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Do labor standards benefit workers in horticultural export chains in Peru?

Monica Schuster¹ and Miet Maertens¹

Abstract

Private standards are spreading rapidly in international food production and trade, and are moving beyond food quality and safety aspect to address environmental and ethical concerns. We examine how effective private standards are in improving employment conditions in global food supply chains. Using panel data from company and workers surveys and different econometric techniques, we analyze how the adoption of a variety of private standards, that differ with respect to their focus on labor standards, influences employment conditions in production, processing and exporting companies in the horticultural export chain in Peru. We find that workers employed in companies adopting private labor standards are more likely to be paid a minimum wage, to have a contract and to receive training but there is no effect of private standards on the level of the wage and on the employment period. We conclude that private labor standards contribute to the enforcement of national labor laws but have no beneficial effect beyond legal employment entitlements; and that despite the enactment of labor regulations at the national level and the wide spread of private labor standards, ethical labor concerns remain an issue in the Peruvian horticultural export sector.

Keywords: global food supply chains, labor standards, private standards, employment conditions, horticultural exports, Peru

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1. Introduction

In recent decades global food trade expanded considerably, with the largest growth in food exports from low-and middle income countries to high-income countries. This trade is subject to public food quality and safety regulations as well as a large variety of, mostly voluntary, private standards (Henson and Humphrey, 2010). These private food standards started to emerge at the end of the 1990s, mainly in response to consumer concerns in high-income countries about food safety and quality, and later expanded to address environmental and ethical concerns (Disdier and Marette, 2012). This includes labor standards, which emerged relatively recently and aim at ensuring dignified work and decent employment conditions. They are based on several resolutions of the ILO Declaration on Fundamental Principles of Rights at Work. Labor standards typically set out provisions on child labor, forced labor, discrimination and gender inequality, collective bargaining, a healthy and safe working environment, working hours and a decent remuneration. They provide guidelines on implementing and auditing labor protections. Private labor standards can be controlled and enforced through third-part certification or through a system of corporate codes of conduct.

In this paper we examine how effective private standards are in improving employment conditions in global food supply chains. We empirically examine how the adoption of a variety of private standards, that differ with respect to their focus on labor standards, influences employment conditions in production, processing and exporting companies in the horticultural export chain in Peru. The country has a long tradition in the export of high-value fresh produce and the sector employs over 140.000 workers. Production and processing activities are located in Peru's coastal desert area and have attracted a high number of migrant workers from other regions in the country. The sector is subject to specific national labor laws that provide companies more flexibility in hiring, especially temporary and unskilled, workers. While the horticulture export sector is an increasingly important source of employment, an ongoing debate questions the quality of that employment. There are specific worries about scarce social services, low wages, long working hours, job insecurity, and the empowerment of workers' organizations, and about the capacity of labor authorities' to supervise the sector and enforce national labor regulations (Chacaltana, 2007). We examine whether private standards contribute to improving the situation of workers in the sector by focusing on wages, employment periods, contract security, and training.

The focus on workers is particularly relevant in the broader discussion on how standards contribute to sustainability, and especially its social component, in global food systems. Various empirical

studies have analyzed how private food standards affect smallholder farmers in developing countries (e.g. Asfaw et al., 2010; Handschuch et al., 2013; Hansen and Trifkovic, 2014; Holzapfel and Wollni, 2014; Subervie and Vagneron, 2013) but there is less evidence on how workers in global food supply chains are affected by standards (e.g Barrientos et al., 2003; Lockie et al., 2014). Yet, in many food export sectors workers largely outnumber the smallholder farmers and are often poorer and more asset-deprived (Maertens et al., 2012). The importance of workers in food export chains is expected to further increase due to an ongoing shift from smallholder family farming to large-scale farming based on hired labor (Beghin et al., forthcoming; Gibbon and Ponte, 2005; Maertens and Swinnen, 2009); the increased need for labor-intensive post-harvest handling (Maertens et al., 2011; Barron and Rello, 2000); and the increased use of hired labor on export-oriented family farms (Rao and Qaim, 2013). Also in the horticultural export sector in Peru the importance of hired workers is increasing as export companies shift their sourcing away from smallholder and family farms to large-scale estate farms and vertically-integrated own production (Schuster and Maertens, 2013).

2. Background: the Peruvian horticultural export sector

Peru is a worldwide leader in horticultural exports. Exports expanded significantly since the mid-1990s and have been growing at an average annual rate of 8.56% since the turn of the millennium (figure 1). The sector initially evolved around asparagus but the importance of other products such as grapes, avocado and artichoke has steadily increased (figure 1). The horticultural production area ranges from 300 km south to 600 km north of Lima along the desert coast. Around 90% of produce is exported. The sector includes about 400 export companies, and a large number of producers and/or processors that deliver to these export companies.

[Take in Figure 1]

The sector is the main source of employment in the region. In the coastal production area, the number of workers increased from about 40.000 in 2000 to more than 140.000 workers in 2013 (figure 2). In addition, there has been a shift in the sector from family to wage employment. This is related to an increased agro-industrial scale of production and to an increase in labor-intensive post-harvest activities such as sorting, washing, grading and labelling (Chacaltana, 2007).

[Take in Figure 2]

The development of the sector was fostered by a favourable regulatory environment for agro-industrial export companies. The national “*Decree Law 22342*” allows non-traditional export companies and farms to employ workers on short-term contracts for an indefinite number of times.

An “intermittent modality” allows companies to grant their workers “temporary unpaid leave” in case seasonality of activities requires it. The “*Agricultural Sector Promotion Law 27360*” establishes a special labor regime for agricultural workers, which stipulates less favourable rights and benefits for workers in export-oriented non-traditional agri-food businesses². The former law exists since the late 1970’s; the latter law was launched in 2000 to explicitly promote the agri-food export sector. These regulations have facilitated the hiring of temporary workers at lower cost, which has resulted in an increase in the absolute number of, mainly low skilled, employees and formally registered jobs (Chacaltana, 2007).

Private standards and certification started to gain importance in the Peruvian horticulture export sector from 2000 onwards. In the fresh asparagus export sector for example, the share of certified firms increased from 7% in 2001 to 38% in 2011, resulting in a rapid increase of certified produce exports (Schuster and Maertens, 2015). These private standards are diverse and include pre-farm gate or production standards as well as post-farm-gate or processing standards. Basic standards focus on quality and safety issues while more specific standards focus on environmental and social issues related to the production, processing and distribution of food. Companies in the sector are often certified to multiple standards, first adopting more basic production and processing standards and later more specific standards related to environmental and labor issues. Specific labor standards started to emerge in the sector towards the end of the 2000s, mainly due to increasing pressure by international buyers to access information on the employment conditions in the companies of origin.

3. Material and methods

3.1. Data

We use a combination of two original datasets. The first dataset contains information from workers in the horticultural export industry, who were surveyed twice, prior to starting employment in horticultural export companies, in August and September 2013, and at the end of the main export season, in February and March 2014. In the first round, a sample of 592 workers in 78 villages in the two main horticultural export regions Ica and La Libertad was used. Workers were randomly selected according to their age (between 16 and 21), little or no previous employment experience in the sector (up to 3 months) and their declared willingness to start such employment in the subsequent

² i.e., 15 days of annual vacation (instead of 30 days as in the general labor regime), 4% contribution to social security by the employer (instead of 9%), a daily minimum wage of 29.26 Soles/ day instead of 750 Soles/ month but which includes the severance pay and the Christmas and national holiday bonus, a compensation of arbitrary dismissal of 15 days’ pay per year worked (instead of 45 days).

<http://www.mintra.gob.pe/mostrarTemaSNIL.php?codTema=184&tip=20>

export season. With 18 being the age limit for formal employment, this strategy allows us to reduce “contagion” from previous employment experiences and to more precisely estimate short-run impacts of seasonal employment. In the second round, 528 workers from the original sample could be re-surveyed, of which 414 had actually started employment in the horticultural export sector. To compensate for this, an additional 85 workers, selected with similar criteria, were surveyed in 2014. This leaves us with a final sample of 499 workers in 78 villages. The dataset contains information on the workers’ socio-demographic background, economic and employment situation, health, education, overall wellbeing, and their employment and working conditions between August 2013 and February 2014.

The second dataset includes information from Peruvian horticultural high-value export farms and companies³, and is constructed from secondary data sources and an own company survey. The secondary data consists of custom records (SUNAT - Peru) and tax administration data from all horticultural export firms from 1993 to 2013; and includes information on the identification of the exporter, the transaction-level export volumes and values, the destination market, the foundation date of the firm, core activities, general managers, location and branches. The company survey data includes information from 171 companies – export companies (58 companies) or large-scale production and processing companies delivering to export companies (113 companies) – on the adoption of standards and company characteristics. A representative sample of companies was surveyed between July and September 2011; the sample was expanded and the information updated in September 2013 and again March 2014 to include all employers of our sample of workers.

3.2. Classification of standards and companies

We classify the companies in our sample according to the type of labor standards they adopt. We categorize three types of standards: 1/ labor standards (LS) with a main focus on employment conditions; 2/ quasi-labor standards (QLS), general food standards with some focus on labor issues; and 3/ non-labor standards (NLS), general food standards without focus on labor. Labor standards are concerned with responsible, safe and ethical business practices in global supply chains and relate to respecting ILO’s core workers’ rights and good employment conditions within a firm. Quasi-labor standards focus on quality and safety aspects in production and post-harvesting but nevertheless include at least one section on worker health and safety in their requirements. Non-labor standards never refer to the wellbeing or conditions of workers. We identified 29 different private standards in the Peruvian horticultural export sector, of which we classify nine as labor standards, four as quasi-labor standards, and 16 as non-labor standards (table 1). We categorize the 171 companies in our

³ Asparagus, grapes, artichoke, mango, avocado and pepper are considered as high-value exports (AGAP, 2012)

sample into four mutuality exclusive groups according to the type of standards they adopt: 1/ LS companies, adopting at least one labor standard (16 companies); 2/ QLS companies, adopting at least one quasi-labor standard but no labor standards (25 companies); 3/ NLS companies, adopting at least one non-labor standard and no labor or quasi-labor standards (12 companies); and 4/ NS (non-standard) companies, not adopting any private standards (118 companies).

3.3. Analytical methods

Across this classification and using a comparisons of means analysis with t-tests and chi2-tests, we compare the characteristics of companies and the characteristics of workers in these companies and their employment conditions. We use a regression analysis to estimate the effect of adopting private labor and non-labor standards on the employment conditions of workers in agro-industrial firm. We estimate regressions of the following type:

$$Y_{ij} = \beta_0 + \beta_1 LS_j + \beta_2 QLS_j + \beta_3 NLS_j + \beta_4 X_{ij} + \beta_5 Z_j + \beta_6 W_i + \pi_v + u_i + \varepsilon_{ij} \quad (1)$$

where Y_{ij} is an indicator of the employment conditions of individual i in company j between August 2013 and February 2014. We use the following indicators: 1/ hourly wages (in Peruvian Nuevo Soles), 2/ a dummy variable for a wage above the national minimum wage, 3/ the total length of employment (in days) between August 2013 and March 2014, 4/ a dummy variable for having a labor contract, and 5/ a dummy variable for receiving work-specific training. We use OLS estimation for continuous dependent variables and logit estimations for binary variables. Our main explanatory variables are three dummies: LS_j , QLS_j and NLS_j for companies adopting LS, QLS and NLS standards. We add a large set of control variables at the job (X_{ij}), firm (Z_j) and individual level (W_i). In the period under analysis individuals have worked on average in 1.83 jobs or companies, and hence the job related variables vary at the individual, company and job level. The job characteristics X_{ij} include the type of crop, a job in production or processing, a job in harvest or non-harvest activities, and the time dedicated to the job (days per week, hours per day and eventual extra hours). The firm characteristics Z_j include the formal registration of a company (1 if registered), the export status of a company (1 for export company), the firm size (proxied by the 2013 export volume and the number of employees), the number of different products in 2013, and two dummy variables for cultivating own land and owning a processing plant. The employee characteristics W_i include education, gender, age, marital status, household composition and migration background. Due to the explicit selection of young workers with less than three months of work experience in the sector, we do not need to control for past work practices. Finally, village dummies π_v are included to control for

common village effects; u_i are time constant unobservable worker-specific effects and ε_{ij} is the error term.

Because companies choose to adopt standards and because workers choose in which company to work, there are identification problems in the estimation. Unobservable firm- and worker-characteristics might be correlated with both employment conditions and with the adoption of standards or the employment in companies that adopt standards, leading to unobserved heterogeneity bias in the estimates. This bias could be negative – e.g., if companies adopting standards are more likely to recruit less motivated workers in order to satisfy a higher labor demand – or positive – e.g., if a company's reputation attracts more motivated workers and at the same time leads to adopting standards. We remedy this potential bias in three ways. First, we use OLS and logit regressions in which we explicitly control for a large set of observable company characteristics in order to isolate a large part of the variability from standard adoption. Second, we use worker fixed effects to eliminate self-selection bias from time-constant unobserved heterogeneity in worker characteristics. This is possible because part of the workers in the sample (33%) have, over the period of interest, employment experiences in more than one company and in different types (with respect to adoption of labor standards) of companies. Yet, the sample size reduces for this analysis. Third, we use an instrumental variable (IV) technique to further reduce bias. We instrument for employment in a LS company⁴ using an interaction between two variables as instrument. The first variable is a village-level variable: the number of labor-standard firms in a radius of 30 minutes travelling from the village. The second variable is a worker-level variable: a dummy variable for hearing the recruitment loudspeakers of companies from home. Companies announce their recruitment intentions by driving through nearby villages with loudspeakers several times a day, especially at the beginning of the high season. Twenty-four percent of workers in our sample declare to have followed these announcements for their current employment. Both variables increase the likelihood of employment in a labor-standard company while the interaction term is not expected to have a direct effect on employment conditions. In all cases the instrument passes the test of weak identification at the 1% significance level. As suggested by Angrist (2001) and Angrist and Pischke (2009) and in order to avoid violating the control function assumption, we use a linear IV approach also for binary dependent variables.

In summary, we estimate the impact of employment in companies adopting different types of labor standards, for five outcome variables (the wage, the likelihood of receiving the minimum wage, the length of employment, the likelihood of having a formal contract and of receiving training) and using

⁴ We tried a similar instrumental variable for the two variables QLS and NLS but the instrumental variables did not pass the weak instrument's test.

three different techniques (OLS and logit regressions, worker fixed effects regressions, and IV regressions).

4. Results

4.1 Company and workers' characteristics

In Table 2 we report summary statistics for the total sample of 171 companies and a comparison of means across the company classification. Almost all companies adopting some private standards are exporting companies while only 15% of the NS companies directly export. Companies that do adopt private standards, export on average larger volumes, export more different products, have more production sites, employ a larger number of workers, and are more likely to have both a production site and a processing unit than NS companies. LS companies have the second highest export volumes and have the largest number of products, production sites and workers. This indicates that especially larger companies adopt labor standards. The majority of companies is located in Ica. All LS, QLS and NLS companies are officially registered with the tax authority while only 42% of the NS companies are. On average 6% of all companies are managed by a foreigner.

[Take in Table 2]

In Table 3 we describe the demographic characteristics of the 499 sampled agro-industry workers, their employment conditions and job characteristics. We report a comparison of means of these characteristics according to the type of employer. Thirty-six percent of the sampled workers is employed in LS companies, 24% in QLS companies, 17% in NLS companies, and 24% in NS companies. The average age in our sample is 20 and around 50% of workers is female. The workers' education is on average 10 years, which points to incomplete secondary schooling. Over two thirds of surveyed workers are not yet married, nor cohabiting, while around 30% have at least one child. The average household size is 4.3. Around 50% of the workers are migrants, meaning they are not born in the Peruvian coastal area. There are no large differences in workers' demographic characteristics across the different employer classes. Workers in NS companies are less likely to be migrants, are slightly younger and are less likely to have children. Workers in LS companies live in more remote areas.

The average hourly wage in the sample is 4.64 PEN, which corresponds to 242 Euro/month for a 48 hour working week. This is slightly more than the 2013 national minimum wage of 750 PEN/month or 203 Euro/month. There are no large differences in wages across different types of employers. Workers are paid more than the minimum wage in 77% of the employment cases in the sample. For

workers in LS or QLS companies this percentage is significantly higher. Workers in LS, QLS or NLS companies work for a longer period, are more likely to sign a contract and to receive trainings. These figures are highest for employees in LS companies. Seventy percent of the jobs are field work but there is more field work, and less factory work, in NS companies. Workers in these companies also work less days per week, less hours per day, are less likely to work overtime, and more likely to work in harvest activities. In 75% of the cases workers receive a daily wage; in the other cases they are paid a piece rate or a combination of the two. Employment is mostly for asparagus (38%) and grapes (30%).

[Take in Table 3]

4.2 Regression results

We summarize the estimated effects of LS, QLS and NLS standards on wage and non-wage employment conditions in Table 4 . The full regression results are reported in appendix.

The results in Table 4 show that companies' adoption of private standards, whether labor standards or other standards, have no effect on workers' wages and no effect on workers' employment period. Yet, the adoption of LS and NS standards increases workers' likelihood of receiving at least the minimum wage. The adoption of LS standards increases the likelihood of workers to have a formal contract but QLS and NS standards have no effect. LS and QLS standards significantly increase the likelihood of workers to receive training while NS standards have no effect. While the direction of the effects is the same for the different methods, the significance levels vary and the point estimates are larger in the FE and IV regressions. This points to a negative bias in the OLS and logit regressions; which could stem from LS, QLS and NLS companies attracting workers that are more vulnerable – i.e. workers who would have a lower chance of receiving the minimum wage, a contract and training when employed in NS companies – because of the companies' reputation or their higher labor demand. The results of the FE and IV regression are more exact as unobserved heterogeneity and selection bias are better controlled for. Hence, the results indicate that LS standards increase workers' likelihood to receive at least the minimum wage with around 90 percentage points, the likelihood to have a contract with 36 to 81 percentage points, and the likelihood to receive training with 37 to 97 percentage points. QSL standards increase the likelihood to receive training with 57 percentage points and NS standards increase the likelihood to receive at least the minimum wage with 76 percentage points.

Other company, job and worker-specific variables influence wage and non-wage employment conditions as well. The full regression results in appendix show that official company registration increases workers' likelihood of receiving at least the minimum wage, a contract and training, and the length of their employment. The likelihood of receiving at least the minimum wage is lower in more diversified companies and higher in companies specializing in either production or processing. The likelihood of a contract and of receiving training is higher in companies that export larger volumes and in companies specialized in processing. Employment periods are shorter and the likelihood of training lower for employment in companies with more workers. Workers who work longer hours and more days a week, earn a lower hourly wage but are more likely to earn at least the minimum wage. Field workers generally receive a lower wage but harvest activities lead to slightly higher wages. Workers in asparagus, a profitable export crops, receive a higher wage with a higher likelihood it is above the minimum wage. Piece rate payment is associated with higher hourly wages but shorter employment periods. Female workers receive lower wages but more training. As other job and personal characteristics are controlled for, this result points to direct gender wage discrimination in the sector. Education increases the likelihood of receiving the minimum wage and training while age increases the wage and the likelihood of a contract. The latter is a surprising effect given our focus on young and inexperienced workers; and indicates that small age differences might matter for being less vulnerable in the labor market.

[Take in Table 4]

5. Discussion

Rapid growth in the horticultural export sector in Peru has tremendously increased employment opportunities in the coastal area, especially in Ica and Trujillo. In these areas, there is competition between the horticultural companies for attracting low-skilled workers, especially during the harvest and peak export season. One would expect this competition to increase the bargaining power of workers, leading to claims for more rights, better remuneration, more job security and improved employment conditions in general. On the other hand, the specific regulatory environment allows horticultural companies a large flexibility in hiring low-skilled and temporary workers while limited low-skilled employment opportunities in both regions prevent workers from exiting the sector. We observe among relatively young and inexperienced workers in the sector: 23% do not receive the national minimum wage, 32% have no formal employment contract and hence no job security at all, and workers have, in a 6 months period, an average employment period of only 80 days in one company or roughly 100 days when summing employment in several companies. When looking at

the total salary a person received from agro-industrial employment in the past six months, the number of employed people per household (1.92 on average) and the total household size, we find that 28% of the sampled households fall below the poverty line of 335 Soles/ person/month (Peruvian statistics institute's estimation, for the coastal area in 2013 – INEI).

Private standards do improve the situation of workers in the Peruvian horticultural export sector but only to a limited extent. First, we find that adoption of private labor standards among companies increases the likelihood of workers to receive a minimum wage but does not lead to wage increases beyond this legal minimum. Other studies also report private labor standard to result in increased adherence to national legal minimum wages; e.g. Barrientos and Smith (2007) for the Ethical Trading Initiative standard in food and garment sectors in several developing countries, and Egels-Zanden and Lindholm (2014) for the Fair Wear Foundation standard in the garment sector in Asian countries. Private standards partially replace enforcement of national labor legislation by public authorities with private third-party certification and external audits. Especially when the institutional environment is poor, private standards may result in increased compliance with labor laws. However, one would expect the adoption of private standards to result in higher wages as well, especially standards that increase companies' profits and labor productivity or standards that lead to a quality price premium. Previous studies came to diverse conclusions; Ehlert et al. (2014) find that GlobalGAP certification in horticulture does not improve wages in Kenya while Colen et al. (2013) find it does lead to higher wages in Senegal. Schuster and Maertens (2015) find that private standards in the Peruvian asparagus sector, one of the two main horticultural export sectors, do not result in a superior export performance of companies nor in higher product prices; which they explain by the fact that it is a well-established export sector where private standards do not lead to important changes. That private standards do not contribute to better company performance could explain the lack of an effect on worker wages in the sector as well.

Second, we find that private labor standards increase the likelihood of workers to have a formal labor contract with the companies but do not have an effect on the length of employment. Other studies have pointed out that labor standards result in an increased incidence of formal employment contracts and sometimes also in longer employment periods – e.g. Colen et al. (2012) find that GlobalGAP adoption among horticultural export companies in Senegal results in more formal labor contracts and in longer employment periods and Egels-Zanden and Lindholm (2014) find that, after a second factory audit, workers' receive more formal labor contracts, but do not analyze effects on the employment duration. The observed effect again relates to respecting national labor laws and private labor standards enforcing the law. The lack of an effect on the length of employment, indicates that

there is no improvement in labor conditions beyond the legal minimum as a result of private labor standards.

Third, we find that private standards, either labor standards or other standards with some focus on labor issues, result in a higher likelihood of workers receiving training. Similar findings were reported by Ehlert et al. (2014) for GlobalGAP in the Kenyan horticultural export sector, and by Nelson et al. (2007) for various ethical standards (ETI, SA8000 and others) in the South African Wine and the Kenyan Cut Flower industries. Private standards require companies to provide their employees information on health and safety issues, working techniques and workers' rights and duties, which requires employee training. One could expect the sunk investment costs of employee training to increase companies' incentives to retain the trained workers, resulting in an efficiency wage premium and/or longer employment periods. We do not observe such effects, implying that the direct consequences of training for worker welfare are rather limited. Nevertheless, the accumulation of human capital through on-the-job trainings may benefit workers in the long run – an effect we could not capture with our data.

6. Conclusion

In this paper we analyze the impact of private labor standards and labor requirements in other private food standards on workers' employment conditions in the horticultural export industry in Peru. Using panel data and different econometric techniques, we find that private labor standards contribute to the enforcement of national labor laws but have no beneficial effect beyond legal employment entitlements, even for the most stringent labor standards. Workers employed in companies adopting labor standards are more likely to be paid the minimum wage, but do not receive higher wages. They are more likely to have a formal contract and to receive training, but are not employed for longer periods. Despite enactment of labor regulations at the national level and the wide spread of international private standards in the Peruvian horticultural export sector, contentious labor issues and ethical concerns remain. A further spread of existing private labor standards could to some extent improve the situation of workers but would be merely a replacement for weak public enforcement of national labor laws.

We find that more general food standards, even if they include specific provisions on labor issues, have no effect on employment conditions of workers labor (apart from more general food standards increasing the likelihood of workers to receive some training). This documents that general food standards do not address all components of sustainability of the value chains – an issue raised earlier (e.g. Lockie et al., 2014; Riisgaard, 2009). It also documents a scope for expanding labor requirements in general food standards, especially in widely spread standards such as GlobalGAP.

Our study focuses on one sector, one type of workers and multiple standards. This is complementary to other studies that have focused on a specific standard in multiple countries and sectors– e.g., Egels-Zanden and Lindholm (2014) on Fair Wear Foundation standards; Barrientos and Smith (2007) on ETI. – and to studies focusing on different type of workers – e.g. Barrientos et al., 2003; Barrientos et al., 2007; Ehlert et al., 2014. The former type of studies are important to highlight differences in the institutional context, which is an important element in determining how standards affect business practices and employment conditions (Brunsson & Jacobsson, 2002). The latter have highlighted less pronounced effects of labor standards for temporary and female workers. Our approach highlights heterogeneity in private standards and in their impact on employment conditions.

References

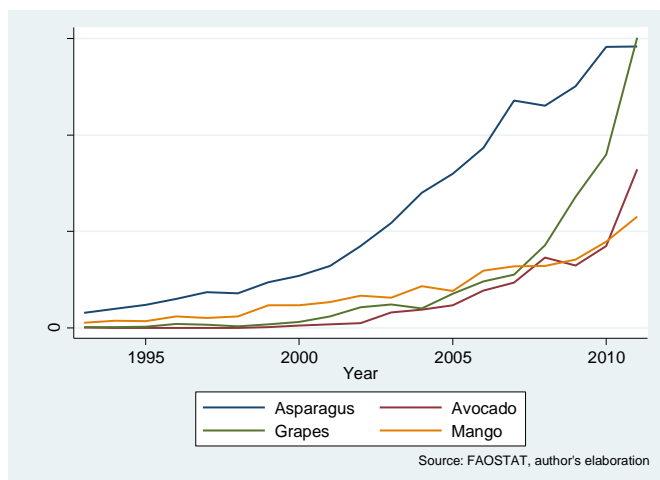
- Angrist, J. (2001). "Estimation of Limited Dependent Variable Models with Dummy Endogeneous Regressors". *Journal of Business & Economic Statistics*. 19(1), 2-28
- Angrist, J. & Pischke, JF (2009). "Mostly Harmless Econometrics. An Empiricist's Companion". Princeton University Press
- Asfaw, S., Mithöfer, D. & Waibel, H. (2010), Agrifood supply chain, private-sector standards, and farmers' health: evidence from Kenya. *Agricultural Economics*, 41, 251–263
- Barrientos, S., Dolan, C. & Tallontire, A. (2003). A Gendered Value Chain Approach to Codes of Conduct in African Horticulture. *World Development*. 31(9), 1511-1526
- Barrientos, S. & Smith, S. (2007) Do workers benefit from ethical trade? Assessing codes of labour practice in global production systems. *Third World Quarterly*. 28:4, 713-729
- Barron, M. A. & Rello, F. (2000). The impact of the tomato agroindustry on the rural poor in Mexico. *Agricultural Economics*, 23, 289–297
- Beghin, J.C., Maertens, M. & J. Swinnen (forthcoming). Non-tariff Measures and Standards in Trade and Global Value Chains.
- Blunch, N-H & Castro, P. (2007). Enterprise-level training in developing countries: do international standards matter?. *International Journal of Training and Development*. 11(4), 314-324
- Brunsson, N. & Jacobsson, B. (eds.) (2002). A World of Standards. Oxford University Press, New York.
- Chacaltana J. (2007). El boom del empleo en Ica. en *Desafiando al desierto: realidad y perspectivas del empleo en Ica* (Chacaltana, Juan. Editor), CEDEP, 2007, Lima
- Colen, L., Maertens M. & Swinnen, J. (2012). Private Standards, Trade and Poverty: GlobalGAP and Horticultural Employment in Senegal" *The World Economy*. 35(8), 1073-1088
- Disdier, A. & Marette, S. (2012). How do consumers in developed countries value the environment and workers' social rights in developing countries? *Food Policy*. 37(1), 1-11.
- Ehlert, C., Mithöfer, D. & Waibel, H. (2014). Worker welfare on Kenyan export vegetable farms, *Food Policy*. 46, 66-73
- Egels-Zandén N. & Lindholm H. (2014). Do codes of conduct improve worker rights in supply chains? A study of Fair Wear Foundation, *Journal of Cleaner Production*. 1-10
- Gibbon, P., & Ponte, S. (2005). Trading down: Africa, value chains and the global economy. Philadelphia: Temple University Press.
- Handschuch, C., Wollni, M. & Villalobos, P. (2013). Adoption of Food Safety and Quality Standards among Chilean Raspberry Producers — Do Smallholders Benefit? *Food Policy*. 40, 64-73
- Hansen, H. & Trifković, N. (2014). Food Standards are Good – For Middle-Class Farmers. *World Development*. 56(C), 226-242

- Henson, S. & Humphrey, J. (2010). Understanding the Complexities of Private Standards in Global Agri-Food Chains as They Impact Developing Countries. *Journal of Development Studies*. 46(9), 1628-46
- Holzappel S. & Wollni M. (2014). Is GlobalGAP Certification of Small-Scale Farmers Sustainable? Evidence from Thailand. *The Journal of Development Studies*. 50(5), 731-747
- Lockie S., Traverso J. & Tennent R. (2014). Private food standards, regulatory gaps and plantation agriculture: social and environmental (ir)responsibility in the Philippine export banana industry. *Journal of Cleaner Production*. 1-8
- Maertens, M., Minten, B. & Swinnen, J. (2012). Modern Food Supply Chains and Development: Evidence from Horticulture Export Sectors in Sub-Saharan Africa. *Development Policy Review*, 30 (4), 473-497
- Maertens, M., & Swinnen, J. (2009). Trade, standards and poverty: Evidence from Senegal. *World Development*. 37(1), 161–178
- Maertens, M., Colen, L., Swinnen, J. (2011). Globalization and poverty in Senegal: a worst case scenario? *European Review of Agricultural Economics*. 38 (1), 31-54
- Nelson V., Martin A. & Ewert J. (2007). The Impacts of Codes of Practice on Worker Livelihoods. Empirical Evidence from South African Wine and Kenyan Cut Flower Industries. *Journal of Corporate Citizenship*. 28, 61-72
- Rao, E.J.O. & Qaim, M. (2013). Supermarkets and Agricultural Labor Demand in Kenya: A Gendered Perspective. *Food Policy*. 38, 165-176
- Riisgaard, L. (2009). Global value chains, labour organization and private social standards: Lessons from East African cut flower industries. *World Development*. 37(2), 326–340
- Schuster, M., & Maertens, M. (2013). Do private standards create exclusive supply chains? New Evidence from the Peruvian asparagus export sector. *Food Policy*. 43, 291–305
- Schuster, M., & Maertens, M. (2015). The Impact of Private Food Standards on Developing Countries' Export Performance: An Analysis of Asparagus Firms in Peru. *World Development*. 66, 208-221
- Subervie, J., & Vagneron, I. (2013). A drop of water in the Indian Ocean? The impact of GlobalGap certification on Lychee farmers in Madagascar. *World Development*. 50, 57–73

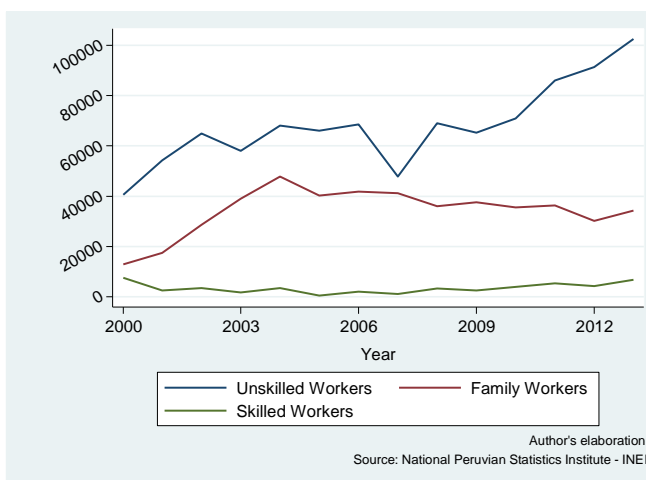
FIGURES

Figure 1: Evolution of exports and employment in the horticultural export sector in Peru

a) Export Values (in 1000 USD)



b) Employees in the coastal area



TABLES

Table 1: Classification of standards in the Peruvian horticultural sector

Type of standard	Name of standard
Labor Standards (LS) The codes of conduct of these standards focus primarily on ILO core workers' rights and good employment conditions	Social Accountability 8000 (SA8000) Occupational health and safety of workers 18000 (OHSAS 18000) Supplier Ethical Data Exchange (SEDEX) UN Global Compact Ethical Trading Initiative (ETI) Fair Trade For Life Business Social Compliance Initiative (BSCI) Amcham - ABE certification
Quasi Labor Standards (QLS) the protocol and codes of conduct of these standards contain a section dealing with workers' welfare and wellbeing	GlobalGAP Tesco - Nurture's Choice Marks & Spencer - Field To Fork Rainforest Alliance
No Labor Standards (NLS) The codes of conduct of these standards do not contain a section explicitly dealing with workers' welfare and employment conditions	Good Manufacturing Practice (GMP) Hazard Analysis Critical Control Point (HACCP) British Retail Consortium (BRC) International Featured Standards (IFS) SQF1000 – Food Safety and Quality management: production SQF2000 - Food Safety and Quality management: processing GAP: ranch, greenhouse, harvest crew (also USGAP) Voluntary Control System (VCS Safety) Kosher Certificate Nutriclean label Control Biologico - SENASA GMA - Safe ISO 9001 ISO 14001 Linking Environment and Farming (LEAF) Business Alliance for Secure Commerce (BASC)

Table 2: Company characteristics, by type of adopted standard

	(I)	(II)	(III)	(IV)	(V)
	All companies (N=171)	LS companies (N=16)	QLS companies (N=25)	NLS companies (N=12)	NS companies (N=118)
Horticulture export company in 2013/ 2014	34%	92%***	84%***	75%***	15%***
Horticulture export volumes in 2013 (in tons)	1,772 (6,683)	8,497*** (8,199)	4,108** (7,113)	9,404*** (23,941)	117*** (470)
Number products produced/ exported in 2013	1.67 (1.68)	3.92*** (2.69)	2.56*** (2.18)	3.13*** (3.83)	1.16*** (0.57)
Number of production sites	3.41 (5.92)	7.85*** (6.68)	5.68*** (9.15)	4*** (4.89)	1.20*** (1.21)
Number of workers in December 2013	661 (2,063)	3,591*** (4,802)	1,436*** (1,975)	2,240*** (4,857)	100*** (135)
Owning field and plant	30%	92%***	72%***	63%***	14%***
Owning field only	8%	0%	4%	25%	9%
Owning plant only	61%	8%***	24%***	13%***	78%***
Ica region (instead of La Libertad region)	65%	69%	88%**	50%	62%*
Formal company	57%	100%***	100%***	100%***	42%***
Foreign manager	6%	8%	2%***	13%	3%***

Standard deviations in parenthesis for non-binary variables; *p < 0.10, **p < 0.05, ***p < 0.01 for t-test for continuous variables, and chi2 test for categorical variables. In the tests, each employment category is compared to the categories with relatively less stringent labor standards; i.e. column II against III, IV and V, column III against IV and V; column IV against V and column V against II, III and IV;

LS companies are companies adopting labor standards; QLS companies are companies adoption other food standards with some focus on labor issues; NLS companies are companies adoption other standards without focus on labor, and NS companies are companies not adopting any private standards.

Source: Authors' calculation based on company survey and custom data (SUNAT)

Table 3: Workers' demographic and job characteristics, by type of employing company

	(I)	(II)	(III)	(IV)	(V)
	All companies (full sample)	LS companies	QLS companies	NLS companies	NS companies
<i>Demographic characteristics</i>	<i>N workers=499</i>	<i>N workers=180</i>	<i>N workers=119</i>	<i>N workers=83</i>	<i>N workers=117</i>
Age	20.2 (1.80)	20.53*** (1.75)	20.40*** (1.51)	20.46*** (1.61)	19.29*** (2.88)
Female	50%	41% **	54%	61% **	45%
Years of education	10.29 (2.52)	10.01* (2.71)	10.44 (2.56)	10.9 (2.24)	10.17 (2.32)
Single	77%	76%	76%	76%	82%
Children (at least 1)	28%	28%	35% **	24%	21% *
Household size	4.3 (2.61)	4.48 (2.70)	3.6*** (2.36)	4.81 (2.68)	4.41 (2.56)
Migration	48%	48%	60% ***	47%	37% ***
Distance from village center (in minutes)	12.8 (20.76)	16.33*** (25.74)	9.79 (12.32)	11.65 (20.90)	11.25 (18.25)
<i>Employment Conditions</i>	<i>N workers/ job=916</i>	<i>N workers/ job=275</i>	<i>N workers/ job=244</i>	<i>N workers/ job=141</i>	<i>N workers/ job=256</i>
Hourly wage (in Soles)	4.64 (1.28)	4.73 (1.20)	4.67 (1.20)	4.22*** (1.25)	4.75 (1.42)
Wage > National minimum wage	77%	85%	85%	69%	63%
Written contract	68%	93% ***	71% ***	80% ***	33% ***
Days of Employment	82.9 (99.5)	103.4*** (106.46)	73.9** (97.63)	84* (91.40)	69.5** (94.38)
Training received	57%	79% ***	49%	74% ***	30% ***
<i>Other job specific characteristics</i>					
Field work (vs processing plant)	70%	61% ***	75%	53% ***	83% ***
Days worked per week	5.94 (0.87)	5.95 (0.64)	6.11*** (0.67)	5.87 (0.83)	5.80*** (1.19)
Hours worked per day	8.27 (1.97)	8.51** (1.55)	8.33 (2.03)	9*** (1.90)	7.56*** (2.14)
Extra hours work	47%	53% **	46%	59% **	35% ***
Harvest activity (instead of other activity)	33%	33%	34%	23% **	38% **
<i>Type of Payment</i>					
Daily wage	75%	69% **	77%	76%	78%
Piece rate wage	19%	21%	19%	16%	19%
Daily + piece rate wage	6%	10% ***	5%	8% **	3% **
<i>Crop</i>					
Asparagus	38%	46% ***	37%	36%	31% ***
Grapes	30%	17% ***	49% ***	15% ****	37% **

Standard deviations in parenthesis for non-binary variables; *p < 0.10, **p < 0.05, ***p < 0.01 for t-test for continuous variables, and chi2 test for categorical variables. In the tests, each employment category is compared to the categories with relatively less stringent labor standards; i.e. column II against III, IV and V, column III against IV and V; column IV against V and column V against II, III and IV; LS companies are companies adopting labor standards; QLS companies are companies adoption other food standards with some focus on labor issues; NLS companies are companies adoption other standards without focus on labor, and NS companies are companies not adopting any private standards.

Source: Authors' calculation based on workers' survey data

Table 4: Regression results – main independent variables

	Model	LS (dummy)	QLS (dummy)	NLS (dummy)	Fixed effects	R-Squared/ Pseudo R-Squared	F-test of excluding instruments	No. of Obs.
Hourly wage (in Peruvian Nuevo Soles)	OLS	0.237 (0.153)	-0.07 (0.24)	-0.051 (0.335)	village	0.29		789
	FE	-0.124 (0.23)	-0.493 (0.299)	0.504 (0.346)	worker	0.28		807
	IV	2.216 (1.569)			village		10.17	744
Minimum wage dummy (=1 if worker earns at least the minimum wage)	logit ^(a)	0.214*** (0.062)	-0.01 (0.078)	0.096 (0.081)	village	0.36		678
	xtlogit ^(a)	0.949*** (0.335)	-0.441 (0.318)	0.764** (0.323)	worker	0.39		159
	IV	0.862* (0.478)			village		10.18	743
Contract (=1 if worker signed a contract with the company)	logit ^(a)	0.227*** (0.068)	0.08 (0.051)	0.021 (0.063)	village	0.42		692
	xtlogit ^(a)	0.358** (0.182)	0.049 (0.18)	0.26 (0.172)	worker	0.35		158
	IV	0.806* (0.484)			village		10.94	820
Length of employment in company, in days	OLS	-11.321 (15.861)	3.234 (18.765)	25.827 (24.763)	village	0.08		830
	FE	-2.681 (17.219)	4.867 (17.102)	13.35 (16.68)	worker	0.07		849
	IV	72.809 (93.471)			village		11.91	785
Training (=1 if worker received a training)	logit ^(a)	0.242*** (0.053)	0.096* (0.056)	-0.075 (0.07)	village	0.38		736
	xtlogit ^(a)	0.376*** (0.086)	0.569*** (0.193)	-0.143 (0.258)	worker	0.39		162
	IV	0.968** (0.429)			village		10.29	789

Robust standard errors in parenthesis; ^(a) Average marginal effects are reported instead of coefficients; *** p<0.01, ** p<0.05, * p<0.1

ANNEXES

Table A1: Description and classification of private standards in the Peruvian horticultural export sector

Name of the Standard	Description of main focus
Labor Standards (LS) The codes of conduct of these standards focus primarily on ILO core workers' rights and good employment conditions	
Social Accountability 8000 (SA8000) http://www.sa-intl.org	SA8000 is promoted as a voluntary, universal standard for companies interested in auditing and certifying labor practices in their facilities and those of their suppliers.
Occupational health and safety of workers 18000 (OHSAS 18000) http://ohsas-18001.fr/	OHSAS 18001 is intended to help an organization to control occupational health and safety risks of workers
Supplier Ethical Data Exchange (SEDEX) http://www.sedexglobal.com/	Sedex is a not for profit membership organisation dedicated to driving improvements in responsible and ethical business practices in global supply chains; it enables retailers and buyers to share data on labor practice in the supply chain and take action to improve their ethical performance.
UN Global Compact http://www.unglobalcompact.org/	The UN Global Compact is a strategic policy initiative for businesses that are committed to aligning their operations and strategies with the universally accepted principles in the areas of human rights, labor, environment and anti-corruption.
Ethical Trading Initiative (ETI) http://www.ethicaltrade.org/	The Ethical Trading Initiative (ETI) was set up to bring together retailers, suppliers, trade unions and charities to agree, deliver and uphold acceptable common standards in the supply chain. When a company joins ETI, it adopts a Base Code of labor practice, and commits to implementing it within its supply chain.
Fair Trade http://www.fairtrade.net/	Fairtrade is a certification system for products that comply with environmental, labor and development standards.
For Life http://www.fairforlife.net	For Life confirms that workers enjoy fair and safe working conditions covering all key labor aspects from core ILO workers' rights to good employment conditions.
Business Social Compliance Initiative (BSCI) http://www.bsci-intl.org/	BSCI is an initiative promoted by companies which are committed with improving labor conditions in the global supply chain. It helps companies to put social responsibility at the core of their business and to cascade it throughout their supply chain.
Amcham - ABE certification http://www.amcham.org.pe/abe/	National certificate of "Good Employers in Peru", which promotes social labor responsibility. It is dispensed by the American Chamber of Commerce.
Quasi Labor Standards (QLS) The protocol and codes of conduct of these standards contain a section dealing with workers' welfare and wellbeing	
Global Gap http://www.globalgap.org/uk_en/	The Global Gap standard is primarily designed to reassure consumers about how food is produced on the farm by minimising detrimental environmental impacts of farming operations. The code also includes a section ensuring a responsible approach to worker health and safety as well as animal welfare

Tesco - Nurture's Choice http://www.tesco.com/csr/g/g4.html	Tesco Nature's Choice certifies that a supplier or producer provides agricultural products that come from environmentally friendly, socially responsible, and sustainable cultivation. The standard was developed to ensure the provision of quality fresh products, by also the wellbeing of the employees .
Marks & Spencer - Field To Fork	Field to Fork focuses on reducing the level of pesticides used by suppliers, encouraging them to support production which benefits the environment, and generally enhances rigorous food safety. It also covers labor standards and fosters the purchase of raw materials from the most sustainable sources available.
Rainforest Alliance http://www.rainforest-alliance.org	The Rainforest Alliance works to conserve biodiversity and improve livelihoods by promoting and evaluating the implementation of the most globally respected sustainability standards in a variety of fields. Among others, it promotes fair treatment and good working conditions for workers in accordance with the ILO conventions.
Non-Labor Standards (NLS) The codes of conduct of these standards do not contain a section explicitly dealing with workers' welfare and employment conditions	
Good Manufacturing Practice (GMP)	GMP is part of a quality system providing guidelines that outline the aspects of production and testing that can impact the quality of a product. It is a system to ensure that products meet food safety, quality and legal requirements.
Hazard Analysis Critical Control Point (HACCP) http://www.fao.org/docrep/005/y1579e/y1579e03.htm	The HACCP system is applied for food safety management and uses the approach of controlling critical points in food handling to prevent food safety problems. It is a system for identifying specific hazards and preventive measures for their control. HACCP can be part of the GMP.
British Retail Consortium (BRC) http://www.brc.org.uk/brc_home.asp	The British Retail Consortium (BRC) global standards are requirements to be met by an organisation to enable the production, packaging, storage and distribution of safe food and consumer products. It builds on the HACCP food safety plan.
International Featured Standards (IFS) http://www.ifs-certification.com	IFS Food is a standard for the auditing of companies that process food or that pack loose food products. It is only applied where the product is "processed or handled", or if there is a danger of product contamination during the primary packaging. It builds on the HACCP food safety plan.
SQF1000 – Food Safety and Quality management: code for primary producers and growers http://www.sqfi.com/	The SQF Program is a leading, global food safety and quality certification program and management system, designed to meet the needs of buyers and suppliers. It provides independent certification that a supplier's food safety and quality management system complies with international and domestic food safety regulations. (SQF 1000 for producers; SQF2000 for processors)
SQF2000 - Food Safety and Quality management: code for manufacturing, processing and distribution sector	
GAP: ranch, greenhouse, harvest crew (also USGAP)	Good Agricultural Practices (GAP) are "practices that address environmental, economic and social sustainability for on-farm processes, and result in safe and quality food and non-food agricultural products" (FAO)
Voluntary Control System (VCS Safety)	The main objective of the VCS Safety is to safeguard the quality of produced goods. Random tests check and assure compliance.
Kosher Certificate http://www.kosher.pe/	The Kosher certificate certifies that kosher ways of production are respected at all levels of the supply chain
Nutriclean label http://www.greenerchoices.org/eco-labels/label.cfm?LabelID=8	NutriClean label means that products are tested for pesticide residues and sets limits of detection for each specific pesticide residues.

Control Biologico - SENASA http://www.senasa.gob.pe/	Pest Management certificate by the National Agricultural Salubriousness institute (SENASA)
GMA - Safe http://www.qmi-saiglobal.com/registration/foodsafety/gma-safe/Default.asp?language=english	The GMA-SAFE Assessment suite consists of a food protection evaluation. It provides a comprehensive narrative of a facility's activities regarding food protection, quality assurance and food defence.
ISO 9001 http://www.iso.org/iso/fr/iso_9000	ISO 9000 describes fundamentals of quality management systems, which form the subject of the ISO 9000 family, and defines related terms
ISO 14001 http://www.iso.org/iso/fr/iso14000	The ISO 14000 environmental management standards exist to help organizations to minimize how their operations negatively affect the environment and to comply with applicable laws, regulations, and other environmentally oriented requirements
Linking Environment and Farming (LEAF) http://www.leafuk.org/leaf/home.eb	The LEAF (Linking Environment And Farming) Marque is an assurance system recognising sustainably farmed products. It is based on environmentally responsible Integrated Farm Management (IFM) principles.
Business Alliance for Secure Commerce (BASC) http://www.wbasco.org/index-eng.htm	BASC is a business-led alliance, supported by the U.S. Customs Service, created to combat narcotics smuggling via commercial trade. It is a voluntary program where corporate participants set self-imposed business standards.

Table A2: Full Regression results – Wage**Hourly Wage (in Peruvian Nuevo Soles)**

	OLS (1)	FE (2)	IV (3)
LS dummy	0.237 (0.153)	-0.124 (0.23)	2.216 (1.569)
QLS dummy	-0.07 (0.24)	-0.493 (0.299)	
NLS dummy	-0.051 (0.335)	0.504 (0.346)	
Formal Company (dummy)	-0.001 (0.243)	-0.298 (0.289)	0.075 (0.228)
Exporter dummy	0.016 (0.212)	-0.075 (0.275)	-0.393 (0.329)
Total volume exported (in 1000 tons)	0.001 (0.008)	-0.024** (0.01)	0.042 (0.032)
Number of products produced by the company in 2013	-0.026 (0.02)	-0.016 (0.036)	-0.077 (0.048)
Owens plant only (instead of plant and field)	0.217 (0.323)	0.091 (0.369)	0.889 (0.632)
Owens field only (instead of plant and field)	-0.181 (0.112)	-0.096 (0.268)	0.17 (0.344)
Number of workers 2013	-0.002 (0.002)	0.007* (0.004)	-0.013 (0.008)
Hours worked per day	-0.392*** (0.039)	-0.387*** (0.063)	-0.373*** (0.043)
Days worked per week	-0.262** (0.103)	-0.13 (0.103)	-0.221** (0.088)
Extra hours (=1 if works extra hours)	0.258*** (0.096)	0.139 (0.147)	0.276*** (0.102)
Contract (=1 if has a contract)	0.238* (0.14)	0.281 (0.19)	-0.117 (0.295)
Field (=1 if field worker; =0 if plant worker)	-0.457*** (0.142)	-0.398* (0.216)	-0.553*** (0.159)
Crop: asparagus (=1 if person works in asparagus; =0 if other crop)	0.366*** (0.11)	0.154 (0.131)	0.503*** (0.152)
Crop: grapes (=1 if person works in grapes; =0 other crop)	0.061 (0.125)	0.28 (0.19)	0.27 (0.213)
Piece rate (instead of daily wage)	0.808*** (0.145)	0.658*** (0.169)	0.776*** (0.157)
Daily wage + Piece rate (instead of daily wage)	0.517*** (0.175)	0.450* (0.235)	0.254 (0.285)
Activity dummy: harvest (=1 if harvest; =0 other task)	0.125* (0.064)	0.224** (0.112)	0.013** (0.006)
Female (=1 if female)	-0.215** (0.104)		-0.152 (0.124)
Years of education	-0.013 (0.021)		-0.003 (0.022)
Single (=1 if single)	0.305*** (0.11)		0.338*** (0.128)
Child dummy (=1 if worker has a child)	0.137 (0.135)		0.149 (0.137)
Age	0.056** (0.026)		0.056* (0.031)
Migration (=1 if migrant)	-0.11 (0.10)		-0.04 (0.131)
Distance from the village centre (in minutes)	-0.005** (0.002)		-0.009** (0.004)
Constant	8.344*** (0.771)	8.676*** (0.823)	
Fixed effects	village	worker	village
R-Squared/ Pseudo R-Squared	0.29	0.28	
F-test of excluding instruments			10.17
No. of Obs.	789	807	744

Standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1

Table A3: Full Regression results – Minimum Wage**Minimum Wage dummy (=1 if worker earns more than the minimum wage)**

	logit (1)	xtlogit (2)	IV (3)
LS dummy	0.214*** (0.062)	0.949*** (0.335)	0.862* (0.478)
QLS dummy	-0.01 (0.078)	-0.441 (0.318)	
NLS dummy	0.096 (0.081)	0.764** (0.323)	
Formal Company (dummy)	0.156** (0.075)	0.245* (0.157)	0.224*** (0.085)
Exporter dummy	0.005 (0.07)	-0.085 (0.173)	-0.068 (0.107)
Total volume exported (in 1000 tons)	0.003 (0.002)	0.007 (0.008)	0.015 (0.01)
Number of products produced by the company in 2013	-0.023** (0.011)	-0.032 (0.037)	-0.039** (0.017)
Owens plant only (instead of plant and field)	0.183 (0.134)	1.106*** (0.291)	0.315* (0.187)
Owens field only (instead of plant and field)	0.124** (0.06)	0.333 (0.216)	0.216** (0.107)
Number of workers 2013	-0.001 (0.001)	-0.001 (0.003)	-0.004 (0.003)
Hours worked per day	0.036*** (0.012)	0.110** (0.055)	0.043*** (0.013)
Days worked per week	0.098*** (0.03)	0.257*** (0.088)	0.096*** (0.022)
Extra hours (=1 if works extra hours)	0.039 (0.032)	-0.121 ((0.152))	0.051 (0.036)
Contract (=1 if has a contract)	0.036 (0.044)	0.22 (0.186)	0.075 (0.084)
Field (=1 if field worker; =0 if plant worker)	-0.014 (0.041)	0.224 (0.157)	-0.036 (0.053)
Crop: asparagus (=1 if person works in asparagus; =0 if other crop)	0.104*** (0.033)	0.08 (0.12)	0.125** (0.049)
Crop: grapes (=1 if person works in grapes; =0 other crop)	0.03 (0.06)	0.069 (0.167)	0.091 (0.078)
Piece rate (instead of daily wage)	0.077* (0.043)	0.307* (0.168)	0.063* (0.037)
Daily wage + Piece rate (instead of daily wage)	0.005 (0.057)	0.115 (0.178)	-0.053 (0.097)
Activity dummy: harvest (=1 if harvest; =0 other task)	0.039 (0.032)	0.078 (0.124)	-0.001 (0.045)
Female (=1 if female)	0.012 (0.032)		0.04 (0.04)
Years of education	0.014** (0.006)		0.014* (0.008)
Single (=1 if single)	0.028 (0.044)		0.03 (0.045)
Child dummy (=1 if worker has a child)	0.127*** (0.045)		0.121** (0.048)
Age	-0.015 (0.01)		-0.013 (0.011)
Migration (=1 if migrant)	0.011 (0.031)		0.052 (0.044)
Distance from the village centre (in minutes)	-0.001* (0.001)		-0.002* (0.001)
Fixed effects	village	worker	village
R-Squared/ Pseudo R-Squared	0.36	0.39	
F-test of excluding instruments			10.18
No. of Obs.	678	159	743

Standard errors in parenthesis; Average marginal effects are reported in columns 1 and 2; *** p<0.01, ** p<0.05, * p<0.1

Table A4: Full Regression results – Contract

	Contract (=1 if worker signed a contract with the company)		
	logit (1)	xtlogit (2)	IV (3)
LS dummy	0.227*** (0.068)	0.358** (0.182)	0.806* (0.484)
QLS dummy	0.08 (0.051)	0.049 (0.18)	
NLS dummy	0.021 (0.063)	0.26 (0.172)	
Formal company (dummy)	0.151** (0.076)		0.198** (0.078)
Exporter dummy	-0.044 (0.052)	-0.356 (0.285)	-0.03 (0.119)
Total volume exported (in 1000 tons)	0.008*** (0.002)	0.012* (0.007)	0.016* (0.01)
Number of products produced by the company in 2013	0.002 (0.008)	0.033 (0.022)	-0.017 (0.016)
Owens plant only (instead of plant and field)	0.262*** (0.082)	3.111*** (0.323)	0.404*** (0.138)
Owens field only (instead of plant and field)	-0.008 (0.045)	0.02 (0.128)	0.029 (0.121)
Number of workers 2013	0 (0.001)	-0.001 (0.002)	-0.003 (0.003)
Field (=1 if field worker; =0 if plant worker)	-0.003 (0.044)	-0.082 (0.124)	-0.013 (0.051)
Crop: asparagus (=1 if person works in asparagus; =0 if other crop)	0.02 (0.041)	0.174 (0.138)	0.05 (0.04)
Crop: grapes (=1 if person works in grapes; =0 other crop)	-0.085** (0.041)	-0.209 (0.131)	-0.071 (0.083)
Activity dummy: harvest (=1 if harvest; =0 other task)	0.024 (0.031)	0.179* (0.1)	-0.01 (0.044)
Female (=1 if female)	0.039 (0.034)		0.013 (0.027)
Years of education	0.004 (0.007)		0.003 (0.007)
Single (=1 if single)	-0.008 (0.039)		0.015 (0.046)
Child dummy (=1 if worker has a child)	-0.090** (0.04)		-0.052 (0.049)
Age	0.036*** (0.01)		0.028*** (0.01)
Migration (=1 if migrant)	0.037 (0.033)		0.065* (0.039)
Distance to the village centre (in minutes)	0 (0.001)	-0.118*** (0.014)	-0.001 (0.001)
Fixed effects	village	worker	village
Pseudo R-Squared	0.42	0.35	
F-test of excluding instruments			10.94
No. of Obs.	692	158	820

Standard errors in parenthesis; Average marginal effects are reported in columns 1 and 2; *** p<0.01, ** p<0.05, * p<0.1

Table A5: Full Regression results – Length of Employment**Length of employment in company, in days**

	OLS (1)	FE (2)	IV (3)
LS dummy	-11.321 (15.861)	-2.681 (17.219)	72.809 (93.471)
QLS dummy	3.234 (18.765)	4.867 (17.102)	
NLS dummy	25.827 (24.763)	13.35 (16.68)	
Formal company (dummy)	47.488* (24.78)	16.173 (24.455)	48.107** (19.846)
Exporter dummy	13.266 (16.437)	-3.65 (15.117)	14.444 (21.577)
Total volume exported (in 1000 tons)	0.204 (0.555)	0.579 (0.647)	1.973 (1.918)
Number of products produced by the company in 2013	-2.408 (1.967)	3.667 (3.082)	-5.481* (3.153)
Owns plant only (instead of plant and field)	12.265 (27.968)	-13.963 (22.662)	18.945 (33.672)
Owns field only (instead of plant and field)	12.135 (19.901)	1.971 (13.285)	11.988 (18.453)
Number of workers 2013	-0.359*** (0.119)	-0.568** (0.242)	-0.767 (0.528)
Field (=1 if field worker; =0 if plant worker)	-7.082 (9.367)	-24.314** (12.036)	-14.574 (10.556)
Crop: asparagus (=1 if person works in asparagus; =0 if other crop)	9.271 (7.437)	-6.22 (9.608)	15.548 (10.146)
Crop: grapes (=1 if person works in grapes; =0 other crop)	-1.689 (7.946)	-7.87 (9.637)	1.592 (13.713)
Activity dummy: harvest (=1 if harvest; =0 other task)	6.354 (8.711)	7.36 (7.43)	5.693 (10.243)
Contract (=1 if has a contract)	16.327* (9.01)	26.499** (10.264)	3.83 (14.554)
Piece rate (instead of daily wage)	-16.031** (6.651)	-13.297* (7.473)	-18.376** (7.953)
Daily wage + Piece rate (instead of daily wage)	7.062 (18.808)	24.379 (18.698)	-3.117 (22.292)
Female (=1 if female)	-13.066** (6.408)		-10.519 (8.349)
Years of education	-0.592 (2.099)		-0.183 (1.978)
Single (=1 if single)	-19.801* (10.654)		-16.462 (10.398)
Child dummy (=1 if worker has a child)	-12.66 (11.429)		-10.302 (10.587)
Age	3.242 (2.733)		4.033 (2.64)
Migration (=1 if migrant)	-8.499 (7.524)		-4.251 (9.122)
Distance to the village centre (in minutes)	0.232 (0.299)		0.125 (0.387)
Constant	-5.579 (78.007)	60.533** (26.125)	
Fixed effects	village	worker	village
R-Squared	0.08	0.07	
F-test of excluding instruments			11.91
No. of Obs.	830	849	785

Standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1

Table A6: Full Regression results – Training dummy**Training (=1 if worker received a training)**

	logit (1)	xtlogit (2)	IV (3)
LS dummy	0.242*** (0.053)	0.376*** (0.086)	0.968** (0.429)
QLS dummy	0.096* (0.056)	0.569*** (0.193)	
NLS dummy	-0.075 (0.07)	-0.143 (0.258)	
Formal company (dummy)	0.208** (0.093)	1.212*** (0.3)	0.164* (0.087)
Exporter dummy	-0.119** (0.053)	-0.759*** (0.147)	-0.249** (0.101)
Total volume exported (in 1000 tons)	0.009*** (0.002)	0.037*** (0.006)	0.021** (0.009)
Number of products produced by the company in 2013	-0.014 (0.01)	0.024 (0.023)	-0.024 (0.015)
Owens plant only (instead of plant and field)	0.216* (0.12)	1.129*** (0.179)	0.369** (0.156)
Owens field only (instead of plant and field)	-0.069 (0.052)	-0.236 (0.169)	0.033 (0.109)
Number of workers 2013	-0.001 (0.001)	-0.011*** (0.002)	-0.004* (0.002)
Field (=1 if field worker; =0 if plant worker)	0.118*** (0.041)	0.600*** (0.134)	0.057 (0.058)
Crop: asparagus (=1 if person works in asparagus; =0 if other crop)	0.002 (0.038)	0.12 (0.118)	0.039 (0.044)
Crop: grapes (=1 if person works in grapes; =0 other crop)	-0.120*** (0.044)	-0.039 (0.079)	-0.06 (0.072)
Activity dummy: harvest (=1 if harvest; =0 other task)	-0.037 (0.036)	-0.219*** (0.083)	-0.044 (0.041)
Hours worked per day	0.016* (0.01)	0.169*** (0.036)	0.020** (0.01)
Days worked per week	0.033 (0.022)	-0.025 (0.036)	0.02 (0.017)
Weeks employed in company	0.006** (0.003)	0.049*** (0.015)	0.003 (0.003)
Weeks employed in company2	0 (0.000)	-0.001*** (0.000)	0 (0.000)
Female (=1 if female)	0.077** (0.035)		0.092** (0.041)
Years of education	0.018*** (0.006)		0.026*** (0.008)
Single (=1 if single)	-0.012 (0.048)		0.019 (0.052)
Child dummy (=1 if worker has a child)	0.025 (0.051)		0.054 (0.055)
Age	0.016* (0.01)		0.013 (0.011)
Migration (=1 if migrant)	0.051 (0.038)		0.076* (0.041)
Distance to the village centre (in minutes)	-0.002 (0.001)	0.013 (0.009)	-0.003** (0.002)
Fixed effects	village	worker	village
R-Squared	0.38	0.39	
F-test of excluding instruments			10.29
No. of Obs.	736	162	789

Standard errors in parenthesis; Average marginal effects are reported in columns 1 and 2; *** p<0.01, ** p<0.05, * p<0.1