Innova-project: measuring innovation ecosystems and their impacts

ETLA and MDI

Outline

- Short summary of Innova and main objectives
- The difficulties in measuring innovation ecosystems
- Our approaches and results
- Examples, from previous literature, of measuring knowledge clusters and networks, and their impacts.

INNOVA

- VNK Project conducted by MDI and ETLA.
- The main purpose is to establish a framework to evaluate the impacts of innovation ecosystems, as well as building a set of indicators to measure them.
- ETLA is focused on using statistical techniques to measure ecosystems and their impacts.
- Despite being treated as separate concepts, innovation ecosystems and knowledge clusters share a lot of similarities.

Introduction-challenges (1)

- Innovation ecosystems usually encompass multiple types of entities, as well as different industries and (in some cases) locations.
- This **heterogeneity makes measurement hard**. For certain entities we do not have statistics. We cannot access micro data of other countries.
- Different members of the ecosystem participate to a different degree.
- Relationships between participants might be informal/implicit. Link between firms are not usually tracked in micro data.

Introduction-challenges (2)

- The statistical analysis of ecosystems is not only complicated in terms of measurement, but it is also **difficult to establish causality**.
- Assuming that we can concentrate on firms belonging to an ecosystem, it is very hard to argue that a firm belongs to an ecosystem by chance.
- This **self-selection** problem is the core issue in making casual analyses in this context.

Our analyses (1)

- We need to rely on some strong assumptions and approximations.
- Firstly, we assume that the geographical dimension of ecosystems is important. This allows us to look for local ecosystems using concepts like clusters, which are easier to measure.
- The first part of our analysis is focused on the study of local clusters and coagglomeration patterns. The **main assumption is that the presence of related industries in an area signals the presence of an ecosystem**.

Our analyses (2)

- Another characteristic usually associated with innovation ecosystems is the collaboration between firms and universities, as well with competitors, clients etc.
- We **assume that collaborating with an external entity (and with a university) approximates participation in an ecosystem**.
- It is a somewhat strong assumption, but at least it allows us to study how belonging to an ecosystem correlates with firm's characteristics and outcomes.

Clusters and coagglomeration analyses

- In this presentation, I focus on location quotients, i.e., how industries are disproportionally concentrated in a given location.
- This analysis is based on plant-level data, which offer both industry and location information.

Location quotients, regional at 3-digit .

Region	Industries
Etelä-Karjala	**Manu of pulp and paper, sawmilling,**
Etelä-pohjanmaa	**Manu of metal prod, manu of metal forming machinery, manu of tanks, manu of bodies of motor vehicles, mining and quarrying, manu of basic and other non-ferrous metals**
Etelä savo	**Manu of prod of wood, silviculture, support serv to forestry, logging** Holiday and short-stay accommodation, hospitality act., other acc.
Keski-Pohjanmaa	**Manu of basic chem and fert., animal prod, mixed farming, manu of prep animal feeds** Building of ships and boats, manu of bodies for motor vehicles
Lappi	**Hotels, other res serv, amusement act., holiday and short stay acc., other acc.** Mining, manu of baising iron, support act. For mining.
Varsinais Suomi	**Manu of other chem, manu of pharma** Building of ships, manu of prepared animal feeds

Location quotients, selected municipalities at 2-digit industry .

Region	Industries
Alajärvi	**Manu of wood, forestry and logging**
Akaa	Manu of machinery and equip, manu of fab metal prod, other manu, manu of rubber and plastic prod
Enontekiö	**Travel agency and tour operators, accomodation**
Espoo	**Computer programming, information service activities**
Haapajärvi/Haapavesi	Manufacture of wood prod, forestry and logging, manu of furniture
Helsinki	**Act. Aux. To financial serv., programming and broad, motion picture, video etc.** (notice that lots of business activities do not appear here, might be due to a lot of diversification in Helsinki)
Vantaa	**Air transport, warehousing and support activities for transport**
Oulu	**Manufacture of computer, electronic, scientific research and development**

Data on collaborations and innovation

- We use the community innovation survey (CIS) waves 2008, 2010, 2012, 2014, 2016 and 2018.
- It contains information on **innovation and cooperation patterns at the firm-level**.
- Unfortunately, firms are not included by design in multiple waves, but there are firms appearing multiple times.
- In this presentation I focus on the correlation between collaborations and various firm-level outcomes.

Regression results (cross-sectional), various outcomes

Outcome	Collab ext	Collab universities
Innovation	1,79***	1,56***
Employment growth (t+1)	0.02**	0.014
Employment growth (t+2)	0.02*	0.0025
LP growth (t+1)	0.009	0.001
LP growth (t+2)	0.013	-0.0082
Wage growth (t+1)	-0.0017	-0.0006
Wage growth (t+2)	0.0014	-0.0004
Share emp. Becoming entr	-0.413**	-0.729***

Regression results (panel), various outcomes

Outcome	Collab ext	Collab universities
Innovation	1,73***	1,56***
Employment growth (t+1)	0.015	0.00000
Employment growth (t+2)	0.005	-0.0119
LP growth (t+1)	0.014	0.015
LP growth (t+2)	0.017	-0.004
Wage growth (t+1)	0.0120**	0.0123*
Wage growth (t+2)	0.016	0.018*

Summary of the results

- **Indicators of clusters can be a helpful first step in the measurement of ecosystems**, which needs to be followed and validated using additional quantitative and qualitative information.
- We find **a strong link between collaboration and innovation**, while we observe a weaker correlation with employment and wages growth, and a non-statistically significant correlation with productivity growth.

Azoulay et al. (2010)

- Example of causal effects of (the disruption of) knowledge networks.
- They examine how the passing of influential academics (superstars) influences the output of coauthors.
- They find a substantial drop in research output for coauthors closer in the idea-space, not explainable by a drop in resources.

Buzard et al. (2020)

- Study on clusters of R&D labs, not using administrative boundaries.
- Find strong localization of knowledge spillovers → higher likelihood of citing patents from the same cluster. Few blocks matter!
- Localization is understated when looking at metropolitan areas/regions.