ESTIMATING AN EXTENDED INFORMAL SECTOR INPUT-OUTPUT TABLE FOR INDIA WITH AN EMPLOYMENT ACCOUNT BASED ON WORKFORCE CHARACTERISTICS

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Introduction:
Increased global awareness on issues of bad and vulnerable labour

- Governments, businesses, the financial sector and civil society are required to take actions to achieve a world free from bad labour and vulnerable employment (SDGs target 8)

- ✓ Bad labour or vulnerable labour often indicates
  child labour, forced labour, gender inequality, working conditions with a high risk of occupational health damage, low wage and low-skilled workers etc.

- Global supply chains have the potential to generate economic growth, employment, skill development and technological transfer. Yet, they have been linked to bad or vulnerable labour in developing countries (ILO, OECD, IOM and UNICEF, 2019).

- Consumption-based accounting using employment by industry estimates and MRIO tables contributed to uncovering the number and quality of employment embodied in trade.

  ✓ Alsamawi *et al*. (2014) "Master-Servant relationship between countries"

  <u>Master country</u> (e.g., Hong Kong, Singapore, UAE) enjoyed their lifestyle consuming more than 3 times of their own workforce

  <u>Servant country</u> (e.g., Madagascar, Papua New Guinea, Tanzania) dedicated more than 50% of their workforce to exported goods

  ✓ Simas *et al*. (2014) Half of bad labour footprint in lower income regions was driven by exports to rich countries

  Export-oriented industries are less intensive in bad labour practices in high-income countries, but both domestic and export-oriented industries have bad labour practices in lower-income countries

Introduction:
Informal sector as key factor of bad and vulnerable labour

- The large presence of unofficial economic activities, often referred to as the **"informal sector" (unorganized sector or household sector)**, is a common characteristic of the economic systems of developing countries.

  ✓ Popular examples of informal sector; small-scale farmers, small family-based factories, street vendors, and informal taxi drivers etc.

- The workforce in the informal sector can be characterised by increased vulnerability and lower wage rates compared to workers in the formal sector.

- The informal sector is not fully regulated by governments.

➢ Bad and vulnerable labour in informal sector has been of great concern for many years

Introduction:
Informal sector as key factor of bad and vulnerable labour

- However, previous studies which estimated the impact of trade on employment were not able to distinguish the informal sector from formal sector.

- ➤ Informal sector and formal sector implicitly aggregated, which leads to loss of information and bias in results of IO analysis→ <u>Aggregation bias</u> (e.g., Kymn, 1990)

- Many studies investigated how aggregation of IO sectors affect estimated various multipliers and total output and validated the effort of disaggregating IO sectors with different production structures (e.g., Lahr and Stevens, 2002; Lenzen, 2011; Olsen *et al*., 2014; Giljum *et al.,* 2022)

- ➤ To enhance the reliability of analysis on bad or vulnerable labour embodied in trade, it is important to collect information on informal production activities and separate them from formal activities

Introduction:
Estimating size and production structure of informal sector

✓ **Estimating the economic size of informal sector (e.g., GDP share)**

- Estimation by econometric model (e.g., Schneider et al., 2010)

  The average share of informal value added in GDP among developing countries was 31% in 2018, whereas it accounted for 17% in developed countries (Ohnsorge and Yu, 2021).

- Estimation by sample survey (e.g., Murthy, 2021)

✓ **Estimating informal sector extended IOT**

- Informal sector extended IOT of China and India (Rada, 2010)
    Income and employment multipliers

- Informal sector extended IOT of India (Mitoma, 2023)
    Carbon footprint analysis

Objective of this study

✓ **Extensions from previous studies**

- Limited industry coverage (3 industry sectors for Rada, 2010; 25 manufacturing sectors for Mitoma, 2023)

- Limited to a single year

- Assuming same production structure for the formal and informal sector

✓ **Objectives of this study**

- Estimating an informal sector-extended IOT with 45 industries and a sectoral workforce characteristics database with multiple years for India.

- Investigate aggregation biases on employment and bad (vulnerable) labour embodied in exports using microdata of PLFS survey and the extended IOT

Methodology

- Disaggregating IOTs and Employment
  - Output and VA by economic activity
  - Employment by 1) industry 2) Formal / Informal 3) Workforce characteristics

- Multipliers
  - Output: $(I-A)^{-1}$
  - VA : $v/x \, (I-A)^{-1}$
  - Employment : $e/x \, (I-A)^{-1}$

- Employment embodied in gross exports
  - Employment : $e/x \, (I-A)^{-1} \, EXP$

Data sources

- National Accounts*
  - Formal and Informal sectors
- India Periodical Labour Force Survey (PLFS)*
  - Microdata of survey results
  - Industry, Household sector, Age, Gender, Status, Education, Occupation
- Japan Firm size extended Input-Output table (2012, Small and Medium Enterprise Agency)*
  - Intra industry transactions between larger and smaller firms
- Time series Input-Output tables (1995-2020)
  - OECD's Harmonised IOTs 2023 edition

Official statistics from government agencies

Employment by workforce characteristics

Industry

i1	i2	…	i44	i45

Formal/Informal x Industry

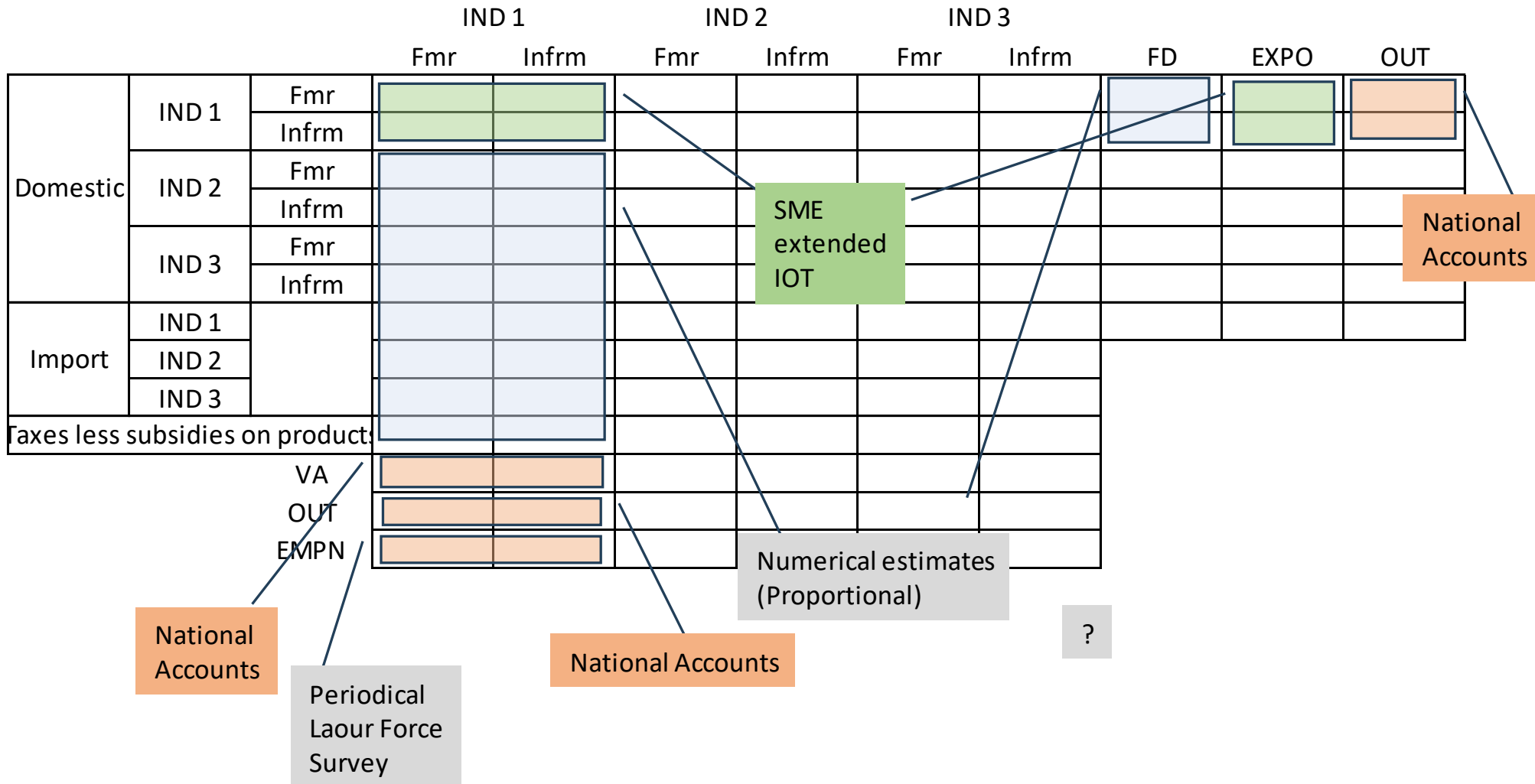|	i1	i2	…	i44	i45
Formal					
Informal					

- Gender
- Occupation
- Income
- Status
- Education

Multiple data sources are used to separate formal and informal sectors

Assumptions for correcting outliers

- VA – Output ratios should be less than 1.0 to avoid negative intermediate inputs

$$\frac{SY^{i,IF} * VA^i}{SX^{i,IF} * X^i} < 1.0 \text{ unless the sum of taxes less subsidies on production for } i \text{ is negative}$$

- *Labour productivity* gaps between IF and FM sectors

$$0.33 < \frac{VA^{IF}/EM^{IF}}{VA^{FM}/EM^{FM}} < 1.2$$

- *Binary observations* in NA statistics

$X^{IF}/X^{IF} = 0$ or 1 and $VA^{IF}/VA^{IF} = 0$ or 1 in National Accounts but LFS may have different results due to response biases and categorisation issues

Output shares are prioritised

- Issues with *small samples* for sectoral employment: If jumps in shares are observed, the simple average of all years is applied.

Overview of the share of informal sector in gross output, GVA and employment

Larger output ← → Smaller output

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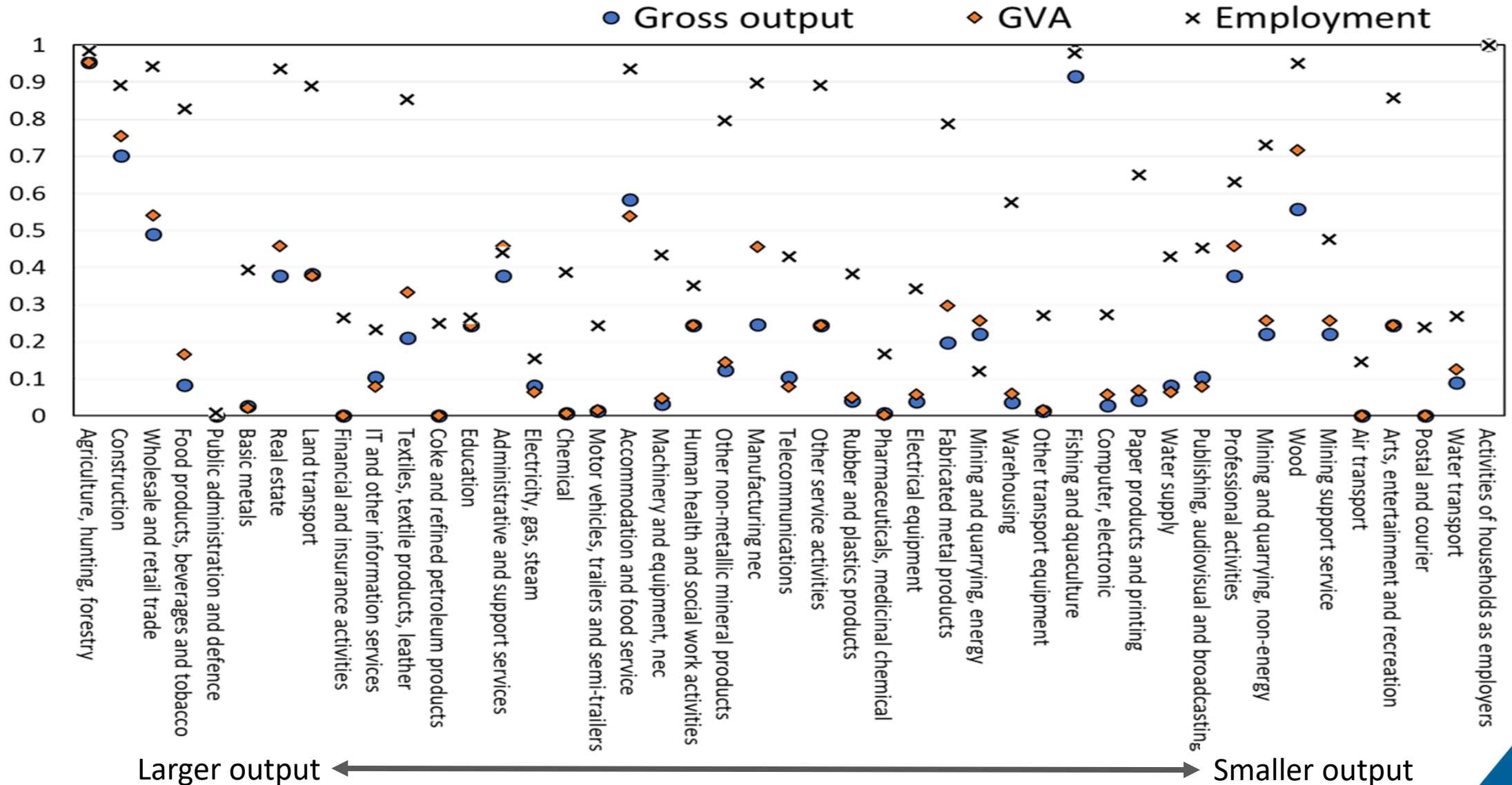
Informal shares (output, value added and employment, 2020/21)

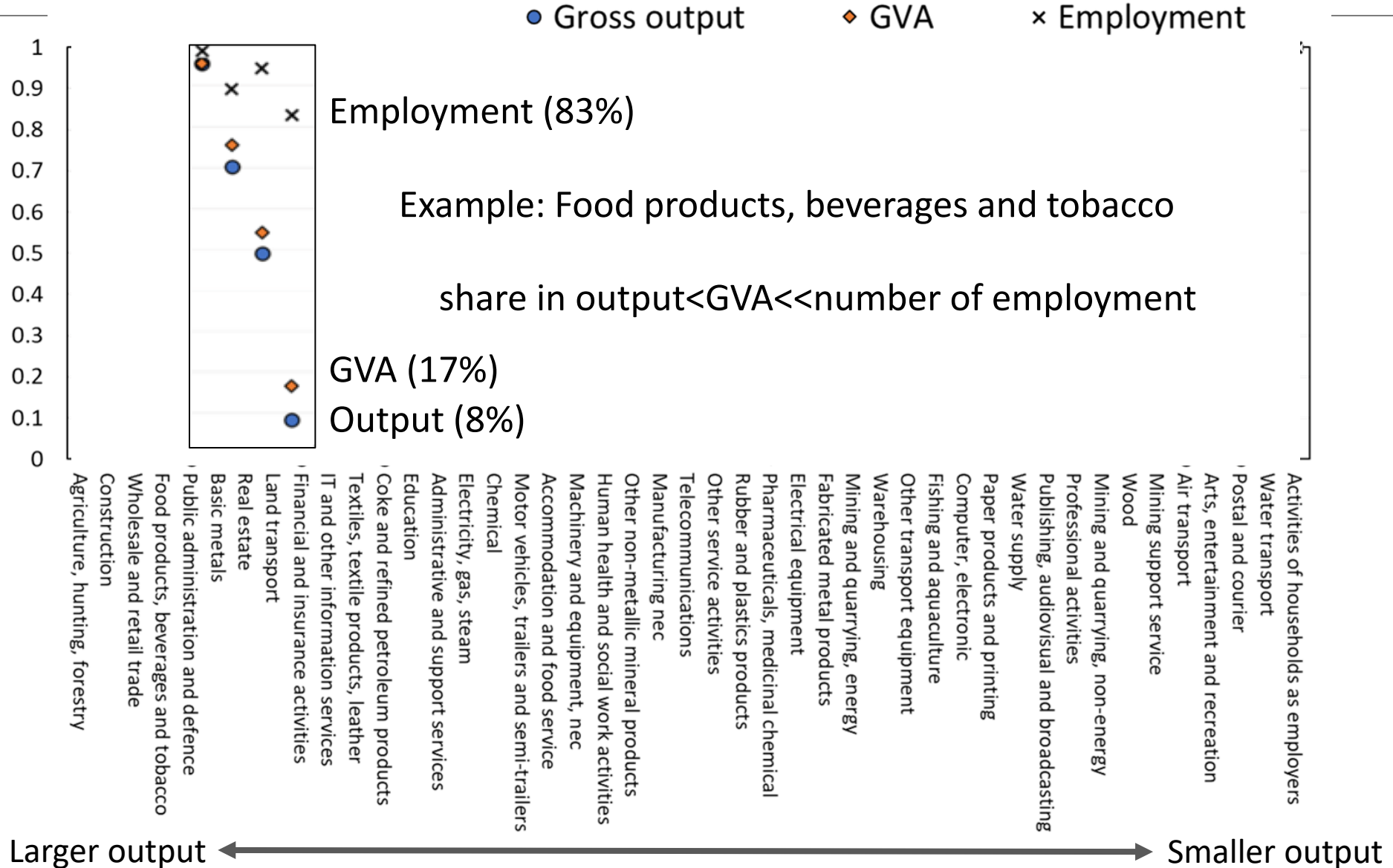Lower labour productivity, lower wage, unpaid workers

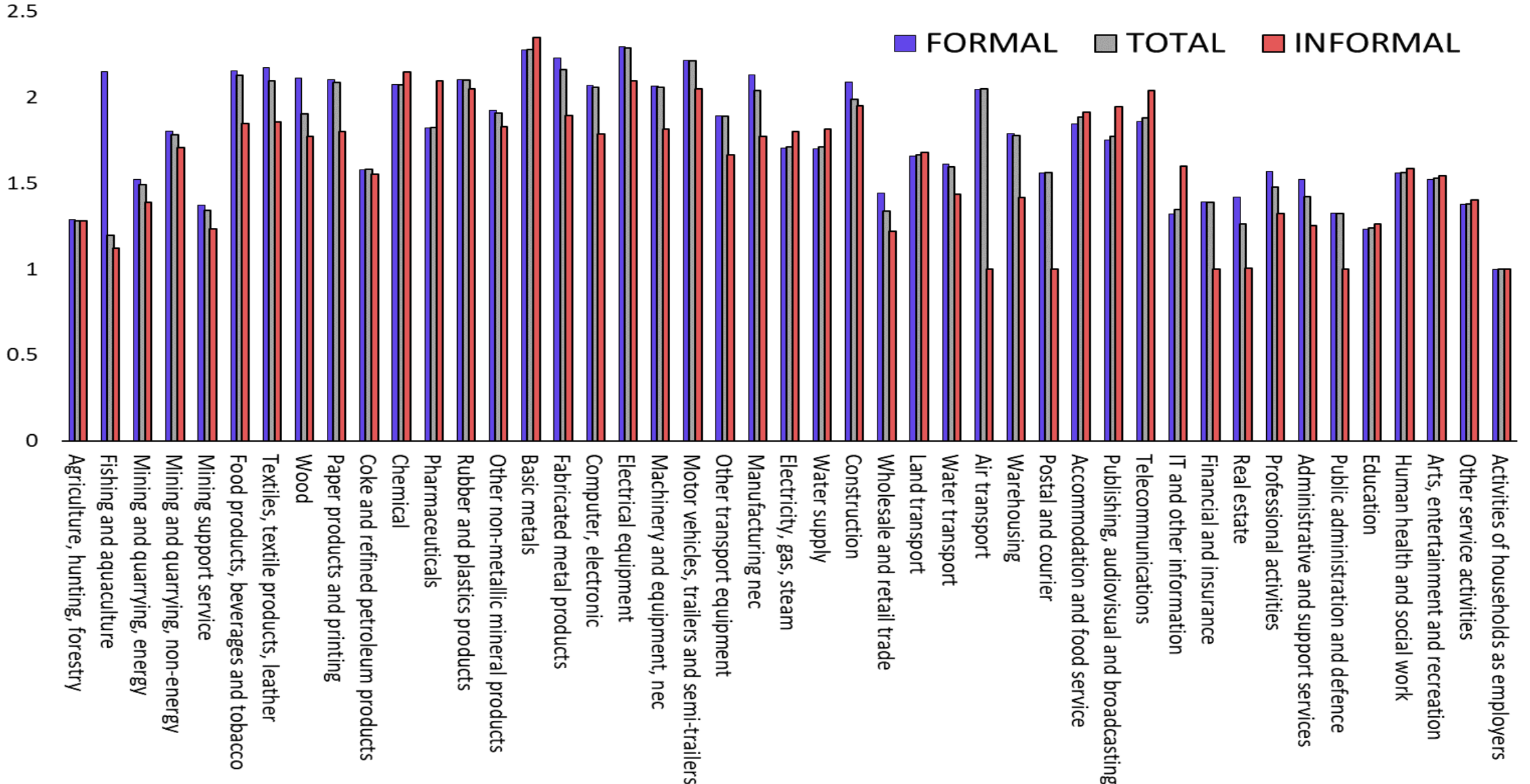Sources: National Accounts, Periodic Labour Force Survey

Overview of the share of informal sector in gross output, GVA and employment

● Gross output ◆ GVA × Employment

Employment (83%)

Example: Food products, beverages and tobacco

share in output<GVA<<number of employment

GVA (17%)
Output (8%)

X-axis categories (from larger output to smaller output):
Agriculture, hunting, forestry; Construction; Wholesale and retail trade; Food products, beverages and tobacco; Public administration and defence; Basic metals; Real estate; Land transport; Financial and insurance activities; IT and other information services; Textiles, textile products, leather; Coke and refined petroleum products; Education; Administrative and support services; Electricity, gas, steam; Chemical; Motor vehicles, trailers and semi-trailers; Accommodation and food service; Machinery and equipment, nec; Human health and social work activities; Other non-metallic mineral products; Manufacturing nec; Telecommunications; Other service activities; Rubber and plastics products; Pharmaceuticals, medicinal chemical; Electrical equipment; Fabricated metal products; Mining and quarrying, energy; Warehousing; Other transport equipment; Fishing and aquaculture; Computer, electronic; Water supply; Paper products and printing; Publishing, audiovisual and broadcasting; Professional activities; Mining and quarrying, non-energy; Wood; Mining support service; Air transport; Arts, entertainment and recreation; Postal and courier; Water transport; Activities of households as employers
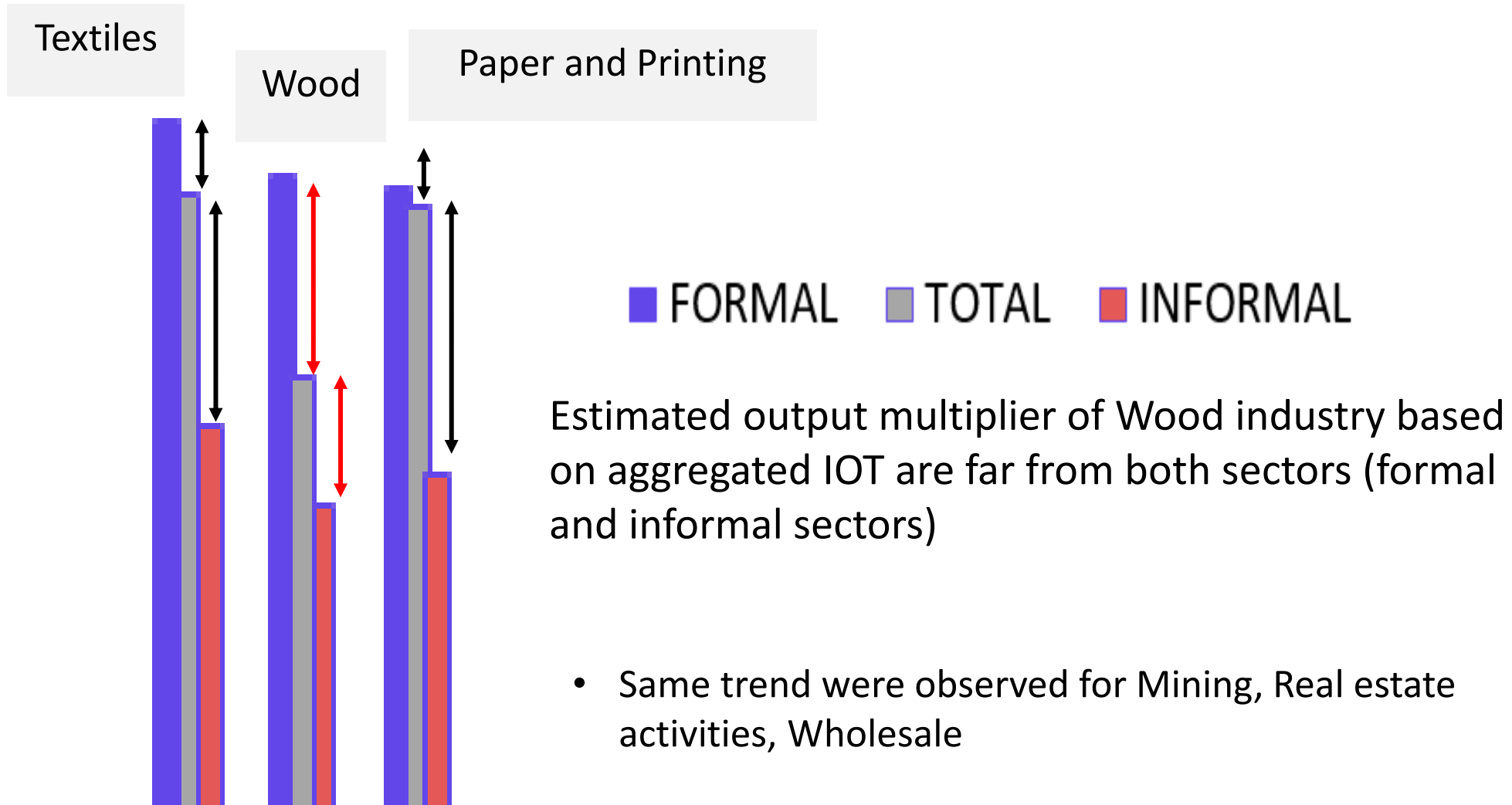
Larger output ⟷ Smaller output

Leontief Backward Linkage (Output multiplier)

Leontief Backward Linkage (Output multiplier)

Textiles

Wood

Paper and Printing

■ FORMAL ■ TOTAL ■ INFORMAL

Estimated output multiplier of Wood industry based on aggregated IOT are far from both sectors (formal and informal sectors)

- Same trend were observed for Mining, Real estate activities, Wholesale

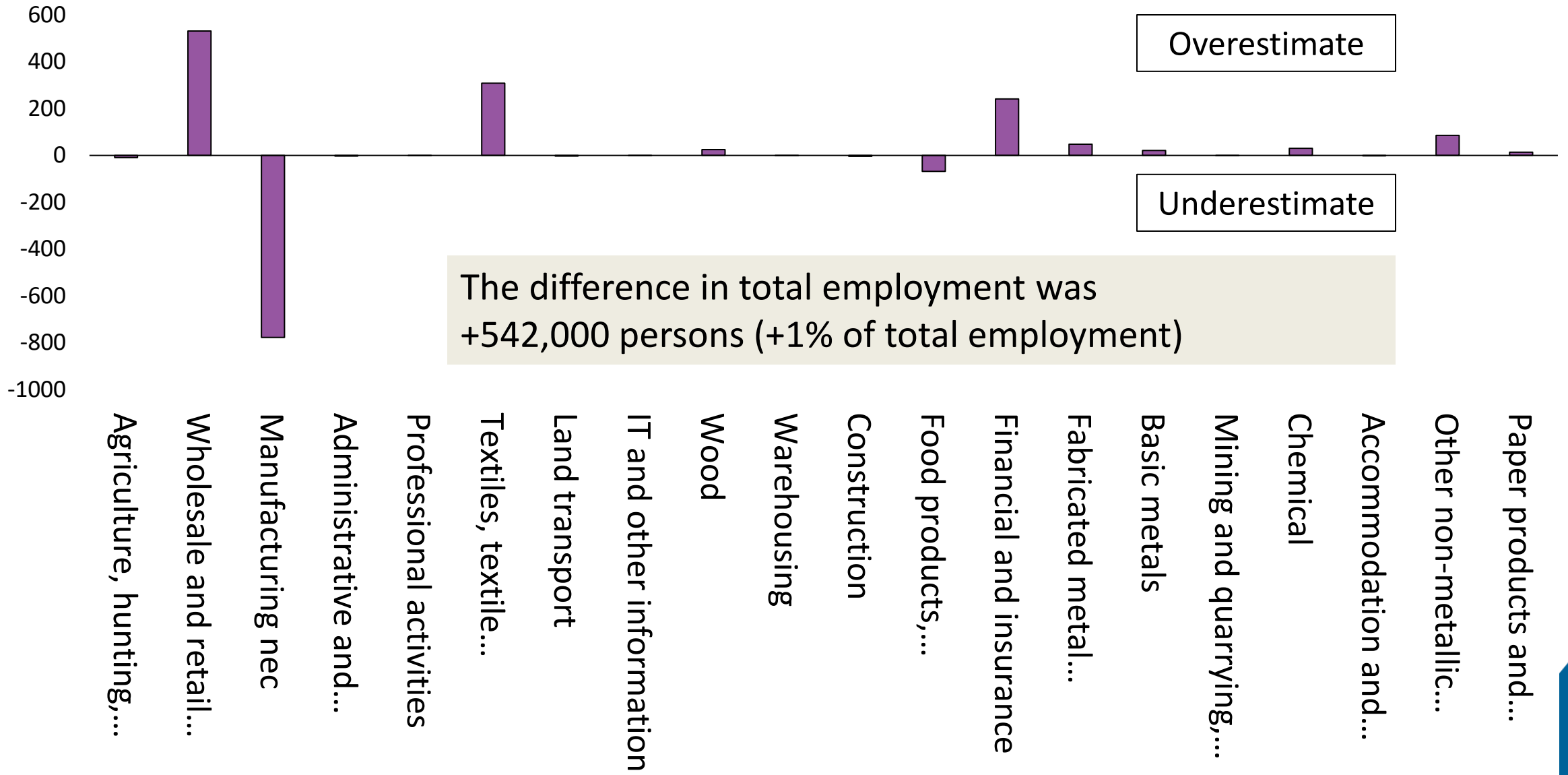# Results: Employment multiplier
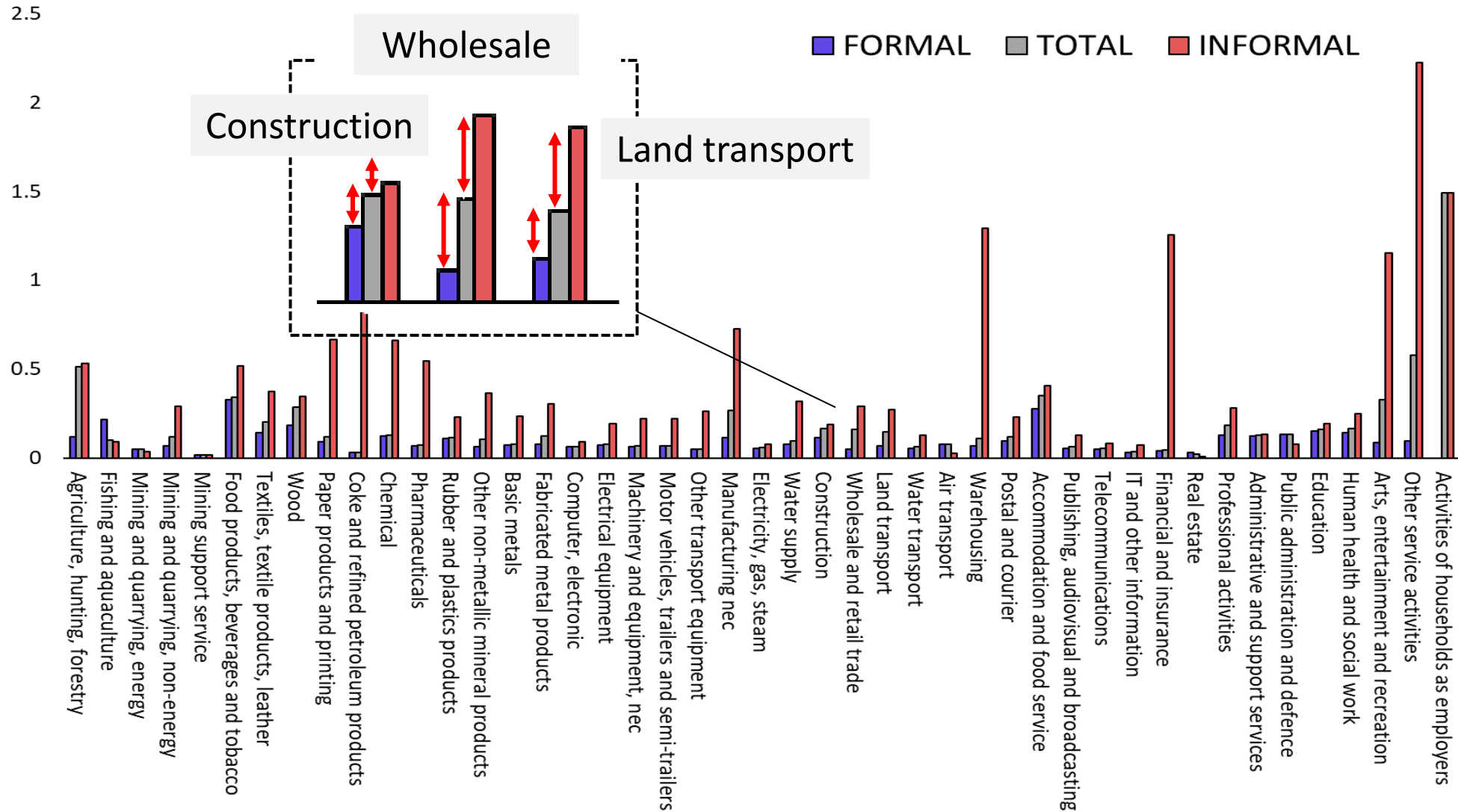
Results: Aggregation bias:
Employment embodied in exports
(Aggregation bias= Aggregated IOT - extended IOT)

Overestimate

Underestimate

The difference in total employment was +542,000 persons (+1% of total employment)

Agriculture, hunting,...
Wholesale and retail...
Manufacturing nec
Administrative and...
Professional activities
Textiles, textile...
Land transport
IT and other information
Wood
Warehousing
Construction
Food products,...
Financial and insurance
Fabricated metal...
Basic metals
Mining and quarrying,...
Chemical
Accommodation and...
Other non-metallic...
Paper products and...

Results: Aggregation bias:
Employment embodied in exports (percentage deviation)

Employment embodied in exports by characteristics: Overview

1. Gender		2. Skill_Education			3. Skill_Occupation		
Male	Female	Low	Middle	High	Low	Middle	High
292	247	157	90	297	95	97	349

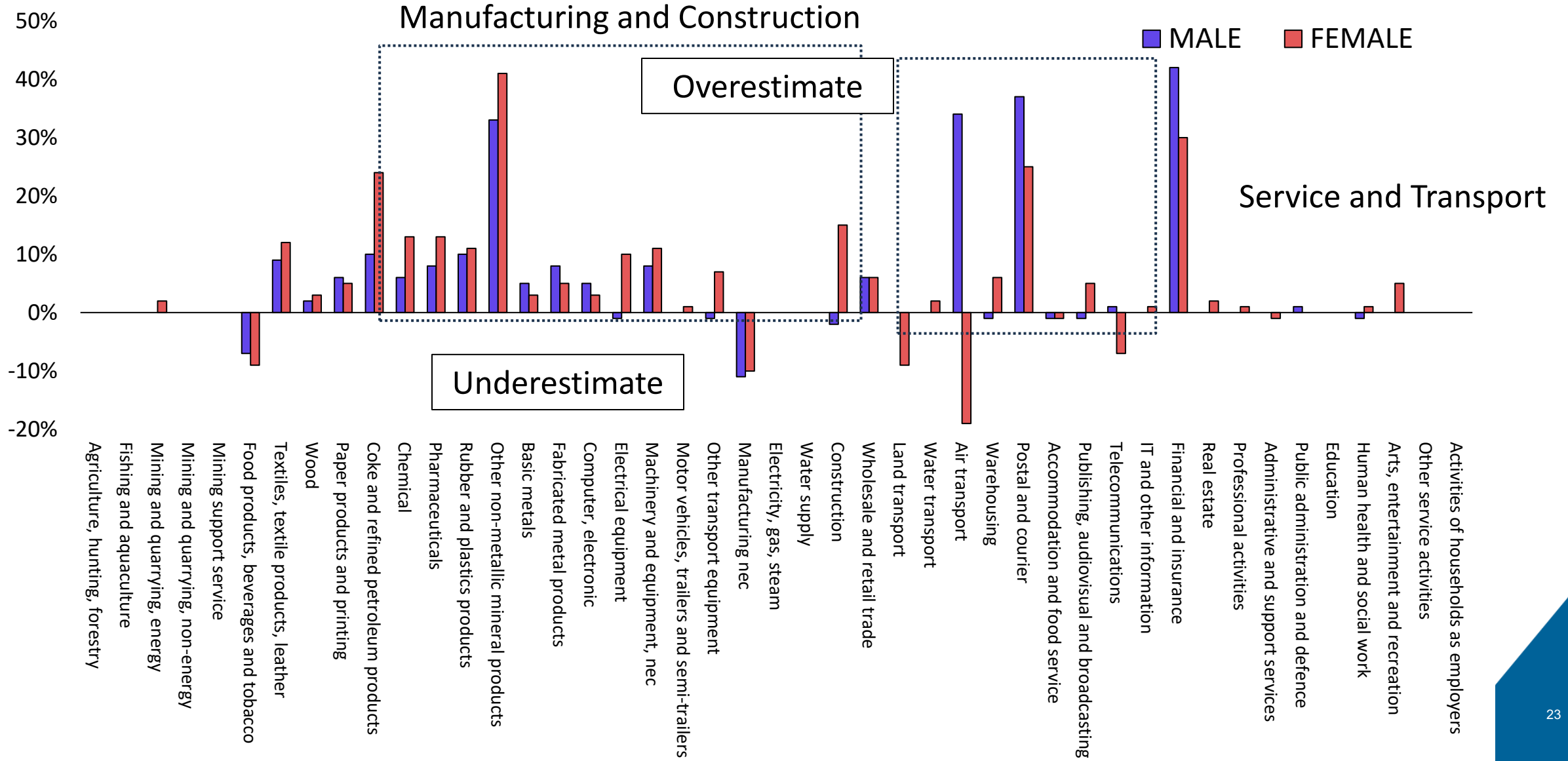| 4. Working status				5. Income		
Self-employed	Unpaid family workers	Regular employees	Temporary workers	Low	Middle	High
207	24	321	-15	204	271	68

*Overestimated by the aggregated IOT

*Underestimated by the aggregated IOT

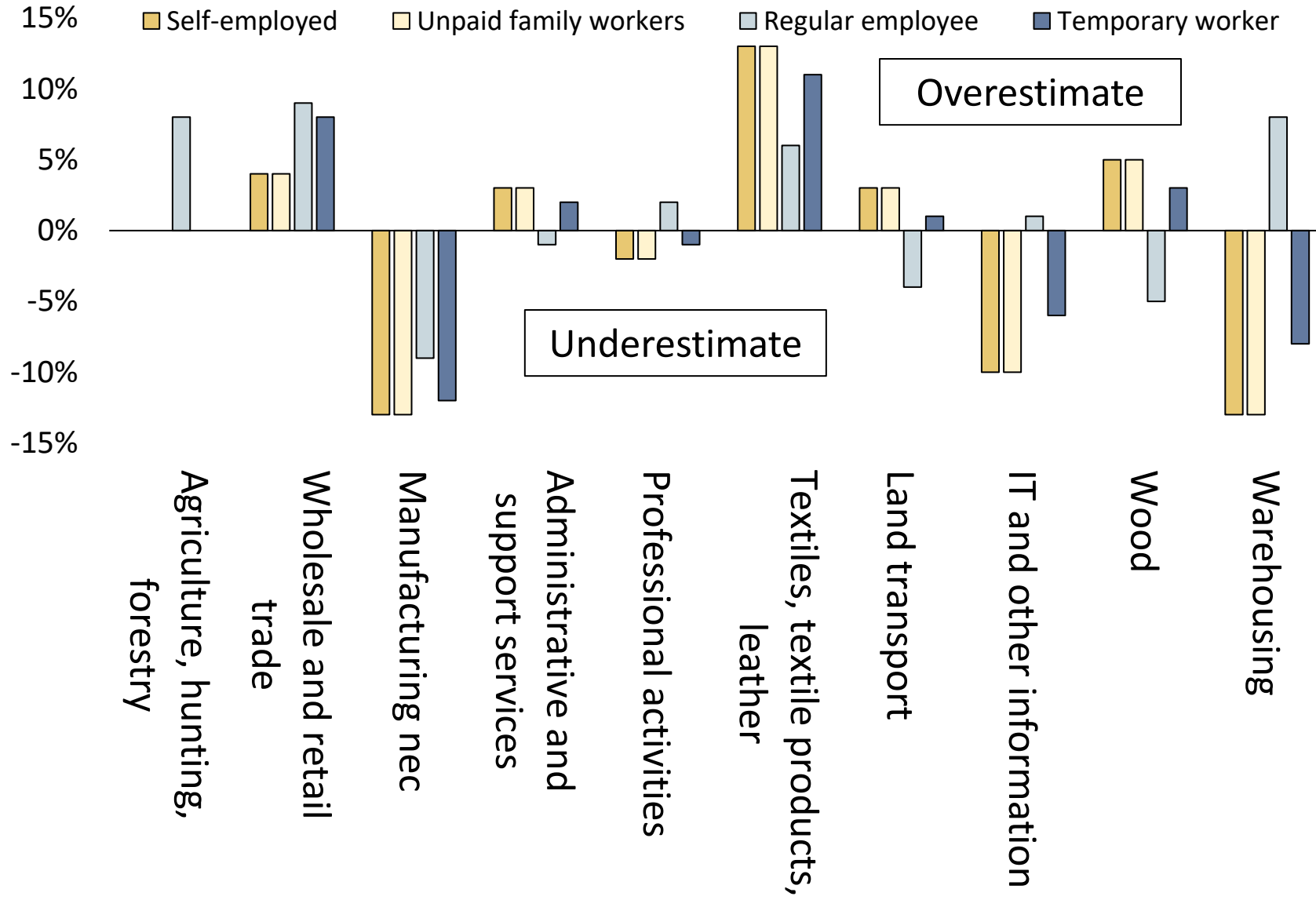# Employment embodied in exports by characteristics:
1. Gender

Employment embodied in exports by characteristics:
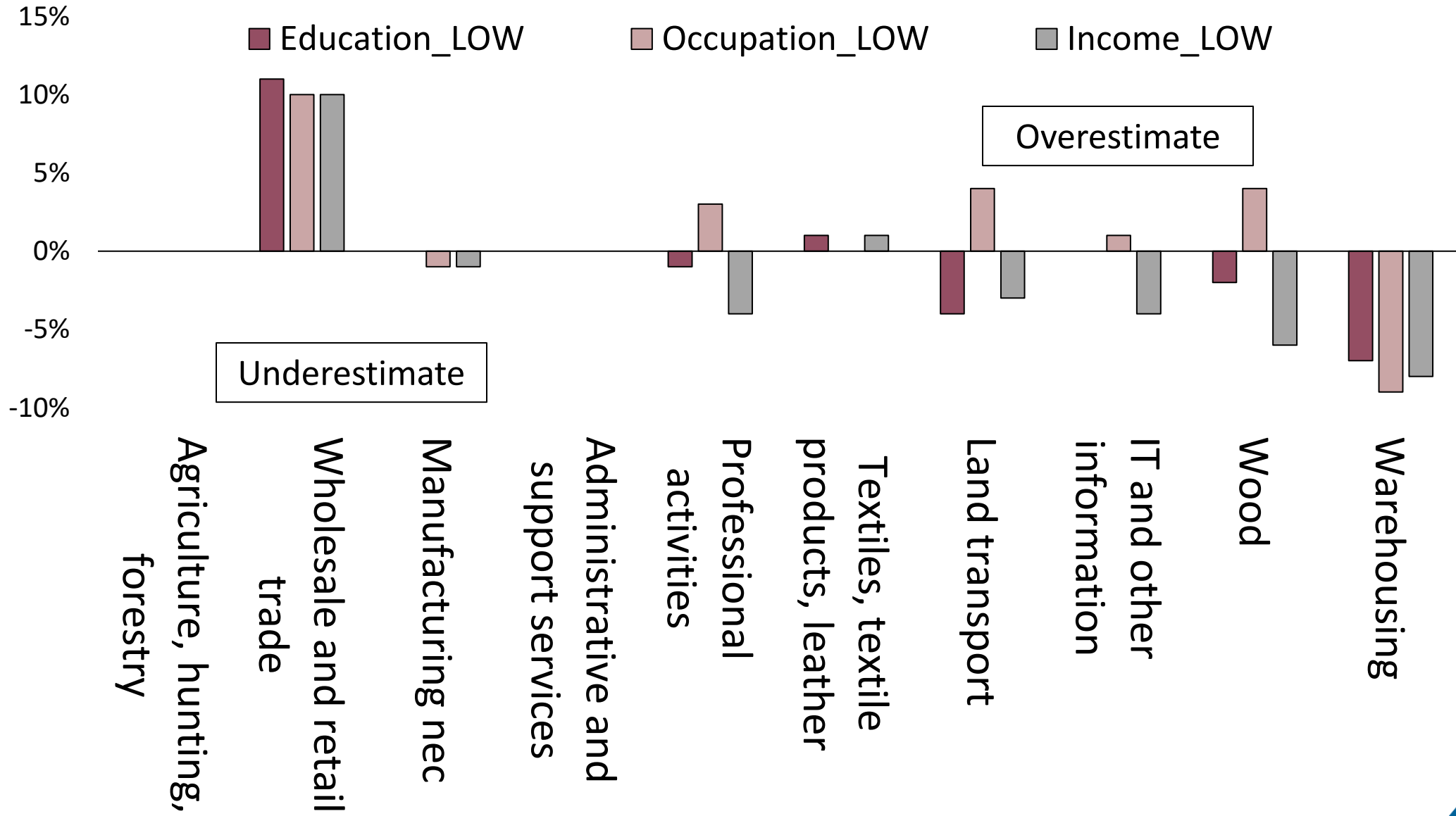## 4. Working status
(Top 10 industry in terms of employment embodied in exports)

Employment embodied in exports by characteristics: Vulnerable labour
(Top 10 industry in terms of employment embodied in exports)

Education_LOW   Occupation_LOW   Income_LOW

Overestimate

Underestimate

Agriculture, hunting, forestry
Wholesale and retail trade
Manufacturing nec
Administrative and support services
Professional activities
Textiles, textile products, leather
Land transport
IT and other information
Wood
Warehousing

Summary

- Confirmed aggregation biases
- Remaining challenges
  - Trade by Enterprise Characteristics
  - Formal / unorganised split is improved more for sectors less affected by "scale of production"
  - Application to other countries
  - Other local and global pollution impacts (ICIO analysis)
  - Unobserved employment

THANK YOU