Private standards and labour productivity in the food sector in Vietnam

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Abstract

The paper analyses how voluntary private standards affect labour productivity of small and medium firms from the food sector in Vietnam. The results based on a three-year panel show that the application of private standards improves labour productivity. These gains primarily occur to firms operating above a threshold labour-intensity level. Firms with low labour intensity are not likely to experience gains in labour productivity from standards. This implies that employee compensation increase due to standards is a likely mechanism for labour productivity gains. The results are robust to several specification changes and instrumental variable estimation.

Keywords: standards, labour productivity, food, small- and medium-sized enterprises, Vietnam

1 Introduction

Food production and trade have become inseparable from requirements for certification of standards that regulate quality, safety, social or environmental impact of products and production processes. Standards have emerged as a way of improving consumer's information about product characteristics, affecting consumer loyalty and trust (Raynolds, 2002). This is especially relevant for food trade from developing to developed countries (Beghin et al., 2015). Private standards are applied voluntarily and, per occasion, independently from national regulation. The issues they address may or may not overlap with the official regulation. Firms in the food sector put a lot of effort in assuring compliance with private standards, which can potentially improve access to higher-value markets (Masakure et al., 2009), firm's reputation (Fulponi, 2006) and financial performance (Alpay et al., 2002; Corbett et al., 2005; Foster and Gutierrez, 2013), but only if firms can overcome the costs of implementation (Maskus et al., 2013). The inability to finance compliance with standards has been identified as one of the main obstacles for participation of small-scale producers from developing countries in global trade (Henson and Humphrey, 2010).

A growing body of literature is focusing on the impact of standards on firm performance, covering both developed and developing countries. Corbett et al. (2005) found improvements in financial performance for ISO 9000 certified firms in the US and Terlaak and King (2006) discovered that certified facilities grow faster after certification. Fontagné et al. (2015) analysed the impact of standards on export performance of French firms, while Martincus et al. (2010) and Otsuki (2011) investigated the effect ISO certification on export performance of firms in Argentina and in Europe and Central Asia. Schuster and Maertens (2015) analysed the effect of various types of private standards on export performance of firms in Peru using fixed effects and GMM models. Henson et al. (2011) and Masakure et al. (2009) analysed the returns to certification in terms of export sales revenue for sub-Saharan African countries and Pakistan. Apart from the study in Peru, all studies report positive effects of standards on export performance and revenue. Goedhuys and Sleuwaegen (2013) studied how international standards certification affects productivity and sales performance in various countries. They found that certification raises productivity and sales, with the effects being larger in countries where market supporting institutions are weak.

The growth of high-standards food exports from developing countries has been associated with positive welfare outcomes and extended employment opportunities (Beghin et al., 2015; Maertens and Swinnen, 2009). Especially in high-value export sectors, private standards can lead to better employment conditions. Colen et al. (2012) have associated GlobalGAP certification with higher employee daily wages and longer employment periods in exporter–producer companies in Senegal. Blunch and Castro (2005) have found that ISO 9000 and ISO 14000 certification affects firm's training decisions. Schuster and Maertens (2016) show mixed evidence of labour standards in Peru, such as Ethical Trading Initiative (ETI) and Social Accountability 8000 (SA8000): While food

export firms with labour standards appear more likely to pay minimum wage, they are not likely to offer higher wages or longer employment. How these benefits relate to labour productivity is fairly underexplored in the existing literature.

In the paper, I look at labour productivity in order to understand whether private standards introduce differences in the efficiency of labour input use between certified and non-certified firms. Labour productivity can change due to the adjustments in the firm's work system after the implementation of standards. For example, international standard ISO 9001 optimises processes while ISO 22000 can cut operational costs by managing food safety risks. If standards entail employee skill-building and streamline operating procedures, cut waste and increase sales, the changes will be registered as improved labour productivity. Opposite, if the costs of implementation of standards are too high, additional employee effort and skills may be under-rewarded and stall productivity. In competitive markets, the differences in productivity resulting from the investments in standards would be entirely reflected in wage differentials. In practice, however, the relationship between gains in productivity and wages can vary according to the origin of financing, job type, as well as wage and fringe benefits structure. In the case of standards, it is probable that there is a considerable divergence between wages and productivity gains since it is the employers who bear the costs of standards implementation. Thus, the wage premium attributed to standards in earlier studies is likely to constitute a lower bound of productivity gains resulting from this investment.

The paper looks at the effect of standards on labour productivity, where labour productivity is measured as value added per worker. The paper uses a panel dataset from three rounds of SME surveys in Vietnam, conducted in 2011, 2013 and 2015, covering 1,837 observations (988 firms) in the unbalanced and 1,425 observations (475 firms) in the balanced panel. The estimation employs OLS, fixed effects and difference GMM models to estimate effects and control for reverse causality and unobserved heterogeneity. The results show that the application of private standards improves labour productivity among the SMEs from the food sector in Vietnam. Firms that have adopted private standards enjoy 20-37% higher labour productivity than firms that have not adopted such standards. The paper also suggests that the benefits from standards are higher for firms with higher labour compensation, implying that employee wage increase due to standards is a likely mechanism for labour productivity gains. The results are robust to several specification changes and instrumental variable estimation. They supplement earlier findings of a positive impact of standards on employee outcomes (Colen et al., 2012; Delmas and Pekovic, 2013; Levine and Toffel, 2010; Schuster and Maertens, 2016). Slowing income and economic growth in many developing countries have been attributed to the inefficient labour use and a lack of productivity growth (Rodrik, 2011). By linking standards and labour productivity, this paper brings a policy-relevant perspective on the performance of the SME sector, which, as Beck et al. (2005) argue, is the foundation of the employment and economic growth for developing countries.

2 The Vietnamese food sector

Food processing is one of the most important manufacturing sectors in Vietnam as it employs around 10% of all workforce in manufacturing (GSO, 2014). The sector has grown four times in value at current prices since 2005. The growth has been around 5% in recent years: the industry has expanded by 5.1% in 2014 and by 6% in 2013 (at 2010 prices). The number of firms in the food sector was around 5,000 in 2005 and it has increased to 5,820 in 2013, showing a 16% overall increase or annual growth of 3.1%. Data from Vietnam's General Statistics Office (GSO) show that the food types processed in largest volumes are: milled rice (45 million tons), refined sugar (1.8 million tons) and frozen aquatic products (1.6 million tons) (GSO, 2015). Processing increased sharply between 2005 and 2014: production of refined sugar increased by 70%, milled rice by 50% and frozen aquatic products by 132%. The highest annual growth rate of 13% was observed for fresh milk, produced at 840 million litres. Food sector contributed to about 15% of the total export

value in 2013 and the food exports reached 18.6 billion USD in the same year. As a comparison, all exported manufactured products were valued at 98.1 billion USD in 2013, with textiles and garment taking 20.8 billion USD and footwear exports taking 10.2 billion USD (GSO, 2015). The value of food export has grown nine times between 1995 and 2013, with yearly expansion of 12%. The US and the EU are Vietnam's two largest export markets.

3 Data

The data are from the small- and medium-sized enterprise (SME) survey from Vietnam that focuses on non-state manufacturing enterprises. This survey has been conducted every second year since 2005 with the aim of evaluating characteristics of the Vietnamese business environment. It is implemented in 10 provinces in Vietnam: Ho Chi Minh City (HCMC), Hanoi, Hai Phong, Long An, Ha Tay, Quang Nam, Phu Tho, Nghe An, Khanh Hoa and Lam Dong. The sampling frame comprises a consolidated list of formal enterprises obtained from the Establishment Census from 2002 and the Industrial Survey 2004-2006 (CIEM, 2014). Firms are randomly drawn from this list, accounting for ownership type to obtain representative data on household-owned, private, cooperative, limited liability and joint stock enterprises. Apart from the officially registered firms, the data also include informal firms that were identified randomly on-site. The analysis uses data from 2011, 2013 and 2015 survey rounds because the question about the compliance with internationally recognised standards was introduced in 2011. The total sample comprises 777 firms in 2015, 714 firms in 2013 and 689 food firms in 2011. Compared to the enterprise census, this represents around 12% of all firms in the food sector (GSO, 2014 reports that there were 5,498 registered food firms in 2011 and 5,820 in 2013). The sample of formal firms comprises 645 firms in 2015, 400 firms in 2013 and 393 firms in 2011. The balanced sample of formal firms includes 249 firms and the balanced sample with informal firms includes 475 firms per year.

The main questionnaire includes information on enterprise characteristics and practices. It has stayed almost the same over the years. One notable exception is that the questionnaire from 2015 asks about international and domestic standards specifically. All questions refer to the situation in the previous calendar year, namely 2010, 2012 and 2014. The 2011 and 2013 survey rounds only contain an indicator for whether firms apply any of the internationally recognised standards, while the 2015 round reveals which standards exactly are applied.

4 Empirical specification

The main goal is to estimate the causal effect of international standards on labour productivity over the period 2010–14. This is done by estimating equation (1):

$$y_{it} = \alpha_i + \beta_i S_{it} + \delta X_{it} + \rho_j + \tau_t + e_{ijt} \quad (1)$$

where i denotes firm, j denotes location and t denotes time period. α_i, ρ_i and τ_t are, respectively, firm, location and time fixed effects. e_{ijt} is the statistical noise term. The dependent variable, y_{it} is the firm-level labour productivity measured as real value added per employee, expressed in 2010 VND. Value added is measured as revenue from sales minus total costs that include expenses on intermediate goods and raw materials and indirect costs. Table 1 shows that the average real value added per employee has increased from around 20 million VND in 2010 to 61 million VND in 2014, achieving an annual growth rate of 25%.

The variable of interest, S_{it}, takes value 1 if a firm applies any private standard and 0 otherwise. The proportion of firms with internationally recognised private standards in the sample is about 5%. The number of certified firms decreased by around 1.7 percentage points between 2010 and 2014. The ISO Survey shows large variation in the number of ISO certificates issued in Vietnam since 2000. For example, there were 7,333 valid ISO certificates in 2009 and 3,786 in 2014 (ISO, 2016). The most commonly applied standards among the Vietnamese SMEs from the food sector are ISO 9001 and ISO 22000. Only 13 firms (14%) have certified more than one standard.

X_{it} are time-varying firm-specific control variables, such as firm size, value of physical assets and the age of firm. Firm size is controlled for due to the well-established labour productivity-size relationship and the advantage of larger firms in complying with standards (see, e.g., Herath et al., 2007; Masakure et al., 2011). One explanation could be that fixed costs that are bound to be incurred in relation to implementation of standards are less significant for larger firms. Firm size is measured as the total number of regular full-time employees. Summary statistics in Table 1 show that the average firm from the sample employed eight employees and that the average size has slightly declined between 2010 and 2014. Value of capital, measured as the deflated value of the total assets of the firm at the end of the year, controls for the cost and the nature of technology. Firm age is also added as productivity may differ between old and young firms (Aw et al., 2001). The adoption of standards may be influenced by the position in the supply chain, so the estimation controls for the type of output, that is, whether a firm produces final or intermediate goods. Linkages with foreign markets enter estimation as firms are more likely to implement standards if their business is export-oriented. The estimation also controls for legal ownership form as potential benefits can be accrued by changing legal ownership status. Legal ownership form enters estimation as a set of dummy variables that represent the specific legal form of the firm (household, private, collective/partnership, limited-liability, or joint-stock enterprise).

Table 2 shows the average performance at the firm level by certification of international standards using data from all years. Firms applying standards show two times higher labour productivity levels than non-certified firms. These firms also tend to be larger (employ more full-time workforce) and to have more capital on average. Certified firms are more likely to be younger, to produce intermediate goods and to export. Non-certified firms tend to sell locally with the distance to the main buyer being only 19 km. Firms with standards tend to have more educated owners and a larger proportion of professionals in total work force.

Identifying the causal effect of standards on labour productivity requires accounting for non-random application of standards among firms. The estimation needs to account for simultaneity, whereby firms with already higher levels of labour productivity are more likely to adopt standards. Another difficulty in estimating the causal impact is the presence of unobserved firm-specific characteristics that influence labour productivity and correlate with the firm's decision to adopt of standards. For example, a manager of a firm may have access to specific information, which could both lead to certification of standards and higher labour productivity. A fixed effects estimation controls directly for all time-invariant unobserved firm-specific factors, such as manager characteristics (given that managers do not change over time). Location fixed effects, ρ_j, control for policy changes that may differentially impact productivity of firms in different regions. The estimation contains province dummies with Ho Chi Minh City as a baseline. Time dummies, τ_t, control for general trends that affect all firms.

Firms can also have unobservable characteristics, which change over time and which are correlated with both implementation of standards and labour productivity. For example, there may be omitted

time-varying firm-specific factors that impact both the decision to implement standards and labour productivity such as, for example, a change in management. In the presence of these factors, standard OLS fixed effects estimates will be biased, but the direction of the bias is not easy to forecast. For example, a change in management could lead a firm to both be more productive and implement standards, in which case OLS estimates will have a positive bias. Alternatively, new management could reduce the extent of activities related to standards in order to invest in productivity-enhancing activities. Also, a demand for certification of private standards coming from trade partners could divert from productivity-enhancing firm decisions. These would lead to a negative bias in OLS estimates.

In addition to a traditional fixed effects approach, I also apply the generalized method of moments (GMM) levels estimator as in Anderson and Hsiao (1982), which uses *t–2* lags of endogenous variables as instruments. In this way, the parameters are identified using the within-firm variation in the application of standards and labour productivity over time. Distance to the main buyer, location, legal ownership status and time dummies are treated as exogenous, while standards S_{it} and firm characteristics X_{it} enter estimation as endogeneous. Endogenous variables are instrumented with all available lags (first and second) in the difference equation and with contemporaneous first differences in the levels equation. The validity of all instruments is checked with the Hansen test of over-identification restrictions. The short time series of the panel data (2010-2014) may limit the extent of variation used to identify parameters and the estimates could be influenced by the exit and entry of firms rather than within-firm variations. Resolving this issue calls for the balanced panel estimates, which I show in addition to the results of the estimation on unbalanced panel.

Additional causal evidence is provided in a two-stage least squares (2SLS) estimation where the endogenous variable, S_{it}, is instrumented by a two-year sector and district share of total ISO 9001, 14000 and 22000 certificates issued in Vietnam, the number of which is obtained from the ISO Survey (ISO, 2016). This IV captures the potential of a firm to obtain information about standards, without influencing labour productivity directly. The underlying assumption is that the distribution of relevant knowledge about standards is more efficient within than across districts and sectors. Aggregating the IV to the district and sector level allows to minimize the correlation with the unobservable factors such as managerial skills. The efficiency of information flows has previously been linked with the adoption of standards. For example, firms are more likely to adopt environmental management systems if their rivals already have certificates (Grekova et al., 2014; Hofer et al., 2012). The F statistic for the tests of significance of the IV show no concerns over weak instruments.

5 Results

Table 3 shows the estimates of the impact of international standards on labour productivity among the Vietnamese SMEs from the food sector, where labour productivity is measured by real value added per employee (in 1,000 VND). Equation (1) is estimated using OLS, a firm fixed-effects estimator and the difference GMM estimator. All models include location, legal ownership and time dummies. Column (1) shows the pooled OLS estimates on a balanced panel with location, legal ownership and time fixed effects in addition to the variables reported. The coefficient points to a significant relationship between application of standards and labour productivity. Column (2) is a counterpart to column (1) with added firm-specific fixed effects which control for all firm-specific time invariant heterogeneity, while column (3) uses the full sample available (unbalanced panel) in the same type of estimation. As expected, the size of the coefficient drops slightly compared to column (1). The fixed effects estimations show that firms who have adopted private standards enjoy around 22% higher labour productivity than firms that have not adopted such standards. Column (4)

contains additional control variables, which reduce slightly the magnitude of the coefficient. Columns (5) and (6) show the estimation results for the sample restricted to 2010 and 2012 data as the structure of the questionnaire changed somewhat in 2015. Restricting the sample in such way results in a sizeable increase of the coefficient that measures the impact of standards. This shows that the change in the questionnaire structure is not a serious threat to estimation validity.

Columns (7) and (8) show the results of GMM estimation on unbalanced and balanced panel, employed to address identification challenges in inferring a causal relationship between standards and labour productivity. I find the magnitude of the effect of standards on labour productivity increases by a notably large amount, suggesting a downward bias in the OLS estimates. The magnitude of the coefficient suggests that standards can increase firm's labour productivity by 49%. As shown in the lower part of the table, Hansen's test for the validity of the instruments is satisfied. Finally, columns (9) and (10) show the results of the instrumental variable 2SLS estimation. They confirm the positive impact of standards on labour productivity.

The results complement earlier findings of the positive impact of standards on work conditions (Colen et al., 2012; Levine and Toffel, 2010; Schuster and Maertens, 2016) and total factor productivity (Goedhuys and Sleuwaegen, 2013). They also support earlier result of the positive impact of environmental standard ISO 14001 on labour productivity among the French firms (Delmas and Pekovic, 2013). Using cross-sectional data, Delmas and Pekovic (2013) have found that the adoption of environmental standards (ISO 14001) is associated with 16-21% increase of labour productivity above the average. The GMM results from the present study are quantitatively larger, but the OLS and FE results are in the same order of magnitude. The downward bias of the OLS estimation is likely coming from unobservable characteristics that are negatively correlated with the covariates. The unobserved characteristics which lower the probability of applying standards lead to better labour productivity, indicating perhaps that firms with weaker managerial capabilities are more likely to seek to improve performance through standards, while more capable firms may not need standards for this purpose. This may point to a trade-off between the investment in private standards and labour productivity for financially constrained firms.

Looking at the control variables, the positive and significant coefficient on the firm size in the OLS estimation disappears after controlling for unobserved heterogeneity. The value of assets is, however, consistently positive in all estimations, implying higher labour productivity among more technology-endowed firms. The relationship between firm age and worker wages is negative, but imprecisely determined in all estimations apart from OLS. The relationship between producing final goods and labour productivity is negative, implying better outcomes for firms who produce intermediate goods. The estimates do not show consistent evidence for the returns on export, professional workforce and owner education.

As some firms apply more than one standard, the precision of estimates could be affected if multiple standards bring synergic benefits. To address this challenge, I restrict the sample to formal firms who apply only one standard. Table 4 shows that the results remain very close in significance and magnitude to the original estimation. The next step investigates whether the impact of standards on labour productivity depends on the intensity of labour use. Labour intensity is measured as annual real costs of labour as a share of value added. Table 5 shows that the impact of standards on labour productivity goes through labour intensity and that the direction of the relationship is convex, with a negative first interaction and a positive interaction on the quadratic term. This indicates that the benefits from standards accrue to firms with labour intensity above a certain threshold. Descriptive statistics reveal that more productive firms applying standards also have

higher labour compensation rates, measured as average real labour costs and more labour intensive firms applying standards also have higher labour productivity.

That private standards affect firm operational practices is established in Table 6, which shows the results of a falsification exercise on the relationship between labour productivity and buyers' requests for certifying standards. Conditional correlations reveal that buyers' requests for certification are not significantly related to labour productivity when firm, location, legal ownership and time effects are accounted for. This implies that standards indeed introduce meaningful operational changes, which, as hypothesised, lead to better operating procedures, management practices, production processes and finally, improved labour productivity.

6 Conclusion

Private standards in developing countries are mostly studied with respect to financial performance and access to export markets, leaving limited little evidence about the impact on employee outcomes, especially on labour productivity. This issue is highly relevant, especially in light of the recent reports of stagnating labour productivity is developing countries (e.g., see Rodrik, 2011).

Earlier research has been ambiguous about the direction of the relationship between private standards and labour productivity. This paper presents evidence that private standards have a positive effect on labour productivity among the SMEs from the food sector in Vietnam, showing that standards can contribute to more than market access and profits. This finding supports earlier research on the relationship between private standards and work conditions (Colen et al., 2012; Delmas and Pekovic, 2013; Levine and Toffel, 2010; Schuster and Maertens, 2016).

It has been argued in earlier research that productivity would increase with the application of standards only if the labour is adequately compensated. The paper shows indeed that productivity gains from standards depend on the level of labour compensation, but this relationship is not linear. Positive productivity effects from standards are observable for highly labour-intensive firms, pointing to the presence of a threshold level of labour compensation necessary for productivity gains. Firms with low levels of labour intensity are not likely to improve labour productivity by applying private standards. This implies that employee wage increase due to standards is a likely mechanism for further labour productivity gains. This is an important finding in the context of weak institutional environments of developing countries, where substitutes for official regulation in the form of private standards appear to be able to generate additional benefits for SMEs. Indeed, Goedhuys and Sleuwaegen (2013) found that certification increases productivity especially in countries with weak institutional framework.

The results are reliable as they are based on the three rounds of panel data, which allow controlling for confounding effects, such as self-selection and unobserved firm-specific characteristics that may or may not change over time. Time-invariant confounding factors are addressed with firm-specific fixed effects, the influence of region-specific characteristics with location fixed effects and general trends that affect all firms with time dummies. GMM estimation is applied to address the influence of time-varying firm-specific factors. Finally, the results are robust to a number of specification changes: placebo exercise, inclusion of lagged dependent variable, restriction of the sample to only formal firms or to firms who apply only one private standard.

The results could be extended in a couple of ways. First, the application of standards is not very common among the SMEs from the food sector in Vietnam. Moreover, the range of standards applied is quite limited compared to other countries. This has prevented measuring the benefits of different types of standards at the intensive margin. Future work could thus estimate the effect of different types of standards on labour productivity. Second, future work could perhaps focus in greater detail on labour productivity mechanisms, some of which could be due to management or labour force skills.

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8 Tables

Table 1: Summary statistics

Variable	Description	2010		2012		2014	
		Mean	SD	Mean	SD	Mean	SD
Standards	Proportion of firms applying internationally recognised standards (%)	4.58	(20.92)	4.91	(21.63)	3.22	(17.67)
Labour productivity	Real value added per worker (1,000 VND)	19.85	(30.93)	50.53	(51.43)	60.68	(226.56)
Firm size	Total full-time regular labour force	8.95	(20.24)	8.71	(20.18)	8.00	(18.87)
Assets	Real value of total assets (1,000 VND)	1,137	(3,468)	2,619	(9,265)	1,912	(6,491)
Age of the firm	Number of years since the firm has been established	19.25	(10.09)	19.23	(10.55)	18.37	(10.88)
Final goods share	Proportion of output used for final consumption (%)	38.88	(37.25)	48.30	(37.99)	52.17	(38.25)
Distance	Distance to the main buyer in km	23.28	(73.30)	19.22	(48.76)	24.16	(65.23)
Export	Firm sells to foreign countries (%)	3.84	(19.23)	2.89	(16.77)	2.84	(16.61)
Owner has higher education	Owner has completed secondary education (%)	44.46	(49.73)	52.60	(49.97)	55.80	(49.69)
Professionals share	Proportion of professional workers in a firm (%)	1.83	(5.68)	1.36	(4.29)	0.94	(3.48)
Formally registered firms	Proportion of formally registered firms (%)	56.87	(49.56)	55.35	(49.75)	82.99	(37.60)
Competition	Firm perceives competition in their line of activity (%)	88.04	(32.49)	88.50	(31.94)	86.51	(34.17)
Legal ownership form							
Household establishment	Proportion of firms listed as household establishment (%)	85.52	(35.21)	84.97	(35.76)	86.08	(34.64)
Private/sole proprietorship	Proportion of firms listed as private or sole owner establishment (%)	4.58	(20.92)	4.05	(19.72)	2.96	(16.97)
Partnership/ Collective/ Cooperative	Proportion of firms listed as partnership, collective or cooperative (%)	0.30	(5.43)	0.87	(9.28)	0.52	(7.17)
Limited liability company	Proportion of firms listed as limited liability company (%)	8.27	(27.57)	8.24	(27.51)	8.63	(28.10)
Joint stock company	Proportion of firms listed as joint stock company (%)	1.33	(11.46)	1.88	(13.59)	1.80	(13.32)
Observations		677		692		776	

Note: Average 2010 exchange rate: 1 USD = 19,128 VND.

Table 2: Differences between firms by implementation of standards, 2010-2014.

Variable	All	Standards	No standards	Difference	t-value
Labour productivity (ln)	44.52	100.68	42.06	58.62	3.86***
	(141.44)	(121.20)	(141.78)		
Firm size (ln)	8.53	50.34	6.70	43.64	22.92***
	(19.73)	(47.47)	(15.12)		
Assets (ln)	1,895	14,405	1,348	13,058	19.12***
	(6,858)	(22,641)	(4,442)		
Age of the firm (years)	18.92	16.71	19.02	-2.31	-2.04**
	(10.54)	(11.02)	(10.51)		
Final goods share (%)	46.73	25.94	47.64	-21.69	-5.30***
	(38.24)	(34.09)	(38.16)		
Distance (km)	22.29	87.85	19.42	68.43	10.29***
	(63.27)	(156.78)	(54.00)		
Export (%)	3.17	44.44	1.36	43.08	26.23***
	(17.52)	(49.97)	(11.60)		
Owner has higher education	51.19	94.44	49.29	45.15	8.52***
(%)	(50.00)	(23.03)	(50.01)		
Professionals (%)	1.35	8.32	1.05	7.27	15.69***
	(4.54)	(7.83)	(4.08)		
Competition (%)	87.68	87.64	87.68	0.39	0.01
	(0.88)	(3.51)	(0.90)		

Note: Average 2010 exchange rate: 1 USD = 19,128 VND. Standard deviation in parentheses. Significance levels: * p<0.10, ** p<0.05, *** p<0.01. Number of observations: 2,145.

Table 3: Impact of standards on labour productivity. Dependent variable: value added per worker (ln).

	OLS balanced (1)	FE balanced (2)	FE unbalanced (3)	FE balanced, additional controls (4)	FE unbalanced, 2010-2012 (5)	FE balanced, 2010-2012 (6)	GMM unbalanced (7)	GMM balanced (8)	IV, unbalanced (9)	IV, balanced (10)
Standards	0.241**	0.200**	0.198***	0.197**	0.305***	0.281**	0.397**	0.426***	0.758**	0.853*
	(0.098)	(0.078)	(0.075)	(0.083)	(0.117)	(0.128)	(0.154)	(0.141)	(0.367)	(0.454)
Firm size (ln)	0.051	-0.030	0.014	-0.035	-0.045	-0.040	-0.028	-0.062	0.023	-0.026
	(0.045)	(0.070)	(0.060)	(0.071)	(0.074)	(0.083)	(0.137)	(0.127)	(0.064)	(0.071)
Assets (ln)	0.156***	0.157***	0.152***	0.152***	0.108***	0.106**	0.166***	0.127**	0.144***	0.139***
	(0.025)	(0.028)	(0.025)	(0.028)	(0.039)	(0.043)	(0.056)	(0.050)	(0.029)	(0.032)
Age of the firm	-0.006**	-0.006	-0.004	-0.006	0.000	-0.003	0.026	0.020	-0.006	-0.006
	(0.002)	(0.010)	(0.009)	(0.010)	(0.010)	(0.011)	(0.025)	(0.022)	(0.009)	(0.009)
Final goods share	-0.001	-0.000	-0.000	-0.000	-0.001	-0.001	-0.002**	-0.002	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Distance (ln)	0.028	0.018	0.020	0.017	0.027	0.027	0.014	0.009	0.018	0.015
	(0.017)	(0.019)	(0.016)	(0.019)	(0.021)	(0.024)	(0.018)	(0.019)	(0.016)	(0.018)
Export				0.058	-0.226	-0.192	0.230	0.020	-0.017	-0.218
				(0.160)	(0.176)	(0.185)	(0.393)	(0.426)	(0.197)	(0.245)
Owner has higher				0.001	0.002*	0.001	-0.001	-0.001	0.001	0.001
education				(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Professionals				0.001	0.009	0.007	0.001	-0.008	0.003	0.003
				(0.006)	(0.007)	(0.008)	(0.011)	(0.010)	(0.005)	(0.007)
Competition				-0.021	0.103	0.136	-0.119	-0.078	-0.043	-0.034
				(0.078)	(0.087)	(0.101)	(0.107)	(0.092)	(0.062)	(0.072)
Year dummies		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Location dummies		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Legal form dummies		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	2.939***	3.026***	2.866***	3.054***	3.118***	3.222***				
	(0.196)	(0.314)	(0.263)	(0.312)	(0.436)	(0.482)				
Number of obs.	747	747	1,007	746	767	497	609	497	1006	746
Number of firms		249	379	249	474	249	361	249	379	249
R^2	0.36	0.09	0.09	0.09	0.15	0.13			0.05	0.03
Hansen test statistics							7.16	8.44		
Hansen test p-value							0.41	0.21		
Kleibergen-Paap F statistic									16.13	11.66
Cragg-Donald F statistic									43.56	32.00

Note: Estimation on the unbalanced panel in column (3) includes firms for which data are available in at least two years. Robust standard errors clustered at the firm level are in parentheses. Significance levels: * p<0.10, ** p<0.05, *** p<0.01. Critical values for the Stock-Yogo (2005) identification test are 16.38 (10% maximal IV size), 8.96 (15% maximal IV size), 6.66 (20% maximal IV size) and 5.53 (25% maximal IV size). The rule of thumb for Kleibergen-Paap F statistic is that it should be over 10.

Table 4: Impact of standards on labour productivity: estimation on the subsample of formal firms that apply only one standard. Dependent variable: value added per worker (ln).

	OLS balanced	FE balanced	FE unbalanced	FE balanced	FE unb., 2010-2012	FE bal., 2010-2012	GMM unbalanced	GMM balanced
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Standards	0.248**	0.201**	0.199**	0.200**	0.305***	0.281**	0.514***	0.401***
	(0.109)	(0.082)	(0.084)	(0.088)	(0.117)	(0.128)	(0.190)	(0.151)
Constant	2.935***	3.054***	2.889***	3.088***	3.118***	3.222***		
	(0.192)	(0.333)	(0.281)	(0.333)	(0.436)	(0.482)		
Observations	732	732	986	731	767	497	589	482
R^2	0.34	0.08	0.09	0.08	0.15	0.13		
Hansen test statistics							8.08	10.46
Hansen test p-value							0.33	0.11

Note: Full set of controls as in Table 3. Estimation in column (3) includes firms for which data are available in at least two years. Robust standard errors clustered at the firm level are in parentheses. Significance levels: * p<0.10, ** p<0.05, *** p<0.01.

Table 5: Impact of standards on labour productivity depending on labour intensity. Dependent variable: value added per worker (ln).

	OLS balanced	FE balanced	FE unbalanced	FE unb., 2010-2012	FE bal., 2010-2012	GMM unbalanced	GMM balanced
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Standards	1.679***	1.057**	1.057***	1.533***	1.565***	1.332**	1.138***
	(0.261)	(0.449)	(0.399)	(0.417)	(0.477)	(0.540)	(0.322)
Standards*Labour	-5.255***	-3.067	-3.371*	-5.789***	-5.780**	-4.784**	-3.485***
intensity	(1.125)	(1.914)	(1.738)	(2.082)	(2.280)	(2.415)	(1.131)
Standards*Labour	3.505***	2.084	2.583	5.633**	5.558**	5.228*	3.045**
intensity (sq.)	(1.140)	(1.811)	(1.690)	(2.315)	(2.530)	(2.685)	(1.436)
Labour intensity	-0.534**	-0.595***	-0.716***	0.127	0.228	-1.914***	-1.527***
	(0.213)	(0.213)	(0.174)	(0.433)	(0.470)	(0.313)	(0.305)
Labour intensity (sq.)	-0.252	-0.145	-0.007	-1.401***	-1.496***	0.631***	0.393**
	(0.177)	(0.120)	(0.064)	(0.515)	(0.561)	(0.165)	(0.185)
Constant	2.990***	3.124***	3.065***	2.955***	2.997***		
	(0.196)	(0.276)	(0.236)	(0.352)	(0.384)		
Observations	746	746	1,006	767	497	609	497
R^2	0.48	0.20	0.21	0.31	0.28		
Hansen test statistics						30.80	21.43
Hansen test p-value						0.01	0.09

Note: Labour intensity is measured as ln(labour costs per value added). Estimation in column (3) includes firms for which data are available in at least two years. Full set of controls as in Table 3. Robust standard errors clustered at the firm level are in parentheses. Significance levels: * p<0.10, ** p<0.05, *** p<0.01.

Table 6: Placebo test: Impact of requesting private standards on labour productivity. Dependent variable: value added per worker (ln).

	OLS balanced	FE balanced	FE unbalanced	FE balanced	FE unbalanced, 2010-2012	FE balanced, 2010-2012	GMM unbalanced	GMM balanced
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Buyers' request	0.082	-0.079	-0.096	-0.084	-0.156	-0.099	-0.025	0.005
for standards	(0.093)	(0.100)	(0.087)	(0.103)	(0.251)	(0.275)	(0.141)	(0.180)
Constant	2.913***	2.974***	2.821***	2.996***	2.994***	3.114***		
	(0.198)	(0.299)	(0.255)	(0.295)	(0.403)	(0.437)		
Observations	747	747	1007	746	767	497	609	497
R^2	0.35	0.08	0.09	0.08	0.14	0.12		
Hansen test statistics							6.32	8.36
Hansen test p-value							0.50	0.21

Note: Robust standard errors clustered at the firm level are in parentheses. Significance levels: * p<0.10, ** p<0.05, *** p<0.01.