

Unpacking Composite Indices: Following the policy trail

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Based on research with Pari Patel and Lionel Nesta (SPRU) & Hugo Hollanders and Catalina Bordoy (MERIT)

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Limitations

- No discussion of weighting, sampling or other technical issues that influence composite indicators.
- Focus here is on policy interpretation
- Examples drawn from TrendChart
- **www.cordis.lu/trendchart**

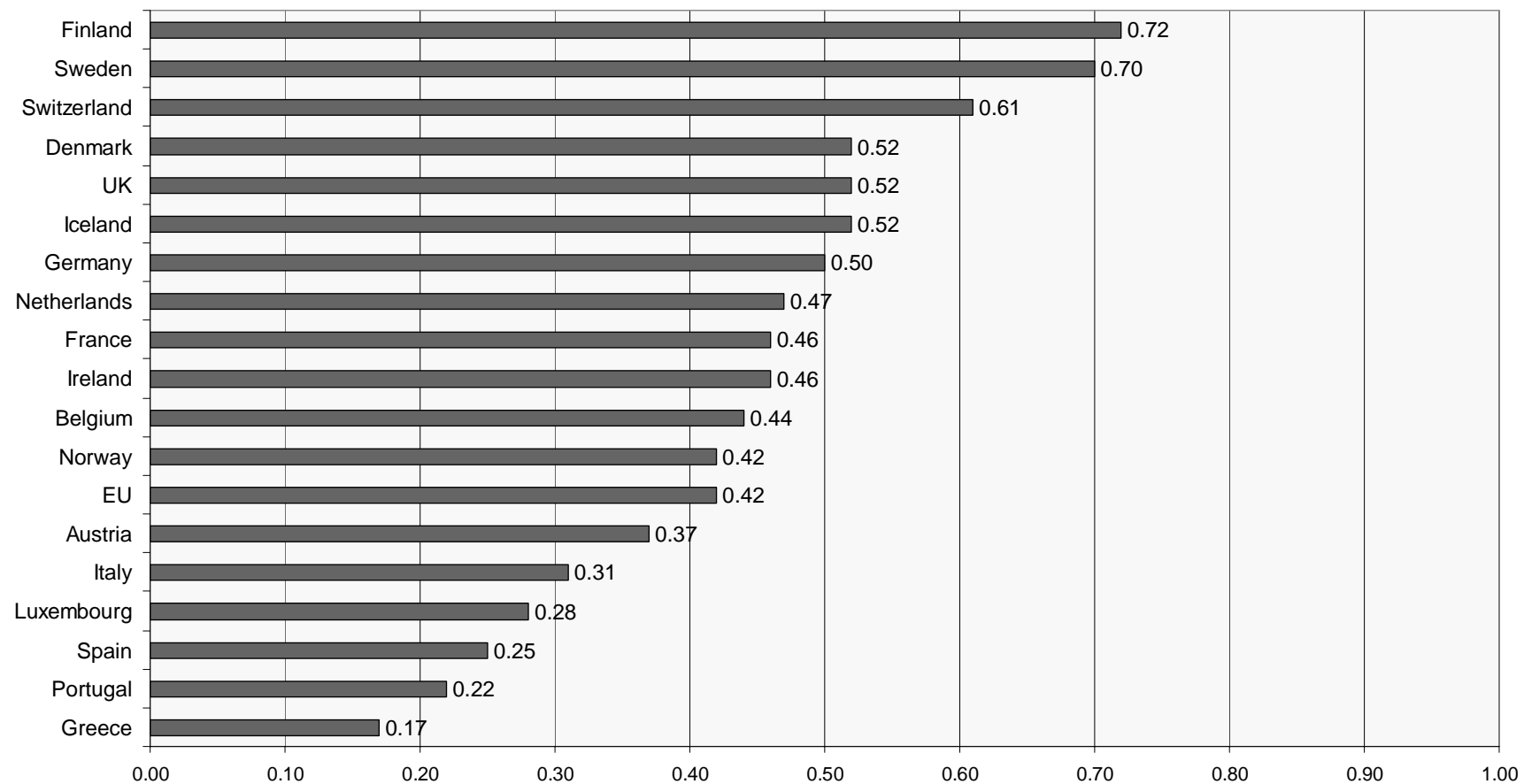
A CI for National Innovation

The TrendChart European Innovation Scoreboard provides a composite index (CI) on national innovative capability.

What is the function of this CI?

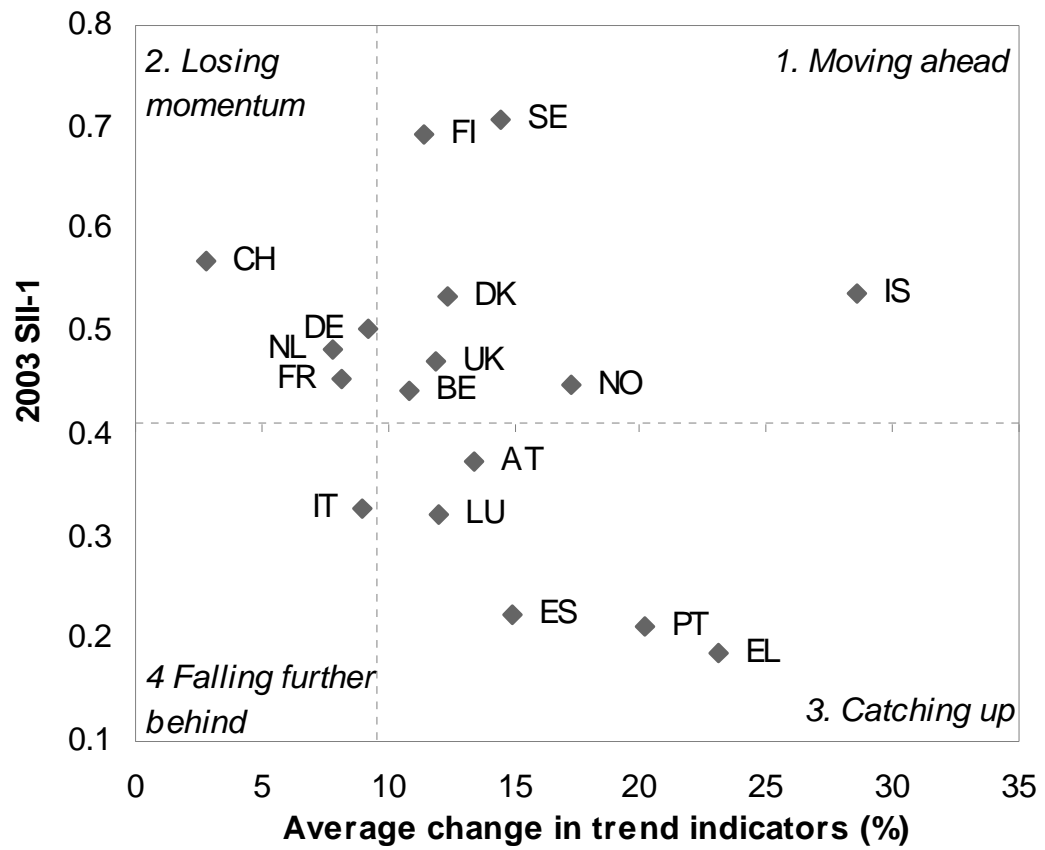
- Attention getting device?
- Naming and shaming?

2003 European Innovation Scoreboard Composite Index



How Useful is a CI?

- A simple CI is not very informative.
- However, there are many different ways of using a CI that can tell us more about policy issues.



Policy Relevance

Different types of CIs are of great value:

- CIs are well suited for investigating multi-dimensional activities such as innovation.
- They permit analysis of complex phenomena in a way that is easy to interpret.

Innovation Policy Terrain

- Innovation ‘dynamo’ or dynamic factors shaping innovation in firms.
- Transfer factors: human, social and cultural factors influencing information transmission.
- Framework conditions: general conditions and institutions which set the range of opportunities for innovation.

Source: Oslo Manual, 1997

TrendChart Approach

Similar to Oslo Manual ‘terrain’, but:

1. European Innovation Scoreboard (EIS)
2. Sectoral Innovation Scoreboard (SIS)
3. National Innovation Systems (NIS)

Goal is to evaluate different ‘terrains’ of innovation.

Sectoral Innovation Scoreboard

- Differences in the summary innovation index on the European Innovation Scoreboard could be due to sector differences.
 - A country specialized in pharmaceuticals and aerospace will do better than a country specialized in textiles and food products.

SIS: Structural Differences

Share of manufacturing value-added from high technology sectors (2000):

Highest

Ireland: 30.2%
Finland: 23.7%
UK: 17.9%

Lowest

Luxembourg: 3.1%
Greece: 6.2%
Portugal: 6.3%

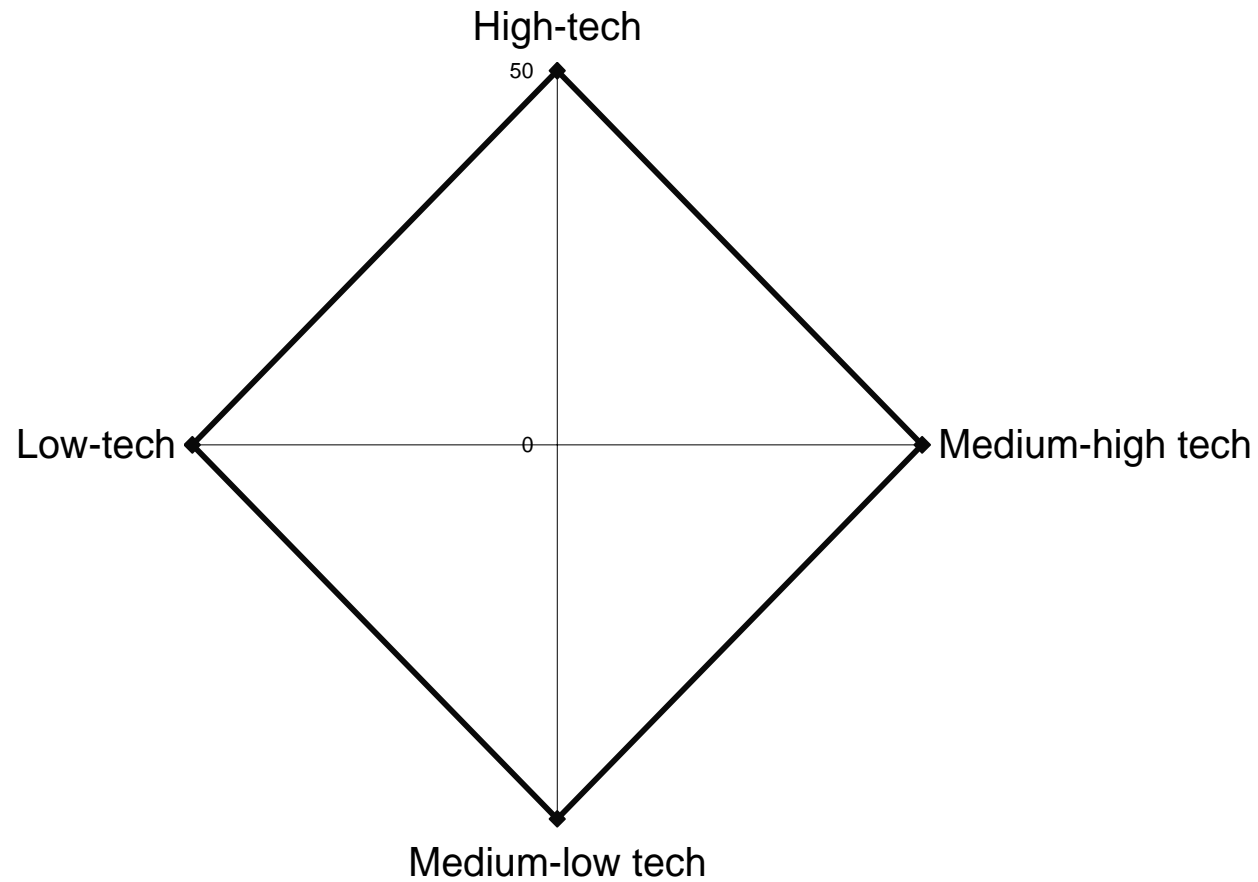
SIS: Ten Indicators

1. BERD as a percent of sector output
2. EPO patent applications per employee
3. USPTO patent applications per employee
4. SMEs innovating in-house
5. SMEs involved in innovation cooperation
6. Total innovation expenditures/all turnover
7. Capital investment per employee
8. Value-added per employee
9. Sales share from new-to-firm products
10. Sales share from new-to-market products

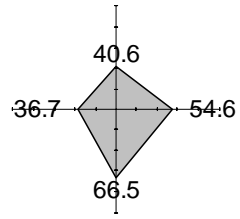
SIS: Four Manufacturing Sectors

- **High-tech:** pharmaceuticals, computers, telecom, instruments, aerospace
- **Medium-high tech:** chemicals, machinery, transport equipment
- **Medium-low tech:** rubber, petroleum, basic metals, fabricated metals)
- **Low-tech:** food, textiles, wood products, pulp and paper, furniture

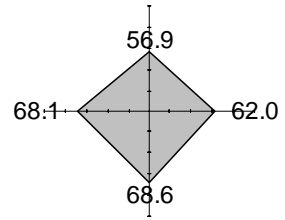
SIS: Sectoral Cls for Innovation



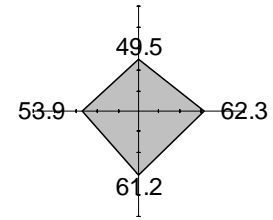
Austria



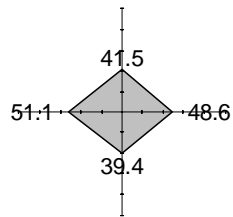
Belgium



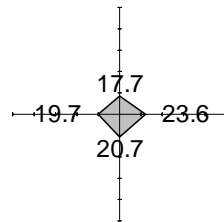
Germany



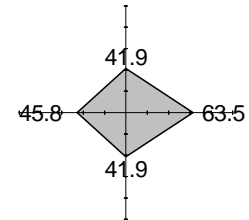
Denmark



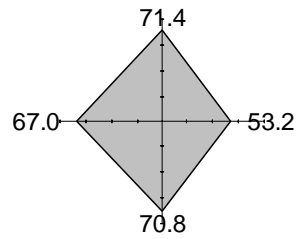
Spain



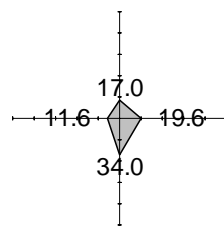
France



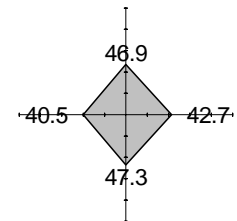
Finland



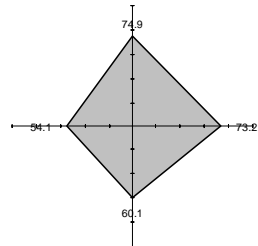
Greece



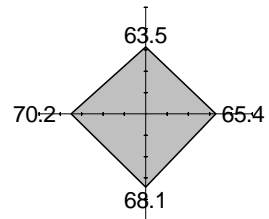
Italy



The Netherlands



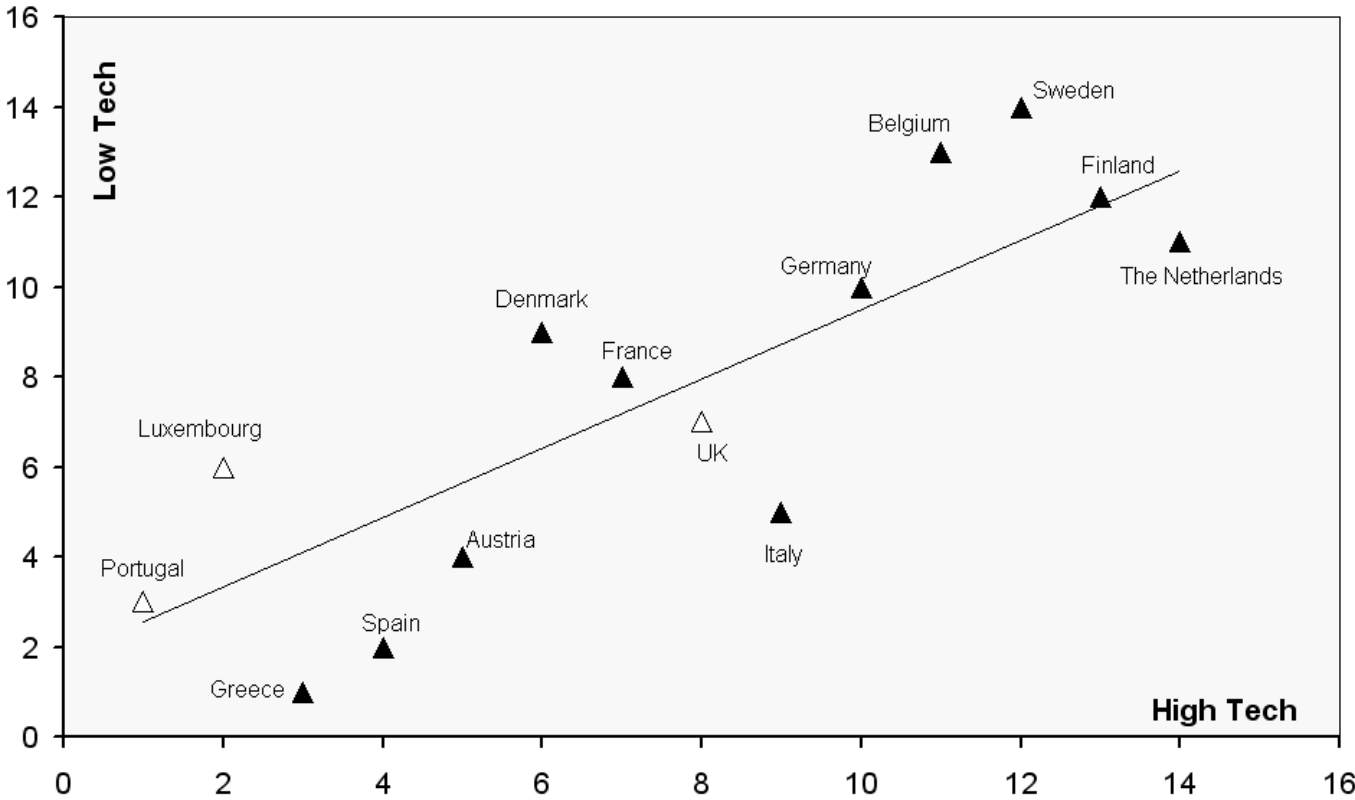
Sweden



SIS: Persistence in Innovativeness?

- Does “innovative success” in one sector class spill over into other sector classes?
- Correlations of the country-specific CIs for each sector group suggests yes:
 - Spearman’s rho for high tech versus low tech of 0.84 ($p < .000$)

Country CI rank order: high tech by low tech



EIS and SIS conclusions

1. Composite indices have more uses than 'naming and shaming'
2. Suitable for summarizing complex phenomena such as innovation
3. Sub-indices can be used to explore questions of policy interest (is innovation an economy-wide phenomena?)

NIS Indicators

- Two main types of NIS indicators:
 - Structural economic features (share of value-added produced by SMEs).
 - Socio-cultural-institutional conditions that encourage individuals and firms to actively seek opportunities for innovation.
- Main issue is that we cannot always assume that more (or less) is best, but there is still a role for composite indicators.

Analysis of NIS Indicators

- Structural:
 - Demand for innovations (4 indicators)
 - Industry structure (3 indicators)
 - Open economy (3 indicators)
- Socio-cultural-institutional:
 - Finance system (1 indicator)
 - Receptiveness to new ideas (5 indicators)
 - Social equity (3 indicators)
 - Labour market (2 indicators)
 - Entrepreneurial attitudes (2 indicators)
 - Social capital (1 indicator for trust)

NIS: Composite Indicators

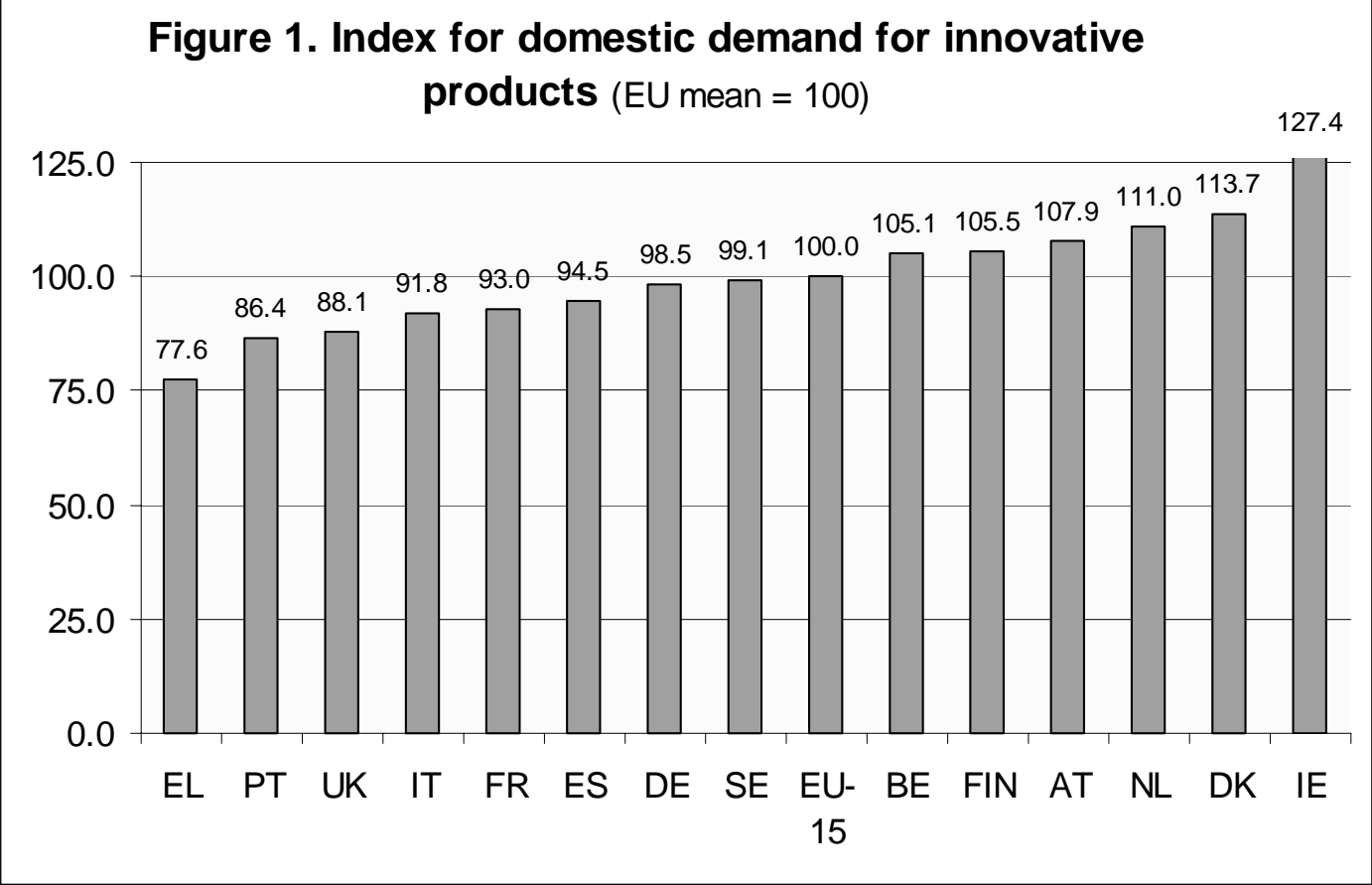
Developed five composite indicators:

- Demand for innovations (4 structural ind.)
- Open economy (3 structural ind.)
- Receptiveness to new ideas (5 SCI ind.)
- Social equity (3 SCI ind.)
- Entrepreneurial attitude (2 SCI ind.)

7 indicators for which a CI was not possible:

3 industry structure, 1 finance, 2 labour market, 1 social capital

NIS: Demand for innovative products



NIS: Cluster Analysis

- We used the five composite indices and the individual 7 indicators in a cluster analysis.
 - Use of the composite indices is of value – they simplify the analysis and make interpretation simpler.

NIS: Four Cluster Solution

NIS Characteristics	Countries	Mean Summary Innovation Index
Economy dominated by SMEs in low-tech sectors, but strong entrepreneurship	Greece, Spain, Italy, Portugal	.24
Middle rank for many indicators, but low score for entrepreneurship	Germany, Austria, Belgium	.44
Large market-based economies	France, UK	.47
Equitable economies	Denmark, Finland, Netherlands, Sweden	.60

Conclusions

- Composite indices, in addition to their value as attention-getting devices, can:
 - Summarize complex phenomena in a way that permits deeper analysis.
 - Provide results that are readily interpretable.
 - Opens up many different avenues for policy relevant research.