

Who benefits from firm-sponsored training?

Firm-sponsored training benefits both workers and firms through higher wages, increased productivity and innovation

Keywords: firm-sponsored training, wages, productivity, innovation, complementarities, human capital

ELEVATOR PITCH

Workers participating in firm-sponsored training receive higher wages as a result. But given that firms pay the majority of costs for training, shouldn't they also benefit? Empirical evidence shows that this is in fact the case. Firm-sponsored training leads to higher productivity levels and increased innovation, both of which benefit the firm. Training can also be complementary to, and enhance, other types of firm investment, particularly in physical capital, such as information and communication technology (ICT), and in organizational capital, such as the implementation of high-performance workplace practices.

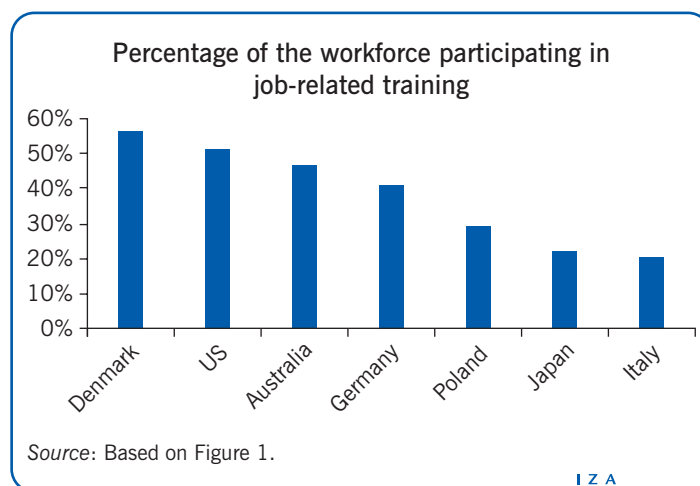
KEY FINDINGS

Pros

- ⊕ Workers undertaking firm-sponsored training improve their skills and receive higher wages as a result.
- ⊕ Firm-sponsored training increases productivity, as measured by sales or value added per worker.
- ⊕ Innovation performance also improves in firms that invest in training.
- ⊕ Larger firms and firms investing in physical capital (IT) and/or organizational capital provide more training due to the benefits of complementarities.
- ⊕ There is evidence that returns are higher in firms that invest in both training and in physical and organizational capital.

Cons

- ⊖ Some workers, particularly older workers and less-educated workers, receive less firm-sponsored training.
- ⊖ Smaller firms tend to favor informal training and provide less training overall than larger firms.
- ⊖ There is little data on the cost of training, which makes it difficult to measure the return-on-investment of training for firms.
- ⊖ There is a lack of research on the effects of training on some important measures of firm performance and workers' well-being.



AUTHOR'S MAIN MESSAGE

Firm-sponsored training is an investment in which both workers and firms can share the benefits. Workers benefit through higher wages and increased skills. Firms benefit through increased innovation and a higher productivity of labor. There is also evidence that firm-sponsored training complements other types of investment in the firm. Policymakers need to consider the importance of firm-sponsored training as a key driver of productivity growth. Policy should also be directed toward reducing barriers to training that may result from a lack of information or access to credit, particularly in smaller firms.

MOTIVATION

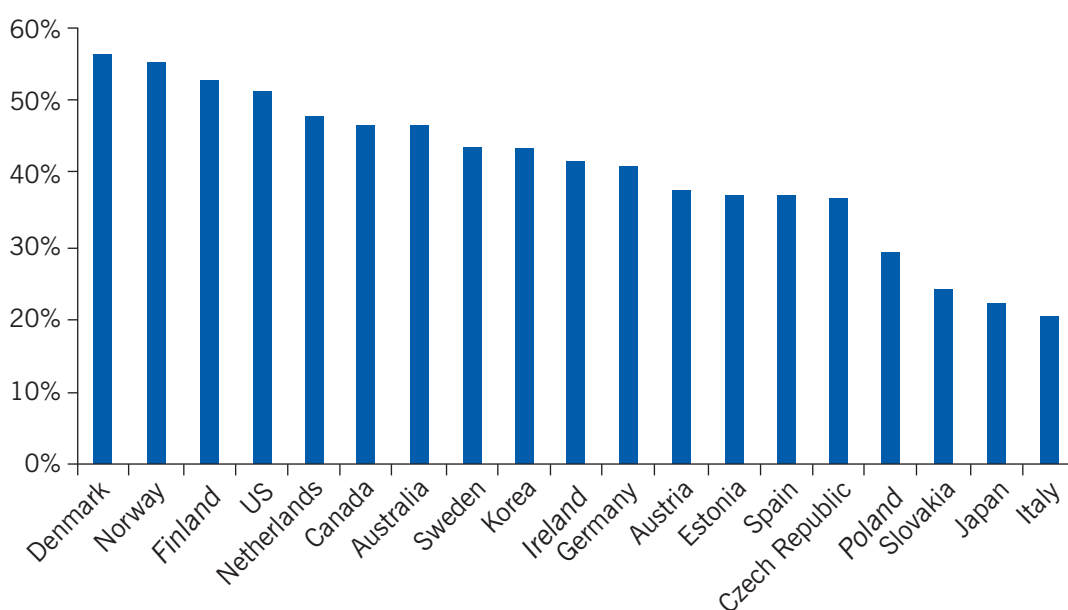
“Firm-sponsored training” is defined as training that is organized and provided by a firm for its employees. The costs of firm-sponsored training are typically shared between employees (through lower wages during the training process) and employers. However, the firm, or employer, generally bears the greater financial burden as they pay most of the direct monetary costs of training. In addition, the firm bears the cost of the forgone loss in productivity as a result of employee time spent on the training program.

Workers and firms can invest considerable resources in training. By some estimates, over half of the human capital generated over the period of a lifetime (i.e., the skills, abilities, ideals and health benefits developed through training programs) is a result of post-school investment, which includes training within firms [1]. Although numbers vary, in many countries almost 50% of the workforce participate in some kind of firm-sponsored training each year (Figure 1). Data on the duration of training from the International Adult Literacy Study from the OECD show that on-the-job training programs take, on average, 137 hours per year [2].

It is likely that the amount of time spent on training will increase in the future in view of the rapidly accelerating pace of technological progress and the new demands that will necessarily exert on individual workers. Developing a highly trained workforce through formal education and further training allows firms to respond quickly to an increasingly competitive, technology-intensive business environment.

It can be helpful to think of firm-sponsored training as an investment in which workers and firms share both the costs as well as the benefits. Human capital theory predicts that training will have a positive impact on wages as long as it increases productivity. In view of this, economists have generally focused their attention on the returns to

Figure 1. Percentage of the workforce participating in job-related training



Source: OECD Skills Outlook 2013.

firm-sponsored training for the workers in the form of higher wages. However, it should be borne in mind that wage increases due to training may be lower than the accompanying increases in productivity when the wage structure of the firm is more compressed and inflexible [3]. Because of that, focusing on productivity is likely to provide a better assessment of the real returns to firm-sponsored training.

Many studies have attempted to measure the differences between the impacts of training on productivity as opposed to wages. Some have done so by using subjective measures of productivity, such as a supervisor assessment [4]. Nevertheless, all of these studies consider the effects of training on productivity to be much higher than the effects on wages. This suggests that employers both pay more of the cost and reap most of the rewards of firm-sponsored training. One study that confirms this result uses Belgian data from 1997 to 2006 [5]. It finds that increasing the proportion of workers who receive training by 10 percentage points increases firm productivity by 1.7% to 3.2%; at the same time wages increase only from 1% to 1.7%. Therefore, as concluded by the earlier studies, firms appear to be the main beneficiary of the benefits of training than only focusing on wages.

It is only quite recently that the returns, or benefits, of training programs to firms have been more carefully measured. One reason for this is due to data constraints. There is a paucity of information at the firm level that elucidates the effects and outcomes of training that may be of most interest to firms, such as improvements in productivity. This contribution considers the available empirical evidence on this issue. It also brings together a related literature that provides a more comprehensive view on decision processes made at the firm level that take into account the complementarities and benefits of simultaneous firm investments in physical, human, and organizational capital.

DISCUSSION OF PROS AND CONS

The different types and methods of training

Firm-sponsored training can be classified into two types: classroom and on-the-job training. On-the-job training is informal and typically takes place during work hours at the workplace. Classroom training is more formal and can take place outside the workplace and outside regular working hours. Most studies have focused on formal classroom training only, which is actually quite problematic given how much training is informal and acquired “on the job.”

The methods of delivery of the training can differ considerably between and within the two types of training. The various methods of training can include: formal internal training; formal external training; seminars and talks; training on the job; job rotation (where the management of the firm moves individuals and groups of employees between two or more jobs in a structured way); quality circles (in which groups of employees meet regularly together in order to solve work-related issues and problems); and self-induced learning [6].

The subject areas of training can also vary, although very few studies have examined the benefits or returns to training at the subject level. However, the three most common subject areas for training are: (1) professional training; (2) computer software training; and (3) occupational health, safety, and environmental protection training [7]. Other

common subject areas are managerial training, supervisory training, and sales-and-marketing training.

At a more theoretical level, it is useful to note that the distinction between classroom and on-the-job training is different from the one typically made by economists between general and specific training. General training can serve to increase worker productivity across many firms, in the sense that the skills are transferable and can be of benefit to other employers. Specific training, however, increases worker productivity only in one particular firm. When the training is firm-specific, an increase in worker productivity does not necessarily lead to an increase in wages, as the skills acquired through training only benefit the worker's current employer.

The measurement of firm-sponsored training also varies widely across studies. Most often, training is measured only by an indication of whether or not the worker received training during the past year. Though some studies also benefited from including information regarding the duration of training (in days or hours) or regarding the money spent on training (i.e. direct expenses by the firm). At the firm level, a typical measure of human capital investment is the fraction of the workforce that received training during the past year, although more detailed measures on hours and costs can be aggregated at the firm level.

Effects of training on wages

The literature on the impact of training on wages is quite extensive and can be classified into three categories, which are differentiated by whether the measured outcome at the worker level is: (1) the worker's hourly wage; (2) wage growth at the worker level; or (3) the workplace's wage bill.

Regardless of the selected measurement outcome, it is difficult to measure the full extent of the effect of training on wages. This is because, first, there is the standard problem that is usually encountered in studies of this type, whereby certain characteristics are difficult to capture because they are not easily measurable. This might be the innate "ability" of an employee, for example, which is difficult to quantify. This problem can lead to an overstating, or an "upward bias," in the estimated return to training. Second, the training history of the worker is rarely captured or observed in such studies. This means that the omission of past training episodes, in case they are correlated with current training and wages, may also bias the estimated wage returns upward.

The most comprehensive study that considers the impact of firm-sponsored training on wages is a recent overview analysis of 71 sets of results from 38 studies [8]. The analysis shows an average wage increase of 2.6% for each occurrence of training. The authors note that returns vary by types of training and that differences in the research approach can partly explain the differences in estimates, as studies that take into consideration any bias that may have been made in the selection of the original sample obtain somewhat smaller returns.

The studies provide two additional conclusions. First, that the returns to training are lower in firms outside the US. Second, that returns tend to be lower in more recent

studies. The former finding is consistent with the view that firm wage structures are more compressed and less flexible in Europe than in the US. The latter finding could be due to diminishing returns over time or, alternatively, as a result of using more sophisticated statistical techniques.

Effects of training on productivity

There are relatively few studies that measure the impact of training on worker productivity. This is perhaps due to the fact that there are correspondingly few data sets that contain information on both the firm's productivity and its training practices. In addition, most of the early literature uses relatively small samples, which implies that their results are not necessarily representative.

Many subsequent studies do not take account of the fact that only workplaces that perceive positive net benefits for undertaking training will do so. Appropriate estimates of the impact of firm-sponsored training on productivity must take into consideration the fact that it is a firm-level decision which is influenced by factors that can be difficult to measure (e.g. management quality). The decision can also be influenced by factors that cannot be predicted (e.g. external changes in demand for the product or service). Such factors can in turn affect both productivity and training. For example, if good management is not accounted for and is linked both to higher training levels and to better productivity, then the returns or benefits of firm-sponsored training will be lower than those estimated using simple estimation procedures. Returns could also be biased downward if firms conduct training programs during periods of weak demand for their products or services.

The solution to those problems uses firm-level or industry-level data gathered over a long period of time, which includes information on both training and productivity. It takes into account differences between firms and productivity "shocks" that may be related to training decisions. One study from the UK finds a significant, positive effect of training on productivity: value-added increases by 6% when the proportion of workers receiving training increases by 10 percentage points [9]. Another study from Germany finds that increasing the proportion of employees receiving training by 1% increases firm productivity by 0.76% [5].

However, neither of these studies distinguish between on-the-job and classroom training. Many studies find positive effects of general (classroom) training but no effect for specific (on-the-job) training. It is therefore important to not aggregate all types of training into one single measure.

Using "value-added per worker" as a measure of productivity at the firm level, one study finds that employees who undertook classroom training are 3.4% more productive than untrained employees, whereas those who undertook on-the-job training are 1.6% more productive in terms of value added per worker [6]. The higher return to classroom training has two explanations. First, on-the-job training is more closely related to turnover and is best thought of as part of turnover cost. Second, some subject areas of training (e.g. professional training) are more amenable to classroom training than on-the-job training.

Is training a good investment for a firm?

Whereas the above-mentioned studies inform us on the returns or benefits of training for workers and firms, they indicate nothing about whether firm-sponsored training is actually a worthwhile investment for the firm. It is impossible to determine if that is the case without simultaneously considering the costs of training.

One study investigates this by using a large panel data set of Portuguese firms from 1995 to 1999—effectively a census of firms with more than 100 employees—in order to determine an internal rate or measure of the return to the firm of its investments in training [10]. The authors consider both the direct costs of training and its “opportunity cost” to the firm, which is the amount of time workers would have spent on production activities for the firm had they not been participating in training programs. The authors conclude that the internal rate of return is 8.6%, which is a rate that is similar to other firm investments in physical capital or to formal schooling. This is understandable in the sense that it would be very surprising to find widely different results, as it would suggest that the firm could increase its return by switching from a poorly performing investment to a better one.

Which workers benefit most from training?

Empirical studies on what explains differences in the incidence of training are surprisingly consistent in their conclusions: workers who receive more firm-sponsored training are younger, more highly educated, and more likely to have an occupation as managers than those who do not receive such training. The reasons for these differences vary. The costs of training more highly educated workers could be lower, or alternatively the returns to training such workers may be higher. Whatever the case, the higher incidence of training for more highly educated workers is consistent with a greater return on the investment.

A higher return on investment may also explain the lower incidence of training for older workers. However, it is also possible that older workers decline training because they have a lower time horizon in which to recoup their investment.

At the firm level, the most common finding is that smaller firms provide less training, particularly formal classroom training. However, even studies that consider informal on-the-job training find a lower incidence of training among small and medium-sized firms. This result is typically explained by informational or credit constraints, in that smaller firms have fewer resources to use on research and information-gathering about training programs. In addition, they have less access to credit in order to invest in training.

The link between training and innovation

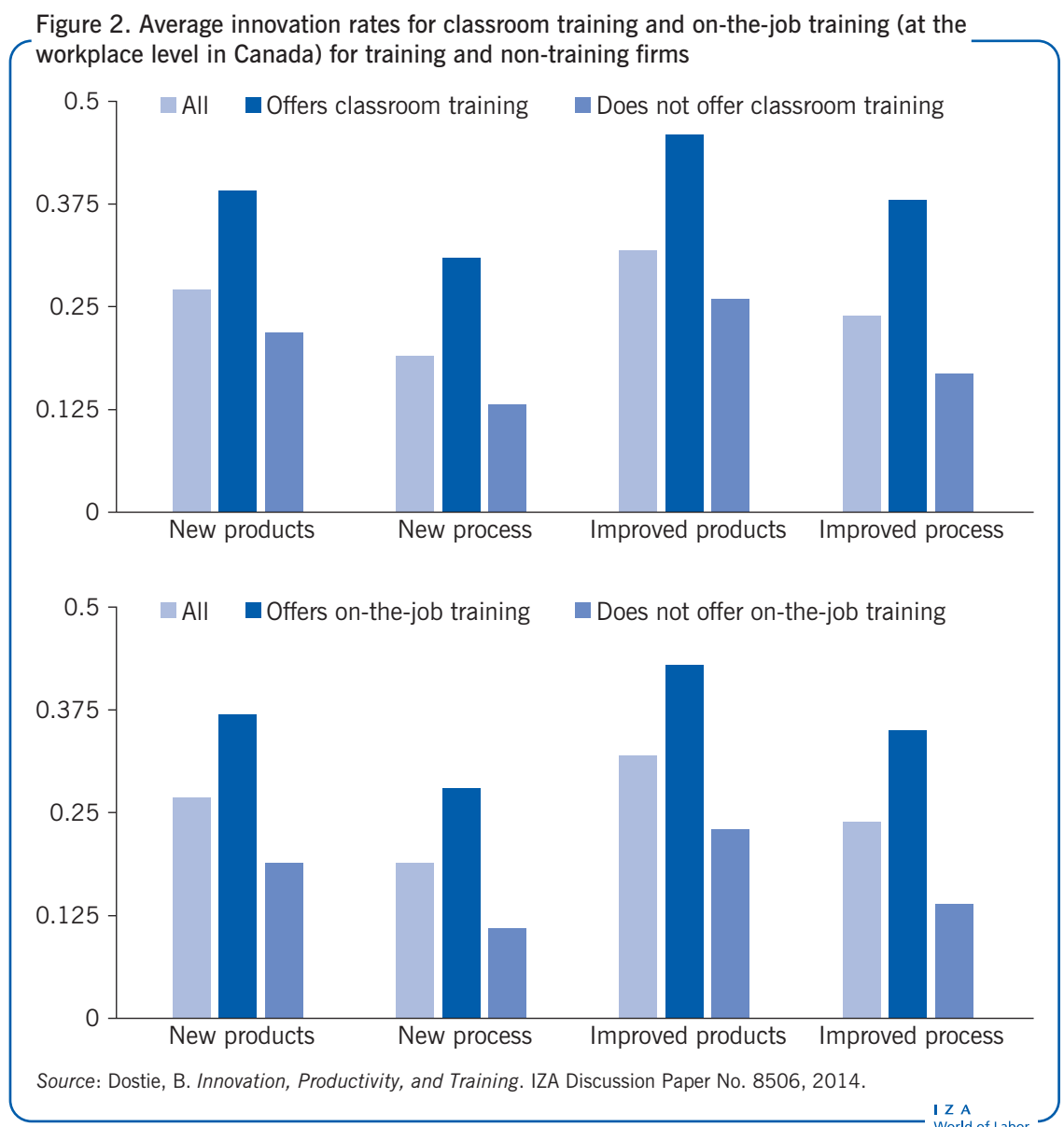
Relatively few studies have investigated firm-sponsored training as a determinant of firm-level innovation performance. This paucity of studies is surprising, as there are numerous reasons to believe that training is essential to successful innovation.

Canadian data from 1999 to 2006 show that workplaces that offer training appear much more likely to innovate. The rates of innovation for workplaces that offer

classroom training are on average twice as high as those of workplaces that do not. For example, 39% of workplaces that offered classroom training introduced product innovation, whereas only 22% of workplaces that did not offer classroom training introduced such innovation. The comparison is even more striking for the introduction of new processes, i.e. 31% versus 13%. The impact of on-the-job training seems to be just as strong (Figure 2).

One study argues that continuous training guarantees access to leading-edge knowledge and thus increases firm innovation [11]. The authors find that firm-sponsored training had a positive and statistically significant impact on innovation among German firms during the period 1997–2001. Their results show that a 10 percentage point increase in training intensity translates into a 10 percentage point higher propensity to innovate.

Distinguishing between routine innovation (that is, significant improvements to existing products or processes), and radical innovation (that is, the development of



new products or processes), the authors find that training has an impact only on routine innovation. They hypothesize that radical innovation depends on the intrinsic abilities of the workforce—in terms of creativity, inventive talent, and the desire to work in teams, etc. Moreover, because radical innovation can be perceived as fraught with risk firms might favor training for routine innovation in order to keep abreast of technological progress.

Different types of firm investment can be complementary

There is strong evidence that investments in certain types of physical capital, like information and communication technology (ICT), and simultaneous investments in human capital can be complementary. For example, ICT physical capital is complementary with cognitive and analytical tasks that require more training, in the sense that as ICT equipment becomes more advanced and sophisticated, more advanced training for the employees is also required.

In this vein, one study examines three different measures of human capital:

- the educational structure of a firm's workforce;
- a firm's occupational structure; and
- the use of workplace practices to increase a firm's stock of human capital [12].

The third of these measures includes how important education is in hiring decisions, the proportion of workers who received training in the past year, and the importance of cross-training, whereby an employee is trained to fulfil another duty or function in a different part of the organization.

The authors find that both work organization and ICT capital stock per worker predict greater investments in human capital. Firms with high levels of IT and work organization exhibit high levels of investments in human capital strategies, regardless of the existing amounts of human capital.

LIMITATIONS AND GAPS

Even though progress has been made in measuring and quantifying the impact of firm-sponsored training on productivity and innovation, there is nevertheless still a lack of research on the effects of training on other important measures of firm-level performance and workers' well-being, such as job satisfaction, firm profitability, customer satisfaction, and product quality.

In addition, there are relatively few studies on the returns to different subjects of training or different methods of delivery. Such information would help in designing training programs that yield better returns for workers and firms.

More studies are also needed on the internal rate of return of firm-sponsored training, as well as on the medium-term or long-term impacts of training. Since most studies look at the contemporaneous impact of current training investments, and since it is likely that the human capital gained through training can be used over many future

years, it is possible that we in fact underestimate the magnitude of the returns, or benefits, to training.

Finally, more studies are needed on possible complementarities between firm-sponsored training and physical capital (including ICT) and/or organizational capital. Recent research shows that firms pushing on multiple channels simultaneously obtain the largest gains, although there are differences in the results obtained. It would, however, be very useful to understand more about the context in which complementarities are more likely to be achieved.

SUMMARY AND POLICY ADVICE

The evidence for the positive impact of firm-sponsored training on workers and workplaces is strong. Firm-sponsored training helps employees acquire new skills and adjust to organizational and technological change. It also in turn leads to higher wages, improved firm-level productivity, and better firm-level innovation performance.

Public policy therefore needs to consider firm-sponsored training as a key driver of productivity growth and innovation.

In addition, policymakers should pay more attention to why some categories of firms or workers provide and receive less training, as there might be a role for public policy in reducing these differences if they are due to a lack of information or to credit constraints. A high degree of inequality in accessibility to training represents a significant source of potential increased productivity.

In particular, possible complementarities between human capital, physical capital, and organizational capital investments require better coordination across government agencies. For example, it would be of considerable benefit if the relevant governmental programs used to promote innovation and productivity could be integrated or “joined up” more effectively in order to promote complementarities of firm investments that include firm-sponsored training.

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Competing interests

The IZA World of Labor project is committed to the *IZA Guiding Principles of Research Integrity*. The author declares to have observed these principles.

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REFERENCES

Further reading

Frazis, H., M. Gittleman, and M. Joyce. "Correlates of training: An analysis using both employer and employee characteristics." *Industrial and Labor Relations Review* 53:3 (2000): 443–462.

Loewenstein, M., and J. Spletzer. "Formal and informal training: Evidence from the NLSY." In: Polachek, S., and K. Tatsiramos (eds). *Research in Labor Economics Volume 18*. Bingley: Emerald Group, 1999; pp. 403–438.

Key references

- [1] Mincer, J. "On-the-job training: Costs, returns and some implications." *Journal of Political Economy* 70:5 (1962): 50–79.
- [2] OECD. *Literacy in the Information Age: Final Report of the International Adult Literacy Survey*. Paris: OECD, 2000.
- [3] Acemoglu, D., and J.-S. Pischke. "Beyond Becker: Training in imperfect labor markets." *The Economic Journal* 109:453 (1999): 112–142.
- [4] Loewenstein, M. A., and J. R. Spletzer. "Dividing the costs and returns to general training." *Journal of Labor Economics* 16:1 (1998): 142–171.
- [5] Konings, J., and S. Vanormelingen. "The impact of training on productivity and wages: Firm-level evidence." *The Review of Economics and Statistics* 97:2 (2015): 485–497.
- [6] Zwick, T. "The impact of training intensity on establishment productivity." *Industrial Relations* 45:1 (2006): 26–46.
- [7] Dostie, B. "Estimating the returns to firm-sponsored on-the-job and classroom training." *Journal of Human Capital* 7:2 (2013): 161–189.
- [8] Haelermans, C., and L. Borghans. "Wage effects of on-the-job training: A meta-analysis." *British Journal of Industrial Relations* 50:3 (2012): 502–528.
- [9] Dearden, L., H. Read, and J. Van Reenen. "The impact of training on productivity and wages: Evidence from British panel data." *Oxford Bulletin of Economics and Statistics* 68:4 (2006): 397–421.
- [10] Almeida, R., and P. Carneiro. "The return to firm investments in human capital." *Labour Economics* 16:1 (2009): 97–106.
- [11] Bauernschuster, S., O. Falck, and S. Heblich. "Training and innovation." *Journal of Human Capital* 3:4 (2009): 323–353.
- [12] Bresnahan, T. F., E. Brynjolfsson, and L. M. Hitt. "Information technology, workplace organization, and the demand for skilled labor: Firm-level evidence." *The Quarterly Journal of Economics* 117:1 (2002): 339–376.

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