

Determinants of Knowledge and Technology Transfer Activities between Firms and Science Institutions in Switzerland

An Analysis Based on Firm Data

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Content of the Paper

- *Descriptive Analysis:*
 - Incidence of (various forms of) Knowledge and Technology Transfer (KTT) activities by sectors, industries, size classes
 - (Mediating institutions: technology transfer offices, government innovation agencies etc.)
 - Motives for KTT activities
 - Obstacles of KTT activities

Content of the Paper

- *Exploratory Analysis:*
 - Factors determining the (overall) propensity of Swiss firms to interact with public science institutions in Switzerland (KTT activities)
 - Factors determining the *main forms* of KTT activities (informational, educational, infrastructure-related, research and consulting activities)

Data

- Data collection by postal survey of about 5'700 firms based on a comprehensive questionnaire
- 2'582 answers (response rate: 45.4%) covering 25 industries (manufacturing, construction and selected service industries - without hotels/catering, retail trade, reale estate/leasing, personal services)
- Non-response analysis based on a telephone survey of about 300 non-respondents of the postal survey
- Multiple imputations for missing values
- Weighted descriptive data

Hypothesized Determinants of (various forms of) KTT Activities

- *Resource endowment of the firm:*
 - LQUAL (logarithm of the share of employees with tertiary-level education → human capital
 - LCI (logarithm of gross investment per employee) → physical capital
 - RD [R&D activities yes/no; RDI (ordinal measure: 0: no R&D; 1: occasional R&D; 2: permanent R&D)] → knowledge capital
- *Positive effects* are expected for all these variables

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- *Other firm characteristics:*
 - LEXP (logarithm of exports as a share of sales) → degree of exposition to international competition) → *positive effect*
 - FOREIGN (dummy variable for foreign firms) → no a priori sign expectation
 - LAGE (logarithm of firm age) → *positive effect*
 - Firm size (six dummies ; linear and quadratic term) → *positive effect*

- *Firm's environment:*

- Industry → *positive* effect for firms belonging to innovative, knowledge-based industries
- Region → *positive* effect for firms located in regions with a high density of universities

- *Mediating institution / science partner:*

- ETH (dummy variable for the two Federal Institutes of Technology)
- KTI (dummy variable for the «Commission of Technology and Innovation»)
- Technology transfer offices (dummy variable)
 - no a priori sign expectations for these three variables

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- *Motives for KTT activities (→ benefits):*
 - MOTIV1 to MOTIV4 (factor values) → *positive effects*
 - *Obstacles of KTT activities (→ costs):*
 - OBSTACLE1 to OBSTACLE5 (factor values) → *negative effects*

Main Results

- About 28% of all firms involved in KTT activities
- «Tacit» forms more important than «codified» forms
- More than 50% of KKT active firms involved primarily in *informational* and/or *educational* activities
- Between 12% and 18% of KTT active firms involved primarily in *research*, *infrastructure-related* and/or *consulting* activities
- Measures for human capital and knowledge capital, but not physical capital, positively correlated with the propensity to KTT activities (model A)
- Firm size clearly positively correlated with the propensity to KTT activities

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- Sector affiliation not important after controlling for all other factors
 - Region of Zurich is the most relevant location
 - *Obstacles:*
«deficiencies of *firms* with respect to KTT» and
«deficiencies of *science institutions* with respect to KTT»
are the most important obstacles, *negatively* correlated
with the propensity of KTT activities
→ «mismatch» of business and science expectations ?
 - *Motives* (model B):
Firms are not driven by a specific motive, they seem to
pursue a series of parallel goals covering quite diverging
areas of activities → «knowledge portfolio»