Regional Embodied Knowledge Flows

(EARLY DRAFT OF EXTENDED ABSTRACT)

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ABSTRACT

Industrial clusters are renowned for being rich in embodied and disembodied knowledge flows between companies active in the same value-chain. Such transfers of knowledge inside cluster regions are expected to occur between related industries more than unrelated industries (Neffke, Henning et al. 2011) and may include labor flows between local companies, knowledge spillovers between competitors, and customer-supplier relationships. This paper attempts to assess the impact of the embodied knowledge flows in clusters by analyzing its different effects on entrant performance of customer and supplier industries. The data were extracted from the employer-employee matched data set for the period from 1986 to 2009 from Portugal, for the molds and plastics cluster. Preliminary results point to significant effects of embodied knowledge from labor mobility but limited evidence of embodied knowledge transfers between clustered customers and suppliers.

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Introduction

For regions with a high specialization in an industry, or where an industry clusters significantly, most of the knowledge flows are directed into that same (usually successful) industry, and it is common to observe high indices of spinoffs (Klepper 2009, Klepper 2010) and entrepreneurship (Feldman 2001) into that same industry. However, quite often clusters are built around an entire value-chain of companies involved in the production of one final product, therefore including several related industries (as is often the case in the industrial district literature, e.g. Becattini 1990). The development of the cluster itself is then contingent on the growth of the set of industries involved in the production chain, which would then be dependent of each other and engaged in a closely-knit network.

The contribution of this study comes from the possibility to investigate empirically the relationship between a supplier and a customer industries inside a cluster. Although this kind of relationship is well acknowledged in the industrial agglomeration literature, very few opportunities have arisen to study them empirically with quantitative data. In addition, this study also allows to investigate the nature of embodied knowledge flows, by disentangling different aspects encompassed in the mobility of people inside regions, such as their role (entrepreneur versus employee), prior experience (industry of origin), location (local or external), quality (quality of previous company), education level, and skills.

Theoretical Background

Since the seminal work of Marshall (1890), clusters are depicted as places where knowledge flows enhance the performance of groups of firms who both compete and collaborate in an intricate localized network. He identified the availability of localized knowledge spillovers from competitors accessible through the social fabric inside the cluster, the pooling of the labor market in the region, and also the benefits from a close relationship with specialized suppliers.

Knowledge is, therefore, a very important driver of the success of industrial clusters, in both its embodied and disembodied varieties. In particular the flows of the knowledge embodied in the people creating companies and working in the region are known to have an effect. The

creation new companies (spinoffs) by industry entrepreneurs who worked in the same industry (Klepper 2001, Klepper 2009) has repeatedly been shown to drive cluster performance (Buenstorf and Klepper 2009). Likewise, early employees have an impact on firm performance (Braguinsky 2015, Buenstorf and Costa 2018). Not much is known about the effect of the embodied knowledge of closely related industries on their performance and even less about the skills that matter the most is such knowledge transfers.

The hypotheses of this study are the following:

H1 – Knowledge embodied in industry workers who become entrepreneurs in the same industry explains part of the performance of the firms in the clustered industry.

H2 - Knowledge embodied in industry workers who become entrepreneurs in the supplier or customer industry explains part of the performance of the firms in the clustered industry.

H3 - Knowledge embodied in industry workers who become early hires of entrants in the same industry explains part of the performance of the firms in the clustered industry.

H4 - Knowledge embodied in industry workers who become early hires of entrants in the supplier or customer industry explains part of the performance of the firms in the clustered industry.

H5 - Knowledge embodied in industry local workers who become early hires of entrants explains part of the performance of the firms in the clustered industry.

H6 - Knowledge embodied in industry workers of higher quality firms who become early hires of entrants explains part of the performance of the firms in the clustered industry.

Additional hypotheses about the types of skills that get interchanged between the distinct clusters will be investigated (in a later stage of this paper).

Methodology and Data

The overall research question is to understand the effect of embodied transfer of knowledge through the mobility of people (entrepreneurs and early employees) inside clusters, within the same industry and across related industries in a cluster. To investigate this, we look at entrants in a cluster, from a supplier and a customer industry, and seek to assess the extent of cross-industry fertilization occurring inside the cluster.

This paper explores the case of one industrial cluster in Portugal, hosted in two different regions: Marinha Grande and Oliveira de Azeméis. Marinha region's economic activity is concentrated in both the molds for plastic injection and the glass industries. Oliveira's economic focus is on both the molds for plastic injection and also the shoe industry. The data are extracted from the employer-employee matched data set for the period from 1986 to 2009 from Portugal.

The molds industry produces the steal molding parts used by the plastics injection industry to shape their products, therefore the molds are one of the most critical supplies required by the plastics industry.

The dependent variable is new entrant survival in the molds and plastics industries, as a proxy for their performance. The variables of interest are: the mobility of workers into entrepreneurship, in the same industry or into the supplier or customer industry (dummy variables); the mobility of early workers with experience in one of the industries (number of workers transferred); the closeness of the early workers hired (number of workers who are local or from other locations); the quality of their early-workers experience (proxied by having experience in a company that survived for more than 7 years).

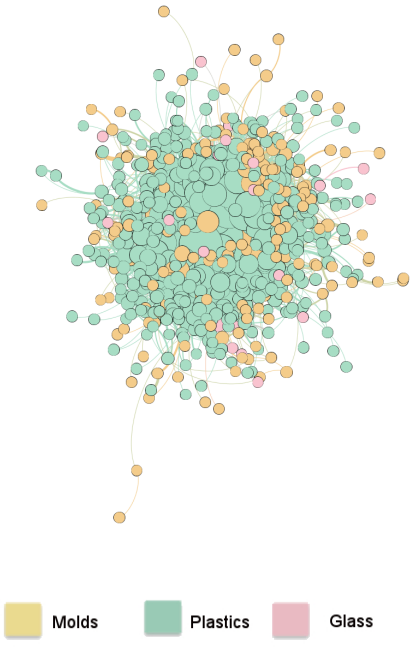
The model also controls for the location of the entrants, inside or outside the cluster regions of Marinha Grande and Oliveira de Azeméis, as proxies for disembodied agglomeration effects.

Preliminary Results

A preliminary analysis has focused on exploring the level of interrelation between the different industries present in the cluster, in order to grasp the depth of knowledge transfer through the existing labor mobility. The initial focus was on the Marinha Grande region and the connection between the molds, plastics, and glass industries (the most prevalent employers in the region). The glass industry does not have a direct value-chain relationship with the other two industries. Its potential relevance lies in the origin of the industrial clustering process in the region (in the 19th century), that later led to the creation of the molds and plastics cluster in the same region.

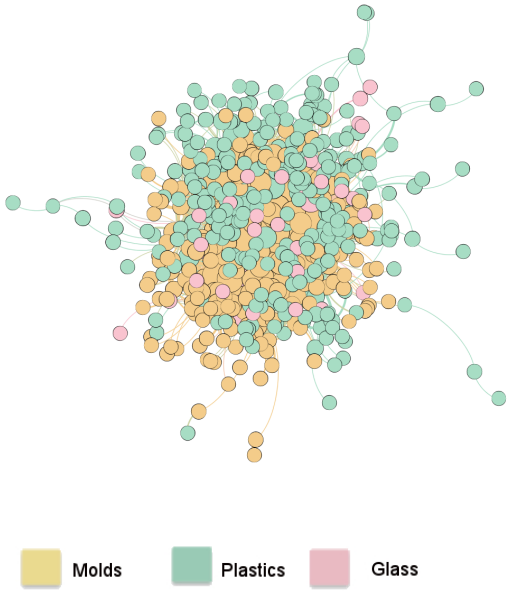
An analysis of the labor mobility flows between the molds, plastics, and glass industries for the period of 1986 to 2009 is as depicted in the networks of Figures 1 to 5. Nodes are companies of the different industries and the edges represent instances of labor mobility, with node size representing in-degree. During this period, the molds industry received a strong inflow of workers from the plastics industry, but the intake from the glass industry seems to be of diminutive volume (Figure 1).

Figure 1 – Labor Mobility into the Molds Industry (by industry of origin) 1986-2009



The plastics industry seems to be less able to recruit from the molds industry but we can still observe an important intake from their supplier industry. Again, the number of workers coming from the glass industry is less impressive (Figure 2).

Figure 2 – Labor Mobility into the Plastics Industry
(by industry of origin)
1986-2009



Finally, the labor mobility flowing into the glass industry is quite mixed, not denoting a specific pattern (Figure 3).

Figure 3– Labor Mobility into the Glass Industry
(by industry of origin)
1986-2009

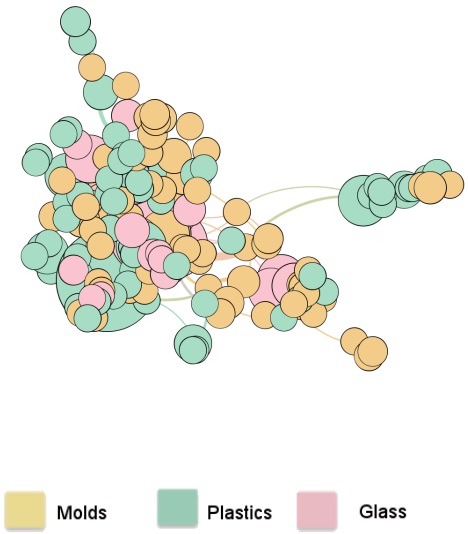


Figure 4 shows the grouped labor mobility for the three industries, for comparison. Although the plastics industry is the largest in size (by number of companies and of workers), the molds industry seems to be more attractive for the workers inside the value-chain network.

Looking into the temporal dynamics in Figure 5, there seems to be a very stable pattern of labor mobility, with a small increase in the prevalence of the molds industry as a destiny of the mobility flows.

From this preliminary study we can conclude that the intensity of labor mobility between the plastics and molds industries merits a deeper analysis, while the relationship with the glass industry does not seem pertinent.

Figure 4 – Total Labor Mobility
(by industry of destination)
1986-2009

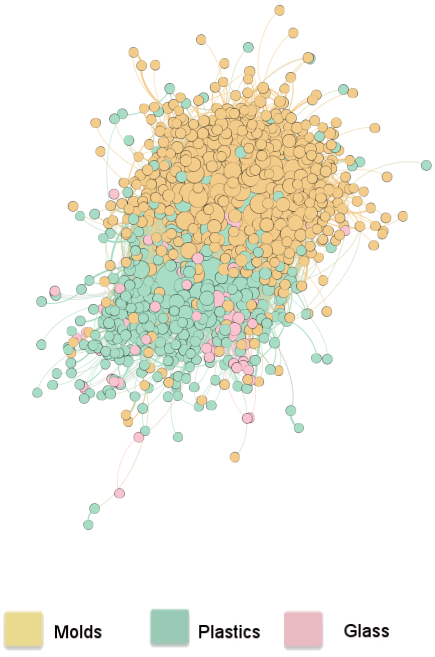


Figure 5 – Evolution of Total Labor Mobility
(by industry of destination)

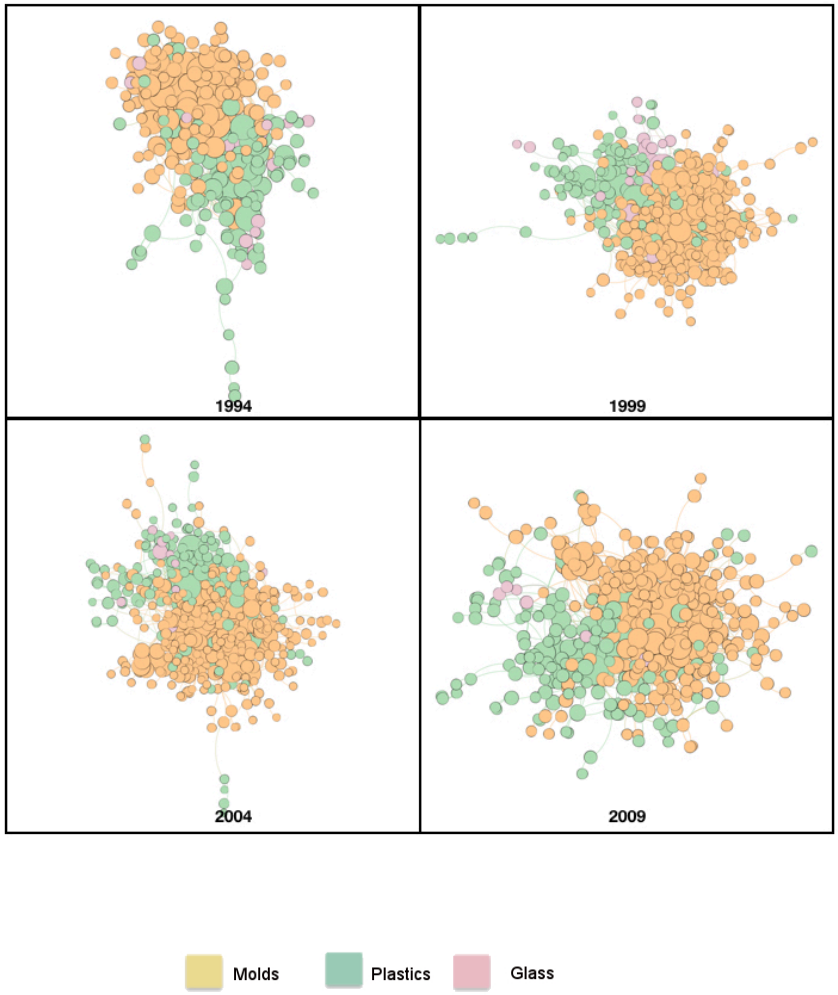


Table 1 shows the results for the analysis of entrant survival in the molds and plastics industries samples, with the coefficients of Cox Proportional Hazards estimations models.

Table 1 - Cox-Proportional Hazards (coefficients)

VARIABLES	Molds				Plastics			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Entrepreneurs (same industry)	0.670*** (0.095)	0.683*** (0.098)	0.687*** (0.100)	0.697** (0.101)	0.704** (0.113)	0.706** (0.114)	0.705** (0.114)	0.711** (0.116)
Entrepreneurs (cross-industry)	0.892 (0.217)	0.934 (0.237)	0.956 (0.244)	0.929 (0.237)	0.989 (0.280)	1.003 (0.290)	0.999 (0.290)	0.993 (0.288)
Number of molds workers hired		0.946*** (0.020)	0.936 (0.039)	0.967 (0.040)		0.979 (0.062)	0.966 (0.095)	0.973 (0.095)
Number of plastics workers hired		0.974 (0.077)	0.878 (0.142)	0.935 (0.153)		0.997 (0.008)	0.999 (0.011)	1.001 (0.011)
Number of local cluster molds workers hired			1.014 (0.048)	0.997 (0.045)			1.031 (0.134)	1.033 (0.133)
Number of local cluster plastics workers hired			1.142 (0.202)	1.087 (0.191)			0.994 (0.016)	0.993 (0.016)
Workers from old company				0.729* (0.119)				0.934 (0.131)
Marinha Grande	0.736** (0.098)	0.813 (0.110)	0.779* (0.116)	0.852 (0.130)	1.023 (0.164)	1.040 (0.169)	1.048 (0.179)	1.054 (0.180)
Oliveira de Azeméies	0.650* (0.150)	0.788 (0.185)	0.759 (0.184)	0.835 (0.206)	0.951 (0.325)	0.987 (0.349)	0.971 (0.360)	0.977 (0.363)
Observations	627	627	627	627	685	685	685	685
Log-likelihood	-1620	-1613	-1613	-1611	-1700	-1699	-1699	-1699

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Preliminary Conclusions

This preliminary analysis aims to initiate the understanding of the main features of embodied knowledge transfer that play an important role inside industrial clusters. In particular, cross-industry effects inside related clustered industries and the different aspects that may enrich those knowledge transfers.

Preliminary findings confirm that the mobility of industry workers into entrepreneurship consistently plays a very important role in the performance of the industry. Entrepreneurial ventures from employees of one industry into the customer or supplier industry seem to be less relevant. Early workers with prior industry experience hired into the molds industry have a large effect on the survival of the entrants who hire them (however the effect is not always significant). Similarly, workers with experience in higher quality companies (who had survived longer) also significantly improve the performance of molds entrants. So far, cross-industry effects have not been shown of importance.

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