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We study the location and occupational composition of establishments within firms between 1981 and 2016. Using Danish administrative data, we document that firms are becoming more spatially dispersed, leaving their managerial activities in the central offices, while moving production and clerical activities away.

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# The Internal Spatial Organization of Firms:

Evidence from Denmark

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**Abstract**

We study the location and occupational composition of establishments within firms between 1981 and 2016. Using Danish administrative employer-employee matched data, we document four novel results regarding the internal spatial organization of firms. First, the average number of establishments per firm increased by 21%. Second, the average distance of establishments and workers from their headquarters about doubled. Third, firms achieved this fragmentation by concentrating managers at headquarters locations and decentralizing jobs in production and business services occupations. Fourth, the ratio of managers to production and clerical workers within firms increased by 80%, driven particularly by headquarters and establishments located in the largest cities. These facts imply that firms are not simply becoming more spatially dispersed; instead, they are fragmenting into functions.

**Resumen**

En este artículo, estudiamos la ubicación y la composición ocupacional de los establecimientos pertenecientes a firmas multiestablecimiento entre 1981 y 2016. Usando datos administrativos de Dinamarca que contienen todos los vínculos entre empleador y empleado, documentamos cuatro hechos sobre la organización espacial dentro de las empresas. Primero, el número promedio de establecimientos por firma aumentó en 21%. Segundo, la distancia promedio de establecimientos y trabajadores a sus *headquarters* se duplicó. Tercero, las firmas lograron esta fragmentación concentrando a sus gerentes en estas oficinas centrales y descentralizando trabajos de producción y de servicios. Cuarto, la proporción de gerentes a trabajadores de producción y empleados administrativos aumentó en 80%, en particular en los *headquarters* y en establecimientos ubicados en las principales ciudades. Estos hechos implican que las firmas no solo se están volviendo más dispersas geográficamente, pero también se están fragmentando por funciones.

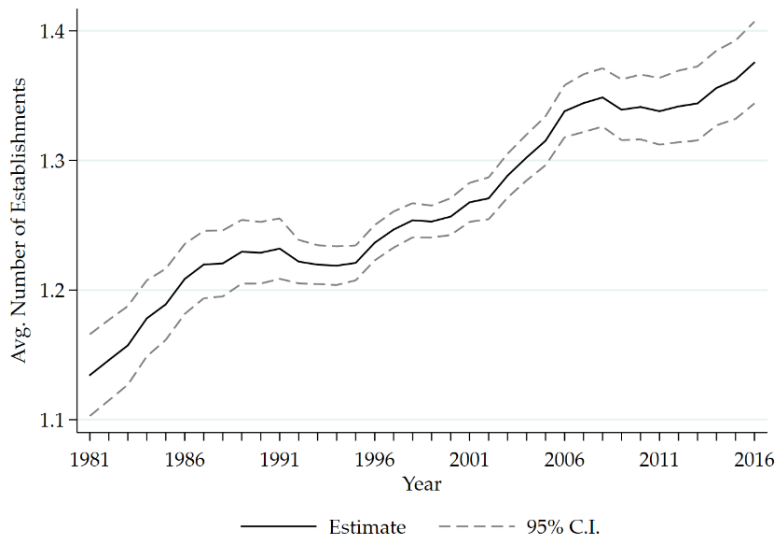
In 1890, Alfred Marshall documented that cities and regions often specialize by sector. He argued that labor market pooling, input sharing, and knowledge spillovers lead to specialization and the rise of agglomeration economies (Marshall, 1890). More recently, Duranton and Puga (2005) document that the pattern of specialization is shifting from sectoral to functional by showing an increasing concentration of managerial occupations in large relative to small cities, relative to production occupations. They contend that changes in the organization of firms---led by decreases in the costs of remote management---could be behind this transformation. Furthermore, research has also shown that the changing spatial organization of activities within firms is sufficiently large to explain changes in occupational structure and wage dispersion across space (Spanos, 2017; Acosta and Lyngemark, 2020).

In this paper, we study how the location and labor composition of different establishments within firms have changed in the last four decades. Understanding these facts is relevant, given the importance of multi-establishment (ME) firms in the aggregate economy. Even though only 7% of all private firms in Denmark have more than one establishment, these firms account for around 47% of all private sector employment and 54% of total output revenue. The relevance of ME firms is not specific to Denmark. Among other examples, ME firms employed more than 55% of workers in the private sector in the US in 1997 and more than 40% in France in 2011 (Aarland et al., 2007; Charnoz et al., 2017).

We study these spatial organizational patterns using Danish administrative employer-employee matched data between 1981 and 2016. Our data is unique for studying these issues. First, our data allows us to determine whether a firm has one or multiple establishments and characterize each establishment based on the characteristics of its workers. Second, we observe the location of establishments at the traffic zone level, which are areas significantly smaller than municipalities. These detailed locations allow us to compute precise measures of firm decentralization without making strong assumptions regarding the location of establishments within a municipality or a county, as has been common in the literature. Third, we can follow the evolution of firms, establishments, and workers over time and study the changes happening inside companies.

Using these data, we lay out four facts that describe the evolution of the spatial organization of firms since 1981. These facts are new in the literature and represent the main contribution of this paper. First, the average number of establishments within a firm increased by 21% between 1981 and 2016, going from 1.13 to 1.38. Figure 1 presents this change. This increase in firm fragmentation holds for all four aggregate sectors in our sample: manufacturing; finance, insurance, and real estate; business services; and transportation. The increase in the average number of establishments has been accompanied by an increasing decentralization of jobs out of the HQ to new non-HQ establishments.

**Figure 1. Evolution of the Average Number of Establishments per Firm**



Second, the spatial decentralization within firms has increased over time. Specifically, the average distance between firms' establishments and their headquarters (HQ) about doubled during the last four decades. This increase primarily comes because firms' new establishments have opened outside of their HQ's commuting area. Moreover, the distance of the firms' average worker to their HQ has also increase substantially, meaning that firms have reallocated jobs from HQ to more distant establishments. Figure 2 presents these changes.

**Figure 2. Spatial Decentralization within Firms**  
**Evolution of the Average Distance of Establishments and Workers to their Headquarters.**

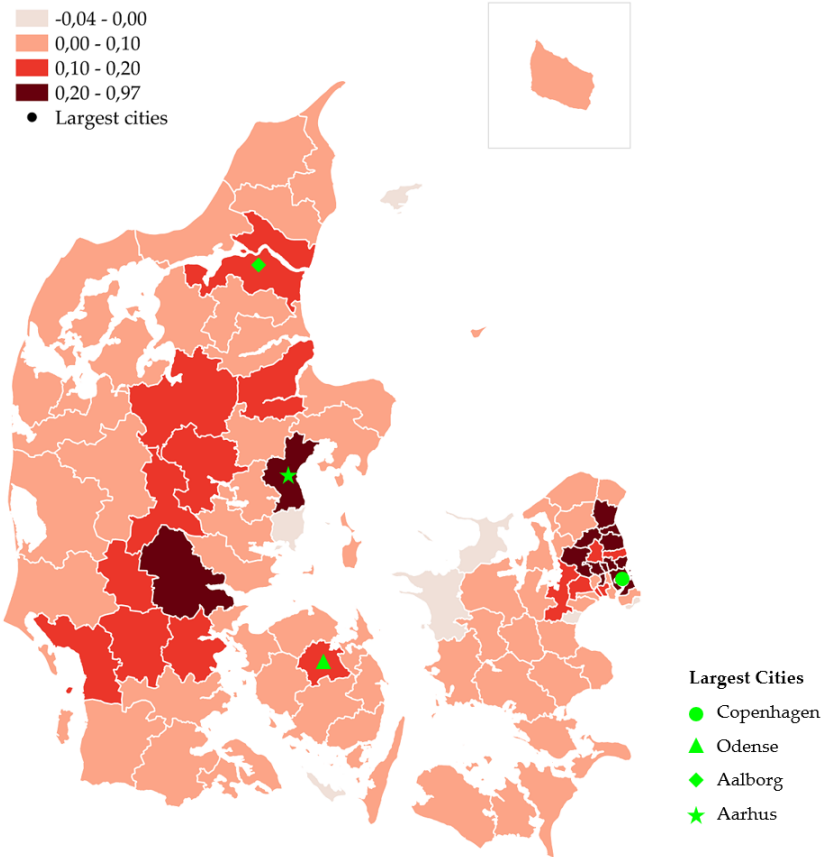




Third, the increase in the distance to HQ has not been uniform across all occupations. Increases in the average distance of workers in production, engineering, and business services occupations to their HQ account for 70% of the total increase in distance. Increases in the average distance of managerial occupations to their HQ have been small (4%), while the use of managers has increased. Finally, there has been a replacement of clerical workers by business services workers.

Fourth, the ratio of managers to production and clerical workers increased by 12 percentage points (or 80%). Changes in this ratio could reflect significant changes in the composition of production teams and managerial span of control. This increase has been particularly large in HQ and establishments located in the main cities: Copenhagen, Aarhus, Odense, and Aalborg. In Figure 3 we show how this ratio has grown faster in firms located in these four cities and in the Triangle Region, which is a group of 7 municipalities with a relatively high concentration of large and high productive firms. These last two facts imply that firms are fragmenting into functions.

**Figure 3. Ratio of Managers to Production and Clerical Workers by Municipality Changes between 1991 and 2016**



These results have important implications for research on agglomeration and urban economics. As our facts suggest, the world seems to be moving from a regime with mostly single establishment firms to a regime in which multi-establishment firms are increasingly important. These firms are likely to locate their manager-intensive HQ in larger cities and production and clerical tasks in

smaller cities. Moreover, our results imply that cities that retain HQs will be increasingly dominated by high-skilled, high-paid workers, which has clear implications for economic inequality, housing affordability, and the operation of regional and national labor markets.

The results from this paper also motivate future research on the causes of spatial allocation of resources within firms. Several forces could be behind the facts documented in this paper. First, fragmentation costs since the movement of knowledge, people, and goods is fundamental for different operations within firms. As these costs decrease, it becomes easier for geographically compact firms to locate some activities farther from the HQ. Second, comparative advantages and high labor and land costs in certain locations generate incentives for fragmentation that lowers marginal costs. Moreover, when facing higher costs in a location, firms could choose to leave tasks that benefit the most from the location's agglomeration economies. We study these mechanisms in (Acosta and Lyngemark, 2020).

## References

Aarland, K., Davis, J., Henderson, J. V., and Ono, Y. (2007). Spatial organization of firms: the decision to split production and administration. *RAND Journal of Economics*, 38(2):480-494.

Acosta, C. and Lyngemark, D. H. (2020). Spatial Wage Differentials, Geographic Frictions and the Organization of Labor within Firms. Work in Progress.

Charnoz, P., Lelarge, C., and Trevien, C. (2018). Communication Costs and the Internal Organisation of Multi-plant Businesses: Evidence from the Impact of the French High-speed Rail. *The Economic Journal*, 128(610):949-994.

Duranton, G. and Puga, D. (2005). From sectoral to functional urban specialisation. *Journal of Urban Economics*, 57(2):343-370.

Marshall, A. (1890). *Principles of Economics*. Macmillan London.

Spanos, G. (2017). Spatial Wage Disparities: Do Firms and their Organizations Matter?

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