International organisation and sourcing of business functions
An innovative approach to meet data needs - combining surveys, statistical registers and micro data linking

Europe in a Globalised World, Copenhagen, 26-27 November 2013

Peter Bøegh Nielsen, Michael E. Nielsen and Zuzanna Tilewska
Statistics Denmark

STATISTICS DENMARK

Today's Presentation

- **Survey on International Organisation and Sourcing**
  - Background and design
  - Definitions
  - Survey results

- **Business Functions**
  - Definitions
  - Survey results

- **Micro Data Linking**
  - Background and design
  - Linking results

- **Experimental Indicators based on MDL**
  - Examples of indicators

STATISTICS
DENMARK

The starting point 2006: Anecdotal evidence…

This is the 8.15 to Mumbai… It is carrying Indian commuters, on the way to do **YOUR JOB**
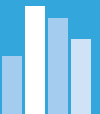
Policy issues addressed

- How many jobs are moved across borders? Which type of jobs and in which sectors?

- Who are the receiving countries?

- What are the overall employment impacts – in terms of job losses or gains?

- What is the impact of international sourcing on the competitiveness of European firms?

- Is there a risk of "hollowing out" skill based activities?

Definitions of International Sourcing

The total or partial movement of business functions (core or support business functions) currently performed in-house or currently domestically sourced by the resident enterprise to either non-affiliated (external suppliers) or affiliated enterprises located abroad.

International Sourcing dimensions

| ORGANIZATION	LOCATION	
	DOMESTIC	INTERNATIONAL
INTERNAL: function within the enterprise or enterprise group	EU terminology: Domestic insourced US terminology: Domestic in–house • Function performed within the enterprise or enterprise group within the compiling country	EU terminology: International insourced US terminology: Offshore in–house Function performed within the enterprise or enterprise group outside the compiling country (by affiliated enterprises)
EXTERNAL: function outside the enterprise or enterprise group	EU terminology: Domestic outsourced US terminology: Domestic outsourced Function performed outside the enterprise or enterprise group by non–affiliated enterprises and within the compiling country	EU terminology: International outsourced US terminology: Offshore outsourced Production outside the enterprise or group and outside the compiling country (by non–affiliated enterprise, e.g., suppliers, service providers, contractors, etc.)

Modules in the IS/GVC survey 2012

- General information

- Domestic activities in the enterprises

- International sourcing and relocation of business functions

- International organisation of activities in the enterprises' foreign affiliates

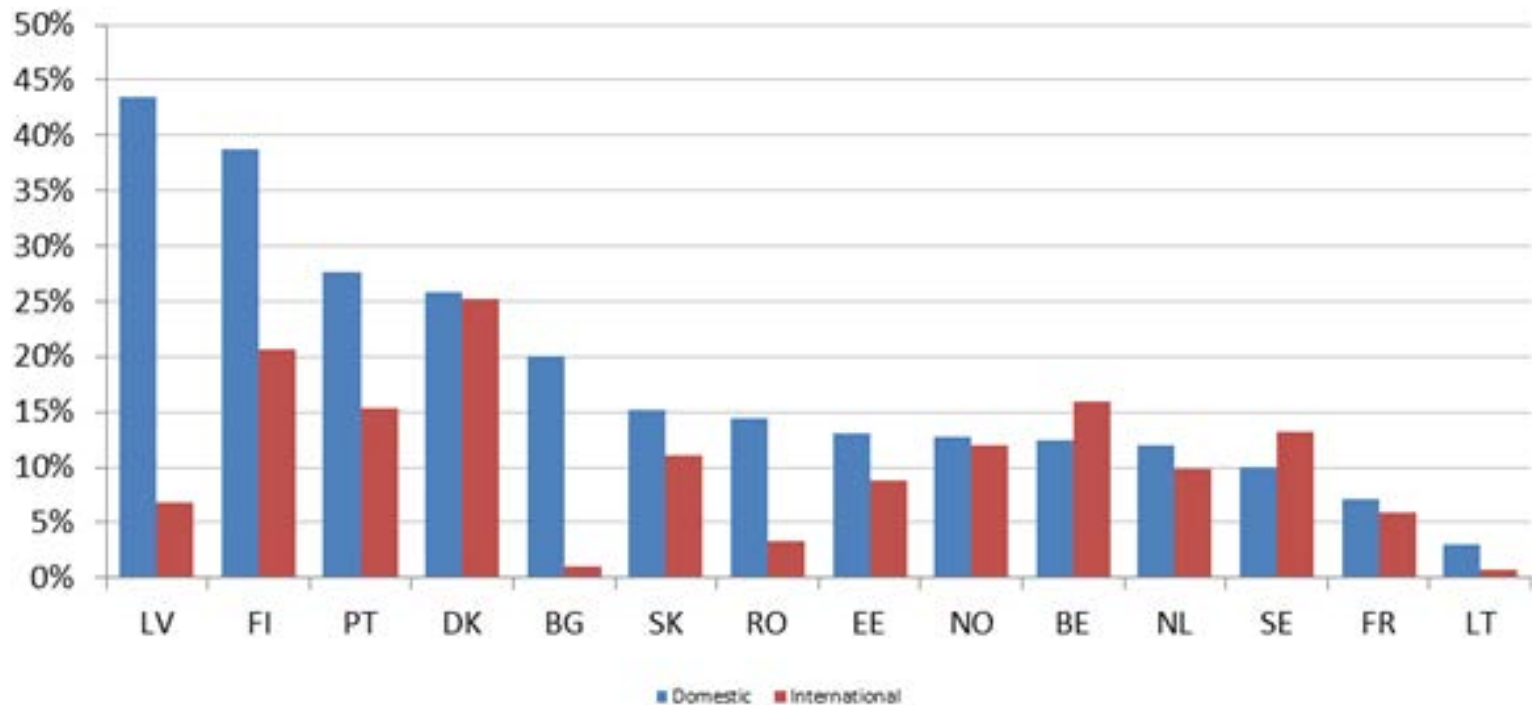- Activities contracted to supplying enterprises abroad

Participating countries 2012

Response rates (number of responding enterprises)

Per cent of sampled enterprises
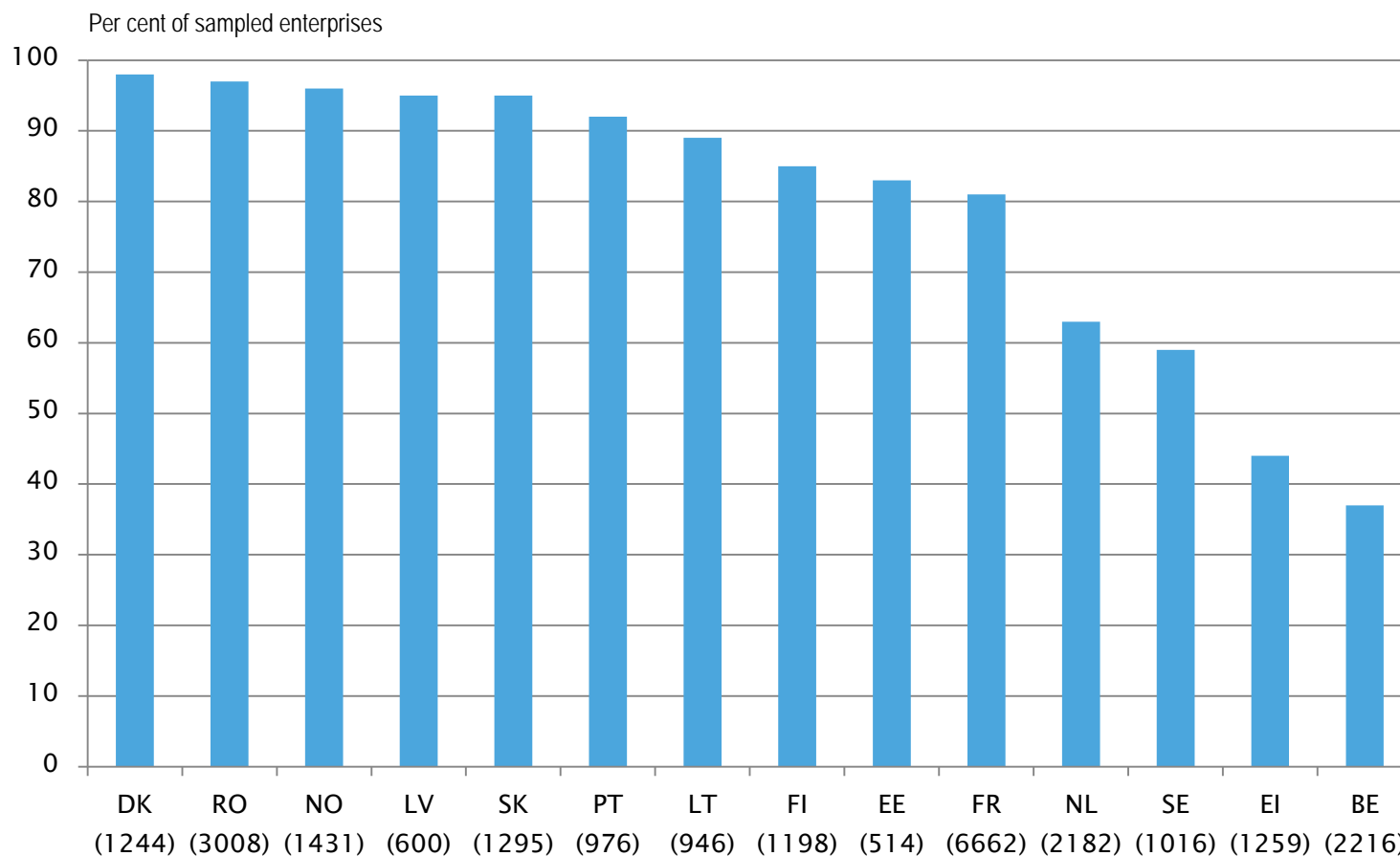
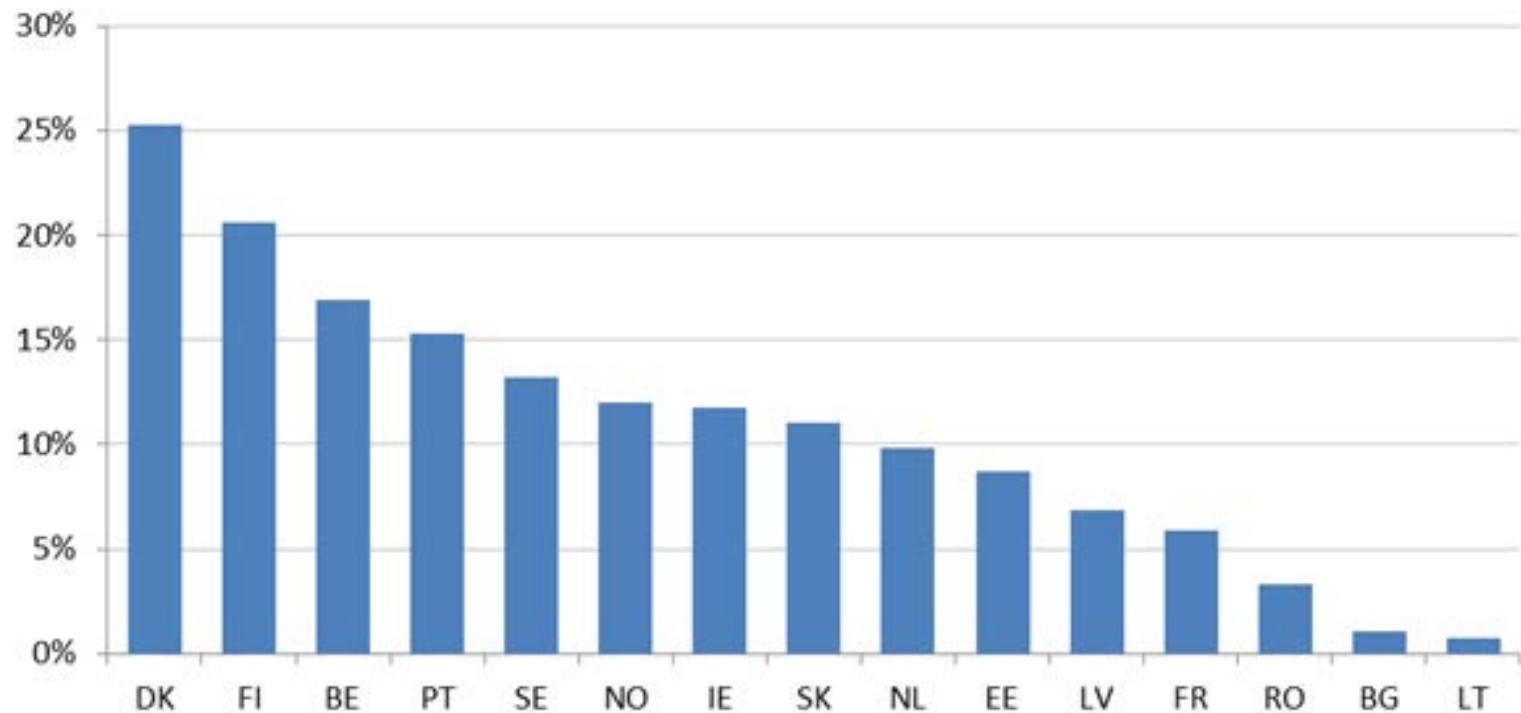# Domestic and International sourcing 2009-2011

(% of enterprises with 100+ employees*)

* Enterprises may source both domestically and internationally.

Enterprises sourcing internationally 2009-2011

(% of enterprises with 100+ employees)

Mainly manufacturing enterprises sourcing internationally

Enterprises sourcing internationally 2009-2011 by main sector. Share of total no. of enterprises with 100 or more employees

■ Manufacturing   ■ Other sectors
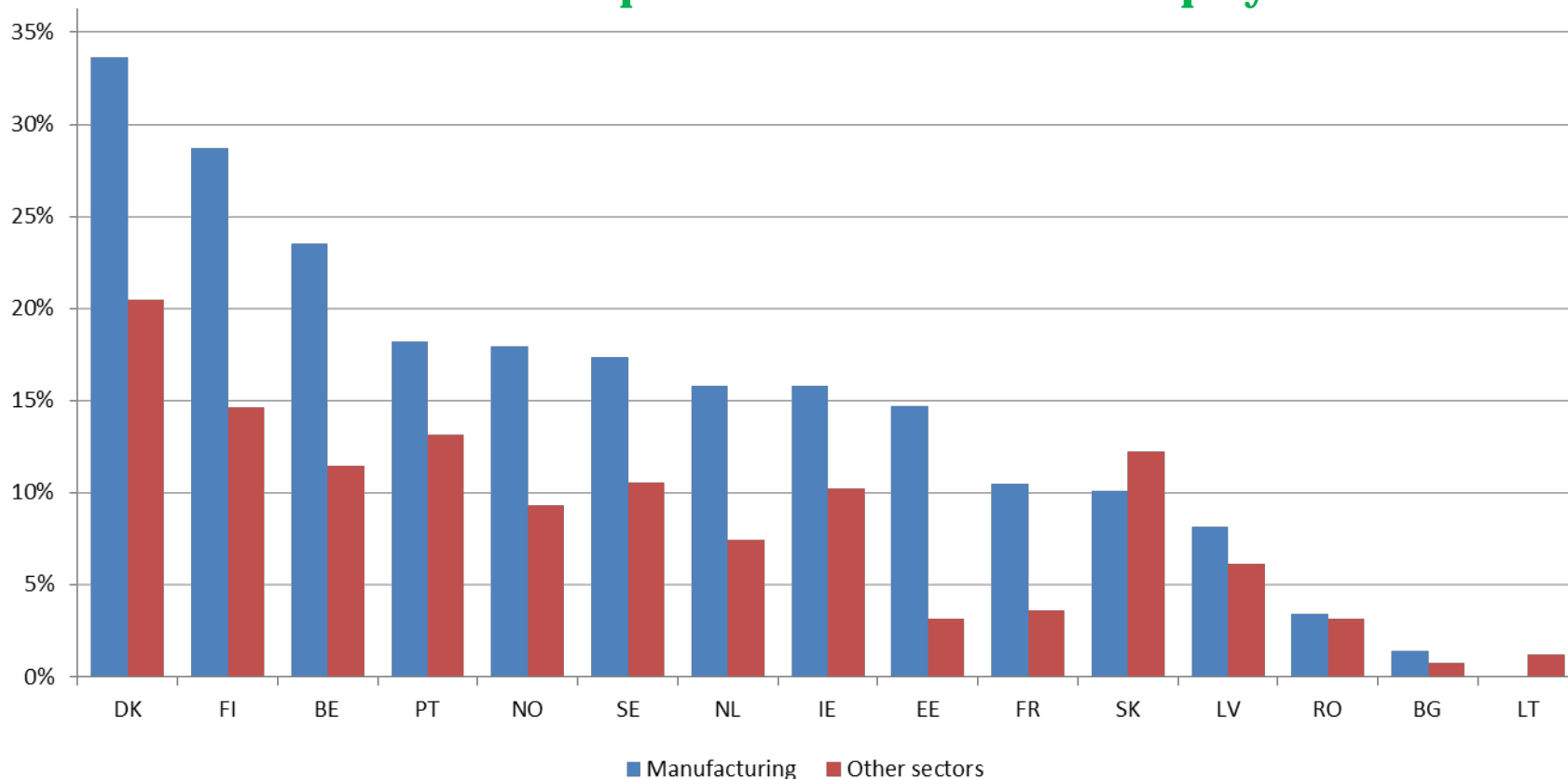
Job losses due to international sourcing 2009 - 2011

(% of number of persons employed in enterprises with 100+ employees)
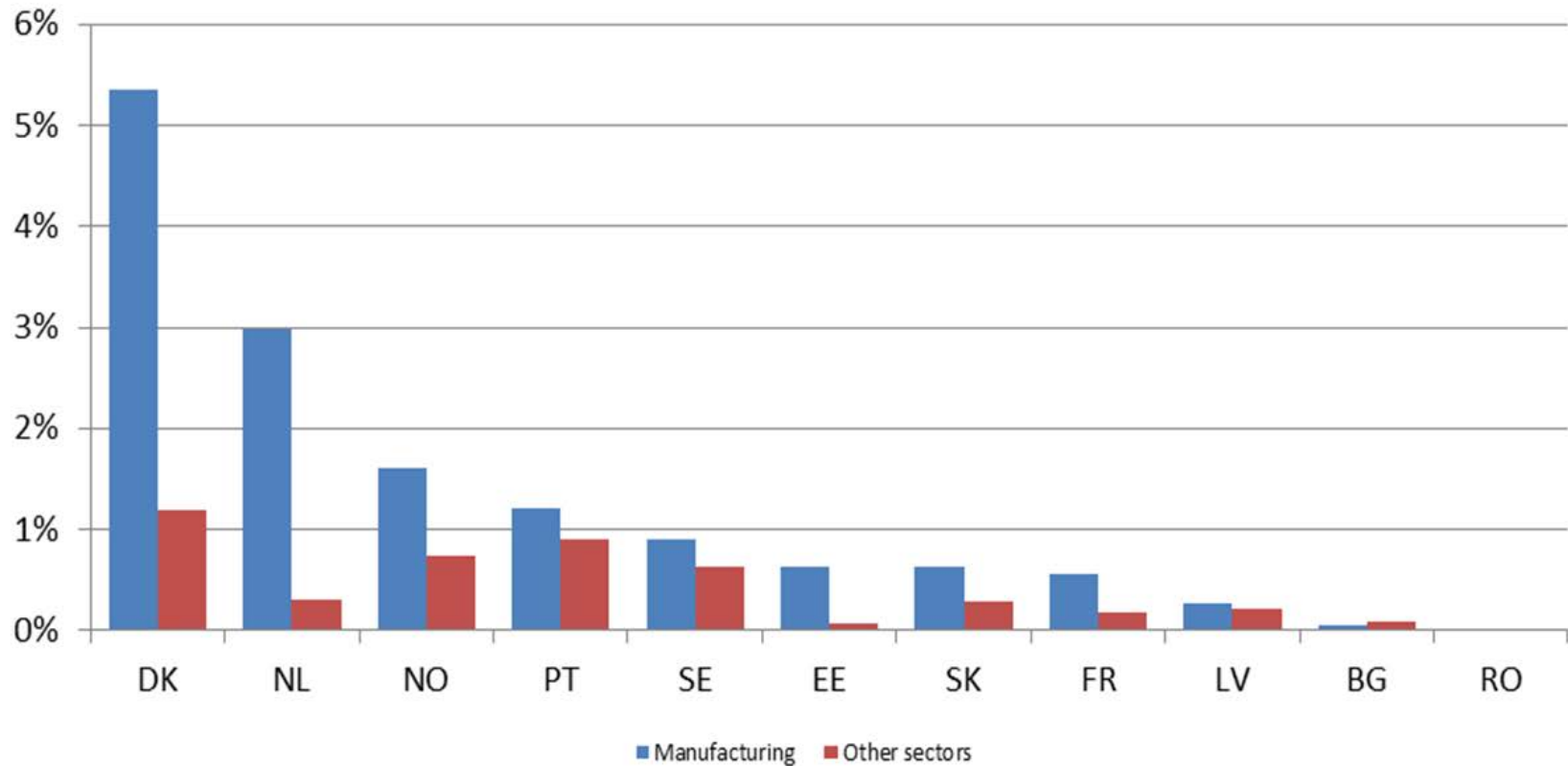
Insourcing and outsourcing 2009-2011

(% of enterprises sourcing internationally*)
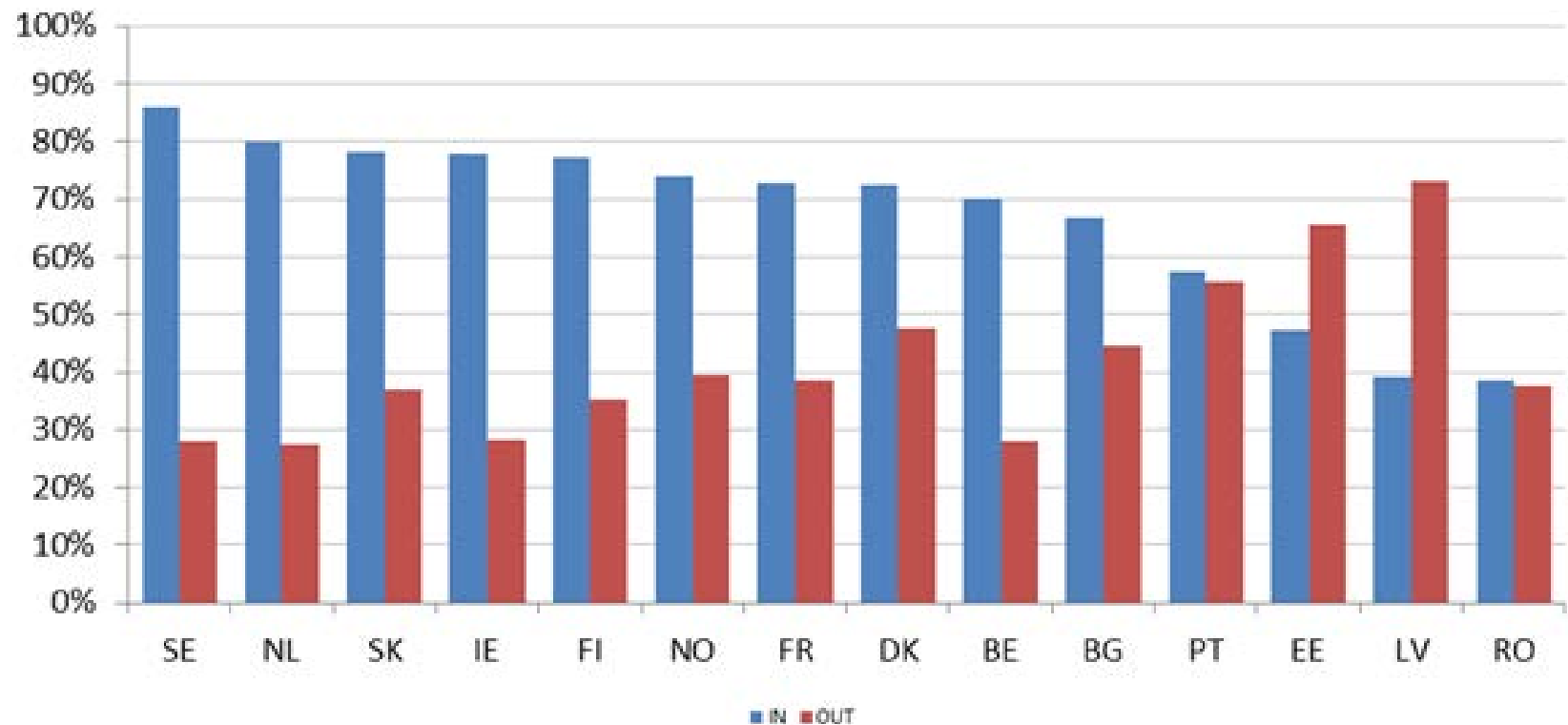
* Enterprises may be both
insourcing and outsourcing.

STATISTICS
DENMARK

13

Strategic decisions taken by the group head a very important reason for international sourcing 2009-2011
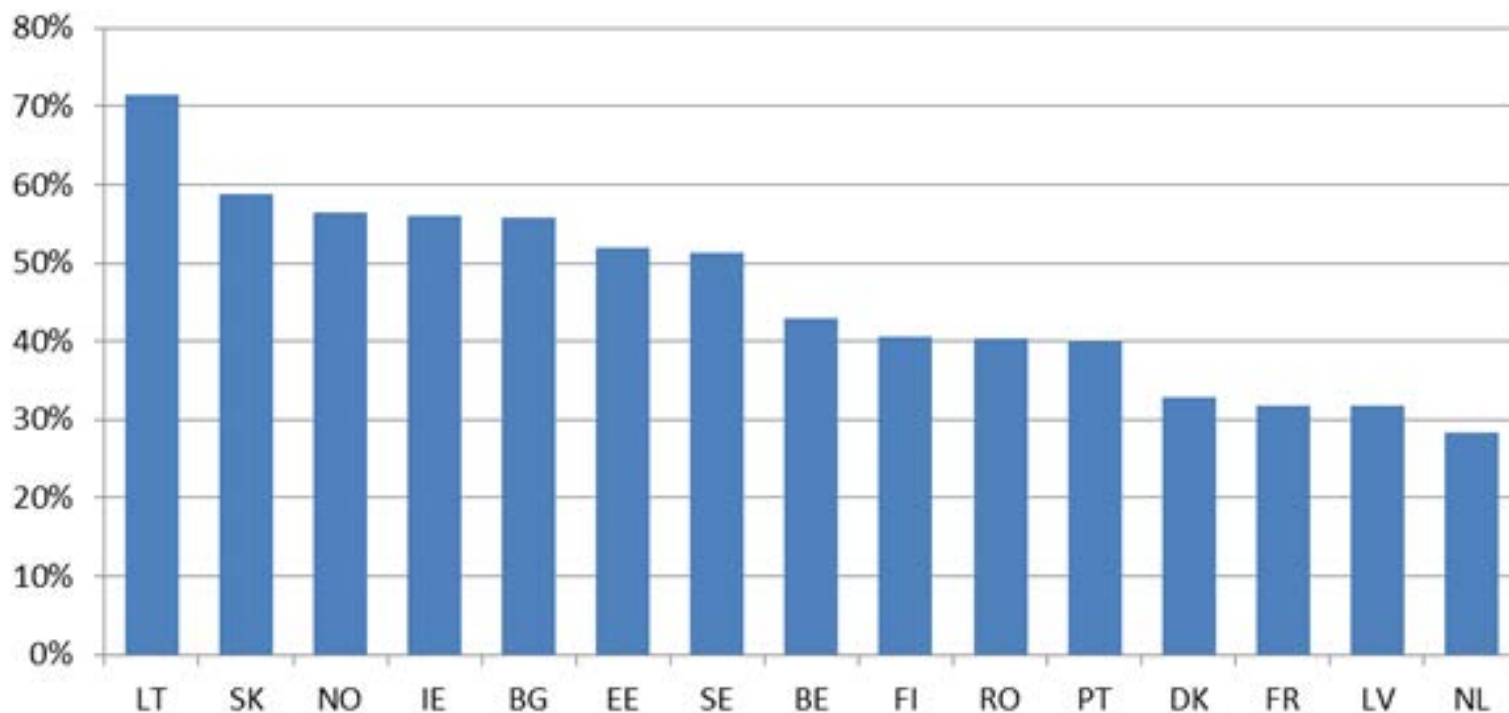
(% of enterprises sourcing internationally)

Today's Presentation

- **Survey on International Organisation and Sourcing**
  - Background and design
  - Definitions
  - Survey results

- **Business Functions**
  - Definitions
  - Survey results

- **Micro Data Linking**
  - Background and design
  - Linking results

- **Experimental Indicators based on MDL**
  - Examples of indicators
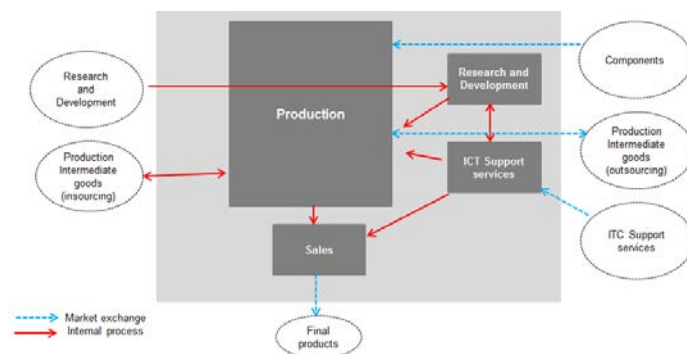
What are Business Functions?

- Unbundling of the total activity of enterprises into tasks constituting the necessary inputs for final outputs, including production and supporting tasks

- Aggregation of specific tasks performed within the enterprise to functions to a specific level of grouping of products (CPA)

- The level is less aggregated than the activity (NACE) but more aggregated than products or tasks

- Business Functions can mainly be seen as a tool to capture services elements in the production processes

Opening the black box of the enterprise by introducing Business Functions

- **Core business function**

Production of final goods or services intended for the market/for third parties carried out by the enterprise and yielding income.

- **Support business functions**

Support business functions (ancillary activities) are carried out in order to permit or facilitate production of goods or services intended for the market/for third parties by the enterprise.

- Distribution and logistics
- Marketing, sales and after sales services
- ICT services
- Administrative and management functions
- Engineering and related technical services
- Research & Development
- Other support functions

Flows of Business Functions

Affiliates

External Suppliers

Production

Research and Development

ICT Support services

Sales

Research and Development

Production Intermediate goods (insourcing)

Components

Production Intermediate goods (outsourcing)

ITC Support services

Final products

- - - → Market exchange
——→ Internal process

STATISTICS DENMARK
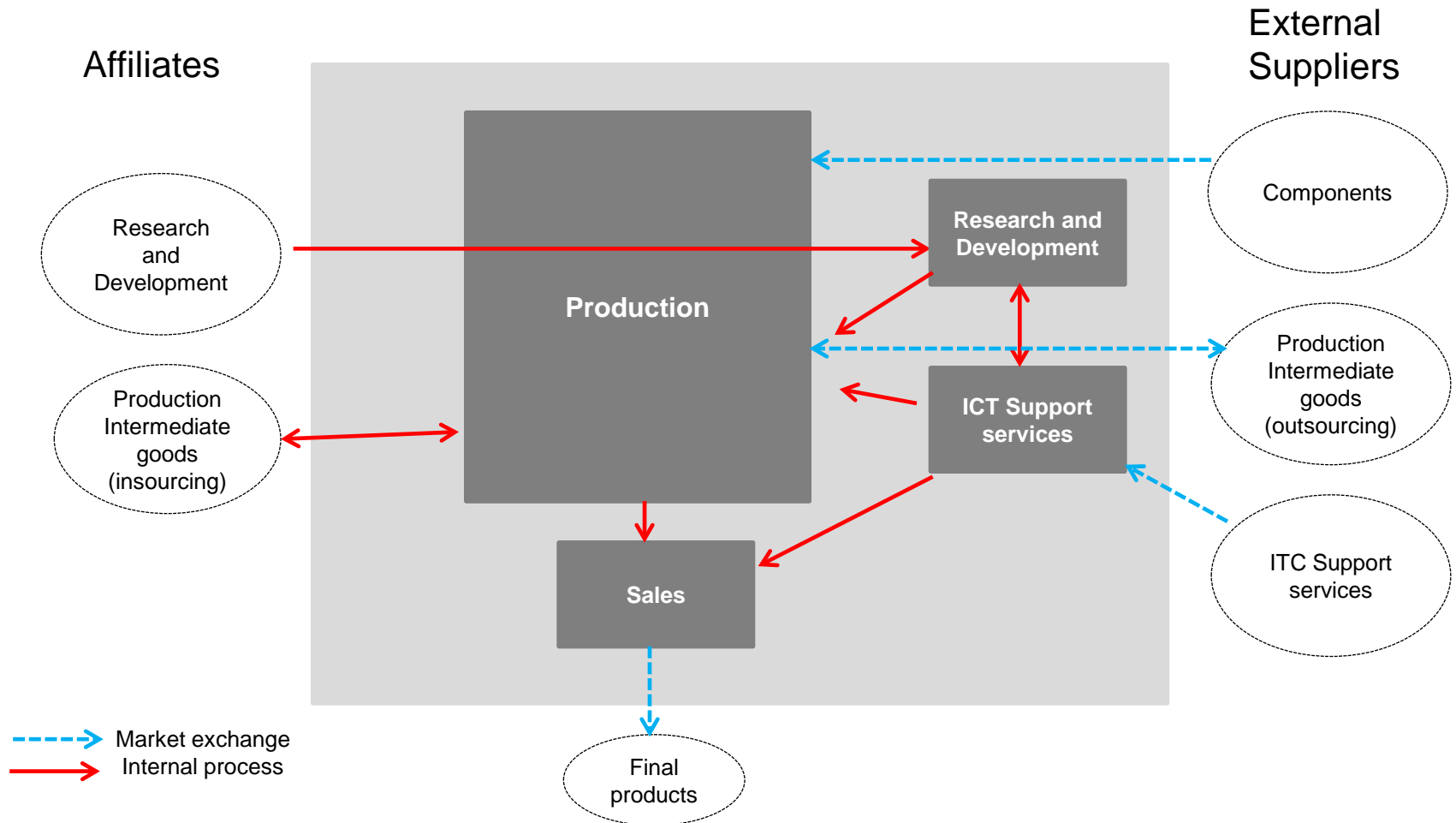
Support functions sourced most frequently

(% of enterprises sourcing internationally*, 2009-2011)

Core business function ■ Support business function
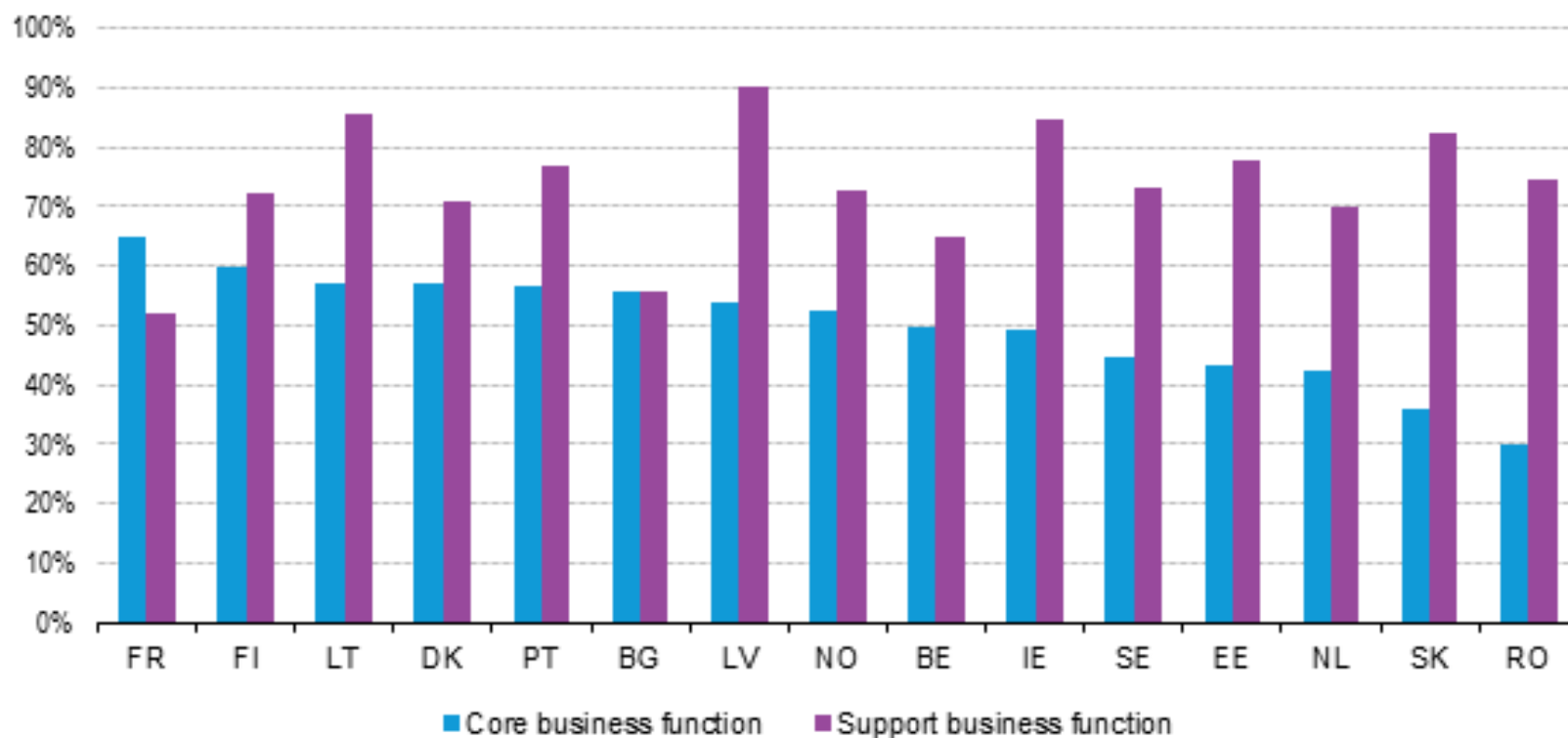
Enterprises may source both core and support functions.

China main non-EU destination for sourcing of core business functions

(% of enterprises sourcing internationally*, 2009-2011)
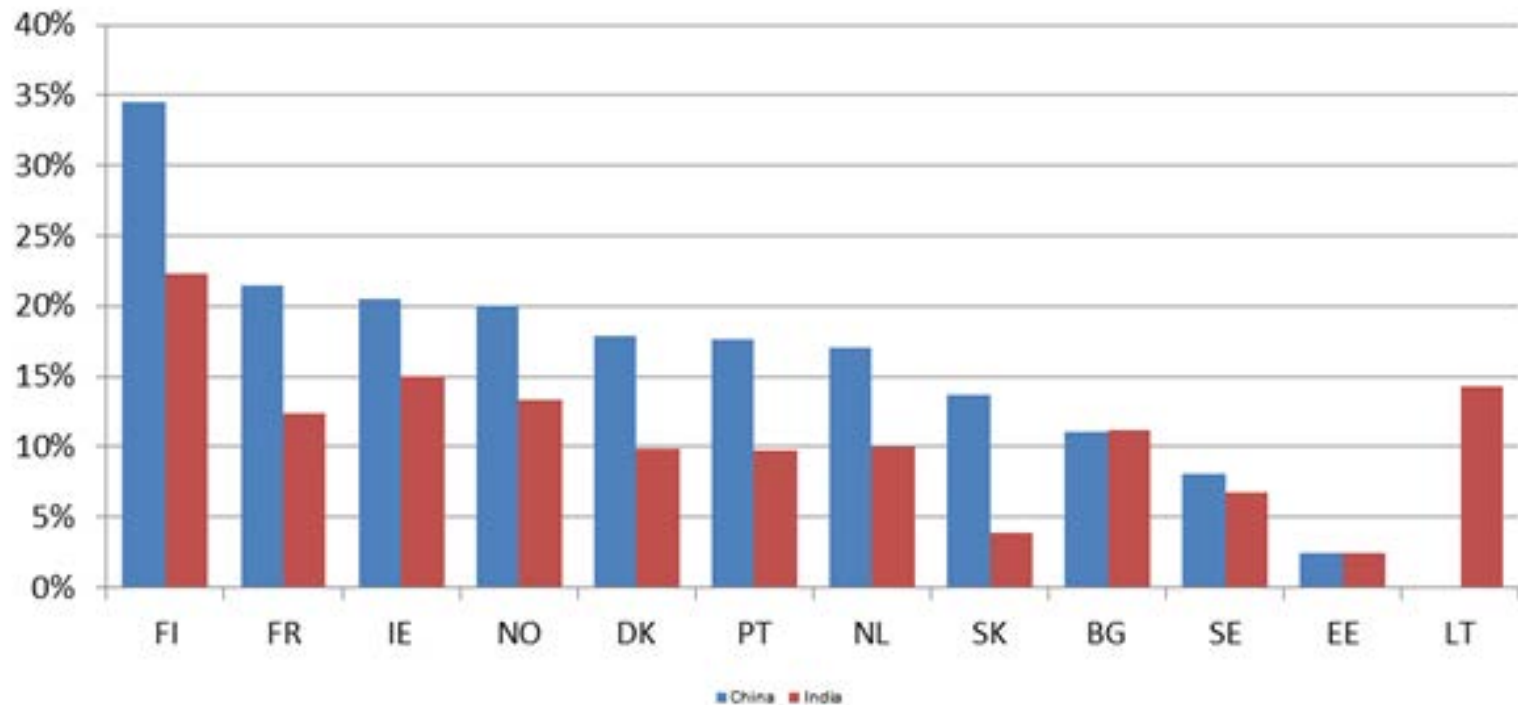
* Enterprises may source to more than one destination.

Enterprises mainly sourcing support business functions to old EU member states

(% of enterprises sourcing internationally*, 2009-2011)
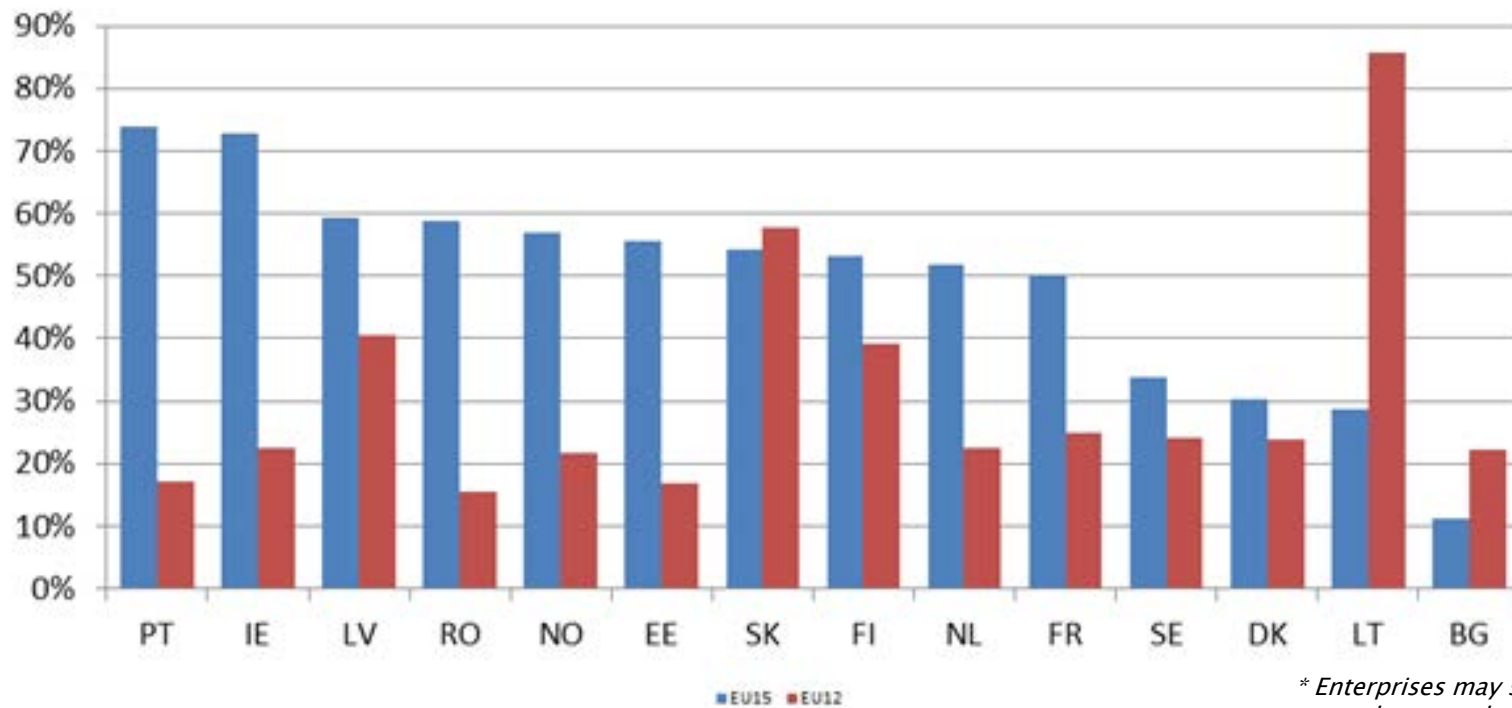
* Enterprises may source to more than one destination.

India important destination for sourcing of support business functions

(% of enterprises sourcing internationally*, 2009 - 2011)
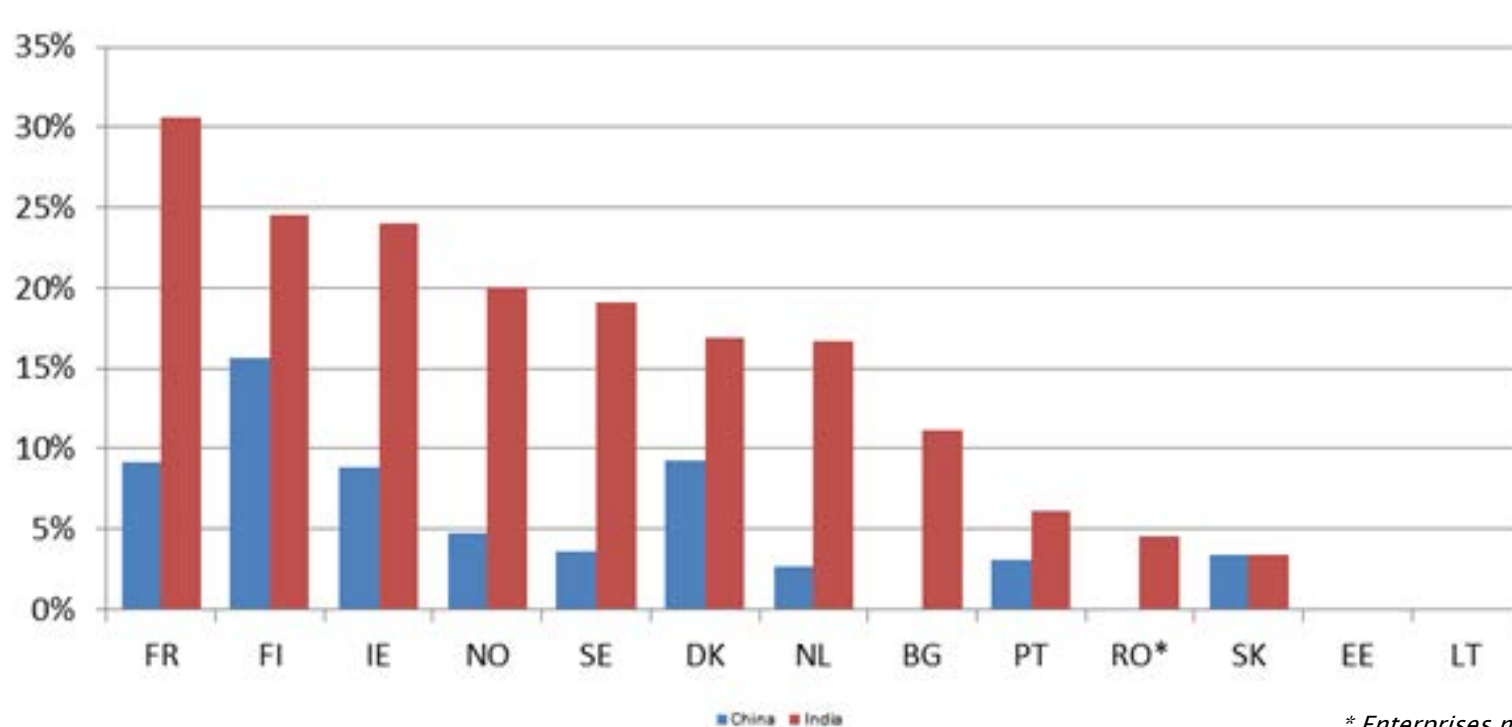
* Enterprises may source to more than one destination.

Type of Business Function influences choice of destination

Destination shares of Danish enterprises sourcing internationally*, 2009-2011. Selected functions
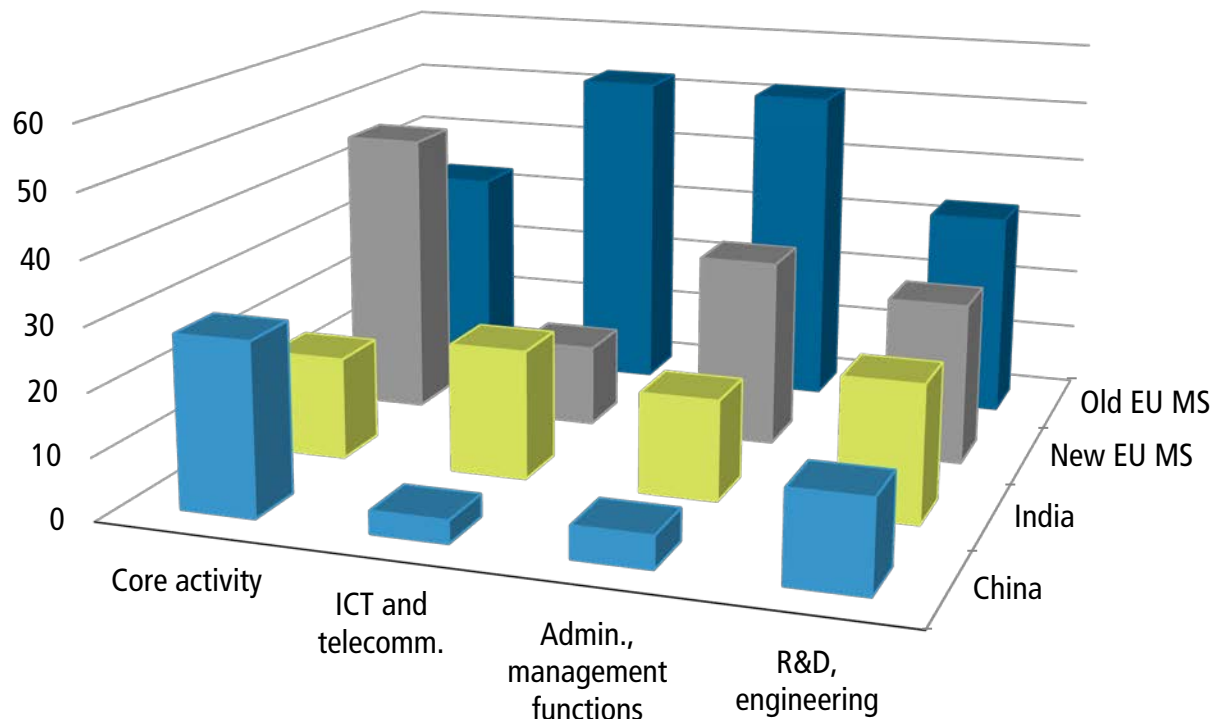
* Enterprises may source more than one function and to more than one destination.

Employment by business functions
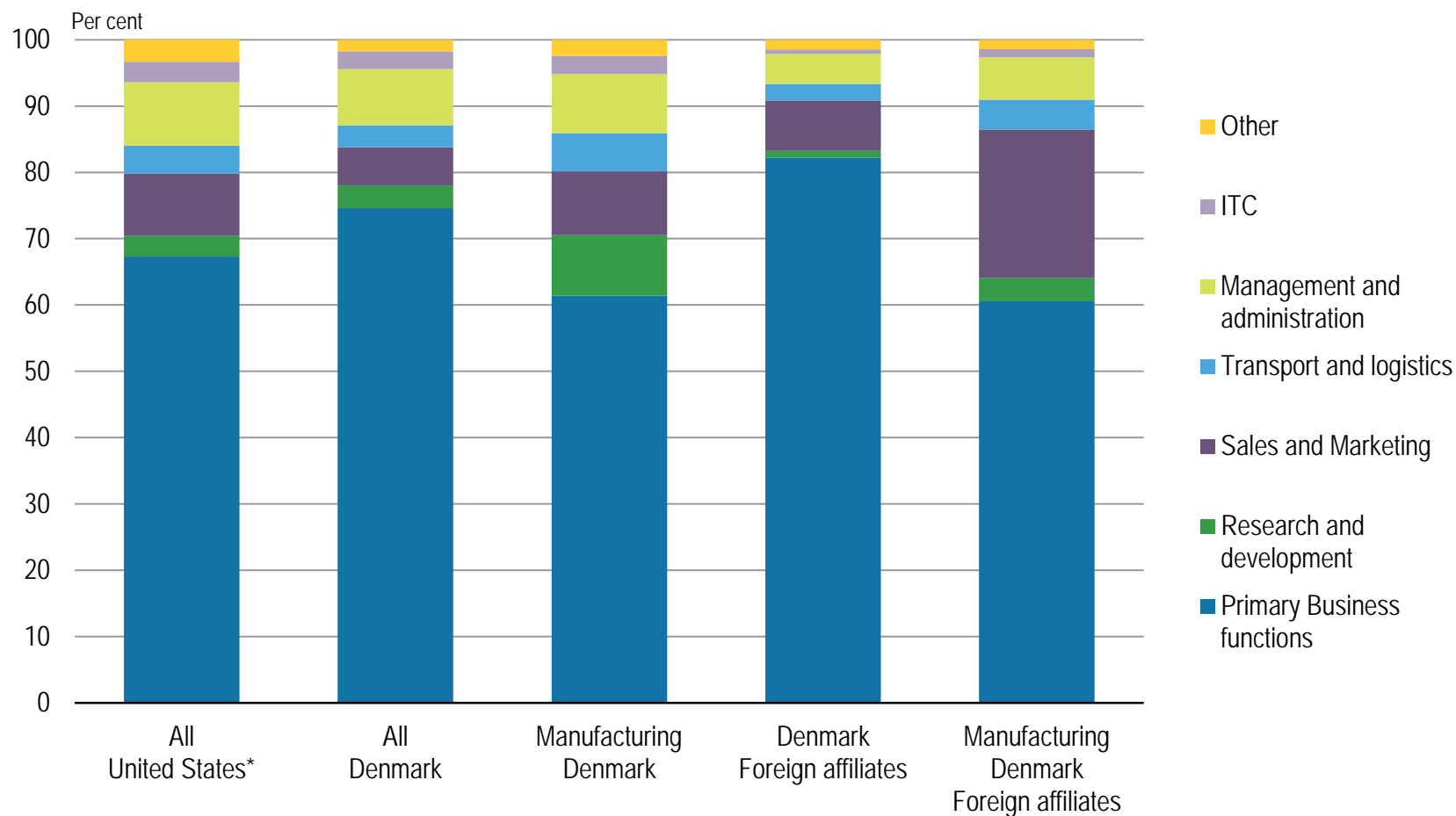
* Source: NOS 2010 published in Brown, Clair; Sturgeon, Timothy; and Cole, Connor, IRLE Working Paper

Location share of R&D, engineering support function employment in foreign affiliates

Legend: EU-15, NMS, Other Asia & Oceania, USA & Canada, China, Brazil, Russia, Other Europe, India, Rest of the world
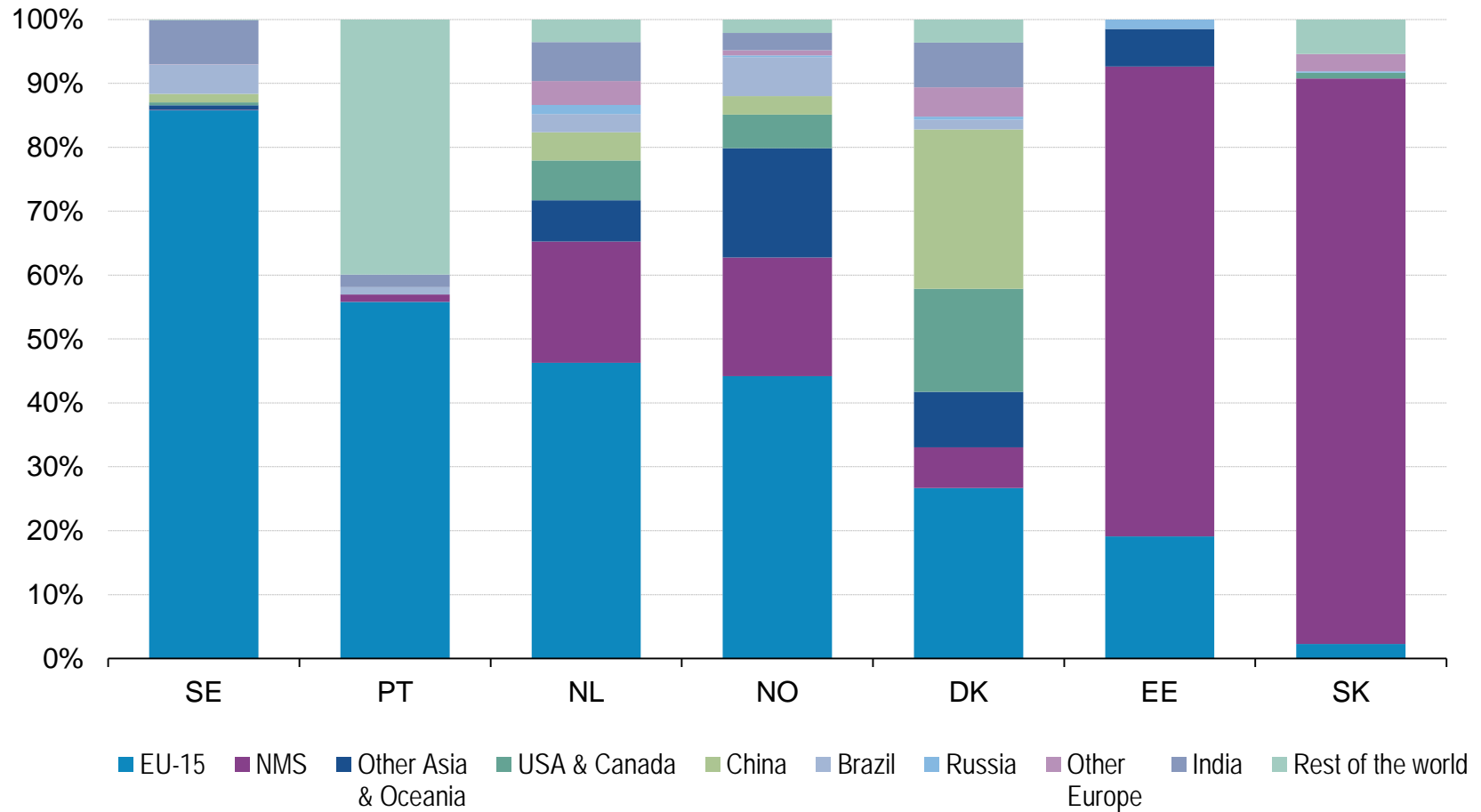
Sourcing of core functions implies more job losses (Denmark, 2000-2007)
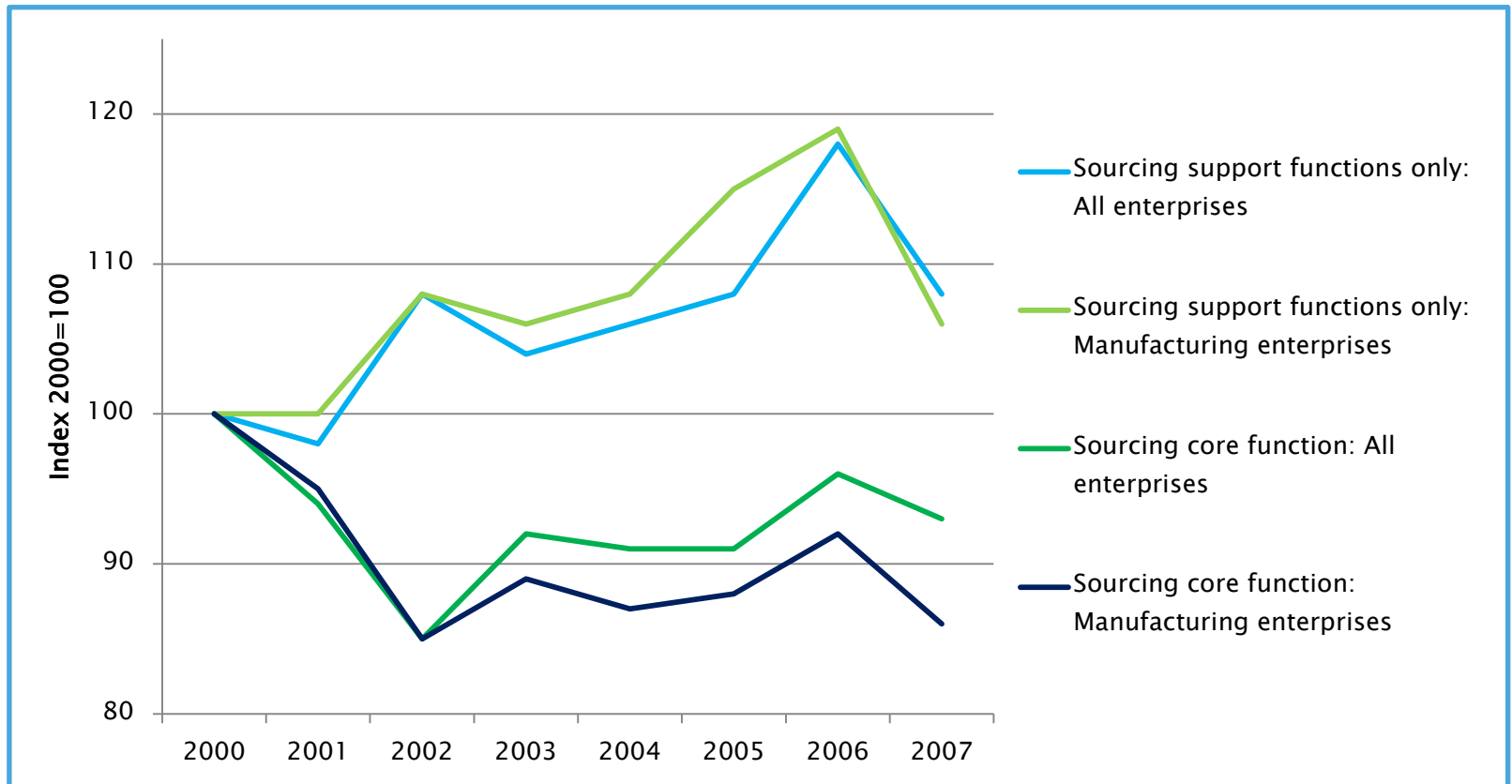
- *Median values of full-time equivalent number of employees*
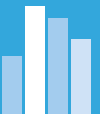
Conclusions

- The survey on *International Sourcing and Organisation of Business Functions* has worked well reflected by high response rates

- The survey has added valuable new information to our knowledge about international sourcing and its impacts

- It could be considered to also cover the job creation effects of international sourcing and globalisation more broadly

- The module on external suppliers has resulted in less valuable information and should be redesigned

- Business Functions as a reporting unit is well taken by enterprises and a consolidated list should be developed – e.g. should R&D and engineering still be aggregated into one category?

Today's Presentation

- **Survey on International Organisation and Sourcing**
  - Background and design
  - Definitions
  - Survey results

- **Business Functions**
  - Definitions
  - Survey results

- **Micro Data Linking**
  - Background and design
  - Linking results

- **Experimental Indicators based on MDL**
  - Examples of indicators

Micro data linking: addressing the *stove pipe* approach

Data sources for MDL

INTERNATIONAL ORGANIZATION AND OUTSOURCING SURVEY (GVC) 2009-2011

BR variables 2008-2011

Unique enterprise ID
Unique enterprise group ID

STRUCTURAL BUSINESS STATISTICS 2008-2011

Unique enterprise ID

INWARD FATS 2008-2011

Unique enterprise ID

Dataset from MDL 2011 project;

IS Survey, SBS, ITGS variables* 2000-2007

Unique enterprise ID

International Trade in Goods 2008-2011

Unique enterprise ID

OUTWARD FATS 2008-2011

Unique enterprise ID
Unique enterprise group ID

STATISTICS DENMARK

MDL variables

GVC	SBS	IFATS	ITGS	OFATS
Enterprise group	Turnover (12 11 0)	Country of ownership	Imports by country of origin (CN08 8-digit level)	Number of foreign affiliates by NACE and host country
Enterprise employment	Value added at factor cost (12 15 0)		Exports by country of destination (CN08 8-digit level)	Number of persons employed in foreign affiliates by NACE and host country
International sourcing	Gross operating surplus (12 17 3)			Turnover of foreign affiliates by NACE and host country
Domestic sourcing	Total purchases of goods and services (13 11 1)			
Jobs lost	Personnel costs (13 31 0)			
IS motivation	Wages and salaries (13 32 0)			
Back-sourcing	Number of employees (16 13 0)			
Foreign affiliates	Number of employees in full-time equivalents (16 14 0)			
Supplying enterprises abroad				

PHASE 1

National Business Register
- Unique Enterprise ID
- Unique Enterprise Group ID

Data Assembly by Unique Enterprise ID/Enterprise Group ID

(Selected Variables from GVC, SBS, IFATS, OFATS, ITGS (and IS))

- GVC Survey
- Structural Business Statistics
- Inward FATS Statistics
- Outward FATS Statistics
- International Trade in Goods Statistics
- (IS Survey)

PHASE 2

Controls for Demographic Events in Data

Internal Validation Controls Across Different Data Sources

MDL Database

PHASE 3

Execution of Standardized SAS Code in Each MS

Calculation of Weights for the Control Group (Enterprises without International Sourcing 2009-2011)

Standardized Output 1: Descriptive Analysis

Standardized Output 2: Longitudinal Analysis

Standardized Output 3: Regression Analysis

Cross Country Analysis, Statistics Explained

Control Groups for analysis

```
┌─────────────────────┐                    ┌─────────────────────────┐
│                     │                    │   Selected variables    │      ┌ ─ ─ ─ ─ ┐
│  GVC/IS Survey      │ ───────────────▶   │   SBS, FATS, ITGS       │ ····▶    no
│  Population         │                    │                         │      │  match  │
│                     │                    └─────────────────────────┘      └ ─ ─ ─ ─ ┘
└─────────────────────┘                                │
                                                       ▼
                        ┌──────────────────────────────────────────────┐
                        │   Enterprises with *no* international         │
                        │   sourcing (control group population)         │
                        └──────────────────────────────────────────────┘
        ┌─────────────────────┐
        │   Enterprises with  │
        │ international        │
        │ sourcing            │
        │ (core population)   │
        └─────────────────────┘
```

Enterprises with international sourcing (core population)

Enterprises with *no* international sourcing (control group population)

NACE $\wedge$=D*part of MNE:

NACE D NACE*part of MNE:

NACE $\wedge$=D*NACE* part of MNE in core population

NACE D NACE*part of MNE in core population

MDL dataset for production of standardized output (descriptive statistics and regression analysis)

Analytical output

Descriptive Analysis

← **Survey based indicators**

(GVC/IS survey)
SNAPSHOT OF SURVEY

POPULATION

← **Register b ased indicators**

(GVC+SBS+FATS)

LONGITUDINAL DATA 2008 -2011

Statistical Analysis

← **MDL based indicators**
(GVC+SBS+FATS (+IS))

REGRESSION ANALYSIS
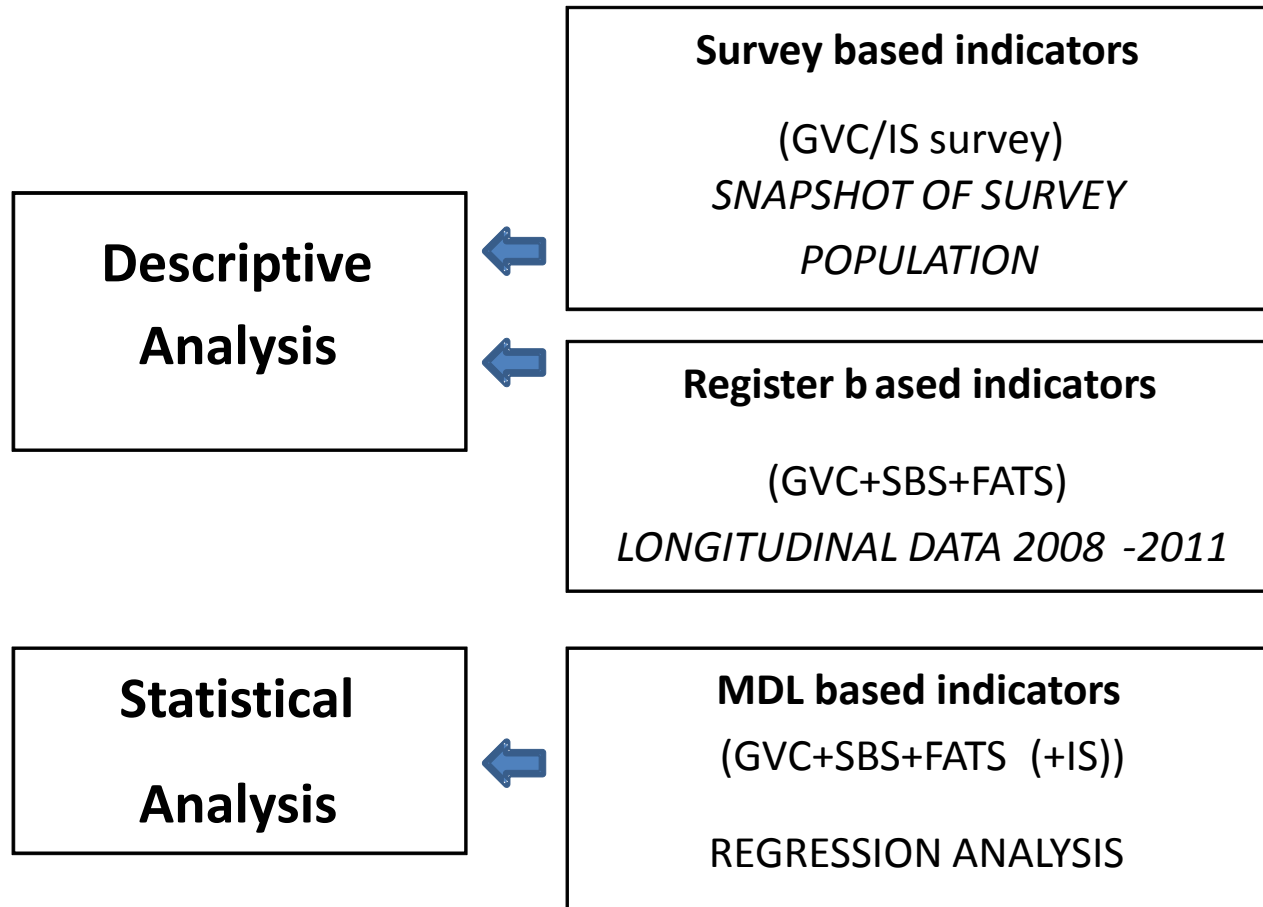
Foreign owned enterprises source more frequently

Legend:
- Int.Sourcing, Domestically owned (light blue)
- Int.Sourcing, Foreign owned (dark blue)

Chart data (approximate values):

Country	Int.Sourcing, Domestically owned	Int.Sourcing, Foreign owned
BG	1	4
DK	19	36
FI	19	36
FR	4	15
IE	4	20
LT		1
NL	6	16
NO	7	22
SE	8	23
SK	4	19

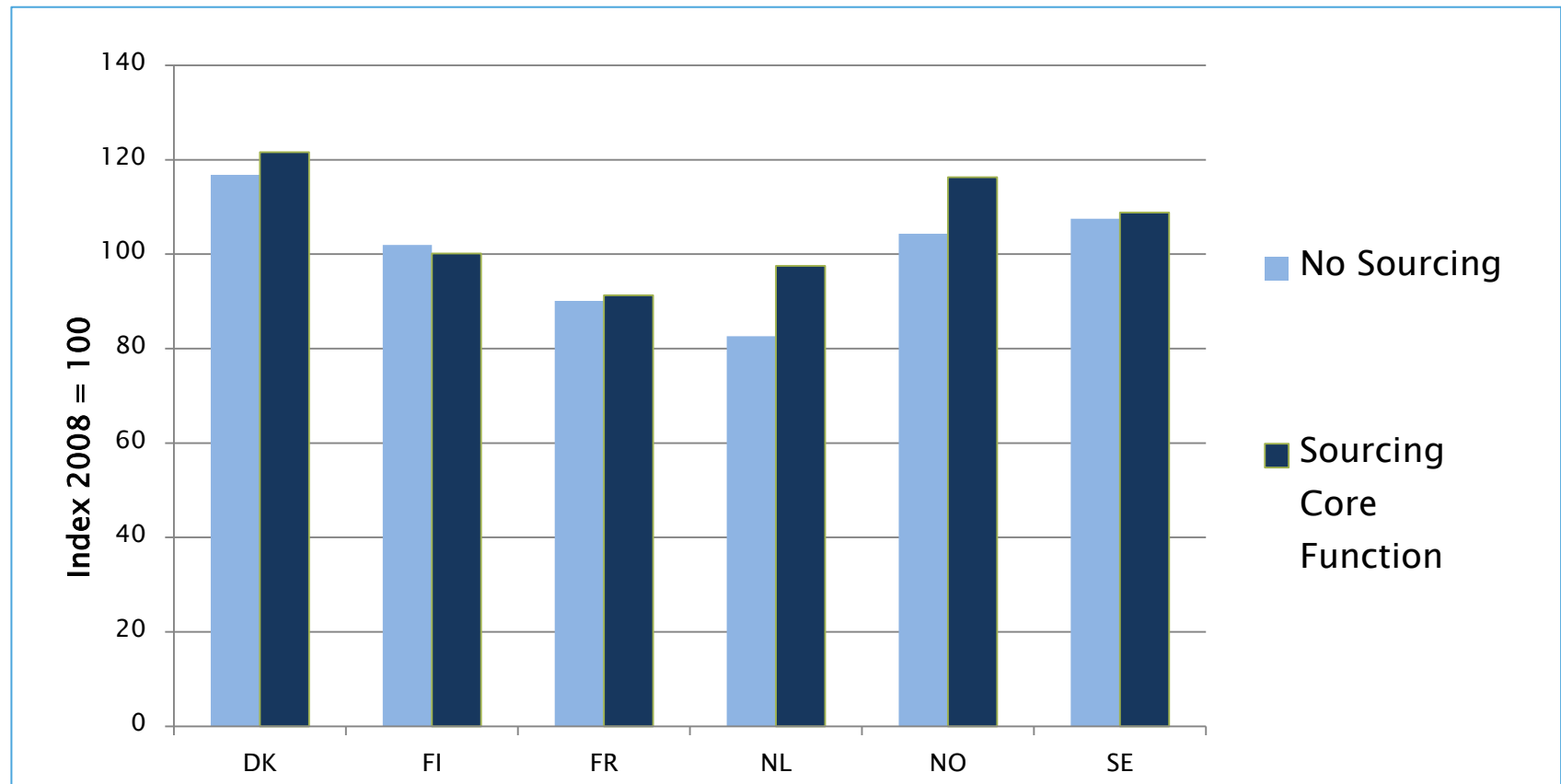STATISTICS DENMARK
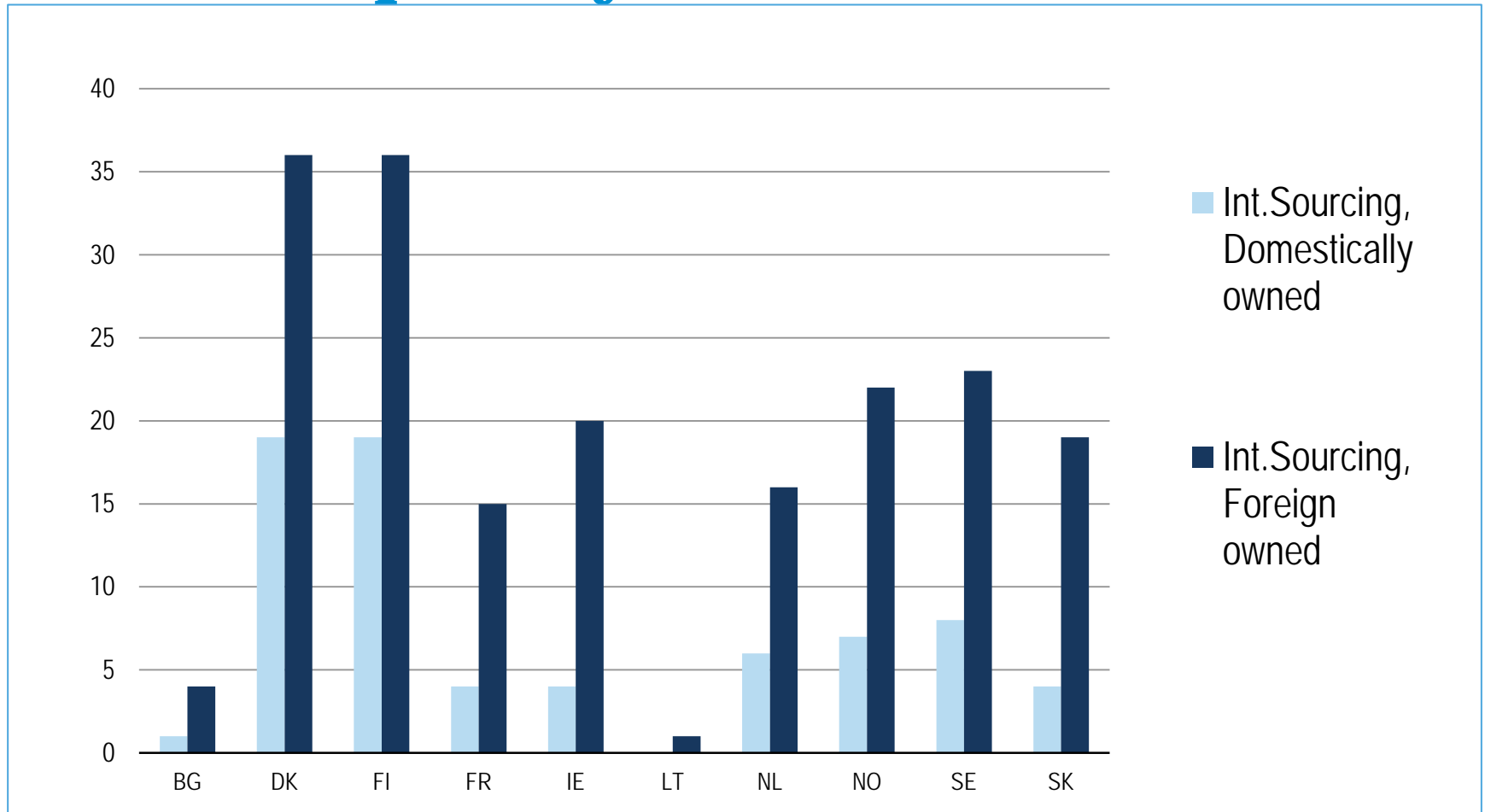
Sourcing of core function has the largest impact on employment

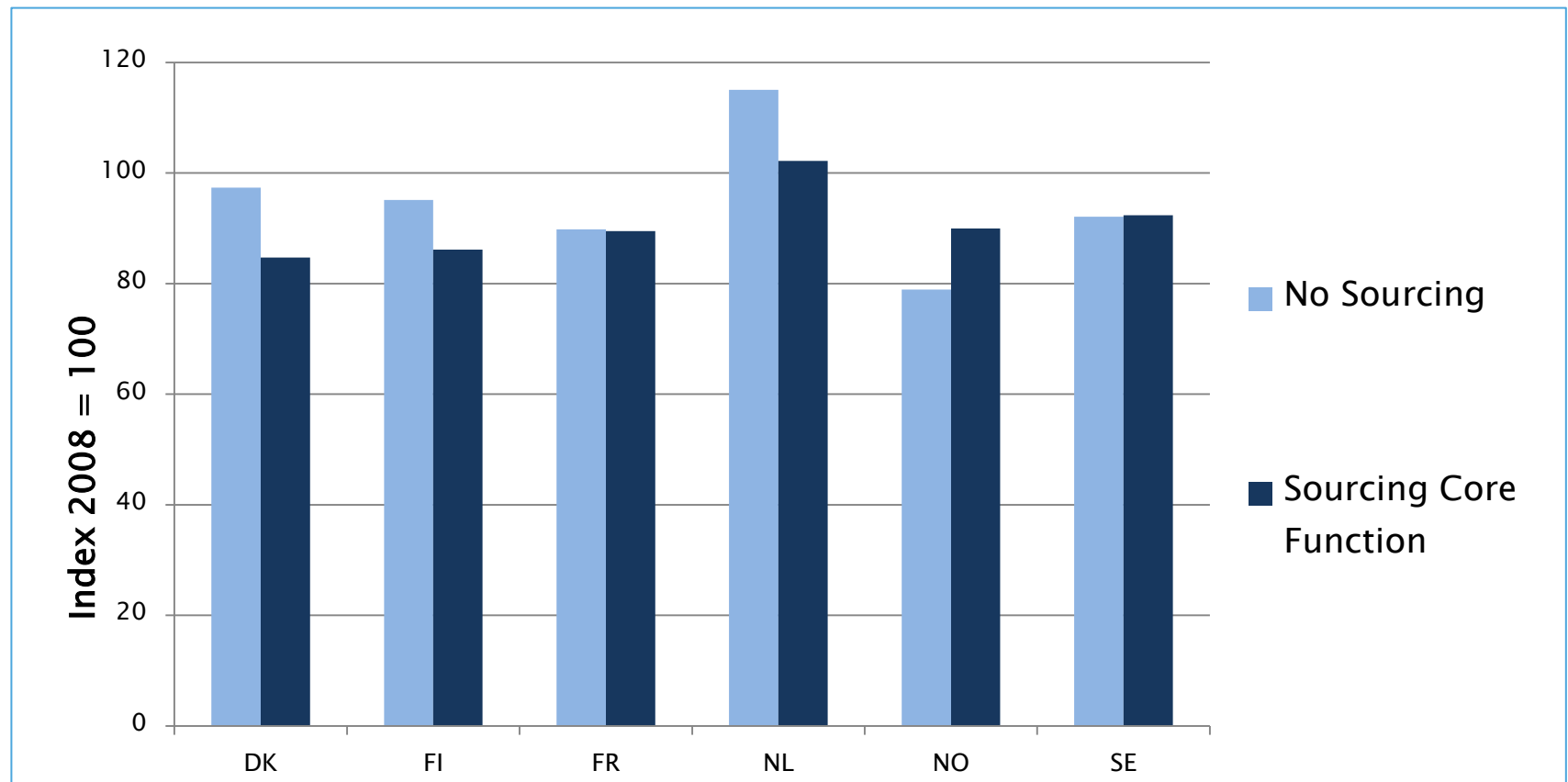**Employment (FTE) and international sourcing , 2008 - 2011 Manufacturing enterprises**
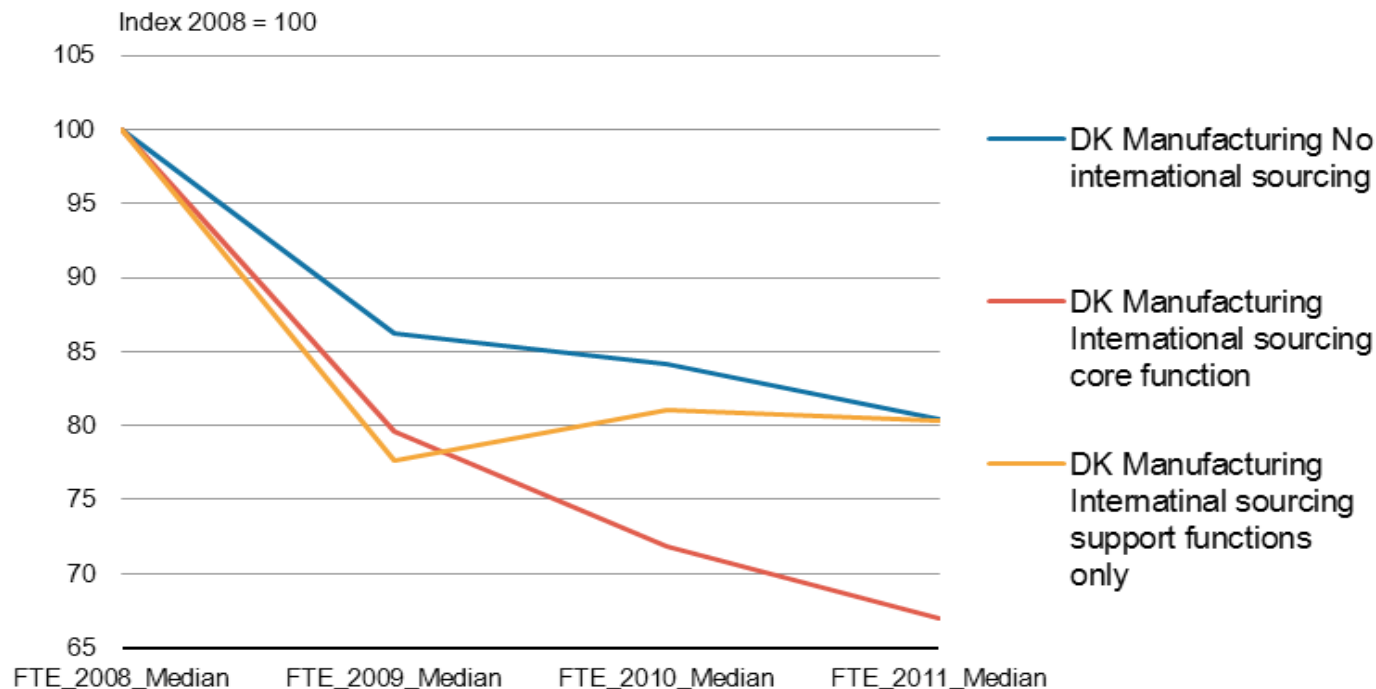
Sourcing enterprises showing increased productivity

Productivity (VAL/FTE) 2011 and international sourcing, manufacturing enterprises

Is sourcing influencing imports?

Import intensity 2011 and international sourcing, manufacturing enterprises

Regression analysis - Denmark

International sorucing and...	Significant correlation
Employment growth	NO
Productivity growth in *manufacturing* enterprises	Positive
Value added growth in *manufacturing* enterprises sourcing support function(s) only	Positive
Total exports growth in goods in *manufacturing* enterprises sourcing core function	Negative
Total imports growth in goods in *manufacturing* enterprises sourcing core function	Negative

Conclusions (1)

1. Micro Data Linking is an efficient way to produce new statistical information without surveying

2. Relative high matching rates indicate that micro data linking is feasible

3. But never total match due to demographic events such as deaths, change in type of ownership, etc.

4. The set-up with identical data sets stored in the NSIs has worked well

5. The approach of sharing common and centrally developed SAS programmes worked excellently

Conclusions (2)

- How to deal with demographic events?
  - *Mergers and acquisitions vs. organic growth*

- Need for co-ordination of samples across surveys?
  - *Size of population can hamper micro data-linking*

- Which statistical unit is the most appropriate for globalisation statistics?
  - *Enterprise vs. Enterprise group*

Today's Presentation

- **Survey on International Organisation and Sourcing**
  - Background and design
  - Definitions
  - Survey results

- **Business Functions**
  - Definitions
  - Survey results

- **Micro Data Linking**
  - Background and design
  - Linking results

- **Experimental Indicators based on MDL**
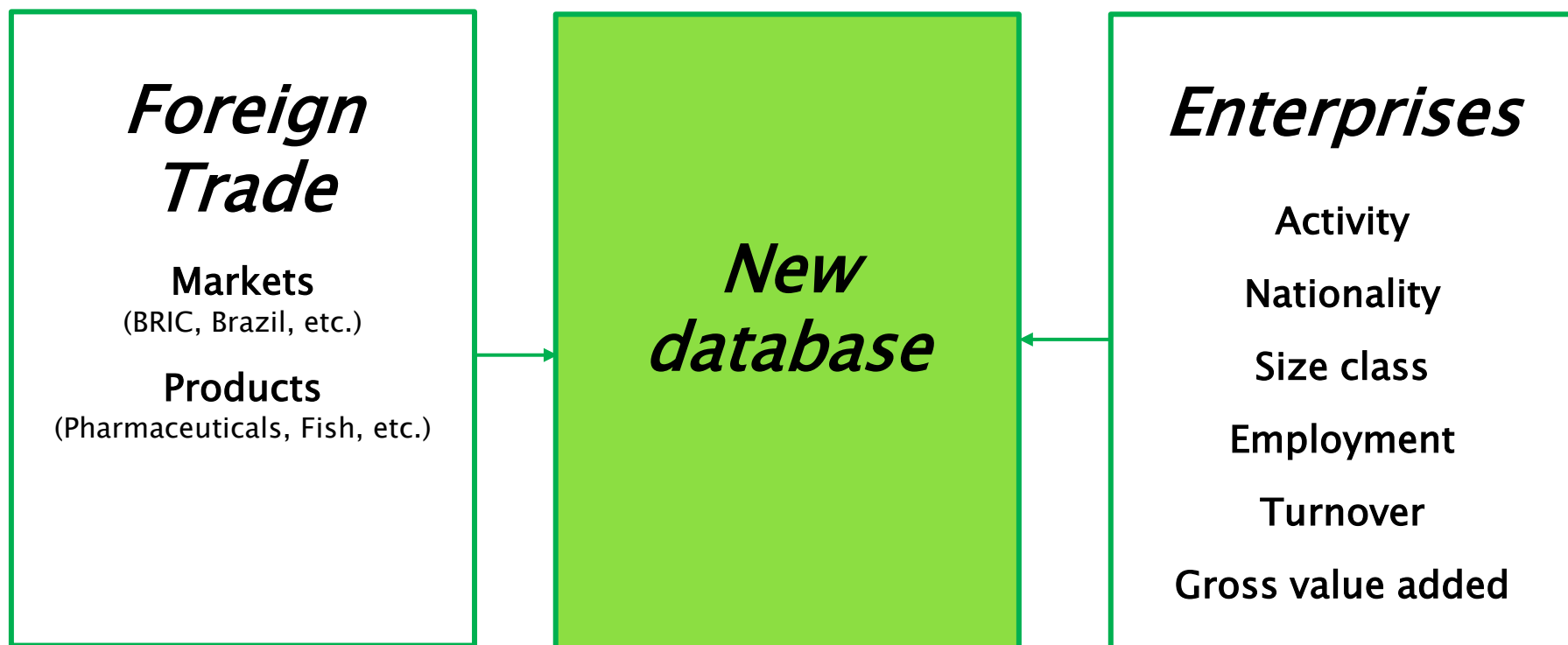 - Examples of indicators

Using micro data linking as input for classification of globalised enterprises

Geo. spread of trade	Global trader (intra- and extra-EU trade)			Extra-regional trader (extra-EU trade only)			Home-regional trader (intra-EU trade only)			Non-trader
Type(s) of trade **Ownership**	*Exports only*	*Imports only*	*Exports and imports*	*Exports only*	*Imports only*	*Exports and imports*	*Exports only*	*Imports only*	*Exports and imports*	-
Domestically controlled without foreign affiliates										
Domestically controlled with foreign affiliates										
Foreign controlled (with/without for. affiliates)										

Establishing a new database

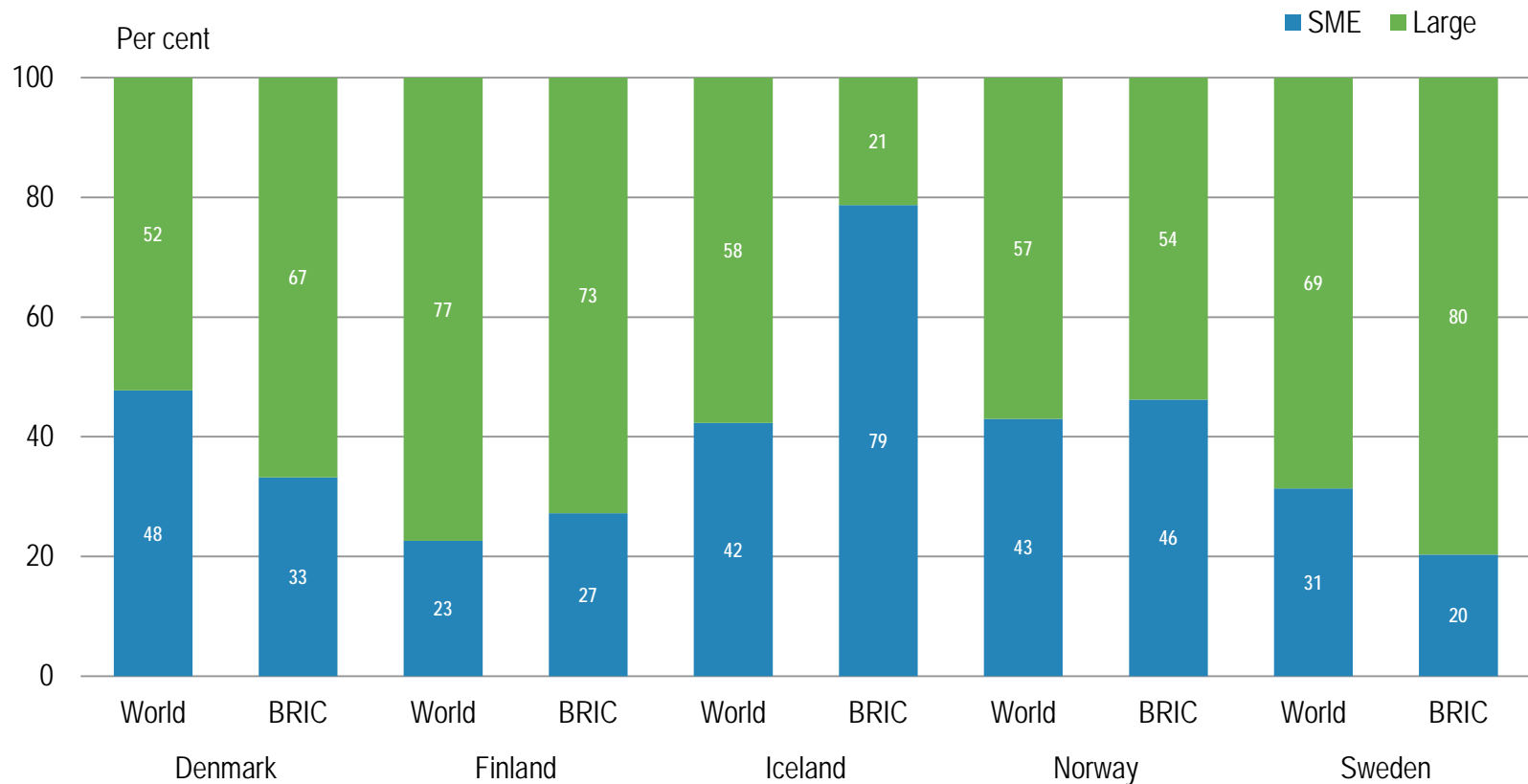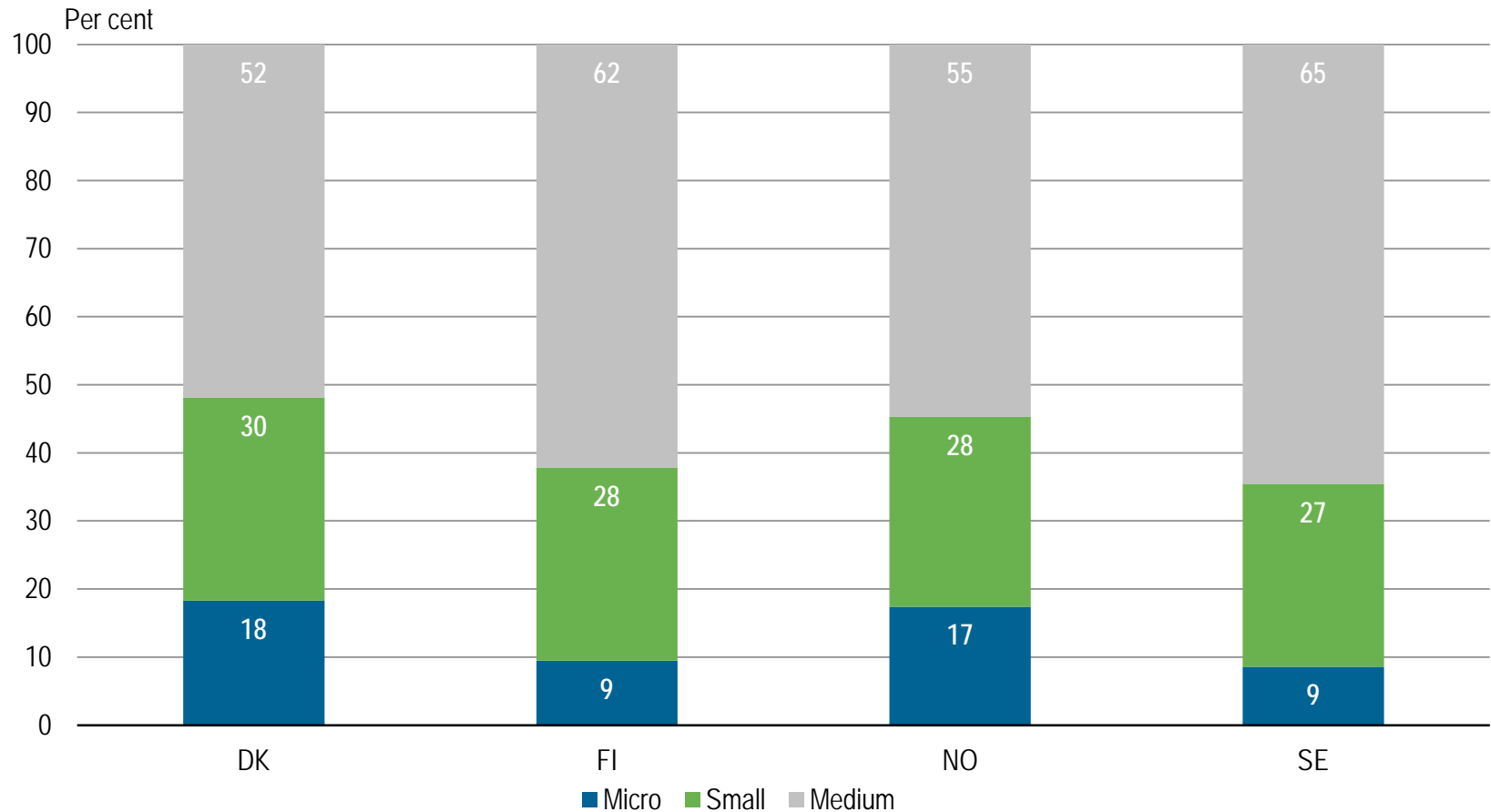| Foreign Trade	New database	Enterprises
Markets (BRIC, Brazil, etc.) **Products** (Pharmaceuticals, Fish, etc.)		**Activity** **Nationality** **Size class** **Employment** **Turnover** **Gross value added**

The role of SMEs in the Nordic countries' export of goods

International trade in goods data linked with SBS enterprises in manufacturing and wholesale. 2011.

Per cent

Legend: ■ SME ■ Large

|	World	BRIC
Denmark SME	48	33
Denmark Large	52	67
Finland SME	23	27
Finland Large	77	73
Iceland SME	42	79
Iceland Large	58	21
Norway SME	43	46
Norway Large	57	54
Sweden SME	31	20
Sweden Large	69	80

SME export of goods – by size class

International trade in goods data linked with SBS enterprises in manufacturing and wholesale. 2011.

Per cent

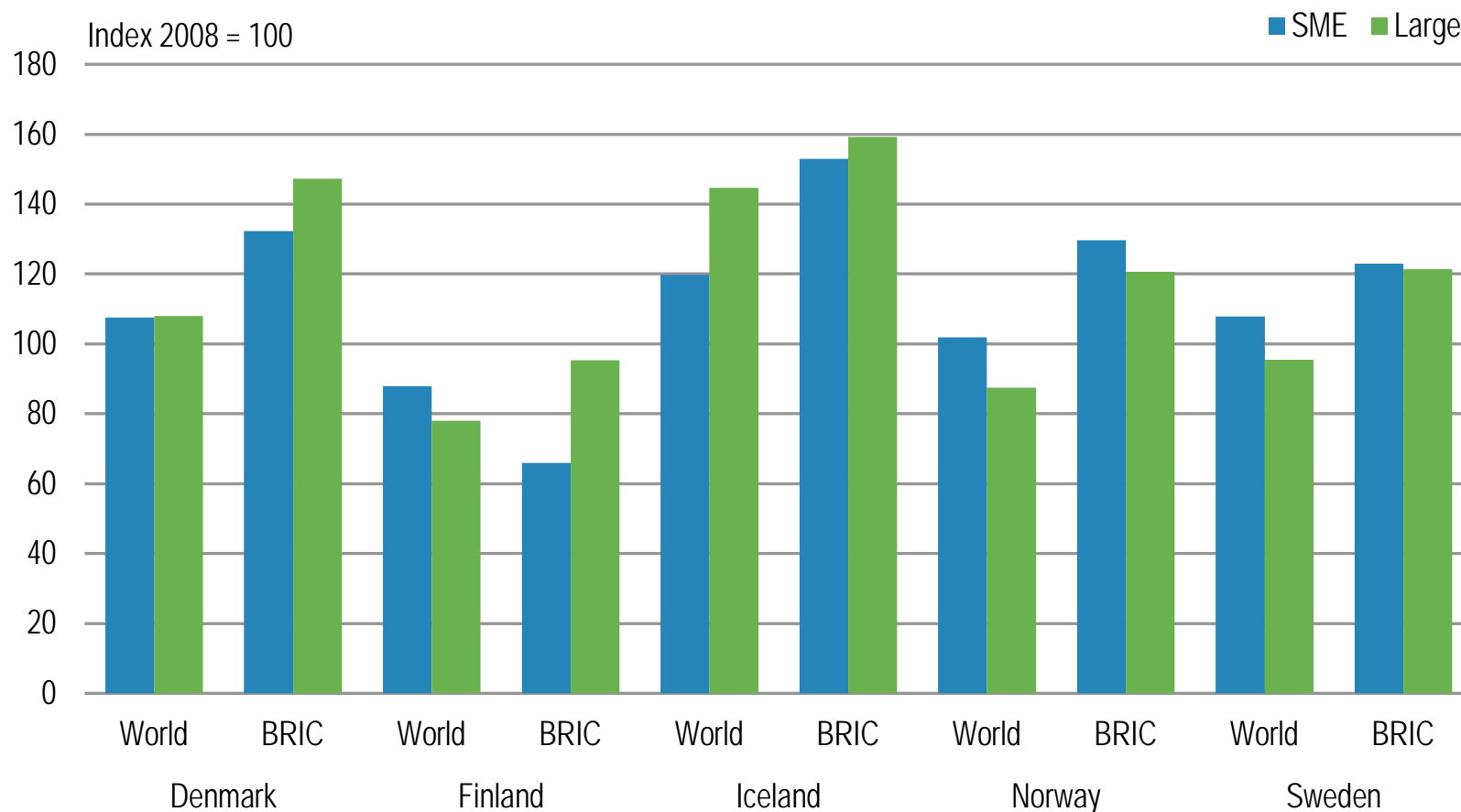|	DK	FI	NO	SE
Medium	52	62	55	65
Small	30	28	28	27
Micro	18	9	17	9

Legend: ■ Micro ■ Small ■ Medium

Danish export of goods to selected areas - by size class

International trade in goods data linked with SBS enterprises in manufacturing and wholesale. 2011.
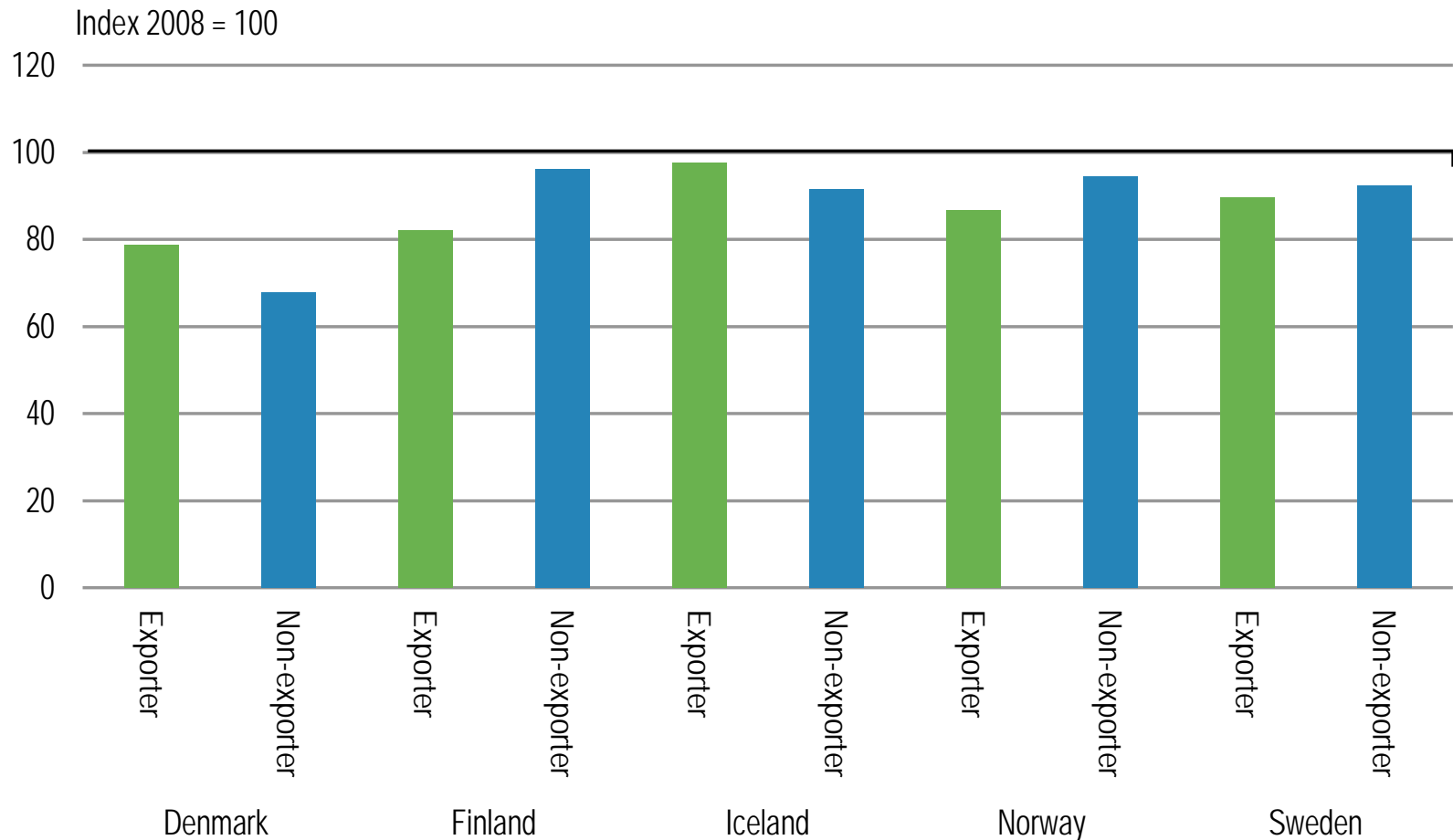

Legend: ■ 1.Micro ■ 2.Small ■ 3.Medium ■ 4.Large
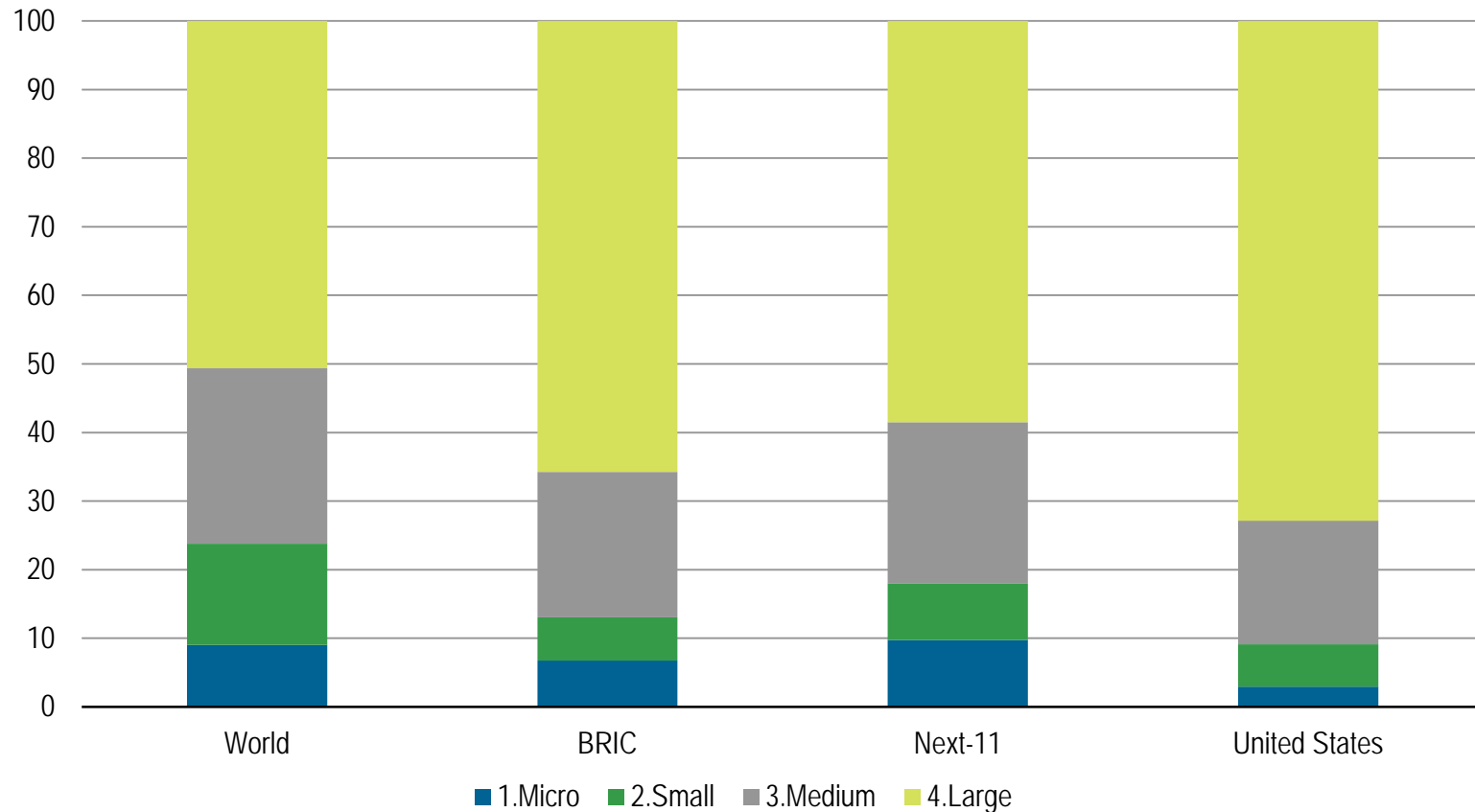
Trends in exports of SMEs and large enterprises

International trade in goods data linked with SBS enterprises in manufacturing and wholesale. 2011.
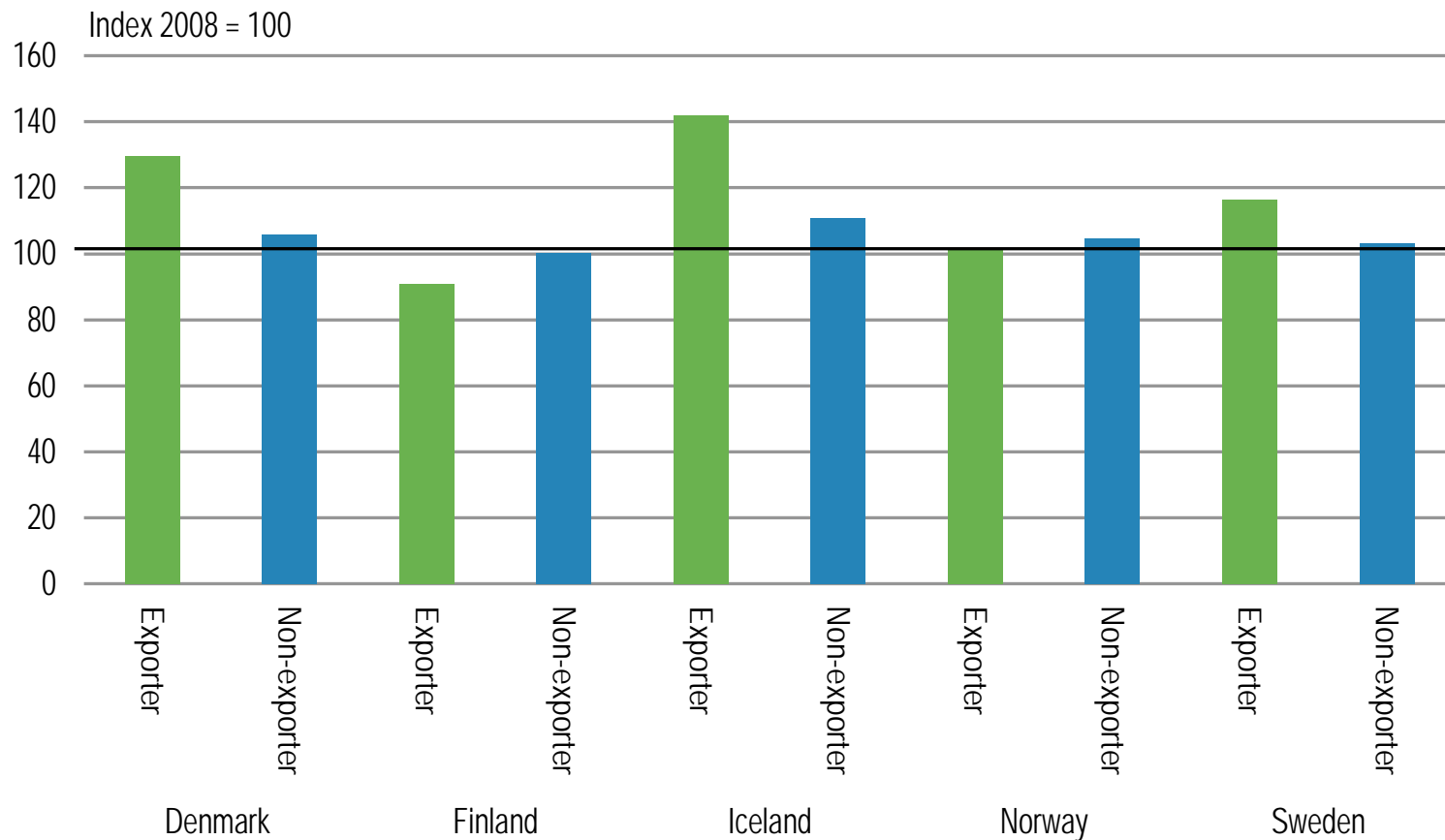
Employment trends in manufacturing: exporters vs. non-exporters

Index 2008 = 100

	Denmark	Finland	Iceland	Norway	Sweden
Exporter	79	82	98	87	90
Non-exporter	68	96	91	94	92

Value added per employee in 2011
Manufacturing

Index 2008 = 100

	Denmark	Finland	Iceland	Norway	Sweden
Exporter	130	91	142	101	116
Non-exporter	105	100	110	104	102

The road ahead

- Repetition of survey on *International Sourcing and Organisation of Business Functions* (every 5 years?)

- Introduction of an international classification of Business Functions

- Introduce a globalisation module in FRIBS including variables from other business surveys such as subcontracting (Structural Business Statistics)

- Establish Micro-Data Linking as an integrated tool in the statistical toolbox to create new information without increasing the respondent burden

STATISTICS DENMARK

Thank you!

STATISTICS
DENMARK