

Does Dual Vocational Education Pay Off?

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Work in progress

OECD

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27 November 2019

Motivation

- ▶ The introduction of dual VE in 2012 is a promising reform
- ▶ The evidence for countries with consolidated dual systems (GE, AU) suggests it can improve school-to-work transitions and reduce youth unemployment. A key objective for Spain
- ▶ It addresses structural problems in Spain's education system
 - ▶ Weak link between education system and the labor market
 - ▶ Low (pre-crisis) enrolment in vocational education
 - ▶ High dropout rates in secondary education
- ▶ But the introduction of dual VE also entails risks and challenges given the large share of SMEs

Motivation

Tradeoffs regarding labor market insertion:

Dual

- ▶ Students acquire more work experience and occupation-relevant skills in a professional setting
- ▶ Training firms can screen apprentices for a longer period, which may mitigate information asymmetries and foster retention/recruitment

Full-time

- ▶ Teachers may be more effective in teaching transversal/abstract skills and have superior pedagogical ability vis-à-vis tutors at firms
- ▶ School instruction may foster a better mix between general and specific human capital

Tradeoffs

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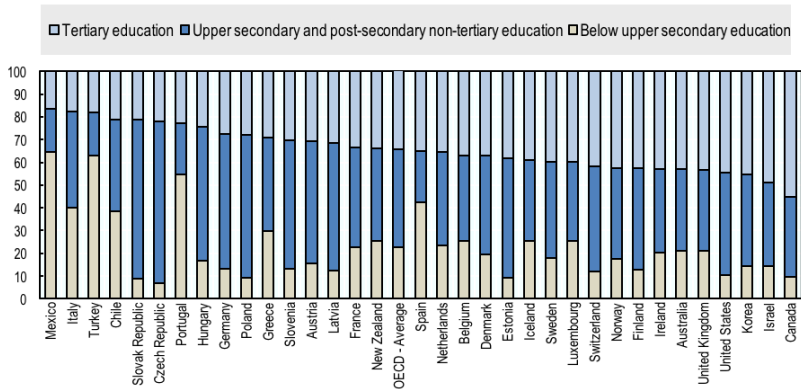
Full-time

- ▶ Teachers may be more effective in teaching transversal/abstract skills and have superior pedagogical ability vis-à-vis tutors at firms
- ▶ School instruction may foster a better mix between general and specific human capital

A potential tradeoff between quick insertion and less stability at later stages

Facts

Distribution of educational attainments entrants



Source: OECD, *Getting Skills Right: Spain* (2017)

Facts

Comparatively low enrolment in vocational education

Table: Orientation of the highest degree of formal education

Orientation	SP	GE	FR	UK	NL
<i>General</i>	80.2	21.9	39.0	57.1	23.1
<i>Vocational</i>	19.8	78.1	61.0	42.9	76.9
Mainly school-based	17.6	1.7	37.8	6.7	
Dual	1.9	75.2	0.0	0.0	
Mainly work-place based	0.2	1.2	21.6	31.7	
No distinction available	0.1	0.0	1.6	4.5	76.9

Source: Dolado, Felgueroso, Jansen, Fuentes and Wolfi, 2013

Note: People aged 15-34 in 2009 with at least secondary education who have left formal education. Calculations based on 2009 ad-hoc module ELFS

Facts

School-to-work transitions

The interplay between skill mismatch and the dual labor market causes delays in the school-to-work transition

Table: Employment rates 3 years after leaving formal education (%)

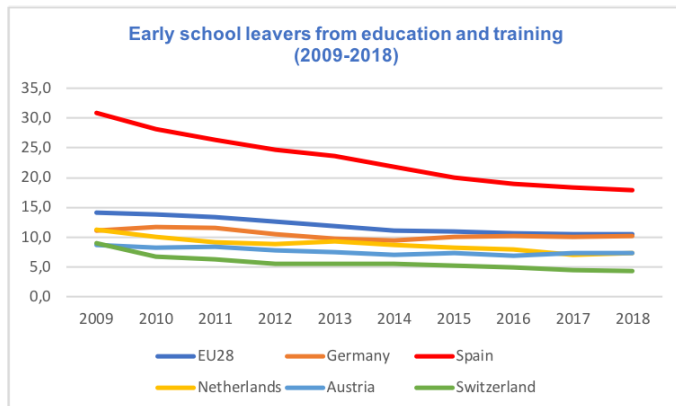
ISCED97	All	3-6	3-4	5-6
EU27	70.5	75.2	69.3	81.8
Spain	53.8	62.0	49.0	67.9
Germany	78.9	83.7	80.5	90.0
Austria	82.0	87.4	85.8	92.1
Switzerland	86.1	87.2	83.3	91.8
Netherlands	87.1	91.4	89.0	93.5

Source: ELFS (2009), ad-hoc module "Entry of young people into the labour market"

In addition, Spain is among the EU countries with the highest share of overqualified university graduates

Facts

The evidence suggest that dual VE may help to reduce dropout rates in secondary education



The 2012 reform

Royal Decree 1529/2012 created the legal basis to offer dual tracks in vocational education:

- ▶ Dual VE provides access to the same degrees as full-time VE
- ▶ One-third or more of all training activities need to take place in firms (3-month internship in full-time VE)
- ▶ Adoption is voluntary
- ▶ No qualification required for tutors at firms
- ▶ Remuneration depends on legal status of apprentices
 - ▶ internship (voluntary)
 - ▶ apprenticeship contract (collective bargaining)

The ample margins of freedom have led to considerable differences across regions in the design and penetration of dual VE

This paper

- ▶ We use linked administrative data to evaluate the impact of dual VE in Madrid on a wide range of labor market outcomes
- ▶ The sample includes the entire first three cohorts of graduates in dual VE at the tertiary level (2014-2016)
- ▶ Our control group are similar students who graduated in the same years, fields and schools but in standard full-time tracks
- ▶ Our objective is to estimate the causal impact from moving a randomly selected group of students from full-time to dual VE

Selection on unobservables

We face very challenging identification problems:

- ▶ The detailed comparison of labor market outcomes at the school-field-year level is not sufficient to identify causal links
- ▶ In particular, student entry into dual VE may be driven by unobservable characteristics — like motivation or work attitudes — that also affect subsequent labor market outcomes
- ▶ To deal with this selection problem, we exploit a novel instrument based on the difference in commuting time to schools with dual and full-time tracks
- ▶ Unlike the existing literature, we also need to deal with the participation decisions of schools and firms and the endogenous selection of fields

Related literature

- ▶ Broad consensus that dual VE improves school-to-work transitions compared to full-time VE, but impact tends to temporary and evidence is inconclusive (e.g. Ryan (2008, 2011), Wolters and Ryan (2011))
- ▶ Two most related studies Parey (2009) and Brébion (2017). Broadly similar conclusions but weaker instruments
- ▶ Distance-based IVs to estimate returns (Card, 1999)

Contributions

- ▶ First impact evaluation of dual VE in Spain
- ▶ To the best of our knowledge, we have access to better-quality data than any of the existing studies on dual vs. full-time VE
- ▶ A novel identification strategy to deal with selection issues

Preview of main results

- ▶ Participation in dual VE has a significantly positive impact on days of work, earnings and retention rates during the first 2 years.
- ▶ We find no significant improvements in the quality of work
- ▶ The causal effects are only partially explained by the higher retention rates in the dual system
- ▶ No convergence over time in absolute terms and only weak convergence in relative terms

Plan

- ▶ Institutional background
- ▶ Data
- ▶ Empirical strategy
- ▶ Main results
- ▶ Robustness checks

Dual VE in the region of Madrid

- ▶ The region of Madrid formally introduced dual tracks in 2012, after a small pilot in 2011.
- ▶ Until 2016 dual tracks were only offered at the advanced level (*grado superior*)
- ▶ No alternation. First year in school, second year at the company — 3 months in standard VE
- ▶ Students are entitled to a stipend of 300 euros/month — No stipend in standard VE
- ▶ Entrance in dual tracks is decided at the start of the first year
- ▶ Firms interview candidates in the sixth month.

The rapid expansion of dual VE (2012-2014)

Table: The participation of students, schools and firms in dual VE in the region of Madrid

	2012-2013	2013-2014	2014-2015
Firms	27	156	356
Schools	6	9	20
Fields	13	17	24
Students			
1st year	392	696	1,135
2nd year	54	327	609

Source: Regional government of Madrid, *Datos y Cifras de la Educación*

The graduates from these first three cohorts represent 6.2% of all graduates in tertiary VE in 2014-2016

Data

1. Academic records tertiary VE & lower secondary education school ID
2. School characteristics (VE & SE)
3. Mean parental characteristics at SE school level
4. Social security records
5. Per capita income at SE school-district level
6. Distances between secondary schools and VE centers
7. Income statements and balance sheets of training firms

Sources:

- (1)-(3): Regional Government of Madrid
- (4): Spanish Ministry of Employment and Social Security
- (5): Spanish National Institute
- (6): Google Application Programming Interfaces (APIs)
- (7): Central Balance Sheet Office of the Bank of Spain

Academic records

Students

- ▶ Age, gender, nationality
- ▶ Field, center, track (dual, standard), full or part-time
- ▶ Date of enrolment and graduation
- ▶ Enrolment, exam participation and pass or fail by subject
- ▶ Entry route
- ▶ Grade point average in VE
- ▶ Training firm(s)
- ▶ Graduation dates for universe of non-university education 2004-2015 in Madrid
- ▶ Grade repetition during mandatory education

Schools

- ▶ Address, ownership (public, private, concerted), course menu

Social security records

The longitudinal social security records allow us to reconstruct the entire pre- and post-VE working histories with daily precision

- ▶ Monthly base wage for social security contributions (top coded)
- ▶ Start and end date of all employment spells
- ▶ Type of contract
- ▶ Occupational category
- ▶ Part-time coefficient
- ▶ Plant- and company level indicator
- ▶ Plant-level data on number of employees
- ▶ Sector of activity (NACE four digits)

Descriptive statistics

Sample characteristics

Table: Number of graduates by track and observed covariates

Observed variables	Dual	Full-time	Total
Education record	1,674	25,465	27,139
Employment record	1,629	21,973	23,602
Graduation date	1,590	19,748	21,338
Secondary school	977	10,239	11,216
Graduated in 2013	0	2,047	2,047
Graduated in 2014-2016	977	8,192	9,169

Note: Graduates from VE in Madrid in 2013-2016 in fields with dual VE. The table shows how sample size changes with the set of observable variables. In particular, the exact graduation date is not included in all education records (third line) nor the compulsory secondary education school, from which we construct its distances to VE schools (fourth line).

Descriptive statistics

Table: Schools and graduates by ownership and track

	Both tracks	Full-time only	Total
Schools			
<i>Public</i>	17	107	124
<i>Private concerted</i>	8	84	92
<i>Total</i>	25	191	216
	Dual	Full-time	%
Graduates (%)			
<i>Public</i>	71.7	78.4	72.4
<i>Private concerted</i>	28.3	21.6	27.6
<i>Total</i>	100.0	100.0	100.0

Note: Graduates from VE in Madrid in 2014-2016 in fields with dual VE. 9,169 observations.

Distribution of graduates by field and track

Field	Dual	Standard	Total
Organization of physical and sport activities	88	1,176	1,264
Clinical analysis and quality control	28	187	215
Industrial chemistry	9	6	15
Business management and marketing	57	630	687
Manufacturing design	10	40	50
Mechatronics	79	111	190
Automotive industry	105	447	552
Fashion design	13	74	87
Aircraft maintenance	21	91	112
Image diagnostics	23	229	252
Clinical diagnostics	39	539	578
Computer network management	46	638	684
Multi-platform application programming	66	480	546
Business and finance	96	1,366	1,462
International trade	8	134	142
Pre-school education	76	1,630	1,706
Management of tourist accommodation	82	163	245
Kitchen management	92	152	244
Management of catering services	39	99	138
Observations	977	8,192	9,169

Empirical strategy

Outcome variables

We compare the labor market outcomes of graduates from dual and full-time tracks in the 24 months following graduation

Outcome variables

- ▶ Days of work: raw and full-time equivalent (FTE)
- ▶ Probability of:
 - ▶ Having a regular job (3 months)
 - ▶ Having a permanent contract (*)
 - ▶ Working part-time (*)
 - ▶ Being retained by internship firm (first year)
- ▶ Earnings

(*) Spain 16-24 y.o. (2019): fixed-term contract rate 71%, part-time rate 37%

Empirical strategy

Baseline specification

Our baseline specification is as follows:

$$y_{i,j,k,t} = \alpha_t + \theta_j + \gamma_k + \beta X_i' + \delta Dual + v_{i,j,k,t}$$

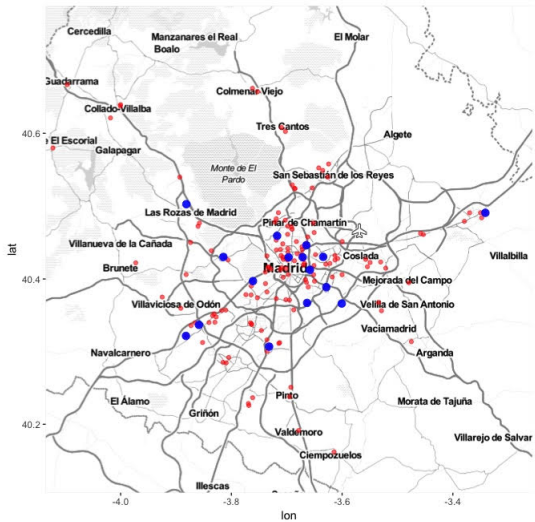
- ▶ $y_{i,j,k,t}$: labor market outcome of individual i graduated in field j at school k in year t
- ▶ α_t : graduation year and quarter fixed effects
- ▶ θ_j : field fixed effects
- ▶ γ_k : VE school fixed effects
- ▶ X_i' : vector of time-invariant individual characteristics
- ▶ $Dual$: 0/1 dummy for dual VE

Under the assumption of conditional independence δ would provide an unbiased estimate of ATE. But this assumption is most likely not met

Empirical strategy

Our IV

- ▶ We need a valid instrument for *Dual* conditional on the choice of field
- ▶ Here we exploit the difference in commuting time to the nearest VE schools that offer dual or full-time tracks in the chosen field
- ▶ We use the location of secondary schools as a proxy for home addresses. It predates the introduction of dual VE by several years
- ▶ **The exclusion restriction:** the differences in commuting time only affect labor market outcomes through their impact on track choice



Empirical strategy

Implementation

- ▶ We implement our IV strategy using 2SLS
- ▶ In the first stage we regress $Dual$ on the full set of observables (except school fixed effect) and our distance indicator

$$Dual_{i,j,t} = \alpha_t + \theta_j + \beta X_i' + \psi F(\Delta distance) + u_{i,j,t}$$

- ▶ We allow $F(\cdot)$ to be non-linear and allow for interactions between $\Delta distance$ and per capita income at SE school level
- ▶ In the second stage we replace $Dual$ in our baseline specification by its predicted value \hat{Dual}
- ▶ The associated coefficient provides an estimate of LATE on compliers — the individuals whose track choice is sensitive to commuting time

Descriptive statistics

Balancing table

Table: Graduate characteristics: dual vs. full-time

	Dual	Full time	Difference	<i>p</i> -value
Age (years)	22.8	22.4	0.4	0.0
Female	36.6	47.9	-11.3	0.0
Born abroad	2.1	2.6	-0.4	0.4
Prior experience (days)	105.3	85.6	19.8	0.0
Entry route				
<i>High school</i>	81.1	82.6	-1.5	0.2
<i>Secondary VE</i>	4.5	3.8	0.7	0.3
<i>Test</i>	10.7	11.1	-0.4	0.7
<i>Foreign degree</i>	0.3	0.1	0.2	0.2
<i>Unknown</i>	3.4	2.4	1.0	0.1
Previous VE	10.0	4.0	6.0	0.0
Secondary education (ESO)				
<i>No delay</i>	68.7	66.8	1.9	0.2
<i>1-yr delay</i>	22.4	23.7	-1.3	0.4
<i>2-yr delay</i>	8.9	9.6	-0.7	0.5
<i>Public</i>	20.2	23.0	-2.9	0.0
District income p.c.	14544.7	14250.1	294.6	0.0
Nearest dual school	17.4	20.8	-3.4	0.0
Nearest full-time school	12.0	9.7	2.3	0.0
Diff. Distance (min.)	5.4	11.2	-5.7	0.0
<i>N</i>	977	8192	9169	

Note: Graduates from VE in Madrid in 2014-2016 in fields with dual VE. Data are percentages unless otherwise indicated. Per capita income refers to 2013. Source: National Statistical Institute (Urban Audit) and Madrid city council.

Descriptive statistics

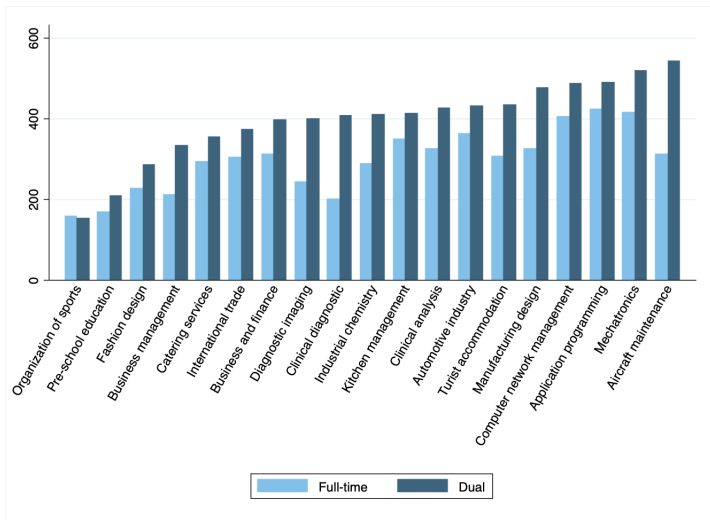
Table: Labor market outcomes (24 months)

	Dual	Full time	Difference	p-value
Days employed	452.7	337.5	115.2	0.0
Days employed FTE				
<i>Mean</i>	392.4	263.2	129.2	0.0
<i>Median</i>	418.6	182.8	235.8	0.0
Regular job	81.8	75.2	6.6	0.0
Open-ended contract	39.6	32.8	6.8	0.0
Part-time contract	49.4	62.1	-12.6	0.0
Retention rates				
<i>First month</i>	14.3	6.8	7.4	0.0
<i>First year</i>	21.7	14.4	7.2	0.0
Earnings				
<i>Mean</i>	15,416.1	11,033.8	4,382.3	0.0
<i>Median</i>	14,241.4	7,917.1	6,324.3	
<i>N</i>	977	8192	9169	

Note: Graduates from VE in Madrid in 2014-2016 in fields with dual VE. Observations: Retention: 6,395. Earnings: 9,072.

Descriptive statistics

Days of work FTC by field



Results

Table: Dual VE and Days of work FTE: Adding covariates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Calendar fixed effects	Demographics	Entry	Experience	Lower SE	Field fixed effect	School fixed effect
Dual VE	122.55*** (8.73)	107.26*** (8.35)	105.93*** (8.36)	104.71*** (8.31)	104.57*** (8.29)	80.75*** (11.04)	94.04*** (11.04)
Observations	9169	9169	9169	9169	9169	9169	9169
Adjusted R^2	0.02	0.02	0.02	0.02	0.01	0.01	0.01

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: Graduates from VE in Madrid in 2014-2016 in fields with dual VE. OLS estimates using Stata module reghdfe (Correia, 2017). Control variables: age at graduation and its square, born abroad, work experience and its square, entry route (high school, secondary VE, test, and unknown), previous tertiary VE, lower SE one- and two-year delay and public school, log average district per capita income, and field, school, quarter, and year of graduation fixed effects. Standard errors clustered by field and school in parenthesis (Cameron *et al.*, 2011). Notation: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

(*) Notice that the VE school fixed effect raises the value of the OLS estimate. This suggests our results provide a lower-bound for causal effects.

First stage IV

Table: First stage: Predicting student participation in Dual VE

	Δ Distance	Δ Distance ²	Δ Distance x log(Income pc)
Δ Distance	-2.92*** (0.40)	-3.53*** (0.42)	-19.65*** (6.17)
Δ Distance ²		1.91* (1.10)	1.98* (1.18)
Δ Distance x log(Income pc)			1.69*** (0.65)
Weak identification test	406.08***	417.30***	437.40***
Observations	9169	9169	9169
Pseudo R ²	0.20	0.20	0.21

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: Note: Graduates from VE in Madrid in 2014-2016 in fields with dual VE. Probit estimates. Control variables: age at graduation and its square, born abroad, work experience and its square, entry route (high school, secondary VE, test, and unknown), previous tertiary VE, lower SE one- and two-year delay and public school, log average district per capita income, and field, quarter, and year of graduation fixed effects. Standard errors clustered by field in parenthesis (Cameron *et al.*, 2011). Weak identification refers to the Kleibergen-Paap rk F statistic. Notation: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

First-stage

Relevance of IV

- ▶ In the rest of the analysis we will use the triple IV (non-linear and with interactions)
- ▶ Our IV passes all tests and is highly relevant
- ▶ Moving from the first to the ninth decile of the distribution of $\hat{D}ual$ reduces the probability of participation in dual VE by 78%!
 - ▶ $\hat{D}ual(P(10)) = 0.190$
 - ▶ $\hat{D}ual(P(90)) = 0.041$

Main results

Table: The causal impact of Dual VE on labor market outcomes

	Days	Days FTE	Regular	Perm	Part-time	Retention	Earnings
A. OLS							
Dual VE	80.93*** (10.33)	80.83*** (11.02)	0.04** (0.01)	0.04* (0.02)	-0.07** (0.02)	0.07** (0.03)	0.18*** (0.03)
Observations	9169	9169	9169	9169	9169	6395	9072
Adjusted R^2	0.01	0.01	-0.00	-0.00	-0.00	0.00	0.61
B. IV							
Dual VE	125.79** (50.11)	111.47** (44.83)	0.16* (0.09)	0.00 (0.09)	-0.04 (0.07)	0.12** (0.05)	0.30** (0.11)
$\Delta\%$	37.3	42.4				83.3	
Observations	9169	9169	9169	9169	9169	6395	9072
Adjusted R^2	0.01	0.01	-0.01	0.00	0.00	0.00	0.61

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

- (*) Contrary to what one may expect, we find evidence of negative selection into VE
(**) However, none of the differences is statistically significant

Robustness tests

We perform three sets of robustness tests to make sure that our estimated coefficients capture nothing else than the causal effect of a switch from full-time to dual VE

- ▶ A non-parametric version of our IV based on fixed effects for the nearest VE schools (*specification test*)
- ▶ Our baseline IV with sample restricted to Madrid capital (*potential weakness exclusion restriction*)
- ▶ Placebo test (*endogenous adoption of VE by schools*)

Non-parametric IV

Under review

In this non-parametric IV, the first-stage contains a pair of fixed effects rather than the difference in distance to the two nearest-by schools

Table: Dual VE and labor market outcomes. Non-parametric IV

	Days	Days FTE	Retention
Dual VE	140.96*** (27.14)	167.10*** (36.70)	0.25*** (0.05)
Observations	8.008	8.008	5.487

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

(*) Less exogenous than our baseline IV

(**) Substantial loss of observations

Robustness tests

Restricted sample

The lack of willingness to commute may also affect labor market outcomes. To mitigate this risk we restrict the sample to the capital.

Table: Dual VE and labor market outcomes (IV)

	Days	Days FTE	Regular	Perm	Part-time	Retention	Earnings
Dual VE	232.91*** (66.12)	219.05** (78.63)	0.26* (0.15)	0.05 (0.15)	-0.15 (0.21)	0.23 (0.21)	0.42 (0.27)
Observations	4732	4732	4732	4732	4732	3140	3140
Adjusted R^2	-0.03	-0.03	-0.03	-0.00	-0.00	-0.03	-0.02

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

(*) This yields an even stronger impact on days of work, yet the coefficient of earnings cease to be significant.

(**) By contrast, the OLS coefficients are smaller than in the baseline

Robustness tests

Placebo

- ▶ Our IV specification excludes school fixed effects (although in some cases the choice of dual is synonymous to school choice)
- ▶ In principle, the coefficient of $\hat{D}ual$ may therefore pick up persistent differences in school quality if these matter systematically for adoption of dual VE
- ▶ By the same token, schools may have introduced dual VE in selected fields with above-average insertion rates
- ▶ To rule out these possibilities, we perform a Placebo exercise using the 2013 cohort of graduates in full-time VE
- ▶ Those who graduated in a school and field that is offered as a dual track at any later moment are assigned to the Placebo treatment
- ▶ We use our baseline IV to estimate the Placebo effects

Placebo

Table: Dual VE and labor market outcomes: Placebo

	Days	Days FTE	Regular	Perm	Part-time	Retention
Dual VE	-0.01 (13.72)	-8.92 (8.62)	-0.00 (0.03)	-0.03 (0.04)	0.03 (0.03)	0.04 (0.04)
Observations	2047	2047	2047	2047	2047	1219
R^2	0.00	0.00	0.00	0.00	0.00	0.00

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: Graduates from VE in Madrid in 2013 in fields with dual VE. OLS estimates using Stata module reghdfe (Correia, 2017). Dual is imputed to students in schools and fields which offered the dual track in 2014-2016. Control variables: age at graduation and its square, born abroad, work experience and its square, entry route (high school, secondary VE, test, and unknown), previous tertiary VE, lower SE one- and two-year delay and public school, log average district per capita income, and field, quarter, and year of graduation fixed effects. Standard errors clustered by field in parenthesis (Cameron *et al.*, 2011). Notation: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

(*) Reassuringly, all parameter estimates are close to zero and insignificant

Discussion

- ▶ Our results rule out that the effects are driven by pre-existing differences in quality at the school-field level
- ▶ VE schools may have started new partnerships with firms to launch a dual track, but the data seem to discard this (no formal test yet)
- ▶ An alternative view is to consider the school-firm partnerships as part of the treatment
- ▶ We plan to address this issue using the balance sheet data of firms

Extensions

Learning effects

The causal effects are increasing over time. The 2016 cohort of graduates obtained the larger benefits.

Table: Dual VE and labor market outcomes (IV)

	Days	Days FTE	Regular	Perm	Part-time	Retention	Earnings
dual2014	53.48 (67.79)	17.51 (58.78)	0.07 (0.08)	-0.06 (0.17)	0.28*** (0.07)	0.09 (0.11)	-0.12 (0.21)
dual2015	112.28** (52.98)	82.28 (58.69)	0.21** (0.09)	-0.13 (0.08)	0.01 (0.09)	0.14 (0.09)	0.34** (0.14)
dual2016	133.34** (61.22)	129.00** (52.96)	0.13 (0.09)	0.08 (0.11)	-0.06 (0.08)	0.11* (0.05)	0.27* (0.13)
Observations	9169	9169	9169	9169	9169	6395	6395
R^2	0.01	0.01	-0.01	-0.00	-0.00	0.00	-0.01

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Extensions

The causal impact at different time horizons

Table: Dual VE and labor market outcomes (IV)

	Days	Days FTE	Regular	Perm	Part-time	Retention	Earnings
12 months							
Dual VE	60.33** (23.33)	58.55*** (20.06)	0.18** (0.06)	0.12* (0.06)	-0.08 (0.08)	0.12** (0.05)	26.8** (0.12)
Observations	9169	9169	9169	9169	9169	6395	6395
R^2	0.01	0.01	-0.00	-0.00	0.00	0.00	0.01
24 months							
Dual VE	125.79** (50.11)	111.47** (44.83)	0.16* (0.09)	0.00 (0.09)	-0.04 (0.07)	0.12** (0.05)	0.30** (0.11)
$\Delta\%$							
Observations	9169	9169	9169	9169	9169	6395	9072
Adjusted R^2	0.01	0.01	-0.01	0.00	0.00	0.00	0.61

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Extensions

Lessons

- ▶ Each cohort of dual VE obtained larger benefits than the previous ones.
 - ▶ This suggests that the returns obtained by the 2016 cohort offer the most reliable prediction for future returns
- ▶ We do not find evidence of a convergence in the outcomes over a 24 months horizon
 - ▶ This seems to rule out that the causal effects are driven by the higher retention rates in dual VE
- ▶ We do not find causal differences across fields (not shown)

To be done

1. Estimate quantile treatment effects — the effects at the median are much bigger than at the mean
2. Use alternative distance indicators to test robustness
 - ▶ Commuting time by public transportation
 - ▶ Distance in meters
3. Explore convergence in labor market outcomes over longer horizons
4. Transferability of skills (movers vs. stayers)
5. Explore the importance of training firm characteristics

Concluding remarks

- ▶ Our results confirm that dual VE improves insertion into employment compared to standard full-time VE
- ▶ The economic returns are surprisingly high and have a causal interpretation
- ▶ It is important to replicate the analysis for other regions (Catalonia, Basque Country)
 - ▶ External validity
 - ▶ To identify the best design and assess the importance of remuneration and alternation on returns
- ▶ Nonetheless, in the case of Madrid we already obtain some policy implications:
- ▶ The strong impact of distance on students' choices points to the need to improve orientation at secondary schools
- ▶ There is an ample scope for improvements by rationalising the supply of fields in line with labor market outcomes