

Temporal employment networks reveal inter-industry dynamics and knowledge transfer in New Zealand

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The transfer of knowledge across firms and industries is an economic phenomenon that is still poorly understood, specially the case of tacit knowledge. One way to better understand this problem is by analyzing the job flows across firms and industries, which has also been shown to play an important role in different economic phenomena that range from individual careers to economic development, structural change, and innovation [1,2].

This project analyzes the flows of workers between firms by creating temporal bipartite networks that indicate where an employee has worked in a window of time. This makes possible to calculate two projections, one that allows us to link firm to firm by the employees (and skills) that they exchange, and a second projection that shows us employee-employee interaction by working in the same firm at the same time.

We create these networks from tax records from all the employees and firms in New Zealand from the year 2000 to 2017, which give us a unique opportunity for studying the case of an entire country. On top of the tax records, we also have the educational background from the employees and information about the size, location and industry sector for firms. With these temporal networks, we are able to tackle two problems; firstly, the transfer of knowledge, which we infer by tracking professional careers and the transfer of skills, and seeing how they reflect in economic outputs for both firms and employees. Second, using the firm-firm projection we can relate the communities in our network to a certain industry sector. By analyzing aspects of the community evolution in the network such as; growth, contraction, merging, splitting, birth and death of communities. It is possible to reveal how industry sectors interact and evolve over time, in the context of job flows.

In addition, by having a more detailed vision of job mobility it is possible to analyze how the industry interdependence and complexity of the community structure in the urban job networks is reflected in economic outputs. Our results contribute to analyzing the impact of knowledge transfer through job flows in the evolution of industry sectors, not only in terms of size, but also in how the flow of employees and their skills affect the levels of productivity and innovation inside firms. Furthermore, they can also give a deeper insight in how exogenous factors that affect the job mobility have a repercussion in the economy and the skill transfer amongst industry sectors.

References

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