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Polish Agency of Enterprise Development
Enterprise Research Centre

Entrepreneurial dynamics - setting-up, creation, development

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The application of the Global Entrepreneurship and Development Index (GEDI) to Poland

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Setup of the presentation

- Measuring entrepreneurship
- The concept of the National System of Entrepreneurship (NSE)
- Measuring NSE: The Global Entrepreneurship and Development Index (GEDI) methodology
- Entrepreneurship in Poland
 - Strengths and weaknesses - sub-index, pillar and variable examination
 - Comparison to other EU member and former socialist countries
 - Average bottleneck efficiency
- Simulation on how to improve entrepreneurship in Poland



Entrepreneurship definitions and measures

- Entrepreneurship: most studied least understood societal phenomenon
 - Different sciences (psychology, sociology, economics), aims (societal phenomenon, academic research, teaching), perspectives (process, context) and levels (individual, firm, country) use
 - A question is it a uni- or a multidimensional concept?
- Entrepreneurship measurements- GEM based data
 - Uni-dimensional: Total Early-phased Entrepreneurial Activity (TEA)
 - Multidimensional measure: Global Entrepreneurship and Development Index (GEDI)
 - Other measures
 - Attitude measures - e.g. preference toward self employment
 - Output (activity) measures - e.g. business density, new startup rates,
 - Framework measures - e.g. Doing business, EU/OECD Entrepreneurship Indicator programme, GEM Expert Survey
- GEDI approach: a useful addition to the traditional GEM report and analyses





GEDI characteristics

- The first complex entrepreneurship index measuring country level entrepreneurship aiming to measure and explain the role of entrepreneurship in economic development
 - 31 original variables, 14 individual, 14 institutional variables, 14 pillars, three sub-indexes
- Incorporates the individual and the institutional contextual factors of entrepreneurship
 - Technically multiplies the individual and the proper institutional variables
- Takes into account the mutually dependent nature of the pillars of entrepreneurship -
 - Developed the Penalty for Bottleneck methodology that is based on the assumption that the weakest link is the most important determinant of the performance of the system
- Provides an opportunity for public/entrepreneurship policy use
 - Developed the The Average Bottleneck Efficiency (ABE) measures the magnitude of the imbalance by showing how much additional resource, on the average, is necessary for a certain country to reach its best pillar value.





The National System of Entrepreneurship and its measure

- Taking into account that
 - entrepreneurship is a multidimensional concept,
 - individual and environmental factors are both important,
 - the institutional setup determines the effectiveness of individual entrepreneurship effort and
 - the components of entrepreneurship constitute a system,
- We define national entrepreneurship as the dynamic, institutionally embedded interaction between entrepreneurial attitudes, abilities, and aspirations, by individuals, which drives the allocation of resources through the creation and operation of new ventures. Attitudes, activity and aspirations are complex categories which include individual and institutional (contextual) measures
- GEDI therefore reflects the quality of National Systems of Entrepreneurship (NSE)
 - Not the whole NSE but only a part is measured





GEDI methodology

- GEDI incorporates individual as well as institutional data
 - All individual data (14) are from the GEM adult population survey, taken from published GEM global reports
 - All institutional data (14) are from non-GEM sources like World Economic Forum, OECD, UNO etc.
 - Individual and institutional data are combined together (multiplied) resulting the 14 pillars and the three sub-indices of entrepreneurship





Index building - the building blocks

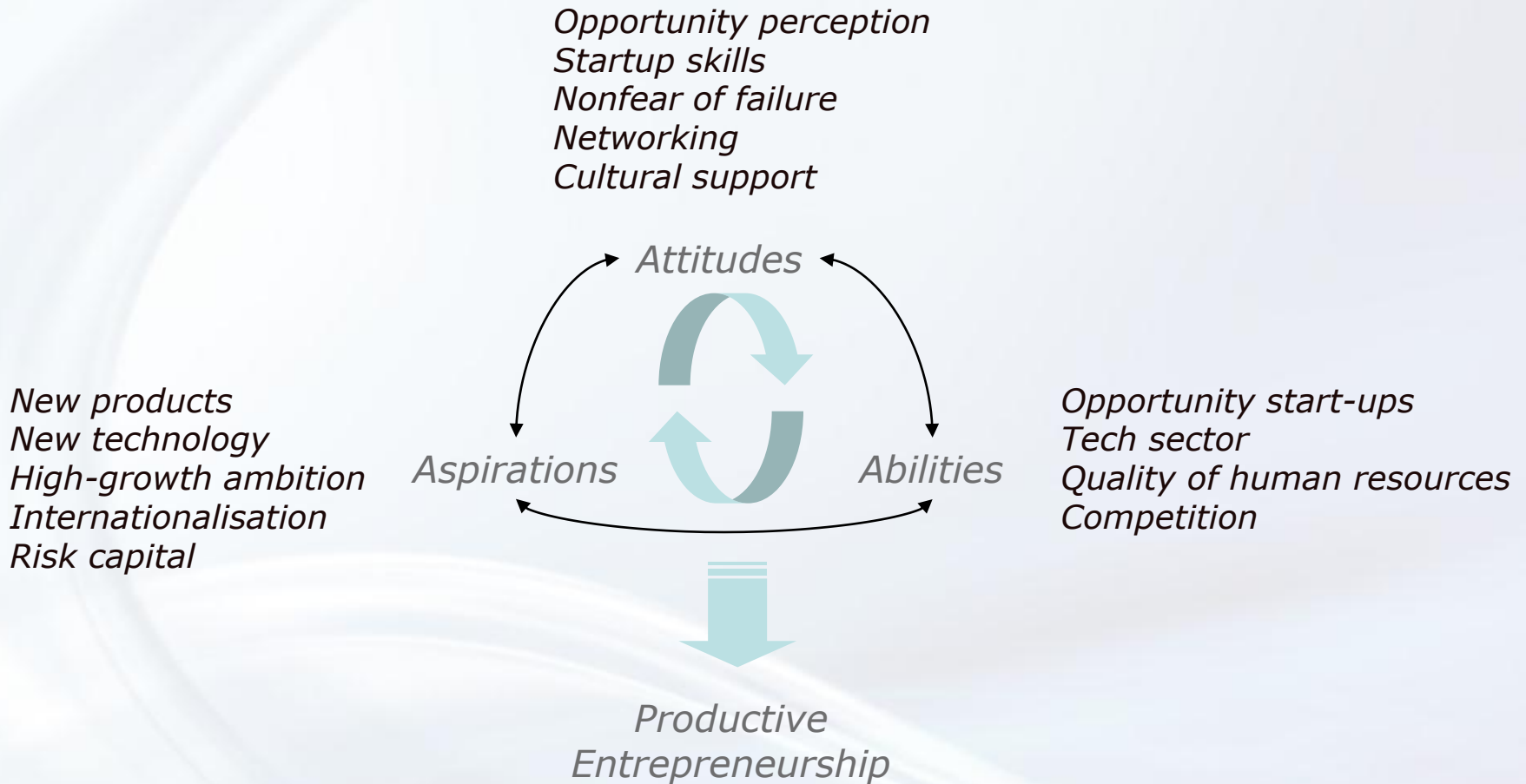
• The Building Blocks

- *Entrepreneurial attitudes* is defined as a population's general attitudes about entrepreneurship including opportunity recognition, networking, start-up skills, taking risk, acceptance of entrepreneurs with high status - five pillars.
- *Entrepreneurial ability* is defined as the quality of startup including the motivation of start-up, the level of education of the entrepreneur, the sector (high or medium), and the potential not to have too many competitors - four pillars.
- *Entrepreneurial aspiration* is defined as the early-stage entrepreneur's effort to introduce new products and/or services, develop new production processes, penetrate foreign markets, substantially increase their company's number of employees, and finance the business with formal and/or informal venture capital - five pillars.





Measuring NSEs: The GEDI Approach





The Global Entrepreneurship and Development Index Rank of the best 60 Countries, 2011

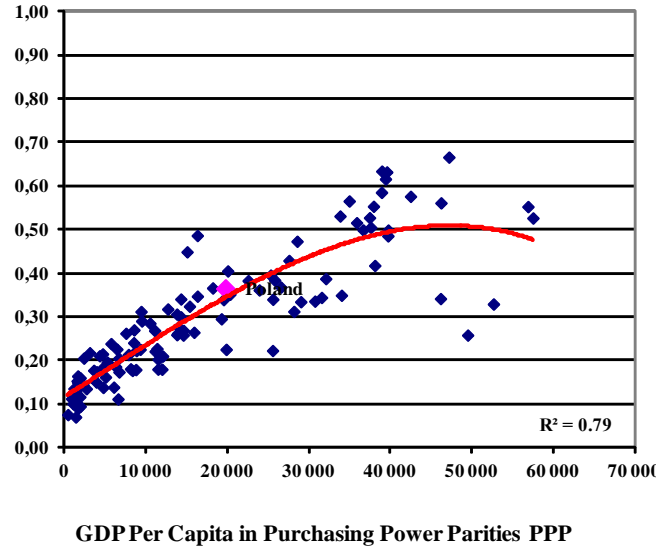
Rank	Country	GDP	GEDI	ABE	Rank	Country	GDP	GEDI	ABE
1	United States	47184	0,67	66,96	31	Lithuania	18184	0,37	49,63
2	Sweden	38947	0,63	70,68	32	Poland	19747	0,37	58,14
3	Denmark	39558	0,63	65,36	33	Slovakia	23897	0,36	43,80
4	Australia	39407	0,62	73,00	34	Hungary	20307	0,35	67,26
5	Canada	38915	0,59	62,44	35	Japan	33994	0,35	47,49
6	Netherlands	42475	0,58	60,87	36	Latvia	16312	0,35	57,14
7	Iceland	34949	0,57	63,05	37	Italy	31555	0,34	49,79
8	Switzerland	46215	0,56	64,89	38	Hong Kong	46157	0,34	47,63
9	Taiwan	37931	0,55	55,05	39	Uruguay	14277	0,34	46,20
10	Norway	56894	0,55	62,80	40	Portugal	25573	0,34	53,40
11	France	33820	0,53	65,75	41	Croatia	19516	0,34	55,71
12	Belgium	37448	0,53	69,18	42	Czech	30728	0,34	61,77
13	Singapore	57505	0,53	63,81	43	Korea	29004	0,34	54,29
14	United Kingdom	35860	0,52	56,02	44	Kuwait	52657	0,33	39,96
15	Germany	37591	0,51	68,27	45	Turkey	15340	0,32	49,89
16	Finland	36660	0,50	60,02	46	Montenegro	12676	0,32	41,41
17	Ireland	39727	0,50	66,44	47	Greece	28154	0,31	37,61
18	Puerto Rico	16300	0,49	58,16	48	Colombia	9392	0,31	40,55
19	Austria	39698	0,49	60,63	49	Bulgaria	13780	0,31	46,77
20	Israel	28546	0,47	53,12	50	Romania	14287	0,30	48,13
21	Chile	15044	0,45	63,09	51	Barbados	19252	0,30	35,98
22	Qatar	80229	0,45	54,64	52	Peru	9470	0,29	43,45
23	Slovenia	27556	0,43	57,14	53	South Africa	10486	0,29	47,80
24	UAE	38089	0,42	54,43	54	Lebanon	13948	0,28	37,85
25	Estonia	20033	0,41	63,44	55	Tunisia	8524	0,27	46,96
26	Cyprus	25299	0,40	45,43	56	Malaysia	14591	0,27	39,77
27	Spain	32070	0,39	58,33	57	Macedonia	11072	0,27	58,23
28	Bahrain	25799	0,38	62,35	58	Argentina	15893	0,26	33,70
29	Saudi Arabia	22545	0,38	43,76	59	China	7536	0,26	41,95
30	Oman	26554	0,37	60,06	60	Panama	13877	0,26	46,59



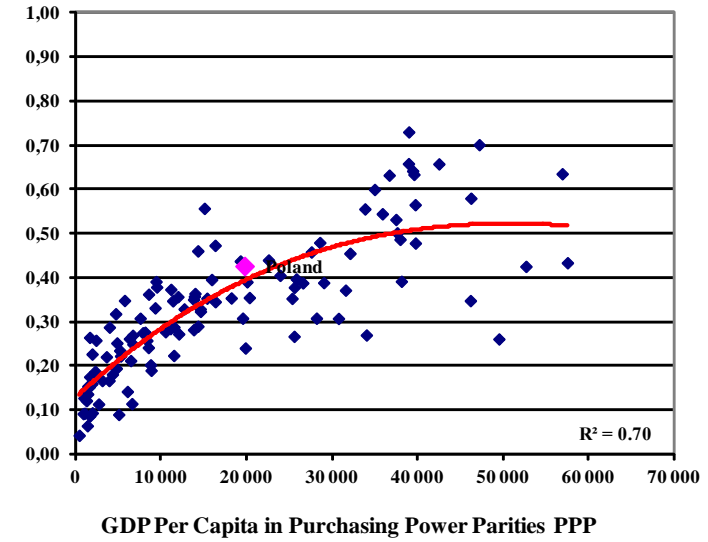


Poland: The three subindexes and the GEDI in relation to GDP

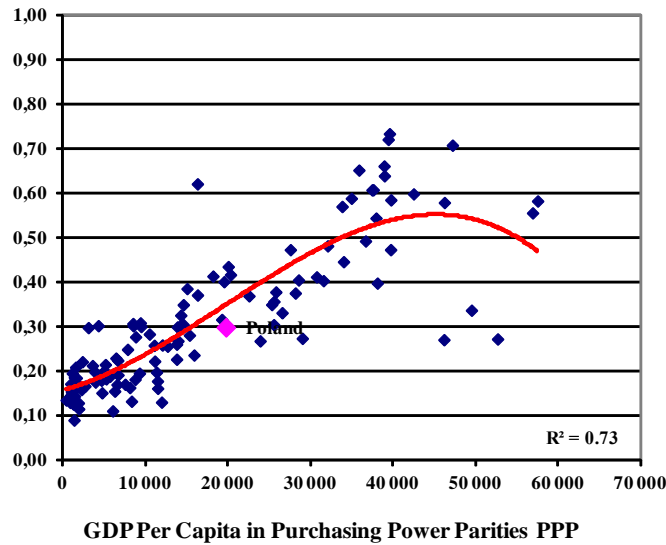
Global Entrepreneurship and Development Index



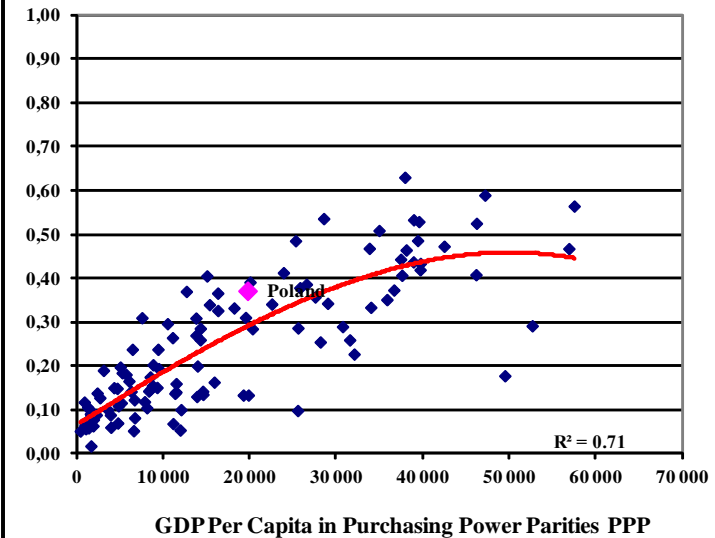
Entrepreneurial Attitudes Sub-index



Entrepreneurial Ability Sub-index

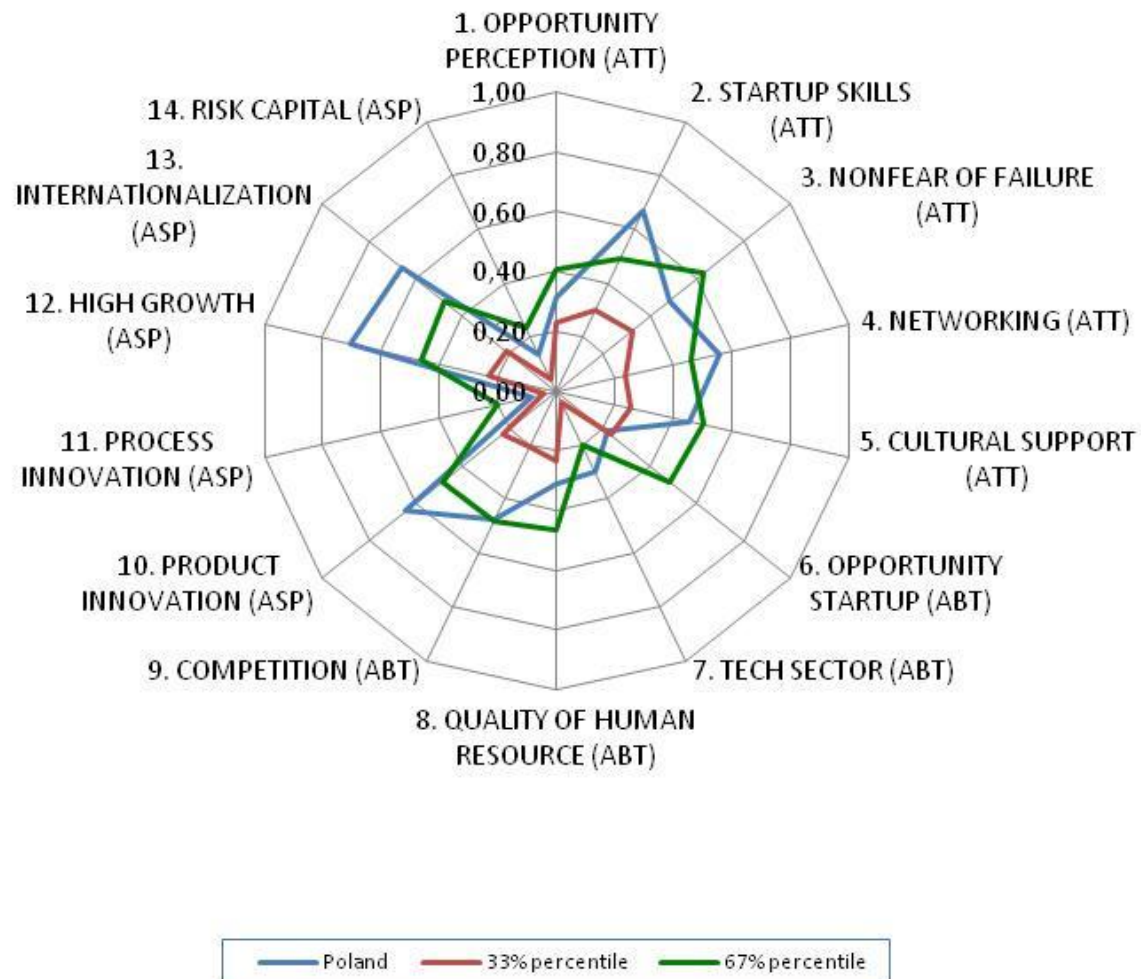


Entrepreneurial Aspiration Sub-index





Poland position in terms of the 14 pillars





The 14 pillars of entrepreneurship in the European Union member countries

Countries	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Austria	0,49	0,57	0,84	0,70	0,56	0,53	0,38	0,33	0,83	0,56	0,36	0,45	0,62	0,24
Belgium	0,59	0,54	0,80	0,42	0,53	0,79	0,40	0,79	0,76	0,46	0,35	0,26	0,79	0,51
Denmark	0,54	0,50	0,80	0,76	0,82	0,90	0,60	0,79	1,00	0,89	0,39	0,58	0,36	0,57
Finland	0,47	0,64	0,86	0,90	0,88	0,73	0,49	0,46	0,49	0,60	0,55	0,30	0,34	0,20
France	0,50	0,37	0,73	0,84	0,62	0,68	0,73	0,50	0,59	0,65	0,48	0,56	0,53	0,27
Germany	0,45	0,32	0,67	0,52	0,73	0,66	0,75	0,52	0,76	0,51	0,31	0,45	0,57	0,27
Greece	0,09	0,83	0,29	0,36	0,23	0,55	0,36	0,39	0,39	0,31	0,14	0,12	0,45	0,37
Ireland	0,15	0,52	0,78	0,59	0,74	0,63	0,63	0,83	0,69	0,59	0,24	0,71	0,66	0,27
Italy	0,29	0,50	0,60	0,37	0,29	0,70	0,37	0,21	0,54	0,34	0,19	0,30	0,41	0,12
Netherlands	0,62	0,50	0,90	0,75	1,00	0,74	0,57	0,62	0,70	0,59	0,27	0,49	0,53	0,62
Portugal	0,13	0,55	0,60	0,33	0,55	0,64	0,33	0,34	0,29	0,26	0,30	0,26	0,67	0,11
Spain	0,21	0,67	0,66	0,46	0,51	0,59	0,46	0,50	0,54	0,27	0,22	0,20	0,21	0,23
Sweden	0,88	0,53	0,83	0,93	0,84	0,90	0,56	0,58	0,68	0,64	0,44	0,40	0,74	0,54
United Kingdom	0,53	0,50	0,74	0,65	0,69	0,82	0,69	0,65	0,98	0,53	0,28	0,39	0,49	0,18
Old member states	0,42	0,54	0,72	0,61	0,64	0,70	0,52	0,54	0,66	0,51	0,32	0,39	0,53	0,32
Bulgaria	0,25	0,53	0,39	0,50	0,27	0,41	0,12	0,26	0,32	0,23	0,12	0,49	0,67	0,21
Cyprus	0,04	0,48	0,29	0,43	0,55	0,60	0,40	0,47	0,48	0,38	0,11	0,13	0,53	0,53
Czech Republic	0,22	0,43	0,66	0,37	0,21	0,45	0,34	0,19	0,50	0,59	0,40	0,70	0,89	0,20
Estonia	0,11	0,48	0,59	0,53	0,52	0,52	0,29	0,64	0,55	0,41	0,23	0,70	0,69	0,23
Hungary	0,18	0,46	0,57	0,46	0,36	0,58	0,57	0,36	0,45	0,32	0,14	0,53	0,57	0,07
Latvia	0,14	0,53	0,51	0,56	0,28	0,52	0,25	0,46	0,48	0,39	0,06	0,67	0,61	0,21
Lithuania	0,14	0,49	0,55	0,40	0,36	0,56	0,24	0,76	0,33	0,30	0,16	0,67	0,59	0,14
Poland	0,31	0,67	0,48	0,56	0,46	0,22	0,30	0,31	0,48	0,65	0,09	0,70	0,66	0,14
Romania	0,18	0,46	0,37	0,31	0,25	0,39	0,15	0,41	0,49	0,23	0,09	0,64	0,54	0,13
Slovakia	0,13	0,52	0,60	0,88	0,27	0,49	0,17	0,14	0,36	0,29	0,11	0,48	0,68	0,90
Slovenia	0,08	0,85	0,70	0,69	0,52	0,68	0,72	0,46	0,42	0,44	0,30	0,48	0,62	0,21
New member states	0,16	0,54	0,52	0,52	0,37	0,49	0,32	0,40	0,44	0,38	0,16	0,56	0,64	0,27
European Union	0,31	0,54	0,63	0,57	0,52	0,61	0,43	0,48	0,56	0,46	0,25	0,47	0,58	0,30





Poland in the pillar and variable level

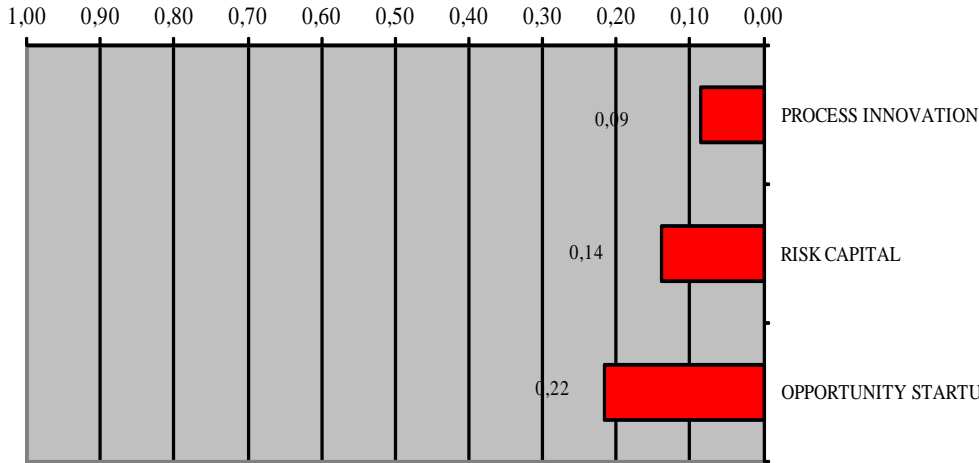
	INSTITUTIONAL VARIABLES		INDIVIDUAL VARIABLES		PILLARS	
ENTREPRENEURIAL ATTITUDES	Market Agglomeration	0,51	Opportunity Recognition	0,34	Opportunity Perception	0,31
	Tertiary Education	0,72	Skill Perception	0,53	Start-up Skills	0,67
	Business Risk	0,83	Risk Acceptance	0,39	Nonfear of Failure	0,48
	Internet Usage	0,65	Know Entrepreneurs	0,40	Networking	0,56
	Corruption	0,47	Career Status	0,56	Cultural Support	0,46
ENTREPRENEURIAL ABILITY	Economic Freedom	0,49	Opportunity Motivation	0,24	Opportunity Startup	0,22
	Tech Absorption	0,36	Technology Level	0,40	Tech Sector	0,30
	Staff Training	0,49	Educational Level	0,35	Quality of Human Resources	0,31
	Market Dominance	0,59	Competitors	0,61	Competition	0,48
ENTREPRENEURIAL ASPIRATIONS	Technology Transfer	0,31	New Product	0,83	Product Innovation	0,65
	GERD	0,16	New Tech	0,25	Process Innovation	0,09
	Business Strategy	0,43	Gazelle	0,59	High Growth	0,70
	Globalization	0,66	Export	0,79	Internationalization	0,66
	Venture Capital	0,25	Informal Investment	0,18	Risk Capital	0,14
	Institutional	0,49	Individual	0,46	GEDI	0,37



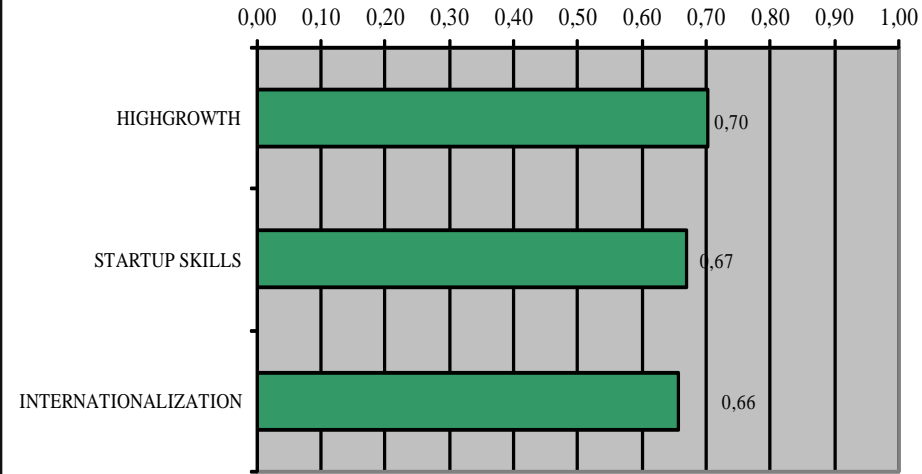


Strengths and weaknesses: pillar and variable level

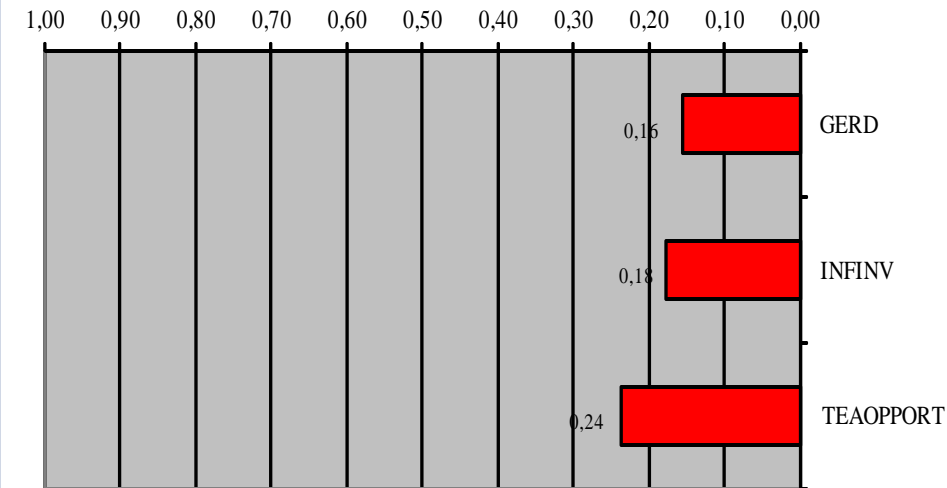
Worst three pillars



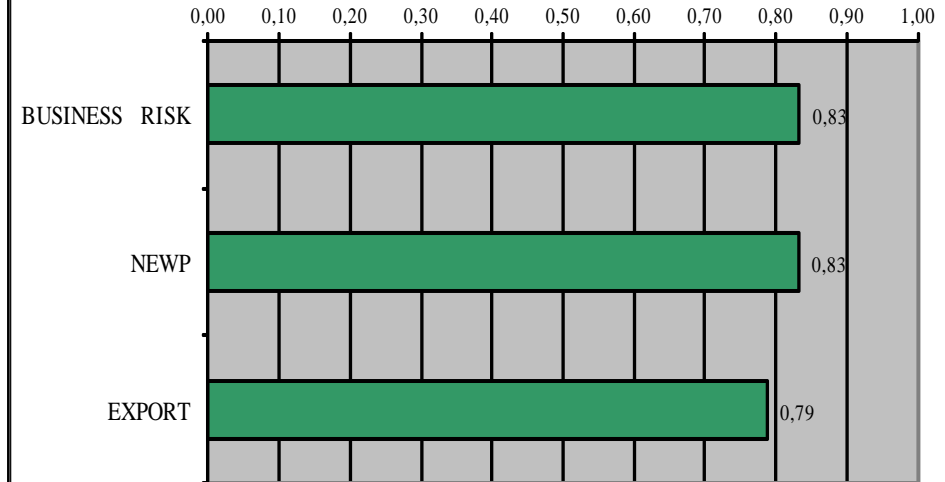
Best three pillars



Worst three variables



Best three variables





Average Bottleneck Efficiency

- The Average Bottleneck Efficiency (ABE) measures the magnitude of the imbalance by showing how much additional resource, on the average, is necessary for a certain country to reach its best pillar value.
 - This calculation is based on the assumption that the marginal improvement of the 14 pillars are about the same.
- Poland on the average, the 13 pillars are only 58% of the value of its best performing index pillar. Average position in the EU.



The Average Bottleneck Efficiency

Country	ABE	Country	ABE
United States	66.96	Slovenia	57.14
Sweden	70.68	Estonia	63.44
Denmark	65.36	Cyprus	45.43
Netherlands	60.87	Lithuania	49.63
France	65.75	Poland	58.14
Belgium	69.18	Slovakia	43.80
United Kingdom	56.02	Hungary	67.26
Germany	68.27	Latvia	57.14
Finland	60.02	Czech Republic	61.77
Ireland	66.44	Bulgaria	46.77
Austria	60.63	Romania	48.13
Spain	58.33	New member states	54.42
Italy	49.79	EU average	58.00
Portugal	53.40		
Greece	37.61		
Old member states	60.62		





Sensitivity analysis - simulation

- Marginal analysis:
 - If Poland were to allocate additional resources to improving its GEDI Index performance, how should this additional effort be allocated to achieve an “optimal” outcome? ‘Optimal’ in the sense of maximizing the GEDI index value.
 - We aim to increase the average GEDI index by 0.1, from the 2011 average of 0.37 to 0.47, that would boost Poland to the 20 most entrepreneurial countries
- Limitations:
 - The applied 14 pillars of GEDI only partially reflect the national system of entrepreneurship.
 - We assume that all GEDI pillars require roughly the same effort to improve by the same magnitude, which might well not be realistic.
 - We assume that the costs of the resources to improve the 14 pillars are about the same. In fact, these costs may vary significantly over pillars.





Alleviating Bottlenecks: Illustration

Countries		1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total effort
Austria	A	0.03	0.00	0.00	0.00	0.00	0.00	0.14	0.19	0.00	0.00	0.15	0.07	0.00	0.28	0.86
	B	3.49%	0.00%	0.00%	0.00%	0.00%	0.00%	16.28%	22.09%	0.00%	0.00%	17.44%	8.14%	0.00%	32.56%	
Belgium	A	0.00	0.00	0.00	0.12	0.01	0.00	0.14	0.00	0.00	0.08	0.20	0.28	0.00	0.03	0.86
	B	0.00%	0.00%	0.00%	13.95%	1.16%	0.00%	16.28%	0.00%	0.00%	9.30%	23.26%	32.56%	0.00%	3.49%	
Denmark	A	0.09	0.12	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.24	0.05	0.27	0.06	0.86
	B	10.47%	13.95%	0.00%	0.00%	0.00%	0.00%	3.49%	0.00%	0.00%	0.00%	27.91%	5.81%	31.40%	6.98%	
Finland	A	0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.01	0.00	0.00	0.20	0.16	0.30	0.75
	B	4.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.33%	5.33%	1.33%	0.00%	0.00%	26.67%	21.33%	40.00%	
France	A	0.08	0.21	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.10	0.02	0.05	0.31	0.85
	B	9.41%	24.71%	0.00%	0.00%	0.00%	0.00%	0.00%	9.41%	0.00%	0.00%	11.76%	2.35%	5.88%	36.47%	
Germany	A	0.10	0.22	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.03	0.23	0.09	0.00	0.27	0.98
	B	10.20%	22.45%	0.00%	2.04%	0.00%	0.00%	0.00%	2.04%	0.00%	3.06%	23.47%	9.18%	0.00%	27.55%	
Greece	A	0.28	0.00	0.07	0.01	0.14	0.00	0.00	0.00	0.00	0.05	0.23	0.24	0.00	0.00	1.02
	B	27.45%	0.00%	6.86%	0.98%	13.73%	0.00%	0.00%	0.00%	0.00%	4.90%	22.55%	23.53%	0.00%	0.00%	
Ireland	A	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.00	0.16	0.62
	B	43.55%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	30.65%	0.00%	0.00%	25.81%	
Italy	A	0.10	0.00	0.00	0.02	0.10	0.00	0.01	0.17	0.00	0.05	0.20	0.09	0.00	0.27	1.01
	B	9.90%	0.00%	0.00%	1.98%	9.90%	0.00%	0.99%	16.83%	0.00%	4.95%	19.80%	8.91%	0.00%	26.73%	
Netherlands	A	0.00	0.11	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.02	0.34	0.12	0.08	0.00	0.71
	B	0.00%	15.49%	0.00%	0.00%	0.00%	0.00%	5.63%	0.00%	0.00%	2.82%	47.89%	16.90%	11.27%	0.00%	
Portugal	A	0.24	0.00	0.00	0.04	0.00	0.00	0.04	0.03	0.08	0.11	0.07	0.11	0.00	0.26	0.98
	B	24.49%	0.00%	0.00%	4.08%	0.00%	0.00%	4.08%	3.06%	8.16%	11.22%	7.14%	11.22%	0.00%	26.53%	
Spain	A	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.20	0.21	0.20	0.19	1.15
	B	18.26%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	12.17%	17.39%	18.26%	17.39%	16.52%	
Sweden	A	0.00	0.13	0.00	0.00	0.00	0.00	0.10	0.08	0.00	0.02	0.22	0.27	0.00	0.13	0.95
	B	0.00%	13.68%	0.00%	0.00%	0.00%	0.00%	10.53%	8.42%	0.00%	2.11%	23.16%	28.42%	0.00%	13.68%	
United Kingdom	A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.09	0.00	0.31	0.61
	B	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	34.43%	14.75%	0.00%	50.82%	



Alleviating Bottlenecks: Illustration

Countries		1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total effort
Bulgaria	A	0.11	0.00	0.00	0.00	0.09	0.00	0.24	0.09	0.04	0.12	0.23	0.00	0.00	0.14	1.06
	B	10.38%	0.00%	0.00%	0.00%	8.49%	0.00%	22.64%	8.49%	3.77%	11.32%	21.70%	0.00%	0.00%	13.21%	
Cyprus	A	0.29	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.20	0.00	0.00	0.76
	B	38.16%	0.00%	5.26%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	30.26%	26.32%	0.00%	0.00%	
Czech Republic	A	0.20	0.00	0.00	0.05	0.21	0.00	0.09	0.23	0.00	0.00	0.02	0.00	0.00	0.22	1.02
	B	19.61%	0.00%	0.00%	4.90%	20.59%	0.00%	8.82%	22.55%	0.00%	0.00%	1.96%	0.00%	0.00%	21.57%	
Estonia	A	0.29	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.17	0.00	0.00	0.17	0.74
	B	39.19%	0.00%	0.00%	0.00%	0.00%	0.00%	14.86%	0.00%	0.00%	0.00%	22.97%	0.00%	0.00%	22.97%	
Hungary	A	0.19	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.05	0.23	0.00	0.00	0.30	0.79
	B	24.05%	0.00%	0.00%	0.00%	1.27%	0.00%	0.00%	1.27%	0.00%	6.33%	29.11%	0.00%	0.00%	37.97%	
Latvia	A	0.21	0.00	0.00	0.00	0.06	0.00	0.09	0.00	0.00	0.00	0.28	0.00	0.00	0.13	0.77
	B	27.27%	0.00%	0.00%	0.00%	7.79%	0.00%	11.69%	0.00%	0.00%	0.00%	36.36%	0.00%	0.00%	16.88%	
Lithuania	A	0.24	0.00	0.00	0.00	0.02	0.00	0.14	0.00	0.05	0.08	0.22	0.00	0.00	0.23	0.98
	B	24.49%	0.00%	0.00%	0.00%	2.04%	0.00%	14.29%	0.00%	5.10%	8.16%	22.45%	0.00%	0.00%	23.47%	
Poland	A	0.05	0.00	0.00	0.00	0.00	0.14	0.06	0.05	0.00	0.00	0.27	0.00	0.00	0.22	0.79
	B	6.33%	0.00%	0.00%	0.00%	0.00%	17.72%	7.59%	6.33%	0.00%	0.00%	34.18%	0.00%	0.00%	27.85%	
Romania	A	0.16	0.00	0.00	0.03	0.09	0.00	0.19	0.00	0.00	0.11	0.25	0.00	0.00	0.21	1.04
	B	15.38%	0.00%	0.00%	2.88%	8.65%	0.00%	18.27%	0.00%	0.00%	10.58%	24.04%	0.00%	0.00%	20.19%	
Slovakia	A	0.20	0.00	0.00	0.00	0.07	0.00	0.16	0.20	0.00	0.05	0.22	0.00	0.00	0.00	0.90
	B	22.22%	0.00%	0.00%	0.00%	7.78%	0.00%	17.78%	22.22%	0.00%	5.56%	24.44%	0.00%	0.00%	0.00%	
Slovenia	A	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.17	0.55
	B	54.55%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	14.55%	0.00%	0.00%	30.91%	
EU		3.67	0.79	0.11	0.29	0.80	0.14	1.59	1.19	0.18	0.91	4.78	2.04	0.76	4.36	21.61
		16.98%	3.66%	0.51%	1.34%	3.70%	0.65%	7.36%	5.51%	0.83%	4.21%	22.12%	9.44%	3.52%	20.18%	



Simulation

- The improvement requires to introduce a policy mix rather than focusing on a single factor.
- To improve the Poland average GEDI index score by 0.1, an “optimal” effort allocation would call for
 - a 34% improvement in the Process Innovation pillar,
 - a 28% in the Risk Capital pillar, and a
 - 18% in the Opportunity Startup pillar.
- Of the remaining effort:
 - 6% should be allocated to Opportunity Perception,
 - 6% to Quality of Human Resources.



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<http://dx.doi.org/10.2139/ssrn.2008160>



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