

Innovation surveys and indicators: some experiences from the OECD

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Overview

- Brief history: OECD and the *Oslo Manual*
- Data collection
- Analytical work
- Interpreting data from innovation surveys
- Ongoing and future work

OECD: methodological work

- Long tradition of manuals and guidelines for the measurement of S&T activities
- R&D: *Frascati Manual* - since 1960s, now 6th edition (2002)
- Innovation: *Oslo Manual*: since early 90s, now 3rd edition (2005)
- Others:
 - Productivity: *Productivity Manual* (2001)
 - Globalisation: *Handbook on Economic Globalisation Indicators* (2005)
 - Human resources in science & technology (HRST): *Canberra Manual* (1995), *Guidelines on the Careers of Doctorate Holders* (CDH - 2009)
 - Biotechnology: *Framework for Biotechnology Statistics* (2005)
 - Patents: *Patent Statistics Manual* (2009)
 - Information society: *Guide to Measuring the Information Society* (2011)

The Oslo Manual

- First edition in 1992 (TPP innovation in manuf.)
- Co-managed with Eurostat since the 2nd edition (1997), developed and reviewed through peer process (NESTI + ESTAT WP STI)
- Provides conceptual background for analysis of innovation in firms
- Built on economic framework (elements from Schumpeter, systems of innovation), subject approach, creation and diffusion of knowledge
- Provides definitions and recommendations for developing surveys, but not a template or list of indicators
- Latest revision: expansion to non-technological innovation (org + mkt), innovation linkages, annex on developing countries



The CIS model

- Despite Oslo framework, innovation surveys follow different models across countries
- Main harmonised effort: Community Innovation Survey (CIS) in Europe
 - Run since reference year 1992, now biannually
 - Used by all EU Member States + some Candidate / Associated countries
 - Guided by:
 - Oslo Manual (2005)
 - EC Regulation 1450/2004 → list of mandatory/voluntary indicators (around 50/50 in CIS-2010)
 - Business survey questionnaire + methodology
 - Harmonised questionnaire (incl. ad-hoc modules) which is then implemented nationally with some modifications
 - Methodological guidelines + aggregations/tabulations

Use of CIS indicators

- National reports
- Eurostat reports
- EU Innovation Union Scoreboard - IUS (ex-EIS):
 - <http://www.proinno-europe.eu/inno-metrics/page/innovation-union-scoreboard-2010>
- OECD reports: STI Scoreboard (2011), Innovation Strategy (2010)
- Growing use but still less widely used than R&D statistics → some concerns about quality, policy relevance, international comparability (outside EU)

Development of innovation surveys

- Increasing use in OECD and developing countries: around 80 countries world-wide have carried some type of innovation survey, mainly following Oslo Manual framework
- 3 broad types:
 - Innovation surveys close to CIS design with some adaptations: China, Japan, Korea, Russia, South Africa
 - Joint R&D/innovation surveys close to CIS: Brazil, Chile, Israel, Mexico, United States* (BRDIS)
 - Broader surveys (business strategies/operations): Australia, Canada, New Zealand, Switzerland

Survey comparability

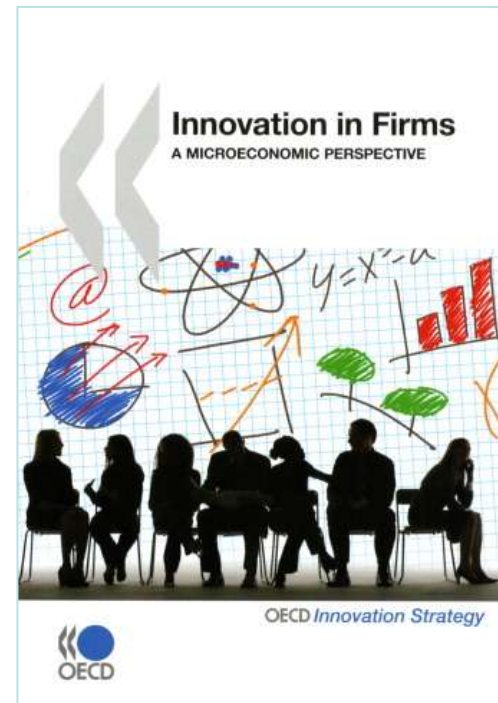
- Examples of potentially significant differences in innovation surveys:
 - scope and type of survey: stand-alone, joint R&D/innov, module within broader survey
 - Target population: industries, firm size threshold
 - length of observation period (2-3 years)
 - Reference period
 - Scope of certain variables: *e.g.* collaboration, expenditure
- At OECD no systematic collection of international data from innovation surveys (unlike R&D)

Data collection

- Some ad-hoc data collections carried out for biannual *STI Scoreboard* publications or analytical projects (e.g. OECD Innovation Strategy)
- Attempts to collect harmonised data through micro-based indicators
- Ongoing efforts to collect methodological information about national surveys and questionnaires to understand differences and assess impact

OECD Innovation Microdata Project

- Rationale and approach: restrictions on accessing microdata → decentralised approach with OECD coordinating and country leads, develop common routines (STATA/SAS)
- Participants and organisation: over 20 countries, around 50 researchers
- 3 modules: (1) indicators; (2) mixed modes and non-tech innovation; (3) innovation and productivity (econometric analysis)
- 2 phases: 2007-09 and 2009-11
- Data used for OECD Innovation Strategy reports, in particular “Measuring Innovation: A New Perspective” (2010)



Microdata Project 1: indicators

- 3 main objectives:
 - International comparability: CIS / others → construct indicators using similar scope (industries, firm size), non-European countries map variables to CIS
 - Develop new indicators and taxonomies
 - Exploit new breakdowns for existing indicators (*e.g.* R&D status)

Indicators (1)

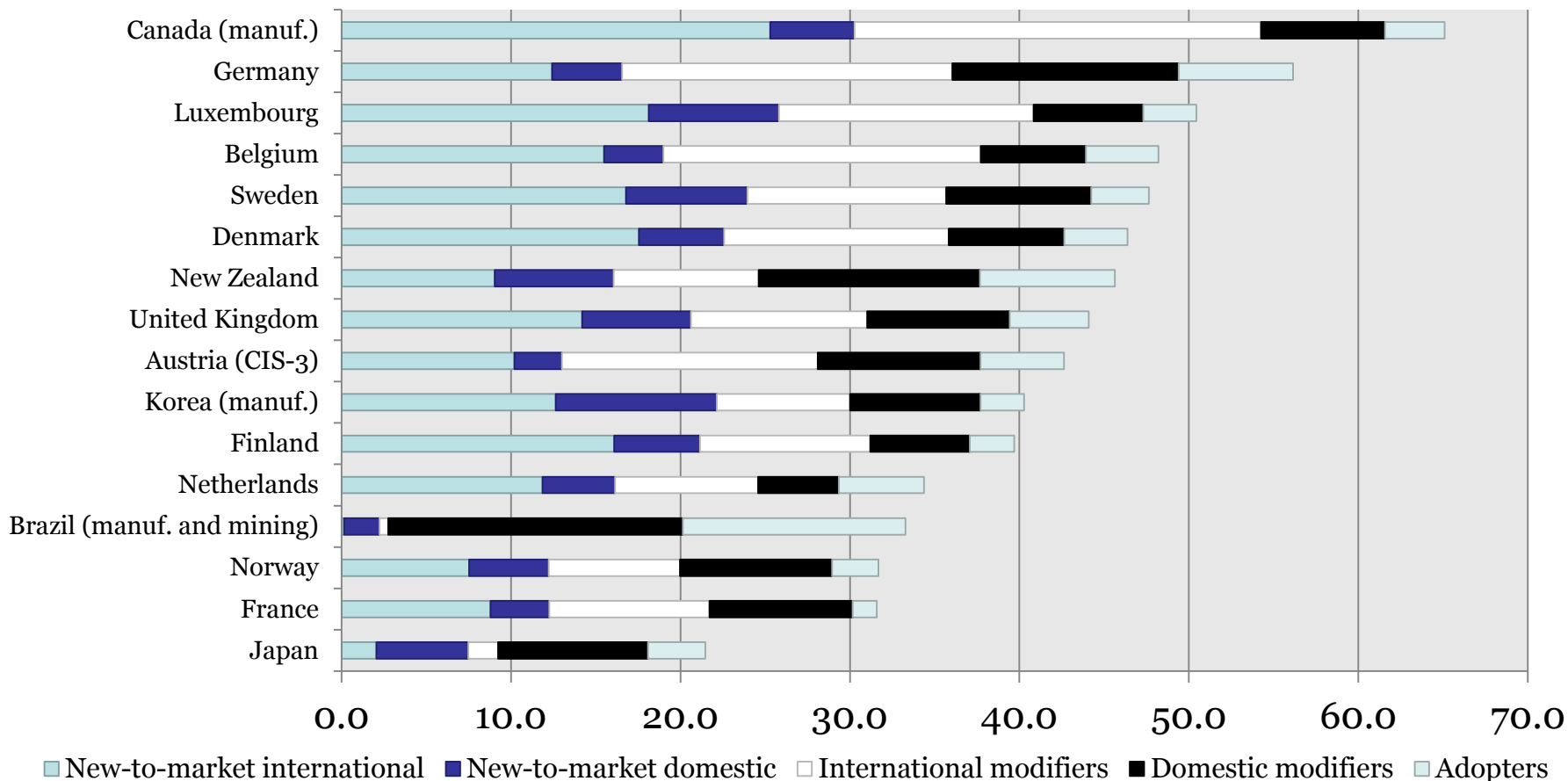
- Selected 20 “basic” indicators usually constructed with a single variable in survey
- Similar to indicators tabulated for CIS:
 - product / process innovators
 - new-to-market process innovators,
 - marketing / organisational
 - R&D performance
 - expenditures (as % of turnover)
 - public support
 - collaboration
 - IPRs

Indicators (2)

- More ‘complex’ indicators and new taxonomies (combining several questions)
- Output-based modes (PP):
 - Combine degree of novelty (new-to-market) with international orientation (domestic-only/foreign)
- Open innovation:
 - Sourcing (extramural R&D, other external knowledge)
 - Joint innovation: product/process innovations with others
- Complementarities:
 - PP only, MO only, both
- Breakdowns: R&D status/intensity, SMEs (single/group)

Indicators: some examples

Output-based innovation modes, 2002-04 (as a % of all firms)



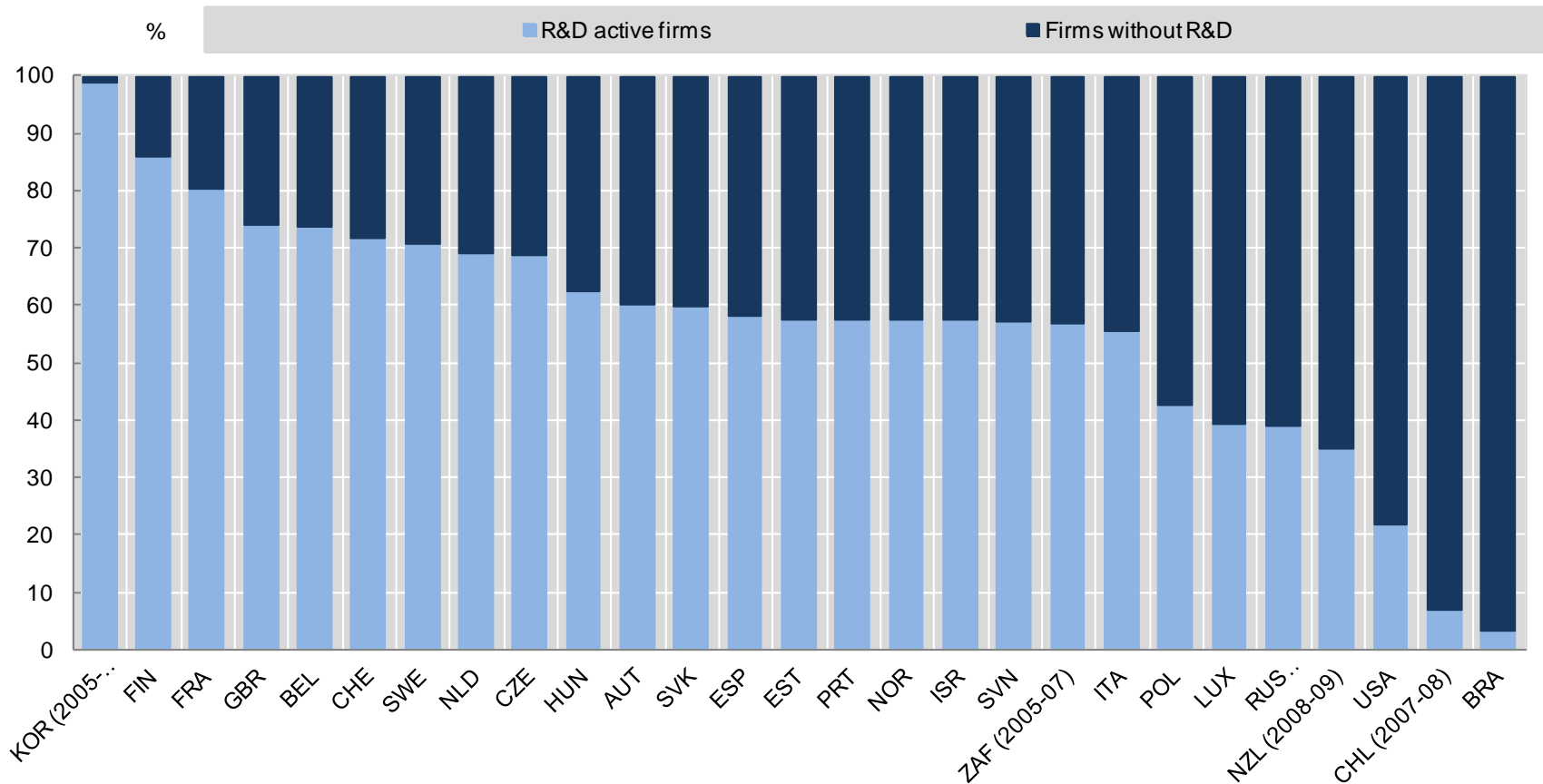
Note: for New Zealand: 2004-05, for Japan: 1999-2001, for Brazil: 2003-05, for Austria 1998-2000.



Source: OECD (2009), *Innovation in Firms: a microeconomic perspective*, OECD, Paris.

Non-R&D innovation

Product innovators by R&D status 2006-08

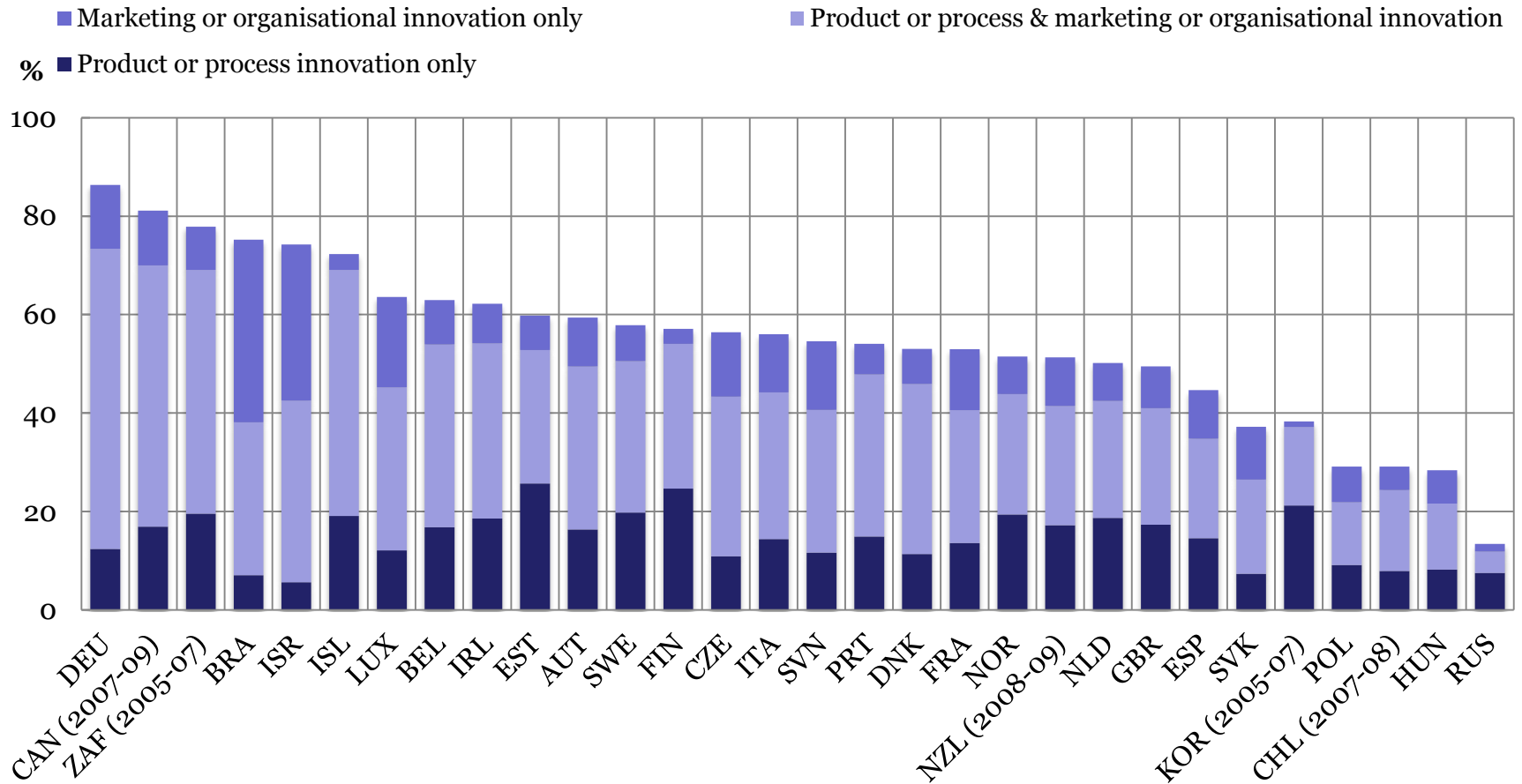


Source: OECD (2011), *Science, Technology and Industry Scoreboard 2011*.

Complementary strategies

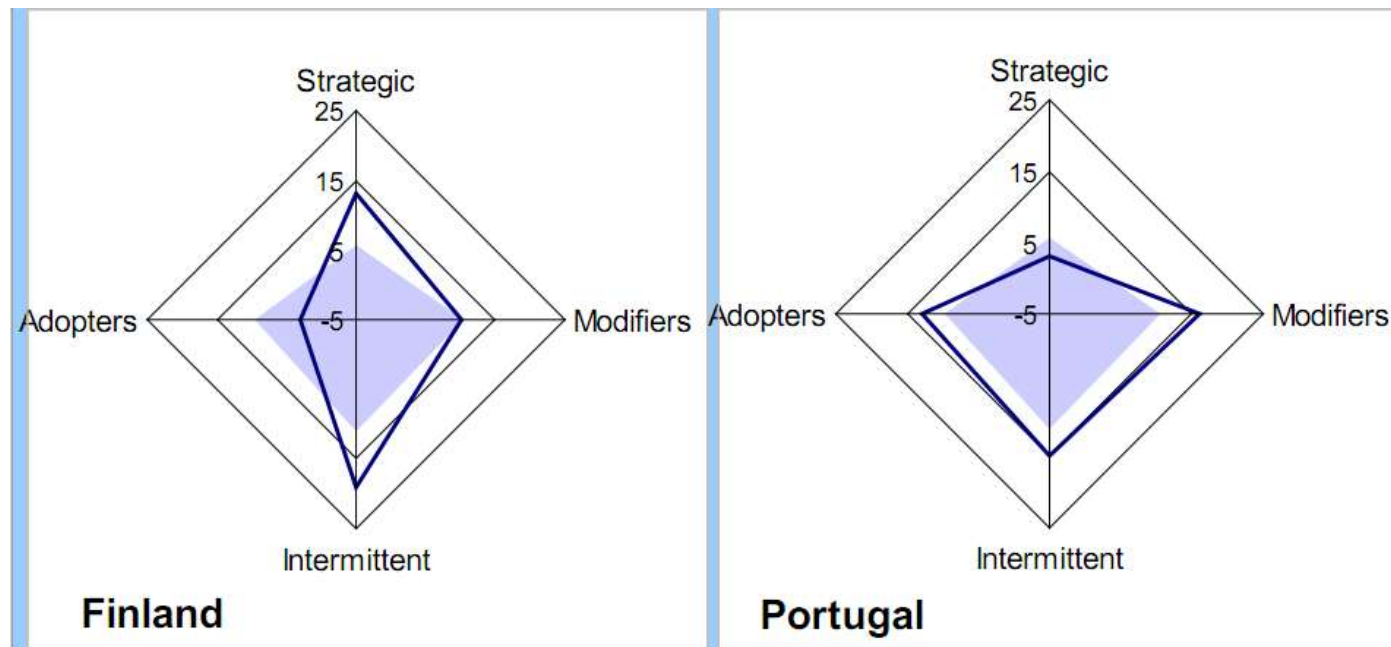
Innovation strategies in the manufacturing sector, 2006-08

As a % of all manufacturing firms



Comparing data: some caveats

- Simple indicators used for international benchmarking can sometimes be misleading
- CIS-3: Finland: 46% ; Portugal: 45%



An example with US data

- US Business R&D and Innovation Survey (BRDIS) incorporated Oslo-type questions on innovation for the first time in 2009 (data for 2006-08)
- But some surprising results...

	NSF figures (n=1,545,000)	Restricting sample to core CIS-2008 industry coverage (n=225,600)
Product innovators	9%	20%
Process innovators	9%	19%

Source: NSF calculations.

Differences BRDIS/CIS

- BRDIS is mainly an R&D survey
- No ex-ante definitions of innovation
- Concepts are new to firms
- Industries covered (all firms in US), firm size thresholds (10+ employees for CIS, 5+ in BRDIS)
- Data adjustments / imputation
- Survey design and weighting

Some explanations

- Must remember what these indicators are measuring:
 - innovation as an incremental process;
 - lowest degree of novelty: new-to-firm;
 - innovation as a change (introduction of...) → catching-up;
 - some indicators are subjective and/or don't measure intensity or frequency (*e.g.* collaboration);
 - sectoral composition matters.
- Hence importance of using a broad set of metrics, since we are measuring an inherently *complex* phenomenon

Challenges

- Methodological problems remain, even for CIS countries where methodology is harmonised:
 - Data quality due to low response rates, widespread use of imputation, qualitative/subjective measures
 - Voluntary/mandatory variables (ad-hoc modules)

Respondents

- Need to understand if/how firms understand concepts
- Are surveys well adapted to certain types of firms? (small, services)
- Are examples given and are they relevant?
- Some concepts/questions still problematic (*e.g.* innovation expenditure, new-to-market, “significantly” improved)

Differences remain

- Despite efforts towards harmonisation, differences remain:
 - countries cover different industries, different size thresholds
 - differences in survey design (voluntary/mandatory, non-response surveys and use of imputation, online vs personal interviews/postal)
 - use of combined surveys (*e.g.* R&D / innovation) or modular approach
 - different questionnaire design (*e.g.* filtering of non-innovators)
- Underlying cultural and linguistic factors at play

Comparability problems: an example (innov. expend)

- Current model CIS (and similar surveys): levels are collected for 4 activities (only for product innovation), binary (Y/N) for other activities (e.g. training)
- Australia (2008-09): only a binary variable (Y/N) is used for 8 activities relating to all 4 types of innovations (product, process, marketing, organisational).
- Canada (2009): expenditure on process innovations, expenditure on product innovations, expenditure on marketing innovations (as a share of total marketing expenditures).
- Japan (J-NIS 2003): total value for innovation expenditure (related to product / process) and shares for certain activities (similar to CIS).
- New Zealand (2009): values for 4 categories relating to product development & related activities (R&D, design, marketing and market research, other) + Y/N to list of 10 activities (and whether to support innovation)
- Switzerland (2008): 5-level scale by type of innovation (product/process) and expenditure category (research, development, design and preparations, subsequent investments, ICT). + levels for 3 categories over 3-yr period

Areas for future work and some messages

- importance of cognitive testing → OECD/NESTI work on survey redesign (BERD and innovation):
 - currently collecting metadata + country experiences with cognitive testing
 - working towards testing of common questions across countries (existing + new formulations)
- Way forward:
 - encourage modular approach: core questions asked in similar way + modules which may include country-specific questions/topics → CIS provides a useful model, but *not the only one*
 - dissemination: encourage access for researchers to microdata
 - better understanding user needs and evaluating policy impacts
 - link to other related OECD work including defining and measuring public sector innovation and work on Intangible Assets
 - collaboration with other international initiatives (e.g. UIS, ESTAT, RICYT)