



MINING AND EXTRACTIVE INDUSTRIES: INNOVATION AND LOW DENSITY ECONOMIES

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Castilla y Leon EU Cluster Matchmaking Event



Presentation outline

1. **Challenges and opportunities for innovation in low density regions**
2. Particularities of mining regions
3. Mining value chain and clusters



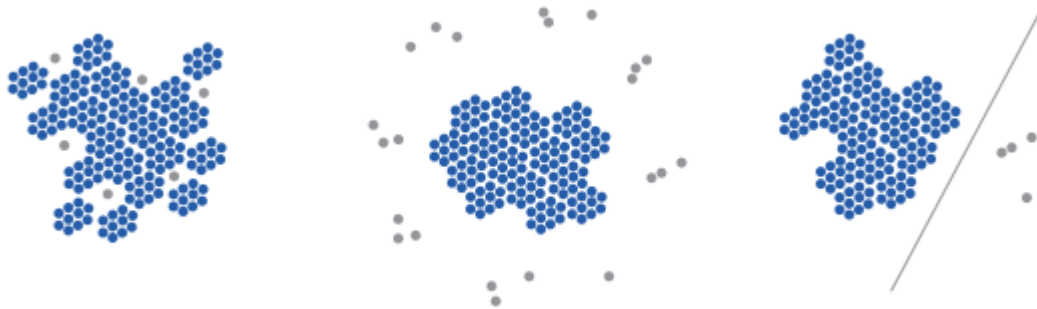
Different types of rural areas

Three types of rural regions

Rural inside
the functional
urban area (FUA)¹

Rural outside but
in close proximity
to the FUA²

Rural is remote
from the FUA³

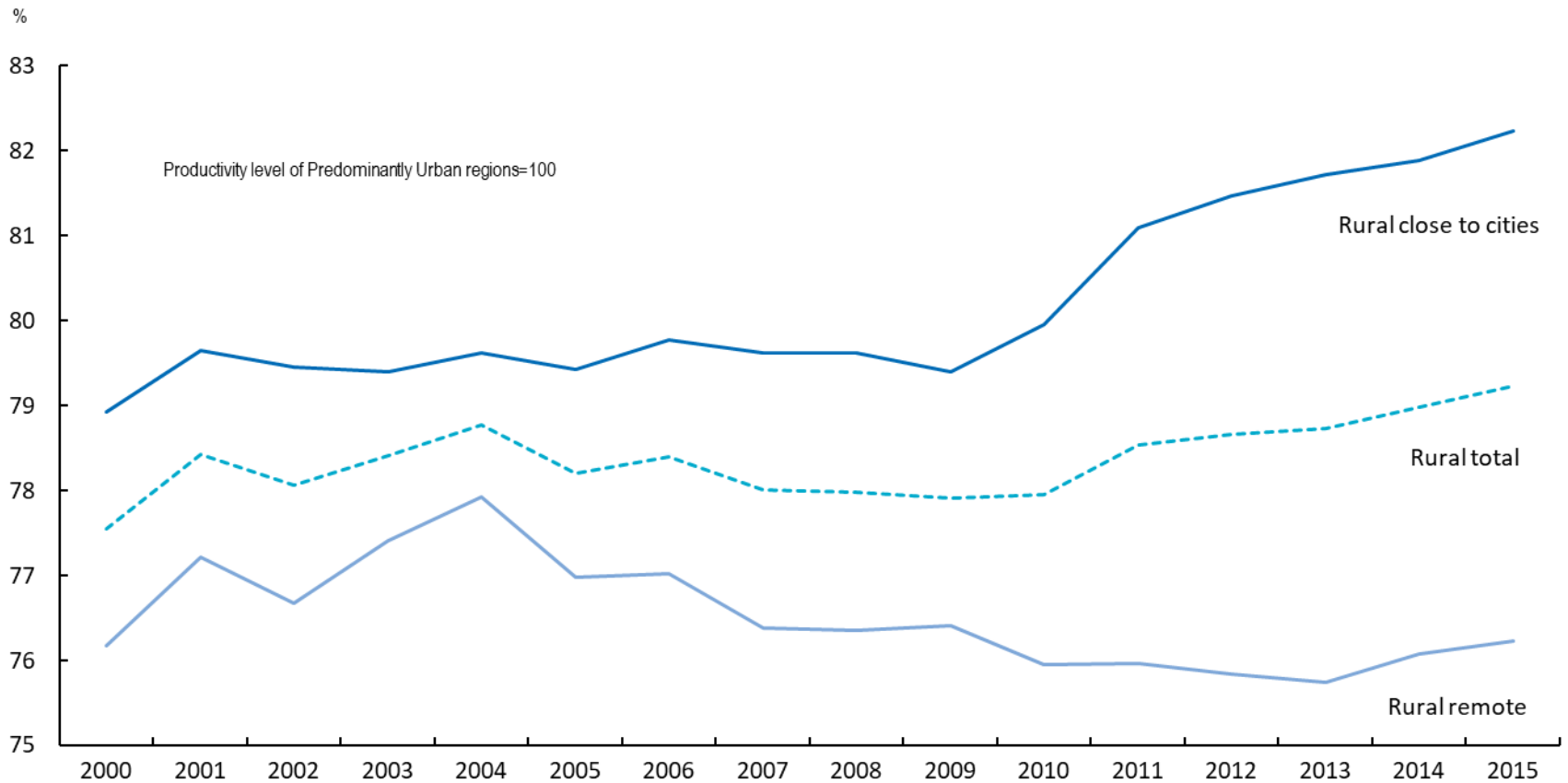


- ❖ **Rural within FUA** – part of the catchment area
 - **Challenges with matching of skills, land use policies, environmental costs**
- ❖ **Rural close to cities** – attract new residents, tend to have good industrial mix
 - **Challenges to balance economic and social diversity and competition for land and landscape**
- ❖ **Rural Remote** – primary activities play a relevant role in the regional economy
 - **Challenges to mobilise areas of absolute advantage, improving provision of essential services**



Convergence forces driven by rural areas close to cities

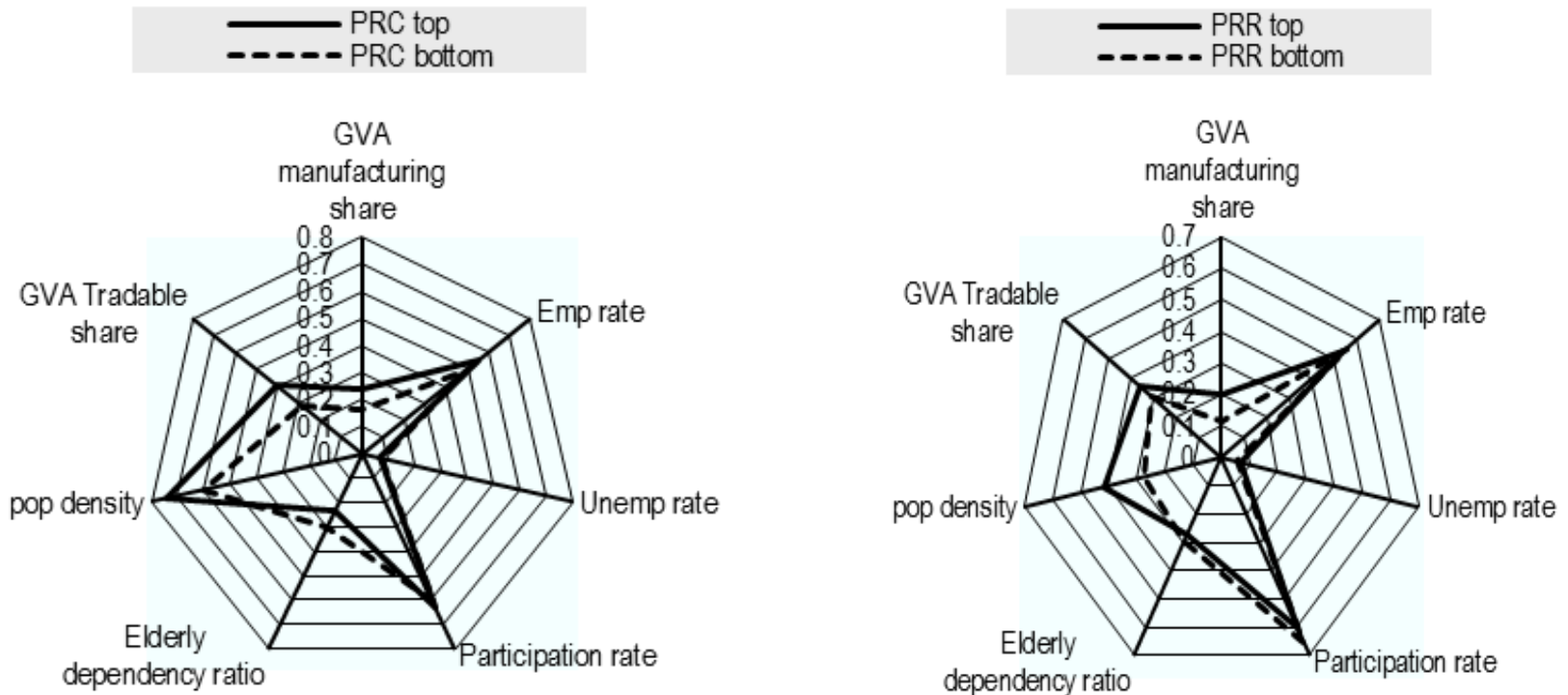
Productivity growth in rural regions, 2000-15 (TL3)





What are the key drivers of productivity growth?

Determinants of productivity growth before the crisis (2000-2008)

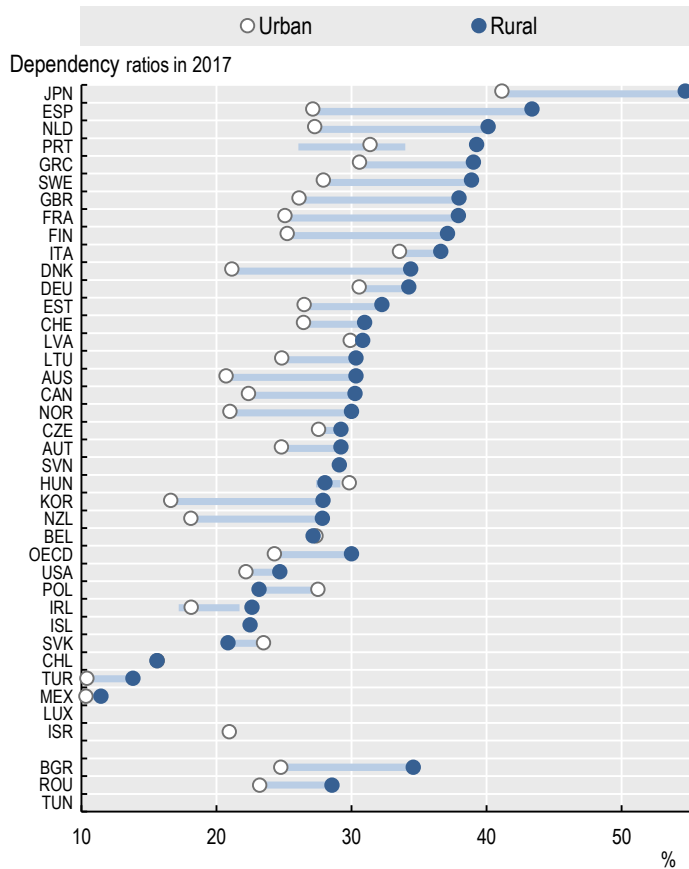


- **Tradable activities** are key for rural close to cities and remote rural
- A minimum level of **density** is key for economies of scale/scope and delivery of goods and services.

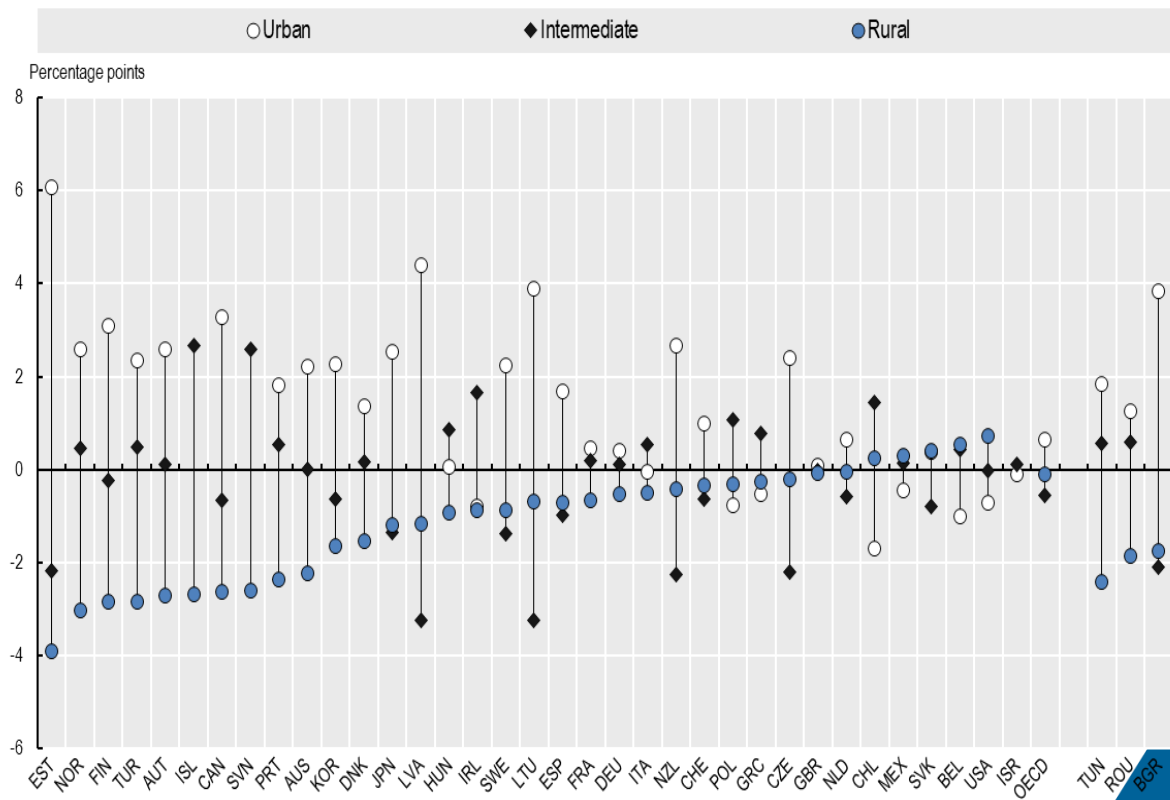


Rural areas face strong demographic challenges.

Elderly dependency ratios by type of region (2017)



Change in the share of population by type of region (TL3) from 2000 to 2017





Low density/ remote economies

Low density/ remote economies face a number of challenges:

- Relative **smaller population** and labour force (**narrow range of skills**)
- Small local markets that offer a **limited set of goods and services**
- **Weak connections** to external markets
- High **dependence on primary sectors** and first stage processing
- Difficulties in **attracting in-migrants** (domestic or foreign)
- **Demographic decline**
- High cost of **public service delivery**

However, these challenges can be overcome:

- Vertical integration in natural resource based sectors
- Exporting goods and services (to overcome small local market)
- Finding niche areas (e.g. arctic know-how and climate) to achieve minimum efficient scale
- Reducing transport and communication costs (e.g. ICT and broadband)
- Quality of institutions – investment facilitation, labour-market matching, supporting entrepreneurial discovery and innovation

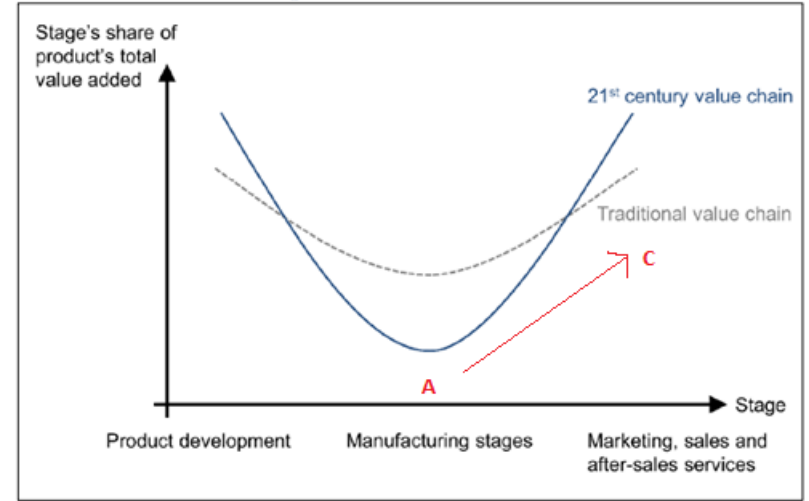
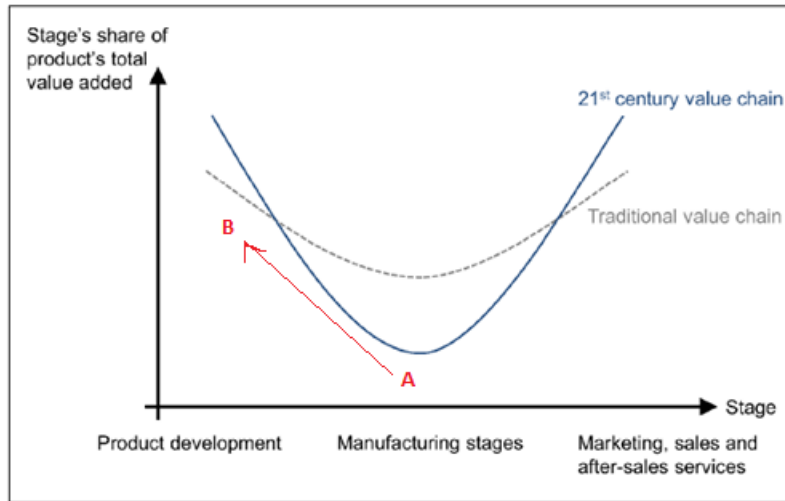


Innovation is not just an urban phenomenon

- **Innovation: new and improved** products, processes, marketing and organisational methods that **increase productivity** and address economic, social and environmental challenges
- **Conventional perspective on innovation:** large scale experimentation (led by R&D) that strategically identify new solutions to major problems – *the linear model*.
- Innovation stems from formal experimentation/innovation systems (R&D, research facilities/ urban) and **combination of tacit and formal knowledge** and creativity (Baumol).
- Successful rural areas have strong ties locally and a number of ties externally (Diffusion and scaling-up local innovations)
- Growth process is not endogenous -- innovation depends upon the actions of **individuals/entrepreneurs** have a great bearing on outcomes



Adding more value in tradable activities



- Differentiation of products
 - Linking local to GVCs
 - Internationalising local firms
 - Improvements in ICT infrastructure
 - Connecting local supply chains to mult. firms
- Retaining more value locally
 - Developing local supply chains
 - Linking demand with labour supply
 - Local procurement frameworks
- Diversification of economic base to address fluctuation in external prices
- Developing support services in community extraction
- Developing a specific know-how



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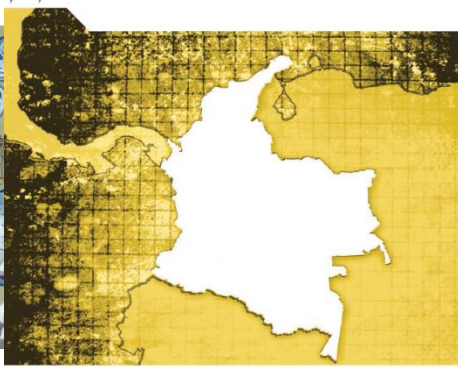
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Regional development in mining/extractive follows specific dynamics

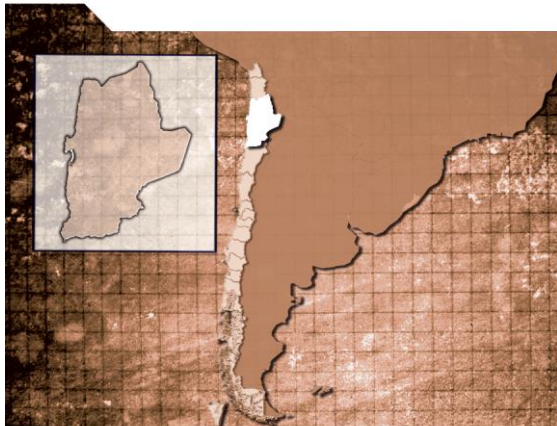
OECD Territorial Reviews
Northern Sparsely Populated
Areas



OECD Territorial Reviews
COLOMBIA



OECD Territorial Reviews
ANTOFAGASTA, CHILE



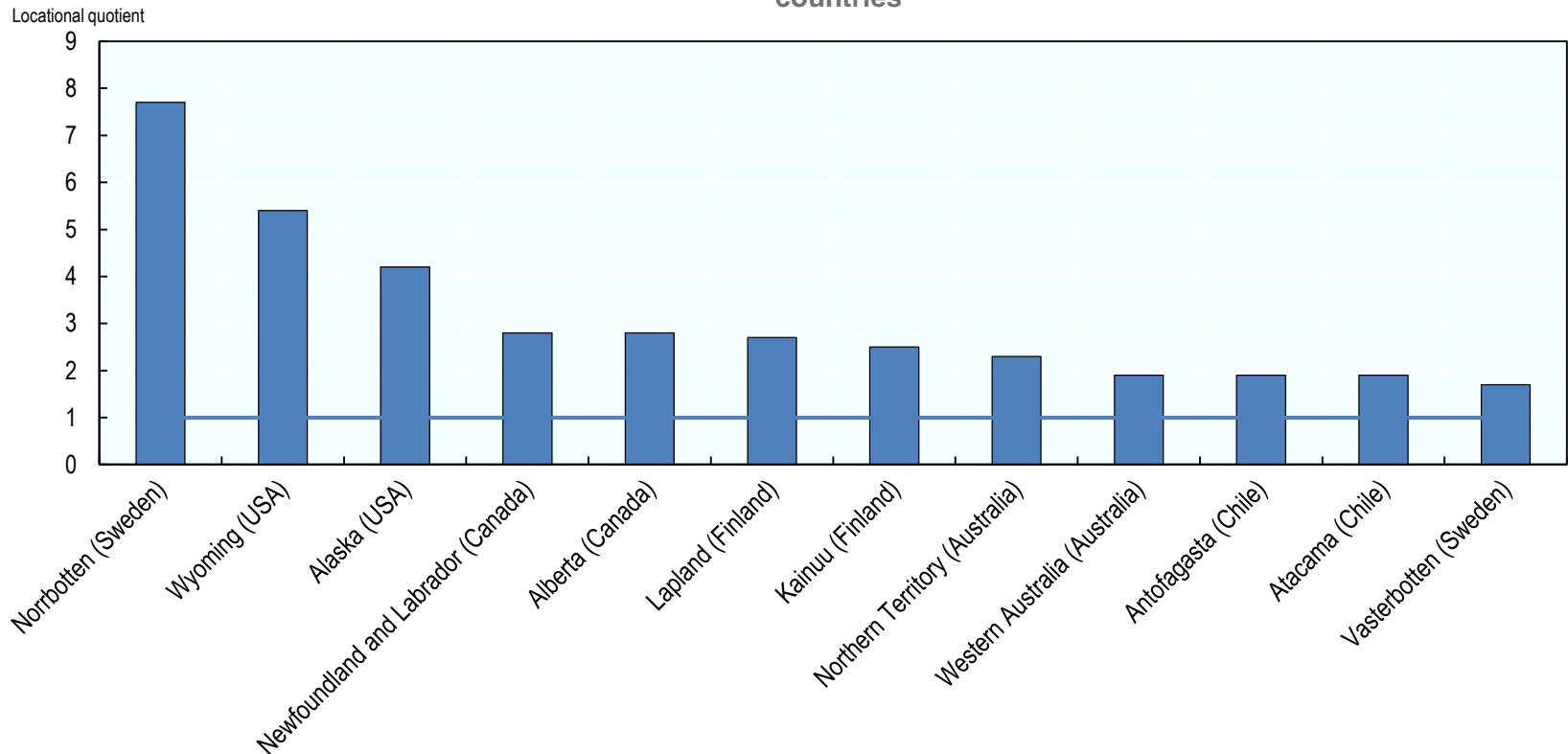
Summary of findings:

- **Mining is spatially concentrated**, often in low density economies – linkages with local economies vary considerably
- **Strong productivity performance** coupled with volatility in growth, inequalities, and local dutch disease effects
- **Place-based approaches are needed to address these issues** – land use and housing, supply of local skills and competencies, and linking local SMEs to mining value chains
- **Importance of multi-level governance** - decentralisation and alignment with revenues and institutional capacities at a sub-national level to support integration of mining with regional development



Mining and extractive activities are spatially concentrated

Regional specialisation in industry* (employment), select OECD countries

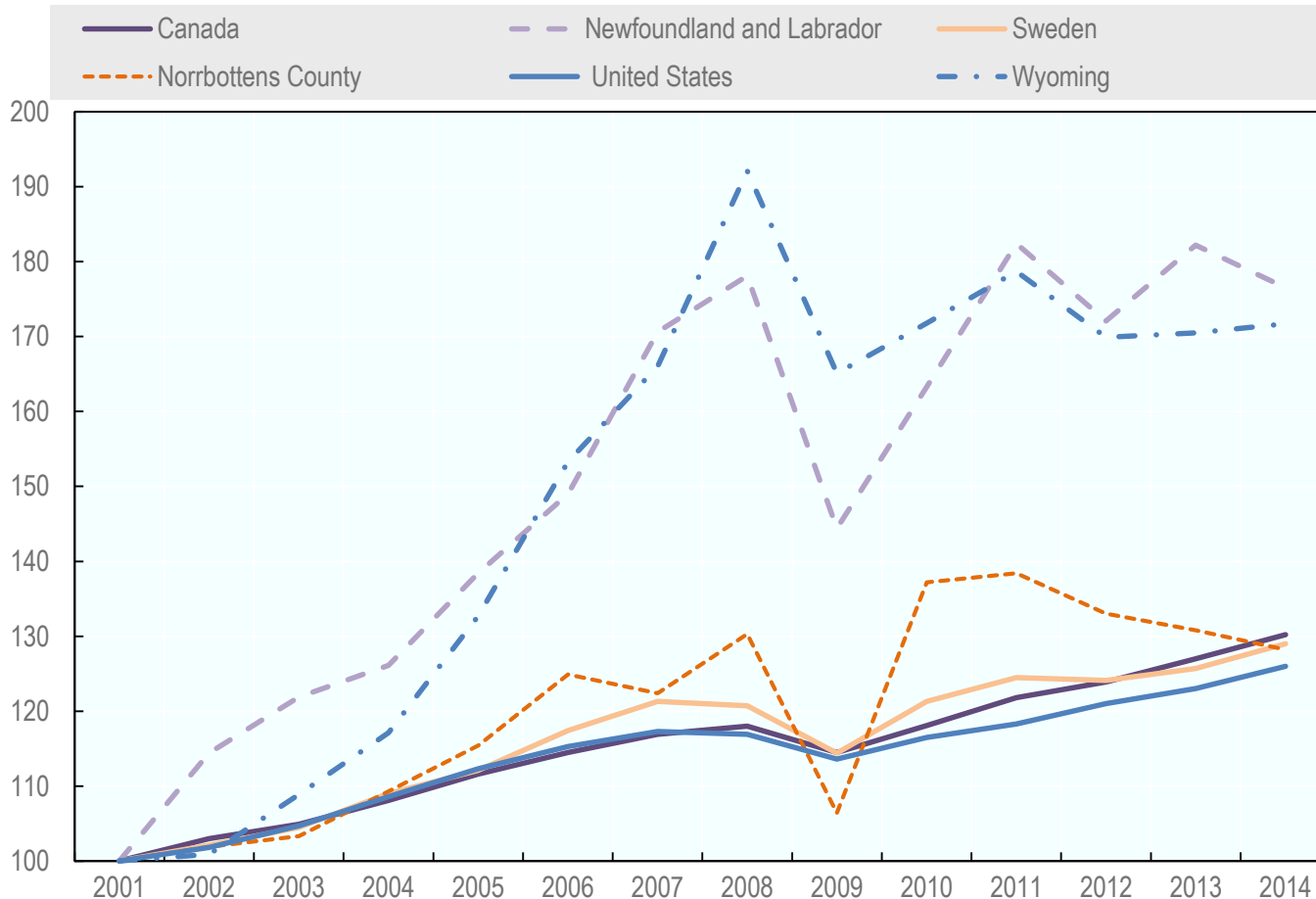


Source: OECD Regional Database. *Industry category in this chart includes mining and extractive activities, energy and water. The locational quotient (LQ) is the ratio between the sector weight in employment for the region, and the weight of the same sector in national employment. A value above 1 implies that the region is more specialised in that sector than the rest of the economy. LQ scores for Sweden and Finland are 2012, and for other countries 2014.



Changes in external markets and volatility in regional growth performance

GDP growth index, select OECD countries and regions, 2001-2014 (2001 = 100)



Standard deviation of difference in GDP growth (2001-2011) for a larger sample of OECD regions specialised in mining was 28.08 compared to 13.08 for the national level*.

Source: OECD Regional Database. *25 regions across Australia, Canada, Hungary, Finland, Sweden, the United States. Regions with a locational quotient higher than 2 were included in the sample.



Mining is a global business, but regional and local issues matter

Key issues	Examples
Localised environmental externalities	Impacts on water quality and availability, run-off and emissions, dust and noise
Conflicts with other land users	Residents, food producers, tourism operators, and Indigenous peoples
Innovation and value-chains	Adapting production techniques to local environment conditions, local procurement and supply chain opportunities
Local workforce	Skills mismatches, access to air services, temporary accommodation and housing, amenities and public services
Regional infrastructure networks	Bottlenecks in existing transport, energy and communications networks, opportunities for investment and shared use
Mining closure and transition	Environmental remediation, localised transition and structural adjustment costs

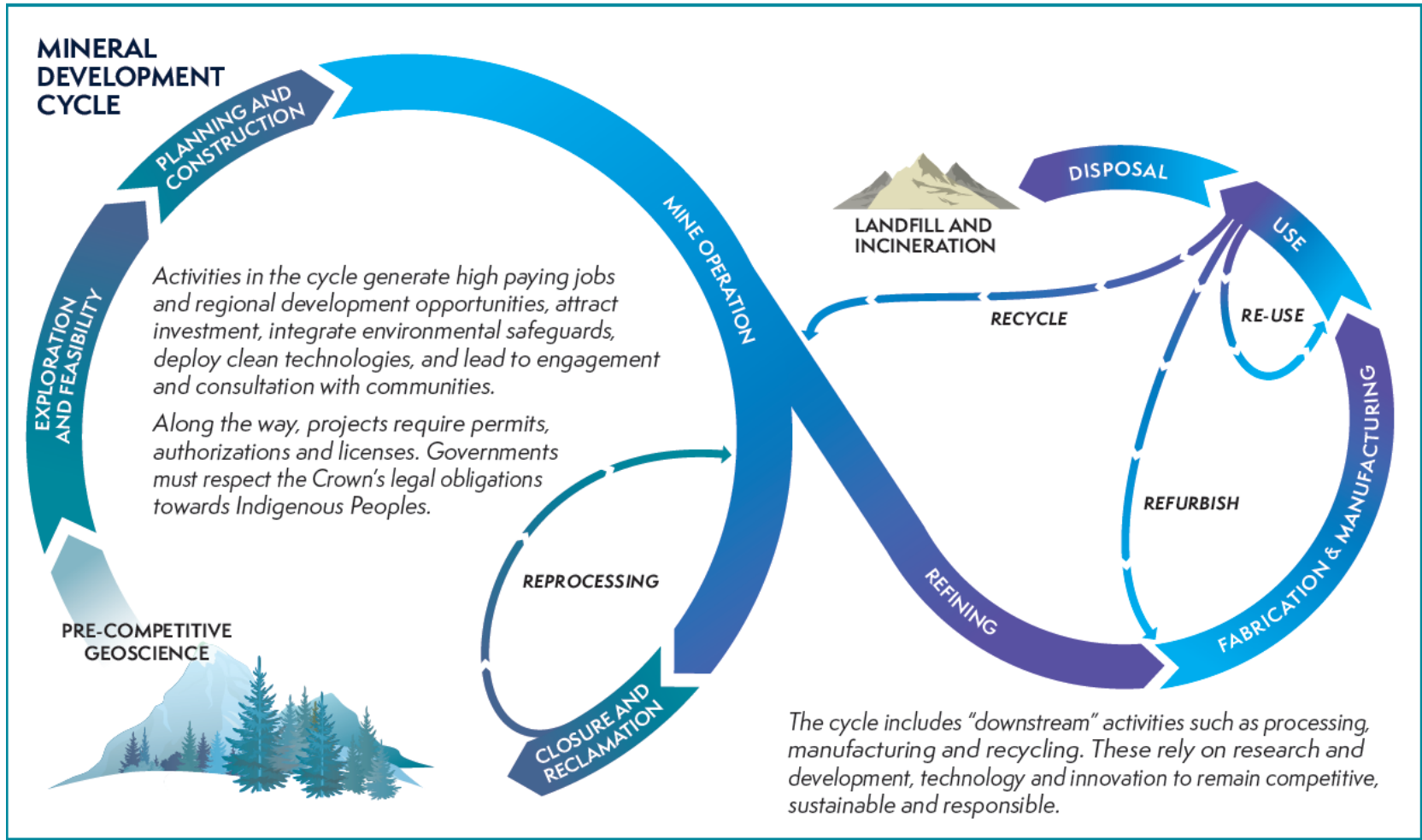


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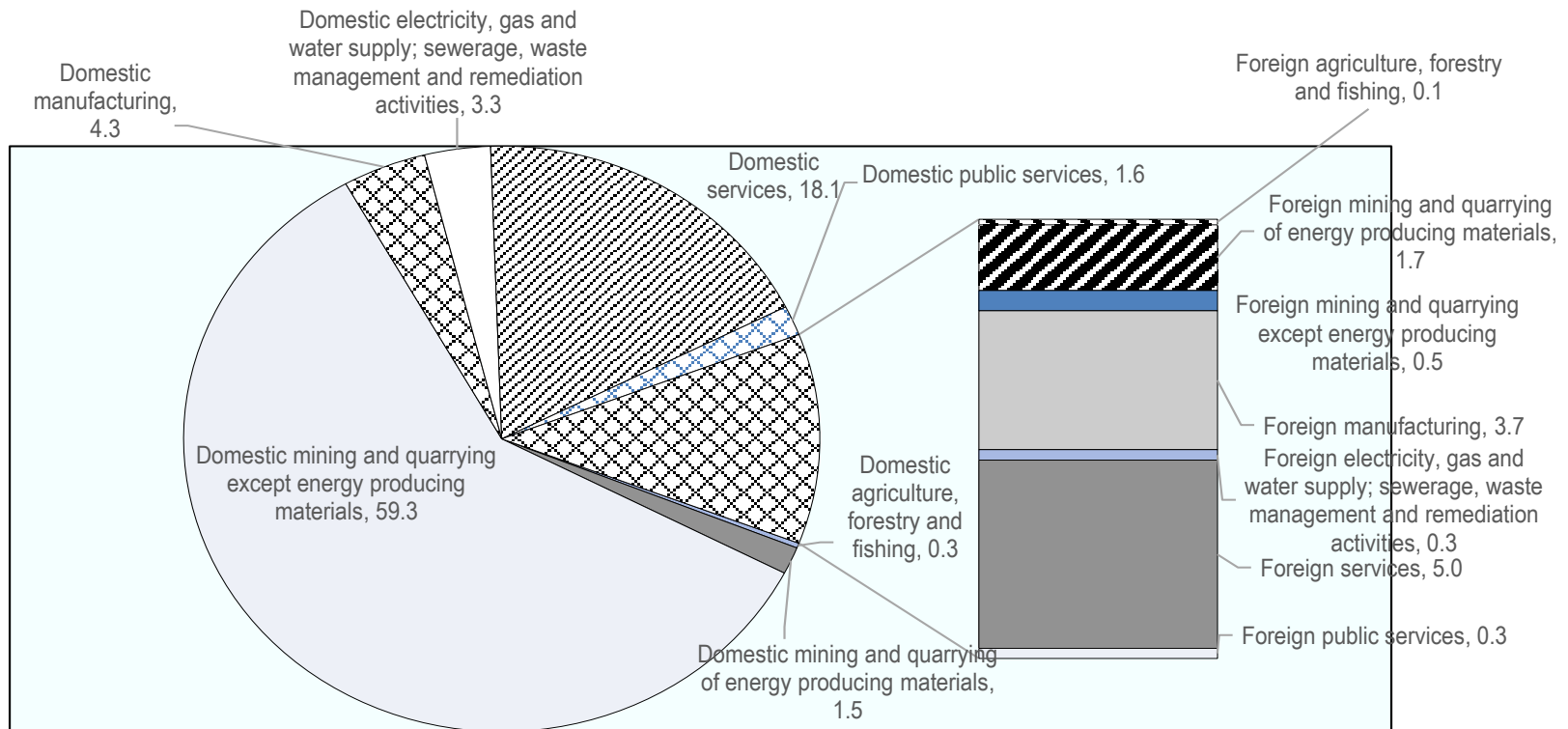
Value Chain of mining





Much of the value added of mining exports comes from the sector itself (59% in 2015).

Backward linkages in mining sector

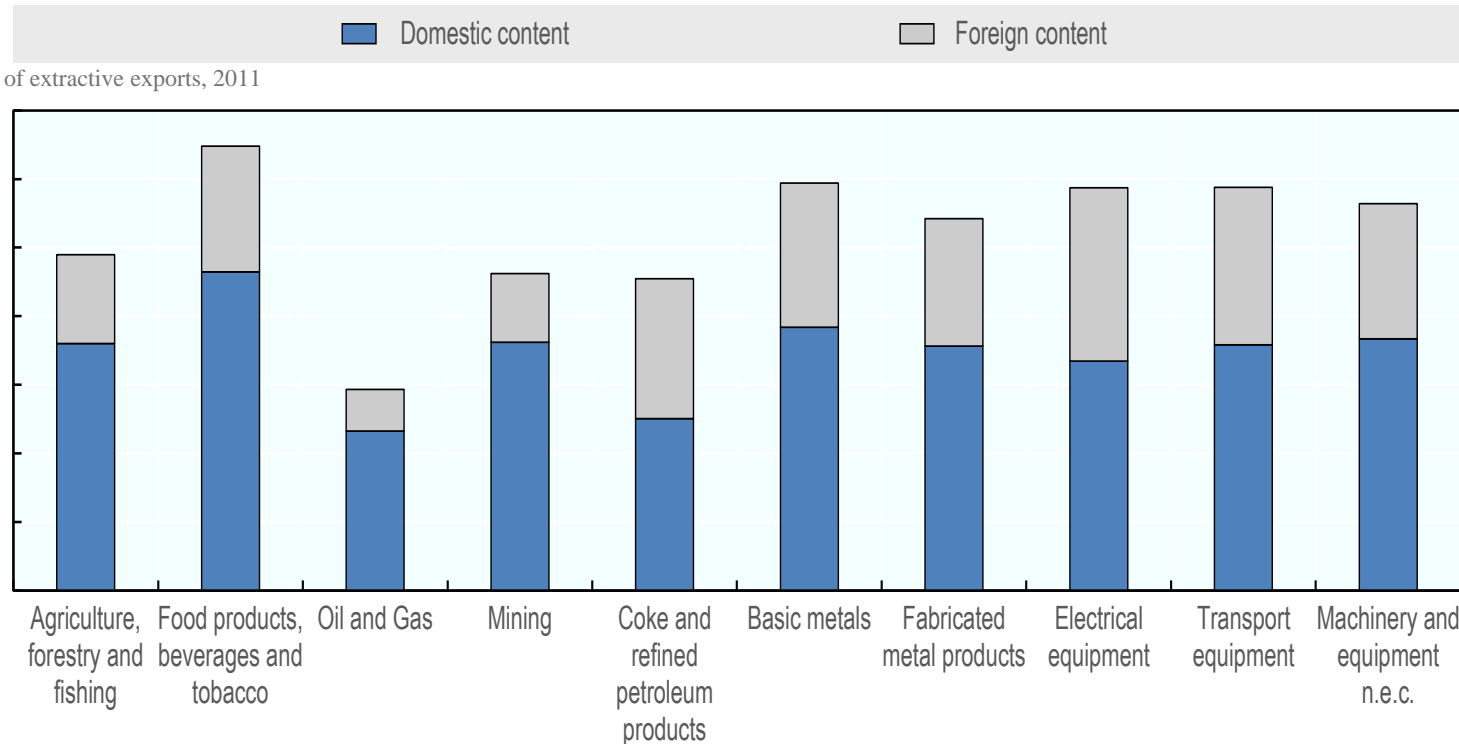


- Services is the sector to which mining displays the strongest backward linkages (23% of value added in exports)
- Inputs from manufacturing represent a far smaller share of the value added in mining: 4% (domestic manufacturing inputs) and 3% (foreign manufacturing).
- Energy and water represent collectively 7% of the value added in mining



Extractive industries require a relatively lower share of services.

Value added of services in exports of selected sectors



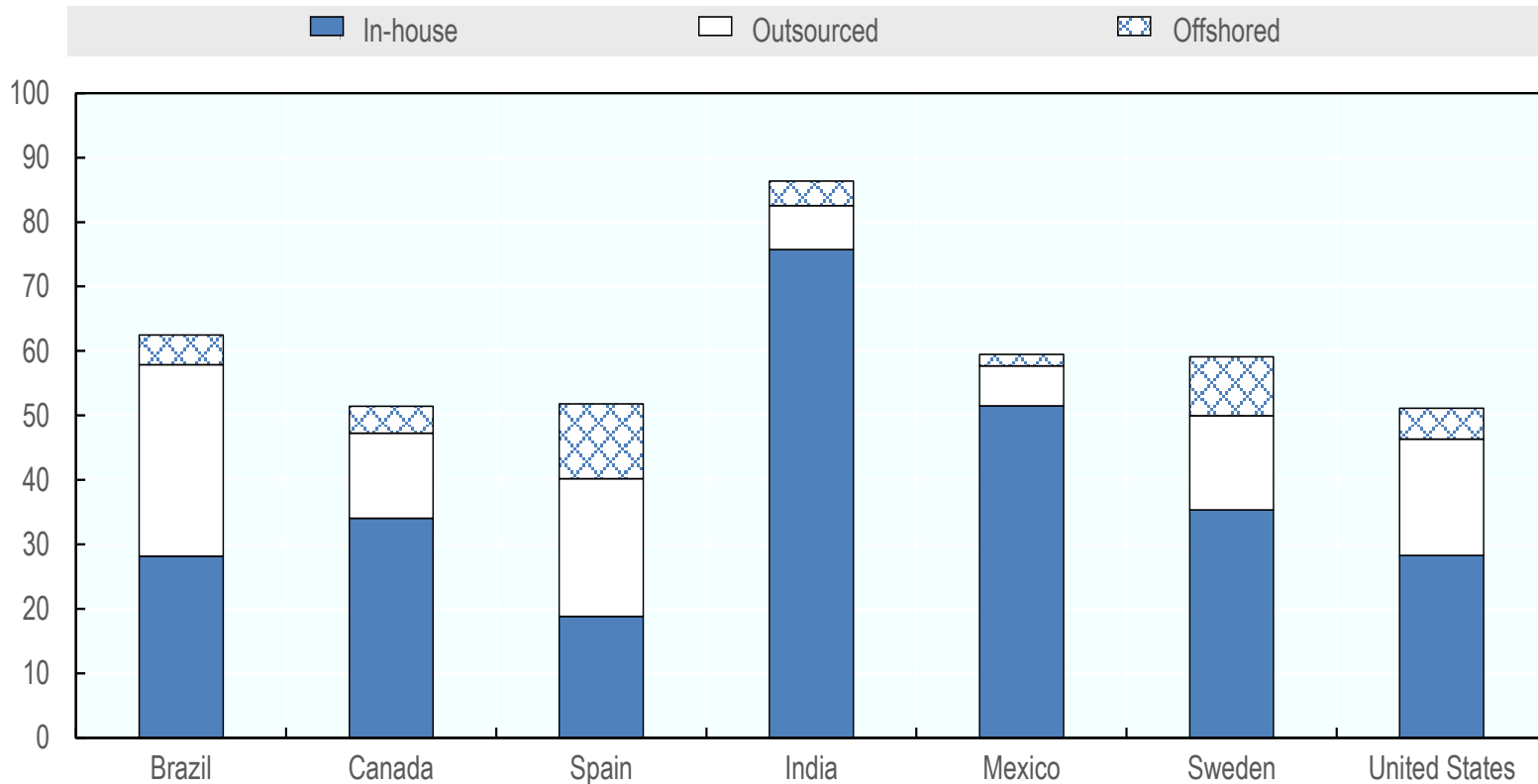
- A high share of services embedded in mining activity are domestic (18% of value added), while small share is foreign (5%)
- Services contribute to more value added of exports in other industries



Most services are provided in-house by extractive-firms.

In-house, outsourced and offshored services in the extractive sector

Share of value added of extractive exports, 2011



- Many mining firms develop their own support services in-house, e.g., engineering, information technology and R&D (services are traded between headquarters and affiliates of mining firms)

Source: OECD (forthcoming_[26]), The Mining global Value Chain and the impact of embodied services.



Clusters can spur innovation in rural areas

Advantages

- Proximity of firms and research generators lead to lower production costs, higher innovation and **productivity growth**
- Cluster policies → to **slow down delocalization** (ability to fit into useful niches in GVCs)
- Convenient and pragmatic organizing principle to **focus resources and build partnerships**
- Contribute to a **process of learning and self-discovery** at the regional level.

Risks:

- Insufficient economic **diversification**
- **Lock-in- being tied by longterm investment strategies** to supporting specific sectors and unable subsequently to change track
- **Over-reliance on key firms**
- Issues with the **effectiveness of the public sector to identify sectors** and the instruments that can help firms to react to very rapid changes in global markets (pick winners)

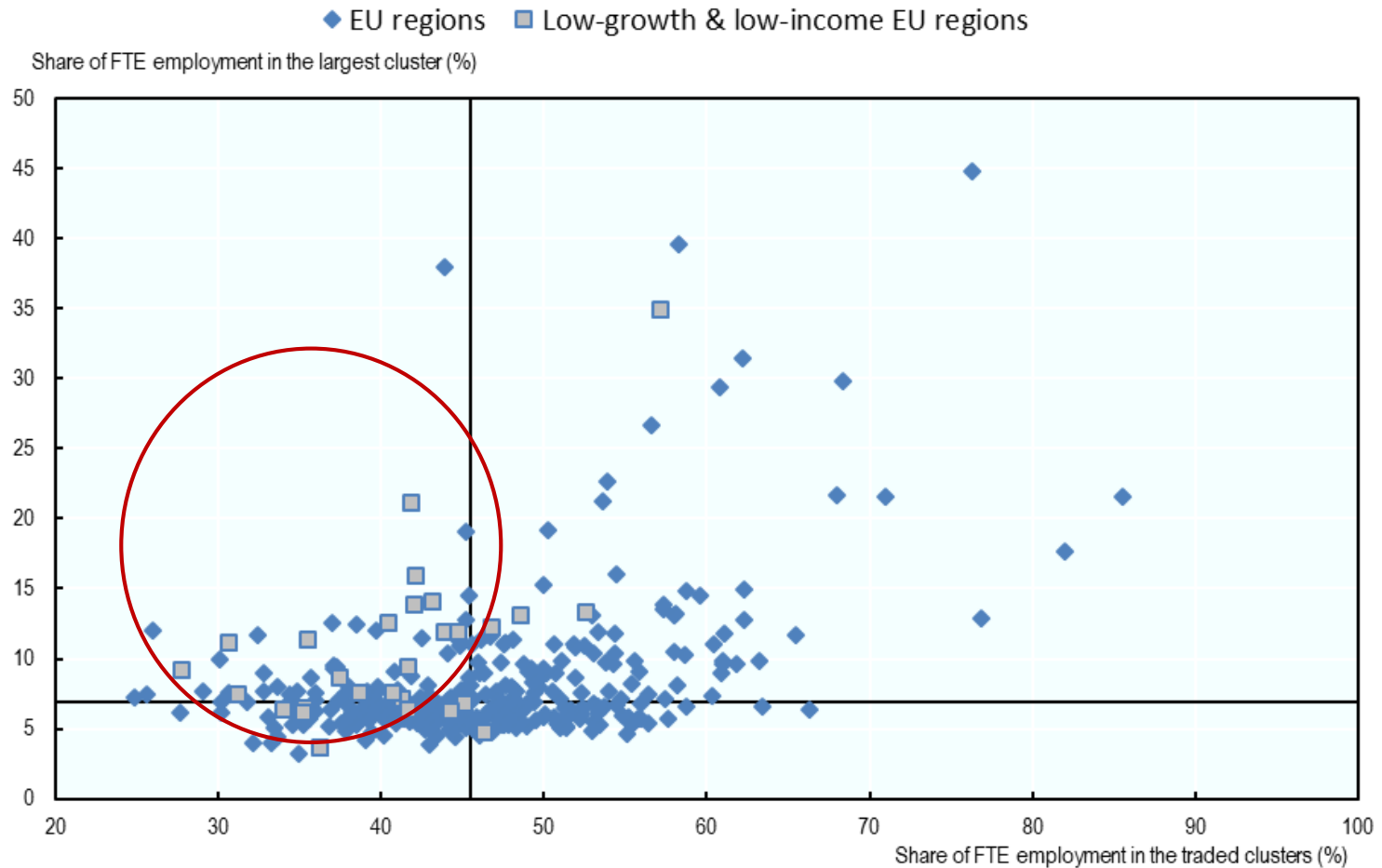
Policy lessons:

- There needs to be a compelling **reason for why a cluster policy** (as opposed to another Policy)
- Policy **complementarities and coordination among government are essential** due to the multi actor-policy nature of clusters.
- Risks involved in such policies are often related to **insufficient private sector engagement** (excessive public sector role and the unsuccessful public sector exit strategy).



Low-growth regions hold a low share of traded clusters and strong reliance on their largest cluster

Specialisation and employment in regional clusters





Clusters can spur innovation in rural areas

Kemi technology park (Lapland, Finland)

- Established as a science park in 1986 to connect ICT capability at the local university, to the significant number of industrial firms in the vicinity
- Now hosts SMEs in different areas (industrial services, electronics, information technology, environmental technology and low temperature and winter technology)
- Expanded beyond its original role to support networking amongst SMEs, connections to large firms, provision of services, and access to external markets

Cornwall Mining Alliance

- **Mining history in the region led to** concentration of innovative businesses, organizations and experienced professionals. The alliance connects these experts (100 members) to services to all aspects of mining and related industries in the UK and around the world.
- The region offers a range of specialist test facilities and practical training, as well as research and development for the mining industry



Geological



Mining Engineering & Surveying



Mineral Processing



Environmental & Social



Energy



Software & Digital



Analysis & Testing



Research & Training



Contractors & Supply Chain



Professional Services



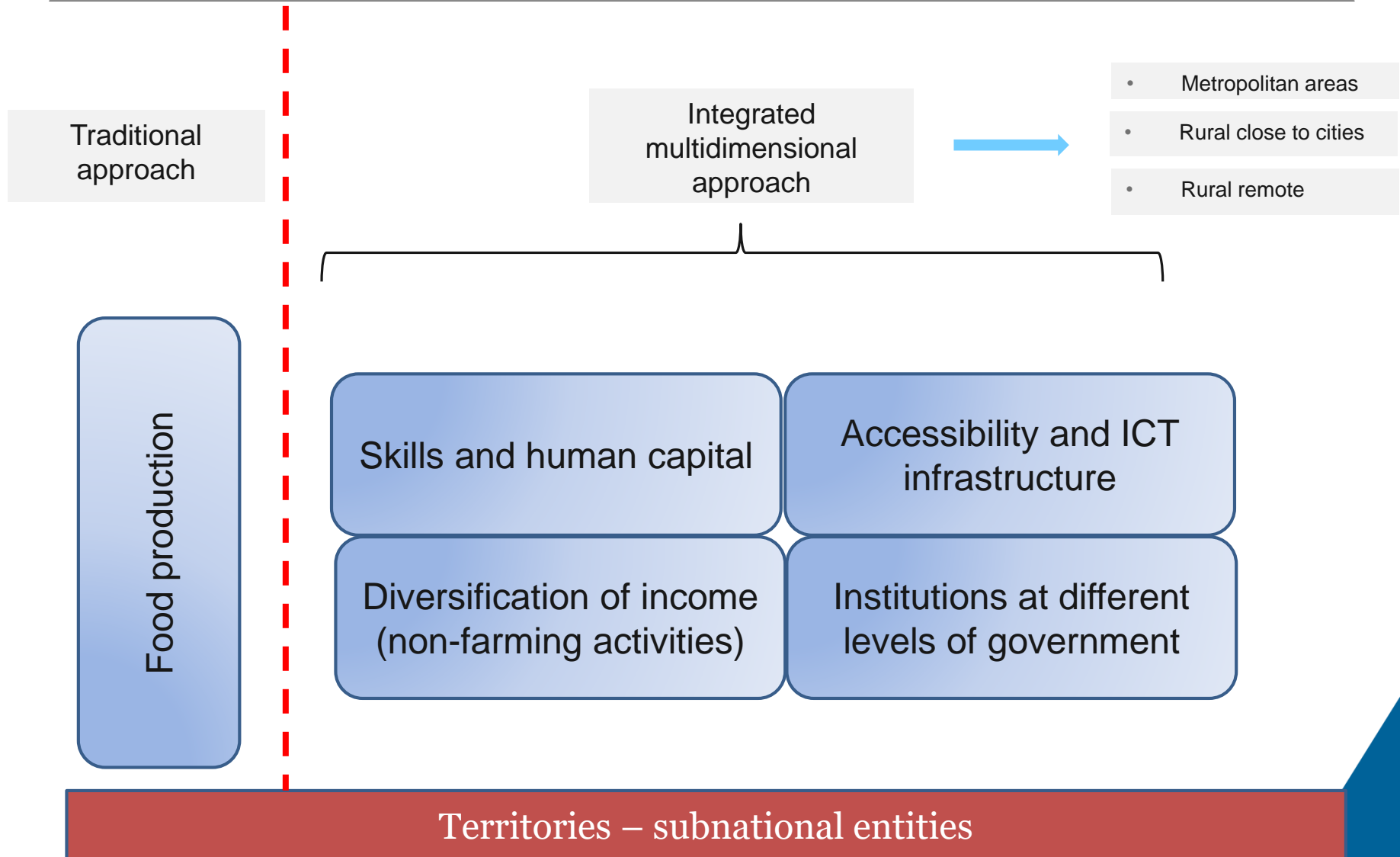
Mines & Quarries



Mining Heritage



An integrated view on rural policies will enhance innovation and build capacity





SAFE THE DATE!

3RD OECD Meeting of Mining Regions and Cities

11th June Pre-Conference in Partnership with MIREU

- Bring together 30-40 key regional and industry stakeholders from the EU, Chile, Australia, and Canada
- Objective: Shape the **quality of life priority** of the OECD Mining Regions and Cities Initiative
 - Mega-trends and future drivers of change (Demographics, Digitalization, Climate Change etc.)
 - Policy Lessons and Levers
 - Defining progress and indicators (including alignment with SDGs e.g. affordable and clean energy, gender equality, and no poverty)

12-13th June 2019, Conference, Skellefteå, Region Västerbotten - Sweden

- Thematic Focus: Regional development in the Arctic & enhancing quality of life for regions and cities with a specialization in mining and resources.





THANK YOU FOR YOUR ATTENTION

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