

A Roadmap to Vocational Education and Training Around the World¹

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June 2014

Abstract

With young people among the biggest losers of the recent financial crisis, vocational education and training (VET) is often seen as the silver bullet to the youth joblessness problem. This paper provides a better understanding of VET around the world, proposing a typology with five types of vocational systems: (i) vocational and technical schools; (ii) vocational training centers; (iii) formal apprenticeships; (iv) dual apprenticeship systems combining school training with a firm-based approach; and (v) informal-based training. We first describe the strengths and challenges of each system. We subsequently review the evidence on the effectiveness of VET versus general education and between the different VET systems. There are clear indications that VET is a valued alternative beyond the core of general education, while various forms of apprenticeships combined with institutional learning tend to be more effective than school-based VET. Informal training is effective, however relatively little is known of its relative strengths compared with other forms of vocational education.

Keywords: vocational education and training, apprenticeships, dual VET, informal training

JEL classification: J24, I25, O17

¹ We thank Costanza Biavaschi, Corrado Giuliatti, Michael Kendzia, Alexander Muravyev, Vicki Finn Paniagua and Janneke Pieters—for their input and support. A related study (Zimmermann et al., 2013) connects vocational training with youth unemployment. The novel feature of our paper is the systematic and updated review of the major vocational training systems from a policy retrospective.

INTRODUCTION

Unemployment rates among youths have soared since the Great Recession of 2008, doubling the adult unemployment rate in many developed and developing countries. While many young people have responded to the sluggish labor market prospects by continuing tertiary education and investing in their human capital, others have altogether withdrawn from education, training and employment. The share of youths (aged 18 to 24) neither in employment nor education (NEET) in 2011 ranges from four percent (the Netherlands) to up to 20 percent (Italy and Greece) in Europe, 12 percent in Australia and New Zealand, and 15 percent in the US (OECD, 2012). Existing evidence from developing countries suggests that rates are even higher, with an average of 20 percent of youths in NEET in Latin America (ILO, 2010) and 25 percent in African countries (AfDB, OECD, UNDP, and UNECA, 2012).

Vocational education and training (VET) is frequently perceived as *the* solution to improve the opportunities of youths who lack the resources, skills or motivation to continue with higher education, and in particular in countries such as the US this has triggered attempts to build up larger and more effective apprenticeship systems (Lerman 2012).^{2, 3} Moreover, many argue that VET provides useful skills to prepare youths for entry into the labor force to improve their chances of a successful professional career (Quintini & Martin, 2006; ; Middleton, Ziderman, & Adams, 1993). In particular, by aligning initial education more closely to particular vocations and tasks demanded in the labor market, the mismatch problem—often seen as a main source of high unemployment in developing countries—may be reduced (Almeida, Behrman, & Robalino, 2012). However, the relevance of VET varies significantly across clusters of countries around the world. As opposed to general education, VET is only a prominent part of secondary education in a number of mostly continental European and Scandinavian countries. VET around the world can be classified into five distinct systems: (i) vocational/technical schools, (ii) vocational training centers; (iii) formal apprenticeship; (iv) dual apprenticeship system combining school training with a firm-based approach, and (v) informal-based training. This paper first presents VET types around the world, assessing the strengths and challenges of the different systems. Then it reviews evidence in support of school-based VET versus general

² In this article, we use the term “vocational education and training” (VET) to refer to qualifying education paths that provide individuals with occupations-specific knowledge and practical skills, independent of the place, content and educational provider. Sometimes it is also called TVET (technical and vocational education and training). The two terms are used interchangeably in the literature. Our focus is on the issue of *initial* VET, in contrast to vocation-specific education and training as part of life-long learning (see Arulampalam et al., 2004; Bassanini et al., 2005 for workplace training in Europe).

³ Of course, VET is complementary to the various policies boosting labor demand (typically industrial policies) in its goal to improve youths’ transition into employment.

education, and summarizes evidence comparing the effectiveness between the different VET systems.

A TYPOLOGY OF VET PROVISION

This section provides a typology of VET provision, reflecting the various country VET models found in practice. This topology focuses on two dimensions. First, differences in provision may be viewed along a continuum, reflecting the relative importance of institutional learning and workplace training. At one extreme, vocational schools can provide VET that is not complemented by work-based training; at the other, older union-dominated apprenticeships did not include formal theoretical institutional learning. As we shall see, there is also middle ground such as the Latin American type vocational training centers or the dual system combining classroom training with apprenticeships in firms. A second dimension is whether institutional-based learning is provided within formal secondary school frameworks (part of the education system) or at vocational training centers (which often have close ties to industry). Below we review the five systems introduced earlier.

Vocational and Technical Secondary Schools

At one extreme, many countries maintain a large vocational schooling system as part of their upper secondary education. This is the case of most southern European countries (such as France, Spain and Italy), but also Middle Eastern and North African (MENA) countries, Eastern European countries and Francophone countries in Central Africa. In these countries, the initial schooling system is characterized by the duality between general and vocational education. While the former aims to provide youth with general, often academically oriented knowledge as the basis for further (higher) education and training, VET provides youth with practice-oriented knowledge and skills required in specific occupations. Most frequently, VET follows a formal curriculum that combines general and occupation-specific knowledge. Compulsory schooling integrates VET as an alternative to an academically oriented schooling track, or as part of several post-compulsory education options. Similar to academic education, the skills that vocational schools provide are mostly general in the sense that they are transferable between employers (Becker, 1964). However, there might be differences in the degree of transferability across occupations—while the VET system in some countries transmits skills that are not restricted to one particular occupation, in others it provides vocational schooling for specific types of occupations (Shavit & Müller, 1998).

Why Do Governments Offer School-Based Vocational Training?

The supply of VET by governments through the educational system can be justified as a means to improve the opportunities of youths who lack the skills demanded in the labor market, the ability or motivation to continue with higher education, or the funding to pursue higher education. Furthermore, individuals might prefer this option to academic education as it implies a shorter human capital investment and facilitates earlier entry into the labor market. Many countries provide a vocational schooling option during compulsory schooling, perceived as an alternative for poor academic performance or at-risk youths (Neuman & Ziderman, 1999), and a safety net for early school dropouts and those who are less academically inclined. The close link to work tasks and hands-on practical experience should motivate practically oriented youths to continue training and remain in school longer. Furthermore, establishing a vocational education track during school has frequently been argued as a means of reducing the influence of parental background on educational choices, thereby increasing intergenerational mobility. Given that the educational decisions of youths are often linked to the educational attainment level of their parents, participation in a vocational track might allow those from working-class backgrounds to pursue educational attainment beyond the compulsory level, hence increasing their chances of attaining skilled rather than unskilled employment (Shavit & Müller, 1998).

In developing countries, the education of youths with practical-oriented vocational skills is further considered a promising means to create flexible and self-responsible learning attitudes, which might better prepare youths for the requirements of the modern work place. Furthermore, given that poor skills and hence low firm productivity is often seen as the reason for low development levels, the investment in vocational education is often justified as a means to promote a bottom-up labor market transformation (Bennell, 1999).

In most cases, participation in either vocational or academic courses during school is operationalized by tracking students in the two different education pathways. The benefits of such a tracking system are not clear, as leaving school with vocational qualification often translates into reduced options of further post-compulsory education, particularly the academic type. The incentive effect of learning more practice-oriented skills might therefore be mitigated by high costs of later switching to academic education. Although the technical possibility of transferring to academic education might exist, earlier tracking will lead to strongly divergent levels of skills and competences (Woessmann, 2008). Furthermore, with the separation of higher and lower performing students, VET might counteract the equalizing potential of vocational education (Shavit & Müller, 2000). Given that only few youth

practically manage to enter academic education after vocational schooling (Kogan, 2008; Carrero Perez, 2006), populations in many countries often have a low regard of the vocational schooling option since they perceive it as a dead-end track and second-choice education.

Southern European Countries

Most of the vocational training in Spain takes place in school instead of within the firm: Only four percent of those in vocational upper-secondary education in Spain combine school- and work-based training (Cedefop, 2010). Similarly, three in four young people in vocational training in France participate in school-based vocational training as opposed to the apprenticeship alternative. In Italy, firm-level vocational training is also not very widespread since it is only used in crafts, retail and large manufacturing companies and based on fixed-term employment contracts.

Youths in these countries face particular difficulties when trying to enter the labor market, especially since the recent economic crisis has aggravated these long-standing problems. In addition to having above-average NEET rates, labor market entry is difficult for both low- and high-skilled young people. One major factor is the deep labor market segmentation between permanent and fixed-term contracts, which can be attributed to strict dismissal protection and largely liberalized temporary employment. In these countries, transition to a permanent position is difficult. Another issue is wage compression in low-skilled occupations by collective bargaining. For instance, collective bargaining in Spain, which is centralized at the province and industry level, sets “entry minimum wage” above the legal minimum wage, inflating the lower part of the wage distribution and resulting in relatively high earnings for young workers and those least qualified. In some of these countries, the relatively marginal role of vocational training can be explained by a limited interest of employers in more formal vocational training (given the dual-employment structure), but also by strong expectations of upward social mobility on behalf of young people and their families which creates strong preference in favor of academic training (Planas, 2005). Moreover, there is a long tradition in these countries to subsidize temporary employment and training contracts as part of Active Labor Market Policies (ALMP). However, the effectiveness of these measures is questionable as explained by Felgueroso (2010) in Spain, Roger and Zamora (2011) in France and Tattara and Valentini (2009) in Italy.

Evidence from cross-country comparisons in Europe, which have attempted to implement a vocational schooling systems, points to several systematic elements of success, as described below (Carrero Perez, 2006 CEDEFOP, 2008; Woessmann, 2008).

1. **Ensure curricula relevance:** All stakeholders (government, employers, social partners, educational institutions) need to be involved in its development, with a clear assignment of responsibilities. However, the weight of the respective voices might differ across countries.
2. **Maintain close labor market contact:** A system of continuous feedback from employers and private-sector institutions is required, which is particularly difficult to implement if employers have poor organization.
3. **Ensure high-quality schooling:** Sufficient funding is required to guarantee the appropriate teaching material and the availability of well-trained teachers.
4. **Incentivize training providers and create competition amongst training providers:** A mix of public and private funding is required in addition to providing autonomy in teaching and staffing decisions.
5. **Maintain high-quality training:** A decentralized system of accreditation and quality assurance is crucial, as well as competition between training centers, such as output-based funding.
6. **Limit the risk of establishing a dead-end vocational schooling track,** the competences and qualifications acquired should be comparable to those acquired in academic tracks in order to promote transferability between the two.

The Middle East and North Africa (MENA) Countries

In some MENA countries, such as Tunisia, centralized government agencies control the vocational post-secondary training system and manage it without the involvement of social partners. In other MENA countries, such as Egypt, Jordan and Lebanon, the coordination of a common strategy proves difficult despite the involvement of private sector and social partners (Carrero Perez, 2006). Consequently, there is a weak linkage between skills provided by the VET system and those demanded by the private sector. In cooperation with the European Union, Egypt has been implementing an extensive “TVET Reform Program” between 2005 and 2013. This reform program has a core focus on strengthening the labor market link by establishing local and sectoral Enterprise Training Partnerships (ETP). According to the

project's website (www.tvet.org), it has established 12 sectoral ETP so far, predominantly in manufacturing, construction and tourism.

Further challenges for MENA countries include insufficient funding and a missing incentives system for the training institutions, both of which are likely crucial determinants of training quality. While public budget allocations (based on past enrollment) predominantly fund VET centers, student fees are usually limited and only cover administrative costs (Egypt, Tunisia, Jordan). Regarding training center accountability, Tunisia initiated the MANFORME reform in the 1990s, which aimed to increase accountability through output-based funding. However, the high degree of centralization hampered the reform, thus limiting the scope for the autonomous action of training providers. In further decentralization reforms, training centers obtained greater autonomy and a self-management structure within a standardized framework. Nonetheless, performance-based funding is still missing (Masson, Baati, & Seyfried, 2010). A performance-based rewards system is difficult to implement since it requires a continuous monitoring and evaluation of training institutions. A project initiated by the European Training Foundation on the exchange of knowledge regarding quality VET monitoring in Mediterranean countries (including Algeria, Egypt, Israel, Morocco, Syria, Tunisia and Turkey) noted weaknesses with respect to the evaluation practice. Monitoring and evaluation predominantly focused on input indicators (teachers, facilities, curricula) rather than the success of the VET in achieving training objectives. Furthermore, when using performance-based indicators, they did not seem to be adequately applied to reassess and improve the current system (*ibid.*).

Besides the concerns of governance and funding, a further challenge concerning the extensive implementation of the vocational system is its stigmatization as second-choice education (Bardak, 2006). With the financial inability to provide an academic education system for all, governments use an early tracking of students into the vocational system to limit demand for higher education. Since some VET systems have insufficient links to the labor market, they tend to be marginalized as low-status tracks for poor academic achievers (Vlaardingerbroek & El-Masri, 2008; Oketch, 2007). Consequently, the quantitative role of the school-based VET is therefore rather limited, with general, non-technical secondary education representing the standard education in the majority of MENA countries.

Russia and Other Transition Economies

Since the start of the transition, general trends have involved vocational education moving from

firms to schools, thus weakening the links between schools and enterprises. There has also been declining enrollment in vocational and technical schooling, often counterbalanced by the expansion of general secondary schools and tertiary education (Saar, Unt, & Kogan, 2008). As noted by Micklewright (1999), this was due to a mix of demand and supply factors, including the closure of enterprise-based schools as well as the shift of students towards general secondary schools; the purpose behind this shift was rooted in obtaining broader education, which is more appropriate in a market economy, particularly at the time of structural changes. Having previously produced more than 50 percent of all secondary graduates in most countries, the vocational school system has since collapsed very quickly. Students left vocational schools in favor of general secondary education and the prospect of pursuing a tertiary degree. However, employers now assert that it has become increasingly harder to find graduates with technical skills (Sondergaard & Murthi, 2012).⁴

Evidence suggests that the VET transition system has been far from desirable. Several studies (Bejaković, 2004; World Bank, 2005; Bartlett, 2009) have identified the following inadequacies that could be improved within the current VET system: (i) subject-specific specialization occurs too early; (ii) the curriculum is too narrowly focused on subject-specific skills and competencies; (iii) VET provision is excessively decentralized across different government ministries, leading to the multiplicity of structures; (iv) training systems are inflexible and unable to adapt to new labor market needs; and (v) systems lack institutional links between schools, employers and social agents.

Sub-Saharan Africa and South Africa

Most Sub-Saharan countries have formal, institutionalized technical and vocational education and training structures at the lower- and upper-secondary or post-secondary levels, paralleling general education in integrated schools. However, it is frequently difficult to distinguish across the two education types, and these programs fail to satisfy the needs of the well-developed informal sector in the economy. Enrollment in vocational education as a share of those in secondary education was below 10 percent in most countries in the early 2000s, with important exceptions such as Liberia and Mali (both reached more than 30 percent) according to DFID (2007) and Atchoarena and Delluc (2001). Moreover, data show some decrease in vocational

⁴ Despite the overall trend in the transition countries representing a shift towards a school-based system characterized by a clear distinction between education and work, important elements of the dual system remain in the region, especially in Central Europe. They are presently visible in the Czech Republic, Hungary, Romania, Slovenia and Serbia. Moreover, some elements are also present in Poland and Slovakia, as well as Croatia (Matkovic, 2008).

education participation in many countries over time—with girls hardly enrolled at all. Differences between French-speaking and English-speaking countries explain, to some extent, differences in the level of VET enrollment as the former places greater emphasis on general content and achieves higher enrollment rates than the latter. However, French-speaking countries disregard more artisan skills and are thus more disconnected from the needs of the important informal labor market, as seen in the case of Cote d’Ivoire or Senegal (Atchoarena & Delluc 2001; Oketch, 2007).

Overall, formal vocational education and training has a difficult status in Sub-Saharan African countries, which can be ascribed to a number of issues, as summarized below (ibid.):

1. **Second-best choice:** VET is considered an inferior alternative to general secondary schooling, as many consider it an unattractive pathway resulting in dead end jobs (Garcia & Fares, 2008).
2. **Lack of demand:** The dominance of informality in economic activities and employment interferes with the possibility of productivity increases, technological innovation and formal job creation. A higher demand for better skilled workers would cause stronger incentives for participation in formal VET.
3. **Limited institutional support:** There is only limited support by policy makers, governments and ministerial agencies, who would have to show greater engagement with VET at schools (and in cooperation with business). Moreover, expanding general education usually crowds out vocational education.

Vocational and Technical Secondary Schools

An alternative to providing training within the framework of formal secondary schools is to offer training at vocational training centers. Basically, this is the Latin American model—where vocational training is followed by, but not alternating with, internships.

Latin America

An increased demand for labor in the manufacturing sector due to the economic expansion after 1945, which exceeded its capacity to provide on-the-job training, triggered the development of VET in Latin America. A special characteristic of this region is the evolution of such programs over time. There are two identifiable phases (Betcherman et al., 2007; Puerto, 2007).

The first phase of VET development started with the foundation of the National

Service for Industrial Training in Brazil (SENAI) in 1942, and the following National VET Institutions (VTIs) that emerged in the whole region. The German dual system initially influenced the SENAI. However, the German system could not be imitated due to the lack of master craftsmen (CINTERFOR, 2008). The VTIs were supply-driven, state managed, financed through payroll taxes, independent from academic schools as well as from the Ministry of Education, and reflected the industry's needs (de Moura Castro & Verdisco, 1998). VTIs used centrally determined curricula and had a tripartite structure throughout the region, representing employers, workers and the government. Nevertheless, the VTIs adapted neither to the changing economic structure after the 1970s nor to the economic challenges and subsequent downturns caused by the oil crisis. At this point, the demand for skilled and semi-skilled labor from the manufacturing sector decreased, with graduates from these programs being unable to gain access to employment. Consequently informal labor markets grew and budgets were trimmed for all these institutions. Such a reduction also resulted from the preference for programs initiated by market principles (ibid.).

The second phase of VET programs, known as the *Jóvenes* programs, began in the early 1990s and targeted mainly disadvantaged youth, such as those from low-income families, the poorly educated and the unemployed or underemployed. Chile created the first program, which was afterwards imitated in Argentina, Uruguay, Paraguay, Peru, Colombia, the Dominican Republic and Venezuela. In contrast to the VTIs governments did not manage the *Jóvenes* programs, yet they did regulate them. Training was offered through a bidding system in which both public and private firms could take part; therefore training was demand-driven in the sense that the government did not specify the contents of the curriculum. Similar to the dual VET system, an internship followed the classroom-training phase (Ibarrarán & Rosas Shady, 2009). In line with Weller (2009), the main differences of the former VTIs are that the newer VET systems show:

1. **A greater diversification of training providers**, with more emphasis on private institutions. In the public sphere, delivery and regulation were institutionally segregated and programs were decentralized, which entailed greater participation by local authorities (provinces and municipalities).
2. **More articulate interest in skill certification**, which was enabled by a larger variety of training supplied and the acknowledgement of informal learning.
3. **Attempts at making training more demand-oriented** through the greater involvement of private companies and trade unions, which helped to recognize unmet needs.

4. **More diverse target groups**, with a transfer from one-time training to continuous training for personnel of strategic value for the firm's competitiveness. At the same time, training programs were developed to support the reintegration of the unemployed and special arrangements for groups with particular employability problems (youths and women with low education levels) or those working in low-productivity, low-income activities (specific occupations, own-account workers, micro-entrepreneurs).
5. **New instruments to publicly finance training**, particularly tax incentives.

Formal Apprenticeship

In some countries, VET is provided through formal apprenticeships, with institutional instruction complementing workplace training. This is the case in the UK, the US, New Apprenticeships in Australia, and Learnerships in South Africa.

The United Kingdom

In the 1980s traditional apprenticeships lost their appeal in the UK because of “the recession, the removal of supports and the introduction of cheaper, less-valued alternative training schemes such as the Youth Training Scheme (YTS) and its successors” (McIntosh, 2007, p. 4). However, with the relative shortage of intermediate (Level 2 and Level 3) vocational skills in the mid-1990s, apprenticeships were reintroduced as Modern Apprenticeships at Level 3 and National Traineeships at Level 2. Nonetheless, despite considerable public interest in their expansion, the overall participation rates remained rather low during the early 2000s. Possible explanations for this include: (i) the lack of a central and rigorous assessment of the apprentices' qualification obtained; (ii) the high costs of apprentices to employers, relative to other countries such as Austria, Germany or France, among others (Steedman, 2010); and (iii) a shift towards offering apprenticeships to older youths who had previously worked at the company already (Wolf, 2011).

The 2009 reform, Apprenticeship, Skills, Children and Learning Act, aimed at addressing some of these issues, in particular tightening the link between the apprenticeships and employers and increasing incentives for employers to heighten training activities (as explained below). As a consequence, the number of youth below the age of 25 who participated in apprenticeships increased from 387,000 in 2007–2008 to about 460,000 in 2011–2012. Moreover, in 2010, the UK implemented the Specification of Apprenticeship Standards for England (SASE), which aimed to harmonize the qualifications of the different

apprenticeships and increase transparency in training activities. In addition, a grant of 2,500 pound sterling per apprentice aged 16 to 17 years old was offered. In 2012, the grant was extended to incentivize training of those up to 24 years old. Moreover, the National Apprenticeship week was initiated, which is a yearly public event that aims to draw media attention to the benefits of offering and learning in apprenticeships, as well as to increase the acceptance of apprenticeships. Finally, further government reforms are currently underway that aim to improve training quality and transferability and ensure continuous adaption of the qualifications and skills to align with economic demand; these objectives are to enhance the attractiveness for employers to train apprentices (Department for Education, Department for Business and Skills, 2013).

The United States of America

In the US formalized apprenticeship have a limited role and are largely confined to adult education in so-called “Registered Apprenticeships” in the construction industry (e.g. such as electricians, carpenters and plumbers, among others). Through the combination of time spent in theoretic instruction and work-based training, the apprenticeship system is aimed at imparting both general and occupation-specific knowledge; however, the place of training is concentrated in the firm, as the apprenticeship system operates without any close links to formal education.

The Office of Apprenticeship (OA) in the US Department of Labor (DoL) is in charge of the registration and evaluation of VET. Thereby, the OA is supported by the “Advisory Committee on Apprenticeship” (ACA). Across 26 states, State Apprenticeship Agencies (SAAs) are responsible for the apprenticeship programs, including the provision of technical assistance. Currently, there are around 21,000 apprenticeship programs registered in the US. Participation numbers from the DoL count approximately 290,000 active apprentices in 2012. Since 2008, the number of active apprentices has been steadily decreasing, largely due to a steep decline in the number of new apprentices. However, this figure only accounts for apprenticeships not offered by the military (currently around 70,000) and those registered with the labor office. Lerman (2012) suggests that the actual number of all apprentices is higher, given that not all apprenticeships have to be registered. Contrary to the European model, US apprentices are in their mid- to late-20s and have most likely already gained some work experience.

Australia

Although the majority of VET participation is school-based (80 percent in 2011), there also exists a comprehensive Australian Apprenticeship system. This system differentiates between two types of contracts: apprenticeship contracts and traineeship contracts. Apprenticeships refer to technical occupations and the traditional trades, whereas traineeships apply to all other occupations (Karmel, Blomberg, & Vnuk, 2010). These traineeships are comparable to further qualifying training in other countries due to their short duration (typically less than one year). The contracts are structured in both work-based learning with an employer and school-based education with certified training providers. Contrary to apprenticeships, which have a long tradition in Australia, traineeships were introduced in 1985 to counteract youth unemployment of those aged 15 through 19 with low levels of schooling. The participation in apprenticeships and traineeships has significantly increased across *all* age groups over the past years due to supportive policies, such as financial hiring incentives, part-time training, minimum training wages and lifting age restrictions (ibid.). Particularly due to specialized subsidies encouraging the training of workers aged 25 and over and mature workers (45 and above), nowadays the share of adults amongst participants increased to one-third (two-thirds) of all new entries into apprenticeships (traineeships).

South Africa

In 1998, South Africa established a nation-wide regulatory framework for the labor market and skill development. Known as the Skills Development Act, it introduced a skill-training levy on employers' payrolls. According to this, 80 percent of the revenue goes into funding for training in firms and additional programs governed by the Sectoral Education and Training Authorities (SETAs). The remaining 20 percent flows to the National Skills Fund, which promotes training for the unemployed and informal workers. In addition, the Skills Development Act also created apprenticeship agreements called Learnerships. These contracts involve a learner, an employer and an accredited training provider. Learnerships imply that after the apprenticeship of a specified nature and duration, the apprentice receives a qualification registered by the South African Qualifications Authority. Along with the Skills Development Act, various National Skills Development Strategies aimed at skills-development levy utilization. For instance, the Accelerated Shared Growth Initiative for South Africa (AsgiSA) and the Joint Initiative on Priority Skills Acquisition (JIPSA) are two initiatives aiming at fostering labor market integration and training through improving the labor market placement of unemployed graduates. The latest strategy, NSDS III, is set for a

five-year period from 2011 to 2016 and its main goal is to facilitate participation in the labor market for all South Africans, regardless of race, class, gender, age, geography and disability. Furthermore, NSDS III aims to increase employment, economic growth and rural development while reducing poverty. To achieve this, closer connections between employers, training institutions (public and private) and political institutions will be reinforced, and a skills development system meeting labor market needs will be introduced. Among the strategies' key elements are professional, vocational, technical and academic learning (PIVOTAL) programs, which combine college or university education with practical learning in a workplace. Upon graduation, the employee gains an occupational qualification. Employers who supply workplaces can reduce costs through accepting a SETA grant.

Dual System

Dual VET, common in Austria, Denmark, Germany and Switzerland, accommodates between 40 percent (Austria) to 80 percent (Switzerland) of all school leavers. The four countries share the following four key institutional elements of the dual system:

1. **A high degree of formalization.** They only provide training in centrally accredited occupational qualifications and the training content is continuously adapted to meet the changing labor market requirements.
2. **Strong involvement of social partners.** Representative advisory boards assist in developing and maintaining curricula at the governmental and federal level. Regional trade or occupational committees, or a combination of the two, undertake implementation and monitoring.
3. **Vocational colleges provide the school-based part of dual apprenticeships.** Colleges cover both general and occupation-specific education. The government bears the costs of training in the schools.
4. **Firms must meet certain technical standards.** Otherwise, the training firm will not obtain accreditation. Offering apprenticeships is optional for companies, but those who choose to offer them follow standard application procedures in order to match the firm with trainees. The training companies cover the training costs within the firm.

Why Would Firms Invest in General Training?

While dual training exhibits several advantages from a societal and individual perspective, establishing an efficient dual apprenticeship system crucially depends on the willingness of firms to participate. To ensure post-apprenticeship skill transferability across firms, the training should provide a sufficient amount of general schooling. However, as Becker (1964)

noted, some general schooling is crucial in enabling apprentices to enter further employment relationships but in a perfectly competitive labor market, in which workers are paid according to their marginal productivity, firms have no incentives to invest into general schooling. This is because workers could leave directly after the training period in order to reap all the benefits of their acquired general skills.⁵ Hence, in order for firms to provide both specific and general training, the worker must bear the general training costs. Implementation would include state-funded school-based general education or firm-based general training, along with workers paying for their training costs. Furthermore, firms could be incentivized to participate if they were able to recoup part of their investments by contractual arrangements ensuring that either: (i) apprentices accept a wage lower than their marginal productivity during the training period, or (ii) apprentices would have a contractual obligation to continue to work for the firm beyond the training period (ibid.; Malcolmson, Maw, & McCormick, 2003).

Based on the empirical finding that firms in some countries (such as Germany) invest in general training despite incurring a net cost during the training period (Dionisius et al., 2009), several theories attempt to explain the training activities of firms (see Wolter & Ryan, 2011 for an excellent overview). In particular, Acemoglu and Pischke (1998, 1999, 2000) develop and extend the framework of Katz and Ziderman (1990) where informational asymmetries regarding the abilities of workers and the quality of training received can lead to sufficient incentives for firms to invest in general training. Given that firms are able to learn the ability of the worker during the training period, the additional presence of a compressed market wage allows firms to pay high-ability workers less than their marginal product, hence reaping part of the benefit of training. A compressed wage structure might arise due to: (i) information asymmetries and complementarity between ability and training in the production function (Acemoglu & Pischke, 1998); or (ii) search costs combined with market frictions such as collective bargaining, minimum wages and firing costs, which are higher for high-skilled workers (Dustmann & Schönberg, 2009). While these components are necessary to ensure incentive compatibility on the firm side, Acemoglu and Pischke (2000) highlight the existence of external certification as a signal to prospective employers that the trainee is willing to invest in their own training. Dustmann and Schönberg (2012) further extend this framework by suggesting that the dual-apprenticeship system is more likely to succeed in

⁵ As discussed below many firms do invest in their employees' general training. Informational asymmetries regarding workers' productivity, search costs and market frictions, or monopsony power are some of the reasons explaining this.

countries where firms can credibly commit to the training provision during the apprenticeship through apprenticeship regulation and external accreditation.

Another set of models aims to explore the deterring effect of poaching, which implies that firms that do not invest in training might hire apprentices from the training firm by offering them higher wages. But firms are more likely to engage in training if they are able to enjoy some monopsony power arising from industry- and occupations-specific skill requirements, dispersed regional location of firms and lower product market competition (Lazear, 2003; Smits, 2007; Gersbach & Schmutzler, 2006).

A further potential reason to participate in training might be that firms would prefer to ensure their own future skill supply through providing training. However, some countries, such as Switzerland, maintain a large dual system and a high turnover rate after training (Wolter & Schweri, 2002). It might be the case that firms train apprentices to use them in current production. Although firms might incur a net cost for the average productive apprentice, some high-productivity apprentices might also be paid less than their marginal productivity, given that the overall wage level for apprentices tends to be low (Mohrenweiser & Zwick, 2009). In particular, if there are few outside options for youth, they might be willing to engage in such a payment scheme since they would benefit afterwards from the acquired skills.

Why Is the Dual System Not Readily Transferable?

The dual VET depends on some essential preconditions. For instance, it relies on strong cooperation between government and employers to develop the VET institutional framework, design and adjust curricula, certify competences, and co-fund the plant-based and school-based elements. In addition to these regulatory and budgetary issues, the dual system also depends on active support from actors as described below:

1. **Trade unions** must accept that apprenticeship contracts have lower payments compared to regular contracts;
2. **Employers** must be willing to provide training (not primarily in an informal manner but according to occupational curricula), to send apprentices to vocational school leading to certified occupational qualification, and to provide them with a credible prospect of sustainable employment;
3. **Government** support for providing vocational schools and teachers and also for preparatory training for young people who fail to enter apprenticeships;
4. **Youth and parents** must accept VET as a solid alternative to academic education.

These elements tend to be mutually reinforcing. As they have developed over a long time, these conditions cannot easily be transplanted to different institutional and historical contexts. However, many countries have tried to develop dual VET programs. A few interesting initiatives undertaken in the US, Egypt, and Sub-Saharan Africa are described in Table 1. Despite multiple efforts to establish a dual VET system in quite diverse countries, successful initiatives remain relatively small-scale and tied to certain sectors such as construction in the US or traditional crafts in Sub-Saharan Africa. While these efforts have led to VET provision combining some institutional learning with workplace training (usually through formal apprenticeship), the dual system continues to lack central institutional ingredients that distinguish it from other apprenticeship models. The challenges of establishing a mainstream dual VET system around the world highlight the need for a specific institutional framework, the complexity of which is not easily replicated in either developed or developing countries.

Informal-Based VET

In India and many African countries where informal employment is widespread, the predominant source of vocational education or training occurs in a so-called “traditional” or informal apprenticeship system, which lies outside of formal vocational or general schooling. In this case, a family or clan transmits knowledge between generations in traditional apprenticeships (ILO, 2011, 2012). Despite taking place in the informal sector, these traditional or informal apprenticeships have locally standardized structures and duration, and are based on contractual agreements between the craftsman and trainee. Apprentices receive no or little remuneration during the training period and might even have to pay a fee to the trainer. Training is generally entirely work-based, but it may follow an informal training plan (ILO, 2012).

While VET needs to acknowledge that formal sector employment cannot absorb but a minor fraction of job entries in many countries, known challenges of informal training include: (i) the fact that it tends to be confined to crafts which have limited technological innovation and company growth; (ii) its limited transferability of the acquired skills due to the lack of training certification and work experience; (iii) the lack of teaching general skills; (iv) the limited acceptance of informal training certificates between local communities; (v) concerns involving the potential exploitation of children as cheap laborers, gender discrimination based on traditional gender roles, as well as unenforceable contractual

agreements resulting in low quality training or an extension of the apprenticeship duration (ibid.).

Sub-Saharan Africa and South Africa

Master craftsmen who own workshops have traditional apprenticeships, mostly in traditional occupations. Especially male youth use the informal sectors for skill acquisition in typical male occupations like metal work, vehicle maintenance, carpentry, furniture making, whereas females apprentice in hairdressing, food preparation and servicing, and tailoring and sewing shops. After the apprenticeship, which varies from several month to up to 5 years, Master craftsman rarely retain apprentices (Lahire, Johanson, Wilcox, 2011).

Given the cost of school attendance and weak family background in some countries, enrollment in secondary education is far from complete. Consequently, some young people enter the (informal) labor market after primary education without any further formalized general or VET at the secondary level, rather than seeking an apprenticeship in a small business or formalized village polytechnics. Non-government providers such as NGOs, churches, for profit agencies and, most importantly, informal entrepreneurs deliver major parts of VET for informal activities (Rioust de Largentaye, 2009). Informal apprenticeships reach approximately 50 to 90 percent of young people in countries such as Gambia, Ghana, Senegal, Madagascar, Zambia, Tanzania, Mali and Malawi. In Sub-Saharan Africa, informality is not necessarily a result of cumbersome regulations and mistrust in public institutions and taxations. It is mainly driven by significant economic pressure on job creation to sustain livelihoods because the population between 15 and 24 years doubled in the region from 1985 to 2010 (Adams, de Silva & Razmara, 2013).

Continuous efforts have started to upgrade the informal training system through formalization. However, this is a difficult task considering that the flexible character of the traditional apprenticeship might easily be deformed and lead to “another supply-driven, dependency-induced training program” (Adams & Johanson, 2004, p. 132). Palmer (2009) discusses several approaches that the Ghanaian government took to formalize informal apprenticeships, and refers to possibly unintended consequences. In particular, his criticism relates to the total or partial takeover of training costs, as suggested in the 2008 National Apprenticeship Program (NAP), as this neglects the complex system of pecuniary and non-pecuniary payments made between apprentices, their families and the craftsmen. Following previous experiences, partial payments might force poor apprentices to leave the

apprenticeship before completion. Since the training plan is unstructured, it is uninsurable that apprentices are able to obtain sufficient skills during this period. Additionally, he points out that the substitution of practical work-based training for a general school-based education could ignore youths' true abilities as well as the local economy's skill demand. As potentially successful measures, Palmer stresses the establishment of practical short-term training courses governed by public or private institutions to accompany work-based training (as accomplished in the Vocational Skills and Informal Sector Support Project in Ghana), as well as specific craftsmen training to guarantee a minimum apprenticeship quality. Regarding the latter, projects in Ghana, Tanzania or Kenya worked well, as they improved both the training content and quality of the output produced (ILO, 2012).

Recently, there is also evidence that decentralized decision making may improve the performance of informal training. In 2012, Blattman, Fiala and Martinez studied the effects of vocational training in Uganda. They emphasized the advantageousness of decentralized decision-making processes concerning vocational training, since individuals or groups are capable of making good or even better decisions than a central policy planner.

The missing or poor involvement of informal business associations is another problem to formalization and standardization. Despite actual existence in many countries, the associations only weakly represent their members due to their heterogeneity, limited funding or lack of structure. To address this issue, an ILO initiative in Niger aimed to restructure the National Crafts Association and enlarge their visibility in local communities; it caused a significant enhancement of their coverage and thus a higher presence in political consultations concerning traditional apprenticeship formalization. Including business associations can help advance training quality by increased monitoring, the definition of skill standards, or the joint acquisition of expensive tools (ibid.).

EMPIRICAL EVIDENCE

Identification Problems

Is school-based vocational training as effective as general-based education? What have we learned from Latin American vocational training institution evaluations? How useful are apprenticeships in helping youth transition into the labor market? How does the dual system compare to general-based education or other types of vocational training? Which type of VET best prepares workers for the labor market? Researchers have attempted to answer some

of these questions for different countries and here we summarize the findings. As will become apparent, there is no easy answer to these questions given variation both across and within countries and studies. Countries' institutional and cultural differences, as well as the available amount of information on workers, jobs and labor market characteristics in the different datasets used explain some differences, yet several identification problems within the literature are difficult to overcome.

Most of the literature compares the employment outcomes of VET students with an alternative group, namely general-based education students, other VET tracks, school dropouts, or college graduates in the same country, after controlling for all observable characteristics available. However, it is acknowledged that unobserved heterogeneity may still prevail given that youth deciding to study VET may have different abilities, tastes and preferences about work from those who choose an alternative education system or no education. If there are unobserved quality differences between both types of youth, results from cross-sectional studies will reflect an omitted variable bias. For instance, given that VET is frequently intended for youth with lower motivation and ability than those who pursue general-based education, non-causal estimates of the returns to vocational education relative to general-based education will be downward biased (Willis & Rosen, 1979; Tuma, 1994; McCormick, Tuma, & Houser, 1995). By contrast, the opposite is likely to be true when comparing students from vocational education to school dropouts. Furthermore, a related concern arises due to different occupations requiring diverse mixes of academic or practical skills. If youth self-select into different occupations based on their skills, evaluating the effectiveness of the different systems becomes a difficult task given that the employment patterns, payment structures and union coverage in the occupations themselves may not be comparable.

Unable to exploit exogenous changes in the institutional setting, the majority of these country studies conduct descriptive analyses controlling for students' characteristics to capture the expected opportunity of the alternative forms of schooling, including grades and test scores achieved prior to accessing VET or remaining in general education, family background and local economic conditions. Additional confounders include subjective statements of preferences for VET or academic studies (Bishop & Mane, 2004), subjective self-assessments of ability (Hotchkiss, 1993) and information concerning the vocational orientation of the school captured by full-time vocational teachers and the schooling choice of previous cohorts (Meer, 2007).

In addition to the aforementioned problems, one has to add measurement issues in

studies comparing the effectiveness of two types of VET systems across countries. Indeed, the covariation of other relevant institutional factors, the absence of a unified framework for defining the respective training options, as well as the difference in data collection and quality frequently bias cross-country studies analyzing the relative effectiveness of school-based VET and the dual system (Hoeckel, 2008). In an attempt to avoid this problem, some studies exploit the two systems' coexistence within countries in order to evaluate their relative effectiveness. However, in most countries one system prevails over the other, the reason for which is likely to be correlated with the labor market structure, thus adding yet another source of endogeneity.

One way to address the selection problem is to exploit some exogenous change that lengthens or shortens one educational system versus the other. For instance, several researchers have exploited institutional changes increasing the duration of general schooling in the vocational schooling tracks of those respective countries (Oosterbeck & Webbink, 2007; Pischke & von Wachter, 2008; Hall, 2012), whereas others have used an instrumental variable approach (Fersterer, Pischke, & Winter-Ebmer, 2008). Furthermore, an alternative way to address the endogeneity is to use propensity score matching that addresses the selection problem (Aedo & Nunes, 2001; Aedo & Pizarro, 2004) or, even better, randomized controlled experiments designed before the VET program implementation (Díaz & Jaramillo, 2006; Attanasio, Kugler, & Meghir, 2011; Card et al., 2011). The concerns with randomized controlled experiments are their external validity and their costs.

Evidence of Vocational and Technical Secondary Schools

Rigorous quantitative evidence on the returns to school-based vocational education is scarce primarily due to the lack of informative data. Most countries experience a negative selection into vocational schooling tracks, leading to a systematic underestimation of vocational training effects when the selection is unaccounted for. Here we review some of the existing evidence on the relative benefits of participating in vocational schooling relative to general schooling. We thereby focus on studies that somehow aim to control for the selection. Clearly, however, the lack of evidence based on random variation is quite unfortunate and raises accountability concerns, as discussed earlier.

Overall, the evidence described below indicates that youth completing school-based VET do as well (and sometimes better) than if they had instead remained in purely academic studies (Tansel, 1994, 1999; Mane, 1999; Moenjok & Worswick, 2003; Tunali, 2003; Bishop

& Mane, 2004, 2005; Meer, 2007). Some evidence finds that school-based VET is most efficient when there is strong matching between the vocational training area and the occupation of employment (Middleton, Ziderman, & Adams, 1993; Chung, 1995; Bennell & Segerstrom, 1998; Neuman & Ziderman, 1999). Additionally it is efficient when offered to low-ability individuals and to those who work in lower skilled jobs (Dearden, McIntosh, Myck & Vignoles, 2002; Kahyarara & Teal, 2008).

A number of studies provide evidence on labor market returns to vocational curricula in the US, showing positive effect in the short to medium run. They also find that for later cohorts returns to attending technical schooling have increased over time. While Hotchkiss (1993) finds no return to vocational schooling on employment and wages of high-school graduates in 1980, even after controlling for training-related occupation choice, Mane (1999) identifies differences in the returns to vocational training of high-school graduates who do not attend college during the 1970s, the 1980's and the 1990s, finding a positive trend over time. Whether this is due to an increasing quality in education or an increase in the demand for these skills remains unclear. The positive wage and employment effects of participating in the vocational track are confirmed by Bishop and Mane (2004), using data from the National Education Longitudinal Survey of 1988, and Bishop and Mane (2005) using high-school transcripts. They note that the increasing returns to vocational training in the US are most likely explained by a growing need for these types of skills during the 1980s and 1990s. Using the same data as Bishop and Mane, Meer (2007) uses a multinomial logit selection model to account for self-selection in track choice, and finds that those on the technical or academic track are best off following the path they chose, suggesting that VET provides a valuable alternative for youth aiming to work in technical occupations.

In contrast with US studies, Newhouse and Suryadarma (2011) find that there has been a decreasing trend in the relative returns to vocational schooling relative to general schooling in Indonesia, as they observe significantly higher wage returns for older cohorts yet lower returns for younger ones in vocational schooling (relative to academic education). The authors explain this by the decreasing value of vocational skills in the increasingly service-oriented Indonesian economy.

Using data on high-school qualifications in Israel, Neuman and Ziderman (1999) find that school-based VET is beneficial only when a good match arises between VET and the occupation of employment. In that case, the authors estimate that vocational high-school graduates earn between eight to 10 percent more than those with solely academic

qualifications. However, they find no significant earnings differences between vocational high-school graduates with unmatched jobs and academic high-school graduates.

In developing countries, the returns to vocational versus general secondary education have been investigated since the 1960s, leading to a large and dispersed evaluation literature, often with contradictory findings. Chung (1995), Bennell and Segerstrom (1998), Middleton, Ziderman and Adams (1993), among others, provide systematic overviews of these earlier studies. They conclude that vocational education is often times at least as beneficial as general education in terms of procuring the necessary work skills, and tends to outperform general education in terms of employment outcomes when individuals are able to find employment that matches the vocational skills. They further note that the benefits of school-based VET are not exclusively related to an increase in employment probability, but also to achieving higher levels of educational attainment. In a discussion of Psacharopoulos and Loxley (1985), Holsinger and Cowell (2000) highlight, that participation in lower vocational schooling lowered the dropout rate and increased students' educational achievement in Columbia and Tanzania.

Several recent studies corroborate the finding that vocational training is often times at least as beneficial as general education. For instance, evidence from Thailand suggests that, when controlling for positive self-selection using a Heckman selection correction, vocational track returns at the upper-secondary level in high schools are higher than the academic track (Moenjak & Worswick, 2003). Another interesting study (Kahyarara & Teal, 2008) investigates the wage returns to vocational relative to academic education in Tanzania, by estimating Mincerian earning equations that take account of: (i) the different stages at which pupils may enter vocational schooling, either during primary or different stages of secondary school; and (ii) the characteristics of the firm that employs the individual. When controlling for firm-fixed effects they find that the negative returns to vocational schooling become zero. Note however, that they only incompletely account for the negative selection into vocational education, thus potentially underestimating the returns to training.

Some studies provide evidence of the differential rates of return to vocational education. After using a variety of datasets, accounting for the time taken to acquire different qualifications, and controlling (when possible) for ability bias and measurement error, Dearden, McIntosh, Myck and Vignoles (2002) find that the returns to UK school-based vocational education vary with the type of qualification obtained. These authors find that the returns to academic qualifications are higher if individuals subsequently acquire a skilled rather than an unskilled job. Heterogeneity also occurs among individuals' ability. The returns

to vocational qualifications are significantly higher for low-ability individuals. In a different setting, Tansel (1994, 1999) and Tunali (2003) find differential returns to vocational (relative to general schooling) by gender in Turkey. Controlling for the differential selectivity into the different tracks, they find that women who participate in vocational education benefit from a higher employment probability, while men experience higher wages. Furthermore, women seem to benefit predominantly in urban areas, while males benefit in both rural and urban settings, suggesting that females face further participation constraints besides educational ones.

It is interesting to note that recent studies that exploit a reform to identify the effectiveness of school-based vocational training relative to general education do not find any effects of increasing the general education for students in the vocational training track by one year. Oosterbeck and Webbink (2007) investigate the increase in duration of the vocational schooling track in the Netherlands in 1975 by one year, with the additional year designated only to general schooling. Adopting a difference-in-difference strategy, they analyze the effect of the change on wages 20 years later and do not find any effect. Most recently, Malamud and Pop-Eleches (2011) evaluate a Romanian reform that postponed the tracking of students into vocational and academic schools. Using a regression discontinuity design, they find no effects of this reform on university completion, labor market participation or earnings. Similarly, Hall (2012) assesses a policy change in Sweden in 1991 that increased the general education content of the vocational schooling at the upper secondary level by one year in duration, after which students were eligible to enroll in tertiary education. Exploiting random differences in time and the regional implementation of a policy pilot, Hall does not find any effects on subsequent study take up, nor any increase in the wages earned up to 16 years after the beginning of upper secondary school. However, he finds that low achieving students are significantly more likely to drop out of upper secondary education.

Using an instrumental variable approach, Capellari (2004) assesses differences in early labor market outcomes for participants in vocational or general secondary schooling in Italy. Observing that the selection into the respective tracks is strongly related to parental background and ability, he uses the grandparents' school participation as an instrument, arguing that this is exogenous to the pupil's labor market outcomes once controlling for parental characteristics, but yet relates to the decision on whether to select into general or vocational schooling. He finds that participating in the vocational track increases the early career employment and labor market participation rates while general schooling increases the probability of participating in university. Unfortunately, the study only analyzes short-term

effects. An interesting French study estimates both short- and long-run effects of vocational versus general schooling tracks (Margolis & Simonnet, 2003). Controlling for non-random selection using a Heckman selection correction with exclusion restrictions, these authors find that technical education has a similar effect as general education on the speed of entry into the first job. However, they find that five years after entering the labor market, youth with lower levels of vocational schooling earn less than those who graduated from the academic schooling track. They further find that one channel by which participants of the lower- or medium-level vocational schooling track experience a fast entry into employment is the increased probability of finding the first job via social networks—although, this network effect fades over time.

Evidence of Vocational Training Centers

Given the early implementation of the Latin American vocational training institutions (VTIs), a proper experimental evaluation is missing. Estimates from studies of the time are usually based on simple earnings comparisons of graduates from these programs and graduates holding other types of formal education. The results suggest higher average earnings for 1970s graduates of these vocational training institutions, at least in Colombia (Puryear, 1979), Brazil (de Moura Castro, 1979), Argentina, Bolivia, Chile, Honduras and Venezuela (Psacharopoulos & Ng, 1992). A more recent assessment of the Mexican technical education system, using propensity score matching techniques, similarly finds increases in earnings for early-1990s graduating cohorts (Lopez-Acevedo, 2003).

Recently there has been several rigorous studies evaluating the effectiveness of the different *Jóvenes* programs. Overall, these programs seem to have guaranteed the participants' increased employability and higher earnings upon graduation (Betcherman et al., 2007). Table 2 summarizes key evaluations in different countries. The bottom line is that the *Jóvenes* model has been successful in improving the job placement and earnings of disadvantaged youth, particularly for disadvantaged females. Nonetheless, the original *Jóvenes* programs have now become particularly expensive for some countries due to the lengthy duration, averaging eight years (ibid.).

Evaluating Apprenticeships

Although apprenticeships seem to improve both social and occupational skills of apprentices (Rose, 2004; Halpern, 2009), rigorous quantitative evidence on their effectiveness is meager, even in countries where apprenticeships are widespread (Lerman, 2013). Overall, studies indicate apprenticeships' effectiveness varies with the counterfactual to which they are compared. When compared to other types of VET or post-school study, it seems that apprenticeships work better than the alternative (Bonnal, Mendes, & Sofer, 2002; McIntosh, 2004, 2007; Lee & Coelli, 2010; Alet & Bonnal, 2011).

McIntosh (2004) analyzes the returns to apprenticeships in the UK prior to the 2004 reform. Using the 1996–2002 Labour Force Survey (LFS) he finds that while completing an apprenticeship increases males' wages by around five to seven percent (controlling for other qualifications held and personal characteristics), it has no effect for women. He also finds that there are sectoral differences, with higher returns among men working in manufacturing industries rather than in the service sector. Most recently, McIntosh (2007) evaluated the government-funded apprenticeships which the UK established in 2004. Using Labor Force Survey and OLS estimates, this author compares the effectiveness of these apprenticeships to other types of vocational qualifications in the UK. He finds that in 2004–2005 individuals who completed apprenticeships earned around 18 percent at Level 3 and 16 percent at Level 2 more than individuals whose highest qualification is at Level 2, or at Level 1 or 2, respectively. However, as acknowledged by McIntosh himself, these estimates may be biased because employers may be creaming the best applicants, as there is excess demand for apprenticeships.

According to Lerman (2013, p. 12), “few rigorous studies have examined how entering and completing apprenticeships in the United States affects the education, job skills, non-academic skills, and job market outcomes of young people.” Orr (1995) analyzes the effects of participating in a Wisconsin youth apprenticeship in printing and finds that apprentices earned substantially higher earnings than those of similar youth. Ethnographic evidence from 24 programs involving nearly 500 apprentices—conducting over 300 hours of observation and over 90 interviews with adult mentors, staff, program directors, and students—suggests that apprentices learn both non-cognitive and occupational skills (Halpern, 2009). Non-cognitive skills include problem solving, self-confidence, teamwork, discipline and the ability to take direction and take initiative, among others. Similarly, Rose (2004) finds that apprentices learn from their mentors and aim at mastering an occupation and becoming part of a community practice.

Lee and Coelli (2010) analyze the labor market returns to vocational education in Australia, using propensity score matching methods, and find substantial differences for individuals who completed 12 years of schooling and who did not complete 12 years of schooling. While the effect of participating in VET on wages and employment probability is zero or even negative for the first group, it is significantly positive for the latter group. This is in line with previous literature, suggesting that vocational education options seem to provide a safety against low labor market attachment.

Bonnal, Mendes and Sofer (2002) study the relative performance of apprenticeship training versus school-based training in France. Correcting for the negative selection of youths into apprenticeships, they find that apprenticeships perform significantly better in integrating youths into their first employment relationship. However, this advantage fades over time and is not associated with higher wages. In addition, a recent study by Alet and Bonnal (2011) shows that young people integrated into the apprenticeship system rather than vocational schooling in France are more likely to successfully complete their final exam and undertake further education.

One of the first studies to use an instrumental variables (IV) approach to measure the returns of apprenticeships is that of Fersterer, Pischke, and Winter-Ebmer (2008) using Austrian data from 1975 to 1998. These authors exploit the different lengths of apprenticeship periods completed for some apprentices in failed firms. Perhaps surprisingly, they find that the estimated returns for apprentices affected by the firm failure are low, at around 2.6 percent; the returns are also not very different from the OLS returns in the same sample, suggesting that the selection problem is not particularly important in this case.

Evaluating the Dual System

As with apprenticeships, the dual system seems to outperform other types of vocational schooling; but in this case, the benefits focus on employment opportunities, as opposed to earnings, and are concentrated at the beginning of individuals' professional lives (Winkelmann, 1996; Plug & Groot, 1998; Parey, 2009). In addition, recent causal estimates of the returns to dual training find that there are no differences in wage returns relative to the academic track (Krueger & Pischke, 1995; Winkelmann, 1996; Fersterer & Winter-Ebmer, 2003; Pischke & von Wachter, 2008).

An extensive area of research exploits the coexistence of the dual VET system and other types of vocational schooling within countries to infer their relative effectiveness and more

specifically the relevance of firm-specific skills. For the case of Germany, studies by Winkelmann (1996) and more recently Parey (2009) show that participation in the dual VET has a particular advantage compared with other options of the vocational schooling system since it improves early labor market attachment and shows a faster and more structured integration into the labor market. However, this advantage fades over time as other education participants find a foothold in the labor market. Furthermore, these studies show that the fast initial transition does not hinge on finding employment in the training firm, suggesting that firm-specific skills do not play a major role in the German apprenticeship system. Investigating wage differentials, Parey (2009) does not find any significant differences in return to the training options in the early working life. Studies regarding the performance of apprenticeship training versus school-based training by Plug and Groot (1998) show similar results for the Netherlands.

When comparing the dual system with purely academic studies, several papers have found that wage returns to apprenticeship training on wages in Germany and Austria range between 15 and 20 percent, based on OLS estimates (see Krueger & Pischke, 1995; Winkelmann, 1996; Fersterer & Winter-Ebmer, 2003). Given that dual vocational training lasts around three years on average, this implies a return of around five percent a year, which is not far from other forms of school-based education. However, selection into the dual system once again raises concerns that OLS wage estimates will be biased (Soskice, 1994). In particular, Soskice finds that much heterogeneity is due to firm size, given that the wages for apprenticeship-trained workers strongly increase along with the training firm size. Pischke and von Wachter (2008) exploit the gradual adoption of a one-year increase in compulsory schooling in the lowest schooling track in Germany between the 1950s and 1970s to study its effects on long-term wages, and likewise find no effects of the policy.

Recently, Adda et al. (2011) use a structural approach to compare the career path of apprentices relative to unskilled workers (pure on-the-job training). They model the entire career path, starting with the original apprenticeship choice then follow period-by-period employment transitions, job mobility, and wages. Using 15 years of German data, they find that apprenticeships lead to more wage growth upfront, while wages in the pure on-the-job (unskilled) training grow at a lower rate yet for longer. Overall, they find that wages are higher following an apprenticeship qualification, with the job arrival rates very high and destruction rates very low after some years of experience. These findings contrast with Heckman's suggestions that qualified apprentices are harder to reallocate following a job loss (Heckman,

1993).⁶

Effectiveness of Informal Training

Evidence on the effectiveness of informal training is rare given the nature of the training per se. The few existing studies focus on the selection problem which we have also perceived in the other types of training (Monk, Sandefur, & Teal, 2008). In addition, they seem to demonstrate that informal training enhances the trainees' labor market opportunities (Aggarwal, Hofmann, & Phiri, 2010; Nübler, Hofmann, & Greiner, 2009; Walther, 2011). Still, additional research on evaluating traditional and informal apprenticeships is needed.

Studies on Malawi and Tanzania provide evidence for labor market outcomes. According to these studies, most informal apprenticeship graduates were employed either within their former training company or with another employer, and after some years a remarkable share of them were self-employed (Aggarwal, Hofmann, & Phiri, 2010; Nübler, Hofmann, & Greiner, 2009). In addition, these authors find that compared to informal jobs without training, informal VET offers the chance of promotion inside informal businesses from unskilled to skilled worker, thereby earning a higher wage. Another advantage of informal and traditional apprenticeships, compared to vocational schooling (often characterized by outdated curricula and lacking employer involvement), is their link to current skill demands and work practices in the informal sector. Consequently, informal apprenticeship graduates find work more easily than vocational school graduates. Given that informal training does not require any formalized entry criteria, it often represents the only opportunity for school leavers to obtain vocational education (Walther, 2011). Finally, an evaluation study of the informal apprenticeship system in Ghana (Monk, Sandefur, & Teal, 2008) reveals an important negative selection of youths into informal apprenticeships, who possess low levels of general schooling. When controlling for this negative selection, the study indicates that individuals with low levels of formal schooling significantly benefit from the informal training, as their earnings increase by 50 percent. However, in general, the effects of informal training on earnings seems to be somewhat disappointing. The main

⁶ Hanushek, Woessmann and Zhang (2011) also analyze the life-cycle employment patterns of people with different educational backgrounds, using data on the labor-market experiences of individuals at various ages in 18 OECD countries, collected in the mid-1990s as part of an OECD-sponsored venture. They find a higher initial employment rate for vocational education participants at labor market entry, which reverses by the age of 50. These results suggest the hypothesis that occupation-specific knowledge quickly becomes outdated and thus leads to lower employment opportunities later in life. However, we need more reliable evidence concerning the perceived trade-off since both occupation-specific labor market segregation as well as limited long-term panel data impede the causal interpretation of these findings.

causal factor of some income improvement appears to be on the access to employment off the farm in the informal or rarely in the formal sector. One possible explanatory factor for this small impact on earnings could be the limited education and literacy of those who typically pursue this type of training. Other explanations are the quality of the training provided, the outdated technology and production methods used and taught, and the intransparent character of the skills acquired (Adams, de Silva & Razmara, 2013).

CONCLUSION AND POLICY PERSPECTIVES

In this paper, we have classified vocational education and training (VET) around the world into five distinct systems: (i) vocational and /technical schools; (ii) vocational training centers; (iii) formal apprenticeship; (iv) dual apprenticeship system combining school training with a firm-based approach; and (v) informal-based training. After reviewing the particular strengths and weaknesses of these distinct types, the empirical evidence on their effectiveness was summarized. Beyond the general education core, youth completing school-based VET do as well (and sometimes better) than if they had instead remained in purely academic studies, especially when there is a strong match between the vocational training area and the occupation of employment. Vocational training makes the transition to gainful employment easier. This is found to be particularly true for low ability youth and for those working in low-skill jobs. Rigorous studies evaluating the effectiveness of the different vocational training centers reveal that these programs increase participants' employability and they have higher earnings upon graduation. Similarly, apprenticeships improve youths' wage and employment outcomes, except when compared to college graduates. Comparing across types of VET, the dual system, which is most prominent in a number of Continental European countries, is more effective at helping youth transition into employment than alternative academic or training education, though there are no wage differences. Although meager, the available evidence on informal training effectiveness finds that it enhances the trainees' labor market opportunities, including self-employment opportunities. Hence, it seems fair to say that vocational training elements generate some added value both to training employers and to the trainees and facilitate the timely entry into more stable and better paid jobs at the beginning of the working life.

Yet, given the fact that economic and institutional conditions are highly diverse across world regions and even within them, policy makers, when it comes to furthering vocational education and training, need to take into account the resources available and build upon them. A

functioning dual vocational training system requires crucial framework conditions that cannot easily be transferred. However, ‘lighter’ elements of VET closer to employers’ demand and real work experience can be developed within the other types of VET discussed in this paper. If stronger ties between employers’ needs or the informal market skill demands and the training system can be established, youth and their families, but also potential employers will see VET as a feasible and respectable educational option.

However, vocational education and training should not be seen as a panacea to combat high youth unemployment. It is important to keep in mind that VET systems are appropriate to prepare young workers for only certain types of jobs. VET may be less appropriate for specific high-tech sectors and to access the highest managerial level positions both in the public and private sectors. Here, general academic training is certainly relevant. To address the problem of rising youth unemployment rates since 2008, VET is complementary to structural reform policies that help revive the economy and reduce entry barriers to employment. Improving VET systems remains relevant even if structural and institutional changes need to interact with attempts to increase certain types of job opportunities (Cahuc, Carcillo, Rinne and Zimmermann, 2013).

Finally, a recent line of research has focused on studying the life-cycle impact of vocational education, motivated by the returns to vocational training potentially varying at labor market entry compared to after spending several years in the labor market. The differences lie in the fact that skills have to adapt to technological change and be mobile across time, firms, occupations and space. While some studies so far support the conjecture that general education still provides a more solid base for such adjustments (Hanushek, Woessmann and Zhang, 2011), others suggest that vocational training is better than pure on-the-job (unskilled) training (Adda et al., 2011). However, the long-term counterfactuals of low-skilled individuals with general or vocational education considering the risk of early unemployment have not yet been well investigated. Future evaluations need to study the long-run consequences better, a challenge that has also to do with the availability of long-term panel data.

Table 1. Three initiatives to implement the dual VET system.

The United States. Both the National Youth Apprenticeship Act under the administration of George Bush and the School-to-Work Opportunity Act under President Clinton were two attempts to implement the dual system. However, according to Lerman and Rauner (2012), widespread participation in the youth apprenticeship could not be reached due to: (i) the inability of employer organizations to coordinate long-term training plans, (ii) the federalist division of responsibilities that impedes a binding national framework for the training systems, (iii) a general mistrust in the idea of imparting specific human capital, as it is likely perceived to lose its value more quickly in a continuously changing labor market (Krueger & Kumar, 2004), and (iv) a lack of interest in participating in this exchange on the part of employers. Despite the futile efforts at the federal level, some states were able to establish and maintain a functioning small-scale dual apprenticeship system, particularly in the construction industry (Bilginsoy, 2003).

Egypt. From 1991 to 2008, the German Society of International Cooperation (GIZ, *Gesellschaft für Internationale Zusammenarbeit*) assisted Egypt in establishing technical and VET structures modeled along the lines of the German dual model under the Mubarak Kohl Initiative. The provision of apprenticeships was coordinated by the newly created National Center for Human Resource Development related to private employers in Egypt as well as the Ministry-related Directorate for Vocational Education and Training. The program started to offer the possibility to enter three-year dual VET courses to secondary-school graduates in Egypt, in 28 occupations involving around 1,600 firms providing training and 44 vocational schools. As of 2009, 76 technical schools had trained 32 occupational profiles involving around 1,900 companies, mostly in the formal and industrial sector. By 2009, 24,000 young people had graduated, with 13,000 in training. Although by now the pilot has been established as a regular part of the Egyptian training system, it remains insufficient to cope with Egypt's challenge of integrating around one million young people into the labor market per year. Program sustainability without external support is also questionable.

Sub-Saharan Africa. Some countries in Sub-Saharan Africa have modernized their apprenticeship systems. Here we discuss four examples. **Benin** put in place a dual apprenticeship system in 2006, mostly devoted to traditional crafts such as masonry, electrical trades and plumbing. It expects to have around 3,000 graduates per year, which indicates the small scale of the system. **Mali** introduced a dual training model in 1997 spending around 80 percent of the time on work supervised by a trained artisan and 20 percent formal courses in training centers. There is some evidence of this reform leading to better skill formation and inclusion into the labor market, particularly due to the systematic involvement of the private sector (Rioust de Largentaye, 2009). **Ethiopia** reformed their education system in 2000 to strengthen primary education for all young people, which now lasts eight years, and complemented this with vocational courses in technical subjects lasting for one or two years. There is some preliminary evidence of improved labor market performance of recent training graduates (Denu, Tekeste, & van der Deijl, 2005). As shown by the **Gambian** example of the National Youth Service Scheme established in the mid-1990s, young people mostly turn to self-employment or work unrelated to the occupations learned (Lahire, Johanson, & Wilcox, 2011). Nonetheless, these models are relatively small and tied to traditional crafts. Thus, establishing VET at a sufficient scale remains a challenge.

Table 2. Jóvenes programs in Latin America.

1. **Argentina:** *Proyecto Joven* (Aedo & Nunes, 2001): The non-experimental analysis based on propensity score matching shows a 10 percent increase in the employment probability of adult women (not of men) and a 10 percent increase in monthly wages for young males and adult females.
2. **Colombia:** *Jóvenes en Acción* (Attanasio, Kugler, & Meghir, 2011): The experimental analysis shows a substantial increase (18 to 35 percent) in earnings and a five percent increase in employment opportunities for both men and women, with larger results for women.
3. **Dominican Republic:** *Joventud y Empleo* (Card et al., 2011): The experimental design finds no effect on employment probabilities, however finds a (marginally significant) 10 percent increase in wages.
4. **Chile:** *Chile Joven* (Aedo & Pizarro, 2004): The non-experimental analysis based on propensity score matching shows a 21 percent increase in the employment probability of young women and a 26 percent increase in monthly wages, with best results for the young.
5. **Peru:** *ProJoven* (Díaz & Jaramillo, 2006): The experimental analysis shows a six percent increase in employment probabilities and an 18 percent increase in hourly wages.

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