
SD Value-Added (A)	0.007	0.012	0.013	0.019	0.026	0.016
S.E.	(0.002)	(0.003)	(0.004)	(0.002)	(0.002)	(0.003)
Mean dep var (B)	0.716	0.720	0.712	0.708	0.713	0.701
(A)/(B)	0.010	0.017	0.018	0.027	0.036	0.022
Observations	58,950	31,846	26,611	74,101	40,280	33,288
Nb. of colleges	227	214	216	250	236	238

Notes: The table shows summary statistics of value-added measures based on estimations of Equation (??) for cross-sectional data and Equation (??) for panel data. The reported standard deviations of value-added measures are adjusted for sampling error. **Estimates based on cross-sectional and panel data for young learners** as defined in the notes to Table ???. Sample: Individuals aged 18-20 when first enrolling in an FE college, excluding individuals who attend higher education at some point after FE college.

Table A8: Value-Added in Labor Market Outcomes in 2017 - by age group

	16-20 year olds			16-17 year olds		
	Cross-Section			Cross-Section		
	(1)	(2)	(3)	(4)	(5)	(6)
	All	Male	Female	All	Male	Female
<i>Log daily earnings in 2017</i>						
SD Value-Added	0.036	0.033	0.043	0.037	0.034	0.043
S.E.	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	521,057	265,142	255,874	450,629	228,566	222,025
Nb. of colleges	238	237	237	235	234	234
<i>Log annual earnings in 2017</i>						
SD Value-Added	0.040	0.037	0.047	0.041	0.038	0.048
S.E.	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Observations	521,057	265,142	255,874	450,629	228,566	222,025
Nb. of colleges	238	237	237	235	234	234
<i>Daily earnings in Levels in 2017 (incl. zeros for not employed)</i>						
SD Value-Added	1.972	2.244	2.074	2.022	2.324	2.068
S.E.	(0.059)	(0.082)	(0.090)	(0.055)	(0.107)	(0.070)
Mean dep var (B)	44.916	50.324	39.388	44.861	50.330	39.319
(A)/(B)	0.044	0.045	0.053	0.045	0.046	0.053
Observations	664,768	336,031	328,711	574,618	289,213	285,349
Nb. of colleges	238	237	238	235	234	234
<i>Employed > 90 days in 2017</i>						
SD Value-Added	0.010	0.015	0.011	0.011	0.016	0.012
S.E.	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Mean dep var (B)	0.754	0.755	0.753	0.755	0.757	0.752
(A)/(B)	0.014	0.020	0.014	0.015	0.021	0.016
Observations	696,098	349,731	346,339	601,425	300,785	300,611
Nb. of colleges	238	237	238	235	234	235

Notes: The table shows summary statistics of value-added measures based on estimations of Equation ?? for cross-sectional data and Equation (??) for panel data. The reported standard deviations of value-added measures are adjusted for sampling error. **Estimates based on cross-sectional and panel data for young learners** as defined in the notes to Table ??.

Table A9: Value-Added in Log Daily Earnings in 2017

	18-20 year olds - Cross-Section								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
SD Value-Added	0.077	0.072	0.052	0.049	0.040	0.040	0.039	0.037	0.036
S.E.	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	70,321	70,321	70,321	70,321	70,321	70,321	70,321	70,321	70,321
Nb. of colleges	227	227	227	227	227	227	227	227	227
Gender	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Timing	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SES	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Neighborhood	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Prior attainment	No	No	No	No	No	Yes	Yes	Yes	Yes
Lagged earnings	No	No	No	No	No	No	Yes	Yes	Yes
Main sector	No	No	No	No	No	No	No	Yes	Yes
Full-time / Part-time	No	No	No	No	No	No	No	No	Yes

Notes: The table shows summary statistics of value-added measures based on estimations of Equation (??) for cross-sectional data. The reported standard deviations of value-added measures are adjusted for sampling error. Specification (1) shows raw VA. Specification (2) controls for gender. Specification (3) additionally controls for fixed effects for academic year compulsory schooling was completed, a series of dummies for the last year observed in education (FE or HE), dummy variables indicating the number of years since starting FE and age first entered FE college. Specification (4) additionally controls for a series of dummies for ethnicity (White, Mixed, Asian/Chinese, Black), a dummy for whether English spoken at home, a dummy for whether student had special educational needs, dummy for whether student was eligible for free school meals in KS4 year. Specification (5) additionally controls for neighbourhood IDACI score based on postcode prior to joining FE college and a series of dummies for region where FE college is located. Specification (6) additionally controls for standardized KS4 score, OFSTED rating of KS4 school, KS3 maths result, KS3 English result, KS2 English result, KS2 maths result. Specification (7) additionally controls for series of dummies indicating whether the student had worked before FE college (never worked before college, worked in year of entry, worked 1 year before entry, worked 2 years before entry), earnings measured prior to FE entry, indicator for when earnings prior to entry were measured, and an interaction between pre-FEC earnings measure and timing of measurement. Specification (8) additionally controls for a series of dummies for main sector. Specification (9) additionally controls for a series of dummies indicating mode of attendance (Fulltime, Full-time part year, Part time, Unknown/Missing).

Table A10: Earnings Returns to Field of Study - **Males** (young learners)

Field of Study	(1) Coefficients		(3)	(4) Estimated return		(6)
	Υ_1	Υ_2	Mean GLH if main field	1 year post FE	5 years post FE	Share of individuals specializing in field
Health, Public Services and Care	0.003 (0.002)	0.001 (0.000)	402	0.013 (0.008)	0.022*** (0.007)	8.1%
Science and Mathematics	-0.006 (0.004)	0.002*** (0.001)	447	-0.015 (0.015)	0.024 (0.013)	2.2%
Agriculture, Horticulture and Animal Care	-0.005 (0.003)	0.001 (0.001)	633	-0.031 (0.019)	-0.017 (0.017)	1.7%
Engineering and Manufacturing Technology	0.004*** (0.001)	0.001*** (0.000)	622	0.036*** (0.007)	0.069*** (0.006)	20.4%
Construction, Planning and the Built Environment	-0.002 (0.001)	0.001*** (0.000)	614	-0.005 (0.007)	0.024*** (0.006)	18.3%
Information and Communication Technology	-0.006*** (0.002)	0.002*** (0.000)	706	-0.031* (0.012)	0.022* (0.011)	6.7%
Retail and Commercial Enterprise	0.000 (0.003)	0.000 (0.000)	477	0.002 (0.011)	0.002 (0.010)	4.6%
Leisure, Travel and Tourism	-0.009*** (0.002)	0.003*** (0.000)	570	-0.035*** (0.009)	0.026** (0.008)	8.8%
Arts, Media and Publishing	-0.009*** (0.002)	0.002*** (0.000)	926	-0.066*** (0.013)	0.000 (0.011)	10.8%
History, Philosophy and Theology	-0.025** (0.008)	0.004** (0.001)	411	-0.087** (0.030)	-0.018 (0.025)	0.5%
Social Sciences	-0.012 (0.011)	0.004* (0.002)	356	-0.030 (0.037)	0.027 (0.033)	0.3%
Languages, Literature and Culture	-0.008 (0.014)	0.005** (0.002)	118	-0.003 (0.015)	0.023 (0.013)	0.7%
Education and Training	0.023 (0.015)	0.006** (0.002)	197	0.057* (0.027)	0.105*** (0.023)	0.3%
Preparation for Life and Work	-0.016*** (0.003)	0.000 (0.000)	154	-0.024*** (0.004)	-0.023*** (0.003)	9.4%
Business Administration and Law	0.000 (0.002)	0.002*** (0.000)	551	0.008 (0.010)	0.042*** (0.009)	7.3%
Observations	286,935					

Notes: The Υ_1 's are coefficients from individual fixed effects regressions of log daily earnings on the total number of guided learning hours (in '00) enrolled in a particular field of study (Equation ??). Υ_2 is the interaction term between guided learning hours enrolled (in '00) and years since finishing FE college education. The estimated returns reported in Columns 4 and 5 are the marginal effects, one and five years after leaving the college, respectively, of choosing the sector as the main sector. The regression controls for guided learning hours enrolled by awarding body and type/level of qualification, plus the interaction term between GLH enrolled by type/level of qualification and years since finishing FE college, college fixed effects and cumulative experience, in addition to the controls reported in Section ?. Sample: Male learners aged 18-20 who were enrolled in FE college between 2005 and 2010 and who study towards qualifications at level 2 or above.

Table A11: Earnings Returns to Field of Study - **Males** (adult learners)

Field of Study	(1)	(2)	(3)	(4)	(5)	(6)
	Coefficients		Mean GLH	Estimated return		Share of individuals
	Υ_1	Υ_2	if main field	1 year post FE	5 years post FE	specializing in field
Health, Public Services and Care	-0.010*** (0.001)	0.003*** (0.000)	73	-0.004*** (0.000)	0.010*** (0.000)	19.0%
Science and Mathematics	-0.036*** (0.002)	0.007*** (0.000)	215	-0.042*** (0.003)	0.034*** (0.003)	1.1%
Agriculture, Horticulture and Animal Care	-0.022*** (0.002)	0.004*** (0.000)	182	-0.022*** (0.002)	-0.012*** (0.002)	1.5%
Engineering and Manufacturing Technology	-0.006*** (0.001)	0.003*** (0.000)	207	-0.009* (0.004)	0.008** (0.003)	19.0%
Construction, Planning and the Built Environment	-0.010*** (0.001)	0.003*** (0.000)	284	-0.007 (0.004)	0.033*** (0.003)	10.7%
Information and Communication Technology	-0.021*** (0.001)	0.005*** (0.000)	166	-0.029*** (0.002)	0.006*** (0.002)	7.9%
Retail and Commercial Enterprise	-0.007*** (0.002)	0.002*** (0.000)	88	-0.018*** (0.001)	-0.009*** (0.001)	6.9%
Leisure, Travel and Tourism	-0.033*** (0.002)	0.004*** (0.000)	134	-0.023*** (0.002)	-0.013*** (0.002)	3.7%
Arts, Media and Publishing	-0.022*** (0.001)	0.004*** (0.000)	342	-0.053*** (0.003)	-0.018*** (0.002)	2.3%
History, Philosophy and Theology	-0.075*** (0.003)	0.011*** (0.001)	389	-0.153*** (0.006)	0.050*** (0.004)	0.5%
Social Sciences	-0.049*** (0.005)	0.008*** (0.001)	348	-0.066*** (0.007)	0.032*** (0.005)	0.1%
Languages, Literature and Culture	-0.005 (0.004)	0.001 (0.001)	113	-0.005** (0.002)	0.000 (0.002)	1.6%
Education and Training	0.003* (0.001)	0.001*** (0.000)	119	-0.005*** (0.001)	0.023*** (0.001)	6.8%
Preparation for Life and Work	-0.025*** (0.002)	0.005*** (0.000)	109	-0.013*** (0.001)	0.026*** (0.001)	4.7%
Business Administration and Law	0.002* (0.001)	0.001*** (0.000)	131	0.003*** (0.001)	0.014*** (0.001)	14.2%
Observations	2,695,465					

Notes: The Υ_1 's are coefficients from individual fixed effects regressions of log daily earnings on the total number of guided learning hours (in '00) enrolled in a particular field of study (Equation ??). Υ_2 is the interaction term between guided learning hours enrolled (in '00) and years since finishing FE college education. The estimated returns reported in Columns 4 and 5 are the marginal effects, one and five years after leaving the college, respectively, of choosing the sector as the main sector. The regression controls for guided learning hours enrolled by awarding body and type/level of qualification, plus the interaction term between GLH enrolled by type/level of qualification and years since finishing FE college, college fixed effects and cumulative experience, in addition to the controls reported in Section ?. Sample: Male adult learners aged 25-59 who were enrolled in FE college between 2006/07 and 2009/2010 and who study towards qualifications at level 2 or above.

Table A12: Earnings Returns to Field of Study - **Females** (young learners)

Field of Study	(1)	(2)	(3)	(4)	(5)	(6)
	Coefficients		Mean GLH	Estimated return		Share of individuals
	Υ_1	Υ_2	if main field	1 year post FE	5 years post FE	specializing in field
Health, Public Services and Care	-0.003 (0.002)	0.002*** (0.000)	514	-0.004 (0.009)	0.044*** (0.008)	25.3%
Science and Mathematics	-0.011** (0.004)	0.006*** (0.001)	369	-0.020 (0.014)	0.068*** (0.012)	2.8%
Agriculture, Horticulture and Animal Care	-0.002 (0.003)	0.004*** (0.000)	796	0.015 (0.019)	0.145*** (0.016)	2.5%
Engineering and Manufacturing Technology	0.005 (0.004)	0.003*** (0.001)	555	0.043* (0.021)	0.099*** (0.018)	1.2%
Construction, Planning and the Built Environment	-0.005 (0.005)	0.003*** (0.001)	630	-0.014 (0.030)	0.065* (0.025)	0.8%
Information and Communication Technology	-0.007 (0.004)	0.004*** (0.001)	351	-0.010 (0.013)	0.048*** (0.011)	3.0%
Retail and Commercial Enterprise	0.002 (0.002)	0.003*** (0.000)	590	0.033** (0.012)	0.114*** (0.011)	25.0%
Leisure, Travel and Tourism	-0.002 (0.002)	0.004*** (0.000)	611	0.014 (0.013)	0.121*** (0.012)	5.6%
Arts, Media and Publishing	-0.006** (0.002)	0.005*** (0.000)	877	-0.002 (0.014)	0.185*** (0.013)	11.3%
History, Philosophy and Theology	-0.019** (0.007)	0.007*** (0.001)	432	-0.054* (0.026)	0.064** (0.021)	1.0%
Social Sciences	0.005 (0.010)	0.006*** (0.002)	336	0.040 (0.032)	0.127*** (0.029)	0.4%
Languages, Literature and Culture	-0.016 (0.009)	0.004** (0.001)	133	-0.015 (0.011)	0.007 (0.010)	1.2%
Education and Training	0.029*** (0.009)	0.002 (0.001)	165	0.051*** (0.013)	0.062*** (0.011)	1.5%
Preparation for Life and Work	-0.022*** (0.005)	0.005*** (0.001)	175	-0.031*** (0.008)	0.004 (0.007)	5.9%
Business Administration and Law	0.004 (0.002)	0.005*** (0.000)	430	0.039*** (0.009)	0.119*** (0.008)	12.5%
Observations	226,524					

Notes: The Υ_1 's are coefficients from individual fixed effects regressions of log daily earnings on the total number of guided learning hours (in '00) enrolled in a particular field of study (Equation ??). Υ_2 is the interaction term between guided learning hours enrolled (in '00) and years since finishing FE college education. The estimated returns reported in Columns 4 and 5 are the marginal effects, one and five years after leaving the college, respectively, of choosing the sector as the main sector. The regression controls for guided learning hours enrolled by awarding body and type/level of qualification, plus the interaction term between GLH enrolled by type/level of qualification and years since finishing FE college, college fixed effects and cumulative experience, in addition to the controls reported in Section ?. Sample: Female learners aged 18-20 who were enrolled in FE college between 2005 and 2010 and who study towards qualifications at level 2 or above.

Table A13: Earnings Returns to Field of Study - **Females** (adult learners)

Field of Study	(1)	(2)	(3)	(4)	(5)	(6)
	Coefficients		Mean GLH	Estimated return		Share of individuals
	Υ_1	Υ_2	if main field	1 year post FE	5 years post FE	specializing in field
Health, Public Services and Care	-0.010*** (0.001)	0.005*** (0.000)	136	-0.007*** (0.001)	0.019*** (0.000)	34.3%
Science and Mathematics	-0.028*** (0.002)	0.009*** (0.000)	177	-0.035*** (0.003)	0.028*** (0.002)	2.2%
Agriculture, Horticulture and Animal Care	-0.014*** (0.001)	0.001*** (0.000)	343	-0.042*** (0.004)	-0.022*** (0.003)	1.1%
Engineering and Manufacturing Technology	-0.007** (0.002)	0.002*** (0.000)	172	-0.008* (0.003)	0.007** (0.002)	1.2%
Construction, Planning and the Built Environment	-0.006*** (0.002)	0.004*** (0.000)	398	-0.010 (0.006)	0.046*** (0.005)	0.5%
Information and Communication Technology	-0.023*** (0.001)	0.005*** (0.000)	134	-0.023*** (0.002)	0.005*** (0.001)	7.2%
Retail and Commercial Enterprise	-0.023*** (0.001)	0.002*** (0.000)	218	-0.044*** (0.002)	-0.023*** (0.002)	11.3%
Leisure, Travel and Tourism	-0.019*** (0.002)	0.002*** (0.000)	176	-0.030*** (0.003)	-0.017*** (0.002)	1.7%
Arts, Media and Publishing	-0.018*** (0.001)	0.003*** (0.000)	291	-0.046*** (0.002)	-0.015*** (0.002)	2.7%
History, Philosophy and Theology	-0.052*** (0.002)	0.013*** (0.000)	431	-0.169*** (0.006)	0.056*** (0.005)	1.1%
Social Sciences	-0.026*** (0.002)	0.007*** (0.000)	429	-0.082*** (0.009)	0.039*** (0.007)	0.3%
Languages, Literature and Culture	-0.006** (0.002)	0.001** (0.000)	130	-0.006** (0.002)	0.000 (0.002)	2.5%
Education and Training	-0.010*** (0.001)	0.006*** (0.000)	140	-0.006*** (0.001)	0.027*** (0.001)	12.7%
Preparation for Life and Work	-0.021*** (0.001)	0.009*** (0.000)	139	-0.017*** (0.002)	0.034*** (0.001)	6.5%
Business Administration and Law	0.000 (0.001)	0.002*** (0.000)	187	0.004*** (0.001)	0.020*** (0.001)	14.8%
Observations	3,194,471					

Notes: The Υ_1 's are coefficients from individual fixed effects regressions of log daily earnings on the total number of guided learning hours (in '00) enrolled in a particular field of study (Equation ??). Υ_2 is the interaction term between guided learning hours enrolled (in '00) and years since finishing FE college education. The estimated returns reported in Columns 4 and 5 are the marginal effects, one and five years after leaving the college, respectively, of choosing the sector as the main sector. The regression controls for guided learning hours enrolled by awarding body and type/level of qualification, plus the interaction term between GLH enrolled by type/level of qualification and years since finishing FE college, college fixed effects and cumulative experience, in addition to the controls reported in Section ?. Sample: Female adult learners aged 25-59 who were enrolled in FE college between 2006/07 and 2009/2010 and who study towards qualifications at level 2 or above.

Table A14: Distribution of guided learning hours by main field of study and age group -
Males

Main Sector	Sector	Share of total GLH (%)	
		age 18-20	age 16-20
Construction & Planning	Health, Public Services & Care	0.64	0.83
	Science & Mathematics	0.13	0.21
	Agriculture, Horticulture & Animal Care	0.15	0.14
	Engineering & Manufacturing Technology	2.02	1.86
	Construction & Planning	85.57	80.35
	Information & Communication Technology	0.36	0.50
	Retail and Commercial Enterprise	0.14	0.13
	Leisure, Travel and Tourism	0.31	0.41
	Arts, Media and Publishing	0.22	0.34
	History, Philosophy & Theology	0.03	0.02
	Social Sciences	0.04	0.05
	Languages, Literature & Culture	0.09	0.16
	Education & Training	0.05	0.03
	Preparation for Life & Work	6.98	11.06
	Business Administration & Law	0.35	0.23

Notes: The table shows the share of guided learning hours enrolled in the different sectors conditional on enrolling in construction and planning as the main sector.

Table A15: Distribution of guided learning hours by main field of study and age group -
Females

Main Sector	Sector	Share of total GLH (%)	
		age 18-20	age 16-20
Health, Public Services & Care	Health, Public Services & Care	85.77	78.94
	Science & Mathematics	0.53	1.08
	Agriculture, Horticulture & Animal Care	0.17	0.09
	Engineering & Manufacturing Technology	0.04	0.10
	Construction & Planning	0.11	0.06
	Information & Communication Technology	0.27	0.47
	Retail and Commercial Enterprise	1.64	1.20
	Leisure, Travel and Tourism	0.40	0.73
	Arts, Media and Publishing	0.44	0.62
	History, Philosophy & Theology	0.11	0.10
	Social Sciences	0.09	0.25
	Languages, Literature & Culture	0.39	0.90
	Education & Training	0.13	0.13
	Preparation for Life & Work	6.58	10.17
	Business Administration & Law	0.32	0.58

Notes: The table shows the share of guided learning hours enrolled in the different sectors conditional on enrolling in health and social care as the main sector.

Table A16: Number of Students and General/Tertiary FE Colleges

(1) Year completion compulsory schooling	(2) Number of students (cohort size)	(3) L2/L3+ in ILR	(4) of which: in FE College	(5) # of FE Colleges
2003/2004	572,513	304,816	244,427	260
2004/2005	575,789	307,331	246,555	258
2005/2006	585,973	318,877	256,774	255
2006/2007	597,763	336,575	272,123	250
Total	2,332,038	1,267,599	1,019,879	

Source: NPD and ILR.

Note: Column (1) shows the academic year in which the student completed compulsory schooling (at age 16). Column (2) shows the total number of students reported in the NPD pupil level census completing compulsory schooling in a given academic year. Column (3) shows the number of students enrolled in L2/L3+ in ILR, which includes students enrolled in any qualifications above Level 2 in General/Tertiary FE colleges or Sixth Form colleges, that were in year group 11 by the end of KS4, with data on KS4 performance and appearing in the pupil level census. Column (4) shows the subset of those in Column (3) that are enrolled in FE colleges. Column (5) shows the number of General/Tertiary FE colleges.

Table A17: Summary Statistics: All Students and our Population of Interest

	(1) All school leavers	(2) L2/L3+ in FE colleges
<i>Demographics and education</i>		
Male	0.504	0.496
Eligible for Free School Meals (FSM)	0.124	0.141
White ethnicity	0.837	0.837
English Spoken at Home	0.907	0.911
Special Educational Needs (SEN)	0.160	0.174
5 or more GCSEs at A*-C incl. English & Maths	0.445	0.330
Ever enrolled in a Bachelor Degree	0.371	0.268
<i>Labour market outcomes</i>		
Employed for more than 90 days [§]	0.794	0.787
Median annual earnings [§] (£)	15,740	14,149
Number of students	2,332,038	1,019,879

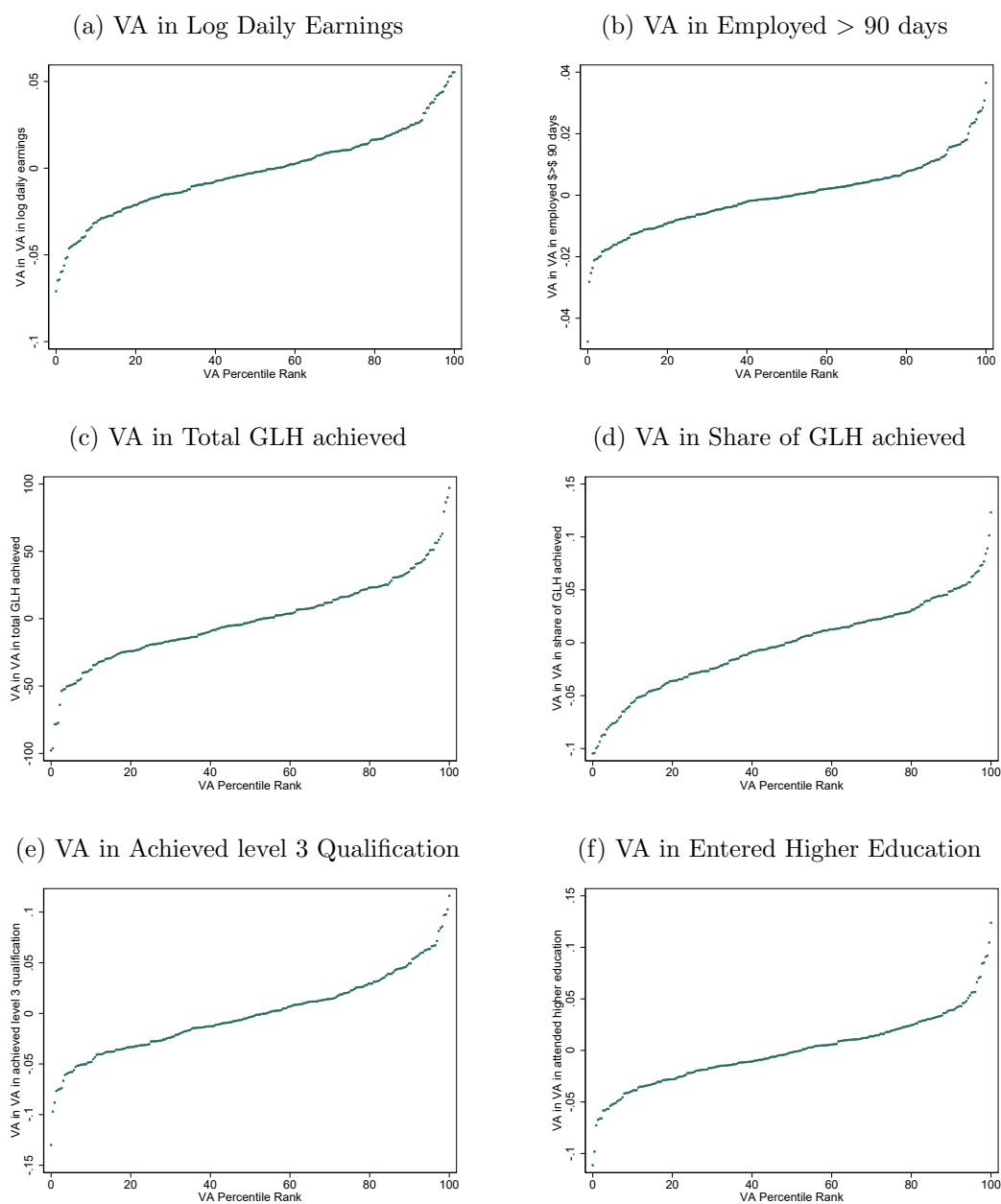
Source: NPD, ILR, HESA and LEO.

Notes: Column (1) shows summary statistics for all four cohorts of school leavers (2003/04-2006/07). Column (2) shows summary statistics for students enrolled in L2/L3+ in FE, which includes students enrolled in any qualifications above Level 2 in General/Tertiary FE colleges, who were in year group 11 by the end of KS4, with data on KS4 performance and appearing in the pupil level census.

§ = Measured in 2015.

A.3 Additional Figures

Figure A1: Distribution of VA measures in different outcomes



Note: The graphs show estimates of value-added in different outcomes against the college's percentile rank in terms of value-added in this outcome, estimated using panel data (sub-figures (a) and (b)) and cross-sectional data (sub-figures (c) to (f)) for individuals aged 18-20 when first enrolling in FE college.