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The Struggle of Small Firms to Retain High-Skill Workers: Job Duration and the Importance of Knowledge Intensity

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Advanced knowledge increases the productivity of skilled workers. Large firms are more innovative and more technological, so this knowledge-skill complementarity may be different for small and large firms. We study how the complementarity affects job duration, and how firm size influences this relationship. We find that skilled workers in large knowledge firms see a premium in terms of longer durations but in small knowledge firms they suffer a penalty instead. Even small knowledge firms paying higher wages find it hard to keep workers. These facts limit small firms' ability to handle knowledge. This calls for policy mechanisms to diminish barriers to knowledge, recognizing that human resources are the main assets of new ventures.

Technological and economic development in the knowledge economy is predominantly skill-biased, leveraging the complementarity between knowledge investments and skills (Griliches, 1969), favoring those better able to create and manipulate knowledge. Skills are increasingly becoming the paramount condition to access high-paying, long-lasting jobs in knowledge-intensive firms, leaving less-skilled workers trapped in low-wage, high-turnover jobs, with fewer ladders for

career advancement. This segmentation issue further compounds when one acknowledges that most knowledge-intensive jobs are concentrated in large employers, which adopt more recent technologies (Dunne, 1994) and are more capital-intensive (Troske, 1999). Furthermore, it is widely accepted that large firms pay higher wages and in general hire more high-skilled workers (Oi and Idson, 1999). The same two facts are also verified in more technological firms (Dunne and Schmitz

Jr., 1995), thus highlighting that skills are more valued in large technological companies if the technology-skill complementarity hypothesis holds. This may present a challenge to small technology- and knowledge-based firms if they struggle to retain the skilled workforce required for survival and growth.

In this brief, based on Castro-Silva and Lima (2021), we analyze the relationship between knowledge intensity and job duration, and how this relationship differs in small and large firms. We provide evidence of contrasting skill requirements in small and large companies with distinct levels of knowledge intensity, and how job separation rates vary across the different categories. There is substantial research on the relationship between employment and technological progress (e.g., Barbieri et al., 2020). Though there is no consensus on the overall impact, most works suggest that innovation brings net employment growth at the firm level (e.g., Baffour et al. 2020; Van Roy et al., 2018).

Technological change is usually considered to be skill-biased, increasing the demand for skilled workers and changing the skills distribution in the labor market (Autor et al., 1998), owing to capital-skill complementarities (Griliches, 1969). If skilled workers are better able to learn how to use new technologies and are more capable of producing new knowledge (Doms et al., 1997), the demand for skills in innovative environments increases. Low-skill workers may expect higher separation rates and shorter job duration in knowledge-intensive companies.

Large firms are more likely to adopt new technologies (see Hall and Khan, 2003; Stoneman and Battisti, 2010 for extensive reviews). Combining the fact that large firms

adopt more technology and value skills more, and that technology and knowledge intensive firms value skills more, we would expect to see an even larger premium for skills in larger technology and knowledge intensive firms, that translates into more stable jobs. Small knowledge-intensive firms face two opposed effects: knowledge-skill complementarities that increase the returns to skills, and a small-size penalty in hiring and retaining skilled workers; the premium in larger firms might be so substantial that smaller knowledge-intensive firms cannot compete for skilled workers.

We use a linked employer-employee dataset from Portugal, to analyze job duration and explore the interaction between human capital, size and knowledge intensity. We also consider heterogeneity of firms' personnel policies on job duration. We use an indicator for the firm's ability to pay above or below market wages as well as to hire more talented workers, following Abowd et al. (1999). The indicator is based on the quartiles of the firm fixed effects from a wage regression.

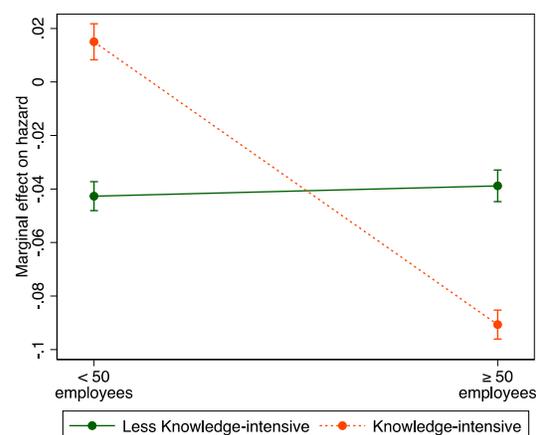


Figure 1 — Average Marginal Effects of College Education

Figure 1 shows the marginal effects of college education on the hazard of job separation over the size and knowledge categories. In knowledge-intensive industries, college-

educated workers in large firms enjoy a premium much in the hazard of job separation compared to those without college education, these workers are penalized in smaller firms.

Figure 2 displays the marginal effects of the quartiles of the firm fixed effects (reflecting the firm’s wage policy) by firm size and knowledge intensity.

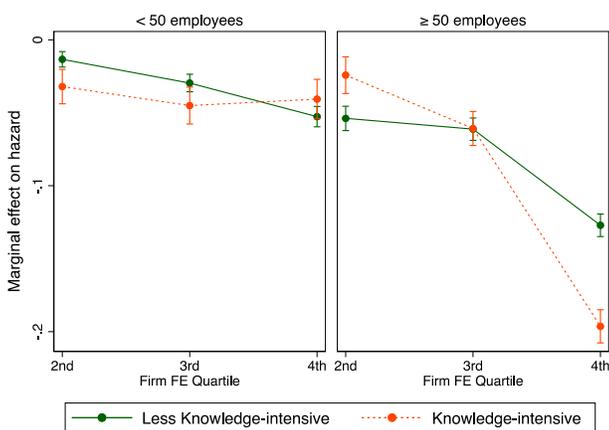


Figure 2 — Average Marginal Effects of Personnel Practices

We see that in small firms in knowledge-intensive industries, the best personnel policies do not translate to an advantage compared to other small firms or large firms. These results further compound with our previous findings where small firms in knowledge-intensive settings could not present a premium to college educated or other highly-skilled workers. In large firms the marginal effect of the fourth quartile is much larger for knowledge-intensive firms.

Our results suggest evidence of knowledge-skill complementarity in large firms, but not in small firms, as well as a greater efficacy of personnel practices in large knowledge intensive firms but no advantage in small firms in the same knowledge category. Our findings paint a picture of the inability of small knowledge-intensive firms to both hire and maintain a skilled workforce that is central to the firms’ survival, success, and growth.

Implications

We find a skill gap between small and large knowledge-intensive firms, which could lead to ever-expanding large firms and dwindling small firms who cannot maintain or grow their ranks of skilled workers necessary for greater innovation, technology adoption and knowledge production. Small firms are an important driver of employment creation and competitiveness. Small firms need to compete for high-skilled workers and to be able to offer conditions to retain it. If evidence shows that small firms are associated with lower job stability, then there is space for public policy to intervene and find mechanisms to diminish the barriers to knowledge use and development, recognizing that human resources are the main assets of any new venture.

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