Institute of World Economics
Centre for Economic and Regional Studies

INDUSTRY 4.0 AND HUNGARY

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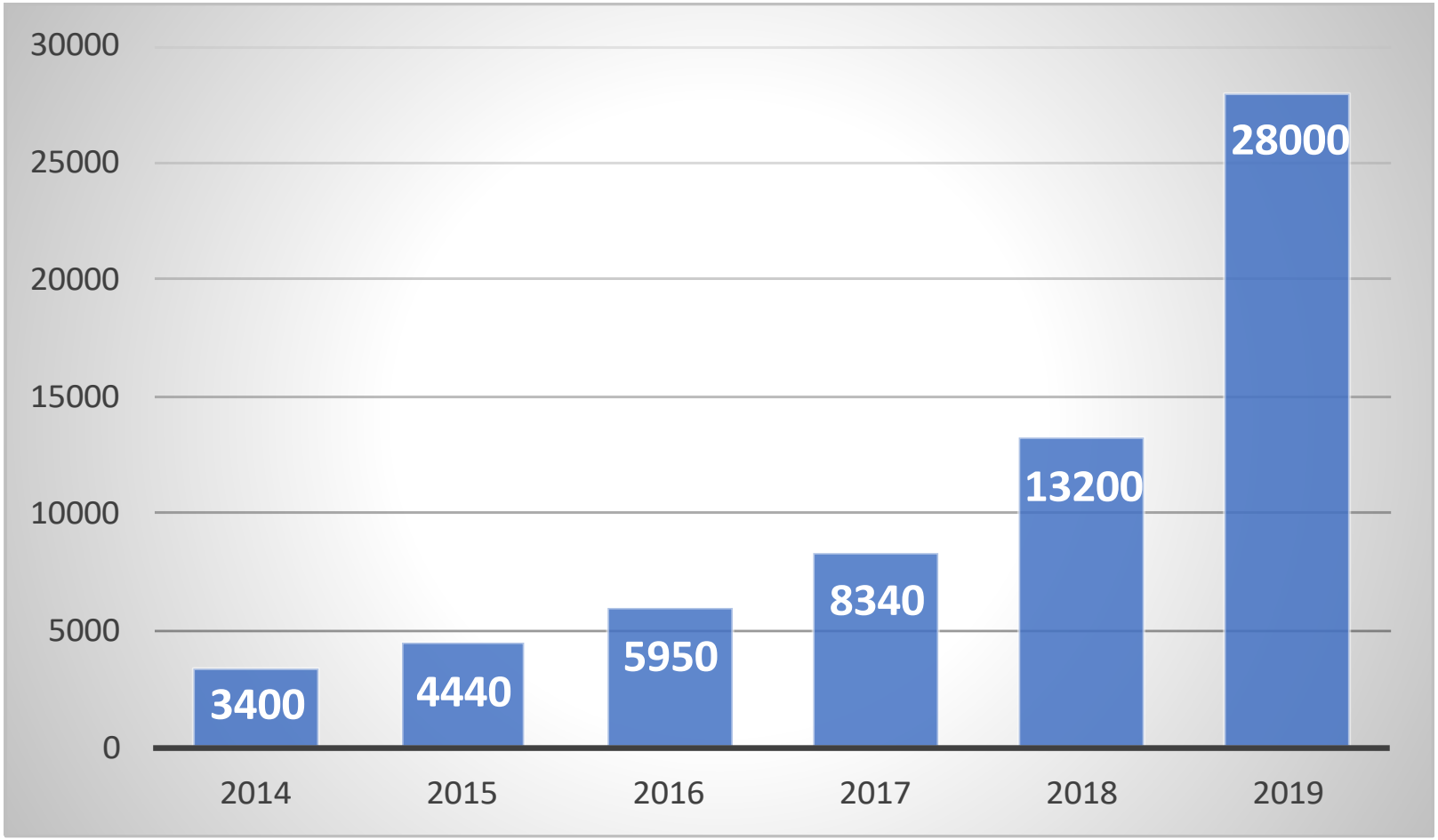
„Effects of Industry 4.0…" (V4) Workshop, Warsaw, 4 February, 2020.

Internet search results for „Ipar 4.0” (Hu. name)



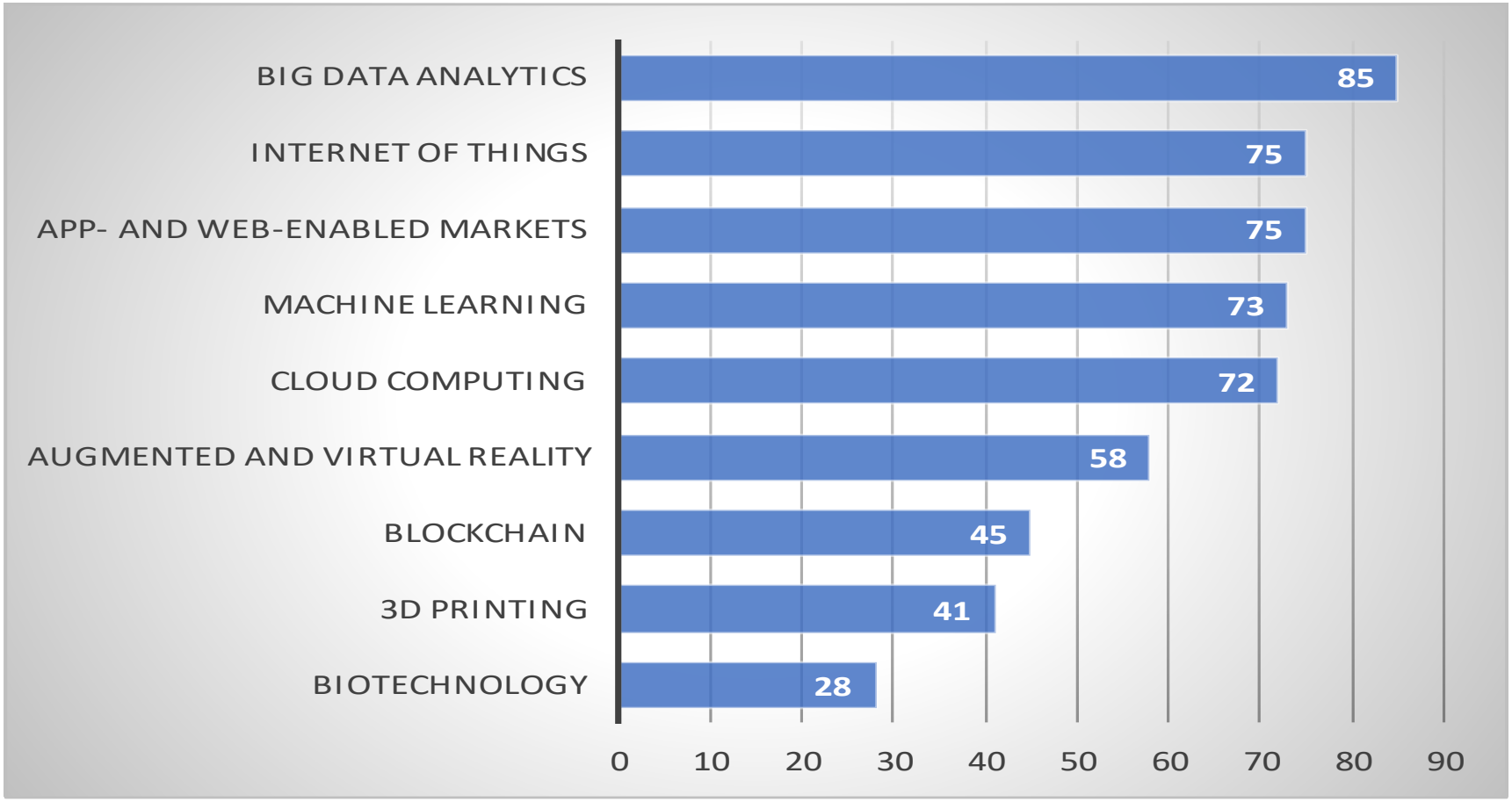
Source: Google

What is Industry 4.0?

- Origin (Hannover fair, 2011)
- Areas – nine pillars
  (Rüßmann et al., 2015)
  - robots, automation
  - internet of things (sensors)
  - big data
  - additive manufacturing (3D printing)
  - augmented reality (virtual repair + training)
  - simulation (3D virtual models)
  - cloud (machine data uploaded, shared across sites)
  - system integration (cross companies)
  - cybersecurity

Constant changes, integrated systems, connectedness

Technologies firms likely to adopt by 2022, %

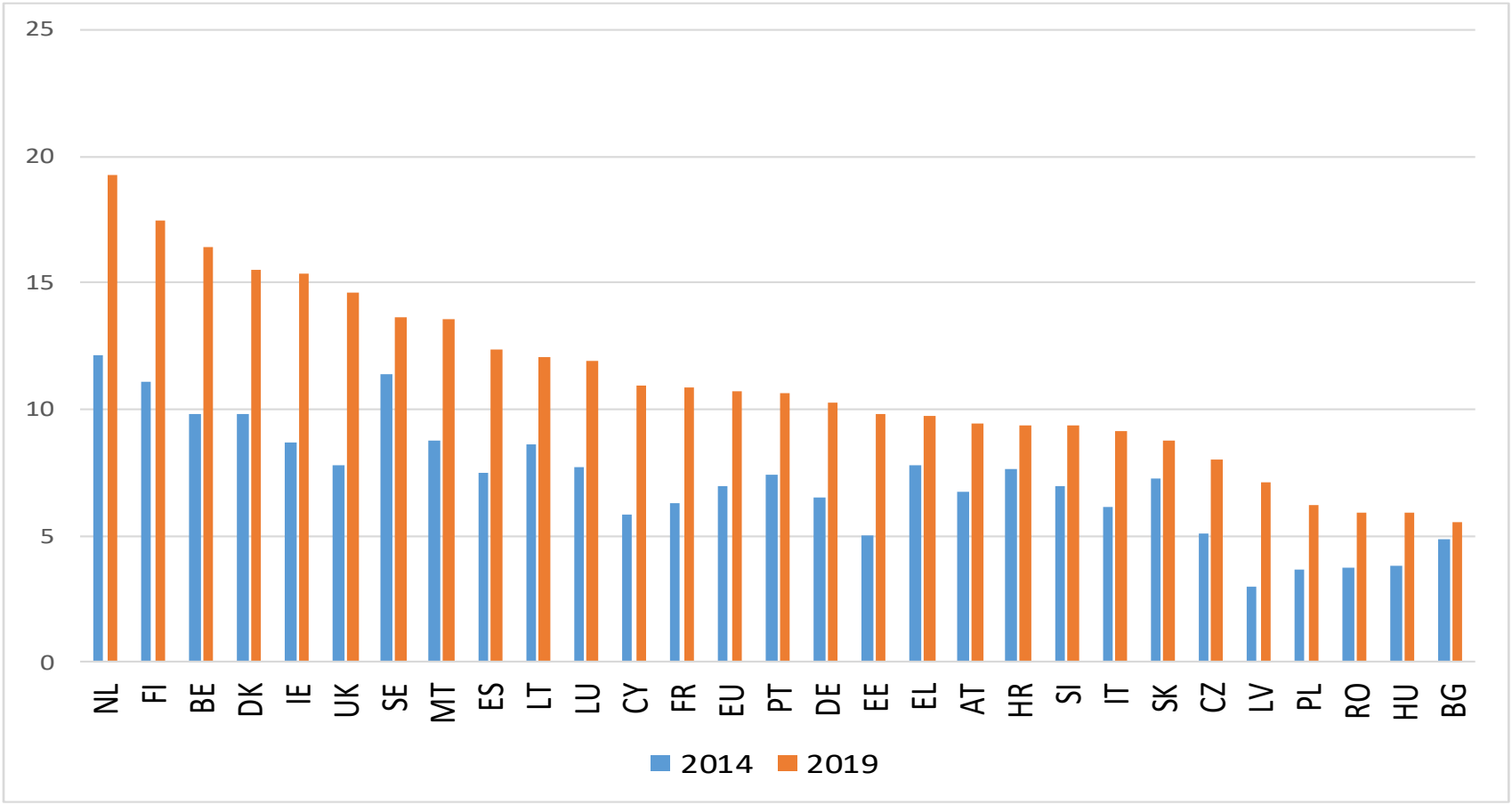


Source: The Future of Jobs Report, 2018 (WEF, sample: 313 firms with 15 million employees)

Policy tools in Hungary

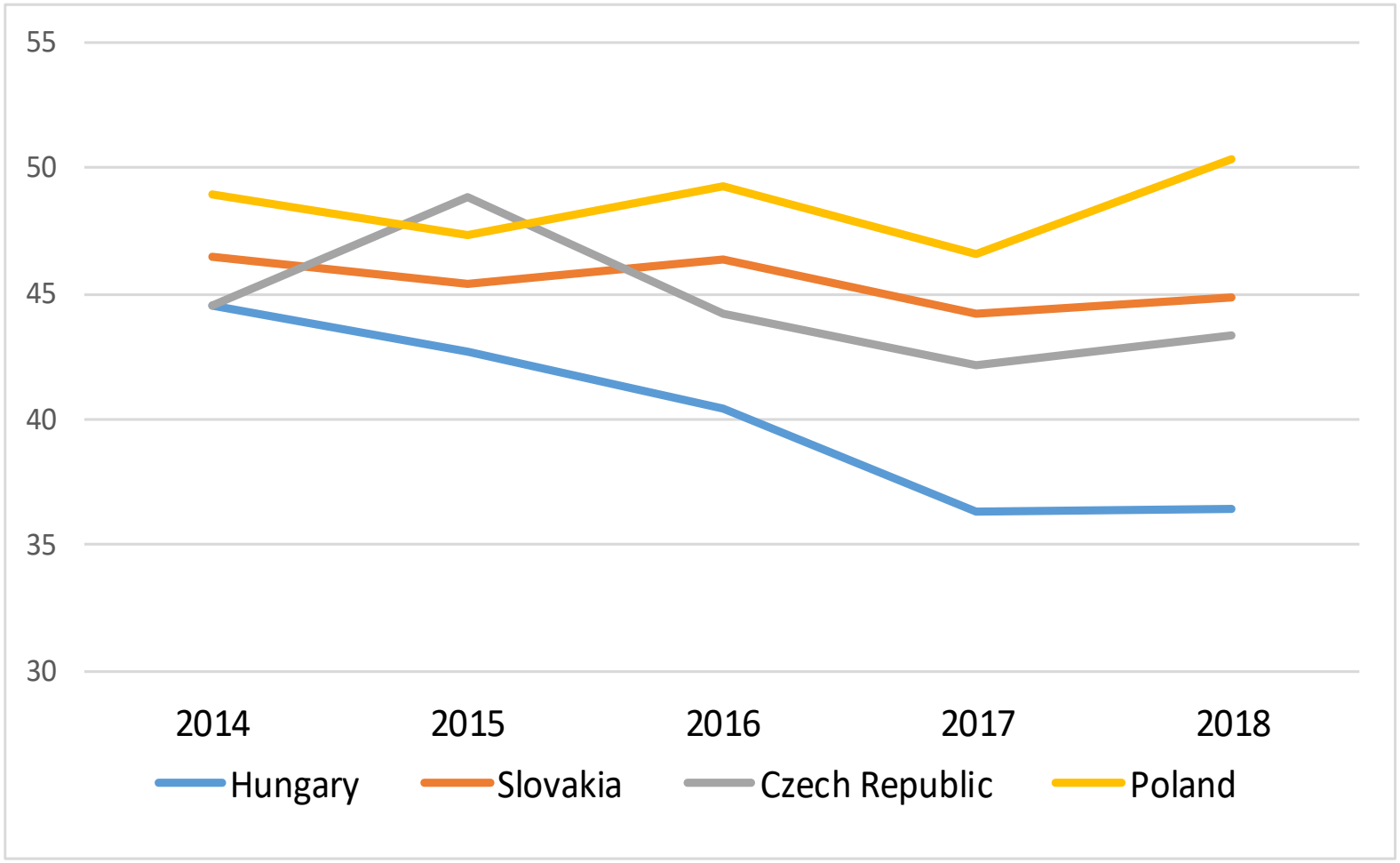
- *Industry 4.0 National Technology Platform Association*: since 2016, more than 100 actors, seven work groups: – strategic planning, – education and training,– production and logistics,– information and communication technologies – industry 4.0 cyber physical sample applications,– innovation and business model,– legal regulation
- *IVSZ:* since 1991 represents the interests of the Hungarian ICT sector, has around 450 member companies. Sample factories.
- *Digital Wellbeing Program*: since 2015, digital strategies (education, startup, fintech, export, etc). In 2017 extended to further areas.
- AI Coalition, 2019, AI strategy

Industry 4.0 readiness, Business Digitization index 2014-19



Part of the Digital Economy and Society (DESI) index

Global Entrepreneurship index – Hungary lags behind



Source: Global Entrepreneurship & Development Institute (GEDI)

Effects of I4.0 on companies

- Product upgrading, better quality
- Process upgrading, efficiency, business indicators improved. Integration of systems, changes in organisation, management techniques. Smart decision support.
- Functional upgrading, gradual evolution of local R&D responsibilities of engineers. Intra-firm competition can occur.
- Chain upgrading, new business models. Previously tacit knowledge codification, standardisation, smooth communication and collaboration among geographically distant units.

Szalavetz, 2018, 2019, Nagy, 2018, Losonci-Takács-Demeter, 2019

Hungarian literature, interviews 1

- Nagy (2019): 4 companies already applying I4.0 (3 foreign-owned). Main challenges: data storing and sharing, emloyee training.
- Szalavetz (2017): 8 large foreign-owned firms. Challenges: shop-floor technological problems, labour shortage, increased production complexity and customer requirements.
- Szalavetz (2019b): 16 technology provider firms. Smart decision support systems are the real novelty
- Nagy et al., (2018): 43 firms and four experts. More efficiency, improved cooperation, competitiveness
- Szalavetz (2019): 10 large firms. Digitalisation caused upgrading.

Interviews, surveys 2

- Halmosi (2019): 10 start-ups – 10 SMEs, some differences in I4.0 perception
- Demeter et al., (2019): affiliate of TE Connectivity with 1550 persons. Experience: improving indicators but expensive, need for experts, trust, risky, special know-how.
- Szabó et al., (2019): survey sample 109. Lack of workforce with digital competencies, old leadership style, management culture.
- Losonci et al. (2019): a manufacturing Industry 4.0 index based on 6000 firms' data. Electronics and automotive branches are leaders. Combined with balance sheet data, 213 panel, not significant VA improvement.

Effects on Foreign Direct Investment flows

- Production reorganisation, relocation
- Reshoring (backshoring to home country and nearshoring to a close country)
- Visegrád countries: FDI-dependent (DME model)
  Question: does the application of Industry 4.0 elements enhance reshoring and nearshoring in the Visegrád region?

Reshoring cases concerning V4

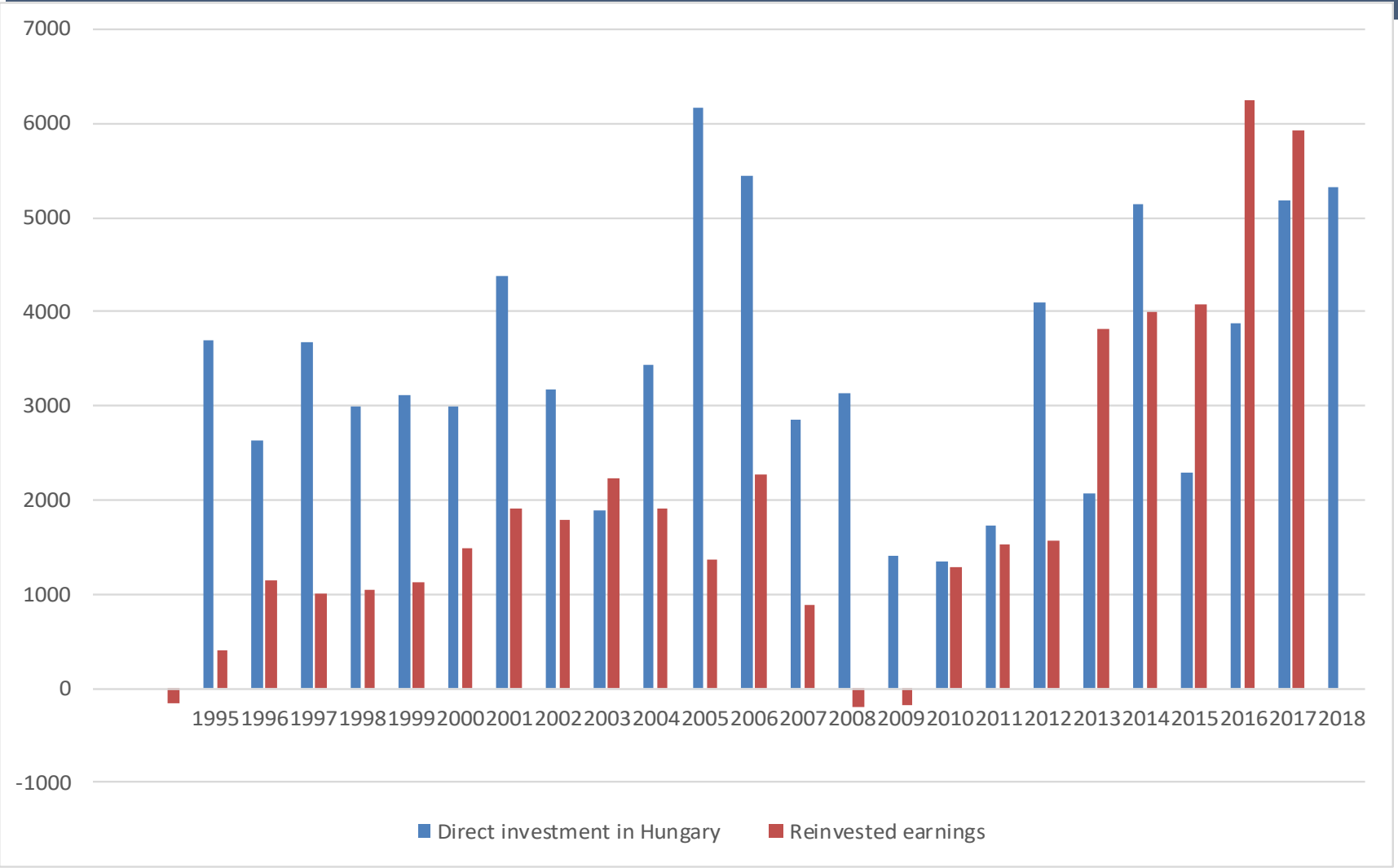
	Backshoring from	Backshoring to	Nearshoring to
No. of cases	15 from Pol 4 from CZ 4 from SK	6 to Pol 1 to SK	4 to Pol 2 to SK 1 to HU
Automation mentioned	9	0	1

Source: *European Reshoring Monitor*, 2014-2018

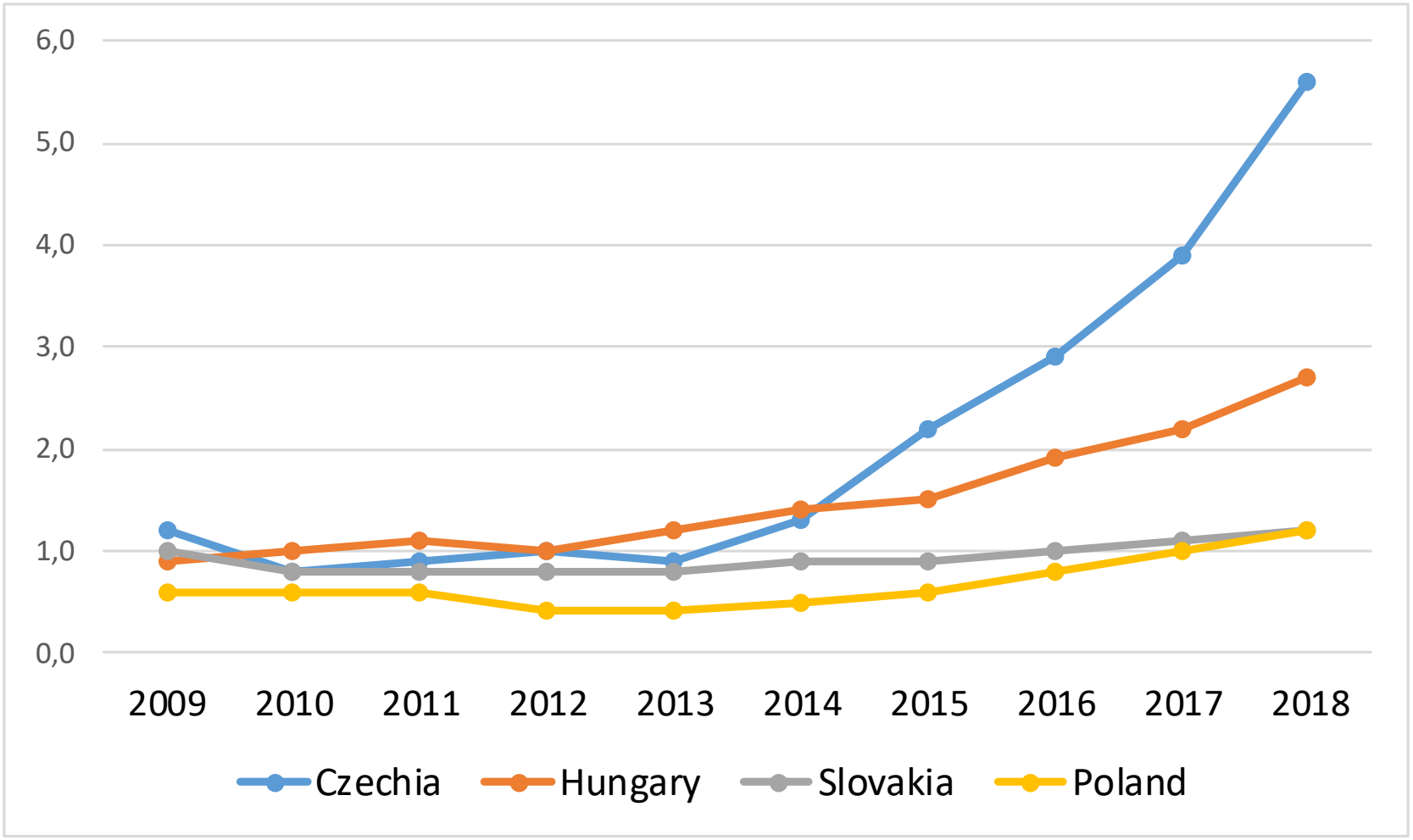
Visegrád location factors

- Favourable geography in Central Europe – important for shortening GVCs, same time zone, lower costs, easier communication
- Policy support in all countries (*Průmysl 4.0 -2016, Smart Slovakia 2015, Morawiecki Plan 2016, Ipar 4.0 Platform 2017*)
- Incentives. Hungarian special Corporate Income Tax rate: 9% – since 2017, lowest in Europe
- New I 4.0 investments: 2018-19: Hanon Systems, Giant, ContiTech, Electrolux
- Two crucial trends: labour shortage and wage increase (productivity increased less or stagnated)

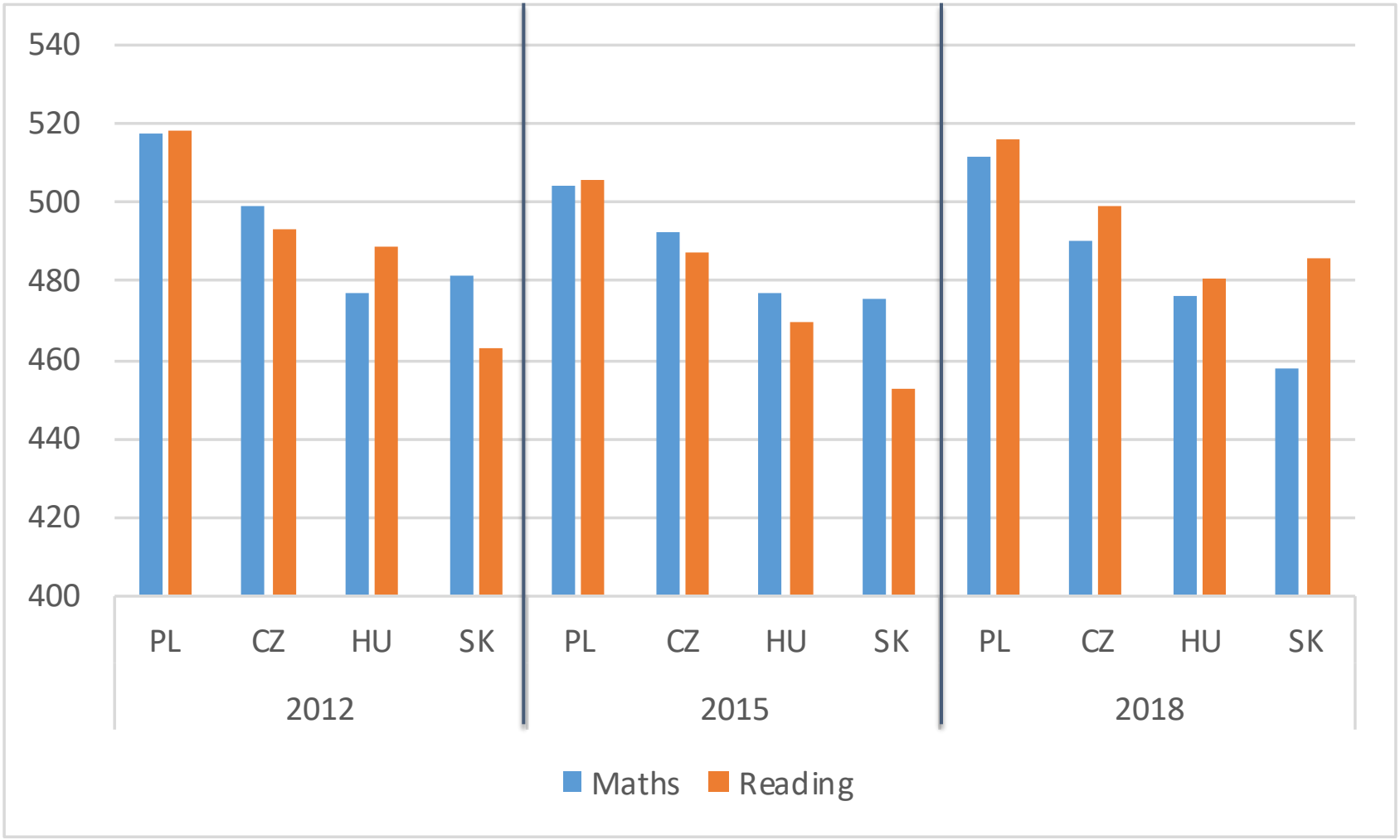
FDI net inflows to HU (cleaned) mn EUR



Job vacancy rate (Eurostat)



PISA score averages, 15 years old



Major conclusions

- Hungary has I4.0 strategies, policies, but not always coordinated
- Foreign-owned companies are far ahead in introducing I4.0
- Those, who introduced it, experienced advantages, improvements but also challenges
- Major probem: skilled labour (shortage and education)