

# 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

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

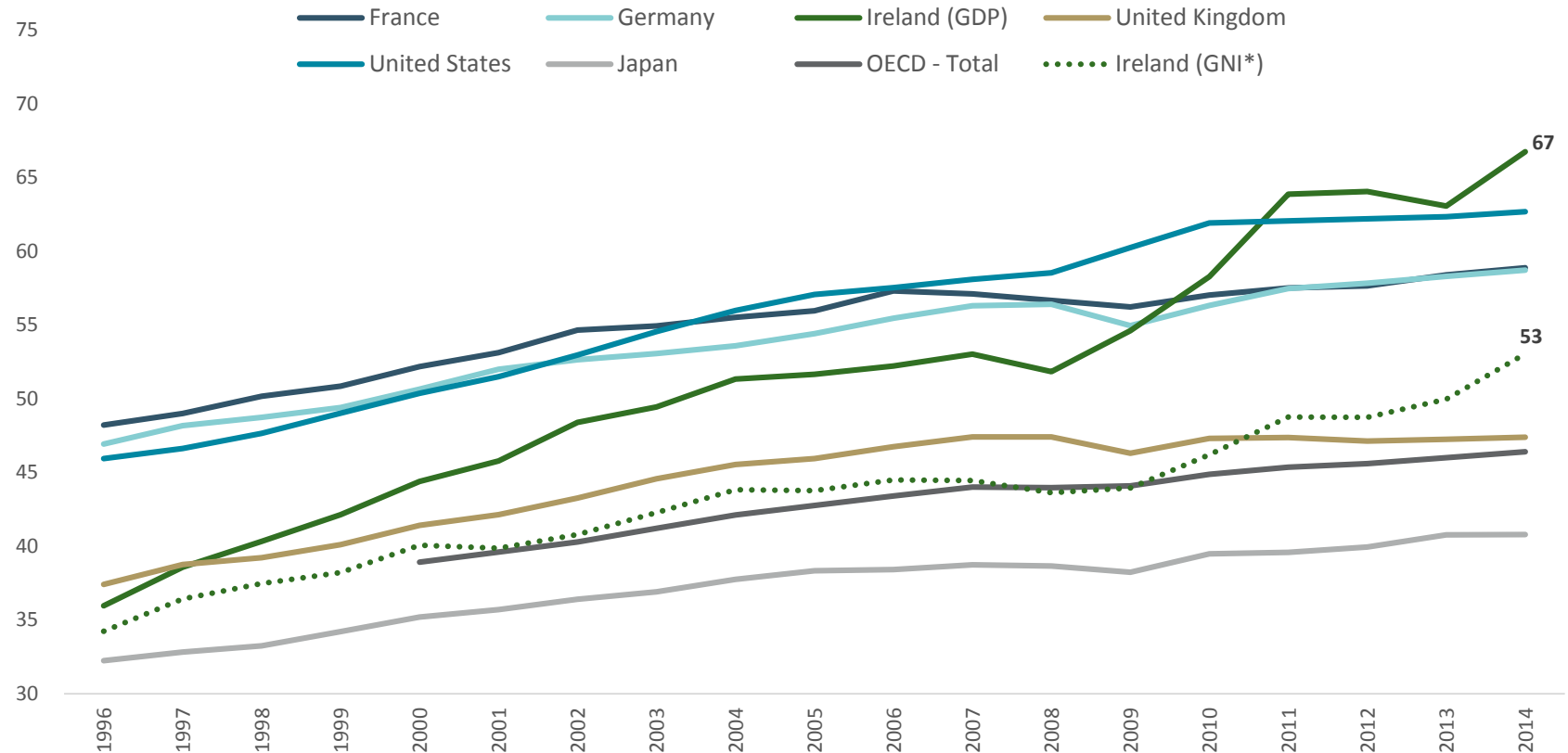


Source: Conference Board Total Economy Database



# High level of labour productivity

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

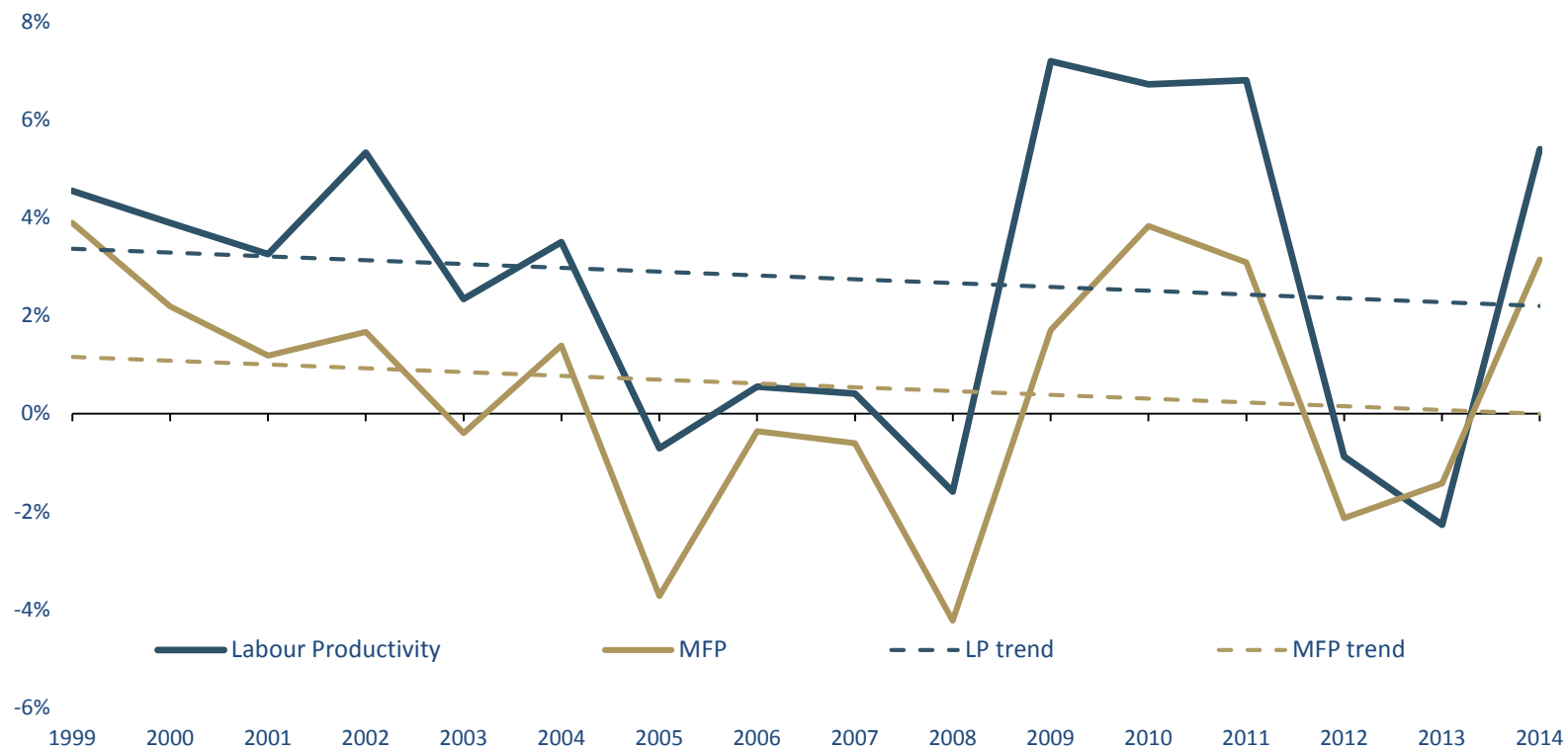


Source: OECD



# Decline in growth rate

## Year-on-year productivity growth in Ireland



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:  $MFP = GO - \beta_K K - \beta_L L - \beta_I I$ 
    - 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<sup>th</sup>, 50<sup>th</sup>, 90<sup>th</sup>), age, size, ownership
- Various measures of the efficiency of resource allocation
  - Measures strength of relationship between firm-size and productivity



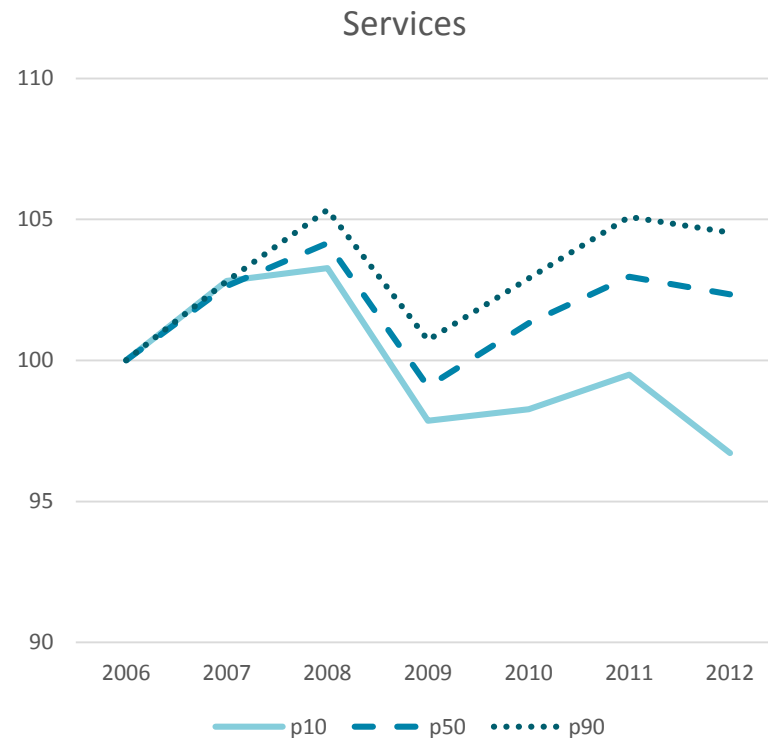
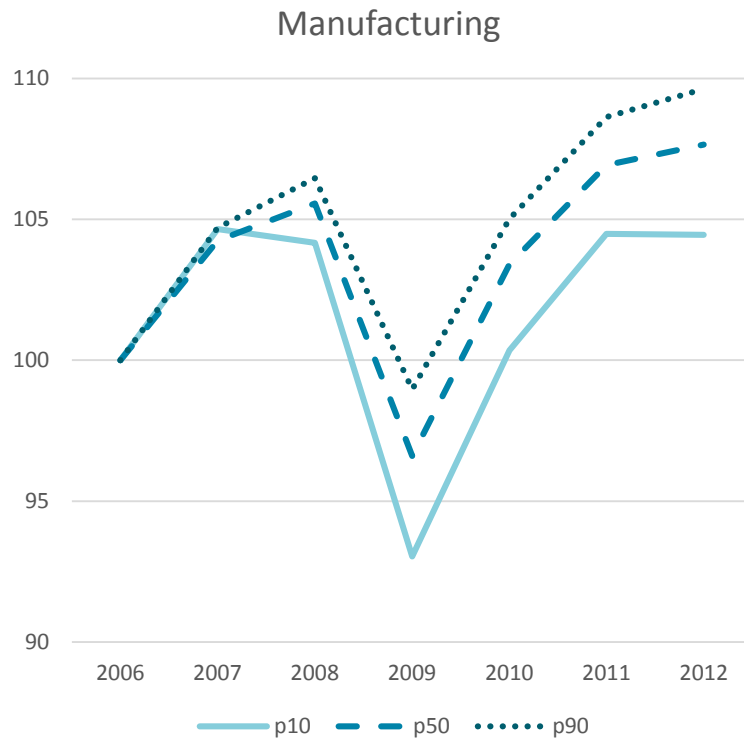


# Data

- **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



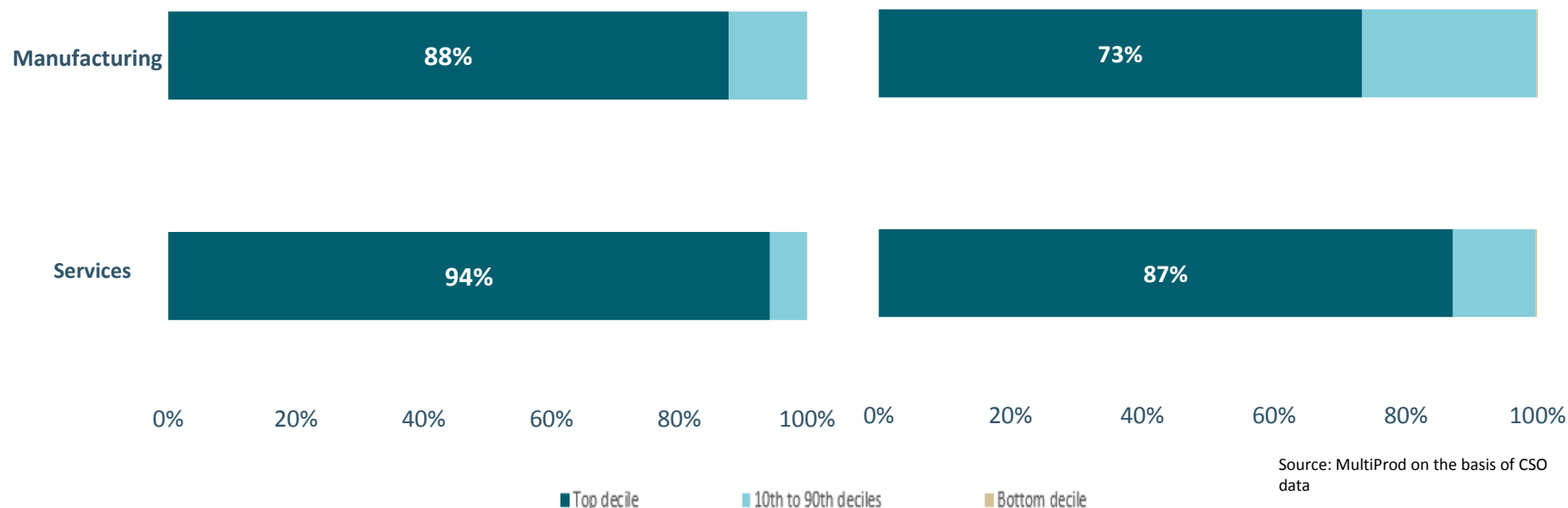
## MultiProd Results for Ireland (2006-2014)



# Granularity – the contribution of largest firms (1)

Share of VA by sales quantile

Share of Employment by sales quantile



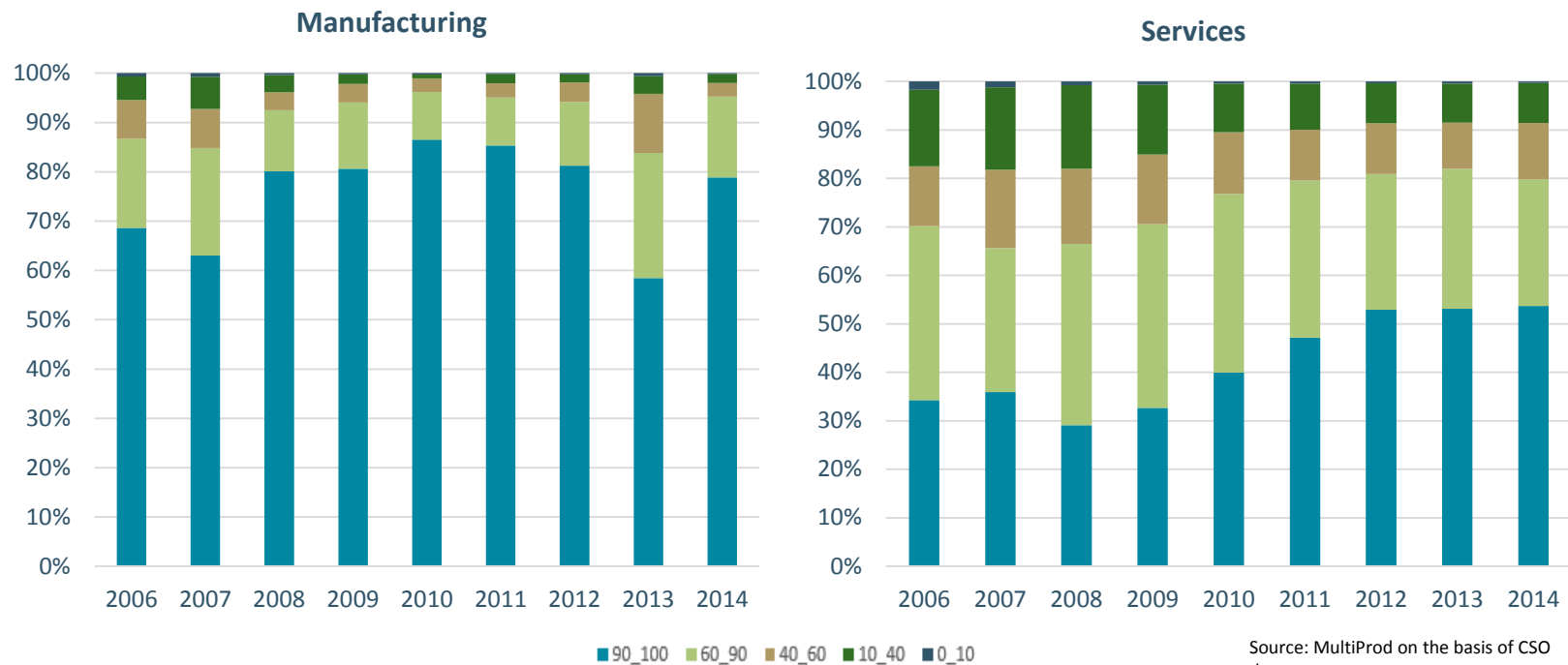
Source: MultiProd on the basis of CSO data

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

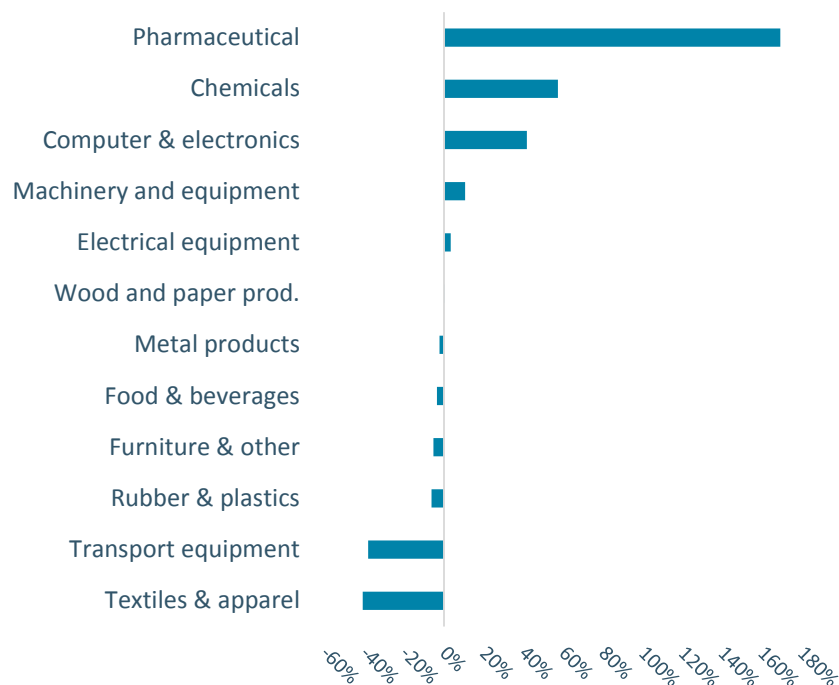


- Most productive firms in manufacturing account for 70 percent of aggregate productivity on average over 2006-2014
- 40 percent (on average) in services, although growing over the period

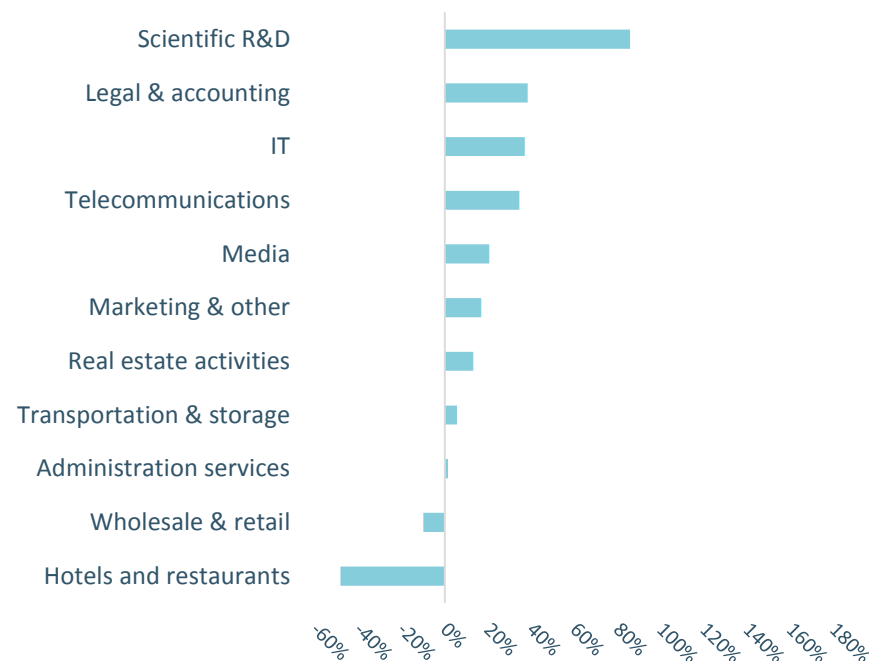


# Labour productivity distribution – across sectors

Manufacturing sectors



Services sectors



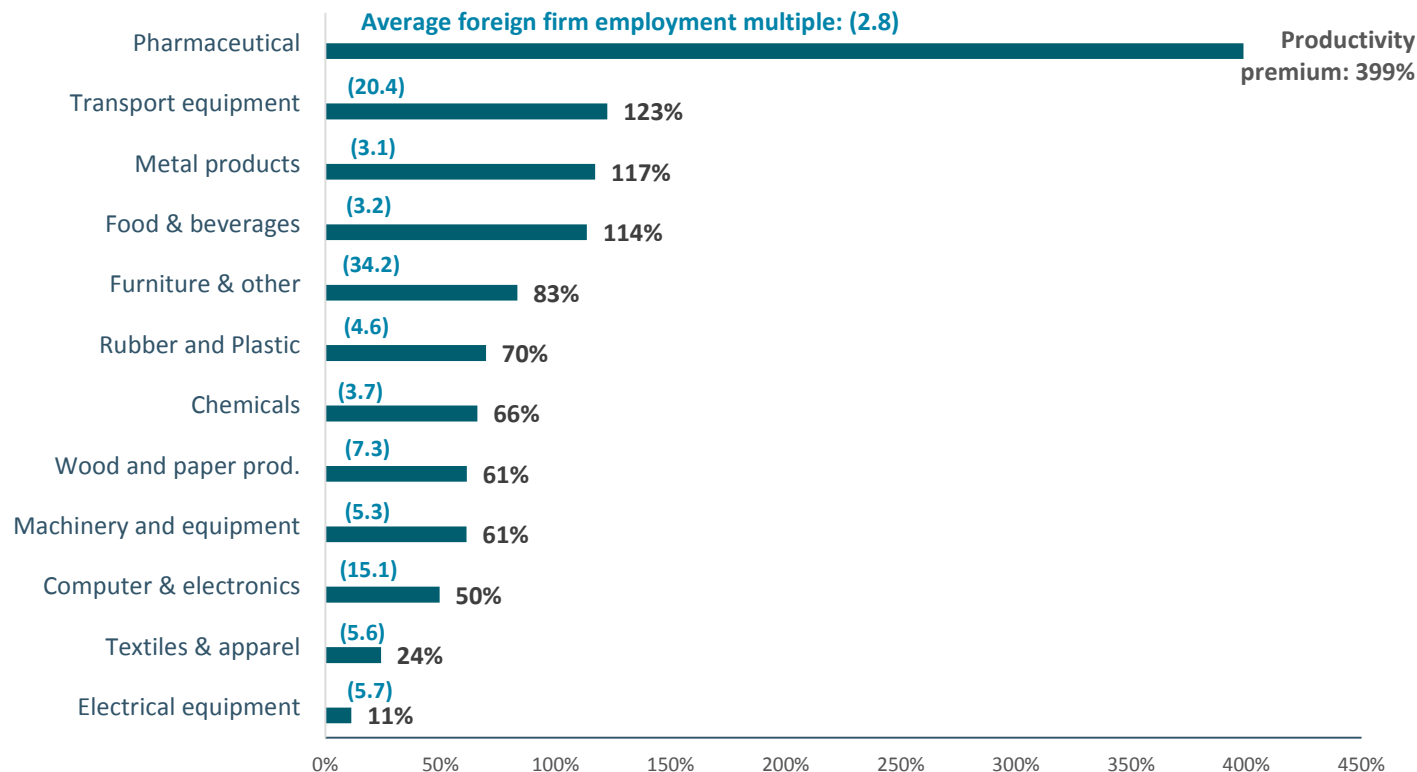
Source: MultiProd on the basis of CSO data

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



# Foreign firm Labour productivity and employment premium

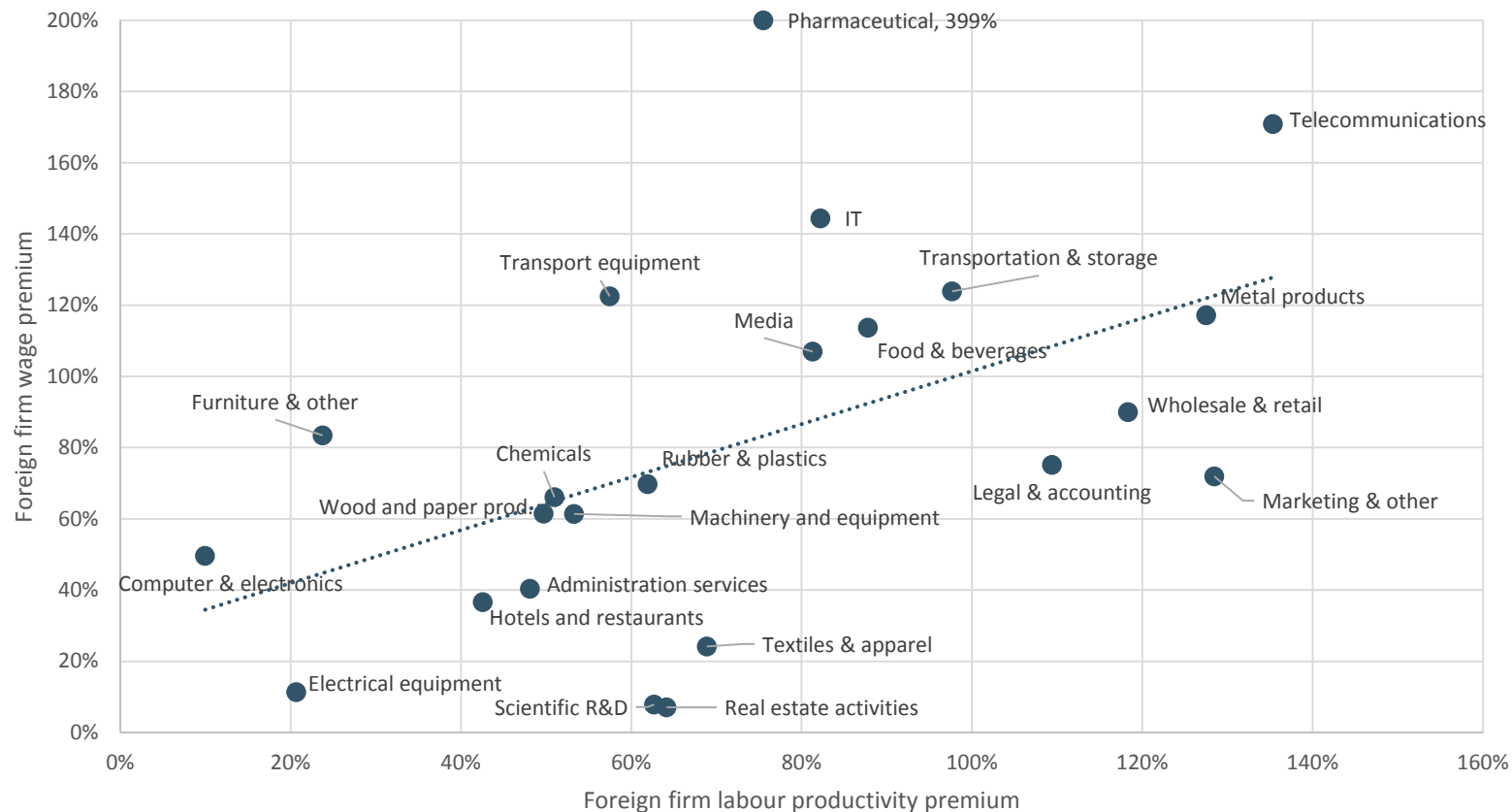
## Manufacturing 2014



Source: MultiProd on the basis of CSO data



## Foreign firm Labour productivity and wage premium

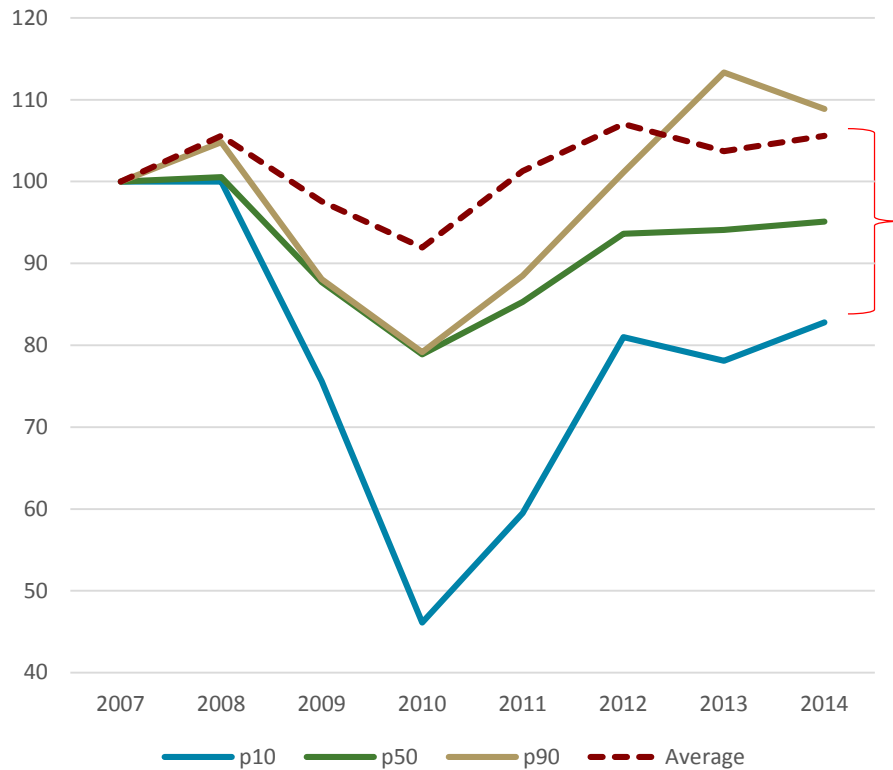


Source: MultiProd on the basis of CSO data

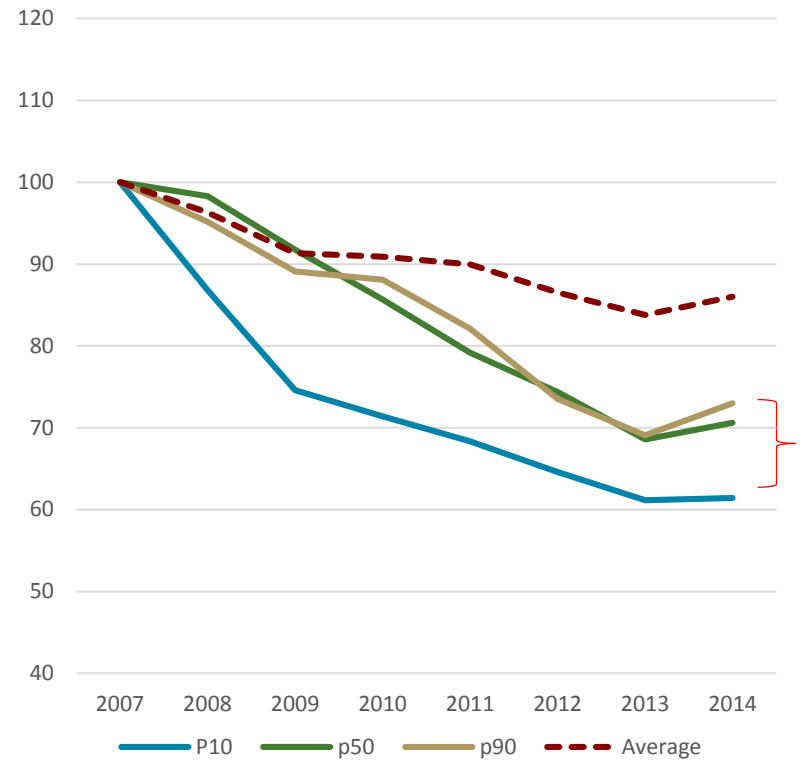


# Productivity dispersion – labour productivity

## Manufacturing



## Services



Source: MultiProd on the basis of CSO data

# Productivity dispersion – by country

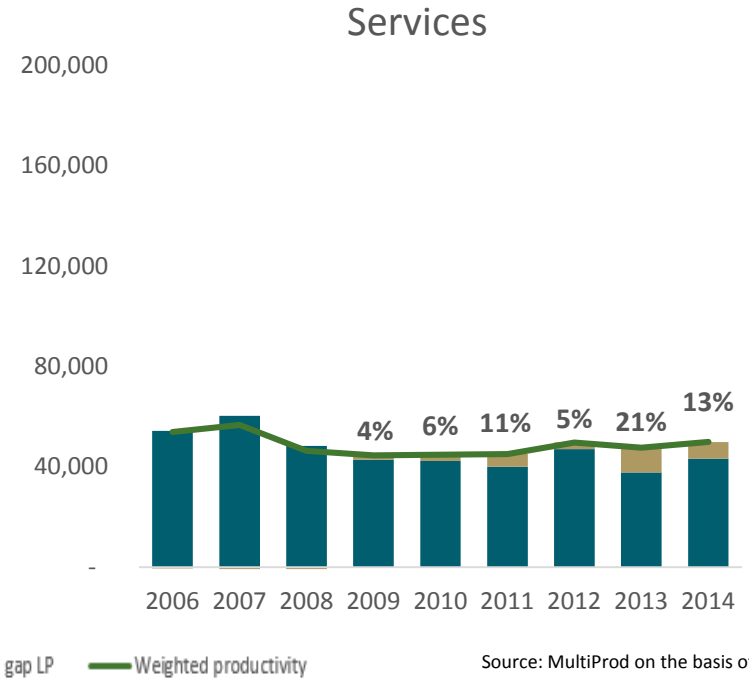
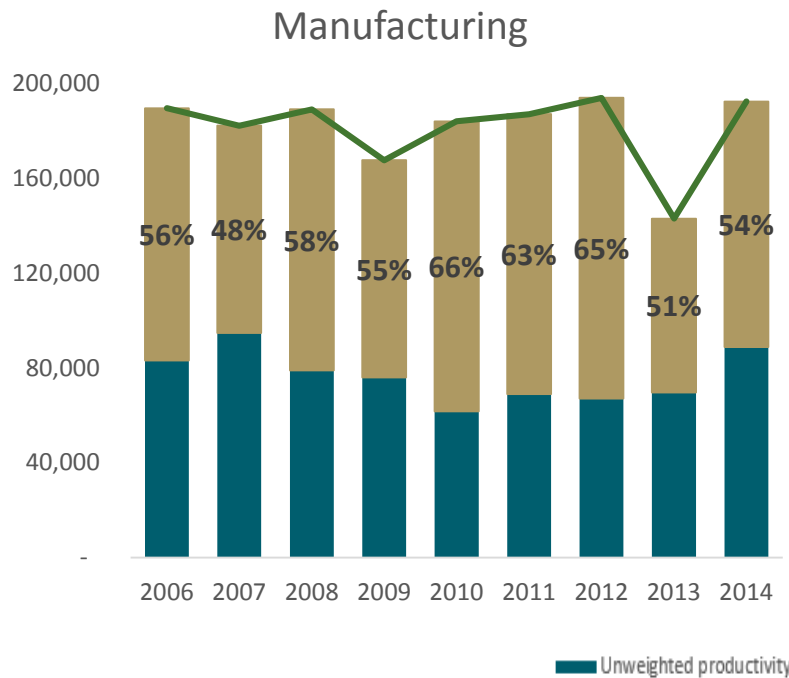


Country 2011	(Labour Productivity) p90-p10 ratio	
	Manufacturing	Services
Australia	6.7	7.8
Austria	7.1	11.2
Belgium	5.0	5.7
<b>Chile</b>	<b>20.1</b>	<b>34.1</b>
Denmark	4.3	7.1
<b>Finland</b>	<b>3.2</b>	<b>4.0</b>
France	3.9	6.1
Hungary	16.3	26.8
<b>Indonesia</b>	<b>22.4</b>	-
Italy	5.3	7.5
Japan	3.5	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
<b>OECD (MultiProd)</b>	<b>6.6</b>	<b>9.2</b>
<b>Ireland</b>	<b>7.7</b>	<b>9.3</b>
<b>Ireland (95-10)</b>	<b>9.8</b>	<b>14.1</b>

Source: MultiProd on the basis of CSO data



# Efficiency of Resource Allocation – Olley Pakes Method

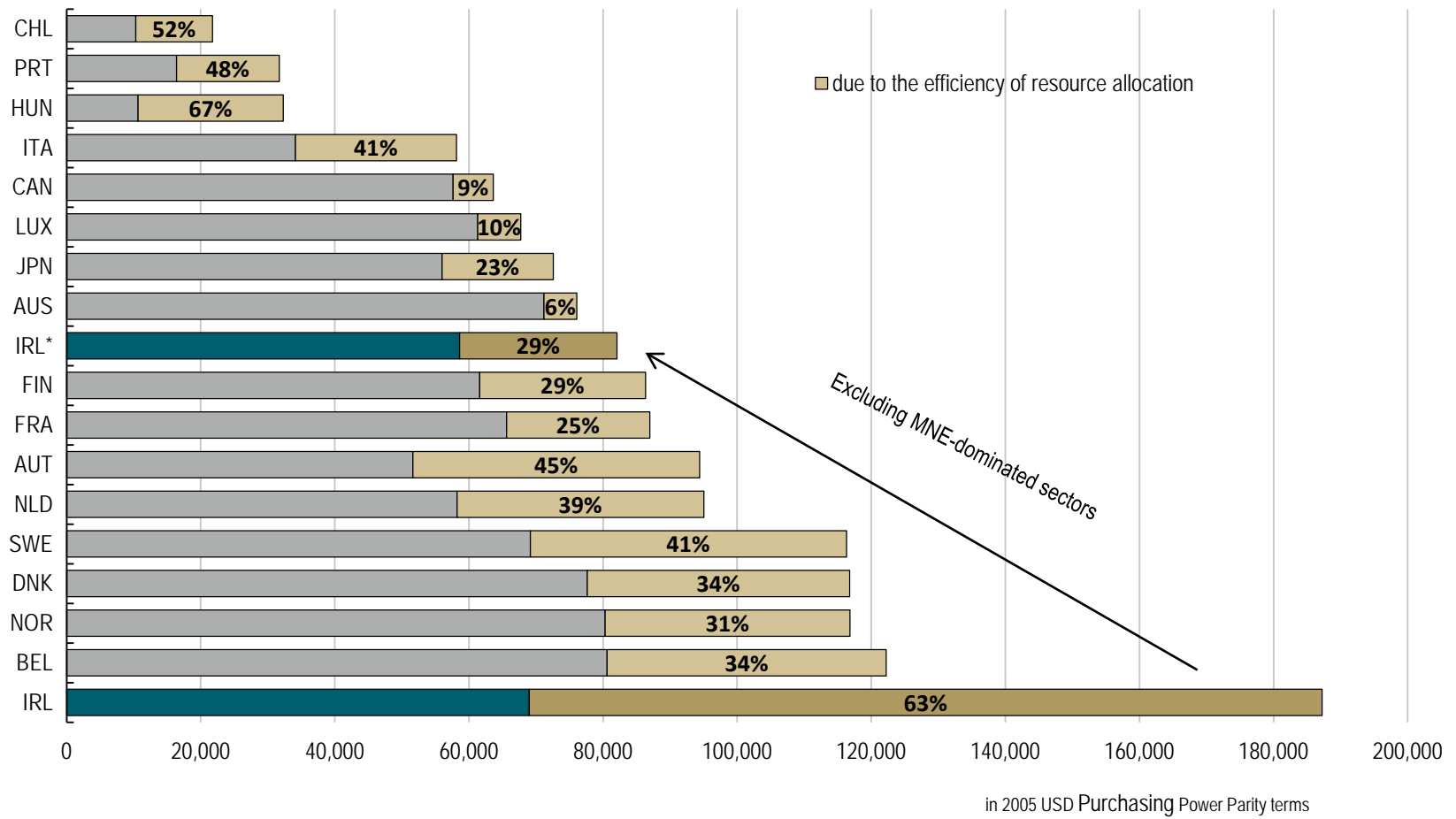


Source: MultiProd on the basis of CSO data

- 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





# 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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