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Determinants of the labour market succes of science graduates

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International Conference
Employability of Graduates & Higher Education Management Systems

WU Vienna University of Economics and Business,
Vienna, Austria, 22 & 23 September 2011

This presentation was prepared as a result of DEHEMS project. This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Aim of the study

- Finding determinants of labour market success of the science graduates
- Reflex/Hegesco database elaboration
- PCA analysis to construct 6 measures of labour market success
- 6 DEHEMS countries: Austria, Germany, Italy, Poland, Slovenia and Turkey

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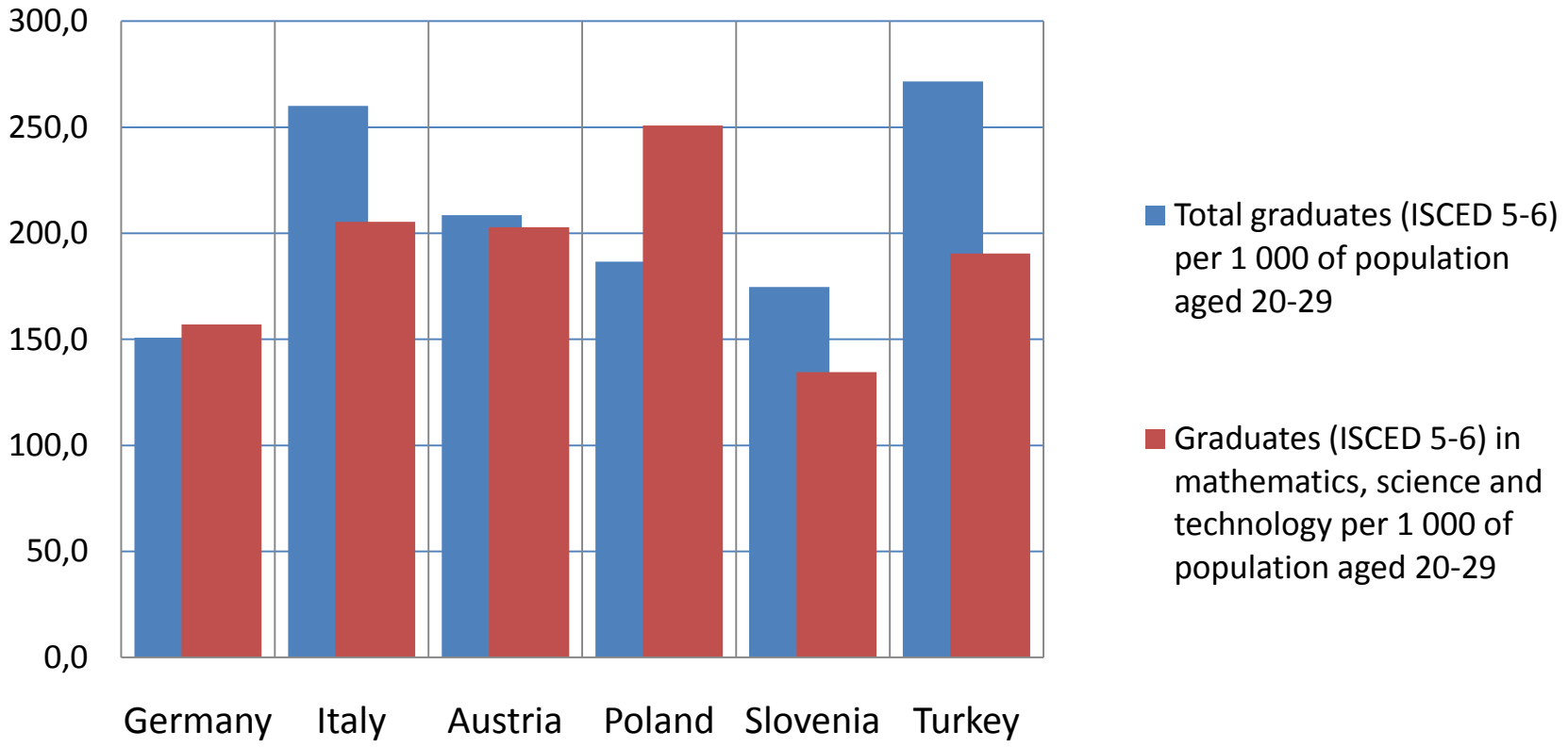
DEHEMS domains

	Vocational Orientation		Academic Orientation
	Unregulated Domain	Regulated Domain	
AREA: Social Sciences and Humanities	*Bussiness and Economics (ISCED 314, 34)*	*Education and Teaching Studies (ISCED 14)*	*Sociology and Political Studies (ISCED 311, 312, 313)*
AREA: Science and Engineering	*Engineering (incl. Civil Engineer) (ISCED 52, 54, 582)*	*Medicine and Pharmacology (ISCED 721, 724, 725, 726, 727)*	*Science (incl. Mathematics, Computing) (ISCED 42, 44, 46, 48)*

Total tertiary graduates and tertiary graduates in science and technology 2009/1999 dynamics



Source: Own elaboration of the Eurostat data.

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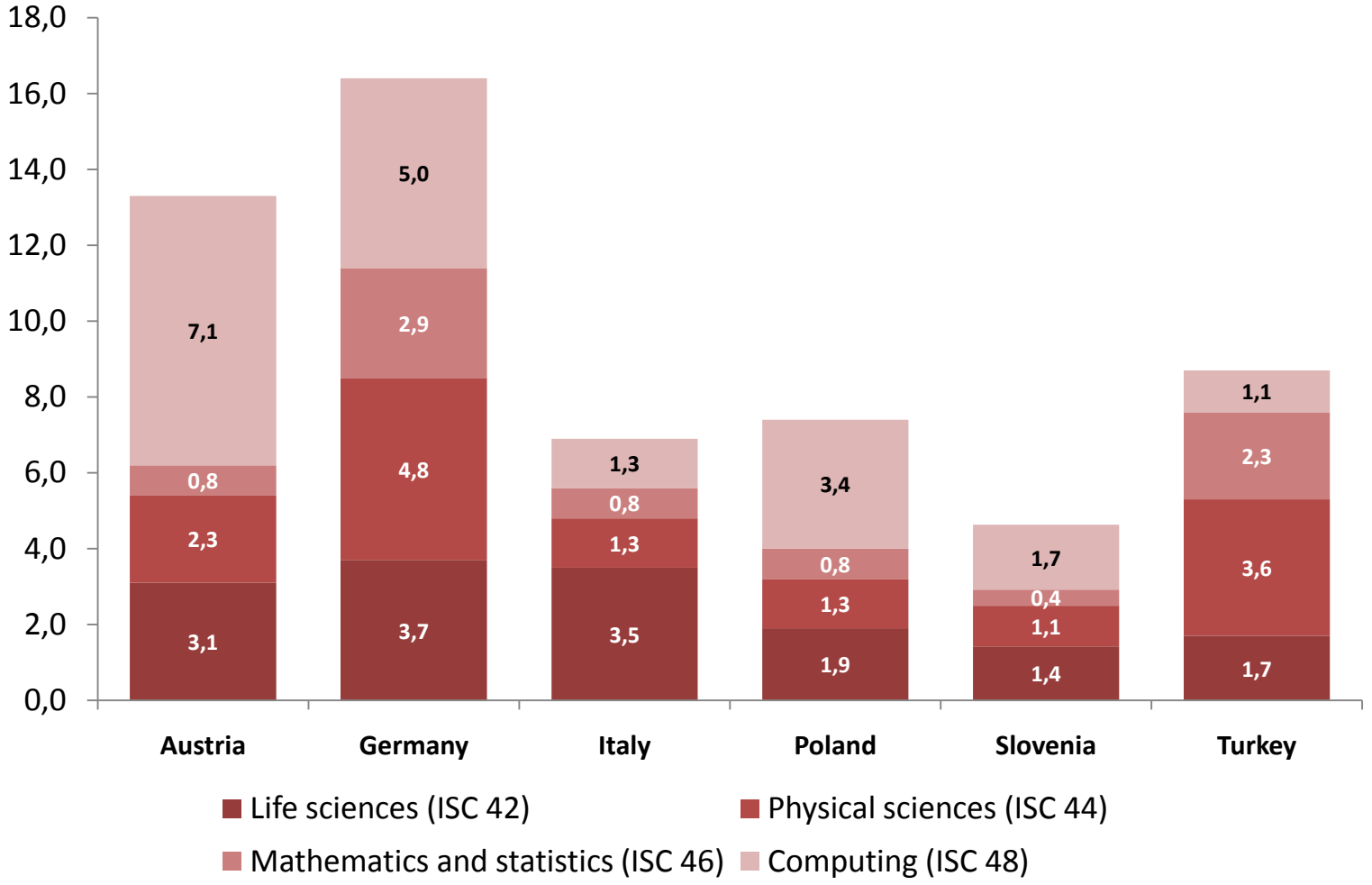
Structure of the science domain



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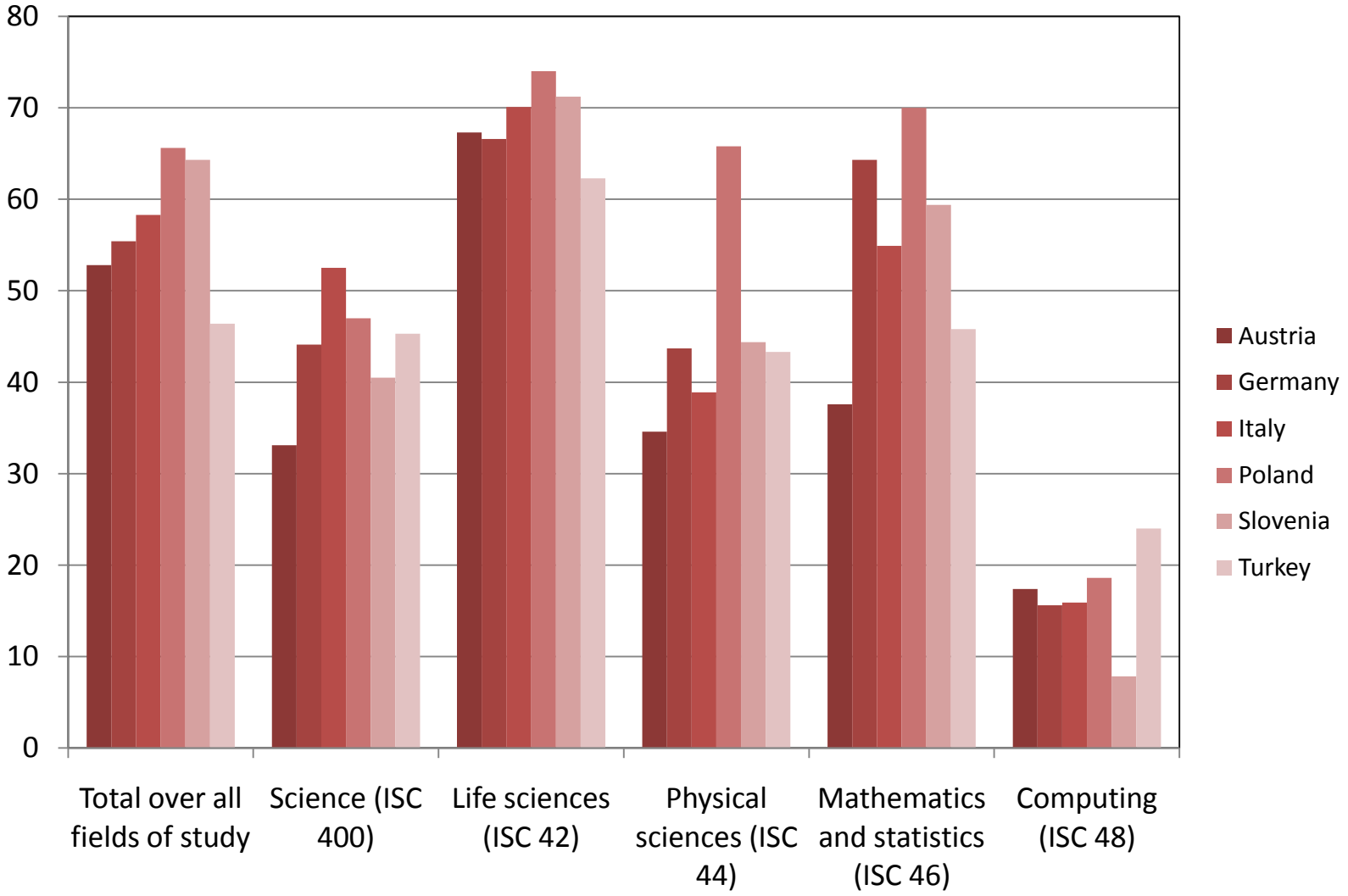
Feminization



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Labour market success

- Traditional approach: employment rate
- Modern labour market:
  - Types of employment contracts
  - Employment stability
  - Wage level
  - Human capital accumulation
  - Utilization of skills and knowledge acquired during education
  - Personal development
  - Career perspectives
  - Degree in which actual job matches graduate's expectations
  - General satisfaction: work-life balance

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How to make the concept of labour market success operational?

Status	Skills & Qualification Matching and Development
Contractual Arrangement	Qualification Matching
Unlimited contract (F5)	Appropriateness of Qualification (F8)
Job security applied to work (J1)	Horizontal/Vertical Skill Matching
Income	Field of study as appropriate (F9)
Hourly wage (F6, F7)	Utilization of skills and knowledge (F11)
High Earnings applied to work (J1)	Work demands more knowledge one can offer (F12)
Prestige	Personal Development
Social Status applied to work (J1)	To learn new things applied to work (J1)
Creativity: Autonomy and innovation at work	Good career prospects (J1)
Playing role in innovation (G11)	Professional role
Authonomy and decission making (G16)	Professional role (G17)
Extend of supervission (G20)	Professional Satisfaction
Work autonomy applied to work (J1)	Satisfaction with current wok (F13)
New Challenges applied to work (J1)	Choosing the same program again (I2)

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	Variable	Job satisfaction	Appropriatness	Challeange	Job security	Independence	Work-life balance
Employment status	empl	0.0077	-0.0310	0.0487	-0.1556	0.0093	0.2357
Current type of contract	contract	-0.0438	-0.0683	0.1063	0.8492	-0.0352	-0.0347
To what extent job security actually applies to your current work situation	security	0.1859	0.0612	-0.0154	0.7773	0.0616	0.1608
To what extent high earnings actually apply to your current work situation	feel_earn	0.6243	-0.0793	0.0535	0.1587	-0.1562	0.2343
To what extent social status actually applies to your current work situation	soc_stat	0.5845	0.0773	0.0783	-0.0119	-0.1502	0.2877
Years of higher education most appropriate for current job	need_hiedu	0.2009	0.5658	0.1570	-0.1740	0.0220	-0.1337
Field of study most appropriate for this work	field	-0.0032	0.7701	0.0038	0.0341	-0.0220	-0.0044
To what extent are knowledge and skills utilized in your current work	util	0.2545	0.6823	0.2131	-0.0258	0.0436	-0.0554
To what extent does your current work demand more knowledge and skills than you can offer?	morethanhave	0.3245	0.1572	-0.1944	0.0734	0.1880	-0.5156
Opportunity to learn new things	learnnew	0.7194	0.1630	0.0855	-0.0075	0.1152	-0.1939
Good career prospects	career	0.7491	0.0018	0.0455	0.1053	-0.2359	0.1148
Professional colleagues rely on me as an authoritative source of advice	profrole	0.0522	0.1046	0.7516	0.1273	-0.1128	0.0548
Do you play a role in introducing these innovations in your organisation?	innov	0.1061	0.0960	0.6027	0.0233	0.0154	-0.1690
Deciding how you do your own job.	autonomy	0.1836	0.0875	0.5842	0.0024	0.4211	0.0623
How closely is your performance monitored by your own supervisor?	supervission	0.1548	0.0251	0.0739	-0.0174	-0.7209	-0.0618
To what extent they actually apply to your current work situation Work autonomy.	auton_apply	0.3578	0.0853	0.3410	-0.0182	0.5035	0.1279
To what extent they actually apply to your current work situation new challenges	challenges~y	0.7613	0.1221	0.1438	-0.0365	0.0825	-0.1949
Satisfied with your current work	satisfaction	0.5438	0.3579	0.1241	0.0419	0.1363	0.1269
If you were free to choose again, would you choose the same study programme at the same institute of HE?	choice_again	0.1233	0.4824	-0.0322	0.0477	0.0047	0.3525
Difference in enjoying leisure	difrleisur~m	0.0075	0.0070	-0.0675	0.2193	0.3000	0.6595
Difference in pushpower character of job	difrpushpo~r	0.8247	0.0972	-0.0089	0.0393	0.0859	-0.0549

PCA approach:
6 new dependent synthetic variables

- Job satisfaction:
  - high earnings, social status, opportunity to learn new things, career prospects, new challenges, satisfaction, expectations match
- Education appropriateness:
  - Years of education and field of study most appropriate for job, utilisation of knowledge and skills, choose the same programme again?
- Challenge:
  - Innovations, To what extent does your current work demand more knowledge and skills than you can offer

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PCA approach:
6 new dependent synthetic variables

- Job security:
  - Job security, current type of contract
- Independence:
  - Deciding how you do your own job, performance monitoring, work autonomy
- Work-life balance:
  - Difference in enjoying leisure

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Modelling labour market success

Explanatory variables

(personal characteristics, family background, learning process, teaching characteristics, employment characteristics)

Dependent variable

(labour market success)

Method: linear regression and logistic regression

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Explanatory variables

- About 60 different graduates' characteristics:
  - Demographic characteristics
  - Study process
  - Study programme and modes of teaching
  - Personal attitude
  - International mobility
  - Labour market experience
  - Firm or current job characteristics

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Determinants of Graduates LM Success	
Previous (secondary) education and work experiences	**International Experiences**
Education prior to HE (B1)	Time abroad for study /during study (K5)
Average final examination grade (B2)	Time abroad for work /during study (K5)
Relevant work Experience prior HE (B3a)	Time abroad for study/after study (K6)
Non-relevant work Experience prior HE (B4a)	Time abroad for work /after study (K6)
Type of HE Qualification/Study	**Contextual (Control) Variables**
Type of Qualification (A1b)	Study Subfield (A1)
Situation during study (A4)	Sub-Sector (G2)
Enrolment to additional HE program in parallel to the main one (B6)	Occupation Sub-group (F1)
Study Success	Public-Private (G3)
Average grade (A3b)	Competition of Organisation (G5)
Program/institution characteristics	Quality Orientation (G6)
Employers are familiar with the content of the programme (A5)	Stability of demand (G7)
The programme was academically prestigious (A5)	Organisational Changes (G9)
Program - a good basis for starting work (I5)	**Sociodemographic**
Program - a good basis for performing current tasks (I5)	Gender (K1)
Program - a good basis for personal development (I5)	Parents education (K10)
Modes of teaching and learning	Lifestyle (K8)
Lectures (A6)	Children (K9)
Group assignments (A6)	
Participation in research projects (A6)	
Internships, work placement (A6, see A7)	
Theories and paradigms (A6)	
Teacher as the main source of information (A6)	
Project and/or problem-based learning (A6)	
Written assignments (A6)	
Oral presentations by students (A6)	
Multiple choice exams (A6)	
Taking part in one/more placementents (A7)	
Doing extra work (A8)	
Striving for best possible marks (A8)	
Weekly hours studying (A9)	
Relevant work experiences during HE (B3b)	
Non - relevant work experiences during HE (B4b)	

Econometric procedure

- 6 models, one for each labour market success variable
- OLS regressions
- Diagnostics
  - RAMSEY RESET test
  - Robust standard errors corrected for heteroscedasticity
  - Logistic regression

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Results

Role of sociodemographic variables

- Gender was found a significant predictor of education appropriateness and job security only. In both cases, male science graduates have higher values of those two variables than women.
- Higher levels of parents education seems to decrease current job satisfaction while it increases education appropriateness.
- Country differences were found quite interesting. In terms of job satisfaction, Polish science graduates have significantly higher values than European average, while Italian and Slovenian graduates have significantly lower. In terms of education appropriateness, the only country that is significantly different from European average is Slovenia, where graduates have higher values of education appropriateness. Austrian and Polish science graduates appear to have more challenging jobs than European average, while their Italian colleagues have significantly lower values of this dimension. In terms of job security DEHEMS countries do not differ from the European average. Austrian and German science graduates exhibit higher values of work-life balance, while Italians are characterized by significantly lower values. Italian, Slovenian and Turkish graduates (to the highest extent) are found to have significantly lower work independence than the average. Austrian and Polish graduates do not differ from the average significantly but Germans have significantly higher values of work independence.

Role of study process characteristics

- Completing master degree programme results in more education appropriateness but it decreases work independence at the same time as compared to bachelor graduates.
- Having finished additional HE programme reduces the probability of experiencing more job security.
- Vocational secondary education background is correlated with lower values of overall job satisfaction.
- Study duration was not found significant predictor of any of the labour market success measures.

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Role of programme characteristics

- Graduates who evaluate their programmes as good for their personal development experience higher values of job security and work-life balance.
- Those for whom the study programmes were good for performing current job tasks exhibit higher current overall job satisfaction and higher education appropriateness.
- The same is true about the programmes which were regarded as good for starting work, but additionally graduates from such programmes experience also higher work independence.
- Science graduates from prestigious programmes experience higher work-life balance.
- Good knowledge of the programme by employers influences positively the job satisfaction and has no relation to other labour market success measures.
- Demanding programmes seem to reduce the work-life balance.
- High level of freedom in shaping own study programme increases education appropriateness.
- Broad focus of the study programme decreases job satisfaction but increases work-life balance.
- Vocational orientation of the programme also reduces job satisfaction but increases job security.

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Role of teaching and learning modes

- High extent of lectures decreases current job satisfaction.
- High extent of oral presentations increases job security,
- High extent of written assignments reduces both education appropriateness and work-life balance.
- High extent of problem based learning favours education appropriateness.
- Graduates who stated that teacher was the main source of information experience higher job security.
- High extent of theories and paradigms favours work independence but reduces education appropriateness.
- High extent of research projects in the study programmes increases both job satisfaction and job security while it decreases work independence.
- High extent of group assignments influences job satisfaction and work independence negatively.
- And lastly, high extent of multiple choice questions increases work-life balance but reduces challenge and work independence.

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Role of labour market experience

- Study-related work experience acquired before HE tends to increase current job satisfaction and work-life balance but reduces education appropriateness and work independence.
- Non study-related work experience gained during HE increases current job satisfaction.
- Study-related work experience during HE decreases job satisfaction but affects positively education appropriateness and work challenge.

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Firm or current job characteristics

- Serious change that occurred in the firm increases job challenge.
- High extent of quality orientation of firms increases job satisfaction and education appropriateness.
- More stable demand on the market on which the firm operates results in higher job security and higher work-life balance.
- High level of competence in analytical thinking, coordinating others' work and language skills increase job satisfaction. The latter determinant reduces job security and work independence.

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Conclusions

- In some cases labour market success can be related to parents education. Therefore one can argue that investment in HE can be seen to have some cross-generational positive social external effects.
- Country dummies were found to be significant in many cases, so one can only regret that insufficient number of observations did not allow for more detailed study of country specifics.
- Study process characteristics seemed to play relatively minor role in determining future labour market success.
- On the other hand the most important factors come from the set of variables describing programme characteristics and modes of teaching (under control of HE management) but also firm or current job characteristics.
- Regression results indicate that programmes regarded as good for performing current job tasks, regarded as good basis for starting work, known by employers favour labour market success in terms of overall job satisfaction, which is a mixture of high earnings, social status, good career prospects and job matching expectations.
- Further studies could be conducted to look for other aspects of labour market success. For instance, it would be very interesting to look at qualification mismatch and the problem of under or over qualification of young labour force. Dynamic analyses using panel data could also shed some light on the problem of unemployment persistence, employment stability and labour market flows for the graduates across Europe.

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Thank You!