PATTERNS OF FIRM LEVEL PRODUCTIVITY IN IRELAND

RESULTS FROM MULTIPROD MODEL

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Outline

- High level macro picture
- Firm level productivity analysis
  - Rationale
  - The MultiProd model
  - Data
- MultiProd Results (2006-2014)
  - Concentration measures – impact of large firms
  - Productivity distribution – the best vs the rest
  - Efficiency of resource allocation

Global trends in productivity growth

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- Global productivity slowdown since 1990s
- Slowdown accelerated pre-crisis
- OECD countries slowed down the most
- Patterns are consistent across measures of productivity (LP & MFP)

Source: Conference Board Total Economy Database

High level of labour productivity

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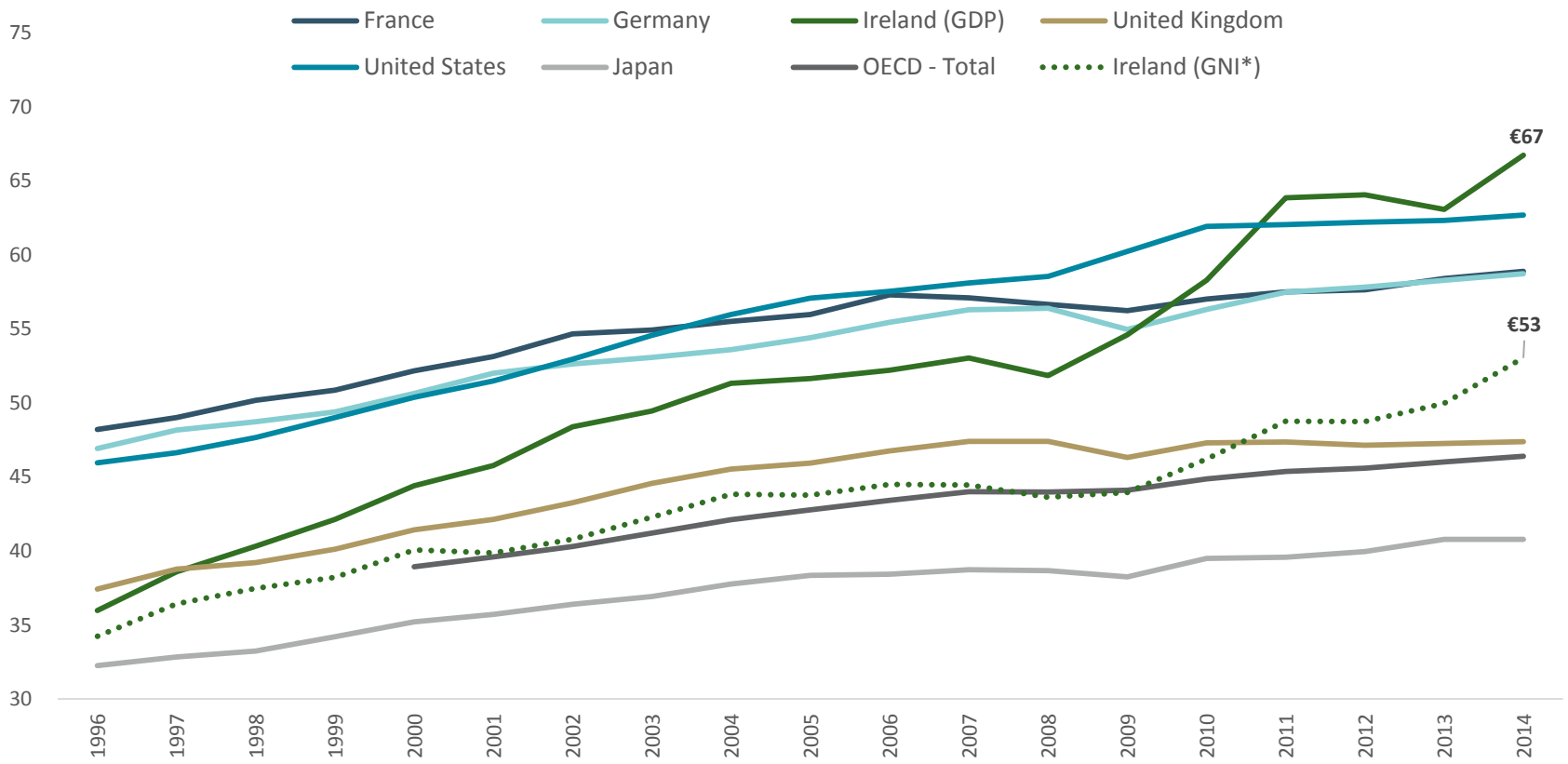
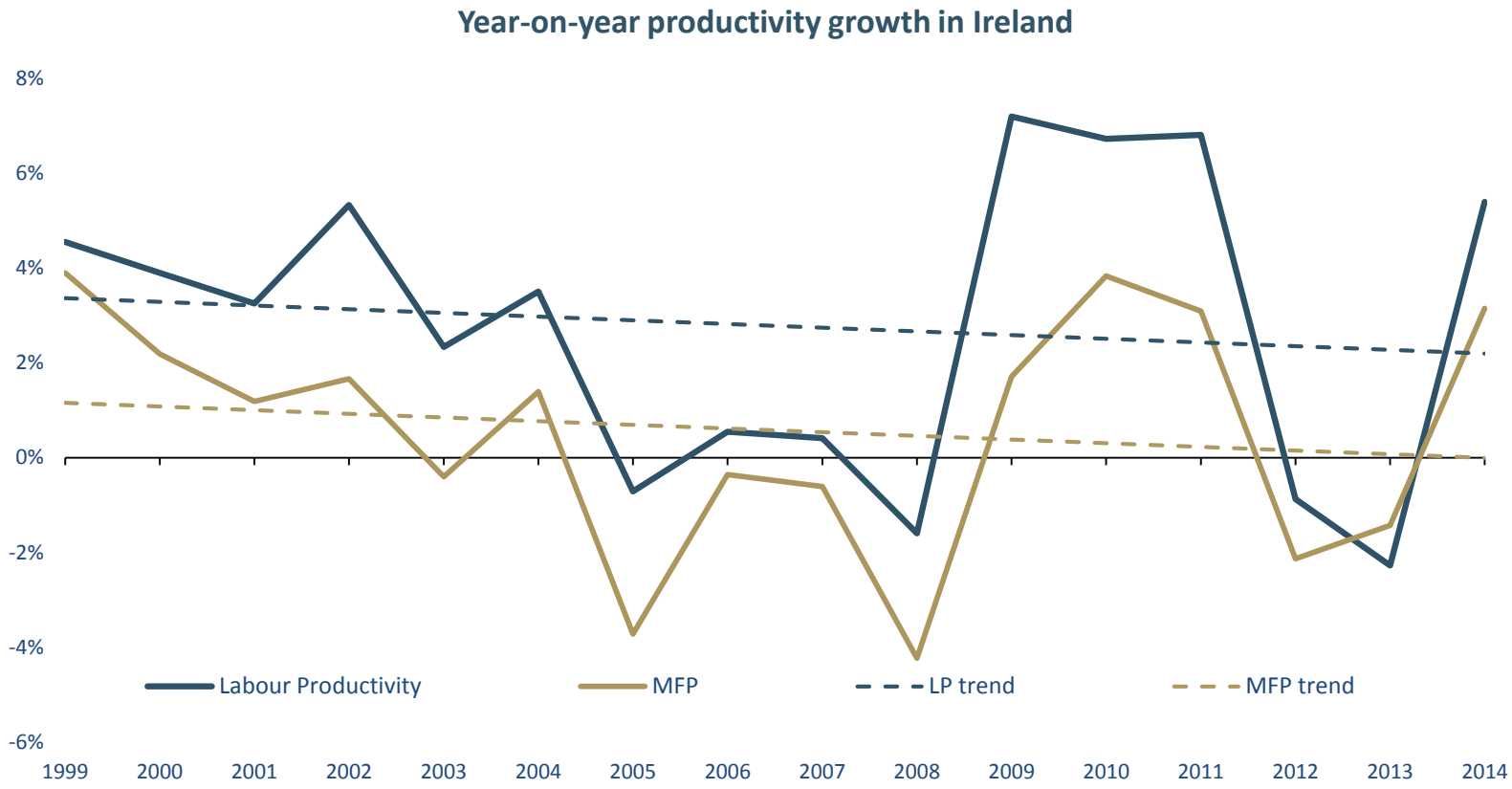
GDP and GNI per hour worked (2015 USD - 2011 PPPs)



Source: OECD

Decline in growth rate



Source: CSO experimental estimates of productivity (forthcoming)

Need for firm-level productivity analysis

- Aggregate productivity statistics hide underlying drivers
  - Countries might display the same level, but be characterised by very different underlying distributions
- Three channels of aggregate productivity growth:
  i. Innovation at the frontier
  ii. Diffusion from frontier to laggard firms
  iii. Resource allocation
- … each of these factors may call for different policy responses.

MultiProd – *Micro drivers of aggregate productivity*

- The MultiProd project is based on a 'distributed microdata' methodology
  - Harmonised software sent to countries
  - Researchers in each country will run the code on their confidential microdata
  - Aggregated output respect confidentiality rules – followed CSO approach
  - Cross country Micro-aggregated results then analysed by the OECD
- Comparable data analysed across countries
- Productivity measured in exactly the same way across countries
- Generates non-confidential aggregate statistics to allow for cross country analysis

MultiProd Model - Output

- Produces estimates of Labour and Multi-factor productivity (MFP)
  - Solow method: $MFP = GO - \beta_K K - \beta_L L - \beta_I II$
    - Industry specific factor shares (cross-country median)
  - Wooldridge method: Regression based approach (GMM)
    - Corrects for bias in estimates

- Aggregation level
  - Industry (Manufacturing, Utilities, Market and Non-Market Services)
  - Sectoral level (2-digit NACE)

- Basic moments are computed (e.g. mean, median, standard deviation)
  - Refined by percentiles of distribution (10^{th}, 50^{th}, 90^{th}), age, size, ownership

- Various measures of the efficiency of resource allocation
  - Measures strength of relationship between firm-size and productivity

Data

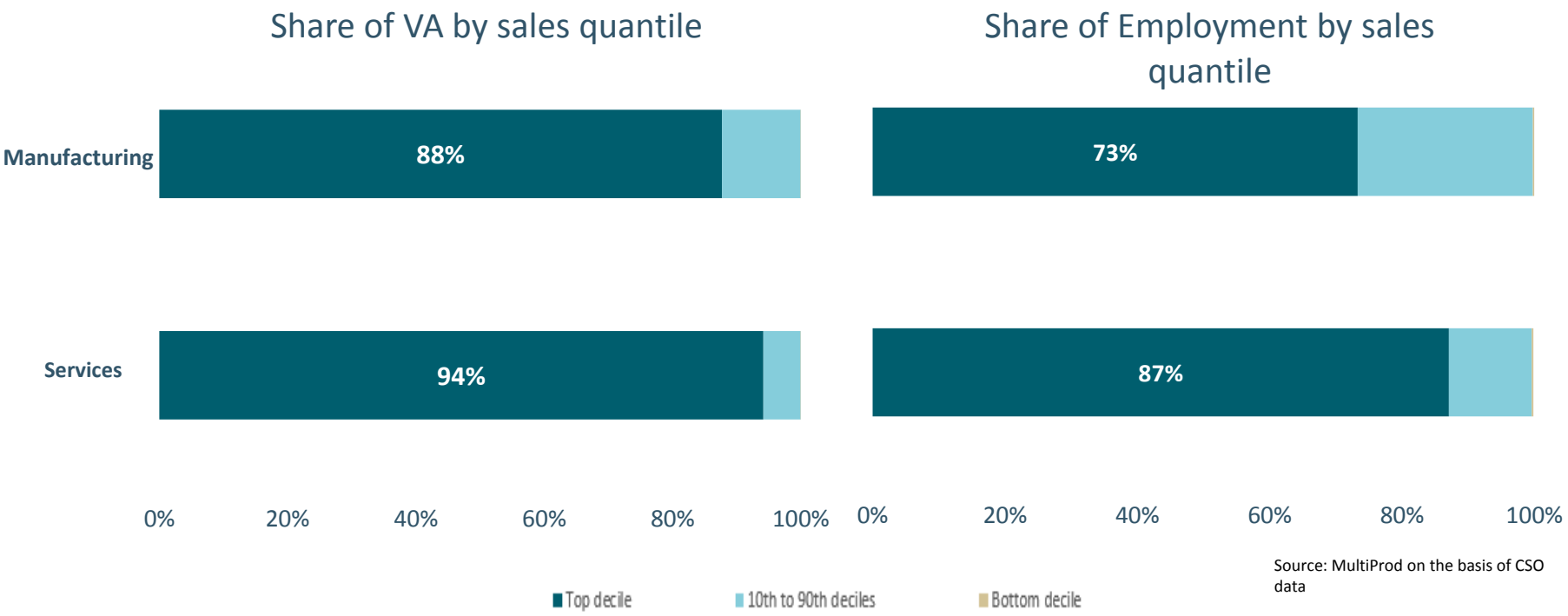
- **CIP** (1991-2014), **ASI** (1999-2014)
  - Year, Sector, Country of Ownership, Birth Year
  - Investment, Value Added, Gross Output, Intermediate Inputs
  - Employment, Wages
- **Business Register** (2006-2014):
  - Weighting to make results representative of population
  - Dealing with entry/exit of firms
  - Changes in industry classification
- Deflators, K/L ratios and depreciation rates based on National Accounts
  - Sector level (Nace Rev. 2)
- Panel sample (2006 – 2014)
  - Manufacturing & Utilities: 2,500 firms (yearly average)
  - Market & Non-Market Services: 7,500 firms (yearly average)

The MultiProd Model – cross country results

- Cross country results based on 18 countries (excl IE)
- Evidence of widening gap between most and least productive firms
- Results based on Orbis data show a consistent pattern

MultiProd Results for Ireland (2006-2014)

Granularity – the contribution of largest firms (1)

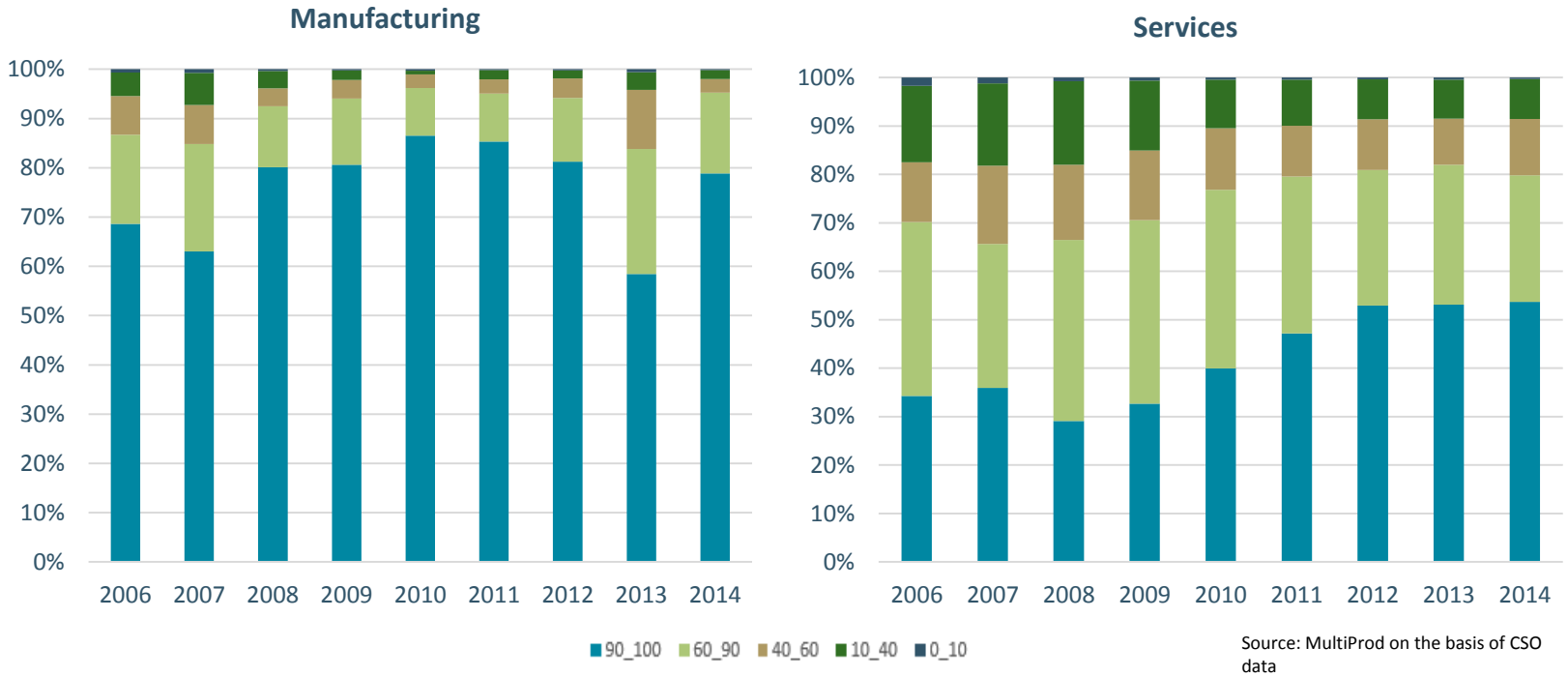


Source: MultiProd on the basis of CSO data

Irish results more concentrated than the cross-country MultiProd results

- Manufacturing 80% of VA and 68% of employment in cross-country
- Services 79% of VA and 66% of employment

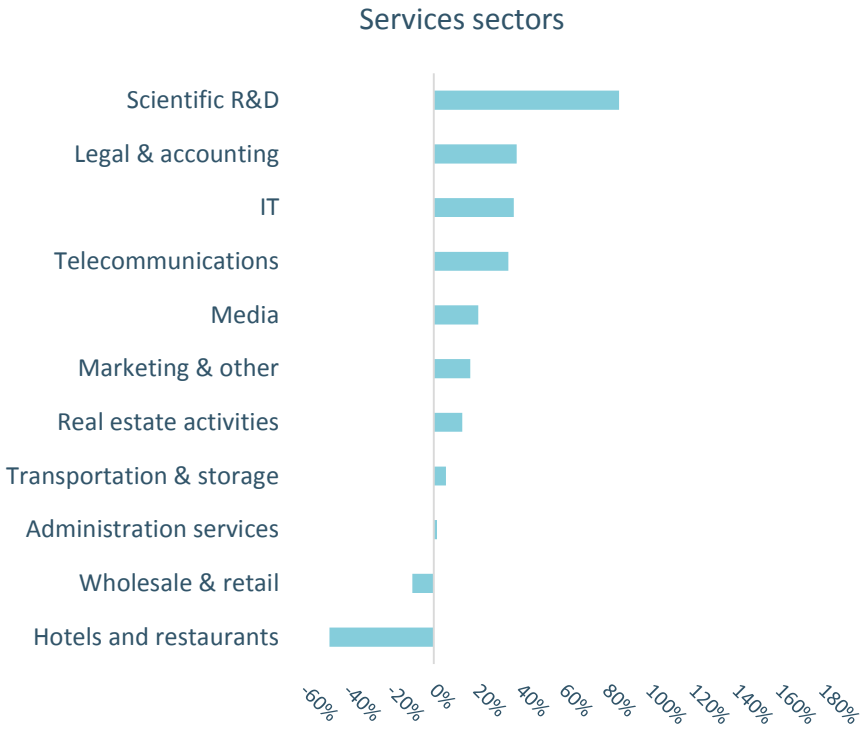
Granularity – the contribution of most productive firms



Source: MultiProd on the basis of CSO data

- Most productive firms in manufacturing account for 70 percent of aggregate productivity on average over 2006-2014
- 40 percent (on average) in services, although growing over the period

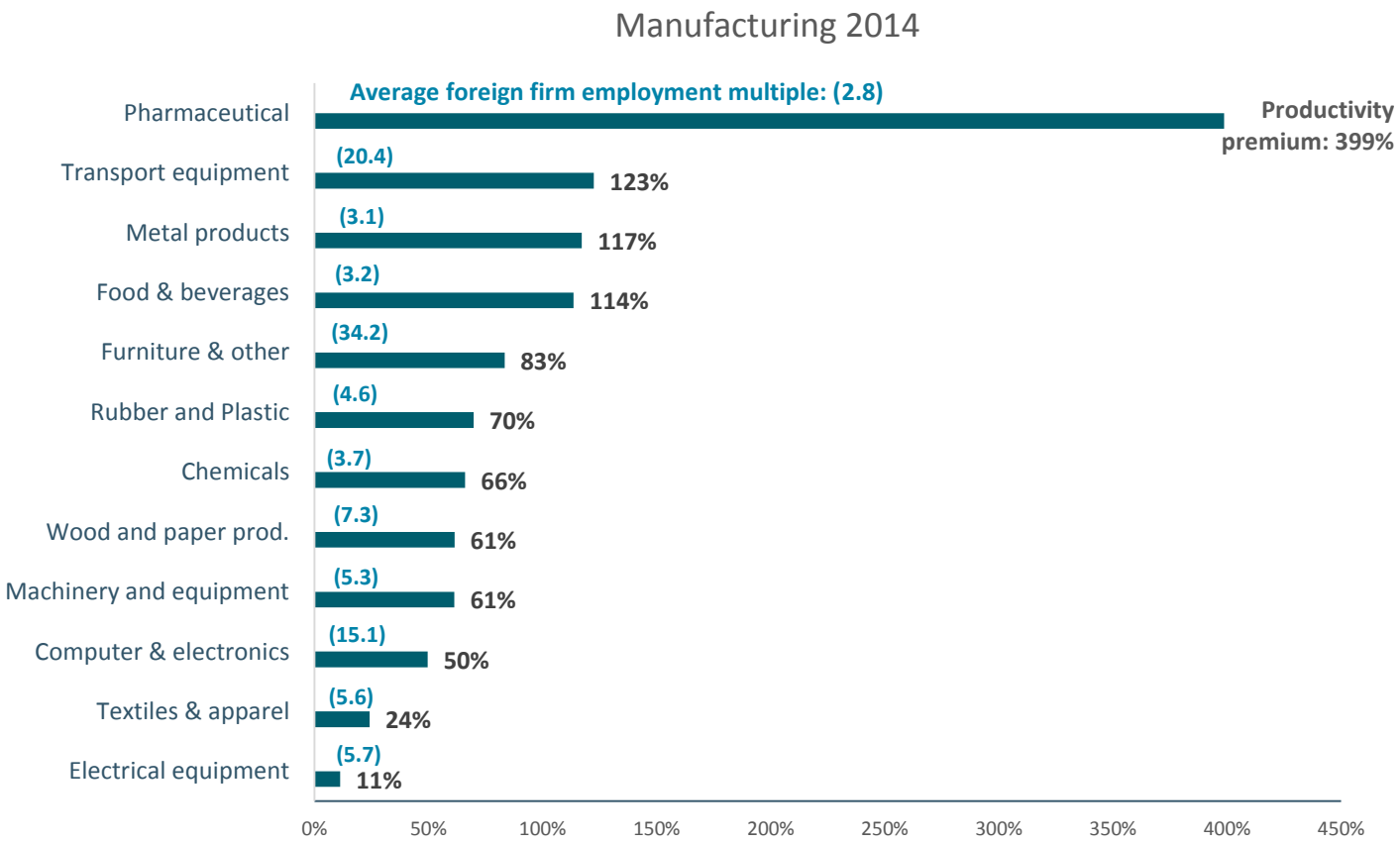
Labour productivity distribution – across sectors



Source: MultiProd on the basis of CSO data

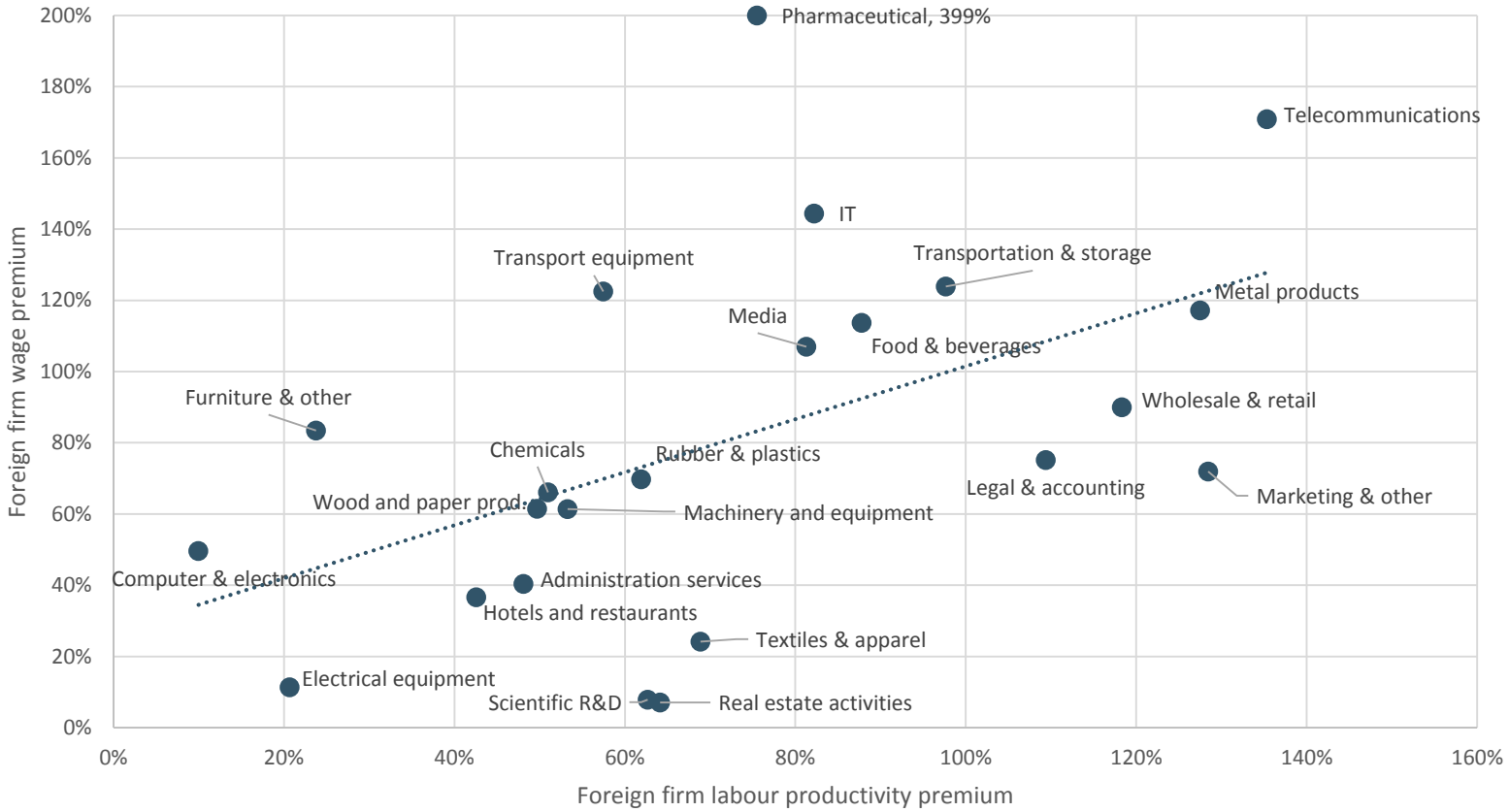
- Results broadly consistent with results of the MultiProd benchmark group (excl. scientific R&D)

Foreign firm Labour productivity and employment premium



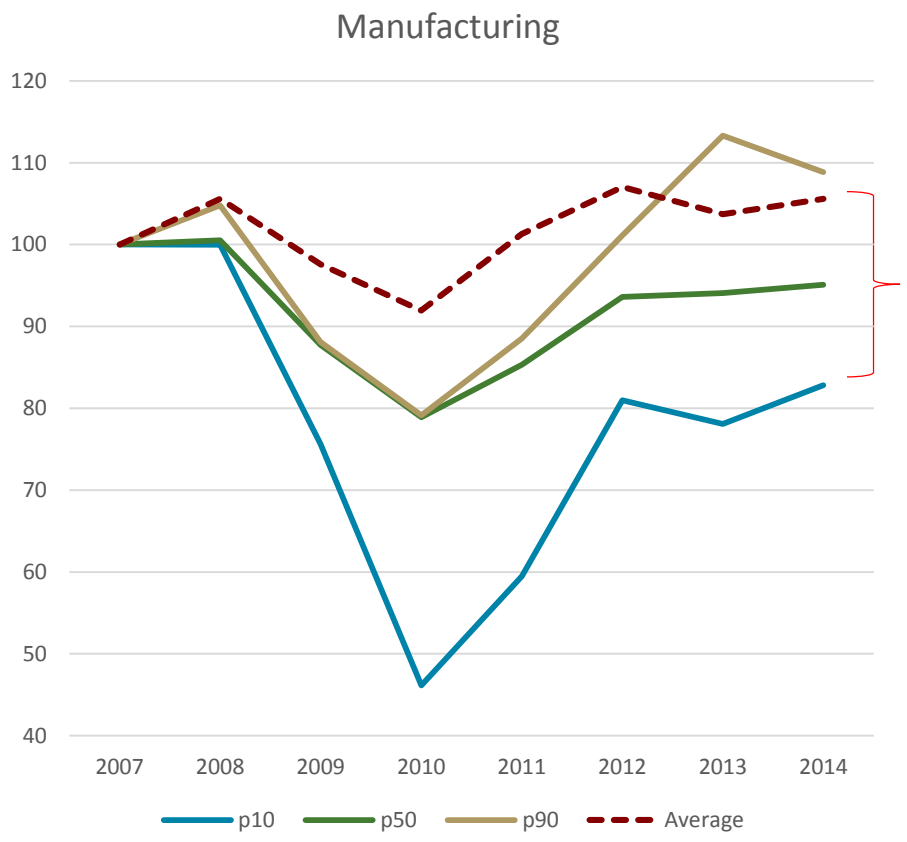
Source: MultiProd on the basis of CSO data

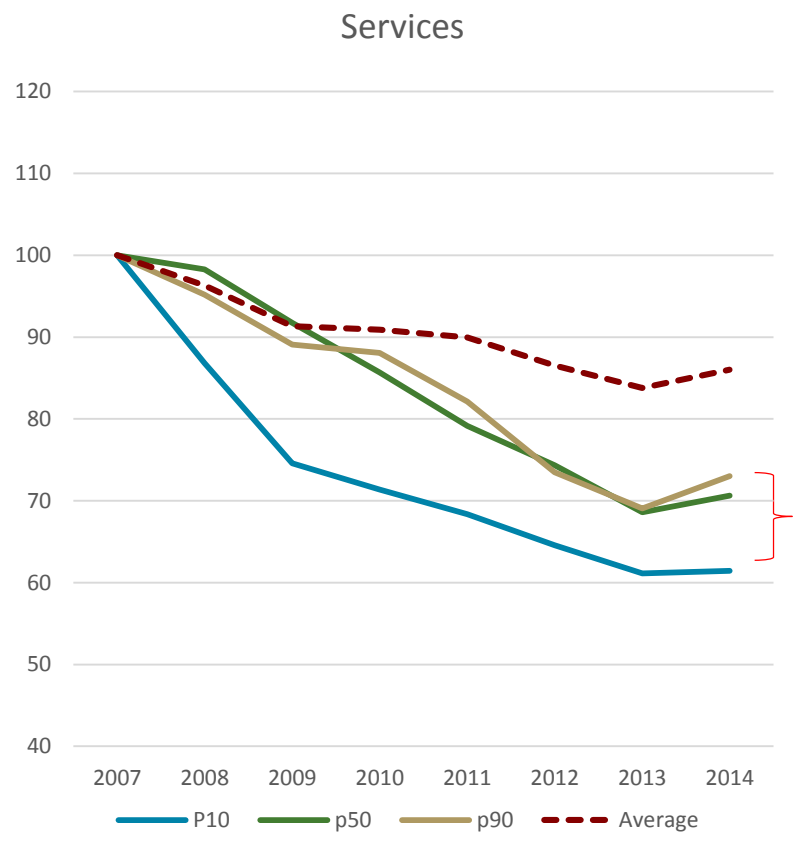
Foreign firm Labour productivity and wage premium



Source: MultiProd on the basis of CSO data

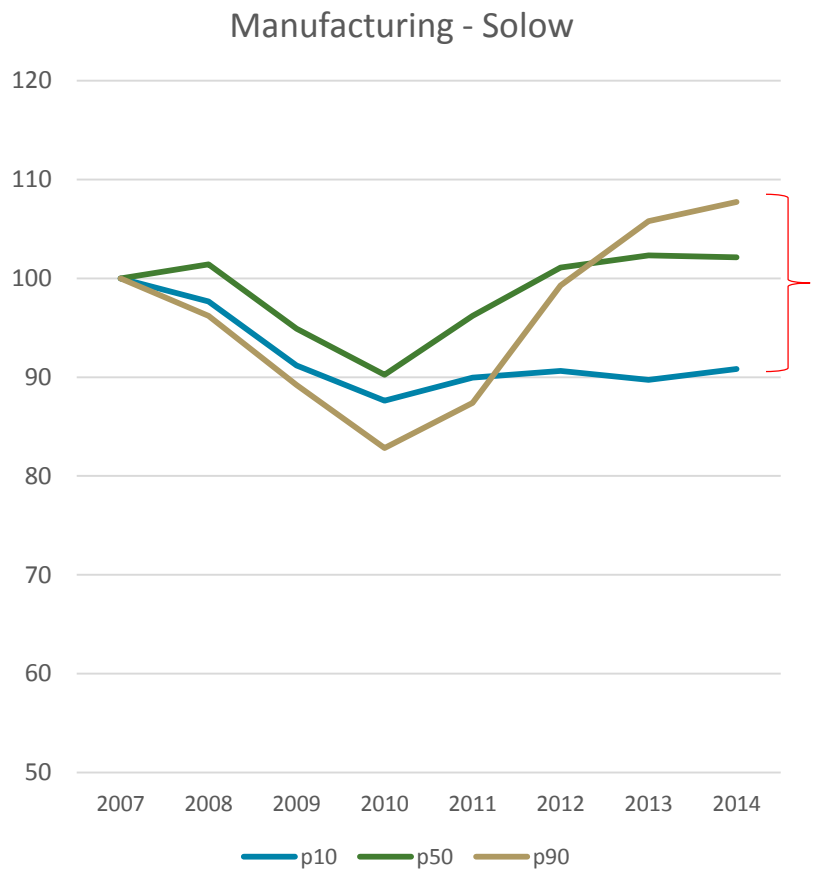
Productivity dispersion – labour productivity

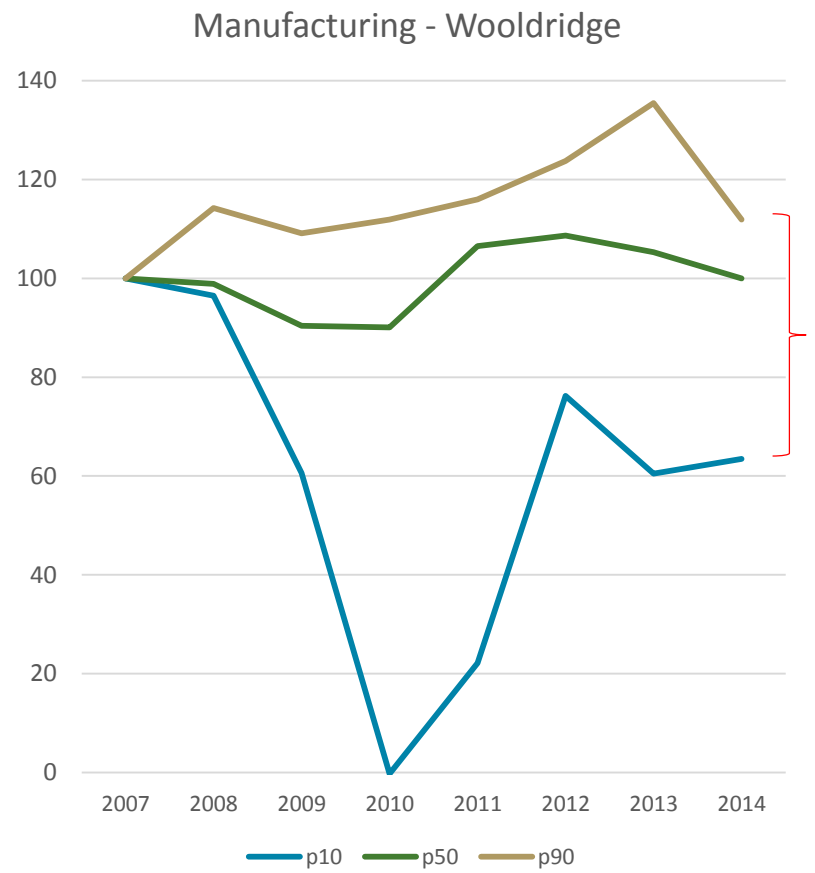




Source: MultiProd on the basis of CSO data

Productivity dispersion – MFP Solow & Wooldridge





Productivity dispersion – by country

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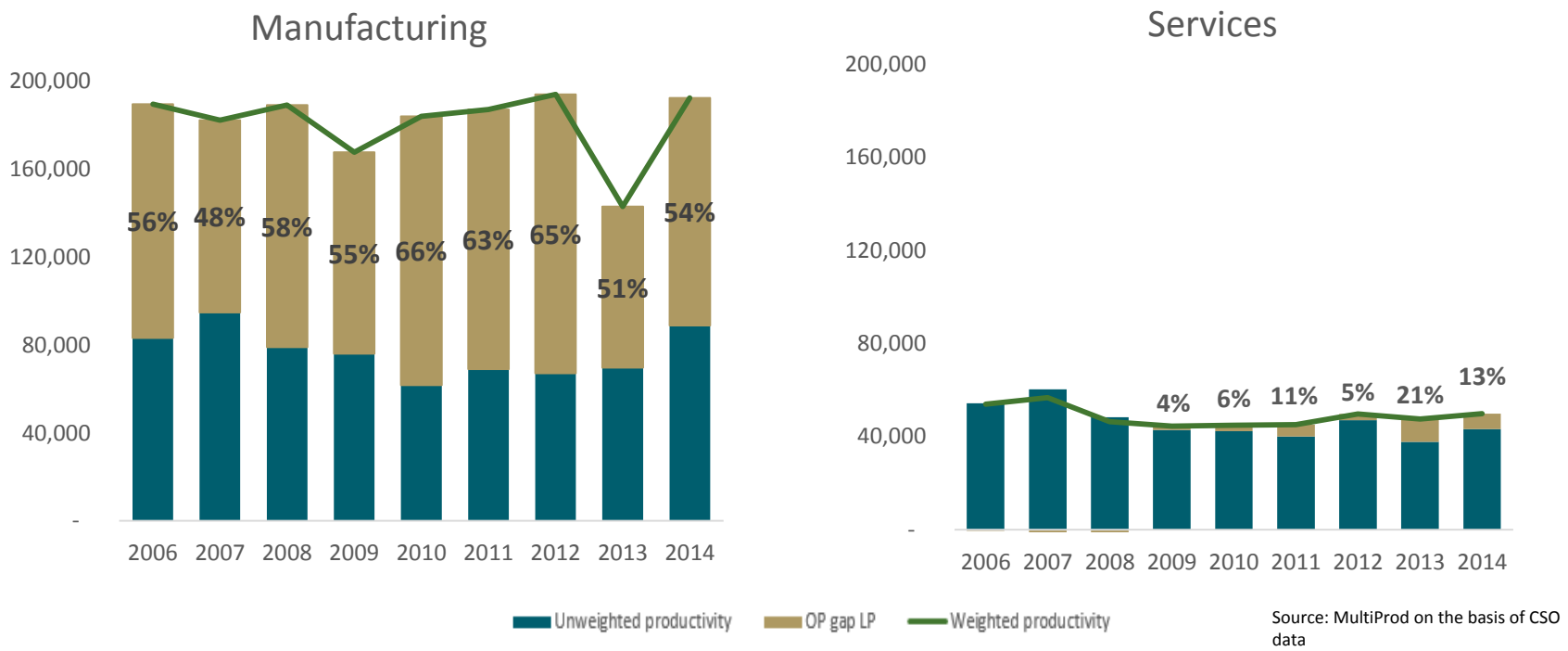
Country *2011*	(Labour Productivity) p90-p10 ratio	
	Manufacturing	Services
Australia	6.7	7.8
Austria	7.1	11.2
Belgium	5.0	5.7
Chile	20.1	34.1
Denmark	4.3	7.1
Finland	3.2	4.0
France	3.9	6.1
Hungary	16.3	26.8
Indonesia	22.4	-
Italy	5.3	7.5
Japan	3.5	4.0
Netherlands	7.4	19.7
New Zealand	6.3	8.1
Norway	5.6	8.8
Portugal	6.6	14.2
Sweden	4.3	6.4
OECD (MultiProd)	***6.6***	***9.2***
Ireland	**7.7**	**9.3**
Ireland (95-10)	**9.8**	**14.1**

Source: MultiProd on the basis of CSO data

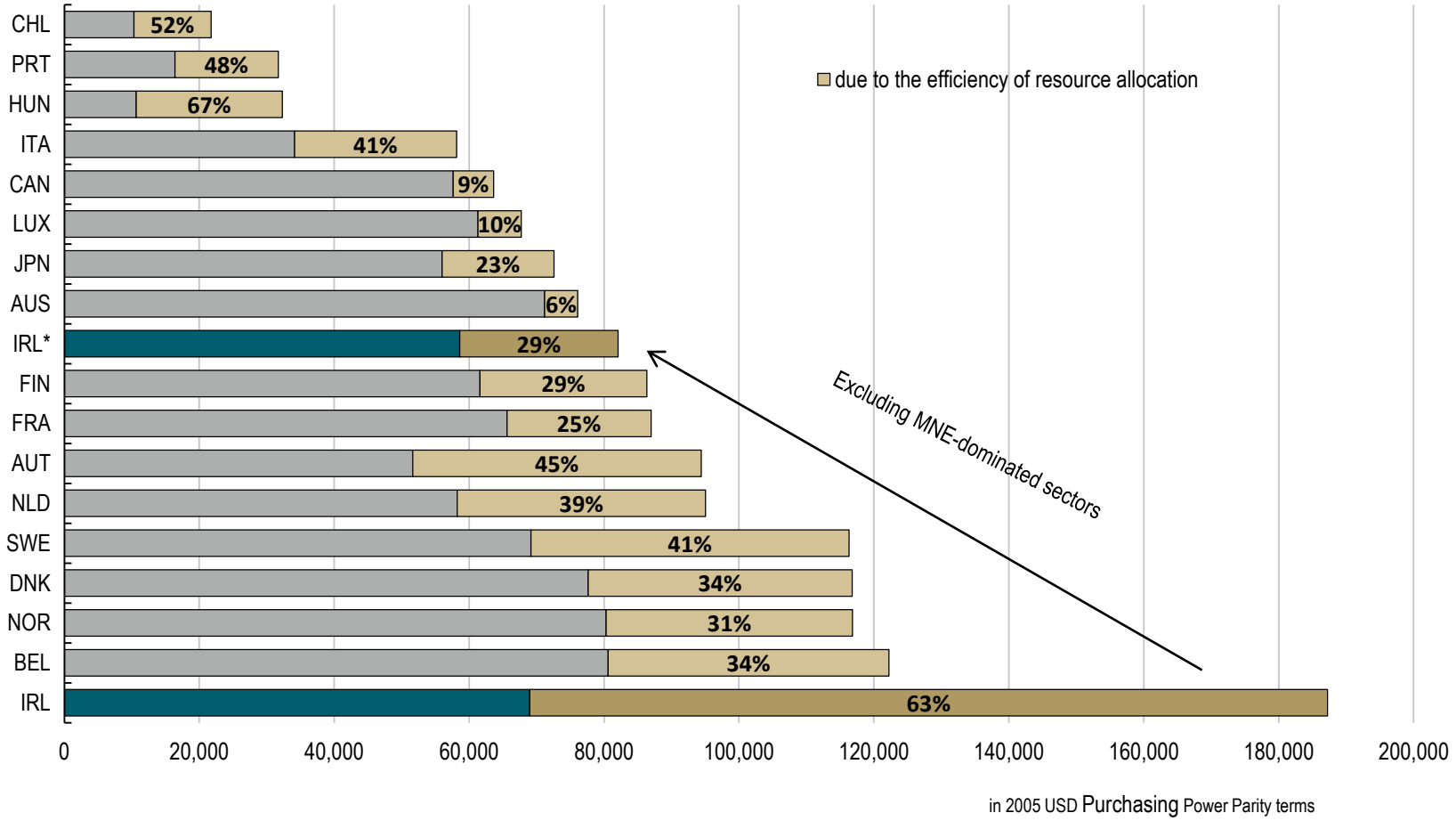
Efficiency of Resource Allocation – Olley Pakes Method



Source: MultiProd on the basis of CSO data

- Aggregate productivity is the weighted average of firm productivity
- Can be decomposed into unweighted firm average, and the covariance between productivity and size
- The Covariance term is known as the Olley-Pakes (OP) gap and measures efficiency in the allocation of resources

Efficiency of Resource Allocation – cross country results 2011



Resource allocation – dynamic OP decomposition

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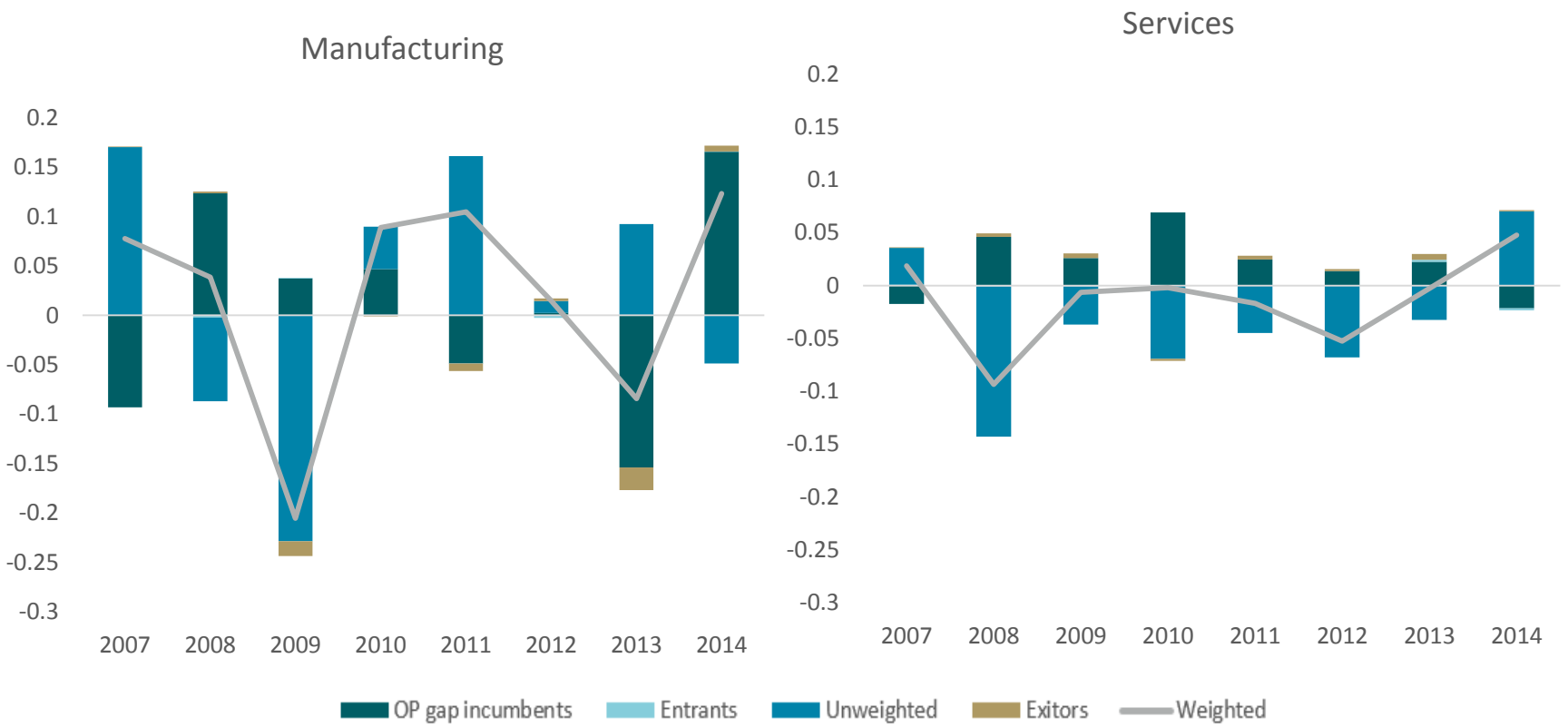

Source: MultiProd on the basis of CSO data

- $\Delta Weighted\ prod. = \Delta Unweighted\ prod. + \Delta OP\ gap + Entrants\ contrib. + Exitors\ contrib.$
- Very small contribution to productivity growth from entrants and exitors
- "Cleansing effect" from crisis evident

Conclusions

- Aggregate productivity levels comparatively high, but growth rate declining
- Skewed distributions
  - Large firms dominate value add and employment
  - Most productive firms dominate aggregate productivity
  - Large foreign firm productivity premium
- Productivity dispersion (i.e. ‘the gap’) is widening
- Efficiency of resource allocation driven by foreign firms (in specific sectors)
  - Efficient allocation of resources among non-MNE firms important for living standards

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