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Elisa Calza and Micheline Goedhuys

Maastricht Economic and social Research institute on Innovation and Technology (UNU-MERIT)

email: info@merit.unu.edu | website: <http://www.merit.unu.edu>

Maastricht Graduate School of Governance (MGSoG)

email: info-governance@maastrichtuniversity.nl | website: <http://www.maastrichtuniversity.nl/governance>

Boschstraat 24, 6211 AX Maastricht, The Netherlands

Tel: (31) (43) 388 44 00

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Domestic quality certification and growth of Vietnamese MSMEs¹

Elisa Calza² Micheline Goedhuys³

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Abstract

Using two waves of the Mirco, Small and Medium sized Enterprises (MSMEs) survey of Vietnamese manufacturing firms, this paper first explores what drives firms' decision to have a domestically recognized certificate, taking into account a rich number of factors related to the cost and expected benefits of certification as well as institutional factors. It further explores the presence of a positive and significant effect of domestic certificates on firm growth, these serving as signaling devices for desirable attributes under information asymmetry and thus leading to an increase in legitimacy and reputation. Evidence is indeed found for a signaling effect of certification, this being stronger for more recently adopted certificates, for advertising firms and for women entrepreneurs.

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Emerging economies, Viet Nam

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²UNU-MERIT/MGSoG, Maastricht, The Netherlands, corresponding author. Contact: calza@merit.unu.edu, telephone: +31(0)433884400.

³UNU-MERIT, Maastricht, The Netherlands

1 Introduction

A better understanding of the mechanisms of entrepreneurial growth is nowadays of great relevance for academics and policy makers alike. A vast empirical literature explores the factors affecting entrepreneurial growth, both in advanced and developing economies (Coad, 2009; Nichter and Goldmark, 2009; Quatraro and Vivarelli, 2014). The industrial economics literature points at firm size and age as main determinants of growth (Evans, 1987), as firms discover their efficiency levels in competition with the market and adjust their size accordingly, in line with a Bayesian passive learning process (Jovanovic, 1982). Models of active learning instead, emphasize the role played by learning- and innovation-related variables in raising efficiency levels (Pakes and Ericson, 1998), thus ultimately enabling firms to experience additional growth opportunities (Doms et al., 1995; Roper, 1997; Audretsch et al., 2014).

In developing countries, however, these market selection mechanisms are hampered by market and systemic failures related to asymmetric information, high transaction costs, and weak institutions, explaining why firms cannot grow and tend to remain in the market at a non-efficient size (Roberts and Tybout, 1996; Tybout, 2000; Goedhuys and Sleuwaegen, 2010). In response to high transaction costs and information asymmetries, firms try to signal quality and gain reputation and legitimacy, which may allow them to access to markets and resources, and to grow (Sleuwaegen and Goedhuys, 2002). Empirical evidence shows that the adherence to standard certificates may serve such purpose, acting as a ‘signaling device’ that facilitates the access to broader and higher-end markets. Moreover, this *external* signaling effect of standard certificates may come in addition to *internal* operational improvements, as certificates may also represent a form of codified knowledge about superior practices, contributing to learning and capability development especially for firms operating in a developing economy (Zoo et al., 2017; Calza et al., 2018).

The relevant literature has almost exclusively focused on the analysis of international management standard certificates (such as ISO 9001 for quality management and/or the ISO 14001 for environmental management)¹, while leaving the features, determinants, and implications of domestically recognized certificates largely under-investigated. With the majority of firms in Viet Nam - as well as in many developing countries - being small and serving mainly domestic and local markets, as well as being often too resource constrained to meet the requirements of international certificates, the question arises whether complying with a domestic standard certificate could play a comparable role for these firms’ performance.

This paper therefore investigates the determinants of domestically recognized certificates and their effects on sales growth for a sample of MSMEs in the Viet Nam manufacturing sector. Using the 2015 and 2013 waves of the MSMEs survey, it analyses the mechanisms relating domestic certification to firm-level performance by simultaneously estimating the certification status and its impact on sales growth. The found evidence shows that, besides firm-level characteristics such as size and age, various factors related to institutional pressure significantly impact on the probability to have a domestic certificate. Results further show that the effect of having a domestic certificate on sales growth is positive and significant. Once operational and environmental improvements are controlled for, we observe a positive relationship between domestic

¹ These have become the two most successfully diffused international standard certificates, both in advanced and developing economies (Marimon Viadiu et al., 2006).

certification and sales growth, providing evidence of a signaling effect.

In addition to bringing the analysis to the level of domestic certification, this work contributes to the literature on certification in developing countries in various other ways. First, the proposed empirical approach attempts to separate the signaling effect of certification on firm growth from the effect of eventual certification-induced improvements in managerial and operational practices. Second, this analytical approach represents a novelty for Viet Nam: the existing contributions focus on the impact of the international certification on labor productivity (Calza et al., 2018; Trifković, 2016), work conditions (Trifković, 2017), environmental performance (Nguyen and Hens, 2015), or the living conditions of household enterprises (Hansen and Trifković, 2014), but no empirical work had yet investigated the role of domestically awarded certificates in fostering entrepreneurial growth in the country. In this respect, this paper provides new insights to the broader debate about the drivers of firm growth in Viet Nam, which has become an issue of great concern and policy relevance for the Government, as proved by the approval of the Law on Support for Small- and Medium-sized Enterprises in early June 2017. Considering that Vietnamese entrepreneurial firms tend to stagnate around small sizes (CIEM and ILSSA, 2016), a better understanding which factors foster entrepreneurial businesses dynamism could contribute to the design and implementation of policies supporting entrepreneurial activities and firms' transition into a larger scale. According to our findings domestic certification may represent a way to address sluggish entrepreneurial growth, thus serving entrepreneurial policy purposes. Third, the paper takes a gender perspective in investigating the signaling role of certification, acknowledging that while legislations may be fostering gender equality, attitudes and gender stereotypes may persist in society. Finally, the paper is one of the first to try to assess whether the effect of certification is persistent over time, hence whether new versus older certificates have a larger impact on firm dynamics.

The paper is structured as follows. Section 2 presents a review of the relevant empirical literature on the determinants and effects of standards and certification for firms in developing countries. Section 3 briefly describes the data used and provides some information on Vietnamese domestic certification. The model, the estimation strategy, and the description of the variables used are presented in Section 4. Section 5 presents the results of the empirical analysis, including robustness checks and a separate analysis for the effects of newly obtained *versus* older domestic certificates. Results are discussed in Section 6, followed by Section 7 that concludes with general considerations and policy implications.

2 Literature review

This section presents a review of the literature on the determinants and effects of certification on firms operating in a developing context. Most of this literature was developed around the family of international management system standard certificates (mainly ISO 14001 and ISO 90001). Given the absence of evidence on domestic certification, we focus on those contributions that may be relevant for the analysis of domestic certification.

2.1 The benefits of certification

One of the main benefits of having a certificate is the reduction of transaction costs, achieved by revealing quality and increasing a firm's legitimacy and reputation (Holleran et al., 1999; Potoski and Prakash, 2005; King et al., 2005). Certification contributes to reduce information asymmetry by allowing actors to communicate non-market information about process and product characteristics (e.g. quality, safety, environment, work conditions) in market transactions (CIEM and ILSSA, 2016) and by serving 'as signal of superior but unobservable attributes and thus provide a competitive benefit' (Terlaak and King, 2006, p.580). Certified firms can therefore obtain a competitive advantage, engage more easily in transactions, and enjoy larger sales. This increase in sales may be driven either by an increase in the quantity sold or - if firms are not price-takers - by higher prices due to the higher willingness to pay of consumers (pure certification premium) (Henson et al., 2011). Blind (2016) argues that certified firms may also enjoy larger markups if certification leads to a reduction in unit costs.

The literature has named this impact of standard certificates on sales as the *external effect* of standard certificates. This effect is complementary to an *internal effect* on firm's efficiency and productivity, which could take place as result of the implementation of internal operational, managerial, organizational, and environmental improvements (Sampaio et al., 2009; Delmas and Pekovic, 2013). Due to upward shifts in efficiency and productivity resulting from adjustments in operational performance, this *internal effect* of certification may therefore spur growth opportunities. A growing number recent of empirical studies has provided evidence of a positive *internal effect* for certified firms operating in developing and emerging countries (Goedhuys et al., 2017; Trifković, 2017; Calza et al., 2018; Javorcik and Sawada, 2018; Gallego and Gutierrez, 2017).

Various empirical studies analyzing the impact of international certificates indicate the presence of a positive *external effect* on sales and export driven by signaling (Potoski and Prakash, 2009; Clougherty and Grajek, 2014). This effect may be heterogeneous depending on some conditions and features, such as when the transaction costs are particularly high. This tends to be the case in emerging and developing countries (Jaffee and Masakure, 2005; Henson and Jaffee, 2006; Clougherty and Grajek, 2008; Masakure et al., 2009; Henson et al., 2011; Martincus et al., 2010; Goedhuys and Sleuwaegen, 2013). Since developing economy markets are typically characterized by lower efficiency, weaker selection, and higher information asymmetries, certificates may reduce uncertainty and compensate for these dysfunctional markets, enabling more frequent and more efficient transactions to take place. Moreover, developing countries suffer from reputation problem: as pointed out by Hudson and Jones (2003), they face greater difficulties in credibly signaling their quality to buyers in advanced economies, as consumers tend to infer the quality of the seller from the general reputation of the country of origin. The adoption of certificates may contribute to address this issue, thus representing a potential policy instrument to support the participation of less developed economies in the global trade (Blind et al., 2018).

Also at micro-level some firms may suffer from similar reputation issues, as a result of imperfect information. The study of female entrepreneurship shows how the presence of gender-based stereotypes in developing countries often implies a differential treatment for female entrepreneurs, such as unequal access to markets (Kantor, 2005), land and productive resources (UN Women and OHCHR, 2013), and financial assets².

² See Pham and Talavera (2018) for an overview of the literature review on gender discrimination and

The origin of this discrimination can be associated with the predominance of traditional gender roles, which feeds into what [Elam and Terjesen \(2010\)](#) define as ‘gendered cultural institutions’. In fact, since leadership is traditionally considered as a masculine activity, women that participate in business activities ‘present a ‘role incongruity wherein their gender identity and leader identity are a mismatch between gender stereotypes and the desirable leader characteristics’ ([Sharma and Tarp, 2018](#), p.11). This generates a perception of women in leadership roles as less qualified than men with similar characteristics, which makes it more difficult for them to have the quality of their management and their reliability recognized, resulting in higher barriers, transaction costs, and discrimination from market actors, but also from their same employees. In this regard, if we follow the argument of [King et al. \(2005\)](#) that certificates can contribute to reduce information asymmetry and enforce communication, certificates can represent an institutional response to these gender-led constraints, thus potentially providing larger benefits to female-run enterprises. We will formally test this hypothesis in the empirical analysis.

Also firms that are dealing with products, processes, and organizations characterized by intangible and unobservable features, thus difficult to be recognized and identified *a priori*, are likely to be affected by large transaction costs; thus, they could enjoy larger benefits from certification. Since the relevance of these intangible attributes varies across industries and individual firms, [Terlaak and King \(2006\)](#) argue that advertising allows to identify these actors, representing an alternative strategy to communicate about a firm’s intangible attributes and to overcome the uncertainty associated with unobservable quality ([Nelson, 1974](#)). Even if advertising reduces information asymmetries, still relevant transaction costs are likely to remain, especially regarding the quality of processes and organization, thus leaving room for certificates to serve as additional institutional devices and provide a competitive advantage. We will formally test also this in our analysis.

A still underinvestigated issue is the moderating effect of the ‘age’ of a certificate - that is, the time since a certificate has been obtained. The few studies that contribute to this emerging debate present rather ambiguous results. [Naveh and Marcus \(2005\)](#) find that the passage of time since certification leads to better performance. [Javorcik and Sawada \(2018\)](#) show that the signaling effect of certification is immediate in the case of sales and export, while it takes place with a delay in the case of labor productivity as a result operational improvements. In this respect, the passage of time may negatively affect the signaling function device if the information that these reveal is believed to have become obsolete. Newer certificates may also be associated with more demanding requirements, which could reflect into a perceived superior quality of new certificates.

2.2 The determinants of certificates

In this section we review various factors that the relevant empirical literature has identified as possible determinants of having a certificate. Certificate adoption has typically been modeled as a function of expected benefits and expected costs: firms may decide to become certified if they believe that the expected benefits from having a certificate would exceed the costs of successfully obtaining and maintaining the certificate. In the previous section we have already noticed how the reduction of information asymmetry is one of the main expected benefits from certification, and how

access to finance in a developing context.

more serious transaction costs may imply larger expected benefits. In the light of this consideration, facing higher than average transaction costs may positively influence also the decision to adopt and maintain a certificate; in other words, firms may find it more strategic to become certified when there is a large gap in information between them and their counterpart (King et al., 2005). This may be the case when firms operate in industries where capabilities and quality are hard to observe, such as in technology-intensive sectors (Terlaak and King, 2006), or when parties are physically, culturally and linguistically distant, as in the case of firms engaging in international trade through export or participation into global value chains (Potoski and Prakash, 2009). In this respect Clougherty and Grajek (2014) claim that certificates contribute to set a ‘common language’, thus facilitating communication and helping settle organizational disputes. The proposed empirical analysis also aims testing whether firms potentially facing higher transaction costs are also more likely to have a domestic certificate.

Moreover, since early 2000s a growing literature has emphasized the role of institutional pressure in affecting firms’ certification decision (Delmas, 2002; Liu et al., 2010; Delmas and Montes-Sancho, 2011; Fikru, 2014). According to the new institutional theory, actors can obtain legitimacy by explicitly conforming to some practices that are perceived as necessary or as ‘state-of-the-art’ among their peers. The non-compliance with these practices may imply a loss of reputation and not being considered as a legitimate actor (DiMaggio and Powell, 1983). This institutional pressure could take three different forms: coercive, normative, and mimetic (Scott, 1995). While normative pressure is associated with sector-level practices that are perceived as ‘the appropriate way to do things’ among peers (e.g. members of industries or business associations), coercive pressure may originate from the fear of repercussions from ‘a higher power’, such as international partners (e.g. foreign firms operating within the same value chain), or from costumers’ demand, activist associations, workers’ unions or inspections from the government (He et al., 2015). Mimetic pressure comes from looking at and imitating competitors and peers, or other actors perceived as desirable models. As showed by Delmas and Montiel (2008) and Liu et al. (2010), firms tend to imitate similar businesses in their corporate and environmental managerial practices.

Finally, firms also take into consideration the costs of getting and maintaining a certificate. These costs may include direct cost, such as the fees associated with the administrative procedures (Masakure et al., 2011), as well as the indirect costs of compliance with the certification requirements, such as the time and resources spent in generating the necessary documentation and in implementing changes such as workforce training and the improvement of workplace conditions (Goedhuys et al., 2017). Maskus et al. (2013) notice that cost of compliance are non-trivial, and that conforming to certification requirements may also lead to an increase in variable production costs. Firm characteristics influence how burdening these costs are. For small firms both direct and compliance costs may represent a serious obstacle to certification, while larger firms are more likely to enjoy larger resource endowments, on top of being able to take advantage of economies of scale to spread the costs of adoption (Hudson and Orviska, 2013). Fikru (2014) notices how older firms have broader networks and more experience, which enable them to recognize better and faster the potential benefits of being certified.

Certification costs may turn out to be particularly cumbersome for firm operating in a developing country (Maskus et al., 2005). Here firms tend to not only be small and more resource-constrained, but they may also lag behind in terms of capabilities: even if most certificates set a basic level in terms of quality and safety of procedures and

products, their implementation still pose various challenges to firms that operate with a lower stock of knowledge and far away from organizational best practices, making the certification process relatively more costly (Zoo et al., 2017). In line with the presented literature, we identify the costs of certification as another factor potentially affecting the certification decision; moreover, we argue that firms facing larger indirect certification costs, such as less endowed firms (e.g. smaller and younger), are less likely to have a domestic certificate.

3 Data

The data used in the present study come from the 2013 and 2015 rounds of the Small and Medium Scale Manufacturing Enterprise (MSMEs) survey³ conducted every second year since 2005 to assess the characteristics of the Vietnamese business environment. The survey covers 10 provinces (Ho Chi Minh City (HCMC), Hanoi, Hai Phong, Long An, Ha Tay, Quang Nam, Phu Tho, Nghe An, Khanh Hoa, and Lam Dong). The first 2005 survey was representative at province level, and the random sample was stratified by ownership type to include: household establishments, private enterprises, collectives or cooperatives, and limited liability and joint stock companies.

The survey targets firms active in manufacturing sectors with fewer than 300 employees. Firms that operate in agriculture or with the participation of foreign or state capital are excluded from the analysis to allow for a more homogeneous sample of domestically private owned MSMEs. We also exclude 88 observations that correspond to self-employed and businesses with only one full-time employee in 2013. After removing missing values, we remain with a balanced sample of 1,934 enterprises that participated in both 2013 and 2015 survey waves.

Since its beginning the survey has collected data about a large range of enterprise features and practices, including information on having a national environmental standard certificate ('Certificate for registration of satisfaction of environmental standards' (ESC)) and the implementation of treatments to factors affecting the environment (e.g. air quality, fire, heat, lighting, waste disposal, water pollution, soil pollution). Only the 2015 survey incorporates for the first time questions about quality certificates recognized only domestically (including, among others, Food Safety certificates, national quality certificates to Vietnamese standard (TCVN), or Vietnamese High-Quality Goods certificates), covering also unique information such as the year and the approximate direct costs of adoption of the certificate. Both national environmental standard certificates (ESC) and domestic quality certificates (QC) fall in the category of domestic certificates - thus, certification that are awarded by national organizations and agencies, and are recognized only in Viet Nam -, which constitutes the main focus of this work.

The first quality certificate (QC) in Viet Nam was developed in 1963. The legislation regulating and enforcing the adoption of certificates - the Law on Standards and Technical Regulations (2007) - has been in place only for the past decade, following the country's accession to the WTO in 2007. The Law distinguishes between technical regulations

³ The survey has been conducted in collaboration between the Central Institute for Economic Management (CIEM) of the Ministry of Planning and Investment of Vietnam (MPI), the Institute of Labor Science and Social Affairs (ILSSA) of the Ministry of Labor, Invalids and Social Affairs of Vietnam (MOLISA), the Development Economics Research Group (DERG) of the University of Copenhagen, and the United Nations University World Institute for Development Economics Research (UNU-WIDER). For more information about the survey and data see [CIEM and ILSSA \(2016\)](#).

(national and local) and national standards: technical regulations are sector-specific (e.g. setting the percentage of fat allowed in pasteurized milk), mandatory, and line ministries are responsible for their development and implementation; national certified standards, instead, set technical standards for product conformity and quality, their adoption being on a voluntary basis, even if industry-specific regulations may foster the diffusion of some certificates (e.g HACCP and GlobalGAP for food and agricultural products). The Law also identifies the Ministry of Science and Technology as the responsible agency for preparing, issuing and managing quality certificates, through its Directorate for Standards, Metrology and Quality of Vietnam (STAMEQ)⁴.

The national environmental standard certificates (ESC) are regulated by the 2005 Law on Environmental Protection, whose implementation is governed by Decree 80/2006 and Decree 29/2011. The Ministry of Natural Resources and Environment awards the certificate to enterprises performing some particularly polluting activities (as defined by the Decree 29/2011), following the submission of an Environmental Impact Assessment (EIA) report describing the pollution and environmental control initiatives to be implemented. Every firm can opt for applying to an ESC as alternative to sign an environmental protection commitment letter (CIEM and ILSSA, 2016). Despite this regulation, in practice the diffusion of domestic environmental standards in Viet Nam is still scarce.

Table 1 reports the composition of Vietnamese domestic certificates in the considered sample. Around 24.6 per cent of firms have at least one domestic certificate at the time of the last survey in 2015, with 14 per cent having a quality certificate, 15 per cent an environmental certificate, and 4.5 per cent both. These are relatively large shares when compared with those for international standard certificates (e.g. ISO 9001 and ISO 14001), which does not reach 5 per cent of the considered sample in 2015. Approximately one third of domestic certificates have been acquired since the last survey in 2013.

Table 1: Number and proportion of firms with a domestic certificate (2015)

Certificate	Number	%
Domestic certificates (total)	475	24.56
<i>of which New</i>	143	30.10
Quality certificates (QC)	271	14.01
<i>of which New</i>	67	24.72
Environmental standard certificates (ESC)	291	15.05
<i>of which New</i>	81	27.84
QC and ESC	87	4.50
Observations	1934	100

Note(s): A certificate is considered to be ‘new’ when it has been acquired since the last survey wave in 2013.

Table 2 shows the allocation of domestic certificates by type, sector and province. Hosting almost 1/4 of certified firms, the province of HCMC presents the highest absolute number of domestic certificates (with 120 ESC and 73 QC). More than 50 per cent of firms with a domestic certificate operate in the sector ‘Food and Beverages’; this is not

⁴ For more information on quality certificates in Viet Nam, see the website the Directorate for Standards and Quality (www.tcvn.gov.vn). See also Section 9 of CIEM and ILSSA (2016) for a more complete discussion on the topic.

surprising when considering that 2/3 of domestic certificates correspond indeed to Food Safety certificates.

Table 2: Number and proportion of firms with a domestic certificate by province and sector (2015)

	QC		ESC	
	#	%	#	%
<i>Province</i>				
Ha Noi	27	12.05	36	16.07
Phu Tho	9	4.81	12	6.45
Ha Tay	29	10.03	16	5.57
Hai Phong	13	8.44	30	19.48
Nghe An	20	8.89	27	12.05
Quang Nam	24	17.65	8	5.93
Khanh Hoa	20	27.40	13	18.06
Lam Dong	32	42.11	17	22.67
HCMC	73	15.30	120	25.42
Long An	26	24.76	12	11.43
<i>Sector</i>				
Food and beverages	207	32.91	80	12.72
Textiles	3	4.92	11	18.03
Apparel	2	2.17	12	13.04
Leather	2	5.13	6	15.38
Wood	5	2.26	12	5.43
Paper	5	10.64	18	38.3
Publishing and printing	1	1.72	10	17.24
Chemical products	4	9.52	16	38.1
Rubber	9	7.63	36	30.51
Non-metallic mineral	9	10.59	21	24.71
Basic metals	2	9.52	7	33.33
Fabricated metal products	9	2.74	31	9.45
Electronic machinery	9	18.75	10	20.83
Vehicles and transport equipment	0	0	5	31.25
Furniture and jewelry	4	3.1	16	12.4
Services	0	0.00	0	0.00
Total certificates	271	14.01	291	15.05
Observations	1934			

Note(s): The percentages refers to proportion of firms with a QC or ESC in each respective province or sector.

4 Empirical approach

4.1 Empirical model and variables

Considering the sets of factors identified in the literature review (Section 2), we use a probit equation to model the probability of a firm j having a domestic certificate in 2015, assuming the following underlying relationship:

$$DC_{jt}^* = \mathbf{w}_{jt}\gamma + u_{jt} \quad (1)$$

where DC_{jt}^* is the latent variable underlying the dichotomous response of having a domestic certificate, which depends on the vector of explanatory variables \mathbf{w}_{jt} . The

error term u_{j_t} is assumed to be normally distributed ($u_{j_t} \sim N(0, 1)$). We only observe the binary outcome as:

$$DC_{j_t}^{probit} = \begin{cases} 1 & \text{if } DC_{j_t}^* = \mathbf{w}_{j_t} \gamma + u_{j_t} > 0 \\ 0 & \text{otherwise} \end{cases} \quad (2)$$

where the dependent variable $DC_{j_t}^{probit}$ is a variable which takes the value 1 if the firm has a domestic certificate in 2015 (and 0 otherwise)⁵. The vector \mathbf{w}_{j_t} contains three groups of explanatory variables that are likely to affect the probability to have a domestic certificate. First, \mathbf{w}_{j_t1} includes factors related to the costs of certification and to a firm's resource endowments, accounting for the ability to undertake the expenses for adopting and implementing a certificate: the average province-sector cost of a domestic quality certificate (*Cost of domestic quality certificate*)⁶, *Employment* (to proxy for firm size), *Firm age*, and a set of binary variables for ownership and for having received governmental financial assistance during the previous year (*Fin. assistance*).

Second, we introduce a set of factors related to the magnitude of transaction costs (\mathbf{w}_{j_t2}). In line with the arguments that the collection of information may be more costly and challenging if actors are physically distant and/or operating with a foreign buyer, the vector of explanatory variable \mathbf{w}_{j_t2} includes the distance from the main customer (*Distance*) and a dummy for having exported in the previous period (*Export*). The inclusion of sector dummies also allows to control for eventual intra-industry differences in information asymmetry, technological complexity and certification practices.

Third, the vector \mathbf{w}_{j_t3} contains proxies for institutional pressure. The variables *Certification required by customers* and *Trade union* account for coercive pressure from customers and workers. Following Fikru (2014), we include the variable *Inspection* to control for the burden of red tape, which may make it more convenient for firms to have a certificate showing proof of complying with more than governmental regulations. Moreover, considering that provinces enjoy a certain autonomy in the implementation of policies and regulations (Nguyen et al., 2007), we control for firm location⁷. Normative pressure is accounted for with the variables *Labor code* and *Business association*. For mimetic pressure, we identify some factors that may facilitate the access to relevant information about certificates: the district-level share of firms having a domestic certificate in or before 2013 (*Neighbor certificates*), which is similar to what used by Hansen and Trifković (2014) to account for a possible 'network effect' in information diffusion; and the variable *Internet* (Fikru, 2014).

Our main interest lies in the effect of domestic certificates on firm sales growth. We test whether having a domestic certificate has a significant effect on the expansion of sales by acting as signaling device for quality and other unobservable attributes. We

⁵ Although the two types of certificates included in this variable may differ in terms of their final aim - ranging from quality and technical features of products, to the environmental sustainability of firm activities - , we analyze them as a common category. This is in line with the empirical literature, where a single variable is often used for different certificates given the similarities in terms of benefits, costs of compliance, and other factors possibly driving the certification decision (Marimon Viadiu et al., 2006; Goedhuys and Sleuwaegen, 2013).

⁶ Since the information about the cost of domestic quality certification is provided only by firms that declared to have a domestic certificate, we use the average cost at province-sector 4-digit level to proxy the direct costs of certification that firms in the same sectors and same administrative level could face (in case of missing, we use averages by province and sector 2-digit).

⁷ When not differently specified, we use province dummies to control for firm location.

believe this effect to be directly driven by the market reaction to certification, and that it persists even after controlling for improvements in firm's operational, organizational and environmental performance (Terlaak and King, 2006; Goedhuys and Sleuwaegen, 2013). We therefore model sales growth (SG_{jt}) as follows:

$$\begin{aligned}
SG_{jt} = \ln(S_{jt}/S_{jt-2})/2 = & b_0 + b_1 DC_{jt} + \\
& b_2 \ln(Age_{jt}) + b_3 \ln(S_{jt-2}) + b_4 [\ln(S_{jt-2})]^2 + \\
& b_5 Inn_{jt} + b_6 OI_{jt} + b_7 Z_{jt} + e_{jt}
\end{aligned} \tag{3}$$

where the dependent variable SG_{jt} denotes annual average sales growth of firm j in time t , expressed as logarithmic difference of the revenues from sales of firm j between time $(t - 2)$ (2013) and t (2015). The independent variable *Domestic certificate* (DC_{jt}) is our main variable of interest. In order to isolate the signaling effect of the certificate, we account also for the gains in efficiency eventually resulting from the implementation of certification requirements by adding a group of factors related to operational and environmental practices (OI_{jt}): a set of dummy variables (*Fire*, *Air*, *Waste*, *Other*) that take the value one if the firm reports to have implemented environmental improvement procedures (irrespective of whether it has certified for it), such as the installation of health and safety measures; and a dummy variable that takes the value of one if the firm provide training to workers (*Training*). This approach is similar to what proposed by Terlaak and King (2006) in their plant-level analysis, who use a measure of scrap generation to approximate the operational performance. In line with the model of passive learning by Jovanovic (1982), equation 3 also contains conventional drivers of growth, such as the age of the firm j in time t (Age_{jt}) and firm size and its squared term. The presence of technology-related variables such as *Innovation* (Inn_{jt}) is in line with the active learning models Ericson and Pakes (1995). Sector and location control variables (Z_{jt}) are always included.

We also examine whether the signaling effect of certification may vary depending on the intensity of imperfect information. We have already discussed how having a female entrepreneur and having advertised a product can reveal the presence of higher transaction costs, and thus of potentially larger benefits from signaling. To test the effect of domestic certificates on the growth of female-run businesses, we introduce in equation 3 an interaction term between the main independent variable DC_{jt} and a dummy that takes the value of 1 if the firm is headed by a woman (*Female*). Alternatively, we also interact DC_{jt} with a dummy that takes the value of 1 if the firm advertised its products (*Advertise*). Equation 3 can then be rewritten as follows:

$$\begin{aligned}
SG_{jt} = \ln(S_{jt}/S_{jt-2})/2 = & b_0 + b_1 DC_{jt} + \\
& b_2 \ln(Age_{jt}) + b_3 \ln(S_{jt-2}) + b_4 [\ln(S_{jt-1})]^2 + \\
& b_5 OI_{jt} + b_6 Inn_{jt} + b_7 Z_{jt} + \\
& b_8 DC_{jt} * Advertise/Female_{jt} + b_9 Advertise/Female_{jt} + e_{jt}
\end{aligned} \tag{4}$$

Table 3 presents the definition of the variables employed in the empirical analysis. Their summary statistics (mean, standard deviation, minimum and maximum values) are reported in the last four columns.

Table 3: Variables definitions and summary statistics

Variable	Description of variables used in the empirical analysis	Av.	SD	Min	Max
<i>Main variables of interest</i>					
Domestic certificate (DC_{jt})	= 1 if firm has a domestic quality standard certificate (QC) or an environmental standard certificate in 2015 (ESC).	0.25	0.43	0	1
Sales growth (SG_{jt})	Average annual real growth of revenues of sales, calculated as the difference in the logarithmic values of real revenues between 2012 and 2014 divided by 2.	0.00	0.38	-2.33	1.69
Revenues (log, lagged)	Real revenues from sales in million VND, in log, lagged. Nominal sales are deflated using the Vietnamese GDP deflator (base year 2010) provided by the World Bank Development Indicators.	6.80	1.54	2.19	12.27
Revenues (million VND, lagged)		6589.11	20780.99	16.14	385011.78
<i>Cost and firm-level characteristics ($W_{jt,1}$)</i>					
Employment (log, lagged)	Employment, measured by number of full-time regular workers plus the number of part-time regular workers weighed 0.6, in log, lagged.	1.86	1.05	0.47	5.58
Employment (regular employees, lagged)		13.16	24.47	1.60	266.00
Firm age (log)	Age of firm, in log.	2.72	0.53	0.69	4.11
Firm age (years)		17.49	9.92	2.00	61.00
<i>Ownership type</i>					
Household	= 1 if firm is a household or private sole proprietorship enterprise.	0.72	0.45	0	1
Partnership and collective	= 1 if firm is a partnership or collective enterprise.	0.02	0.15	0	1
LSC	= 1 if firm is a limited liability company or a joint stock company.	0.25	0.44	0	1
Cost of domestic quality certificate (log)	Average of the cost of domestic quality certificate, by province and sector 4-digit, in log.	15.31	1.43	10.82	17.73
Cost of domestic quality certificate (thousand VND)		8778.87	9271.28	50	50000
Fin. Assistance (lagged)	= 1 if firm has received governmental financial assistance, lagged.	0.10	0.31	0	1
<i>Transaction costs ($W_{jt,2}$)</i>					
Distance from customer (log)	Distance in km from the main customer, in log.	2.26	1.57	-4.61	8.70
Distance from costumers (km)		40.23	191.77	0.01	6000
Export (lagged)	= 1 if firm exports, direct or indirect (lagged).	0.06	0.24	0	1
<i>Institutional pressure ($W_{jt,3}$)</i>					
Local trade union	= 1 if firm has a local trade union.	0.12	0.32	0	1
Inspected	= 1 if firm has been inspected during the previous year.	0.38	0.49	0	1
Certification required by customers	= 1 if firm declare that costumers would require a certification (of any kind).	0.09	0.28	0	1
Business association	= 1 if firm is member of a business association.	0.08	0.27	0	1
Neighbor certificates (share)	Share of firms with a domestic certificate (excluding the observed firm) in or before 2013, by district.	0.16	0.11	0	1
Labor code	= 1 if firm has a good or average knowledge of the labor code.	0.33	0.47	0	1
Internet	= 1 if firm has Internet connection.	0.42	0.49	0	1
Website	= 1 if firm has a website.	0.11	0.31	0	1
<i>Operational improvements and innovation</i>					
(OI_{jt} and INN_{jt})		0.16	0.36	0	1
Innovation	= 1 if firm has introduced a product improvement or a process innovation since last survey.	0.06	0.24	0	1
Training	= 1 if firm provides training to workers				
<i>Environmental treatments:</i>					
Fire	= 1 if firm treats for fire control.	0.37	0.48	0	1
Air	= 1 if firm treats for air control.	0.06	0.24	0	1
Waste	= 1 if firm treats for waste control.	0.10	0.30	0	1
Other	= 1 if firm treats for other environmental controls (water, soil pollution, noise, lightning, etc.).	0.34	0.48	0	1
<i>Other variables</i>					
Female respondent	= 1 if the respondent (manager or owner) is female.	0.41	0.49	0	1
Advertise (lagged)	= 1 if the firm advertise its products (lagged).	0.13	0.34	0	1
Sector	Food, beverages and tobacco; Apparel and textile; Paper and wood; Chemicals and rubber; Metals, electronics and vehicles;				
Province	Others (furniture, musical instruments, recycling, etc.)				
Region	Ha Noi, HCMC, Hai Phong, Ha Tay, Long An, Phu Tho, Quang Nam, Nghe An, Khanh Hoa, Lam Dong.				
	Red River Delta, Northern midlands, North-central and coastal areas, Central highlands, Mekong River Delta.				
Observations					1934

Note(s): Values (in t) for employment and revenues refer to the end of 2014 (the year previous to the 2015 survey round). Lagged values (in $t-1$) refer to the end of 2012.

4.2 Estimation strategy

The empirical investigation of the effects of domestic certificates on sales growth poses a series of methodological issues. The main concern arises from selection, since certificates are likely not to be randomly assigned. This may be associated also with reverse causality, if fast-growing firms tend to select into domestic certification.

To obtain consistent estimations of the parameters of interest we propose a simultaneous estimation of the equations for sales growth and for the probability of having a domestic certificate as a recursive mixed-process model⁸. This approach allows to address endogeneity under the condition that the model is correctly specified, meaning that at least one (or more) of the covariates in the certification equation fulfills the exclusion restrictions, and thus it significantly affects the endogenous variable (*Domestic certificate*) but not the outcome variable (*Sales growth*). In the absence of these instruments, the derived results are based on (not testable) distributional assumptions about the residuals, rather than upon the variation in the explanatory variables (Sartori, 2003). We identify three variables that fulfill the exclusion restrictions and that can thus serve the purpose of identification⁹: *Cost of domestic quality certificate*, *Trade union*, and *Certification required by costumers*. To further test the validity of the instruments and as additional robustness check we implement an IV 2SLS estimation for sales growth, where the three mentioned covariates are used as instruments in a first-stage equation for domestic certification. The validity of the instruments is confirmed by the results of the conventional tests for instruments validity, which are reported in Table 10 in the Appendix.

The proposed estimation strategy addresses the issue of selection on observables but cannot do much to account for bias due to unobservables. The application of panel data techniques could solve this problem. Unfortunately our main variable of interest (*Domestic certificate*) is available only for the last wave of the MSMEs survey in 2015. To control as much as the data allow for individual heterogeneity we propose a rather complete specification for domestic certification, including various lagged variables to control for a larger number of observable factors.

We also implement various checks to verify the robustness of our findings. We start by examining the sensitivity of our results to the presence of outliers. We implement two alternative robust-to-outliers approaches: first, we identify outliers on the basis of discrepancy and/or leverage (Verardi and Croux, 2009) and estimate the model excluding these ‘anomalous observations’ from the sample; second, we perform a robust regression using Huber M-estimator (Huber, 1964). The implementation of this estimator uses standardized residuals and an iteratively reweighed least squares algorithm, which assigns a weight zero to the observations associated with a Cook’s distance statistic larger than the value 1.

Finally, we complement our empirical analysis with propensity score matching (PSM) techniques to estimate the average effect average treatment effect on the treated (ATE) when the selection into the treatment is not random. In our case the treatment corresponds to having a domestic certificate, while sales growth is the outcome variable upon which the treatment’s effect is assessed.

⁸ We estimate the model by implementing the `cmp` STATA command proposed by Roodman (2009).

⁹ Since we introduce an interaction term to test the heterogeneity of the signaling effect of *Domestic certificate*, the full model contains two endogenous variables (*Domestic certificate* and its interaction with *Female* or, alternatively, *Advertise*). We then need at least two variables to fulfill the exclusion restrictions.

5 Results

5.1 The determinants of domestic certificates

The results of the probit model for domestic certification are shown in Table 4 (marginal effects reported)¹⁰. Column (1) presents the estimations of an individual probit model, while column (2) shows the results of the simultaneous estimation of the probit for certificates together with the sales growth equation.

The direct cost of the certificate impacts negatively and significantly on the likelihood of having a domestic certificate: a doubling in the cost induces a decrease of approximately 2 percentage points in the probability of having a domestic certificate, all else being equal. This effect is of the same sign but of smaller magnitude than what found by Masakure et al. (2011) in the case of international standard certificates. In line with both theoretical and empirical studies on firm-level determinants of certification, larger and older firms are more likely to have a domestic certificate: a doubling in firm employment, from the average of 13 to 26 employees, increases the probability of having a domestic certificate by 6 percentage points, while doubling the number of years in activity rises this probability by approximately 4 percentage points. These results are similar to what found by Gebreeyesus (2015) in the case of the Ethiopian floriculture sector, but of a smaller order of magnitude. The binary variable for having received governmental financial assistance in the past is not significant; this result suggests that the barriers to obtaining a certificate may not only be financial in nature, and that having built up over time capabilities, knowledge, and networks may better help in reducing compliance costs and foster certification (Fikru, 2014). Overall, we find evidence that the direct cost of a domestic quality certificate, as well as indirect costs-enhancing firm characteristics, significantly affect the probability of having a domestic certificate.

We also find positive, even though weaker, empirical evidence in support of the hypothesis that higher transaction costs affect the decision to adopt and maintain a domestic certificate. In the simultaneous estimation (column 2) the coefficient of distance from customers is positive and significant (even if only at 10 per cent), pointing towards a positive effect of more remotely located costumers, this accounting for a possibly larger information asymmetry. The coefficient of the variable *Export* is not significant: differently from what often found in the case of international certificates, having a domestic certificate does not seem to be attractive for - nor needed by - firms operating in international markets.

We find that the factors related to institutional pressure significantly influence the likelihood to have a domestic certificate. Firms with a *Trade union* and more demanding costumers have a higher probability to have a domestic certificate, respectively of 6 and 28.6 percentage points. Having been inspected also rises the likelihood of certification by 6.6 percentage points. Regarding normative pressure, a good knowledge of the labor code an increase by almost 4 percentage points, while being member of a business association does not have any effect on certification decision. We find a positive ‘network effect’ associated with the share of certified firms within the same district. Also the possibility to obtain more and better information about domestic certification through Internet induces an increase of more than 9 percentage points in the probability of having a domestic certificate. We also test whether we find the same result substituting *Internet* with a binary variable for having a website (*Website*) (results are reported in Table 9 in

¹⁰ The corresponding probit coefficients are reported in the Appendix in Table 9.

Appendix). The fact the coefficient of *Website* turns out to be not significant allows us to argue that the effect of *Internet* is indeed directly associated with an improved access to information, rather than with a better connection with business and market contacts. In sum, our results about the effect of institutional pressure on certification decisions are consistent with what observed by some authors, that firms in developing countries are becoming increasingly aware of the importance of their environmental performance and tend to behave pro-actively and more responsibly, even beyond minimum compliance (Fikru, 2014; Liu et al., 2010).

Table 4: Determinants of domestic certificates: marginal effects

Dep. variable: domestic certificate	(1) Probit	(2) Probit SE
<i>Cost and firm-level characteristics</i>		
Cost of domestic quality certificate (log)	-0.022*** (0.007)	-0.021*** (0.007)
Employment (log, lagged)	0.055*** (0.012)	0.060*** (0.011)
Firm age (log)	0.038** (0.015)	0.040*** (0.015)
Partnership and collective	0.031 (0.052)	0.033 (0.050)
LSC	0.063*** (0.024)	0.057** (0.025)
Fin. Assistance (lagged)	0.017 (0.025)	0.017 (0.023)
<i>Transaction costs</i>		
Distance from customer (log)	0.005 (0.005)	0.008* (0.005)
Export (lagged)	0.010 (0.035)	-0.003 (0.031)
<i>Institutional pressure</i>		
Neighbor certificates (share)	0.253*** (0.080)	0.210*** (0.080)
Business Association	0.031 (0.030)	0.030 (0.029)
Local trade union	0.060** (0.029)	0.062** (0.026)
Inspected	0.058*** (0.016)	0.066*** (0.016)
Certification required by customers	0.301*** (0.028)	0.286*** (0.027)
Internet	0.098*** (0.022)	0.093*** (0.022)
Labor code	0.026 (0.018)	0.039** (0.018)
Sector	Yes	Yes
Location	Yes	Yes
Obs.	1933	1933

Standard errors in parentheses
*p<0.10 **p<0.05 ***p<0.01

Note(s): Average partial effects (APEs) are reported. Location is accounted for with region dummies, due to the presence of a sector-province level variable. The probit coefficients are reported in Appendix in Table 9.

5.2 The drivers of sales growth

5.2.1 The effect of domestic certificates

Table 5 presents the results of the sales growth equation. Columns (1)-(2) report the OLS results (with robust standard errors), as reference. Given the possible endogeneity, we focus our comments on the results obtained with the simultaneous estimation, reported in columns (3)-(7).

In all models we find evidence that smaller and younger firms experience larger sales growth, on average and controlling for other firm characteristics (such as ownership). In the baseline specification (column (3)), the main independent variable *Domestic certificate* presents a positive and significant coefficient: having a domestic certificate increases annual average sales growth by 36 per cent, on average and all the rest being equal. The fact that this coefficient becomes larger when endogeneity is controlled for indicates the presence of a downward bias, probably due to omitted variables that affect growth and certification in the opposite direction¹¹. This may be the case if firms with decreasing sales decide to get certified to try to reignite their performance (Trifković, 2017).

In column (4) we introduce more variables to account for the operational and environmental improvements that could affect efficiency and productivity, and ultimately also trigger an increase in sales. Controlling for this effect, we interpret the obtained coefficient of *Domestic certificate* as capturing the residual ‘signaling’ growth premium for certified firms as result of costumers’ reaction to certification. We further refine the specification by adding the variables *Internet*, *Advertise*, and *Export*, which might also play an independent role in fostering sales growth. After adding these variables, having a domestic certificate induces, on average, a 23 per cent increase in annual average sales growth, increase that we associate with the signaling effect of certification. The found effect is slightly larger than the average annual growth premium reported by Goedhuys and Sleuwaegen (2013) for internationally recognized certificates once productivity gains have been accounted for (around 20 per cent).

To test whether the effect of having a domestic certificate varies depending on faced transaction costs, we interact the variable *Domestic certificate* with the dummy variable *Advertise* (column (6)) and *Female respondent* (column (7)). Consistent with what was found by Terlaak and King (2006), the interaction term with *Advertise* is significant and positive, revealing the presence of a larger growth ‘premium’ from certification for firms that have also advertised to mitigate information asymmetry. The interaction term with *Female respondent* is also positive and significant (column (7)). This result is particularly interesting: even if there is no evidence of a direct effect of gender on sales growth (column (5)), female-run enterprises gain significantly larger benefits from being certified, possibly due to the higher transaction costs that female-run businesses face in accessing markets and to the difficulty of raising trust about their quality. This result support the argument that these conditions still limit women’s empowerment in business in Viet Nam, as recognized by World Bank (2017a).

To explore the domestic certification-growth link in more detail, we implement some additional variations to the main model. First, we calculated the marginal effect by quartiles of the firm size (lagged sales) distribution. We find a positive and significant marginal effect of domestic certification in each quartile, proving that domestic certificates are effective growth drivers even among micro and smaller firms, and that not only for

¹¹ This is also confirmed by the negative correlation between the error terms of the two equations, as showed by the negative and significant *rho* coefficients reported at the bottom of Table 5

relatively larger ones. Second, we test the independent effect of the two different types of domestic certificates considered - ESC and QC - by estimating separate models with different probit equations for each type of certification (using the same covariates as in the original model). The positive effect on sales growth remains, being it stronger for ESC than for QC¹².

5.2.2 Robustness checks

a) Robust regressions

We performed additional robustness checks to verify the soundness of the presented findings. We first examined the sensitivity of the above results to the presence of outliers. These atypical observations can be detected according to different criteria, such as discrepancy and/or leverage. Discrepancy corresponds to the difference between the predicted and the observed dependent variable, and thus gives an idea of ‘vertical outlyingness’ with respect to the regression plane. Standardized and studentized residuals with a value exceeding a set threshold can be used to detect ‘atypical’ observations by discrepancy. Leverage corresponds to the case when an extreme value of the dependent variable is paired with a non-average value of the independent variables, thus outlying in the space of explanatory variables and representing a measure of ‘horizontal outlyingness’. It can be measured using Mahalanobis distance. Finally, observations with both high leverage and high discrepancy, that are ‘outlying in the space of explanatory variables and located far from the true regression line’ (Verardi and Croux, 2009, p.3), represent ‘bad leverage’ points that can be detected using Cook’s distance.

Once identified, we exclude the outliers from the considered sample and re-estimate the original sales growth models, both with OLS and simultaneous estimations (SE). Results are reported in Table 6 (for convenience, columns (1) and (6) displays the original results for OLS and SE on the full sample). Columns (2) and (7) present the results when outliers identified by discrepancy; here standardized residuals are larger than $|3|$ have been excluded from the sample. In columns (3) and (8) we remove the observations with excessive leverage, thus characterized by large Mahalanobis distances. In columns (4) and (9) we eliminate the ‘bad leverage points’, identified as the observations presenting a value of Cook’s distance greater than $4/N$. As further check, we implement a robust regression employing the Huber M-estimator (column (5)). This latter estimation method does not eliminate outliers, but limits their influence on the parameter estimates by reducing their weight in the estimation.

In the robust-to-outliers models the coefficient of *Domestic certificate* is positive and significant in all specifications; however, its magnitude is smaller than in the original model including outliers. Looking at the SE estimations, having a domestic certificate now implies a significant sales growth premium between 11 and 17 per cent. Considering the persistently positive evidence of the effect of *Domestic certificate* across different robust-to-outliers estimation methods, we conclude that the findings of the previously presented empirical analysis are robust.

¹² Given the high correlation between the two variables, we still preferred to use the aggregate domestic certificate variable.

Table 5: Sales growth: main drivers

Dep. variable: sales growth	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	OLS	OLS	SE	SE	SE	SE	SE
Domestic certificate	0.095*** (0.022)	0.060*** (0.022)	0.306*** (0.037)	0.208*** (0.044)	0.209*** (0.044)	0.177*** (0.045)	0.166*** (0.049)
Revenues (log, lagged)	-0.227*** (0.047)	-0.211*** (0.047)	-0.206*** (0.037)	-0.198*** (0.037)	-0.194*** (0.037)	-0.188*** (0.037)	-0.194*** (0.037)
Revenues(log, lagged), sq	0.009*** (0.003)	0.006* (0.003)	0.006** (0.003)	0.004* (0.003)	0.004 (0.003)	0.004 (0.003)	0.004 (0.003)
Firm age (log)	-0.048*** (0.016)	-0.031* (0.016)	-0.057*** (0.017)	-0.039** (0.016)	-0.040** (0.016)	-0.039** (0.016)	-0.040** (0.016)
Partnership and collective	0.234*** (0.060)	0.181*** (0.061)	0.201*** (0.057)	0.167*** (0.056)	0.168*** (0.056)	0.176*** (0.056)	0.170*** (0.056)
LSC	0.205*** (0.027)	0.142*** (0.027)	0.166*** (0.025)	0.126*** (0.026)	0.123*** (0.026)	0.128*** (0.026)	0.124*** (0.026)
Innovation		0.098*** (0.023)		0.091*** (0.023)	0.091*** (0.023)	0.089*** (0.023)	0.091*** (0.023)
Training for existing workers		0.052 (0.039)		0.036 (0.035)	0.037 (0.035)	0.031 (0.035)	0.038 (0.035)
Internet		0.098*** (0.022)		0.079*** (0.023)	0.077*** (0.023)	0.084*** (0.023)	0.079*** (0.023)
Fire		0.060*** (0.023)		0.056** (0.023)	0.055** (0.023)	0.056** (0.023)	0.057** (0.023)
Air		0.097*** (0.036)		0.093*** (0.034)	0.093*** (0.034)	0.094*** (0.034)	0.091*** (0.034)
Waste		0.069** (0.028)		0.064** (0.029)	0.065** (0.029)	0.062** (0.029)	0.065** (0.029)
Other		-0.013 (0.021)		-0.016 (0.020)	-0.016 (0.020)	-0.015 (0.020)	-0.017 (0.020)
Export (lagged)		0.046 (0.039)		0.043 (0.036)	0.044 (0.036)	0.043 (0.036)	0.046 (0.036)
Advertise (lagged)		0.067** (0.028)		0.059** (0.026)	0.059** (0.026)	0.000 (0.034)	0.059** (0.026)
Female respondent					0.017 (0.017)		-0.004 (0.020)
DC* Advertise (lagged)						0.137*** (0.049)	
DC* Female respondent							0.076** (0.037)
Constant	1.101*** (0.173)	1.047*** (0.173)	1.040*** (0.148)	1.010*** (0.146)	0.994*** (0.147)	0.983*** (0.146)	1.004*** (0.147)
Sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Insig_2			-1.015*** (0.018)	-1.050*** (0.018)	-1.050*** (0.018)	-1.053*** (0.018)	-1.052*** (0.018)
atanhrho_12			-0.441*** (0.067)	-0.298*** (0.079)	-0.301*** (0.079)	-0.287*** (0.079)	-0.292*** (0.080)
Obs.	1933	1933	1933	1933	1933	1933	1933
df_m	20	29	44	53	54	54	55
r2_a	0.12	0.16					

Standard errors in parentheses

*p<0.10 **p<0.05 ***p<0.01

Table 6: Sales growth: robust regressions

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)		
Dep. variable: sales growth	OLS		OLS		OLS		OLS		Robreg		SE		SE		SE		SE		
Domestic certificate	0.060*** (0.022)	0.046** (0.020)	0.059** (0.024)	0.033** (0.015)	0.031** (0.016)	0.208*** (0.044)	0.141*** (0.044)	0.163*** (0.051)	0.104** (0.045)										
Revenues (log, lagged)	-0.211*** (0.047)	-0.216*** (0.042)	-0.226*** (0.062)	-0.198*** (0.031)	-0.203*** (0.039)	-0.198*** (0.037)	-0.207*** (0.033)	-0.213*** (0.057)	-0.191*** (0.030)										
Revenues(log, lagged), sq	0.006* (0.003)	0.007** (0.003)	0.007 (0.005)	0.007*** (0.002)	0.008*** (0.003)	0.004* (0.003)	0.006** (0.002)	0.005 (0.004)	0.006*** (0.002)										
Firm age(log)	-0.031* (0.016)	-0.030** (0.015)	-0.003 (0.018)	-0.023* (0.013)	-0.022* (0.013)	-0.039** (0.016)	-0.036** (0.015)	-0.007 (0.018)	-0.027** (0.013)										
Partnership and collective	0.181*** (0.061)	0.162*** (0.041)	0.000 (.)	0.135*** (0.025)	0.132*** (0.031)	0.167*** (0.056)	0.155*** (0.050)	0.132*** (0.044)	0.132*** (0.044)										
LSC	0.142*** (0.027)	0.125*** (0.024)	0.113*** (0.032)	0.119*** (0.020)	0.107*** (0.021)	0.126*** (0.026)	0.115*** (0.023)	0.106*** (0.029)	0.111*** (0.020)										
Innovation	0.098*** (0.023)	0.082*** (0.021)	0.058** (0.027)	0.047*** (0.017)	0.066*** (0.018)	0.091*** (0.023)	0.077*** (0.020)	0.052** (0.026)	0.044** (0.018)										
Internet	0.098*** (0.022)	0.106*** (0.020)	0.128*** (0.023)	0.084*** (0.017)	0.074*** (0.017)	0.079*** (0.023)	0.093*** (0.021)	0.115*** (0.025)	0.075*** (0.018)										
Training	0.052 (0.039)	0.032 (0.033)	0.000 (.)	0.037 (0.024)	0.033 (0.027)	0.036 (0.035)	0.022 (0.032)	0.030 (0.028)	0.030 (0.028)										
Fire	0.060*** (0.023)	0.055*** (0.021)	0.072*** (0.025)	0.047*** (0.017)	0.052*** (0.017)	0.056** (0.023)	0.053** (0.021)	0.070*** (0.026)	0.046** (0.018)										
Air	0.097*** (0.036)	0.088*** (0.034)	0.084* (0.048)	0.081*** (0.022)	0.071*** (0.027)	0.093*** (0.034)	0.086*** (0.031)	0.086* (0.046)	0.078*** (0.027)										
Waste	0.069** (0.028)	0.049** (0.025)	0.000 (.)	0.036* (0.020)	0.035* (0.021)	0.064** (0.029)	0.046* (0.026)	0.034 (0.023)	0.034 (0.023)										
Other	-0.013 (0.021)	-0.017 (0.018)	-0.015 (0.023)	-0.022 (0.015)	-0.017 (0.016)	-0.016 (0.020)	-0.019 (0.018)	-0.017 (0.022)	-0.023 (0.015)										
Advertise (lagged)	0.067** (0.028)	0.042* (0.024)	0.034 (0.034)	0.009 (0.019)	0.023 (0.020)	0.059** (0.026)	0.038 (0.024)	0.031 (0.033)	0.006 (0.021)										
Export (lagged)	0.046 (0.039)	0.074** (0.036)	0.000 (.)	0.075*** (0.025)	0.048 (0.030)	0.043 (0.036)	0.072** (0.032)	0.074*** (0.029)	0.074*** (0.029)										
Constant	1.047*** (0.173)	1.051*** (0.158)	1.025*** (0.220)	0.956*** (0.121)	0.948*** (0.146)	1.010*** (0.146)	1.024*** (0.131)	0.979*** (0.202)	0.937*** (0.116)										
Sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes										
Province	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes										
Insig_2						-1.050*** (0.018)	-1.177*** (0.017)	-1.116*** (0.019)	-1.361*** (0.018)										
atanrho_12						-0.298*** (0.079)	-0.216** (0.091)	-0.224** (0.098)	-0.192* (0.115)										
Obs.	1933	1904	1488	1815	1933	1933	1904	1488	1815										
df_m	29	29	25	29	29	53	53	47	53										
r2_a	0.16	0.17	0.15	0.17	0.15	0.17	0.17	0.17	0.17										

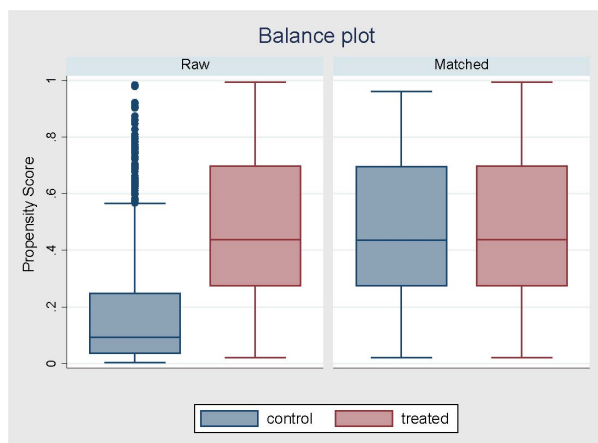
Standard errors in parentheses
 p<0.10 *p<0.05 ****p<0.01

b) *Propensity score matching (PSM)*

We finalize our robustness checks by implementing a PSM non-parametric estimation. We first estimate a propensity score with a probit model for having a certificate (treatment). Since this method requires that the observable factors affecting the probability of being treated are considered, we rely on the same covariates used in the original probit for domestic certification¹³. Then, in order to obtain the effect of having a domestic certificate on sales growth, certified firms and non-certified firms are paired up on the basis of their propensity to have a domestic certificate. However, the application of PSM requires to fulfill various conditions, such as the conditional independence assumption, the presence of a common support, and the satisfaction of the balancing property - all of which are satisfied in our analysis.

To check whether the range of values of the propensity score is the same in the two groups of treated and control firms we graph the estimated propensity scores before and after matching. The graphical representation in Figure 1 shows plot of the propensity scores for treated and control firms, before and after matching.

Figure 1: Balance box plot: Domestic certificate



Note(s): The plot has been obtained by implementing one-to-three nearest neighbor.

In Table 7 we compare the results of one-to-one and one-to-three nearest neighbor, and kernel-based matching¹⁴. The ATET of domestic certification is significant and positive in all estimations, falling within a range between 0.065 and 0.09. These effects are very similar to the coefficients of domestic certification obtained with OLS estimations (Table 5, columns (1) and (2)), thus being smaller than the effects obtained with the simultaneous equations. Although this methodology cannot isolate the signaling effect of certification from eventual growth-boosting operational improvements, we can conclude

¹³ Except the variable *Cost of domestic quality certificate*, we use values in 2013 for all explanatory variables to exclude that their 2015 value may be influenced by sales growth between 2013 and 2015 (outcome variable).

¹⁴ The nearest neighbor method matches treatment to one or several control observations based on the closest propensity scores, thus allowing a control unit to be linked to one or more than one treatment observation. We allow for replacement in finding the nearest control unit for each treated. With the kernel-based matching, every treated observation is instead matched with a weighted average inversely proportional to the distance between the propensity scores of the treated and of the control observations.

that the obtained ATET confirm the importance of having a domestic certificate on annual firm sales growth.

Table 7: Average treatment effect on the treated (ATET)

Matching method	ATET	SE	<i>t</i> -stat
One-to-one nearest neighbor	0.089**	0.034	2.64
One-to-three nearest neighbor	0.073**	0.029	2.52
Kernel	0.065**	0.027	2.36
Observations	1931		

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

Note(s): The presented results have been obtained implementing the STATA command `psmatch2`. Alternative STATA commands for PSM, such as `teffect psm` (Abadie and Imbens, 2016) and `pscore` (Becker and Ichino, 2002) generate similar results.

5.2.3 The effect of ‘new’ and ‘old’ certificates

The availability of the variable *Domestic certificate* only in the last survey wave (2015) limits the possibility to employ panel techniques in our analysis. However, thanks to the information on the year in which a domestic quality certificate was obtained and to the availability of the variable for environmental certificates already in 2013, we can investigate whether there is a difference between the signaling effect of a domestic certificate adopted within past two years *versus* one acquired and maintained one for a longer time period. In this way we can attempt to explore the short-run *versus* a long-run *external effect*, and to empirically distinguish between the impact of ‘adopting’ *versus* ‘maintaining’ a domestic certificate. The results of this analysis also contribute to better understand the perception of market actors with respect to the nature of the unobserved information revealed by domestic certificate: whether they believe that the signaled quality tends to decay since having obtained a certificate, or that it is rather maintained (when not even increased) over time.

We generate two dummy variables corresponding to whether the firm already had a domestic certificate or not at the time of the previous survey round in 2013 - *Domestic certificate, old* and *Domestic certificate, new* - and we introduce them as main independent variables in the sales growth equation. Results are reported in Table 8 (as reference, columns (1) and (3) show the original OLS and SE estimations, respectively). Column (2) shows the marginal effects obtained with OLS, and column (4) displays the results of the simultaneous estimation of the sales growth equation with a bivariate probit for *Domestic certificate, new* and *Domestic certificate, old*¹⁵. Once the possible endogeneity of the certification-related variables is accounted for, the coefficient of *Domestic certificate, old* becomes not significant, while the growth premium enjoyed by newly certified firms corresponds to an increase of almost 25 per cent. These results suggest that costumers react to the novelty of becoming certified, triggering a shift in the sales level in the initial years in accordance with the changed reputation.

To further check the prior results, we also implement separate PSM for new and old domestic certificates (results are reported in Table 11 in Appendix). For *Domestic*

¹⁵ The specifications of both probit equations for old and new certificates include the same covariates used in the original probit for domestic certificates. The results using different specifications are very similar.

Table 8: Sales growth: ‘new’ and ‘old’ domestic certificates

	(1) OLS	(2) OLS	(3) SE	(4) SE
Domestic certificate	0.060*** (0.022)		0.208*** (0.044)	
Domestic certificate, new		0.065* (0.034)		0.224*** (0.068)
Domestic certificate, old		0.058** (0.024)		0.066 (0.066)
Revenues(t-2)(log)	-0.211*** (0.047)	-0.211*** (0.047)	-0.198*** (0.037)	-0.203*** (0.037)
Revenues(log, lagged), sq	0.006* (0.003)	0.006* (0.003)	0.004* (0.003)	0.005* (0.003)
Firm age(log)	-0.031* (0.016)	-0.031* (0.016)	-0.039** (0.016)	-0.032** (0.016)
Partnership and collective	0.181*** (0.061)	0.182*** (0.061)	0.167*** (0.056)	0.189*** (0.057)
LSC	0.142*** (0.027)	0.142*** (0.027)	0.126*** (0.026)	0.145*** (0.027)
Innovation	0.098*** (0.023)	0.098*** (0.023)	0.091*** (0.023)	0.093*** (0.023)
Internet	0.098*** (0.022)	0.098*** (0.022)	0.079*** (0.023)	0.089*** (0.023)
Training for existing workers	0.052 (0.039)	0.052 (0.039)	0.036 (0.035)	0.045 (0.035)
Fire	0.060*** (0.023)	0.060*** (0.023)	0.056** (0.023)	0.055** (0.023)
Air	0.097*** (0.036)	0.096*** (0.036)	0.093*** (0.034)	0.094*** (0.035)
Waste	0.069** (0.028)	0.069** (0.028)	0.064** (0.029)	0.067** (0.029)
Other	-0.013 (0.021)	-0.013 (0.021)	-0.016 (0.020)	-0.013 (0.020)
Advertise (lagged)	0.067** (0.028)	0.067** (0.028)	0.059** (0.026)	0.065** (0.026)
Export (lagged)	0.046 (0.039)	0.047 (0.039)	0.043 (0.036)	0.052 (0.037)
Constant	1.047*** (0.173)	1.047*** (0.173)	1.010*** (0.146)	1.020*** (0.146)
Sector	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes
lnsig_2			-1.050*** (0.018)	
atanhrho_12			-0.298*** (0.079)	-1.311*** (0.200)
lnsig_3				-1.056*** (0.017)
atanhrho_13				-0.266** (0.116)
atanhrho_23				0.025 (0.118)
Obs.	1933	1933	1933	1933
df_m	29	30	53	78
r2_a	0.16	0.16		
F/chi test		0.852		0.143

Standard errors in parentheses
 *p<0.10 **p<0.05 ***p<0.01

Note(s): The F and chi test refer to the null hypothesis of equality between the coefficients of old and new domestic certificates, which we fail to reject.

certificate, new, only the ATET obtained with nearest-neighbor methods are positive and significant, with a magnitude between 0.13 and 0.10. These effects are larger than what found in the case of the PSM for total domestic certificates, reinforcing the hypothesis that new certificates may be driving the average result. Differently than the regression model, we find positive and significant ATET also for *Domestic certificate, old*, although of smaller magnitude (between 0.086 and 0.06). The difference with the parametric results may be partially due to the fact that the PSM methodology does not allow to disentangle signaling from internal operational improvements, which may indeed take time to be built and come into effect.

Our analysis on the possible mediating effect of the ‘age’ of domestic certificates provides new evidence about the relationship between sales growth and new certificates, whose effect is found to be significant and stronger compared to older ones. This is consistent with the results of Javorcik and Sawada (2018) about the stronger impact of international certificates on sales growth immediately after adoption. Despite representing only 30 per cent of all domestic certificates in the our sample, new certificates seem to be playing a major role in shaping the average effect of domestic certificates on growth. In the case of the separate PSM we also find that domestic certificates might maintain their impact over time. The possibility of a prolonged - even if weaker - positive effect on sales growth offers a rationale for why firms may decide to maintain certificates.

6 Discussion

This work presents original findings about the role played by domestic certification in fostering sales growth for a sample of Vietnamese MSMEs in manufacturing sector. It provides empirical evidence about the existence of a positive and significant effect of having a domestic certificate, effect that persists across different specifications and estimation methods. We argue that the growth premium derives from a competitive advantage enjoyed by certified firms as result of the use of certification as signaling device to communicate quality and other attributes that are difficult to observe and assess, especially in markets where distrust regarding product quality and environmental conduct are widespread. Thus, certificates seem to play a role *per se* on sales growth, and independently from whether or not the certification actually improves firms’ organizational, operational, and environmental performance. This does not mean that additional effects on sale growth for certified firms cannot derive also from efficiency improvements, but rather that focusing only on certification-induced operational improvements cannot fully explain how certificates affect firms’ performance (Terlaak and King, 2006). Hence, having this ‘piece of paper’ seems to be effective in increasing reputation by communicating about quality and other attributes that are likely to be relevant in influencing costumers’ decisions.

Our result also give further empirical support to the argument that certificates provide larger benefits when information asymmetry is larger. The result about female-run businesses is particularly interesting: when female-run business are indeed perceived as less credible or reliable partners, female managers may find it more difficult to gain legitimacy, and certificates may help them better flag their quality and other intangible attributes, ultimately allowing to improve their performance. Gender bias in business is generally less diffused and less serious in Viet Nam with respect to other developing economies, even thanks to the implementation of new legislation (e.g. Law on Gender

Equality 2010) and gender-equality policies addressing gender inequality since mid 2000s (Wells, 2005). Yet, traditional patriarchal attitude and gender stereotypes tend to persist in Vietnamese society and economy, reflecting into wage-gender gaps (Bjerger et al., 2016), exposure to more vulnerable jobs and unpaid housework, and prejudice towards women taking up leadership positions (World Bank, 2011). The presence of gender gaps is thus still an issue even in this country (World Bank, 2017b).

The main novelty of this work is to provide new firm-level empirical evidence about the determinants and effects of domestic certificates, contributing to move forward our current understanding of the role of certification in a developing and emerging context. In fact domestic certificates have been largely disregarded by existing empirical analyses, partly due to difficulties in collecting relevant information in a developing context, partly due to being perceived as less important in influencing firm growth because less demanding and less costly than international standard certificates thus potentially conveying less reputation gains and less transaction costs reductions (Zoo et al., 2017). Yet, often domestic certificates are designed on the basis of international ones, and thus have not necessarily to be interpreted as their ‘minimal version’ (Zoo et al., 2017). Our results indicate that even these potentially ‘simpler’ domestic certificates can still flag some desirable intangible attributes and generate additional growth opportunities for micro and small firms operating almost exclusively on the domestic market.

The positive effect of domestic certifications in Viet Nam can be better interpreted when considering that Vietnamese costumers are becoming increasingly sensitive and demanding in terms of quality and environmental safety of products and production, with pollution and food safety becoming major issues in current Vietnamese societal and political debate (World Bank, 2017a). As their living conditions improve, costumers call not only for better environment but also for better and safer products: in this context, even a domestically awarded ‘Food Safety certificate’ or an ESC may help flag the presence of some intangible features that have become important for costumers’ decisions, such as the quality of food processing and or the implementation of environmental control treatments. Considering that similar challenges are faced also by other emerging countries, domestic certificates may contribute to sustain entrepreneurial firm growth also beyond the specific case of Viet Nam manufacturing sector.

The increasing relevance of the demand from costumers is consistent with our results on the determinants of having a domestic certificate, which shed light on the primary role played by institutional pressure in the decision of adopting and maintaining a domestic certificate. This further confirms what already noticed by Fikru (2014) and Liu et al. (2010), that the influence of institutional pressure on certificate adoption and implementation is relevant especially in the weak regulatory and institutional environments that often characterize emerging and developing economies. Our findings also emphasize the importance of mimetic pressure in this particular context, where businesses are likely to be not fully informed about certificates and not fully aware of their potential benefits.

The analysis of the determinants of domestic certificates also allows to draw a comparison between these and the factors affecting international certificates. In terms of similarities, in both cases direct and indirect costs play a relevant role in influencing the decision to have a certificate; on the other hand, for international certificates the pressure from foreign markets is a much more important driver, while it is not significant for domestic ones. Domestic certifications may present - in principle - less drawbacks in terms of constituting an entry and market barrier for the smallest and resource poor

firms than adopting an international standard certificate such as ISO 9001 or ISO 14001. They may thus act as a sort of easier-to-access ‘first stage’ in preparation to adopt more demanding international certification. A better understanding of the relationship between domestic and international certificates would be very relevant for Viet Nam, which a decade after joining the WTO is still struggling with meeting international safety and quality regulations, with the consequent frequent cases of product detention and rejection at the borders. The signing of a trade agreement with the European Union at the beginning of 2017 represents a great opportunity for the country, but the high level of contamination and poor quality still affect Vietnam’s reputation amongst its trading partners (World Bank, 2017a), compromising its export potentials and a further insertion of Vietnamese produces into the global value chain.

Finally, this work also provides an original and pioneering contribution to the debate on the differences between the effect of recently acquired *versus* previously obtained certificates, a distinction that is indeed uncommon in the existing empirical literature. We find that newer certificates seem to have a significantly stronger effect on firm growth than certificates that have been implemented for a longer period, suggesting that Vietnamese costumers might be more attracted and more responsive by the novelty of a certificate, associating this novelty with more reliable information and better quality.

7 Conclusions

Using simultaneous estimations to deal with endogeneity and rigorously checking the robustness of the findings with different estimation methods, the empirical analysis provides evidence of a positive effect of domestic certification on sales growth among manufacturing MSMEs in Viet Nam as a signaling device to overcome transaction costs and increase firm growth in an emerging economy. It shows the importance of domestic certificates and aims to offer practical insights to assist the design and implementation of better and more effective entrepreneurial policies.

We are aware of the limitations of this study. The availability of unique information about domestic certificates is pared with the impossibility to perform panel analysis, which limits the range of employable estimation techniques and does not allow to fully account for selection on unobservables. On top of this, the study of domestic certificates is still at an early stage in developing countries: its novelty makes it difficult to compare with other works in the literature and to draw broader conclusions. It would be also interesting to examine the effect of domestic certificates with respect to international ones with a cross-country comparison. The scarce availability of data on domestic certificates currently constrains this comparative effort, but an expansion of this type of studies would surely contribute to a better understanding of the role of certificates at firm-level. In terms of firm performance, we follow the extant entrepreneurship literature and use growth of revenues from sales; this implies that we are unable to say whether the effect on sales growth is driven by an increase in the markup due to a reduction in costs or an increase in price, or it is mostly a ‘volume effect’, or both. The use of other performance indicators, such as markup or profit, could provide interesting corroborating insights in this direction.

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8 Appendix

Table 9: Determinants of domestic certificate: probit coefficients

	(1) Probit	(2) Probit SE	(3) Probit	(4) Probit SE
<i>Cost and firm-level characteristics</i>				
Cost of domestic quality certificate (log)	-0.112*** (0.036)	-0.104*** (0.037)	-0.091** (0.036)	-0.084** (0.036)
Employment (log, lagged)	0.277*** (0.060)	0.300*** (0.057)	0.344*** (0.059)	0.362*** (0.056)
Firm age (log)	0.192** (0.077)	0.204*** (0.078)	0.139* (0.075)	0.155** (0.076)
Partnership and collective	0.155 (0.263)	0.166 (0.237)	0.178 (0.269)	0.192 (0.235)
LSC	0.318*** (0.122)	0.277** (0.115)	0.493*** (0.119)	0.439*** (0.111)
Fin. Assistance (lagged)	0.085 (0.125)	0.087 (0.119)	0.081 (0.125)	0.087 (0.118)
<i>Transaction costs</i>				
Distance from costumer (log)	0.027 (0.027)	0.043* (0.026)	0.029 (0.027)	0.045* (0.026)
Export (lagged)	0.051 (0.179)	-0.016 (0.157)	0.098 (0.182)	0.029 (0.158)
<i>Institutional pressure</i>				
Neighbor certificates (share)	1.284*** (0.411)	1.023** (0.407)	1.302*** (0.408)	1.038** (0.404)
Business association	0.158 (0.151)	0.160 (0.146)	0.219 (0.151)	0.219 (0.148)
Local trade union	0.305** (0.148)	0.321** (0.132)	0.335** (0.150)	0.345*** (0.132)
Inspected	0.295*** (0.082)	0.334*** (0.080)	0.313*** (0.081)	0.349*** (0.079)
Certification required by customers	1.530*** (0.161)	1.438*** (0.148)	1.583*** (0.159)	1.483*** (0.149)
Labor code	0.134 (0.094)	0.200** (0.090)	0.188** (0.092)	0.248*** (0.088)
Internet	0.496*** (0.111)	0.468*** (0.111)		
Website			-0.205 (0.141)	-0.168 (0.128)
Constant	-0.644 (0.584)	-0.829 (0.580)	-0.839 (0.580)	-1.016* (0.576)
Sector	Yes	Yes	Yes	Yes
Location	Yes	Yes	Yes	Yes
Insig_2		-1.049*** (0.018)	1933	-0.356*** (0.018)
Constant		-0.306*** (0.077)		-0.310*** (0.075)
atanhrho_12				
Constant				
Obs.	1933	1933	1933	1933
df.m	24	52	24	52

Standard errors in parentheses
*p<0.10 **p<0.05 ***p<0.01

Table 10: First stage and sales growth with IV estimation

	(1) First stage	(1) IV 2SLS
Domestic certificate		0.109*
Certification required by customers	0.467*** (0.033)	(0.060)
Cost of standard (log)	-0.025*** (0.008)	
Local trade union	0.159*** (0.044)	
Revenues(t-2)(log)	0.051 (0.035)	-0.209*** (0.047)
Revenues(log, lagged), sq	-0.001 (0.003)	0.005 (0.003)
Firm age(log)	0.043*** (0.016)	-0.033** (0.016)
Partnership and collective	0.045 (0.067)	0.176*** (0.061)
LSC	0.087*** (0.029)	0.137*** (0.027)
Innovation	-0.009 (0.023)	0.097*** (0.023)
Training	0.034 (0.039)	0.046 (0.039)
Internet	0.097*** (0.022)	0.093*** (0.023)
Fire	0.027 (0.025)	0.058** (0.023)
Air	0.103** (0.045)	0.090** (0.036)
Waste	-0.025 (0.032)	0.069** (0.028)
Other	-0.005 (0.021)	-0.014 (0.021)
Advertise (lagged)	0.032 (0.031)	0.063** (0.028)
Export (lagged)	0.037 (0.045)	0.044 (0.039)
Constant	0.190 (0.174)	1.042*** (0.172)
Sector	Yes	Yes
Province	Yes	Yes
Obs.	1933	1933
df_m	31	29
R sq		0.16
Kleibergen-Paap LM statistic		122.463
Kleibergen-Paap Wald F statistic		84.575
Cragg-Donald Wald F statistic		94.491
Hansen J statistic		3.284
Hansen J statistic p-value		0.194

Standard errors in parentheses

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

Note(s): The null hypothesis that the model is underidentified (Kleibergen-Paap LM test) is rejected (with $p=0.000$), as well as that the equation is weakly identified (the values of Kleibergen-Paap Wald F test are larger than the rule-of-thumb value 10, and the values of Cragg-Donald Wald F statistic surpass the Stock-Yogo critical values for weak instruments). The test for over-identification (here the Hansen-J statistic) fails to reject the null hypothesis that the instruments are valid.

Table 11: Average treatment effect on the treated (ATET) for ‘new’ and ‘old’ certificates separately estimated

Matching method	ATET	SE	T-stat
<i>Domestic certificate, new</i>			
One-to-one nearest-neighbor	0.136***	0.051	2.66
One-to-three nearest-neighbor	0.108**	0.044	2.44
Kernel	0.065	0.041	1.60
Observations	1600		
<i>Domestic certificate, old</i>			
One-to-one nearest-neighbor	0.086**	0.036	2.37
One-to-three nearest-neighbor	0.061*	0.032	1.88
Kernel	0.059*	0.030	1.95
Observations	1788		

*p<0.10 **p<0.05 ***p<0.01

Note(s): The presented results have been obtained implementing the STATA command psmatch2. In order to avoid that newly certified firms are matched with similar firms with an ‘old’ certificate when estimating the ATET of *Domestic certificate, new*, and *viceversa*), we exclude from the sample the firms with an old (resp. new) domestic certificate when we estimate the ATET for having a new (resp. old) certificate.

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