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The distribution of the gains from spillovers through worker mobility between workers and firms

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ABSTRACT

Knowledge spillovers through worker mobility between firms, found in previous research, imply that knowledge production within firms creates a positive externality to the hiring firms and their workers. We calculate the shares in the gains from spillovers retained by these parties using matched employer–employee data from Danish manufacturing. We find that around two-thirds of the total output gain (0.1% per year) is netted by the firms as extra profit, about a quarter goes to the incumbent workers as extra wages, while the workers who bring spillovers receive no more than 8% of it. This gains distribution, which favors the hiring firms, is similar for different types of moving workers, and is stable over time.

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1. Introduction

Theories of knowledge spillovers across firms have often relied on inter-firm worker mobility as a mechanism facilitating such spillovers (Fosfuri et al., 2001; Markusen, 2001; Glass and Saggi, 2002; Dasgupta, 2012). Several recent empirical studies, including Gorg and Strobl (2005), Markusen and Trofimenko (2009), Balsvik (2011), Parrotta and Pozzoli (2012), and Stoyanov and Zubanov (2012), have documented the workings of this mechanism, linking firm productivity gains to hiring workers from technologically superior firms.[1] Since the latter receive no compensation from the firms that hire their workers, the existence of knowledge spillovers through worker mobility implies a positive externality. The ambition of our study is to determine how much of this externality ends up as extra profit to the hiring firms, and how much is transferred as extra wages to the workers they employ.

The findings from previous empirical studies, most of which focussed on the movements of workers from foreign- to domestic-owned firms, suggest that part of the ensuing output gains is indeed remitted to the workers. In particular, domestic firms pay a wage premium to new hires with foreign-firm experience over the wages of otherwise similar workers without such experience (Pesola, 2011). Incumbent workers benefit as well, seeing their wages grow in step with the share of ex-foreign firm employees in their firms (Poole, 2013). Hiring foreign specialists by domestic firms is also linked to wage increases in those firms, estimated at 4.5–6.2% depending on skill level (Markusen and Trofimenko, 2009).

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[1] A related literature on patent citations, historically the first to discuss knowledge spillovers, found a link between the movements of R&D workers and citations by their new employers of the patents granted to their previous employers (Almeida and Kogut, 1999; Song et al., 2003; Oettl and Agrawal, 2008; Singh and Agrawal, 2011).

Despite the gains to the firms and to the workers being available from the above studies, there has been no attempt to compare those gains. Our study is the first such attempt. We estimate the gains from the worker mobility to the hiring firms and their workers using a specially designed empirical framework, and for all firms in an economy regardless of their domicile. Doing so requires a measure of a receiving firm's exposure to spillovers through worker mobility that is more flexible than foreign vs. domestic ownership of the sending firm. The lack of such measure in the previous literature forced researchers to narrow down the study scope, to assume that all foreign-owned firms are equally good sources of knowledge spillovers, and to ignore domestic firms as a source of potentially useful knowledge. Our method, which we outline below, relaxes these limitations.

We estimate output gains from worker mobility and their distribution between the parties by tracking inter-firm movements of spillover potentials (SPs), whom we identify as the workers with a positive gap between their previous and new firms' total factor productivity (TFP) levels. This characterization is consistent with the theories behind spillovers through worker mobility (for example, Dasgupta, 2012) that treat the exposure to superior knowledge, which is manifested in higher productivity, as the source of spillovers. Assuming that output gains through mobility come entirely from SPs' higher labor productivity, aided by their exposure to knowledge in their previous firms, we obtain an equation linking a hiring firm's output gains from SPs to their average productivity gap and share in the labor force. We next derive a decomposition of the total output gains into the wage gains to SPs and non-SPs, and the profit gains to the hiring firms, which we estimate using linked worker-firm data from the Danish manufacturing sector.

To preview our findings, the total output gain linked to SPs is 0.1% in the year after hiring, or just under a tenth of the annual productivity growth averaged over the sample period. Compared to otherwise similar non-SPs, SPs receive a wage premium of 1.17% per year on average. Non-SPs benefit too, though their average wage gain is a lot less, 0.09% per year. With SPs making up only about 2% of all the workers, the total wage gain from spillovers through mobility is 0.11% per year. Applying our gains decomposition to the above estimates, we calculate that the hiring firms net 57–76%, and non-SPs between 20% and 35%, of the total output gain, whereas SPs retain at most 8%. Put differently, firms receive a profit of around two dollars per each dollar spent on hiring SPs. This distribution of the output gains between the parties, which reveals abnormally high rents to the firms, is robust to alternative estimation approaches and is stable over time.

On the qualitative side, our findings suggest that knowledge acquisition through hiring SPs may be a lucrative alternative to buying patents or in-house R&D, and is all the more attractive because it does not require significant cash outlays or technical expertise. It is, however, hard to pinpoint labor market imperfections that would explain the high rents to the hiring firms that we find. The one that we find most plausible and consistent with the (limited) empirical evidence so far is poor observability of moving workers' spillover potential, which leads to a lack of competitive market for SPs. Further research should examine this explanation more rigorously.

In the remainder of this paper, Section 2 presents the conceptual framework for our study, which is followed by a discussion of the relevant estimation issues in Section 3. Section 4 presents our data together with some descriptive statistics. The baseline results – output and wage gains from SPs, and their distribution – are reported in Section 5. Section 6 contains a number of extensions corroborating our baseline results, and Section 7 concludes.

2. Conceptual framework

In this section, we define the key concepts that we use in our analysis. We also present a framework that relates firm output gains to hiring SPs and decomposes these gains into the wage and profit gains. Although one could estimate the wage and profit gains from SPs directly, without linking them to output, the advantage of our output gains decomposition is in the keeping of negative profit observations in the sample, which would have been lost if profit gains were estimated directly.

2.1. Output gains from spillover potentials

Suppose that firm i's output in year t, Y_{it}, is a Cobb–Douglas function of labor (L), capital (K), materials (M) and the total factor productivity (TFP, A):

$$Y_{it} = A_{it} K_{it}^{\beta_k} L_{it}^{\beta_l} M_{it}^{\beta_m}$$

As in Stoyanov and Zubanov (2012), we define spillover potentials (SPs) as workers hired from firms with a higher TFP than that of their current employer. Assuming that the gains from SPs come solely in the form of their higher labor productivity, we capture the labor productivity difference between SPs and non-SPs by specifying labor input in efficiency units:

$$\begin{aligned}
L_{it} &= L_{it}^{nSP} + \delta_{it} \cdot L_{it}^{SP} \\
&= (L_{it}^{nSP} + L_{it}^{SP})(1 - s_{it} + s_{it} \cdot \delta_{it}) \\
&= \tilde{L}_{it}(1 + s_{it} \cdot (\delta_{it} - 1)),
\end{aligned} \tag{1}$$

where $\tilde{L} = L^{SP} + L^{nSP}$ is the total labor input in nominal units[2] (the sum of headcounts), s is the SPs' share in total workforce, and $\delta \geq 1$ is the measure of SPs' labor productivity advantage (LPA) over the rest of the workers, more on which is given in

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[2] Depending on whether SPs are observable to the firm or not, the firm's choice variable can be either the numbers of SPs and other workers separately, or the total labor input. Our estimation approach can handle both cases.