Abstract: Engagement in foreign markets can have an impact on firm organization and on the type of occupations that a firm needs. We examine the effect of globalization on the occupational mixes using detailed Swedish data that cover all firms and a representative sample of the labor force 1997-2005. We find a robust relationship between a firm’s degree of international integration and its occupational mix. Multinationals, which are the most globally engaged firms, have a distribution of occupations skewed toward the more skilled occupations. Non-multinational exporters have a distribution of occupations less skewed toward the skilled compared to multinationals, but more skewed toward the skilled compared to Swedish non-exporters (which are the least globally engaged). Moreover, firms tend to be even more skill intensive when they mainly export to far away markets or when they export differentiated goods. Our results are little changed (1) when we control for firm size, productivity, capital intensity, and firm age, (2) when we control for offshoring and R&D expenditures; (3) when we use alternative methods to rank occupations, or (4) when we use wage shares instead of employment shares. In addition, the results are very similar for manufacturing and service sectors, and for foreign and Swedish multinationals.

JEL: F1, F2

Keywords: Occupation mix, Globalization, Multinational Enterprises

Acknowledgements: We are indebted to XXX for helpful discussions. We have also benefitted from the feedback provided by seminar participants at Lund University and conference participants at YYY. Fredrik Heyman and Fredrik Sjöholm gratefully acknowledge financial support from the Swedish Research Council and Torsten Söderbergs Stiftelse.
1. Introduction

Profits are the *raison d'être* for firms. Toward this end, firms undertake a variety of tasks in addition to production. These supporting tasks include *inter alia* research, financial management, logistics, marketing, and sales. Each of these activities, including actual production, requires the input of workers who are trained in various occupations (e.g., managers, professionals, operators, and clerks). It is likely that the mix of occupations required to undertake various activities varies from firm to firm. In particular, the tasks required to support a multinational enterprise (MNE) are likely to differ from those required to support a non-MNE that exports, which in turn are likely to differ from a firm that has no global engagement at all. However, a decade after the seminal work of Melitz (2003), “[t]he productivity of the firm remains largely a black box and we still have relatively little understanding of the separate roles played by production technology, management practice, firm organization and product attributes towards variation in revenues across firms” (Melitz and Redding, 2013).¹ In this paper we aim at shedding light on the organization of production within firms, as captured by the distribution of occupations, and its relationship with a firm’s international orientation.

In our empirical investigation we focus on workers that are included within a firm’s boundaries. We use comprehensive and detailed Swedish matched employer-employee data spanning the period 1997-2005. The data include all Swedish firms with at least 20 employees and detailed information on a representative sample of the labor force. In particular, we have information on the occupation for all included employees at a very detailed level (more than 100 occupations). We are therefore able to examine how the degree of a firm’s global integration relates to the distribution of occupations within the firm.

¹ See also Arkolakis (2010), who argue that the nature of entry costs to foreign markets remains largely unexplained.
A first look at the results is seen in Figure 1 which displays the aggregate distribution of occupations by skill levels for three types of firms. Three different firm types are included: (i) the most integrated ones – MNEs; (ii) the least integrated ones – Local firms (i.e., non-MNEs that do not export); and (iii) the intermediate firm type – Exporters (i.e., non-MNEs that export). The horizontal axis is the ranking of 100 occupations by skill levels, from the least skilled to the most skilled. The vertical axis is the share of the labor force accounted for by the skill category below that is indicated on the horizontal axis. The upper figure shows occupations ranked according to the average wage for all firms in 1997. The lower figure is based on a regression ranking.²

Figure 1 shows that roughly 50 percent of the employees hired by Exporters are in the 50 percent lowest ranked occupations. The corresponding figures for MNEs and Local firms are roughly 40 and 70 percent respectively. Moreover, Exporters have a distribution close to the 45 degree line, meaning that their employees are evenly distributed over occupations by skill categories. Looking at MNEs, it is seen that their distribution is skewed towards high skilled occupations. The opposite is true for Local firms which have a distribution skewed towards low skilled occupations.

More elaborated econometric estimations in the paper show a robust relationship between the degree of international integration and the distribution of occupations at the firm level. MNEs, which are the most globally engaged, have a distribution of occupations skewed toward the more skilled. Non-MNE exporters have a distribution of occupations less skewed toward the skilled compared to multinationals, but more skewed toward the skilled compared to Swedish non-exporters (which are the least globally engaged). Furthermore, firms tend to be even more skill intensive when they mainly export to far away markets or when they produce differentiated products. Our results are little changed (1) when we control for firm size, productivity, capital

² The beta ranking is derived from a Mincer wage regression. See Section 2.C. for more detail.
intensity, and firm age; (2) when we control for offshoring and R&D expenditures; (3) when we use alternative methods to rank occupations; or (4) when we use wage shares instead of employment shares. In addition, the results are very similar for manufacturing and service sectors, and for foreign and Swedish MNEs.

In order to explain the empirical results, we develop a theoretical model that relates to the literature emphasizing fixed costs associated with internationalization. For instance, Helpman, Melitz and Yeaple (2004) stress the different productivity requirements for engaging in production for domestic sales, export, and foreign direct investment (FDI). Compared to non-exporters, exporters need to incur an iceberg transport cost and an additional fixed cost for entering a foreign market which is higher than the fixed cost for domestic production. A firm can also choose to sell to the foreign market via foreign affiliates, which implies an even higher fixed cost, but no transport cost. Their model suggests that the most productive firms can cover the highest fixed costs and will pursue FDI, firms with an intermediate level of productivity will export, and the least productive firms will produce for the domestic market only.

Extending Helpman et al. (2004), our theoretical model considers workers with different occupations as the inputs in production. We assume that fixed inputs, needed for internationalization and production, are intensive in professional occupations (e.g., managers and professionals). Thus, fixed costs consist of wages paid to high skilled occupations. By contrast, variable inputs used for production are a combination of both skilled (e.g., managers and professionals) and less skilled occupations (e.g., clerks and operatives). Since fixed inputs are intensive in the use of professionals, the higher the required fixed cost, the higher is the share of professionals in the workforce. Because the most productive firms are able to cover the highest fixed costs, these firms choose FDI and are the most intensive in professional occupations. On the other hand, firms that are the least productive can only cover the fixed cost of domestic
production and thus serve the domestic market only. These firms also have the lowest share of professionals. Finally, firms with an intermediate level of productivity become exporters and have an intermediate intensity in professional occupations.

There are few previous theoretical papers examining the relationship between globalization and organization of production within firms. One exception is Matsuyama (2007) who constructs a model where factor intensities can differ within products. Production for export is assumed to be more skilled intensive than production for domestic sales since export requires “white-collar workers, particularly those with language skills, international business experiences and/or specialists in export finance and maritime insurance.” Matsuyama shows that an increase in the world supply of skilled labor will therefore increase the degree of globalization.

Moreover, Caliendo and Rossi-Hansberg (2012) construct a model with heterogeneous firms in a monopolistic competition market. Managers solve problems that production workers are not able to solve and a firm can have many layers of managers where higher layers solve more complicated problems. Adding a layer of managers involves new fixed costs but reduces variable costs. Productivity will be endogenous in this model and depend on the number of layers of management. The number of layers is in turn dependent on the demand for the firm’s product since the extra fixed cost of layers can only be motivated if the scale of production is sufficiently high. Demand is exogenous and only firms with a large demand for their products can afford enough layers to make the firms so productive that it can cover the fixed cost for exporting.

Our paper also relates to a small but growing empirical literature on globalization and the organization of firms. For instance, Rajan and Wulf (2006) find that U.S. firms have become flatter over time, i.e., firms have fewer layers of management. Moreover, Guadulupe and Wulf (2010) find trade liberalizations to make firms flatten their organizations by removing layers between the CEO and division managers, and by increasing the number of positions that report
directly to the CEO, a result that is in contrast with the theoretical predictions by Caliendo and Rossi-Hansberg (2012). Finally, Caliendo, Monte, and Rossi-Hansberg (2012) use French firm level data with information on five different occupation categories - three types of management, clerks and blue-collar workers – to examine the wage effect of adding a layer (one of the above categories) or by expanding existing layers. They report that exporters are more likely to add layers than non-exporters, and that firms that exit the export market are more likely to drop layers than firms that continue to export. Unlike these empirical studies that focus on the organizational hierarchy, our work is mainly about the occupational mix in firms with different degree of global engagement.

The paper is organized as follows. In the following section we begin with some descriptive statistics of the comprehensive Swedish matched employer-employee data. In Section 3 we sketch out a simple theoretical framework to understand the empirical facts revealed by our data. Our model suggests systematic differences in occupational mix across firm modalities. We then turn to detailed empirical analysis in Section 4. We offer concluding remarks in Section 6.

---

3 Tåg (2013), using Swedish data, find results that are in accordance with the theoretical predictions of Caliendo and Rossi-Hansberg (2012) and are similar to the results presented in Caliendo et al. (2012). He finds that firms with more layers are larger in size, in value added, and pay higher wages. The analysis in Tåg is however not related to globalization of firms.