

BACKGROUND PAPER TO THE 2018 WORLD DEVELOPMENT REPORT

On-the-Job Training

Returns, Barriers to Provision, and Policy Implications

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Abstract

Firms that provide on-the-job training do so when it is critical to their productivity—and when productivity is critical to their survival. This paper begins by confirming a significant and positive return from on-the-job training on wages and productivity, as well as the presence of positive externalities from on-the-job training, while discussing the methodological considerations at play. The paper then reviews and validates the presence of market failures such as information asymmetries within the firm as a result of low-quality management practices that dampen firm demand for on-the-job training. Lack of competition in the firm's external environment appears to undermine adoption of on-the-job training and other complementary productivity-enhancing activities within the firm. The

literature suggests that for most firms, a comprehensive policy approach that resolves external constraints to becoming more productive is likely to have a positive impact on the provision of on-the-job training and adoption of complementary policies. More direct forms of firm-level support to improve management capabilities could also alleviate under-provision of on-the-job training. Where societies have improved welfare as a goal, public policy measures would be needed to complement on-the-job training for some specific groups of workers (older, less educated, women). In essence, the paper highlights the importance of demand-side constraints for firms, rather than supply-side constraints, for the provision of on-the-job training.

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On-the-Job Training: Returns, Barriers to Provision, and Policy Implications*

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Abbreviations

ALMP	Active Labor Market Policies
CEO	Chief Executive Officer
FDI	Foreign Direct Investment
HRM	Human Resource Management
IALS	International Adult Literacy Survey
ICT	Information and communications technology
IRR	Internal rate of return
MNC	Multinational Corporation
MNE	Multinational Enterprise
NCC	Non-compete contracts
OECD	Organisation for Economic Co-operation and Development
OJT	On-the-job training
PPP	Public-Private Partnership
R&D	Research and Development
RPL	Recognition of prior learning
SME	Small and medium enterprise
TFP	Total Factor Productivity
TVET	Technical and Vocational Education and Training

1. Introduction

It is widely recognized that on-the-job training (OJT) is linked to an increase in worker wages, firm productivity and, ultimately, long-term economic growth. Workers acquire most of their new and improved skills on the job over the course of their lifetimes. To maintain competitiveness in a context of rapidly changing preferences and technologies, firms need to continually acquire new production and management technologies. This increases demand for better-skilled workers.

Even though training is beneficial for both firms and workers, the existence of OJT is far less common than the evidence about its benefits may suggest. Possible explanations have been explored in the microeconomic theoretical literature, including: information gaps and uncertainty about key aspects of OJT, the free-rider problem (positive externalities) and credit constraints regarding the supply of OJT. More recently, literature from other fields, such as management and firm productivity, has pointed to barriers to adoption of managerial practices and new technologies as factors that depress demand for OJT.¹

Despite a rich theoretical literature on OJT, very little empirical evidence is available about which constraints and market failures affect firms more. In the past two decades, there has been a rise in the number of rigorous (and innovative) experimental research projects regarding how firms become more productive. This paper leverages these findings together with the traditional literature on training and labor mobility, to improve understanding of the barriers to providing OJT. Several methodological challenges exist to quantifying the links between OJT, wages and productivity. This paper discusses these as well.

First, we look at how the literature defines OJT.

A review of more than 80 papers in peer-reviewed journals on OJT and skills finds little agreement on the best ways to define and measure skills. But some areas of convergence do surface (box 1). The term *skill* reveals the modern understanding that what used to be thought of as invariant traits can be altered through experience and intervention. Skills, in general, could be regarded as the ability to carry out a task. More and more, there is growing recognition that not only intelligence quotient (IQ) and cognition as measured by achievement tests (literacy, numeracy), but other types of skills could be important predictors of success in many aspects of life (Heckman 2015). These include socio-emotional, psychological and foundational skills (communications, team work, interpersonal skills, analytical skills, and the ability to learn) that are important for trainability on the job (Heckman, Stixrud and Urzua 2006) and ideally acquired early in life.

¹ The theoretical arguments around the market failures for OJT are well documented in the microeconomic literature. In a seminal paper on training, Becker (1962) made a distinction between general and specific training. Under perfect competition, he suggested that firms will not pay for general training of their workers, who can then leave the firm searching for better-paid work that compensates them for the increased productivity they acquired through general training. Hence the worker is the sole recipient of general training benefits and also bears the costs of it. In a series of later papers, Acemoglu and Pischke (1998, 1999, 2000) argue that a substantial amount of training is paid for by firms and is still general in nature. Firms pay for general training in the presence of a compressed wage structure caused by imperfections in the labor market. With a compressed wage structure, training increases the marginal product of labor more than the wage, which creates incentives for the firm to invest in general training.

Among these skills, OJT has been referred to as a *post-school investment* (Heckman, Lochner and Taber 1998). According to them, investments in human capital occur over an individual’s life-cycle, and post-school investments (often in the form of OJT) account for more than half of a person’s life-time human capital. It can happen through a combination of learning-by-doing or formal on-the-job training in the firm. Other authors have mentioned that OJT “plays a crucial role to not only maintain but also improve [the] human capital of the workforce” (Konings and Vanormelingen 2015, p. 485). Some say that “employer-provided training is by far the most important source of further education and training after an individual enters the labor market” (Hansson 2008, p.5). A substantial portion of these human capital investments are financed by firms. Work-based training or OJT could be industry-specific or occupation-specific, general (useful to many firms), or specific (useful to the firm that is conducting the training). However, research on OJT and its impact is still in a preliminary stage; not surprisingly, “economists know less about the incentives and returns to firms of investing in training compared with what they know about the individual's returns of investing in schooling” (Almeida and Carneiro 2009, p. 1).

Box 1: How Does the Literature Define OJT?

According to the relevant literature, OJT has the following characteristics:

- The distinguishing feature of OJT is that the decision about whether to provide it is typically made by the firm with a specific business need in mind.
- OJT focuses on the acquisition of skills within the work environment under normal working conditions. It can also include training courses in the workplace or through a training institute for existing workers, master classes, internships and apprenticeships, or even Massive Open Online Courses (MOOCs).
- OJT typically includes verbal and written instructions, demonstrations and observations, as well as hands-on practice and imitation.

Formal aspects of OJT have been measured in the literature (such as time spent training on the job and the share of employees receiving formal training). But measuring the “unobservable” tacit learning through interactions with co-workers, both within and outside the firm, has proven difficult (also called learning-by-doing). Most studies on OJT measure formal training. Further, most studies do not separate the source of funding for OJT—though in most cases, workers contribute only modestly to the direct cost of OJT, and the firm bears the cost of OJT. The worker contribution is found to be through indirect means—for example, accepting compressed wage structures (see Section 2.1). Lack of credit for the firm also does not appear to significantly constrain the provision of OJT (see Section 3.2).

Next, as we review the literature, we develop a framework that looks at demand-side and supply-side constraints to the provision of OJT, whereby each constraint is one that has been suggested by the microeconomic literature on skills and OJT (table 1). In reviewing the literature, we try to determine to what extent these reasons hold empirically.² At a broader level, the analysis of the constraints in table 1 will help answer the key questions covered in box 2. This is important for policy makers trying different combinations of instruments to increase the incidence of OJT.

² For example, microeconomics suggests that two kinds of information asymmetry are at play: (i) where firms that stand to gain a lot from OJT do not have correct information about its returns or how much they need it; and (ii) where firms do not know what kind of training is available. Recent literature throws strong light on the first kind of information asymmetry as a real problem that firms across sectors are dealing with; in the second case, there is not enough empirical proof to suggest that it is a binding issue in the provision of OJT.

Table 1: Constraints and Market Failures Associated with Providing OJT

Demand-side constraints	Information gaps and uncertainty about returns	<ul style="list-style-type: none"> Value of OJT not understood by firms (that is, accurate information about productivity returns, costs, and wage rises). Value is most misunderstood by firms that stand to gain the most, and that do not realize how poorly run their firms are.
	Barriers to adoption of managerial practices and new technologies	<ul style="list-style-type: none"> <i>Firm</i>: Low adoption of new managerial practices or new technologies among firms that reduces their demand for better skills, and hence, for training. This could be due to factors internal or external to the firm. <i>Worker</i>: Misaligned compensation structures limit worker incentive to adopt and train in new technologies.
Supply-side constraints	Information asymmetry	<ul style="list-style-type: none"> Firms do not know what kind of training is available and how to go about providing it.
	Free-rider problem	<ul style="list-style-type: none"> Firms that provide general OJT are not able to fully appropriate the rents to it.
	Credit constraints	<ul style="list-style-type: none"> Firms do not have adequate resources to finance OJT, even though it may have positive returns.

Box 2: Key Questions Explored in the Literature Review

Guided by this understanding of constraints/market failures and the available literature, the key questions to be explored in this review are:

1. To what extent does a firm benefit from providing OJT? How do productivity gains for the firm compare to wage gains for the worker? What are the returns after factoring in the cost of training?
2. To what extent do future employers benefit from hiring trained workers? What is the extent of positive externality (and the associated free-rider problem) in the provision of OJT?
3. What are the barriers to provision of OJT at the firm level? Which barriers appear binding in nature? Here we will review the literature about constraints on the demand and supply side (see table 1 for the constraints description).
4. What are the policy implications of the findings from the literature? What are areas for future investigation?

The methodology involves reviewing more than 80 peer-reviewed papers that deal empirically with OJT. Given the multidisciplinary nature of this topic (including issues such as education, economic development, labor economics, personnel economics, firm productivity, competitiveness), we do not restrict ourselves to the skills literature. In this regard, we review leading papers from these fields to the extent that we find them useful in understanding the barriers affecting provision levels of OJT. As an example, keywords (and variations on them) such as on-the-job training, work-based training, skills, training, productivity, wages, manager, human

resource development, technology adoption and others were used based on the Journal of Economic Literature (JEL) classification system.

Within these papers, we prioritize those that we find rigorous in their methodology and treatment of selection issues. We prioritize papers that are rich in spelling out the “why” driving the empirical phenomenon: a justification of the economic mechanisms driving the quantitative result.³ For example, if the finding is that OJT-related wage increases tend to be lower than productivity gains, then a natural question is whether the economic mechanism is one of imperfect competition-general skills or perfect competition-specific skills. Does the paper test for one versus the other? The economic justification would influence the type of policy advice (for instance, more support to sector-specific skills or general training).

Most OJT literature deals with developed countries, but we also analyze papers that include developing country examples to validate these findings. There are few rigorous empirical studies that can compare different types of training programs—for example, OJT with active labor market policies (ALMPs) and other types of training; see box 3. We also investigated a few areas where we had hoped to find empirical links to OJT, but ultimately did not. We mention these in the section on “Policy Considerations and Areas for Future Investigation.”

Summary of results by key questions

Regarding question 1 in box 2, we reviewed recent studies that measure the effect of OJT on wage and productivity separately, and treat for selection issues.⁴ We also looked at literature that tries to factor in the cost of training (direct costs, forgone earnings and opportunity costs) to determine returns. Carefully designed literature that treats for selection issues suggests that OJT is linked with wage and productivity gains, but with firms benefiting more than workers (Almeida and de Faria 2014; Dearden, Reed, and Van Reenen 2006; and Konings and Vanormelingen 2015). (See Section 2.1 for a detailed review.)

For question 2, we studied the literature on labor mobility to better understand whether the future employer experiences productivity gains from hiring previously trained workers (Balsvik 2011; Poole 2013; and Stoyanov and Zubanov 2012). The evidence points to the presence of positive externalities because future employers tend to value and pay a premium for previously trained workers. This also indicates that while much of the OJT is general enough, it is also industry-specific in nature. Where accreditation and recognition of competence are effective, the transferability of training wage premia occurs more often. (See Section 2.2 for a detailed review.)

³ We provide an annotated list of references (Annex 1) that details key papers reviewed, as well as a complete list of references containing all the papers found using this methodology.

⁴ While there is considerable research connecting OJT to wage increases (Bartel 1995; Bartel and Sicherman 1999; Booth 1991; Blanchflower and Lynch 1994; Blundell, Dearden and Meghir 1996; Frazis and Loewenstein 2005; Greenhalgh and Stewart 1987; Lillard and Tan 1992; Lynch, 1992; Mincer 1989; Winkelmann 1994), empirical work that connects OJT to firm productivity is more recent and limited (Almeida and de Faria 2014; Black and Lynch 2001; Dearden, Reed, and Van Reenen 2006; Konings and Vanormelingen 2015). For a long time, wages were used as a proxy to determine productivity gains from OJT. However, wage-productivity equality does not hold in imperfect markets. Such studies might then underestimate the gains to firms.

For question 3, we reviewed the firm productivity and management literature that emphasizes the importance of information processing, effective human resource policies, and management capability for OJT provision and aligning worker incentives (Atkin and others 2015; Bandiera, Barankay, and Rasul 2011; and Bloom and others 2013). In this regard, we find evidence of information failures within the firm. (See Section 3.1 for a detailed review.)

Among the external conditions, we find that product market competition plays a key role in forcing firms to be more efficient and productive by creating the pressure (and incentive) to invest in innovation, exports, management capability, and/or adoption of new technology. These factors have been shown to be complementary to the demand for OJT (Almeida and Aterido 2008; Black and Lynch 2001; Frazis, Gittleman and Joyce 2000; Frazer 2006; Pierre and Scarpetta 2004; and Rosholm, Nielsen, and Dabalán 2007). We did not find strong evidence pointing to credit constraints or lack of information about training programs (or how to go about it) as binding constraints to firm uptake of OJT (Atkin and others 2015; Bloom and others 2012; Carneiro and Heckman and Lee 2004; and de Mel, McKenzie, and Woodruff 2008).⁵ (See Section 3.2 for a detailed review.)

The purpose and contribution of this paper are twofold. First, it provides a review of systematic empirical evidence regarding the links between OJT, wages, productivity, costs in the firm that trains and, to an extent, at the future employer. This is helpful in assessing the extent to which positive externalities are at play, the type of training imparted and who benefits from OJT. Second, the review goes beyond the traditional literature on skills and education, and delves into the literature on firm management (personnel economics) and productivity. As such, it provides a more granular sense of the different types of barriers that the firms may be facing. To the best of our knowledge, this has not been done before. Because firm productivity and survival are necessary conditions for productivity-enhancing activities such as OJT, we need to cross over to that literature to better understand the economic mechanisms at play both within and outside firms. We believe this will enhance the understanding of “why” with regard to OJT provision. In addition, it has direct implications on how governments decide whether to support this important training area.

⁵ Studies show that access to information about new training in the market is not a binding constraint for sporting goods firms in Pakistan and textiles firms in India (with an intervention that is available on the market, for example, consulting services or sharing of information). Some firms are faster than others in accessing these tools, depending on their management capability and other factors (Atkin and others 2005; Bloom and others 2012).

Table 2: Summary of Findings from the Literature on Constraints to Providing OJT

	Constraint	Explanation (from Theoretical Literature)	Findings (from Empirical Literature)	Policy Considerations and Areas for Future Work
Demand-side constraints	Information gaps and uncertainty about returns	Value of OJT is not understood by firms (accurate information on productivity returns, costs, wage rises); it may be particularly misunderstood by those firms that stand the most to gain, and that do not realize how poorly run they are.	Literature indicates that the returns to OJT (firm productivity and worker wages) are positive. The internal rate of return is positive (see section 2.1). Literature presents validation of information gaps, and finds that firm-level management is often not well-informed about the cost-benefit calculus of new training, leading to ineffective HR policies (see sections 2.1 and 3.1).	<u>Demand side considerations</u> Reforming product market competition, trade, regulatory environment and other institutions (see section 4.1.1). Reducing uncertainty about gains, increasing information flows, and providing certification systems (see section 4.1.2).
	Barriers to adoption of managerial practices and new technologies	<i>Firm:</i> Low adoption of new managerial practices or new technologies among firms — reducing their need for better skills and, hence, demand for training. This could be due to factors internal, or external, to the firm. <i>Worker:</i> Misaligned compensation structures limit worker incentives to train in new technologies.	Evidence of external environmental factors such as low product market competition linked to low adoption of productivity-enhancing activities (OJT, new technologies, such as information and communications technology [ICT], management practices). Within firms, low adoption of managerial practices in developing countries with a preponderance of family-owned firms depresses demand for productivity-enhancing activities such as OJT (see sections 3.1 and 3.2). Even if the firm management wants to adopt new technology, there is evidence of distorted HR policies (linked to information gaps) that creates low incentives for workers to participate as they do not share in the gains (see sections 3.1 and 3.2).	Helping to improve management skills for better HR policy formation (see section 4.1.3). Using more gain-sharing instruments and performance-based compensation for workers (see section 4.1.4). <u>Supply side considerations</u> Targeting selective firms for the provision of government subsidies (see section 4.2.1). Lower coordination costs among firms (see section 4.2.2).
Supply-side constraints	Information asymmetry	Firms do not know what kind of training is available on the market, and/or how to go about providing for it.	Literature review does not suggest this is a binding constraint because some firms in the market are able to access this information, while others cannot. Simple interventions, such as increasing information awareness, can help resolve the problem (see section 3.1).	Targeting support to disadvantaged groups (see section 4.2.3).
	Free-rider problem	Firms that provide general OJT are not able to fully appropriate the rents to training.	There is evidence of productivity benefits for future employers profiting from hiring workers trained in the previous firm. Wage gains for existing workers in the future employer are higher when the firm hires a trained worker (for example, from multinational corporations) (see sections 2.1 and 2.2).	<u>Areas for future work</u> More rigorous analytical work on OJT link to Public-Private Partnerships (PPPs); impact of agglomeration on OJT; and resolving methodological issues for better OJT measurement.
	Credit constraints	Firms do not have adequate resources to finance OJT, even though it may have positive returns.	For most firms, a lack of convincing evidence about the presence of credit constraints is a significant reason why firms under-provide training. This could be a bigger issue for microenterprises and low-income workers (see section 3.2).	

The next section discusses the findings from the literature with respect to the four guiding questions: OJT returns to the current employer, returns to the future employer of hiring previously trained workers (i.e. the extent of the free rider problem), barriers to adoption (within and outside firms) and policy considerations and suggestions for future research and investigation.

2. Returns to OJT

2.1 At current employer: Effect on productivity, wages and costs

To what extent does a firm benefit from providing OJT? How do productivity gains for the firm compare to wage gains for the worker? What are the returns after factoring in the cost of training?

At the level of aggregate economic growth, the skills level of the workforce is a first-order determinant of country growth (Mankiw, Romer, and Weil 1990). Adding educational quality measures beyond the quantity (years of education) produces better skills, mostly by improving cognitive skills (Hanushek and Woessmann 2008).⁶ Indeed, measures of cognitive skills can account for three times the variation in economic growth than models that include only years of schooling.⁷ The impact is larger for more open economies.

Countries have used different kinds of training programs that range from government-subsidized active labor market programs (ALMPs) for disadvantaged young adults to OJT for workers who have completed primary and secondary school. ALMPs tend to prepare young adults *for* the job, while OJT is typically for workers who are already employed—that is, *on* the job. Theoretically, there would be nothing better than a systematic comparison across different kinds of training programs (for example, OJT with ALMPs) to determine how best to spend public funds. However, we cannot do this practically without running into serious methodological challenges. Directionally, however, there is evidence of rather modest returns to ALMPs (Betcherman, Dar and Olivas 2004), whereas the returns to OJT have been found to be higher (Konings and Vanormelingen 2015). However, the challenge is that we are not able to attribute causality to program design properly as these programs target different groups of trainees. Their quality varies, and disentangling the priors of trainees from achieved results is hard. See box 3 for a summary of the methodological challenges in comparing returns across training programs, as well as a short review of ALMPs.

Box 3: The Methodological Challenge of Comparing Returns across Training Programs

Serious methodological issues are involved in comparing types of skill programs (such as ALMPs and OJT), including:

(1) Training programs differ vastly in the type and quality of trainees they attract. Disentangling worker selection into programs from causal effects is hard: Are the returns high because of the program or because of the higher-ability students attracted to it (endogeneity)? More disadvantaged workers are likely to enroll

⁶ There is a significant body of literature regarding the returns to secondary and tertiary education. The paper will refer to it as required, without focusing on it per se. In general, secondary education is an important feeder into OJT, and the two complement one another.

⁷ Evidence indicates that a standard deviation in cognitive skills increases income by a range of [0, 0.48], being mainly positive in several (mostly African) countries.

in government-driven ALMPs, which is not the case for OJT, where high skills beget more skills.⁸

(2) Training systems vary across and sometimes even within countries. Therefore, it is difficult to successfully isolate, or even compare, system-level effects (local institutions, informality, and public spending on training). For instance, Organisation for Economic Co-operation and Development (OECD) countries have extensive experience with ALMPs, technical and vocational education and training (TVET) and OJT. Developing economies have much less experience with these programs.

(3) Program quality could vary widely between ALMPs and OJTs: there are master-trainers within firms, access to the latest machines and equipment, and concrete opportunities to utilize the new skills. The fact that a firm is conducting OJT could also imply less asymmetry of information between the needs of the firms and the training output.

However, in an indirect way, by looking at the evolution of the content and setting of training used in ALMPs—a widely studied area in social protection—we can arrive at some sense of what training approaches work better. ALMPs use a mix of approaches, including in-classroom training programs; workplace training; the interaction of the previous two types; and in-classroom and workplace training—plus supplementary services, such as counseling and mentoring, monitoring, job search and placement assistance, and soft and life skills training.

A comprehensive meta-assessment of training programs from 90 countries found some patterns of transition from in-classroom only training toward combined measures of in-classroom, workplace training, and other supplementary services (Fares and Puerto 2009). The meta-analysis of 345 studies of training programs indicated that programs that combine different training approaches in ALMPs have a higher probability of positive labor market impacts on employment. In particular, the combination of in-classroom and workplace training increases the likelihood of positive labor market impacts by 30 percentage points over in-classroom training only. When this interaction is combined with other services, the probability of a positive impact increases by 53 percentage points.

In another relevant study, Betcherman, Dar and Olivas (2004) take an instructive approach about not viewing ALMPs as a panacea to youth unemployment, given the modest returns to these. They emphasize the following as good features to consider: a comprehensive package of services, programs oriented to demand and linked to workplaces; careful targeting; and early engagement of employers in training design. Both studies lament the lack of rigorous impact evaluations and cost-benefit analyses as a missing piece of the puzzle—and an area for future research.

The following subsections focus on reviewing the literature on OJT (given the high returns), to examine wages for workers, productivity for firms, costs of provision, and common measurement challenges (that the more rigorous studies analyzed here have managed to address).

⁸ ALMPs are typically government programs that intervene in the labor market to help the unemployed find work. Many of these programs grew out of earlier public works projects designed to combat widespread unemployment in the developed world during the inter-war period. ALMPs include: (i) public employment services, such as job centers, help for the unemployed in their job search effort by disseminating information on vacancies, as well as by providing assistance with upgrading interview skills; (ii) training schemes, such as classes and apprenticeships, help the unemployed improve their skills and increase their employability prospects; and (iii) employment subsidies, in the public or private sector, directly create jobs for the unemployed. These are typically short-term measures designed to enable the unemployed to build work experience and prevent skill atrophy.

Upside to OJT: Productivity and wage effects

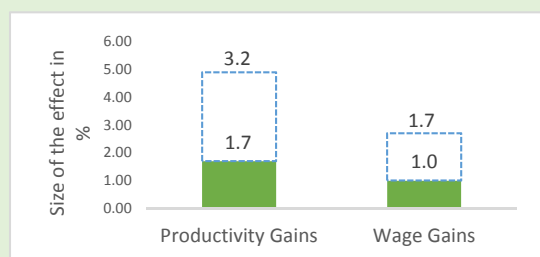
What is the upside to OJT, in terms of productivity gains and wage effects? Studies find positive effects of OJT on direct measures of firm productivity and wages. For example, Konings and Vanormelingen (2015) use firm-level panel data of OJT to estimate its impact on productivity and wages in Belgium (figure 1). Treating for endogeneity of input factors and training, they find that the increase in productivity of the trained worker is higher than the increase in wages the trained worker commands because the worker participated in OJT. In numeric terms, the average sales per worker, a proxy for productivity, increased from 1.7 to 3.2 percent, while their wages only increased from 1.0 to 1.7 percent. This occurred in response to a 10 percent increase in the number of workers who benefited from training.⁹

Another study confirms these results. Dearden, Reed, and Van Reenen (2006) study the impact of work-related training on productivity. Using panel data from the United Kingdom, they find that OJT is associated with significantly higher productivity. In response to a 1 percent increase in training, there is an increase in value-added per hour of about 0.6 percent, as well as an increase in hourly wages of about 0.3 percent. They also provide evidence of training externalities (a topic covered in greater detail in section 2.2), while controlling for firm selection and training.

Studies that look at the impact of OJT on productivity in developing countries are more limited due to data constraints. Therefore, to get a directional sense, we reviewed studies that show a link between the incidence of OJT and wage gains (which are studied widely in the developing world). Evidence from two carefully prepared country studies suggests that individuals' earnings can substantially increase with OJT (Tan and Lopez-Acevedo 2003, for Mexico, and Rosholm, Nielsen and Debalsen 2007, for Kenya and Zambia). Rosholm, Nielsen and Debalsen (2007) find a 20 percent wage increase, and Tan and Lopez-Acevedo (2003) find an impact of 5 to 7 percent due to OJT. These studies also control for endogeneity. These studies also find that the incidence of training is different for different groups by gender, prior skill level and age (box 4).

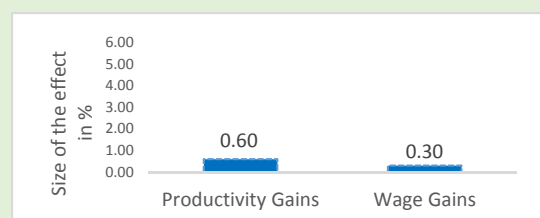
⁹ Details on each study (as well as other papers reviewed), including data set descriptions, dependent and independent data sets, and challenges with regard to methodology (if any) are included in Annex 1. Initial data collection work is described in the internal memo (Saraf, Mariscal and Velazquez, 2016).

Figure 1: Effects of OJT on Productivity and Wage Gains



Note: In the case of Belgium, firm productivity gain ranges from 1.7 to 3.2 percent in response to an increase of 10 percentage points in the fraction of workers who receive training. The average wage increases by only 1 to 1.7 percent in response to the same independent variable.

Source: Konings and Vanormelingen, 2015.



Note: In the United Kingdom, a 1 percent increase in work-related training is associated with an increase in value-added per hour of about 0.6 percent for the firm, as well as an increase in hourly wages of about 0.3 percent for the worker.

Source: Dearden, Reed, and Van Reenen, 2006.

Box 4: What Type of Workers Receive Training?

Training is not equally distributed among employees. Indeed, certain types of workers usually receive more training than others. More education and a higher threshold of skills from before begets more training. In this regard, various studies (Barron, Black and Loewenstein 1989; Hansson 2009; Leuven and Oosterbeek 2004; and Lillard and Tan 1992) show that less-educated and older workers receive less training, and that worker tenure increases the likelihood of training for the same job. Almeida and Carneiro (2009) consistently show that the workforce in firms that provide training is more educated than the workforce in firms that do not. The proportion of workers with a Bachelor's or other college degree(s) is 6 percent and 3 percent in high and low training firms, respectively, versus 1.3 percent in non-training firms. Balsvik (2011) also finds that firms that provide training to their workers tend to have a workforce with more years of formal schooling.

Training incidence is also lower among female workers. Blundell, Dearden and Meghir (1996) find that men have a much higher probability than women of undertaking employer-provided training and work-related training leading to a formal vocational qualification. Evertsson (2004) finds that women are significantly less likely to take part in formal OJT than men based on a Swedish pooled cross-sectional data set. Her research concludes that among those who receive training, women are more likely to participate in industry-specific training, while men participate in general training for lifelong skills.

There is no conclusive evidence that returns to training on productivity vary significantly with worker characteristics such as gender, educational or skill levels. Wage premiums to those participating in training while working for an employer are relatively homogeneous across age and educational attainment. However, some factors might be influencing employers to have an unequal distribution of training investments for these groups: discrimination, higher worker turnover for specific groups, prior skill levels, distortionary public policy, selection into job characteristics in the firm or possibly other factors (Evertsson 2004; Hansson 2009; Leuven and Oosterbeek 2004; Lynch 1991; Melero 2004; and Veum 1995).

The impact of training on different groups can manifest differently: in the case of relatively young and/or higher-educated workers, training provides transferable skills and increases mobility. For older and lower-

educated workers, training allows them to attain and maintain the competencies required to bring productivity in line with market wages, thereby sustaining the employment prospects of these groups.

It is clear from the literature that certain groups are likely to receive less OJT, thereby potentially amplifying skill gaps and equity concerns. This would imply an area for government intervention to stimulate acquisition of basic/secondary education, socio-emotional skills and others forms of training for these groups. Given the modest returns to government-driven training programs such as ALMPs, the design of these programs would need to factor into the latest evidence regarding what works and what does not (for evidence on ALMPs, see box 3; for policy considerations, see section 4.2.3).

Cost of providing OJT

If training were free or cheap, it would suffice to look at its returns using productivity and wage indicators. But the direct costs of training can be quite high. Data on costs are essential for computing meaningful estimates of efficiency. However, for the most part, finding data that are detailed enough and that contain cost information is rare.

Important work has been done in this area by Almeida and Carneiro (2009), who analyzed a range of large manufacturing firms in Portugal in the 1990s—with detailed information on investments in training and costs. They estimated training's internal rate of return on firms and workers. They classified costs into forgone earnings, opportunity costs and direct training costs.¹⁰

According to Almeida and Carneiro (2009), about three-quarters of the cost is associated with the direct costs of training and only a quarter with forgone production. For the group of firms that provide training, the internal rate of return on OJT is 8.6 percent, with the return diminishing over time. For the entire sample, the internal rate of return of an additional hour of training is zero, indicating a profitable investment. In general, these firms enjoy similar returns of investment on training and physical capital, and yet, a small fraction of hours is dedicated to training (less than 1 percent). This could be reflecting the difficulty of appropriating the benefits of training. They control for selection issues. However, external validity is limited as the sample is one of large firms (>100 employees), limiting application of results to smaller and medium-size enterprises in developing countries, where similar empirical work would be required.

Some other papers come to a similar conclusion regarding the cost of training. Bartel (1995) used detailed data from a manufacturing firm in the United States, and found a 13 percent internal rate of return. Frazis and Loewenstein (2005) characterized costs and obtained a 60 percent opportunity cost of training and a 40 percent direct cost. Their internal rate of return was found to be 50 percent.

Methodological challenges associated with measuring returns to OJT

The literature on OJT faces a few methodological challenges that merit discussion. First, most data on productivity and costs are for developed countries. Hence caution is required while doing cross-country comparisons and applying results across contexts. Second, the definition of what is considered training could vary by survey. Often, one cannot separate the formal aspects from the

¹⁰ Forgone earnings are paid by the worker, direct costs are mostly paid by the firm, and opportunity costs can be associated with both the worker (time dedicated to training that could instead be dedicated to other activities) and the firm (the worker being trained could have been producing instead). The authors only had information about the direct cost of training. They then calculated the forgone productivity costs of training using the marginal product of labor and the time allocated to training. However, they could not disentangle the effect on both firm and worker rates of return, so they estimated a joint rate of return.

learning-by-doing. Information about the length, type and timing of programs may not be available, or may be self-reported. In some cases, perceptions of training might vary.¹¹ In most studies the sample includes large and formal firms due to data limitations. Hence it is important to remember what OJT studies measure (and what they exclude). Finally, when measuring the impact of training, it is important to treat for selection bias as the results may capture the superior attributes of the worker rather than the actual effect of training. At the firm level, the main difficulty in measuring impacts comes from the fact that firms offering OJT tend to already have a set of better observable (and unobservable) characteristics.

The studies included in the review (for example, Almeida and Carneiro 2009; Dearden, Reed and Van Reenen 2006; and Konings and Vanormelingen 2015) treat for selection issues and indicate that even after this, increasing OJT could have productivity gains.

Beyond quantitative challenges, another issue with the literature on OJT is that few studies delve into the economic mechanisms explaining the causal relationship between OJT and productivity. To improve our understanding of the economic mechanisms, we will review the literature on barriers to provision of OJT in section 3.1 and section 3.2 to explore these issues more.

In general, returns to firm productivity and worker wages are both positive (factoring in the cost of OJT) with regard to OJT provision. Firm productivity gains are higher than wage gains, indicating an imperfect pass-through of gains to workers and the presence of a high general skills content to the OJT (see Section 2.2. for more information on type of skills).

2.2 At future employer: Evidence of positive externalities

To what extent do future employers benefit from hiring trained workers? What is the extent of positive externality (and the associated free rider problem) in the provision of OJT?

To explain the gap between the productivity and wage premium for trained employees, theory suggests a situation of general training in imperfect markets (Acemoglu and Pischke 1998, 1999, 2000; Becker 1962). Recent empirical evidence appears to validate this. The evidence points to two specific results about firm provision of OJT: (i) productivity gains more than wage gains indicating worker willingness to bear some cost for the training as the firm cannot fully appropriate the benefits of OJT in imperfect markets (we saw this in the previous section 2.1); and (ii) future employers willing to pay a wage premium for previously trained workers, indicating the presence of transferrable (general) skills and positive externalities (we will discuss in this section 2.2). Therefore, much of OJT is general training relevant to the current firm and others in the market.¹²

The literature reviewed validates the presence of general skills content in the training imparted. Booth and Bryan (2005) find that workplace training is associated with significantly higher wages at current and future firms, with a larger impact at future firms, using a household panel survey in the United Kingdom. Accredited OJT is more strongly associated with higher wages at both current

¹¹ Black and Lynch (1995) mention that "... a supervisor who is assigned to work side-by-side with a new employee may view the time she spends with a new hire as training, whereas the employee views the fact that the supervisor is always hanging around as monitoring, not training".

¹² If the returns to future employers were not statistically significant, one could have argued for the wedge between wages and productivity to be created by perfect competition and firm-specific training. However, this does not seem to be the case given the rise of productivity at future employers as a result of hiring previously trained workers.

and future employers than is non-accredited training—and that only accredited training is transferable between employers. However, the literature did not provide much by means of explaining how firms were paying (individually or via cooperation) for these accredited general skills. Findings from this research are consistent with Loewenstein and Spletzer (1998) and Acemoglu and Pischke (1999, 2000).

In another related study involving labor movement between multinational companies (MNCs) and non-MNCs in Brazil, Poole (2013) shows that when former MNC-employed workers move to domestic firms, incumbent workers of the hiring domestic firms enjoy wage gains. This starts to point to the positive externalities associated with more trained workers. At the average wage of a typical domestic worker, a 10 percentage point increase in the share of former multinational workers increases wages by \$23 a year. For the average domestic establishment with 60 workers in Brazil, the total implied wage effect from an enhanced foreign presence is roughly \$1,400.

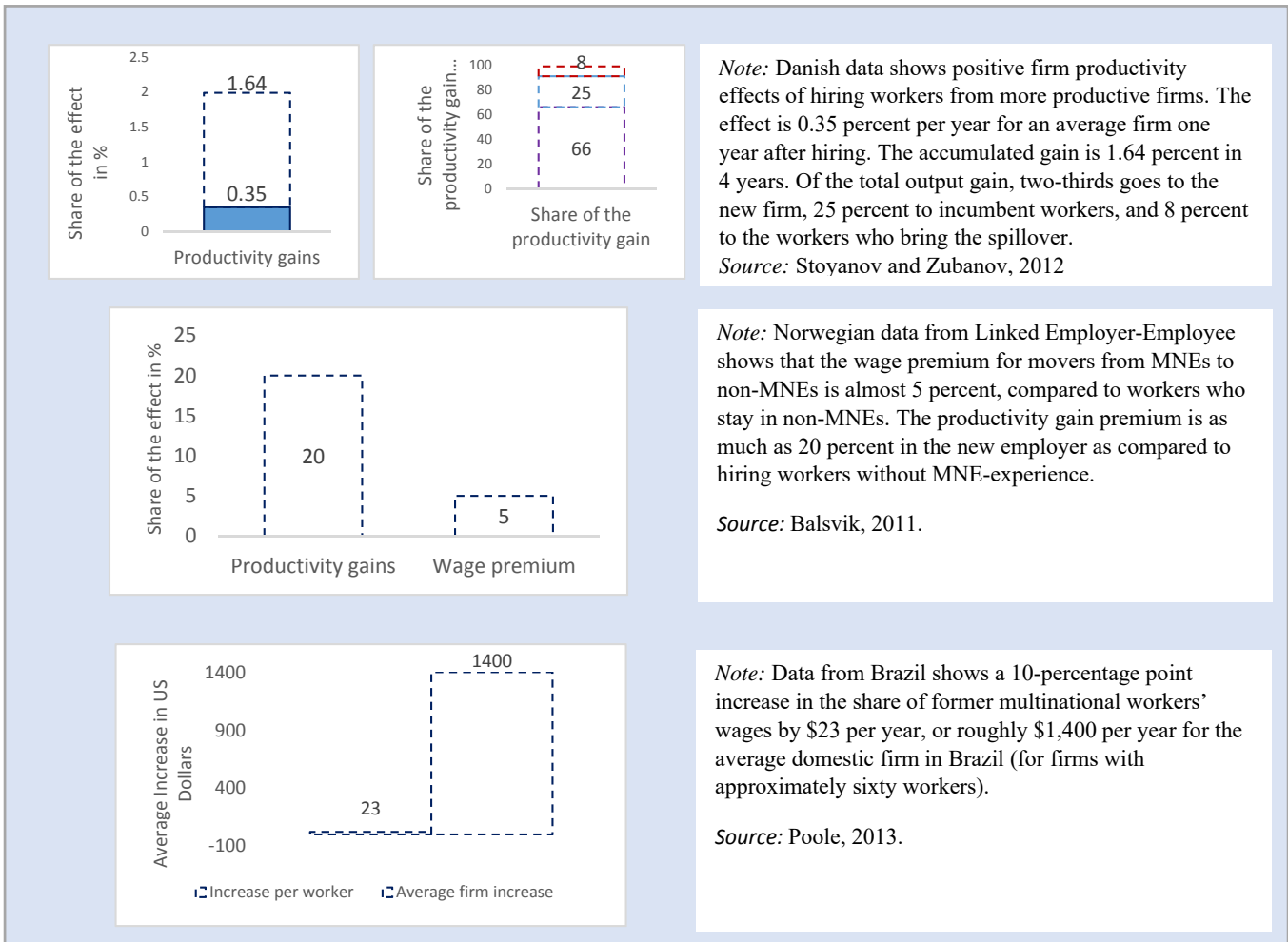
In a similar study in Ghana, Gorg and Strobl (2005) use firm-level data for a sample of manufacturing plants to find that firms whose owners worked in MNCs in the same industry prior to joining are more productive than other firms. In OECD countries, Stoyanov and Zubanov (2012) show positive productivity effects of hiring workers that come from more productive firms (using Danish data). They find that the effect is 0.35 percent per year for an average firm one year after hiring. The accumulated gain in the fifth year is 1.64 percent. This result is similar to Balsvik (2011), who using matched employer-employee data for Norway, finds that workers with MNC experience contribute 20 percent more to the productivity of non-MNCs than workers without such experience, even after controlling for unobservable characteristics of the workers.¹³

Through fixed effects, these studies are able to control for the firm-specific advantage of MNCs, such as better technology (so that the gains are not attributed to MNCs simply being bigger or better firms). Regarding the role of human capital developed in the previous firm as a factor in increasing wages, Balsvik (2011) mentions that through on-the-job experience (or training), workers in MNCs may be able to embody valuable knowledge and bring this knowledge to a new employer. Stoyanov and Zybanov (2012) find that while the presence of human capital accentuates the productivity gains, it does not fully explain it. This leads them to conclude that the presence of knowledge spillovers or positive externalities are related to labor mobility. Poole (2013) finds that among different types of workers, highly skilled workers from MNCs produce a larger effect.¹⁴

¹³ Stoyanov and Zubanov also show that of the total output gain, two-thirds goes to the new firm, and 25 percent to the incumbent workers. For Norway, the wage premium for movers from MNEs to non-MNEs is 5 percent compared to workers (with similar characteristics) who stay in non-MNCs. The productivity gain premium is 20 percent in the new employer, as compared to hiring non MNC workers. See Saraf, Mariscal and Velazquez (2016).

¹⁴ The literature on R&D spillovers and labor mobility uses a human capital framework: since at least a part of the knowledge acquired in the firm will move with the worker in the case of mobility, workers who receive access to formal training/knowledge should be willing to pay for this by accepting a pay cut (Pakes and Nitzan 1983).

Figure 2: Effects of Worker Mobility on Productivity and Wages



These studies demonstrate that future employers are able to benefit from hiring previously trained workers, indicating the presence of general skills in the training (useful across multiple firms). In addition, they demonstrate the positive externalities that exist due to the provision of OJT. The future employer benefits by not paying the full cost of this advantage. Thus, the benefit to the firm that provides training is less than the benefit to society. This includes the future firm and workers in the future firm who enjoy spillover advantages of having a trained person in the workforce. In an unregulated market, with positive externalities, less is produced than the socially optimal level.

How general are the general skills imparted through OJT? Firms do not seem to provide the type of (very important) general skills, such as behavioral, psychological or socio-emotional skills, perhaps because these are better provided during the formal education years of the worker, or because firms may not have the methodology to train in these skills (Gonzales-Velosa, Rosas, and Flores 2016). In fact, some studies indicate the presence of industry-specific general skills in OJT. In other studies, the productivity effect of hiring workers from more productive firms *within the same sector* was found to be twice as high as for workers from other sectors. This could imply that the knowledge brought by new workers is, in large part, industry-specific, but also general enough

to be applied in different firms (Gorg and Strobl 2005; Stoyanov and Zubanov 2012). The skills imparted through OJT are more likely to be *general, but industry-specific* (see box 5).

Box 5: Evidence of the Presence of Industry-specific General Skills

The literature review highlights the presence of general skills content in training imparted, as well as productivity gains in the future employers who hire previously trained or more productive workers (Balsvik 2011; Booth and Bryan 2005; Gorg and Strobl 2005; Poole 2013; Stoyanov and Zubanov 2012). The question then becomes: How transferable are these general skills? For example, are these skills applicable across sectors, for example, socio-emotional or behavioral skills?

Studies suggest that the type of general skills imparted through OJT are unlikely to be skills such as socio-emotional or behavioral, even though they are highly valued by most employers. Socio-emotional or behavioral skills are the most highly valued by employers and the most difficult to find in the labor market (Busso and others 2012). However, only a fraction of firms give priority to behavioral skills in their OJT, according to a recent study on Latin American countries (Gonzales-Velosa, Rosas, and Flores 2016). Even firms that have the greatest difficulties fulfilling their requirements for socio-emotional skills tended to offer more training in industry-specific skills. The tendency to give less training in behavioral skills may result from a firm's lack of capacity (for example, methodologies and technologies) to teach general skills. It may also reflect the disincentives that arise due to a lack of appropriation given that most of the OJT in this region is financed by the employer.

In fact, there seems to be evidence of the presence of *industry-specific general skills* in OJT. In two studies, the productivity effect of hiring workers from more productive firms within the same sector was found to be twice as high as for workers from other sectors. This implies that the knowledge brought by new workers is, in large part, industry-specific, but also general enough to be applied in different firms (Gorg and Strobl 2005; Stoyanov and Zubanov 2012).

An example of such industry-specific general skills could be machining skills that are valuable across automotive, tooling, electronics and other kinds of manufacturing sectors. It also helps to remember that the distinction between general and specific skills is not binary because industry-specific skills could also have general elements, and general skills could be specific to some sectors. A useful lens to use is whether the skills imparted by one employer are useful to another firm, and whether the future employer is willing to pay for such skills.

However, provision of skills may not be fully left to OJT. In times where automation stands to make several existing jobs in manufacturing obsolete, emphasis needs to be placed on the general lifelong skills such as socio-emotional and behavioral training that may be under-provided by the OJT market, but would be critical to help workers adapt to new technologies. In this area, there is an argument for some public support.

There are three ways in which firms appear to cope with the presence of positive externalities and the absence of corresponding regulation: increasing labor market rigidities that raises the cost of switching for the worker, voluntary cooperation or under-provision. From 2000-08, many firms used non-compete contracts (NCCs) to increase the cost of switching employers for workers. Indeed, the number of non-compete cases has been on a rise in the United States. In 2009 poaching

became such a serious issue in Silicon Valley that firms worked on a cooperative basis not to approach each other's employees.¹⁵

At other times, firms under-provide OJT, consistent with what is shown in the research and development (R&D) literature: firms reduce their R&D expenditures due to the risks of R&D workers moving to other employers. In this context, they also increase patenting (Kaiser, Kongsted and Ronde 2008; and Kim and Marschke 2005). In the section on "Policy Considerations and Areas for Future Investigation," we revisit the evidence to suggest potential instruments that governments can consider using.

In summary, much of OJT is general enough, but at the same time, industry-specific. Where accreditation and recognition of competence is effective, the transferability of training wage premia occurs more often. Some kind of policy effort to internalize the positive externalities and bring provision levels closer to the social optimum might be useful. Under-provision could be a more serious issue in developing countries where property rights are still a work in progress, enforceability of contracts low and cooperation harder due to high informality. Policy support is also perhaps required in the provision of general lifelong skills such as socio-emotional traits that are likely to be under-provided by firms.

3. Barriers to Provision of OJT

What can we learn from the literature on constraints and barriers —such as information gaps among firm management, low demand for complementary technologies, low product market competition and credit constraints—that might influence provision of OJT? Which ones appear binding in nature?

Complementarity of skills and technology is well acknowledged (Acemoglu 1998; Berman, Bound, and Griliches 1994; Bugamelli and Pagano 2004; Doms, Dunne, and Troske 1997; Disney, Haskel and Heden 2003). This holds for developing countries, as shown in the recent work by the World Bank in South Asia, where new technology adoption was positively and significantly linked with the share of more educated employees in the firm (Lopez-Acevedo, Medvedev, and Palmade 2016). Adoption of new technologies tends to require training workers who could learn to operate it. Complementarity between skills and management practice has also been shown recently (Bloom, Eifert, Mahajan, McKenzie and Roberts 2013). Management capability is viewed as a form of soft technology (or intangible capital) that helps a firm utilize its factor inputs, such as trained labor, more efficiently. In turn, training helps to improve the quality of managers, creating a virtuous cycle of sorts.

Regarding the context of OJT, we are particularly interested in understanding how firms develop effective policies (such as for training and compensation). The role of management (owners, managers) is of great importance. Management accesses information in the market, makes critical decisions about human resources and decides how much training to provide, to whom, and how to compensate them. We want to understand how these mechanisms play out within firms, and what

¹⁵ Although with negative results, as they got sued for anticompetitive practices and had to settle in 2014 (more on this issue in the section on policy considerations).

barriers exist in their path. In this context, then, we review the recent empirical management capability and organizational (personnel) economics fields.

The literature has also identified external conditions positively linked to OJT provision at the firm level. Favorable external conditions include advancing competition, improving regulatory environment, influencing firm conditions by providing incentives to adopt new technologies, and improving management and providing OJT. We review this evidence to understand what type of conditions would facilitate boosting the demand for OJT.¹⁶

3.1 Factors within firms: Information asymmetries, low management quality

How do firms decide on human resource policies? What steps are involved in accessing market information about new practices and training? Who accesses this information, and who does the cost-benefit analysis of such training? How accurate are their expectations? How adequate are their cognitive skills for information processing? How quickly do they act on it?

These are the types of questions addressed in this section.

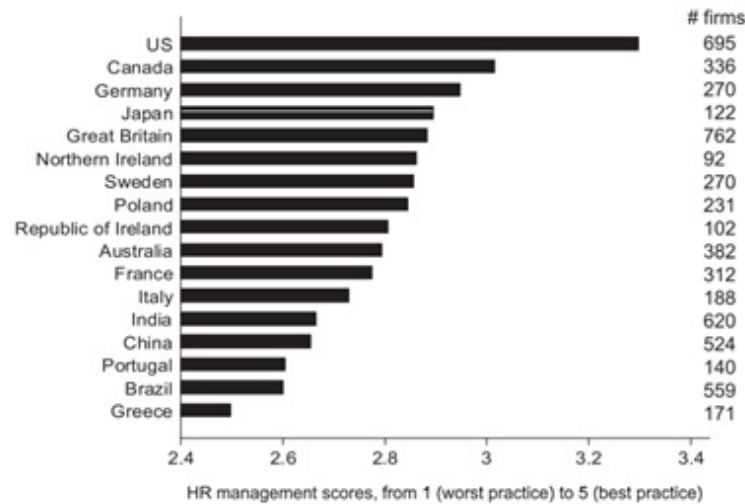
There is a small but growing literature with robust field evidence about the link between management capability and firm productivity. We draw on this literature to provide suggestive evidence regarding the barriers to effective policy-making within firms—which in turn impacts decisions regarding the provision of OJT (Atkin and others 2015; Bandiera, Barankay, and Rasul 2011; Bloom and others 2013).

More often than not, management teams - within firms - access information about training and decide whether to provide it. They also tend to decide based on their internal cost-benefit analysis. The literature reveals that, across countries, substantial variations exist in management practices across organizations and sectors (Bloom and Van Reenen 2007; Bloom and others, 2012).¹⁷ In developing countries like Brazil, China and India, management scores are lower than in the United Kingdom or United States, reflecting lower management capabilities in general. Among management practices, those pertaining to human resource management are the most relevant for our purposes: policies on evaluating worker performance, designing incentives for worker performance, training provision and so on.

¹⁶ In a sense, the provision of OJT could be likened to the adoption of other productivity-enhancing activities such as information and communications technology (ICT) or R&D. In the case R&D and OJT, the ability of a firm to appropriate rents may be more limited than in the case of ICT.

¹⁷ They have been using double-blind survey techniques and randomized sampling methods to gather information on management practices for more than 10,000 organizations across 20 countries. See Annex 2 for the survey instrument.

Figure 3: Management Practice Scores across Countries



Source: Bloom and Van Reenen 2007; Bloom and others 2012

The literature indicates that despite the presence of large gains, management teams within firms do not adopt new practices readily. In a study investigating the reasons for this, Bloom and others (2013) show that adopting new practices—such as factory operations, quality control, inventory, HRM and sales management—raised productivity by 17 percent in the first year for their sample of Indian textile firms. This was achieved through improved quality and efficiency, as well as reduced inventory. Within three years, this led to the opening of more production plants. Their methodology included randomizing free consulting to provide these practices.¹⁸

Despite high (and proven) returns, low management capabilities and (resultant) poor human resource policies at the firm level depressed demand for these practices. These mechanisms are likely at play for decisions which are at the discretion of firm management—such as adoption of OJT, R&D or ICT.

Based on firm management and organizational economics literature, there is also evidence of information failures within the firm that lead to low demand (and supply) of OJT within firms. Bloom and others (2013) find that firm-level management is often not well-informed about the cost-benefit calculus of new training. Indeed, firm owners have been misinformed about the cost-benefit of new practices. For example, in the case of the textile industry in India, for commonly known business training where information is widely available, owners held the mistaken view that they did not need training. Through deep interviews, the authors found that such owners were comparing themselves with other (low-quality) local firms and judging that their quality was good

¹⁸ During the second phase of Bloom’s experiment, the consulting firm worked closely with plant management staff for four months on the job. During this time, they put the procedures into place, fine-tuned them, stabilized them so that employees could readily carry them out. For example, one of the practices was holding daily meetings for management to review production and quality data. The consultant attended these meetings for the first few weeks to help the managers run them, provided feedback on how to run future meetings, and adjusted their design. The third phase involved the measurement of results.

based on these comparators. The same firms, when compared to international benchmarks, were lagging.

Almeida, Behrman and Robalino (2012) explain that skill provision failures might arise because individual expectations could be based on partial observations of labor market outcomes in the local economy, as well as the experience and advice of peers, friends and family that can be unrepresentative of the average experience. That appears to be the case here. Regarding the issue of information failures, Atkin and others (2015) suggest that if firms believed that adopting OJT would lead to non-trivial costs (due to incorrect information about cost-benefit), that is, they had low prior knowledge about the utility of a new practice, they may be (rationally) unwilling to pay even quite small transaction costs. This could then lead to inefficient outcomes.

We ask, then, what prevents the management within firms from having more informed views about the cost-benefit of new practices *even when it is available in the market*? This question brings us to the composition of the “management” within a firm. In this case as well as in many developing country contexts, several of these (small and medium) firms are family-owned businesses. Firm owners do not fully trust outsiders or non-family members. As a result, these family-owned firms suffer from a limited number of professional managers (in proportion to workers). A lack of delegation, limited managerial time, and limited autonomy are linked to poor decision-making on most fronts: in finance, purchasing, operations, and/or human resources.

In Bloom’s work in India, non-family members were given only lower-level managerial positions with authority only over basic day-to-day activities. The span of control constraints also meant that a limited number of managers had time to process new information, do the necessary quality checks, develop an accurate cost-benefit perspective, and arrive at a more informed view about fairly obvious productivity-enhancing practices. In a study on competitiveness of auto-parts firms in India, the on-duty line manager at the plant level was found not to have authority to ‘pull the line’ at the first sight of a defect and needed to gain permission from the SME owner (Saraf 2016). It also raises questions about the extent to which such family-owned firms invest in the skills of the manager to solve the more unusual problems (Caliendo and others 2015).

With respect to incentives to adopt training, a recent experimental study from the field of organizational economics shows how poorly informed human resource policies could affect worker incentives to adopt new training (even when the firm management wanted to introduce it). This work is a cautionary tale about poorly designed worker compensation structures that reduce their motivation to adopt a new form of training (Atkin and others 2015). The paper studies technology adoption in a cluster of soccer-ball producers in Sialkot, Pakistan. The authors invented a cutting-edge technology that reduced waste of the raw material (benefiting the firm’s profits), and gave the technology to a random subset of producers. However, after 15 months, take-up remained very low. Not only was the technology not disseminated, it was not even adopted.

The suggested explanation has to do with the *perverse incentives* impacting the workers in charge of cutting activities. Most workers were paid a piece rate, and the new die would slow the cutters in the learning period—but also potentially in the longer run. As a consequence, if cutters are paid at a pure piece rate, their effective wage falls. Therefore, unless owners modify the payment scheme, the benefits of the new technology accrue to the owners and the costs are borne by the plant workers. Realizing this, the workers resist adoption. In this case, information asymmetries

seemed to work in both directions. First, management's misperception about the continued benefit of using piece-rates, and second, employees misinforming the owners about the value of the technology to prevent its uptake. Evidence from the OECD validates this, and suggests that firms that adopt more performance-based schemes are more likely to offer job training (for example, Gittleman, Horrigan and Joyce 1998).

Regarding the final issue of information asymmetry about the types of programs available in the market, two studies (Bloom and others 2013; Atkin and others 2015) find that it exists, but is not a critical problem. For textile firms, for less commonly known practices, once this information was provided to firm owners through consulting firms, adoption rates improved drastically. In the Pakistan study, the only firm that successfully adopted the new technology was found to pay a performance bonus (a better gain-sharing arrangement), indicating that such knowledge was available in the market. However, few owners adopted the new practice. These cases indicate that compared to information asymmetry about types of training available, it is in fact, information barriers within the firm at the level of managers/owners, that are perhaps more binding in nature.

3.2 Factors outside firms: Low competition

Studies show that the environment in which the firm operates matters in terms of OJT adoption. External factors (such as competition) can act as levers to pull internal factors (such as management capability and adoption of complementary technologies). Firms facing greater competition in their product markets are inclined to raise the minimum productivity threshold to operate profitably and reduce inefficiencies. They do this through both investing in productivity-enhancing activities (such as OJT and ICT), and reducing costs, which in turn helps them capture greater market shares of existing ones (Almeida and Aterido 2008; Lopez-Acevedo and others 2016). Competition also helps to reallocate resources from the less productive to the more productive firms, increasing the incentives for all firms, to invest in the within-firm productivity levers discussed in section 3.1.

The literature also indicates that trade and foreign direct investment (FDI) can affect productivity through providing greater opportunities for exporting and learning by doing, increasing access to new markets, more competition from imports, and selection and reallocation effects (Melitz 2003; Pavcnik 2002; Bloom, Draca and Van Reenen 2016). Complementary studies have examined the role of human capital in the process of adopting new technologies—which becomes even more important as markets open up and standards become more demanding (Bartel and Lichtenberg 1987; Berman, Bound, and Griliches 1994; Bugamelli and Pagano 2004; Doms, Dunne, and Troske 1997; Disney, Haskel and Heden 2003).

Let us focus on the case of exporters as an example. Bustos (2011) found that exporters tend to be more skill intensive in both production and non-production occupations in Argentina. She also showed that technology and skill deepening are positively associated at the firm level. Brambilla, Lederman and Porto (2012) observed that the nature of destination markets matters for the type of skills provided. In more sophisticated destination markets, exporting firms need to meet higher standards, while also being cost competitive. These results, in the form of an exporter productivity premium, are confirmed in developing countries by Blalock and Gertler (2004), Clerides, Lachand Tybout (1998), and De Loecker (2007). Export is linked to being able to make higher quality products, which requires better human capital (Fieler, Eslava and Xu 2014; Khandelwal 2010).

In the auto-parts sector in India, a handful of auto suppliers who were exposed to greater competition since the 1990s achieved higher productivity and became global suppliers, while car-makers who were protected remained sub-scale and unproductive to a large extent (Saraf 2016). Opening up markets through reduction of import tariffs from 60 to 12.5 percent since the 1990s enabled auto-parts suppliers to cross the fixed cost of exporting through accessing cheaper intermediate inputs, learning from working with discerning buyers in OECD and other markets, and forming technical alliances to learn new technologies. Although there were subsidized public training programs, these global suppliers invested in their own OJT programs to ensure a supply of talented line managers, business managers, and technical floor-level workers to maintain the high productivity levels required to participate in export markets.

More product market competition is found to be linked to increasing aggregate management capability—another channel that affects provision of OJT, as previously noted. More competitive product markets would push the badly managed firms out and “raise the stakes” for existing firms that could capture more market share and allocate better resources toward them (Bloom and others 2009).¹⁹ In such markets, managers would be more fearful of losing their jobs and firm owners would be more likely to select competent Chief Executive Officers (CEOs) (ideally non-family member).²⁰

Another way more competition and trade could influence internal firm levers is by helping firms grow or creating the conditions for this. Large firms tend to invest more in skills, R&D and other technologies. Indeed, studies also show a positive correlation between firm size and OJT provision in developed and developing countries (Almeida and Aterido 2008; Black and Lynch 2001; Frazer 2006; Frazis, Gittleman and Joyce 2000; Pierre and Scarpetta 2004; and Rosholm and others 2007). Some of these studies also find that firms that initiate more innovative activities (for example, more investment in R&D) tend to train more. Pierre and Scarpetta (2004) and Almeida and Aterido (2008) find that larger and more innovative firms tend to train more (based on data from the World Bank Enterprise Data Surveys for 66 countries). There is evidence of a positive and significant relationship between OJT and firm characteristics (size, innovative activities, and technology adoption) for the Latin America and Caribbean region (Gonzales-Velosa, Rosas, and Flores 2016).

Overall, the argument for competition and trade increasing the incidence of OJT is not very different from the reasons why firms exposed to competition increase their demand for other productivity-enhancing activities, such as ICT or R&D.²¹ However, as in the case of these activities, it remains unclear whether the directional link is from size to productivity, or vice versa. Do firms grow larger first, obtain economies of scale, and then demand new technologies and OJT? Or, does it work the other way around? Do firms that are able to adopt productivity-

¹⁹ In their surveys, Bloom and others (2009) asked managers how many competitors they faced, and found the average management score was significantly higher when firms reported facing more competitors. Using other measures of competition not reported by managers, like the import penetration rates (measured by imports as a share of domestic production) or Lerner indices of competition, yields a similar general result that management quality tends to increase with competitive intensity.

²⁰ Meritocratic selection of a CEO (ideally a non-family member) is linked to better management outcomes. However, as family-owned firms typically have less debt, they are less vulnerable to product market pressures, and continue to survive—although with economic losses.

²¹ See Bayo-Moriones and Lera Lopes 2007; Dasgupta and others 1999; Giunta and Trivieri 2007; Haller and Siedschlag 2011; Hollenstein 2004; Keller, 2004; Kowtha and Choon 2001; Kretschmer, Miravete, and Pernías 2012; Narula and Zanfei, 2005; and Lucchetti and Sterlacchini 2004.

enhancing activities cross the fixed cost to export markets and become bigger? Some clues to potential answers are offered by the seminal work by Melitz (2003), who put forth an explanation connecting firm size to a firm's total factor productivity. Melitz proposed a theory for selection into exporting: only the most productive firms overcome the sunk costs of exporting and foreign direct investment (FDI), start to export, and grow as a result.²² This remains an area for future investigation.

Finally, the effect of the regulatory environment, such as labor market reforms, can vary depending on the exact kind of regulation. Reforms that increase the number of temporary workers — and simultaneously protect existing employees through unions—are linked to lower OJT. While stricter hiring regulations and rigidity in the working hours are associated with a higher investment in OJT, stricter firing costs tend to be associated with reduced investment in job training by employers (Almeida and Aterido 2008). There is a lot of variation in results depending on the type of labor regulation. Constraints in the credit markets do not appear as binding constraints (box 6).

Box 6: The Limited Role of Credit Constraints

The literature review did not provide much evidence regarding the role of credit constraints as binding barriers to the provision of OJT. Although in most developing countries, capital markets could be imperfect, these imperfections do not appear to have a significant bearing on the under-provision problem. Carneiro and Heckman (2004) suggest a low importance of credit constraints in explaining investments in education. Hannson (2008), using the International Adult Literacy Survey (IALS), finds that 25 percent of workers reported wanting to take further training. However, only 4-7 percent claimed that it would be too expensive as the reason for not participating. In evidence from Ghana, Gorg, Strobl and Walsh (2007) note that lower wage bounds — like credit constraints, efficiency wages or minimum wages — do not prevent OJT.

In the case of microenterprises, credit constraints could play a role. In an experiment from Sri Lanka, De Mel, McKenzie, and Woodruff (2008) find high returns — higher than existing interest rates — to drops of cash of US\$100 or US\$200 (or of capital of roughly similar magnitudes). This suggests that the microenterprises might be operating under credit constraints. However, for microenterprises, skills have not arisen as the top constraint in analyses, according to the World Bank Enterprise Surveys. Low-income workers might be more affected by credit constraints, suggesting some role for government support.

However, for most firms, the marginal importance of credit constraints for OJT provision is likely to be a consequence of employers financing most of the training, and workers being accustomed to receiving training without paying any direct costs (although they contribute indirectly through compressed wages). Studies have pointed to other challenges involving information gaps about returns, ineffective HR policies, or the barriers to demand for training as the main constraints.

²² Empirical data seems to support this (Bernard, Eaton, Jensen and Kortum 2003; Mayer, Melitz and Ottaviano 2014). In a recent World Bank study regarding competitiveness in South Asia (World Bank 2016), researchers found that across sectors, local firms were managing to cross the productivity barrier by learning through working with lead firms in the domestic market, acquiring technologies and/or becoming more efficient. Thereafter, as the markets were deregulated and new markets opened (for example, in the auto-parts sector as well as apparel), they were able to meet the stricter requirements of export markets. In addition, they were also able to compete with incoming imports. In time, such firms grew in size.

4. Policy Considerations and Areas for Future Investigation

What are the policy implications of these findings? What are areas for future investigation?

This paper confirms that OJT could be a powerful instrument in helping firms become more productive and keeping abreast of technological change. At the same time, workers benefit through wage gains at current and future employers. Thus, the first step for policy makers and practitioners would be to familiarize themselves with the empirical data on returns to OJT, as has been captured in this report. OJT programs have shown a high rate of return where studied carefully. The evidence also shows that future employers benefit from hiring previously trained workers, indicating that the social benefit is greater than the private benefit—thereby making a case for OJT as a public good of sorts. This paper clarifies the extent to which oft-mentioned theoretical constraints are real constraints and backed by data. This is critical to any evidence-based policy-making effort.

To improve how the public sector supports and engages with OJT, it would need to communicate, partner with and improve its understanding of firm-level challenges (for example, how information failures operate within firms, how human resource policies are formulated, and how to help firms upgrade skills), as well as work more closely with private firms. This would require bolstering the capacity of public institutions that work with the private sector to include skilled personnel who can effectively help the private sector.

Finally, regarding specific policy considerations, it is important to highlight that the guiding principle for any policy in this area should be to correct for market failures that prevent firms and workers from fully internalizing the costs and benefits of OJT — rather than crowding them out.²³ In the sections that follow, we will discuss considerations for policy makers, utilizing the framework of demand- and supply-side constraints (table 1). Conclusions follow with a discussion of areas for future research/investigation, as well as remaining open questions.

4.1 Demand-side considerations²⁴

Regarding demand-side considerations, the following question is posed: What policy directions would help increase the uptake of training/complementary activities leading to an attendant increase in the demand among firms for OJT? The demand for OJT is more likely to improve in environments of high product market competition (see section 4.1.1), more information within the firm (see section 4.1.2) and improved firm management capability (see section 4.1.3). For workers, presence of aligned incentives in the form of gain sharing compensation could help increase uptake of OJT opportunities (see section 4.1.4).

4.1.1 Reforming product market regulation, increasing competition and trade

The literature suggests an important role for (product market) competition in encouraging the adoption of new practices and technologies. Competitive environments act as a channel to increase

²³ The case of OJT is one of positive production externalities — a rare form of externalities. To alleviate this market failure, policies that decrease the marginal cost to the firm of providing OJT would bring levels closer to the social optimal. In order to achieve a level close to the social optimal, the marginal benefit to the firm of providing OJT would need to increase (see section 4.1 on demand-side considerations), and/or, the marginal cost would need to decrease (see section 4.2 on supply-side considerations).

²⁴ These would increase the marginal benefit of providing OJT to the firm, or to all firms in the market.

the demand for human capital. There are many types of product market reforms. Although it is outside the scope of this paper to go into the details of all instruments, the key ones are noted here.

The principle driving product market reforms is to increase competition in the domestic market, as well as to link markets across domestic and international firms. This not only increases the opportunities for local firms (through the trade route), but also allows them to interact with other firms. In doing so, such firms can learn new technologies and adopt better practices. These could be achieved through: (i) reforming restrictive trade policies that could protect unproductive local firms and restrict the expansion of the more productive firms; (ii) aligning domestic and international standards so that local firms have the incentive to learn new technologies to serve the demands of more sophisticated markets overseas; (iii) strengthening trade logistics to reduce the cost of doing business locally and internationally; (iv) supporting firm-level capacity building through incentives for R&D, as well as improvements in management practices and production processes; and (v) reforming distortionary regulations that create an incentive to remain small e.g. labor regulations for SMEs. These would also enable local firms to access opportunities in international value chains, thereby providing an impetus to improve productivity.²⁵

The example of an auto part firm from India that became a global supplier in the wake of the liberalization of import tariffs (from 60 to 12 percent in 10-15 years) is instructive. In a recent sectoral study from the World Bank, Saraf (2016) traces the evolution of the automotive sector in South Asia. The Chairman of the leading auto-parts company is reported mentioning: *“We train workers and lose them to others. But we still train because the ones who stay are crucial for our productivity. Unskilled workers are cheaper, but costs match up when their mistakes are financially accounted for. We cannot afford that type of delay and quality when we need to serve clients in Germany and the US.”*

The channels through which product market reform would help in increasing the uptake of OJT are likely to be two-fold. First, at the market level, it would amplify the number and size of opportunities, and increase the demand for productive activities that would require better human capital to realize the benefits.²⁶ Firms that do not invest in improving their human capital would

²⁵ A useful area for future research would be to test the sensitivity of OJT to various aspects of product market reforms. Some common product market reform areas include: reducing average rates of protection and harmonizing tariff schedules across intermediate and final goods; improving standards and product market regulations; facilitating imports for exporters (for example, through better functioning duty-drawback schemes); and strengthening trade logistics to reduce customs clearance, tax burden and transit times. Many services-related regulations might go beyond the scope of “product-market” reform, for example, e-commerce rules. Depending on the country and the sector context, further analysis would be required to ascertain the appropriate instrument. World Bank work regarding competitiveness in South Asia (Hallward-Driemeier 2007) suggests that an inefficient business environment would lead to low and uncertain returns on investment, dragging down productivity and reducing the incentive to adopt technical improvements on the factory floor. As seen from the literature, this would, in turn, reduce demand for complementary activities such as OJT.

²⁶ It is possible that even when the size of opportunity increases in the light of reforms, firms may choose production processes and technologies that might be capital-intensive — avoiding the need for more investment in human capital. This seems unlikely in developing countries because labor inputs tend to be relatively cheaper. Further, firms that are profit-maximizing entities will not want to under-utilize a cheaper input. Second, training might increase the

be penalized more, thereby raising the marginal benefit to training for firms that do provide training. Such firms can then capture a greater market share (a new share in new markets, as well as capturing shares away from competitors in existing markets). To some extent, this would tackle the issue of free-riders because in competitive markets, the marginal cost of not training for “all firms” would increase during the same time period. The future employer would need to invest in training at the same time as the current employer, and both would have similar risks of poaching.

Second, within the firm, managers would have to make greater efforts to conduct due diligence regarding information about new practices and technologies to remain competitive. This would help to alleviate the information failure issues. Further, it would help firms create the right in-house incentives and policies to motivate workers to participate in training.

Firms that export, meet international standards, innovate and adopt more advanced production technologies (such as MNCs) tend to have better management capability (Bloom and Van Reenen 2007) and more training incidence (in the Latin America and Caribbean region, see Gonzalez-Velosa and others 2016). In effect, such reforms would increase the ability of the product market to allocate resources efficiently. It would do so by enabling more productive firms to grow and the badly managed ones to exit.

The literature about firm productivity also shows a link between productive activities and firm size: firms that are large tend to participate in exports, innovation, R&D and FDI. Large firms also tend to do more OJT.²⁷ Thus, policies that support reforming licensing, size restrictions, labor laws and strengthening property rights might be steps in the right direction for developing countries.

4.1.2 Reducing uncertainty about returns, increasing information flows, providing certification

The literature suggested the presence of information failures among firm management that reduce the adoption of beneficial OJT. As noted, product market reforms could provide an incentive for more due diligence on the part of firm managers and owners with regard to information processing and better HR policies. At the same time, governments could provide further support by using low-cost means to help firms interact and learn from each other.

One such part of increasing information flows in the market concerns greater coordination among firms. Government-facilitated demonstration projects, networking sessions, and greater informational awareness efforts regarding evidence about productivity, wages and cost effects

cost of inputs through wage hikes over time. However, the literature indicates that even in developed markets, firm productivity increases more than the wage gain.

²⁷ Size and productivity: which comes first? Causality is difficult to establish, as firms that are already more productive are more likely to enter export markets than less productive firms (Amiti and Konings 2007; Atkin and others 2014; Melitz 2003; Clerides and others 1998; Goldberg and others 2010; and Wagner 2007.) Lopez-Acevedo, Medvedev, and Palmade (2016) note that “competition plays a key role in forcing inefficient, unproductive, or unprofitable firms to either improve or exit and transfer their resources to more efficient, productive, or profitable firms, thus boosting economy-wide productivity. More formally, there are two mutually reinforcing mechanisms — spurred on by competition in product and factor markets — that increase productivity. First, greater competition, from either domestic or international sources, pushes firms to become more efficient at doing what they do: for example, by learning from international exposure, investing in innovation, improving business practices, adopting better technology including ICT, and improving the input mix. This is the within-firm component of productivity growth. Second, competition also induces inefficient firms to transfer resources to more efficient ones or exit altogether, boosting economy-wide productivity — this is the between-firm component of productivity growth.”

could help firms to better understand the cost-benefit calculus of OJT. These could be cost-effective ways for the government to engage with the private sector, while also including academic institutions, industry leaders and business associations.

Policies that support the formation and expansion of information platforms between large firms and local suppliers about lead firm requirements/standards on the one hand, and product offerings of local firms on the other hand, might help reduce the information asymmetry in the market. In so doing, it could increase the demand for skilled labor among small and medium enterprises (SMEs). In many cases, the information platform could serve to reduce information gaps regarding certifications of local suppliers by providing these data online. For public programs that help firm upgrading, it could have as a filtering criterion the accreditation of the training provider (including the firm).

For workers, the literature clarifies that accredited OJT is more strongly associated with wage gains at both current and future employers. This would also suggest the importance of signaling and policy interventions for providing greater certification and formal recognition of prior learning (RPL). However, reduced asymmetric information between workers and firms could increase turnover, thereby discouraging firms from providing OJT. Thus, it is likely that the effects on OJT provision levels are mixed: the worker demand for OJT would increase due to better signaling, but the firm supply would fall due to greater worker turnover. However, Acemoglu and Pischke (2000) show that by guaranteeing workers a higher wage, certification provides an incentive for workers to exert more effort in the skill acquisition process. If so, then this might alleviate some of the supply contraction on the firm side.

4.1.3 Helping improve management skills for better HR policy formation

The literature shows this is one area of skills that has an impact on firm productivity and worker incentives to adopt new skills. Increasingly aware of the importance of investments in managerial capabilities, governments across the world are experimenting with programs that boost these capacities at the firm level. In Latin America and Africa, for example, authorities are piloting interventions which provide SMEs with access to individualized consulting services (similar to the approach by Bloom and others 2013), as well as more novel approaches of providing group consulting services. Such services can be delivered at a lower cost and can help leverage group-learning dynamics (similar to agricultural extension services).

Another innovative approach to fill the management capability gap in smaller firms could be to provide incentives for diaspora knowledge transfer and exchange. Building on evidence that shows significant productivity and wage gains to hiring trained workers from MNCs, some countries have targeted programs and policy frameworks to encourage movement of diaspora members who have obtained superior management training from firms outside the country back to the home country (Aguinas and Newland 2012; Brinkerhoff 2006; and Meyer and others 1997). In such programs, the home country may facilitate diaspora members' personal efforts to transfer skills to the homeland, or work to connect home-country firms to advanced institutions in countries of destination in which diaspora members have ties. In some cases, country-of-destination governments, acting alone or with regional organizations, may partner with home country governments to provide technical assistance. Although some of these initiatives have had a positive

impact, particularly in OECD countries where they were conceived, making such programs viable in the long run for developing countries is still a challenge.²⁸

4.1.4 Using more gain-sharing instruments and performance-based compensation for workers

Due to heterogeneous parties and agency issues, workers may not have incentives to cooperate with the firm in adopting new technologies and training. At times, the worker could transmit incorrect information about the impact of new technologies to management to restrict its uptake, causing further inefficiencies. To avoid this problem, the greater use of gain-sharing contracts and performance-based pay for workers are suggested. Studies show that firms using such instruments are more readily able to adopt new technologies. Reforms that increase competition in these markets would prompt better compensation policies through two routes. First, firms would want to invest in better technologies, creating a rise in demand for training, a complementary activity. Second, in these markets, the firm management would need to be more diligent about designing attractive HR and compensation policies for fear of losing good workers, thereby alleviating issues of misaligned incentives among workers.

4.2 Supply-side considerations²⁹

In general, government interventions - such as subsidizing training or providing direct financial support - to increase the supply of OJT need to be considered with caution as they could crowd out what private sector firms would have already provided. As seen in many countries, this could then reduce the quality of overall OJT provision.³⁰ Government support towards firms to encourage more OJT should minimize crowding out existing private provision through appropriate targeting and due-diligence of the firms (see section 4.2.1). Through ensuring enforceability of contracts and lowering coordination costs among firms, governments could encourage more supply of OJT (see sections 4.2.2 and 4.2.3).

The review indicates that demand constraints are more critical to address as the way to increase OJT provision. However, it also finds that there are cases where a private sector led OJT approach would lead to distributional issues and tend to underprovide certain types of skills that are important for the workers (and for society) in the long run but less for the firm in the short run. As such, when societies have improved welfare as a goal, interventions could be required to restore equality of opportunity rather than reinforce existing inequalities (see section 4.2.4).

4.2.1 Targeting selective firms for government subsidies

Government financial support should only go where training would otherwise not occur, or to internalize a positive externality by reducing the marginal cost of OJT provision for firms. In this context, co-financing schemes are a better tool for the alignment of incentives with workers and training providers (in this case, firms), as well as a better use of public monies. Very rarely should the government pay the full cost of training given the presence of other parties that benefit. The

²⁸ Some examples of diaspora programs that encourage skill transfer are: the Return of Qualified Afghans (RQA) program, the Moroccan Migrations and Développement Economique dans la région de l'Oriental (MIDEO), Colombia's Red Caldas de Colciencias, Senegal's Senexpert programme, and ChileGlobal in Chile.

²⁹ Supply-side considerations would decrease the marginal cost of OJT to the firm, or to all firms in the market.

³⁰ Since training is difficult to monitor or quantify, there are serious risks of government failure, such as low-quality training by an external third party (for example, an ALMP or private TVET institutes). An external party may find it more difficult to motivate both the firm and the worker to behave efficiently.

employer-worker combination should bear the remaining cost. This would also require better targeting mechanisms for public support to training.

In order to encourage an activity that has positive externalities for society, policies should use appropriate targeting methodology to help those firms that have a higher propensity to provide training, but need an additional push to cross the fixed cost point of training. What the specific targeting indicators would be would depend on the country and the sector context. However, the literature confirms a few common features that targeting methodologies could consider including: firms engaged in productive activities (exports, innovation, R&D, selling high-quality products, ICT adoption) tend to offer more OJT. Other firm-level metrics could also be considered, such as the presence of professional managers in family-owned firms (better management); performance-based pay (alignment of worker incentives); and the number of technical alliances (new technologies). The targeting methodology should include an assessment of the sensitivity of these characteristics (export-orientation, involvement in R&D) to the propensity to provide OJT, the growth trajectory of the firm (over the short and medium run), and a sense of what the firm is already investing to prevent crowding out.

How to target and with what kind of training is an emerging area of research in private sector development. In a recent randomized control trial (Anderson, Chandy & Zia 2016), businesses that received training increased profits significantly compared to those in the control group. Marketing training was significantly more effective for businesses with lower prior business exposure, whereas finance training was significantly more effective for larger, more established businesses. This indicates that programs targeting training at firms to improve management skills must look at the starting point of the company.³¹

For firms at the size spectrum ends, that is, for the very large and micro firms, government support is likely to crowd out other training, or simply be ineffective. For instance, large firms linked to export markets are known to train with or without government support. If government offers its support through subsidies, it would crowd out this segment of the private sector, creating a deadweight loss for society. For firms in the middle – SMEs – with the above-mentioned characteristics, there is a higher likelihood of success. However, for firms on the margin, government intervention may have a net positive effect by encouraging greater training that would not otherwise have occurred without its support.

The question of policy instrument could be an important one. Whether a tax deduction, a levy/grant scheme, or a grant, these instruments are prone to abuse and require careful design and monitoring by the implementing agencies. For example, in the absence of appropriate measures and monitoring, the employer may use government support toward other organizational needs, subsidize wages of employees, or train those who would otherwise have received training. Thus, a correct evaluation of the impact of different instruments requires information regarding the responsiveness of wages and training prices to changes in payroll taxes and other instruments. Each policy choice also has different administrative costs, as well as a bureaucratic responsibility

³¹ Companies in two treatment groups were given marketing training and finance training respectively. The authors found that businesses assigned to marketing training were more likely to implement practices connected to top-line business growth (e.g. market research, marketing tactics, and sales tactics). In contrast, finance training tended to shift a firm owner's focus towards greater efficiency in the business through more finance/accounting activities that economized on costs to boost profits.

for monitoring and compliance. While much data exists for developed/OECD countries, it is a policy area requiring further experimentation and data collection in developing countries.

To summarize, in order to calculate the optimal size of government support, policy makers would need to consider the type of firm, whether its skill efforts are systemic, how close it is to the frontier, its absorptive capacities (including management quality), and the extent of externalities.

4.2.2 Lower cost of poaching for firms

One question to consider regarding costs is: In which ways could companies coordinate to reduce the cost of poaching? In this regard, it would be instructive to learn from examples that have *not* worked before moving on to some new approaches.

When four key Silicon Valley companies (Apple, Adobe Systems, Google, and Intel) signed a non-poaching agreement (2005-2009) to prevent employee attrition, it resulted in a lawsuit by the employees. In 2009, the companies decided to settle. The rationale of the companies was two-fold: first, to avoid having to rehire and retrain employees given the high levels of labor mobility in the technology sector; and second, to protect intellectual property to which the employees had become privy. However, this provoked a heated debate about anti-competitive practices and forced the four companies to settle. These tactics are also unlikely to work in developing country contexts where enforceability of contracts is often weak.

Other options to consider could be instruments, such as Non-Compete Contracts (NCCs), payback clauses or back-loading bonuses to increase the worker cost of switching, as well as the attrition for the firm.³² With NCCs, the employee is not allowed to join a competitor for a defined period of time after quitting the current firm. This reduces labor mobility. In effect, it allows the company to reduce the benefits that the future employer could use. In the case of back-loading contracts, the employee receives a bonus at the end of a period during which he or she agrees to stay with the company. It is up to the employee to decide whether he/she prefers to stay for that length of time [to obtain the bonus], or whether the outside offer is more attractive. All of these instruments increase the cost of switching for the employee, and reduce the (probability adjusted) marginal cost for the firm. With payback clauses, the employee has to pay back the cost of training if he/she leaves before a certain time period, as contractually agreed upon prior to the training.

The common basis among these instruments that help to increase the switching cost among employees and reduce the cost of poaching is the assurance of rule of law and enforceability of contracts. This is an area where developing countries would need to pay more attention and communicate policies that would ensure a stronger rule of law among private sector firms.

4.2.3 Lower coordination costs for a group of firms

Governments could try to reduce coordination costs among firms through the provision of common/sharing facilities or industry-/cluster-based training centers. In the past, the initiative, land, and some financial support came from the state and federal governments. However, the curriculum design, methodology, teacher recruitment, and other management matters were decided by the private sector or non-profit organization.³³ The private or non-profit entity assumes the role

³² Downloaded on December 11, 2016 from: <http://knowledge.wharton.upenn.edu/article/silicon-valleys-poaching-case-growing-debate-employee-mobility/>

³³ See the example of the Penang Skill Development Centre (a public-private partnership [PPP] skill center), Dundar and others (2014).

of an ‘aggregator’, and the government acts as a facilitator. The government supports capital expenditures, such as equipment for training. After a few years of operation, the training center can then assume responsibility for recurring costs (materials, trainers, and so on). In some cases, the private sector firms can share the cost of introducing accredited providers and content.

In other similar models, grant funding from governments could help industrial clusters cover basic start-up costs by establishing common/shared facilities — with the firms donating space and paying the cost of training (now arguably lower per person due to economies of scale). Thus, instead of financing the direct cost of training, government resources support a group of firms, helping them to meet the fixed costs of cooperating to provide skills that are commonly required.

In theory, these arrangements could work because they do not help a single firm, but rather a group of firms to assess common skill gaps, produce skill upgrading plans, create apprenticeship programs, and obtain skills for a fee. In practice, the impact and efficiency of such programs is not yet fully known. Rigorous impact evaluations are required to measure the outcomes of such programs, which are becoming a popular way of increasing coordination among firms and addressing positive externality issues.

4.2.4 Targeting support toward disadvantaged groups

Better targeting is also required for workers to alleviate distribution issues. The literature notes that highly skilled workers are more likely to receive training, whereas certain groups of workers (including women and older people) receive less training.

The government approach could vary based on the type of skills in question, as well as the seriousness of the distribution issue. For more general skills and groups that may be at a disadvantage but remain capable of accessing credit markets (that is, at a non-serious disadvantage), policies that support an easing of regulations around access to finance for education and training could encourage greater participation. This could take the form of training and education loans with low interest rates or credit default guarantees. With a credit default guarantee, instead of directly paying for skills, the government allows for a guarantee or form of insurance to the training provider (in case the trainee defaults on the loan). This is achieved by the issuer of the bonds insuring the buyer’s potential losses as part of the agreement. The efficiency of these investments would need to be tested, taking into account the welfare gains.

In cases of serious distribution issues, the government could direct greater resources toward general training for disadvantaged groups. In this regard, a short-term policy intervention to provide targeted government support on the grounds of equity would be best. However, governments should use more efficient training methods than ALMPs. The literature review shows that the following programs maximize the chances for success: (i) a comprehensive program combining traditional in-classroom training with workplace training; and (ii) supplementary services, such as counseling and mentoring, monitoring, job search and placement assistance, as well as soft and life skills training.

This means that training programs for targeted worker groups should aim to create an opportunity for all of these elements to come together, if they are to have a chance of genuinely helping them. For instance, classroom learning provides general skills that increase labor mobility across a worker’s lifetime. However, it may not provide practical knowledge of technical skills in specific occupations which may be required to cross initial barriers to entry and survival in the firm. This

is where the workplace training component refines practical skills of the trainees and exposes them to industry standards, technical equipment, and gives them a sense of operating in a real workplace.

It is important for trainees to fit in well into the new environment. This will also help to increase worker retention. The trainee needs access to a system for counseling, mentoring and job matching services to find the right opportunities. Over the longer term, more investment and better learning outcomes in basic and secondary education, as well as achievement of lifelong skills for such groups, would be needed to correct the problem at its origin in the future.

4.3 Areas for future investigation

There are a few interesting analytical questions for future investigation. However, robust literature was found to be limited. For example: What is the relationship between economic geography/agglomeration and provision of training? What is the relationship between different public-private partnership (PPP) models of training and the impact on a firm's provision level of OJT? What are the empirical reasons for the lack of private training markets for general OJT? These could be stimulating questions for future investigation.

In general, much more work is also required to identify the conditions (that is, the characteristics of the firms, type of training, and types of workers) in which OJT is offered, as well as the economic mechanisms through which OJT contributes to firm productivity. This would improve the targeting of policy interventions. Finally, more attention is needed with regard to techniques to resolve methodological concerns associated with OJT measurement.

5. Conclusion

While creating gains for workers and society, firms that provide on-the-job training do so when it is critical to their productivity—and when productivity is critical to their survival. This paper begins by confirming a significant and positive return from on-the-job training on wages and productivity, as well as the presence of positive externalities from on-the-job training, while discussing the methodological considerations at play. The paper then reviews and validates the presence of market failures such as information asymmetries within the firm as a result of low-quality management practices that dampen firm demand for on-the-job training. Lack of competition in the firm's external environment appears to undermine adoption of on-the-job training and other complementary productivity-enhancing activities within the firm.

The literature suggests that for most firms, a comprehensive policy approach that resolves external constraints to becoming more productive is likely to have a positive impact on the provision of on-the-job training and adoption of complementary policies. More direct forms of firm-level support to improve management capabilities could also alleviate under-provision of on-the-job training. Where societies have improved welfare as a goal, public policy measures would be needed to complement on-the-job training for some specific groups of workers (older, less educated, women). In essence, the paper highlights the importance of demand-side constraints for firms, rather than supply-side constraints, for the provision of on-the-job training.

Table 3: Summary of Findings from the Literature on OJT

	Constraint	Explanation (from Theoretical Literature)	Findings (from Empirical Literature)	Policy Considerations and Areas for Future Work
Demand-side constraints	Information gaps and uncertainty about returns	Value of OJT is not understood by firms (accurate information on productivity returns, costs, wage rises); it may be particularly misunderstood by those firms that stand the most to gain, and that do not realize how poorly run their firms are.	Literature indicates that the returns to OJT (firm productivity and worker wages) are positive. Internal rate of return is positive (see Section 2.1). Literature presents validation of information gaps, and finds that firm-level management is often not well-informed about the cost-benefit of new training, leading to ineffective HR policies (see Section 2.1 and 3.1).	<u>Demand side considerations:</u> Reforming product market competition, trade, regulatory environment and other institutions (see Section 4.1.1). Reducing uncertainty about gains, increasing information flows, providing certification systems (see Section 4.1.2).
	Barriers to adoption of managerial practices and new technologies	Firm: Low adoption of new managerial practices or new technologies among firms — reducing their need for better skills, and hence, demand for training. <i>Worker:</i> Misaligned compensation structures limit worker incentives to train in new technologies.	Evidence of external environmental factors such as low product market competition linked to low adoption of productivity-enhancing activities (OJT, new technologies, such as information and communications technology [ICT], management practices). Within firms, low adoption of managerial practices in developing countries with preponderance of family-owned firms depresses demand for productivity-enhancing activities such as OJT (see sections 3.1 and 3.2). Even if the firm management wants to adopt new technology, there is evidence of distorted HR policies (linked to information gaps) that creates low incentives for workers to participate as they do not share in the gains (see sections 3.1 and 3.2).	Helping to improve management skills for better HR policy formation (see Section 4.1.3). Using more gain-sharing instruments and performance-based compensation for workers (see Section 4.1.4). <u>Supply side considerations:</u>
Supply-side constraints	Information asymmetry	Firms do not know what kind of training is available in the market, and/or how to go about providing for it.	Literature review does not suggest this is a binding constraint because some firms in the market are able to access this information, while others cannot. Simple interventions, such as increasing information awareness, can help resolve the problem (see section 3.1).	<u>Targeting selective firms for the provision of government subsidies (see Section 4.2.1).</u> Lower coordination costs among firms (see Section 4.2.2).
	Free-rider problem	Firms that provide general OJT are not able to fully appropriate the rents to training.	There is evidence of productivity benefits for future employers profiting from hiring workers trained in the previous firm. Wage gains for existing workers in the future employer are higher when the firm hires a trained worker (for example, from MNCs) (see section 2.1 and 2.2).	<u>Targeting support to disadvantaged groups (see Section 4.2.3).</u> <u>Areas for future work:</u>
	Credit constraints	Firms do not have adequate resources to finance OJT, even though it may have positive returns.	For most firms, a lack of convincing evidence about the presence of credit constraints is a significant reason why firms under-provide training. This could be a bigger issue for microenterprises and low-income workers (see section 3.2).	<u>More rigorous analytical work on OJT link to PPPs; impact of agglomeration on OJT; and resolving methodological issues for better OJT measurement.</u>

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Annexes

Annex 1: Annotated Bibliography (key literature on various aspects related to OJT)

Name of Study	Country and Time Period	Dependent Variable	Training	Other Independent variables	Effects Training on productivity and wages	Controls Endogeneity Training
Literature looking at impacts of OJT on productivity and wages separately; also Internal Rate of Return						
(Dearden, L., Reed, H., & Van Reenen, J. (2006))	United Kindom// Panel data 1983-1996	Mean change in ln(Sales per worker) Mean change in ln(Average Wage)	Share of trained workers	Sector dummies. Proportion of male employees, proportion in occupation, qualification, tenure, proportion in small firm, average log capital-labor ratio, avg log real value added per worker, avg log gross output per worker, avg log hourly wages, avg hours worked, avg R&D spend as a proportion of output	1% increase in the proportion of workers trained in an industry is associated with an increase in value added per worker of about 0.6% and an increase in wages of about 0.3%.	YES, Control for unobserved heterogeneity and the potential endogeneity of training using a variety of methods including GMM system estimation.
(Konings, J., & Vanormelingen, S. (2015))	UK// Firm level panel dataset 1997-2006	Wages, productivity	Share of trained workers at the firm	Capital, type of worker, proportion of workers/trained workers.	Effective labor input increases by 1.7% to 3.2% in response to an increase of 10 percentage points in the fraction of workers who receive training,	YES, Control function approach to estimate production functions. Wage equations at the firm level to infer productivity and wage premiums of training

					while the average wage increases by only 1% to 1.7%	
(Barret, A., O'Connell, J., (2001))	Enterprise surveys, Ireland// 1993-1996/7	Proportionate change in productivity	Trainees/Employees, Training Days/Employees, Training Expenditure/Payroll, General Training Days/Employees, Specific Training Days/ Employees	Investment, Change in employment, personnel Policies, Corporate Innovation, Corporate Restructuring, Labor Cost/Employees in 1993, Number of employees in 1993. Sector of activity.	Statistically significant positive effects on productivity are found both for all training and for general training, but not for specific training.	NO
(Almeida, R., Carneiro, P. (2009))	Portugal (Ministry of Employment)// panel of 1500 firms (with more than 100 employees) (1995-1999)	Internal rate of return (r). $\sum_{t=1}^N \frac{MB_{t+1}}{(1+r)^t} - MC_t^T = 0$	Training, Training hours above the median (1,489 h)	Firms location, Sector of activity, value added, number of workers, capital, average workforce age, yearly number of hires and fires,	On average it is -7% for firms not providing training and 24% for those providing training.	Yes. First difference and instrumental variables (following the approach by Blundell and Bond (2000)).
(Frazis and Loewenstein, (2005))	US// NLSY data set. Harley Frazis, Bureau of Labor Statistics	Gap between log wage after two years and log starting wage	Hours of training on the current job	Tenure, experience at start of job, AFQT, 10 years of education, married, part-time, union, dummies for initial occupation in the job, Black, Hispanic, female, enrolled in school, missing value indicators for AFQT, union, and part-time	60% opportunity cost of training, 40% direct cost of training. IRR equal to 50%.	YES: adjust for heterogeneity in wage growth. Evidence of heterogeneity in returns

(Anderson, S., Chandy, R., and Zia, B., (2016))	Sample of 852 small businesses in the Cape Town area of South Africa through a randomized controlled trial	Firm profits	Treatment groups receive marketing or finance business training	Variables covering business owner background, business owner exposure, business establishment	Profit improvements in the range of 41-61 percent over the control group	YES: randomized control trial
Literature looking at impact of OJT on worker wages (or using wages as proxy for productivity)						
(Almeida R. K. & de Faria, 2014)	Matched employer-employee data for Malaysia (2002) and Thailand (2004)	Log hourly wage	Dummy: having received formal on-the-job training since having joined the firm	Educational attainment, gender, age, tenure, experience, marital status, occupation, union participation, computer, bank account, internet transaction, training at a previous employer, size, foreign capital, exports, education of the work force, education of the manager, new production technologies, industry, region	7.7% for Malaysia and 4.5% for Thailand	Yes, Matching Estimators Method (Local Linear Matching)
Tan and Lopez-Acevedo (2005)	Mexico// Panel data from CIMO program in Mexico (1991-1993)	Value added per worker Log (value added) Log (production value – materials cost)	Participation in CIMO	Wages, set of industry dummy variables,	Organizational changes (80% Vs 50% for control firms). Adoption of quality control systems (23% more). Increased investment	Industry dummy variables to control for industry effects. Indicator variable to control for ec. downturn

					in worker training	
(Bartel, (1995))	US// Personnel records of a large company	Wages, job performance	Training received in 12 months	Employee development training, vector Z: years of education, years of company service, source of hire and type of occupation. Relative salary.	Positive and significant effect on both wage growth and the change in job performance scores	YES: Control for selection bias in training programs. 2 step estimation method.
(Chung, 2000)	Worker Level Data for Malaysia (1976, 1988)	Log hourly wage	Dummy: having ever participated in training	Age, marital status, nationality, schooling, dummies for employers and unpaid family workers	20%-30% (for women)	Yes, Excluded instruments (selection model): having a bank account, level of education in 1976, and parent occupational status
(Frazer, 2006)	Worker Level Data for Ghana (1991-1999)	Log hourly wage	Dummy: having participated in an apprenticeship	Gender, potential experience, schooling	Not statistically different from zero for the whole sample but 17% for self-employed	Yes, selection equation with instruments: father's education and occupation, as well as total household assets.
Hansson, B. (2009)	Different datasets from different IEs (Switzerland, EU, UK, USA, Netherlands, Italy, France,	Wage returns, internal employability and job-security. External: labour participation rates,	Training, Employer-financed training	Worker characteristics (age, education, gender),	Returns to training are higher if it is employer-financed. Returns to training do not vary with age,	Partially. Some studies do control for endogeneity .

		unemployment.			education or gender, but tend to be unequally distributed among firm.	
Loewenstein and Spletzer (1999)	Employer Opportunity Pilot Project (EOPP) survey and the National Longitudinal Survey	Log (wage) after two years	On-the-job training	Intercept, education, gender, union, temporary or seasonal employment, firm size, industry, and occupation	Positive and statistically significant impact of training on wages. General nature of OJT.	Partially: set of individual and job characteristics.
(Rosholm et al., 2007)	Matched employer-employee data for Kenya and Zambia (1995)	Log monthly wage	Dummy: having participated in training in the previous 12 months	Age, ethnicity, experience, gender, occupation, schooling, tenure, union participation and familiar relations within the owners of the firm, ownership, industry, location, size, financial situation, skill demand, turnover, unionization, training annual expenses	2.3% for Kenya and not statistically different from zero for Zambia	Yes, Matching Estimators Method (Local Linear Matching)
Hanushek & Woessmann, (2008)	Data on school attainment across countries	Log annual earnings, economic growth	Years of schooling, quality of schooling. Cognitive skills	Gender, potential experience, living in rural areas, test score, openness.	Cognitive skills have powerful effects on individual earnings, on the distribution of income, and on economic growth. The current	Alternative estimation methods, and samples. control variables.

					situation in developing countries is much worse than generally pictured on the basis just of school enrollment and attainment as it doesn't factor in schooling quality.	
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Literature looking at gains in future employer using various methods including MNC spillovers

(Poole, J. P. (2013))	Matched establishment-worker database from Brazil	Log individual annual wages	Multinational spillovers through skilled worker mobility.	Worker's identification code, 4 annual real wages in reais, 5 job tenure in months, type of job separation, age, educational attainment, occupational classification, the tax number of the worker's establishment, and the industrial classification of the worker's establishment. Dummy worker works at a foreign-owned establishment.	Positive multinational wage spillovers through worker mobility	Control for omitted variables.
Gorg and Strobl (2005)	Ghana// Firm-level data from manufacturing firms	TFP	Training/ experience in foreign firm	Years of schooling, set of sector and time dummy variables	Firms which are run by owners that worked for	Partially: GLS-AR(1) estimator

					multinationals, same industry prior to opening up their own firm have higher productivity growth than other domestic firms.	
(Balsvik, R. (2011))	Norway// Annual Norwegian statistics 1990-2000	Worker's productivity	MNE experience	Real wage, Tenure, Experience, Age, Years of schooling, Plant size, Labor productivity, Skill share, Female share, Worker/plant observations. Year and industry dummies: Plant, worker characteristics.	MNE experience increases productivity by 20%. Positive correlation.	YES, Controlling for differences in unobservable worker and plant characteristics
(Stoyanov and Zubanov, (2012))	Employer-employee data from Danish manufacturing for the period 1995-2007	Output and worker wage	Workers from growing firms	Age, gender, education, skill group, experience, worker coming from productive firm, human capital estimated, number of job transitions.	Total output gain from SPs is 0.11% per year. At least two-thirds – is retained by the hiring firms, whereas the SPs themselves receive a trivial 6% at most	Yes, use of instrumental variables
(Booth and Bryan (2005))	EU// Panel data from the European Community Household	Forms of output and worker wages	Training incidence, 1 if the individual started training, 0 otherwise	Set of dummy variables: gender, age group, type of contract, part-time, full time,	Both current and future firm benefit, with the future firm	YES: control for unobserved heterogeneity; Control for industry,

	Panel, 1994-1999			education level, private/ public sector worker	benefiting more than the current firm	occupation, firm-size. Uses random effects probit model.
Literature connecting OJT to firm management and technology adoption						
(Bloom, N., Eifert, B., Mahajan, A., McKenzie, D., & Roberts, J. (2013))	India// Experimental data, RCT large firms	Productivity - Quality (log QDI), inventory (log tons), output (log picks).	Management, Intervention.	Male family members, post treatment, plant manager related, plant manager tenure	TFP: 11%; Profits: 330.000 annually. Statistically significant.	YES, RCT. Instrumental variables: instrument the management practice score with log(1+weeks since the implementa tion phase began)
(Atkin, D., Chaudhry, A., Chaudry, S., Khandelwal, A. K., & Verhoogen, E. (2015))	Pakistan/ Jan-Apr 2012, (RCT)	Technology adoption	A new cutting technique	Output/month, employment, employment (cutters) Rs/Ball, size, promotional, age of firm, CEO experience, cutter experience, cutter tenure.	Lack of adoption is a misalignme nt of incentives within firms: Fearing reductions in their effective wage, employees resist adoption and misinform owners. Introducing incentives positive effect on adoption. The results are supportive of the	Yes, RCT

					hypothesis that misalignment of incentives within firms is an important barrier to technology adoption.	
(Caliendo, L., Mion, G., Opromolla, L. D., & Rossi-Hansberg, E. (2015))	Portugal// Firm-level balance sheet data set, and a firm-product-level data set containing information on the production of manufactured goods.	Log revenue labor productivity	Number of management layers	Value added, hours, and wage Quantity, revenue, demand shocks and markups at time t-1; capital at time t; and productivity at time t – 2.	One management layer, quantity based productivity increases by about 4%, while revenue-based productivity drops by more than 4%.	Yes, structural productivity estimation. Instrumental variables for endogenous variables, methodology of Wooldridge (2009) to deal with the endogeneity in input use.

Literature on evolution of curriculum in ALMPs

(Fares, J. , & Puerto, O. (2009))	90 countries// set of 345 studies of training programs	Probability of positive labor market effect	Type of training program	Exogenous variables: training type, specific characteristics of the program, economic/workforce and institutional country context, characteristics of the labor supply. Dummy variables for control groups.	Net impact evaluations greater in OECD countries followed by ECA and LAC. In-classroom and workplace training combined with other services increases probability of positive labor market	Partially. Some studies do control for endogeneity
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					outcomes, compared to in-classroom training up to 20%.	
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Annex 2: Survey instrument to measure quality of management in a firm

Source: Bloom, N., and J. Van Reenen. (2007) "Measuring and Explaining Management Practices Across Firms and Countries," *Quarterly Journal of Economics*, 122(4), 1341-1408.

The Management Practice Dimensions - Categories Score from 1–5	
<i>Categories</i>	Score from 1-5 based on:
1) Introduction of modern manufacturing techniques	What aspects of manufacturing have been formally introduced, including just-in-time delivery from suppliers, automation, flexible manpower, support systems, attitudes, and behavior?
2) Rationale for introduction of modern manufacturing techniques	Were modern manufacturing techniques adopted just because others were using them, or are they linked to meeting business objectives like reducing costs and improving quality?
3) Process problem documentation	Are process improvements made only when problems arise, or are they actively sought out for continuous improvement as part of a normal business process?
4) Performance tracking	Is tracking ad hoc and incomplete, or is performance continually tracked and communicated to all staff?
5) Performance review	Is performance reviewed infrequently and only on a success/failure scale, or is performance reviewed continually with an expectation of continuous improvement?
6) Performance dialogue	In review/performance conversations, to what extent is the purpose, data, agenda, and follow-up steps (like coaching) clear to all parties?
7) Consequence management	To what extent does failure to achieve agreed objectives carry consequences, which can include retraining or reassignment to other jobs?
8) Target balance	Are the goals exclusively financial, or is there a balance of financial and nonfinancial targets?
9) Target interconnection	Are goals based on accounting value, or are they based on shareholder value in a way that works through business units and ultimately is connected to individual performance expectations?
10) Target time horizon	Does top management focus mainly on the short term, or does it visualize short-term targets as a "staircase" toward the main focus on long-term goals?
11) Targets	Are goals too easy to achieve, especially for some "sacred cows" areas of the firm, or are goals demanding but attainable for all parts of the firm?
12) Performance clarity	Are performance measures ill-defined, poorly understood, and private, or are they well-defined, clearly communicated, and made public?
13) Managing human capital	To what extent are senior managers evaluated and held accountable for attracting, retaining, and developing talent throughout the organization?
14) Rewarding high performance	To what extent are people in the firm rewarded equally irrespective of performance level, or are rewards related to performance and effort?

15) Removing poor performers	Are poor performers rarely removed, or are they retrained and/or moved into different roles or out of the company as soon as the weakness is identified?
16) Promoting high performers	Are people promoted mainly on the basis of tenure, or does the firm actively identify, develop, and promote its top performers?
17) Attracting human capital	Do competitors offer stronger reasons for talented people to join their companies, or does a firm provide a wide range of reasons to encourage talented people to join?
18) Retaining human capital	Does the firm do relatively little to retain top talent or do whatever it takes to retain top talent when they look likely to leave?