Swiss Leading House VPET-ECON
A Research Center on the Economics of Education, Firm Behavior and Training Policies

Universities of Applied Sciences and Regional Firm Location: A Heterogeneity Analysis Across Fields of Study and Industries

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Introduction

Motivation:

- Empirical evidence: Positive effects of HEIs' output (i.e., R&D and human capital) on regional firm location (e.g., Audretsch & Lehmann, 2005; Baptista & Mendonça 2010; Varga 2000).
- However, two sources of heterogeneity often neglected:
- Knowledge outputs of HEIs vary across fields. Examples: i) codified vs. tacit knowledge, ii) applied vs. basic research, ii) specific vs. general human capital
  → First source of potential heterogeneity
- Knowledge inputs required by firms vary across industries. Examples: i) knowledge sources, ii) innovation patterns (e.g., radical, incremental, process innovation);
  → Second source of potential heterogeneity

Research question

- How do higher education institutions (HEI) in different study fields influence firm location across different manufacturing and service industries?

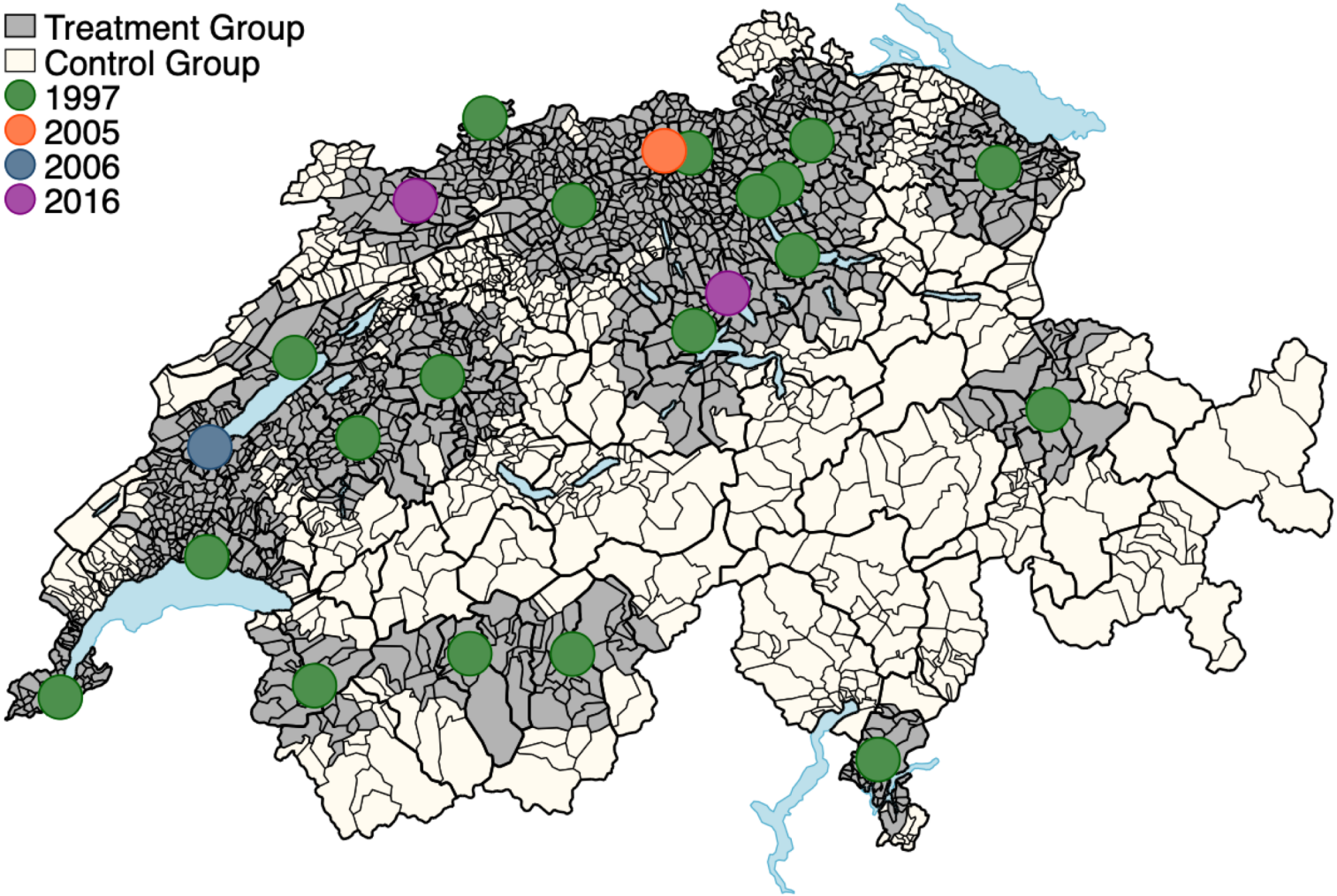
Data – matched at the municipality level

Data on the establishment of UASs:

- Self collected data on timing and location of the establishment of 139 UAS-campuses in 53 municipalities between 1997 and 2018 in Switzerland.
- Fields of study according to department of economic affairs, education & research: (1) Chemistry & Life Sciences, (2) Business, Management & Services, (3) Architecture, Construction & Planning, (4) Design, (5) Engineering & IT, (6) Music, Theater & other Arts, (7) Health, (8) Social Work
- Assign municipalities to treatment and control groups across fields of study.
- Assignment rule: All municipalities that are closes than 25-km to a UAS (as measured by actual travel distance).

Data – matched at the municipality level

Example: establishment of UASs in "Business, Management & Services":



Data – matched at the municipality level

Data on firm location:

- Business census: full survey of firms in manufacturing and service industries.
- Available for the years 1995, 1998, 2001, 2005, 2008, 2011-2017
- Use industry taxonomy that depends on a firms' knowledge inputs required and their prevailing innovation patterns *(Bonaccorsi et al. 2013):*

Manufacturing Industries	**Service Industries**
(1) Science-based *e.g., pharmaceuticals*	(5) knowledge-intensive business services *e.g., R&D*
(2) Supplier-dominated manufacturing *e.g., textiles and furniture*	(6) supplier-dominated *e.g., education*
(3) scale-intensive manufacturing *e.g., car industry*	(7) physical network *e.g., transportation*
(4) specialized supplier manufacturing *e.g., electrical and machinery equipment*	(8) information network *e.g., financial and insurance services*

Empirical strategy – fixed effects estimation

– Subsample estimation for the eight fields of study and the eight industry categories:

$$y_{it}^{m} = \alpha + \beta \mathrm{UAS}_{i(t-2)}^{k} + \delta \mathrm{UAS}_{i(t-2)}^{l \neq k} + \boldsymbol{x}'_{i(t-1)}\boldsymbol{\rho} + \tau_t + \phi_i + \mu_{it},$$

with: $i =$ municipality, $t =$ year, $m =$ industry category

Empirical strategy – address potential endogeneity issues

Control variables:

- Yearly population data to account for the "population density"

  → Controls for potential agglomeration effects *(Baptista & Mendoca 2010)*

- Yearly data on m^2 in gross floor space used for infrastructure *(provided by Wuest & Partner)*

  → Accounts for regional differences in infrastructure *(Bonaccorsi et al. 2013)*

- Yearly daytime satellite data

  → Controls for regional economic activity at the municipality level, where otherwise no data is available *(provided by Lehnert et al. 2020).*

Fixed effects

- Year fixed effects → Controls for common time trends of municipalities
- Municipality fixed effects → Controls for time-invariant municipality characteristics

Results – summary

Main analysis

- UASs in Chemistry & Life Sciences and Business, Management & Services: Associated with increases in firm location in service industries (knowledge-intensive business services, physical and network services).
- UAS in Design or Engineering & IT: Associated with few positive effects on service industries but negative effects on firm location in some manufacturing industries.
- UASs in Music, Theater & other Arts, Health and Social work: No significant effects on regional firm location.

Further analysis

- Positive effects associated with UASs in Chemistry & Life Sciences and Business, Management & Services driven by micro firms (potential startups)
- Slight positive effect of UASs in Engineering & IT on large firms in service indudstry

Interpretation and conclusion

Effect Heterogeneity

- Effects of UASs differ across fields of study and across industry categories.
- Outputs of UASs must match inputs required by local industries

Complementarity of universities and UASs in a regional ecosystem

- Service industries that show positive effects are predominantly characterized by innovation patterns based on incremental or process innovations.
- UASs—and their applied focus—favor other industries than academic universities do (as shown by others), and can thus complement them in a regional ecosystem.

UASs might foster consolidation and tertiarization

- Negative effects of UASs in Engineering & IT on manufacturing industries: UASs might provide human capital that fosters trend towards service oriented economy *(Schweri & Zbinden 2009)*

Thank you for your attention!

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For more information see:
"The Heterogeneous Impacts of Higher Education Institutions on Regional Firm Location: Evidence from the Swiss Universities of Applied Sciences"
by T. Schlegel & U. Backes-Gellner,
Swiss Leading House Economics of Education Working Paper No. 187.
(http://repec.business.uzh.ch/RePEc/iso/leadinghouse/0187_lhwpaper.pdf)

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