The European Commission's science and knowledge service Joint Research Centre

In search of highgrowth, innovative enterprises in Europe

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European Commission

Motivations

Interesting for multiple policy domains:

- Post-crisis job creation: A small group of high-growth innovative enterprises (HGIEs) generate a large share of new jobs
- Structural change towards innovative sectors (close EU <> US gap in technology intensity)
- High-growth may simply indicate that labor-intensive, not the most knowledge-intensive activities generate most jobs
- Despite the interest, we still don't know about the share of HGIEs in the European economy (data challenge: both innovation & growth)



Key Questions



- 1. What is the **share** of HGIEs in Europe?
- 2. HGIEs:
 - Grow fast... but how fast growth makes them *HGIEs*?
 - Innovate... but what kind of innovations makes them *HGIEs*?



 How does high-growth and innovation performance of sectors and countries relate to one another at the country and sectoral level? (Do the two co-occur?)



Methods we followed

- 1. Discuss the **theoretical considerations** for measuring highgrowth and innovativeness of firms
- 2. Construct a **Growth and Innovativeness Matrix** to measure the share of HGIEs using 20-country CIS2012 microdata and analyze the difference between the various HGI measures
- 3. Reduce the number of dimensions to analyze how **sectors** and **countries** perform in terms of high-growth and innovation?



Measuring high-growth: theoretical considerations



Evidence of **uncertainty**:

Eurostat <> OECD EIP disagree in growth thresholds (10% vs. 20%)

Definition is crucial – results are sensitive to (Delmar, 1997; Delmar et al, 2003; Coad et al, 2014):

- indicator (turnover- or employment-based?)
- <u>Measure</u> (absolute or relative? Or, combined? /Birch Ind/)
- <u>Period</u> considered (growth spurts vs. sustained growth?)
- The process of growth (organic vs M&A)
- <u>Threshold</u> for high-growth (absolute (above X%) or relative (Top % of distribution))
- => Apply many alternative definitions to ensure more valid results



Measuring innovativeness: theoretical considerations

CIS-based measurement: richer data on inputs and outputs

- Oslo Manual (OECD, 2005); 4th ed. update in progress
- Quantitative data from innovation survey responses are of various quality (Mairesse and Mohnen, 2010);

(Other proxies: i.e. patents, new designs, R&D, etc.)

Alongside cross-country & cross sectoral differences, companies' innovative profile differs in terms of...

- Core measures:
- Innovation <u>types</u> (product, process, organizational, marketing)
- Degree of <u>novelty</u> (new to world or new to firm /diffusion/)
 - Importance of new products in turnover

Contextual measures:

 In-house or external R&D performer; R&D intensity (overall, by sector, country, etc.)





Absolute and relative growth thresholds: What is the difference?



Commission

The share of HGIEs among European firms The HGIE matrix results

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Hg1	hg1 hg2 hg3 hq4	7% 5% 4%	8% 10 6% 7 4% 5	% 11% % 8% % 6% % 2%	4% 3% 2% 1%	14% 11% 7%	5% 4% 3% 1%	3% 2% 1%	2% 1% 1%	2% 1 1% 4 1% 3	5% 4% 3%	1% 1 1% 1 0% 1 0% 0	1% 2 1% 1 1% 1	2% 3 1% 2 1% 2	% 0°	6 1% 6 1% 6 0%	1% 1% 1%	0%	0%	6 0% 6 0% 6 0%	7% 5% 3%	6% 4% 3% 1%	4% 3% 2%	3% 2% 1%	1% 10 0% 8 0% 5 0% 2	% 19 % 09 % 09	6 7% 6 5% 6 4%	1% 0% 0%	3% 2% 2%	1% 1 1% 0%	1% 1 8% 1 6% 0	% 75 % 65 % 45	6 1% 6 1% 6 0%	3% 2% 2% 1%	1% 1% 1%	4% 3% 2%	1% 1% 1%	3% 1 2% 1 2% 1 1% (y KU11 1% 1% 1%	1% 1% 0%	3% 2% 2%	3% 2% 2%	4% 3% 2% 1%	3% 4 2% 3 2% 2 1% 1	1% 05 3% 05 2% 0 1% 0	6 0% 6 0% 6 0%
Hg2	hg5 hg6 hg7 hg8	0% 12% 9% 7%	0% 0 12% 16 10% 13 8% 10	% 0% % 17% % 14% % 11%	0% 6% 5% 4%	0% 22% 18% 14%	0% 8% 6% 5%	0% 4% 3% 3%	0% 3% 2% 2%	0% (2% 4 2% 2%	0% 8% 7%	0% 0 1% 1 1% 1 1% 1	0% 0 1% 3 1% 2 1% 2	0% 0 3% 5 2% 4 2% 3	% 0°	6 0% 6 1% 6 1%	0% 2% 2% 1%	0% 0% 0%	C. 0% 0%	c. 6 0% 6 0%	0% 11% 9% 7%	0% 9% 8% 6%	0% 6% 5% 4%	0% 5% 4% 3%	0% 0 1% 15 1% 12 1% 9	% 09 % 19 % 19 % 19	6 0% 6 10% 6 8%	0% 1% 1%	0% 4% 4% 3%	0% 1% 1 1% 1 1%	0% 0 5% 1 2% 1 9% 1	% 05 % 105 % 85 % 75	6 0% 6 1% 6 1% 6 1%	0% 5% 4% 3%	0% 2% 1% 1%	0% 5% 4% 3%	0% 2% 1% 1%	0% 0 5% 2 4% 1 3% 1	1% 1% 1%	0% 1% 1%	0% 5% 4% 3%	0% 5% 4% 3%	0% (7% 5% 4%	0% 0 4% 5 3% 5 3% 4	9% 09 5% 09 5% 0 4% 0	% c. % 0% % 0%
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Reading the matrix

		inn1	inn2	inn3	inn4	inn5	inn6
HGill	NNj						
	-						
		Prod.	Proc.	Pd/Pc	Org/M	kt	Any
hg1		7%	8%	10%	11%	4%	14%
hg2	Ļ	5%	6%	7%	8%	3%	11%
hg3	MF	4%	4%	5%	6%	2%	7%
hg4	ш	1%	1%	2%	2%	1%	3%
hg5		0%	0%	0%	0%	0%	0%
hg6		12%	12%	16%	17%	6%	22%
hg7	S	9%	10%	13%	14%	5%	18%
hg8	ALE	7%	8%	10%	11%	4%	14%
hg9	S	3%	3%	4%	5%	2%	6%
hg10		1%	1%	1%	1%	0%	1%
hg11	b. D	13%	14%	18%	20%	7%	25%
hg12	Bir (Em	13%	13%	18%	19%	7%	25%
hg13	ch es	17%	1 7%	23%	24%	9%	31%
hg14	Bir Sal	17%	17%	23%	24%	9%	31%
hg15	Ы	1%	1%	1%	1%	0%	1%
hg16	E	1%	1%	2%	2%	1%	2%
hg17	d o	2%	2%	2%	3%	1%	4%
hg18		3%	3%	4%	5%	2%	6%
hg19	S	1%	1%	1%	1%	0%	2%
hg20	Sale	2%	2%	2%	3%	1%	3%
hg21	, do	3%	3%	3%	4%	1%	5%
hg22	Ē	4%	4%	6%	6%	2%	8%



PowerPoint

Reading the matrix

		inn1	inn2	inn3	inn4	inn5	inn6							
HGil	NNj													
		Prod.	Proc.	Pd/Pc	Org/M	kt	Any							
hg1		7%	8%	10%	11%	4%	14%							
hg2	2	5%	6%	7%	8%	3%	11%							
hg3	M	4%	4%	5%	6%	2%	7%							
hg4	ш	1%	1%	2%	2%	1%	3%							
hg5		0%	0%	0%	0%	0%	0%							
hg6		12%	12%	16%	17%	6%	22%							
hg7	S	9%	10%	13%	14%	5%	18%							
hg8	ALE	7%	8%	10%	11%	4%	14%							
hg9	S	3%	3%	4%	5%	2%	6%							
hg10		1%	1%	1%	1%	0%	1%							
hg11	ch ol.	13%	14%	18%	20%	7%	25%							
hg12	Bir (Em	13%	13%	18%	19%	7%	25%							
hg13	ir ch ales	17%	17%	23%	24%	9%	31%							
hg14	Bir (Sal	17%	17%	23%	24%	9%	31%							
hg15	op Empl <mark>B</mark>	op Empl	Empl	Empl	1%	1%	1%	1%	0%	1%				
hg16					Emp	Emp	Emp	Emp	Emp	Emp	1%	1%	2%	2%
hg17			2%	2%	2%	3%	1%	4%						
hg18	F	3%	3%	4%	5%	2%	6%							
hg19	S	1%	1%	1%	1%	0%	2%							
hg20	Sale	2%	2%	2%	3%	1%	3%							
hg21	do	3%	3%	3%	4%	1%	5%							
hg22	F	4%	4%	6%	6%	2%	8%							

Empl. 10% [Eurostat]



Reading the matrix



		inn1	inn2	inn3	inn4	inn5	inn6				
HGil	NNi										
nom	,										
		Prod.	Proc.	Pd/Pc	Org/M	kt	Any	2			
hg1		7%	8%	10%	11%	4%	14%				
hg2	_	5%	6%	7%	8%	3%	11%				
hg3	MF	4%	4%	5%	6%	2%	7%				
hg4	ш	1%	1%	2%	2%	1%	3%				
hg5		0%	0%	0%	0%	0%	0%				
hg6		12%	12%	16%	17%	6%	22%				
hg7	S	9%	10%	13%	14%	5%	18%				
hg8	ALE	7%	8%	10%	11%	4%	14%				
hg9	S	3%	3%	4%	5%	2%	6%	-			
hg10		1%	1%	1%	1%	0%	1%				
hg11	ch.	13%	14%	18%	20%	7%	25%				
hg12	Bir Em	13%	13%	18%	19%	7%	25%				
hg13	ch es	17%	17%	23%	24%	9%	31%				
hg14	Bir Sal	17%	17%	23%	24%	9%	31%				
hg15	р	1%	1%	1%	1%	0%	1%				
hg16	o p Emp	op Emp	op Emp	E	1%	1%	2%	2%	1%	2%	
hg17				2%	2%	2%	3%	1%	4%		
hg 18	F	3%	3%	4%	5%	2%	6%				
hg19	S	1%	1%	1%	1%	0%	2%				
hg20	Sales	2%	2%	2%	3%	1%	3%				
hg21	do	3%	3%	3%	4%	1%	5%				
hg22	H	4%	4%	6%	6%	2%	8%				

Sales 20% [OECD]



Reading the matrix

		inn1	inn2	inn3	inn4	inn5	inn6
HGil	NNj						
		Prod	Proc	Pd/Pc	Org /M	kt	Δnv
hg1		7%	8%	10%	11%	4%	14%
hg2		5%	6%	7%	8%	3%	11%
hg3	MPI	4%	4%	5%	6%	2%	7%
hg4		1%	1%	2%	2%	1%	3%
hg5		0%	0%	0%	0%	0%	0%
hg6		12%	12%	16%	17%	6%	22%
hg7	S	9%	10%	13%	14%	5%	18%
hg8	ALE	7%	8%	10%	11%	4%	14%
hg9	0)	3%	3%	4%	5%	2%	6%
hg10	_	1%	1%	1%	1%	0%	1%
hg11	.ch Jpl.	13%	14%	18%	20%	7%	25%
hg12	Bir En	13%	13%	18%	19%	7%	25%
hg13	les I	17%	17%	23%	24%	9%	31%
hg14	Bi Sa	17%	17%	23%	24%	9%	31%
hg15	Idu	1%	1%	1%	1%	0%	1%
hg16	Ē	1%	1%	2%	2%	1%	2%
hg1/	Тор	2%	2%	2%	3%	1% ~~/	4%
hg10		3% 10/	3% 10/	4%	5% 10/	2%	0% 29/
hg20	ales	1/0 2%	2%	2%	3%	1%	2%
hg21	p Si	3%	3%	3%	4%	1%	5%
hg22	T ₀	4%	4%	6%	6%	2%	8%





PowerPoint

Reading the matrix

	_	inn1	inn2	inn3	inn4	inn5	inn6
HGill	NNi						
	_	Prod.	Proc.	Pd/Pc	Org/M	kt	Any
hg1		7%	8%	10%	11%	4%	14%
hg2	2	5%	6%	7%	8%	3%	11%
hg3	MF	4%	4%	5%	6%	2%	7%
hg4	ш	1%	1%	2%	2%	1%	3%
hg5		0%	0%	0%	0%	0%	0%
hg6		12%	12%	16%	17%	6%	22%
hg7	S	9%	10%	13%	14%	5%	18%
hg8	SALE	7%	8%	10%	11%	4%	14%
hg9		Ś	3%	3%	4%	5%	2%
hg10		1%	1%	1%	1%	0%	1%
hg11	h. Io	13%	14%	18%	20%	7%	25%
hg12	Bir (Em	13%	13%	18%	19%	7%	25%
hg13	r S	17%	17%	23%	24%	9%	31%
hg14	Bir (Sale	17%	17%	23%	24%	9%	31%
hg15		1%	1%	1%	1%	0%	1%
hg16	Ш	1%	1%	2%	2%	1%	2%
hg17	орЕ	2%	2%	2%	3%	1%	4%
hg18	Tol	3%	3%	4%	5%	2%	6%
hg19	Ŋ	1%	1%	1%	1%	0%	2%
hg20	p Sales	2%	2%	2%	3%	1%	3%
hg21		3%	3%	3%	4%	1%	5%
hg22	Ţ	4%	4%	6%	6%	2%	8%



European Commission

The share of HGIEs among European firms The HGIE matrix results



0.1 – 31% of European firms are HGIEs (depending on the definition)
0.1 – 10% of firms are HGIEs in the 90% of cases



The co-occurrence of high-growth & innovativeness across countries, sectors

Aim: reduce dimensions

30 x 50 HGIE indicators: too many to handle

=> 2 pillars of high-growth

=> 1 core innovation pillar



- Around core variables (ESTAT-based definition + relative threshold; all types of innovation); statistically coherent
- Address uncertainty in the establishment of thresholds
- Leave contextual variables apart
- 1. HG_P1: Employment growth: absolute threshold
- 2. HG_P2: Various growth measures: top N% of distribution
- 3. INN_P1: Core innovation types



Country level:



- Both absolute and relative HG pillars anti-correlated with the innovation core pillar at the country level
- Countries strongest in Innovation relatively weaker in high-growth
 - Less innovative firms grow fast in RO, BG, LV, LT or NO
 - [ES: not fully comparable due to larger number of sectors]
- Correlation:

	C	Country-level										
	inn_p1	hg_p1	hg_p2									
inn_p1	1											
hg_p1	-0.329	1										
hg_p2	-0.553 **	0.904 ***	1									



Sectoral level [2-digit]



At the sectoral level: no association between HG & INN

 Note that we observed a positive correlation at the 1-digit level [heterogeneity within 1-d sectors]

		NACE 1-digi	t
	inn_p1	hg_p1	hg_p2
inn_p1	1		
hg_p1	0.406 *	1	
hg_p2	0.257	0.819 ***	1
		Europea	an ssion

Sectors by knowledge-intensity



Core innovation activities:

- KIABI: positive, moderate correlation;
- KIABI: more innovative, both high and low HG performance
- but no association between HG & INN for non KIABI

=> Knowledge-intensive sectors do not seem to underperform other (some labour-intensive) sectors



Innovation and Growth by Size



Country and sectoral performance gaps explained largely by structure



Conclusion

Novelty of study: quantify the share of HGIEs in Europe using CIS'12

- between 0.1 and 10% in case of 90% of HGIE def. combinations
- Results most sensitive to growth measure and threshold & degree of novelty of innovations.
- Method useful to characterize innovative profiles of HGEs

Observed difference between country-level and sector-level relationship between HG & I

- Chasing 2 targets at the same time: danger of trade-off between high-growth & innovativeness [especially in catching-up countries]
- Horizontal HGIE policy may be problematic

Limitations:

- Due to CIS dataset properties: will high-growth be persistent...?; use other measures of growth performance; replicate with other waves?
- Data for many sectors collected only on a voluntary basis



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Thank you!

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Data: sample distribution by country and size

		Unwe	ighted sam	ple			Wei	ghted sam	ple	<u> </u>	
	Cmall	Madium	Lorgo	Tota	al	Cmall	Madium	Lorgo	Tota	al	
Country	Small	wealum	Large –	Ν	%	Small	wealum	Large -	Ν	%	
BE	2,361	1,071	260	3,692	4%	8,642	2,391	434	11,467	3%	• 92,960
BG	2,096	1,664	460	4,220	5%	2,096	1,664	460	4,220	1%	(a/50k) firms
CY	603	168	31	802	1%	761	168	31	960	0%	(10450K) 111115
CZ	1,252	1,288	764	3,304	4%	7,207	3,620	879	11,706	3%	 20 countries
DE	1,753	1,332	1,222	4,307	5%	70,648	25,050	5,297	100,995	22%	
EE	444	439	56	939	1%	1,062	543	64	1,669	0%	$C_{1}E_{2}(76)0/1$
ES	11,289	7,871	2,923	22,083	<i>2</i> 4%	66,588	16,164	3,153	85,904	19%	• 5.55 (70)%;
FR	9,659	2,649	1,797	14,105	15%	44,124	9,978	2,316	56,417	13%	M:33 (20)%;
HR	558	905	242	1,705	2%	2,318	1,191	266	3,775	1%	$1 \cdot 13(4)\%$
HU	1,140	1,513	494	3,147	3%	4,144	2,205	505	6,854	2%	
IT	8,919	2,945	1,299	13,163	14%	96,381	13,411	1,975	111,766	25%	
LT	288	603	169	1,060	1%	1,577	1,188	176	2,941	1%	 IT, DE, ES,
LU	300	292	75	667	1%	845	341	81	1,267	0%	FR:~80%
LV	317	344	108	769	1%	941	597	106	1,645	0%	
NO	2, 116	1,105	218	3,439	4%	5,864	1,374	220	7,457	2%	
PT	1,914	1,623	425	3,962	4%	5,366	2,537	457	8,360	2%	
RO	987	2,411	961	4,359	5%	5,356	3,658	1,047	10,061	2%	
SE	2,188	1,251	457	3,896	4%	11,291	2,374	518	14,183	3%	
SI	658	535	134	1,327	1%	1,752	692	142	2,587	1%	
SK	833	848	333	2,014	2%	3,245	1,784	373	5,402	1%	
Total	49,675	30,857	12,428	92,960	100%	340,206	90,931	18,499	449,636	100%	
Share	53%	33%	13%	100%		76%	20%	4%	100%		



Our approach: multiple definitions

30 definitions of **high growth**

- indicator (turnover- or employment-based?)
- Measure (absolute or relative? Or, combined?)
- <u>Period</u> considered (growth spurts vs. sustained growth?)
- The process of growth (organic vs M&A)
- <u>Threshold</u> for high-growth (absolute (above X%) or relative (Top N% of distribution))

50 definitions of **innovation**

Core measures (21):

- Innovation <u>types</u>
- Degree of <u>novelty</u>
- Contextual measures (29):
- In-house or external R&D performer; R&D or innovation spending intensity; knowledge-intensity



Conclusions: indicators of HG&I firms

High-growth

- Absolute thresholds (above below ESTAT & OECD values)
- Relative thresholds (distribution-based)
- By size class...

Element of definition	Alternatives considered
Indicator of growth	number of employees; value of turnover
Measure of growth	Relative; Birch index
Growth period	2010-2012
	Organic only (excl. mergers and
Growth process	acquisitions)
Identification	Distribution-based: top P%, where
	$P \in [1, 5, 10, 15]$ as well as absolute
	threshold-based: growth \geq N%
	$N \in$ (10, 15, 21, 44, 100)
	all firms vs. growing firms (<=0 growth
Additional qualification	excluded), by size class; by industry

=> 30 definitions of growth

Innovation

Core variables:

- <u>Types</u> (product, process, organizational, marketing)
- Degree of <u>novelty</u> (new to world or new to firm)

Contextual Variables:

- Importance in turnover
- R&D performance In-house/ext.
- R&D intensity (overall, by sector, country, etc.)
- Knowledge-intensity
 - [...& their combinations...]

=> 50 measures of innovativeness



Measuring HG&I: empirical consideration

- 5 General observations on the growth of firms in the CIS sample
- 1. Average growth rates are most influenced by small firms' growth
- 2. High heterogeneity of countries in terms of growth at the 90th percentile;
- 3. Absolute growth thresholds: OECD 20% too restrictive; ESTAT 10% more reasonable to offer sufficient variation
- 4. Average growth predicts high growth up to 68-72%
- Product & process innovators grow faster than non-innovators; both product and process innovations generate jobs and sales growth



Data: employment growth by country and size classes

1. Average growth rates are most influenced by small firms' growth





Data: The top of employment change distribution by country



- 2. Change at 90th pctile distinguishes country performance
- 3. Absolute thresholds:
- OECD EIP 20% very restrictive (0-10% of firms in 17 countries!)
- ESTAT 10% typically between p75 and p90: offers

reasonable variation



Data: average growth as predictor of high-growth



4. Average growth predicts high growth up to 68-72%



Data: difference in firm growth by type of innovation



Difference vs. non-innovators in terms of...

5. Innovators grow faster than noninnovators;

Surprise: Process innovation generate more jobs than product innovation (i.e., in BE, CZ, DE, EE, HU, SE); at par in overall sample

 Product innovation generates more turnover



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High-growth measures:

Share of firms meeting a growth definition hg13 - Birch Index (sales) > 10% 57.8% hg14 - Birch Index (sales) > 100% 57.8% 45.5% 44.7% 38.7% 30.5% 26.29 18.6% 12.0% Sales 10% [Eurostat] 9.69 8.9% 8.2% Empl. 10% [Eurostat] 6.6% Sales 20% [OECD] 5.1% 4.4% 4.3% Empl. 20% [OECD] 3.1% 2.8% 2.0% 2.0% Sales and employment growth, absolute thresholds 2.0% Sales and employment growth, relative thresholds 1.5% Birch index, absolute threshold 1.2% Birch index, relative threshold 5% 10% 15% 20% 25% 30% 35% 40% 45% 0% 50% 55% 60% Share of firms meeting a growth definition



hg11 - Birch Index (empl) > 10%hg12 - Birch Index (empl) > 100%hg6 - sales growth >= 10% hg7 - sales growth >= 15% hg1 - total employment growth > 10% hg8 - sales growth >= 21% hg2 - total employment growth > 15% hg3 - total employment growth > 21% hg22 - Among top 25% relative sales growth (by size class, growing firms) hg30 - Among top 25% in terms of Birch Index (sales), by size class, growing firms) hg9 - sales growth >= 44%hg18 - Among top 25% relative empl. growth (by size class, growing firms) hg26 - Among top 25% in terms of Birch Index (empl), by size class, growing firms) hg29 - Among top 15% in terms of Birch Index (sales), by size class, growing firms) hg21 - Among top 15% relative sales growth (by size class, growing firms) hg17 - Among top 15% relative empl. growth (by size class, growing firms) hg25 - Among top 15% in terms of Birch Index (empl), by size class, growing firms) hg20 - Among top 10% relative sales growth (by size class, growing firms) hg28 - Among top 10% in terms of Birch Index (sales), by size class, growing firms) hg4 - total employment growth > 44% hg16 - Among top 10% relative empl. growth (by size class, growing firms)

hg24 - Among top 10% in terms of Birch Index (empl), by size class, growing firms) hg27 - Among top 5% in terms of Birch Index (sales), by size class, growing firms) hg19 - Among top 5% relative sales growth (by size class, growing firms) hg10 - sales growth >= 100%

hg15 - Among top 5% relative empl. growth (by size class, growing firms) hg23 - Among top 5% in terms of Birch Index (empl), by size class, growing firms) hg5 - total employment growth > 100%

Share of firms meeting an inn. definition

Innovation measures



inn6 - any kind of innovation (product or process or organizational or... inn33 - Among top 10% in terms of R&D intensity (by nace, 0's incl.) inn27 - Among top 10% absolute R&D spender (by nace, 0's incl.) inn4 - organizational or marketing innovation (anv inn3 - product or process innovation (any) inn1 - product innovation (good or service) inn29 - Among top 10% absolute R&D spender (by country, 0's incl.) inn35 - Among top 10% in terms of R&D intensity (by country, 0's incl.) inn23 - Perform in-house R&D & product or process innovator inn11 - New to firm product or process innovation inn7 - product or process innovation is new to the market inn5 - organizational or marketing innovation only (not prod/proc) inn24 - Continuously engaged in-house R&D over 3 yrs with permanent... inn48 - Knowledge-intensive product, process, organizational or marketing... inn39 - Among top 10% in terms of overall innovation spending intensity... inn44 - R&D or machinery purchaser, without in-house R&D inn45 - R&D or machinery purchaser, but not performer, product or... inn41 - Among top 10% in terms of overall innovation spending intensity... inn31 - Among top 10% in terms of R&D intensity (all firms, 0's incl.) inn37 - Among top 10% in terms of overall innovation spending intensity... inn25 - Among top 10% absolute R&D spender (all firms, 0's incl.) inn47 - Knowledge-intensive product or process innovator inn15 - Innovation new to firm or market represent at least 25% of sales inn8 - product innovation is new to the market and first in the country inn14 - Innovation new to firm or market represent at least 50% of sales inn9 - Radical innovation: New to market prod. or proc. innovation is a... inn10 - =inn9, and the company is an exporter inn18 - New to market Innovation represent at least 25% of sales inn40 - Among top 10% in terms of overall innovation spending intensity... 3.8% inn42 - Among top 10% in terms of overall innovation spending intensity... 3.5% inn38 - Among top 10% in terms of overall innovation spending intensity... 3.5% inn13 - Innovation new to firm or market represent at least 75% of sales inn34 - Among top 10% in terms of R&D intensity (by nace, excl. 0's) inn28 - Among top 10% absolute R&D spender (by nace, excl. 0's) inn12 - Innovation new to firm or market represent at least 90% of sales inn30 - Among top 10% absolute R&D spender (by country, excl. 0's) inn36 - Among top 10% in terms of R&D intensity (by country, excl. 0's inn26 - Among top 10% absolute R&D spender (all firms, 0's excl.) inn32 - Among top 10% in terms of R&D intensity (all firms, 0's excl.) inn17 - New to market Innovation represent at least 50% of sales inn43 - R&D intensity (RD/turnover) is 15% or more (YIC definition) 1.8% inn16 - New to market Innovation represent at least 75% of sales 11% inn49 - =inn48, with new to market or new to firm Innovation representing..1.0%

The HGIE matrix



Reading the matrix

		inn1	inn2	inn3	inn4	inn5	inn6
HGil	NNj						
	,						
		Prod.	Proc.	Pd/Pc	Org/M	kt	Any
hg1		7%	8%	10%	11%	4%	14%
hg2	1	5%	6%	7%	8%	3%	11%
hg3	MP	4%	4%	5%	6%	2%	7%
hg4	ш	1%	1%	2%	2%	1%	3%
hg5		0%	0%	0%	0%	0%	0%
hg6		12%	12%	16%	17%	6%	22%
hg7	S	9%	10%	13%	14%	5%	18%
hg8	ALE	7%	8%	10%	11%	4%	14%
hg9	S	3%	3%	4%	5%	2%	6%
hg10		1%	1%	1%	1%	0%	1%
hg11	ch pl.	13%	14%	18%	20%	7%	25%
hg12	Bir Em	13%	13%	18%	19%	7%	25%
hg13	ch es	17%	17%	23%	24%	9%	31%
hg14	Bir Sal	17%	17%	23%	24%	9%	31%
hg15	Ы	1%	1%	1%	1%	0%	1%
hg16	E	1%	1%	2%	2%	1%	2%
hg17	do	2%	2%	2%	3%	1%	4%
hg18		3%	3%	4%	5%	2%	6%
hg19	S	1%	1%	1%	1%	0%	2%
hg20	Sale	2%	2%	2%	3%	1%	3%
hg21	, do	3%	3%	3%	4%	1%	5%
hg22	Ē	4%	4%	6%	6%	2%	8%



Innovative profile of HGIEs

By novelty of innovations:

- 2/3 of HGIEs have **new to firm** product or process innovation:
- 22% report that this is **new to the world**.

HGIEs have a **portfolio** of innovative products:

- <0.5% of firms in sample report that at least 25% of their sales originates from new to the market innovations;
- <0.5% of firms in sample report that such a product represents 5% of turnover

HGIEs are **above-average R&D spenders**

- 47% of HGEs with any kind of innovation do in-house R&D;
 24% of the rest purchase R&D from outside the firm
- Non-R&D innovators: 0.1-10% of high-growth firms







Simplified HG and INN 'pillar' indices

High employment growth measured applying absolute thresholds [hg-P1] [Ev 3.3; 65.9% var]

- Relative employment growth measures hg1-hg4; (>10-44%)
- Empl. Birch index >10% hg11
 [also correlates with sales growth]

Relative mesure of high growth [hg-P2] [Ev 5.1; 63.6% var]

 Among top of distribution in terms of employment (top 5-25%), sales (top 25%) growth and Birch-index (top 10-15%), by size class hg15-18, 19, 23, 25, 26

Innovation core pillar [inn-P1]

[Ev 3.8; 61.4% var]

- Product, process, any kind of innovation (inn1-inn3, inn6);
- radical innovation (new to market, world or Eur first inn9)
- New to firm prod/proc innovation (inn11) [regardless of R&D performance...]



Validation / Cross-reference



HG_P1 corr vs HGIE TOT 50% .24 - .28

HG_P2 corr vs. HGIE TOT 50% Not sign.

HG_P1 corr vs HGIE Share in Tot .37



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