Cost and Benefit of Apprenticeship Training – A Comparison of Germany and Switzerland

Dionisius, Muehlemann, Pfeifer, Walden, *Wenzelmann*, Wolter

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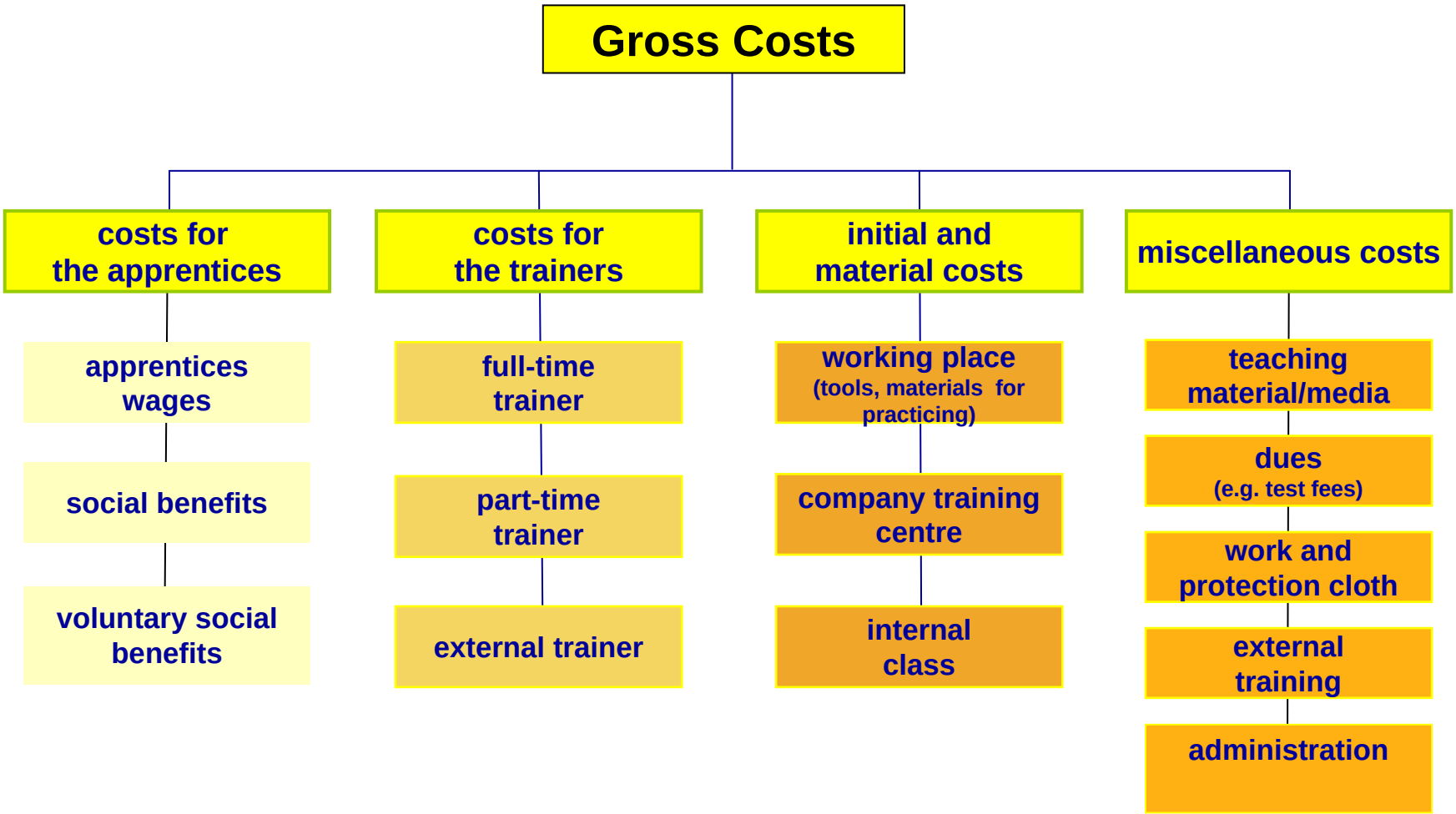
Concept of the Cost-Benefit-Surveys

- No direct analyses of costs and benefits possible
  - usually no explicit cost unit for app. training in cost accountings
- Expert Commission on Costs and Financing of Vocational Education and Training (“Edding-Commission” (1974)
  - Development of a first concept of cost-benefit-surveys
  - Definitions: Gross Costs, Benefits, Net Costs
- Complex questionnaire to calculate the costs and benefits
- Interview partners are personnel managers or managers in charge for apprenticeship training

Gross Costs


Gross Costs
costs for the apprentices
costs for the trainers
initial and material costs
miscellaneous costs
apprentices wages
social benefits
voluntary social benefits
full-time trainer
part-time trainer
external trainer
working place (tools, materials for practicing)
company training centre
internal class
teaching material/media
dues (e.g. test fees)
work and protection cloth
external training
administration

Benefits

- Benefits achieved by the apprentices are calculated by the times apprentices perform productive work

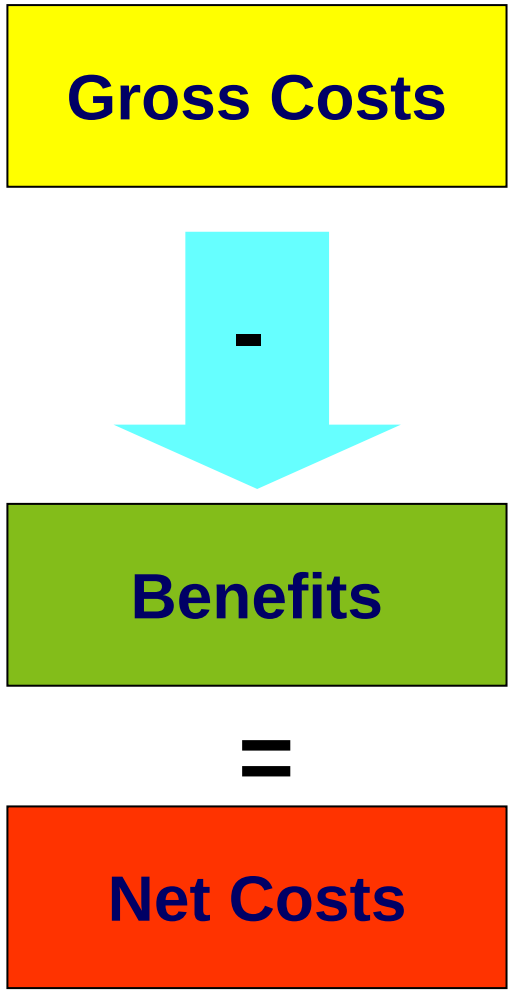
  – Calculation of days at workplace (less vocational school days, vacation days, sick days etc.)

  – Calculation of productive work (I and II)
    - Productive work I: work, that otherwise would be carried out by unskilled workers
    - Productive work II: work, that otherwise would be carried out by skilled workers

    => Weighted by the relative productivity compared to an average skilled worker

  – valued at wages

Net Costs

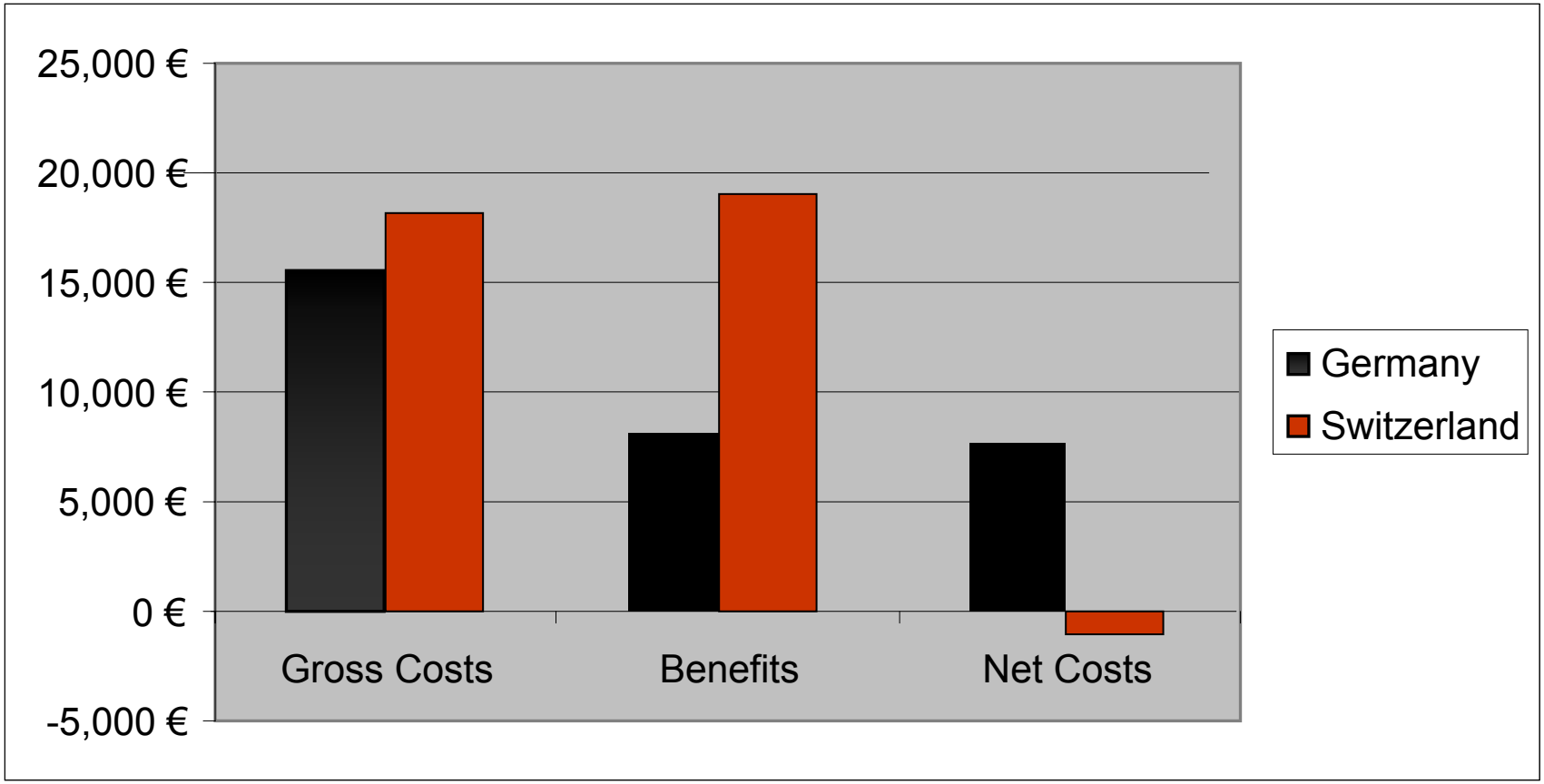


Data and Sample Selection

- Merge of two surveys with the reference year 2000
  - For Switzerland see Schweri et al. (2003)
  - For Germany see Beicht et al. (2004)
- Focus on apprenticeship programs that last three years
- n = 3296 firms
  - 1825 German
  - 1471 Swiss
- All results presented are weighted by sampling weights that account for the stratified sample

Descriptive Statistics I

Comparison of Gross Costs, Benefits and Net Costs



Possible Reasons for the Differences in Net Costs

- Structural variables (e.g. industry, firm size or training profession)

- Parameters of net costs
  - Wages
  - Parameters concerning the VET system
    - Days in vocational school
    - Other external courses
    - Vacation days
  - Time allocation at the workplace
    - Productive time I (work, that otherwise would be carried out by unskilled workers)
    - Productive time II (work, that otherwise would be carried out by skilled workers)
    - Non-productive time (e.g. practicing time)

OLS-Regressions with Structural Variables I

Dep. variable: net costs of training	(1)	(2)	(3)	(4)	(5)
German firm	8440.79 (341.24)	8419.92 (348.12)	8451.60 (354.40)	8393.03 (363.59)	8430.11 (364.93)

Independent Variables:

(1) Dummy German firm

(2) (1) + firm size

(3) (2) + industry

(4) (3) + training profession

(5) (4) + dummies for training centre and full-time trainers

Descriptive Statistics II

Wages

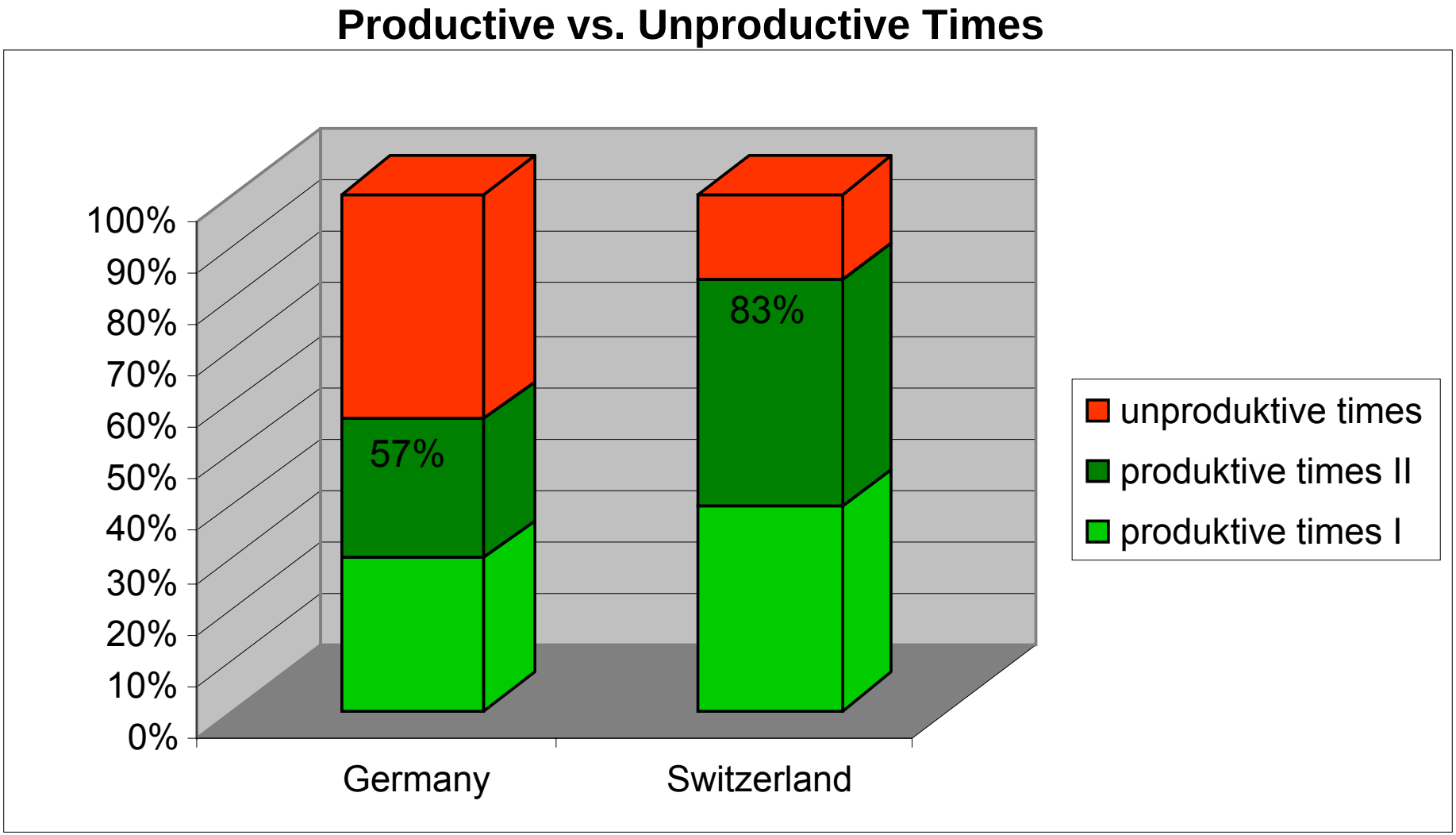
- Employees` Wages: German skilled and unskilled worker earn between 60% and 70% of Swiss employees
- Apprentices` Wages: In GER and CH almost similar
- Larger difference between apprentices-wages and wages for skilled (unskilled) workers in Switzerland

Descriptive Statistics IV

Parameters concerning the VET system

	Germany	Switzerland	Diff. GER-CH
days of absence			
vocational school	61.8	50.6	11.1
external courses	9.0	6.6	2.4
interships	3.6	2.3	1.3
vacation days	27.3	26.5	0.8
sick days	9.1	5.8	3.3
total days of absence	**109.4**	**92.2**	**17.2**
at the workplace	138.2	156.2	-18.0
at the company training center	1.8	0.5	1.3
in internal cources	2.7	1.9	0.7
total	250	250	0

Descriptive Statistics V



The Matching-Approach

- OLS-Estimation impossible as the parameters of interest are part of the net costs by construction
- Basic idea was to estimate the costs and benefits of German (Swiss) firms if they face ”Swiss” (“German”) attributes concerning certain parameters
- Basic literature on matching:
  - Rubin (1974)
  - Rosenbaum and Rubin (1983)
  - Abadie et al. (2004)
- Regarded parameters:
  - Wages of apprentices, skilled and unskilled workers and non-wage labour costs
  - Parameters related to the VET system (e.g. days spend in vocational school)
  - Allocation of tasks to apprentices at the workplace

The Matching-Approach II

Intention of matching in general:

- Estimation of direction and size of a treatment effect

- Each member of the treatment group is assigned to one or more members of the control group

- The estimated effects are:

$$ATE_i = E\left[Y_i(1) - Y_i(0)\right]$$

$$ATT_i = E\left[Y_i(1) - Y_i(0) \mid D_i = 1\right]$$

$$ATC_i = E\left[Y_i(1) - Y_i(0) \mid D_i = 0\right]$$

- D is the treatment indicator; *D = 1* if the firm is situated in Germany

The Matching-Approach III

- Empirical Strategy:
  1. Matching of the parameters with large differences in the descriptive statistics
  2. Use of the estimated parameters to re-calculate the cost model

- Nearest neighbour matching (Abadie et al. (2004))

- Matching parameters:
  - Number of employee
  - Industrial sector
  - Training profession
  - Dummies for training centre and full-time trainers

Results

Effects of treatment on costs and benefits for German firms

Treatment	ΔCosts	ΔBenefits	ΔNet Costs
Wages	2214	3340	-1126
VET-system	326	869	-543
Allocation of tasks to apprentices	-69	2865	-2934

Change in € compared to original values

Results II

Effects of treatment on costs and benefits for German firms II

Treatment	Costs	Benefits	Net Costs
None	15536	8008	7528
Wages	17750	12148	6402
Wages & VET-system	18205	12679	5526
Wages & VET-system & Task-allocation	18066	17132	934

Absolute values in €

- Dummy “German firm” is still significant in OLS-Regressions

Results III

Effects of treatment on costs and benefits for Swiss firms

Treatment	ΔCosts	ΔBenefits	ΔNet Costs
Wages	-1852	-5841	3989
VET-system	-455	-2306	1851
Allocation of tasks to apprentices	-111	-5998	5887

Change in € compared to original values

Results IV

Effects of treatment on costs and benefits for Swiss firms II

Treatment	Costs	Benefits	Net Costs
None	18131	19044	-913
Wages	16279	13202	3077
Wages & VET-system	15971	11620	4351
Wages & VET-system & Task-allocation	15924	8006	7918

Absolute values in €

- Dummy “German firm” is not significant in OLS-Regressions

Discussion and Conclusion

- The above mentioned parameters are at large responsible for the difference in net costs between Germany and Switzerland.
- The only parameter firms can actually influence is the time allocation at the working place.
- The larger difference between apprentices-wages and wages for skilled (unskilled) workers is an incentive for Swiss firms to substitute skilled (unskilled) worker by apprentices.
- There is no evidence (in our data) that apprenticeship training in Germany is of higher quality.
- The labour market in Germany is more regulated so opportunity costs might be higher.
- German apprentices stay in their training firms more often (more than 50% in GER, 36% in CH).

Further Research - Investment- vs. Production-Model

- German firms train their apprentices more investment oriented than Swiss firms

  – A variety of ratings/items and factors of our dataset operationalise the investment and production motive

  – First results of probit-regressions confirm the hypothesis
    – Dependent variable: Country Dummy
    – Control variables: Firm size, industry, training profession, training centre, full-time trainers, school performance

  ⇒ Swiss firms are significantly more satisfied with the cost-benefit-ratio of the own apprenticeship training than German firms

  ⇒ German firms tend to train apprentices significantly more in order to save costs of recruitment and to qualify them as skilled workers for their firm

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FULL COST vs. DIRECT/ VARIABLE COST APPROCH