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On the benefits of formalization

Panel evidence from Vietnam

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Abstract: This paper examines the relationship between formalization and firm-level outcomes in Vietnam using a unique panel dataset. Results show that switching firms differ from informal non-switching firms, confirming heterogeneity. We also find that becoming formal leads to increased profits, value added, and revenue. The performance of switching firms is higher than that of informal ones, but remains lower compared to non-switching formal firms. Our results suggest that the benefits of formalization materialize in the short term and persist over time. These benefits run through access to improved equipment, larger customer base, advertising, and business association membership, but not access to credit.

Keywords: benefits of formalization, informal sector
JEL classification: D21, O12, O17

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1 Introduction

Two main complementary views of informality can be found in the literature: exclusion and exit (Perry et al. 2007). The exclusion view sees informality as the result of burdensome entry regulations that prevent small firms from entering the formal sector (e.g. de Soto 1989). Consequently, they cannot thrive because they are excluded from critical formal sector benefits.[1] The exit view suggests that informality stems from a deliberate private decision after cost–benefit analyses (see e.g. Maloney 2004; de Mel et al. 2011).[2] As a result, efforts to uncover the positive effects of formalization can create incentives for firms to shift out of informality (Rand and Torm 2012).

However, building evidence on the effects of formalization on the performance of existing informal firms has been challenging, due to potential selection bias and endogeneity. Selection bias can arise from the fact that firms choosing to formalize have different underlying characteristics, for example, the owner's abilities or firm preferences, compared to the ones that remained informal. In addition, formalization might be correlated with unobserved characteristics that affect firm outcomes. For instance, registration might be partly determined by performance if more successful firms become more visible, leading to a higher probability to formalize in order to avoid paying fines and/or bribes (see e.g. Fajnzylber et al. 2011; McKenzie and Sakho 2010). In summary, formal and informal firms may simply not be comparable due to firm heterogeneity.

A first objective of this paper is to analyse the effects of formalization on the performance of informal firms opting out of informality, while accounting for unobserved heterogeneity. We also explore whether the effects of formalization differ according to firm size. Second, we analyse the effects of formalization over time, an aspect that is absent in most previous studies. Given that registration costs can affect performance in the year following formalization, it is important to analyse both the short-term and longer-term effects of formalization. Finally, we look at the channels through which formalization can impact firms.

In contrast to most existing studies, we use a panel dataset constructed from five small and medium enterprises (SME) surveys in Vietnam (conducted in 2005, 2007, 2009, 2011, and 2013). We define formal firms as those that are registered to pay taxes (i.e. have a tax code), a common indicator of formality in the literature (Fajnzylber et al. 2009; McKenzie and Sakho 2010; Rand and Torm 2012). Using the formal status variable (namely *Status*: 0 if a firm is informal, and 1 if formal), we

[1] Formal sector benefits include increased access to credit, greater opportunities to engage with large firms and the government, or greater access to training and support programmes (Joshi et al. 2012). A clear policy implication of the exclusion view is the removal of costly entry regulations, but evidence suggests that ease of formalization alone will not induce most informal firms to become formal (Bruhn and McKenzie 2014).

[2] This broader approach may help explain why reducing business registration costs has had little or no impact on formalization (Bruhn 2011; Kaplan et al. 2011). McKenzie and Sakho (2010) hypothesize that a profit-maximizing firm becomes formal if and only the expected present discounted value of the net benefits from doing so outweighs the upfront costs:

$$\sum_{t=1}^{T} \delta^t E\left(\pi_{F,t} - \pi_{I,t}\right) + \theta_{law-abiding} > C_{Money} + C_{Time} + C_{Information}$$

where $\pi_{F,t}$ denotes the firm's profits if it is formally registered at time t, and $\pi_{F,t}$ denotes the firm's profits if it is not formally registered at time t. $\theta_{law-abiding}$ denotes the utility benefit to firm owners from obeying the law and feeling they are contributing to national welfare through paying taxes. C_{Money}, C_{Time} and $C_{Information}$ denote the monetary, time, and information costs of registering.

construct our main variable of interest, *Switcher*. The latter variable equals 1 if a firm left the informal sector, irrespective of the year it became formal; 0 if the firm remained formal or informal during the survey periods. Furthermore, we create two dummy variables to make a distinction between firms that remain formal (formal non-switcher) or informal (informal non-switcher) throughout the sample. By differentiating between formal, informal, and switching firms, we are able to account for time-invariant unobserved heterogeneity. Finally, through the interaction of the variables *Status* and *Switcher*, we obtain the net effects of formalization on firm performance before and after switching to the formal sector.[3]

Our first results support the fact that switching firms are different from informal non-switching firms. Such heterogeneity is typically assumed in most previous studies. Second, we find that becoming formal leads to an increase in revenue, value added, and profits, in total amount or per employee. Namely, formalization increases profit, value added, and revenue levels of switchers by respectively 10 per cent, 8 per cent, and 15 per cent, compared to when they were informal. Similarly, per employee, the levels of profit, value added, and revenue are significantly higher by respectively 8 per cent, 7 per cent, and 10 per cent, thanks to formalization. Third, our results indicate that formalization is beneficial for firms, irrespective of their size. While the performance of switching firms is higher compared to those that remained informal, it remains lower compared to non-switching formal firms. Relative to time, we find that the benefits of formalization exist in the short term and persist over the longer term. Finally, we show that this higher performance of switchers results from better access to improved equipment, larger customer base, advertising, and business association membership. Yet we find no evidence of increased likelihood to apply for formal loans or improved access to credit.

The remainder of this paper is organized as follows. Section 2 briefly presents an overview of the existing literature on the impact of formalization. In Section 3, we describe our dataset. Section 4 discusses the econometric approach, while Section 5 presents the main empirical results. We conclude in Section 6.

2 Literature review

The literature on the impact of formalization on firm performance can be divided into two main categories: non-experimental and experimental studies. The first category mainly uses cross-sectional data and relies on one or a combination of methods such as difference-in-differences (before and after an exogenous event), matching, instrumental variables, or regression discontinuity. The majority of these studies find that formalization has a positive impact on firm performance (see e.g. Fajnzylber et al. 2011; McKenzie and Sakho 2010; Rand and Torm 2012). Experimental studies, on the other hand, suggest that the costs of formalization may typically outweigh the benefits, as many firms remain informal despite incentives to formalize (see e.g. de Andrade et al. 2013; de Mel et al. 2013; Jaramillo 2009).

Using firm-level data from Mexico, Fajnzylber et al. (2009) show that being formal increases profits by at least 20 per cent. However, their approach relies on the assumptions that formal status is determined by a set of observable variables (matching) or through a specific functional form in the estimation equation (control function).[4] If selection into formality is based partly on unobserved characteristics, this may lead to overestimating the effects of formalization (McKenzie

[3] Note that we do not insert the variable Status itself in our regressions.

[4] Likewise, Sharma (2014) finds, through propensity score matching, that registration leads to significant gains in sales per employee and value added per employee in India.

and Sakho 2010). Fajnzylber et al. (2011) used regression discontinuity and difference-in-differences to compare firms that were created immediately before and after a business tax reduction and simplification scheme (SIMPLES), in Brazil. They found that this reform led to increased levels of registration and to higher revenues, profits and employment among registered firms. As this paper concentrates on newly created firms that opt for operating formally, not existing informal sector firms, the results can simply reflect self-selection at formal sector entry.

Monteiro and Assunção (2012) use a 1997 cross-sectional survey of micro and small firms, just after the implementation of SIMPLES. Using a difference-in-differences approach, they compare the legal status of firms created before and after the programme, in sectors affected and those not affected by the SIMPLES reform. They found an increase of 13 percentage points in the registration of retail firms, but no effect is found for other eligible sectors, such as construction, manufacturing, transportation, and services. The authors cannot rule out that the effect on the retail sector could be generated by a specific sectoral shock coincident with the SIMPLES reform.

McKenzie and Sakho (2010) estimate the impact of tax registration on firm profits in Bolivia, by using the distance between firm and registration office as an instrument for registration status.[5] The assumption is that being closer to tax office increases the probability of registration. They find that the overall impact of tax registration is positive but heterogeneous; it leads to higher profits for medium-size firms in their sample, but has a negative impact on small and large firms. They also find that owners of larger informal firms have higher entrepreneurial abilities than owners of larger formal firms, in contrast to the mainstream view (see for instance La Porta and Shleifer 2008).

An exception to the use of cross-section data is Rand and Torm (2012) who use a matched double-difference with the same panel data as in this study, but for 2007 and 2009. They find that registration leads to an increase in firm profits, investments, and access to credit for Vietnamese SMEs; and to a decrease in the use of casual labour, indicating higher compliance with labour regulations. Compared to Rand and Torm (2012), by extending the panel dataset up to five observations per firm, the present study allows additional insights on the effects of formalization of firms shifting out of the informal sector. Moreover, as explained below, our empirical approach is different.

A second strand of the literature on the effects of formalization on firm performance uses the experimental approach. This recent experimental evidence suggests that the costs of formalization outweigh the benefits, resulting in many firms remaining informal despite incentives to formalize. De Andrade et al. (2013) conducted a field experiment in the city of Belo Horizonte, in Brazil, to examine government actions that promote registration of informal firms. Firms were randomly assigned to a control group or one of four treatment groups: the first received information about how to formalize; the second received this information and free registration costs, along with the use of an accountant for a year; the third group was assigned to receive an enforcement visit from a municipal inspector; and the fourth group was assigned to have a neighbouring firm receive an enforcement visit to see if enforcement has spillovers. Receiving an inspection increases registration probability by 21 to 27 percentage points, but the three other interventions had no effect. This could suggest that informal firms formalize mostly when forced to do so.

De Mel et al. (2013) provide evidence suggesting that firms become formal as the related benefits increase. In a field experiment in Sri Lanka, the authors found that simply reimbursing the direct

[5] See also de Vries (2010), who controls for self-selection by using the degree of value added tax compliance among the firm's suppliers and buyers as an instrument. He finds large differences in productivity when comparing formal retailers to informal ones in Brazil.

costs of registration had no effect on formalization. Yet, 20 per cent of firms registered when offered an amount equivalent to one-half to one month's worth of the median firm's profits, and 47 per cent registered when offered payments corresponding to two months of the median firm's profits. In follow-up surveys, firms that formalized were found to have higher profits, but this result was driven by a few fast-growing firms: formalizing had no effect on the profits of the majority.

Jaramillo (2009) reports an experiment in Lima, Peru, where registration was promoted by subsidising the full money cost and providing guidance through the process. Although most firms reported greater disadvantages than advantages of being informal, only one out of four firms opted to formalize despite the incentive. This suggests that formalization is simply not desirable for some firms.

Relative to transmission channels, formalization is assumed to benefit the firms through increased access to credit, greater opportunities to engage with large firms and the government, or greater access to training and support programmes (Joshi et al. 2012); but the existing evidence is weak. McKenzie and Sakho (2010) find that higher profits due to registration appear to come mainly from increases in their customer base; and there was no impact of formalization on the prospect of obtaining a bank loan. In Fajnzylber et al. (2011)'s study, improvements occur, not through access to credit or contracts with larger firms, but through lower cost of contracting labour, leading to the adoption of production techniques involving a permanent location and a larger paid labour force. Likewise, Rand and Torm (2012) could not obtain decisive evidence on the positive impact of formalization on access to credit. In examining the channels, de Andrade et al. (2013) find that registration increases advertising and use of receipt books, but not the likelihood of receiving government contracts, or of using bank accounts or loans, or of participating in government programmes. According to Bruhn and McKenzie (2014), the likely explanation is that many informal firms would not receive credit even if they did register, or are unlikely to sell to the government anyway; and those firms that are in a position to do so, formalize when this need arises.

3 Data

Our dataset comes from SME surveys conducted in Vietnam in 2005, 2007, 2009, 2011, and 2013.[6] The surveys, covering about 2,500 firms in each year, were carried out in ten locations; namely the cities of Hanoi, Hai Phong and Ho Chi Minh City, and rural provinces of Ha Tay, Phu Tho, Nghe An, Quang Nam, Khanh Hoa, Lam Dong, and Long An.

The population of non-state manufacturing enterprises was based on two data sources from the General Statistics Office of Vietnam (GSO): the Establishment Census from 2002 (GSO 2004) and the Industrial Survey 2004-2006 (GSO 2008). A representative sample of registered household and non-household firms was drawn from this population, using a stratified sampling procedure. The aim was to ensure the inclusion of an adequate number of enterprises in each province with different ownership forms, such as officially registered households, private firms, co-operatives, or limited liability companies. For reasons of implementation, the survey was confined to specific areas in each province/city. In addition, the GSO enterprise census focused only on 'visible' firms (those with fixed professional premises), which resulted in an underestimation of household firms.

[6] These surveys are conducted by the Central Institute for Economic Management and the University of Copenhagen as part of a research project funded by the Danish International Development Assistance.

Informal household firms were included in the SME survey based on random on-site identification within the survey districts observed by the enumerator. With such an identification approach, the informal firms included in the survey are those operating alongside officially registered enterprises. These informal firms may be relatively more competitive (and profitable) compared to informal firms clustering in areas with none or very few formal firms (see Rand and Torm 2012). In this regard, the sample of informal firms may not be fully representative of the informal sector as a whole in Vietnam.

Despite the above weakness, our dataset remains unique by the number survey years (five) and the number of firms. We keep only firms with at least two observations in our sample, for a total of more than 11,900 observations (3343 firms) in the dataset. At the panel level, in Table 1, the sample is dominated by formal non-switcher firms, which account for 60 per cent of the total number of firms, followed by informal non-switchers (27 per cent), and switchers (14 per cent). Table 2 and 3 describe the dependent and independent variables per year.

4 Econometric approach

We now turn to the regression analyses to examine the effects of formalization on firm performance. We estimate the following model using ordinary least squares (OLS):

$$ln(y_{it}) = \beta X_{it} + \rho D_i^{Firm\ type} + w_{it} \quad (1)$$

As explained below, $D_i^{Firm\ type}$ is a dummy variable for the firm type (formal, informal, and switching firms).

When the error term is modelled as $w_{it} = \mu_i + \varepsilon_{it}$, with $Var(\varepsilon_{it}) = \sigma_\varepsilon^2$ and $Var(\mu_i) = \sigma_u^2$ the above equation can be estimated using random effects model to exploit the panel nature of the data:

$$ln(y_{it}) = \beta X_{it} + \rho D_i^{Firm\ type} + \mu_i + \varepsilon_{it} \quad (2)$$

Where y_{it} represents six performance indicators, namely gross profit; gross profit per employee; value added; value added per employee; revenue; or revenue per employee. The average profit, value added, and revenue (both total amount and per employee) of switchers is significantly higher than that of informal non-switchers, but lower compared to formal non-switchers (see Table 4).

As highlighted in the introduction, the main difficulty in identifying the impact of formalization on firm outcome is that formal, formalized and informal firms may simply not be comparable due to unobserved firm heterogeneity. To address this issue, we control for firm-level fixed effects relative to non-switcher (formal and informal) and switcher status. Namely, we use the formal status variable *Status* (0 if a firm is informal, and 1 if the firm is formal) to construct our main variable of interest, *Switcher*, which equals 1 if a firm in our sample left the informal sector, irrespective of the year; 0 if the firm remained formal or informal during the survey periods.[7] We create two additional dummy variables to make a further distinction between firms that remain formal (formal non-switcher), and those that remain informal (informal non-switcher) throughout the survey periods; the latter group is used as control group in our regressions.

[7] In other words, the variable Switcher identifies firms that shifted out of the informal sector at a given point in time.

The inclusion of firm-level fixed effects in our regression model (by using a dummy variable $D_i^{Firm\ type}$ for each type of firm) enables us to account for time-invariant unobserved heterogeneity between formal, informal, and switching firms. Finally, through the interaction of the variables *Status* and *Switcher*, we obtain the net effects of formalization on firm outcomes before and after switching to the formal sector. The above approach amounts to a least square dummy variable model, that we first estimate using OLS.

We then turn to panel regression by using a random effects model. It can be noted that the use of random effects (instead of fixed effects model in our regression analysis) is driven by the fact that our primary variables of interest are time-constant (i.e. being a formal, informal, or switching firm). A possible downside of random effects modelling relates to the requirement that the firm-specific effect (μ_i) is uncorrelated with the explanatory variables. For a robustness check, we use Mundlak's approach to correct for possible violation of the independence assumption between the covariates and the error term in the random effects model, through the inclusion of panel-group means of time-varying (continuous) variables (see e.g. Bell and Jones 2015; Mundlak 1978).

In addition to the main variables of interest relating to formal status, we include several covariates, namely (i) the gender of the owner/manager, (ii) the education level of the owner/manager, (iii) the number of regular full-time employees in log (also the square), (iv) the share of production and service workers over all types of employees, (v) the share of female workers in total regular employment, (vi) the number of government inspections, (vii) whether or not the firm owns a CLUR (Certificate of Land Use Rights), (viii) location, industry, and time dummies.[8] A summary of the control variables is given in Table 4.

We now discuss each control variable in some detail. Unless otherwise mentioned, the average statistics discussed below are significantly different among the three groups of firms.

First, the gender of the owner/manager (0 if female, 1 otherwise) is included as female owners have been found more likely to provide fringe benefits such as annual leave, social benefits, and health insurance (Rand and Tarp 2011), which in turn may affect firm profits (Rand and Torm 2012). The share of male-headed firms is highest among switching firms at 72 per cent, compared to 67 per cent among firms that remain informal, and 62 per cent among firms that were always formal in the sample.

Second, the education level of the owner/manager (0 if secondary school not completed, 1 otherwise) is used to proxy owner/manager's human capital. Gennaioli et al. (2013) document large productivity gaps between firms run by educated versus uneducated managers, while Jaramillo (2009) finds post-secondary education to predict formalization. In relation to firm category, 42 per cent of owners/managers in informal non-switching firms have completed secondary school, compared to 52 per cent in switching firms and 72 per cent in formal non-switching firms. These percentages are significantly different and highlight human capital differences between these three types of firms.

Third, the number of regular full-time employees (in log), as well as the square, are included to control for firm size effects, given that the costs and benefits of becoming formal are likely to vary according to firm size (McKenzie and Sakho 2010). The average size of firms (here number of full-time workers) is 5.5 for informal non-switchers and 7.3 for switchers; the difference is not

[8] The choice of covariates is derived mainly from Rand and Torm (2012).

significantly different between the two groups.[9] Yet, the average size in informal and formalized firms is significantly lower compared to that of formal non-switchers (23.78).

Fourth, the share of production and service workers (as opposed to white-collar workers) measures the average skill level in the firm, which can have an impact on firm performance (Rand and Torm 2012). This share is similar between switchers and formal non-switchers at about 69 per cent, and is significantly higher compared to the share of production workers in informal non-switching firms.

Fifth, the share of female workers has been shown to depress wage levels in firms, thereby affecting performance (Larsen et al. 2011); and this might result from women being less productive, being more likely to work in less productive enterprises, or being discriminated against. Consequently, the exact mechanism through which the share of female workers can impact firm performance remains unclear. The average share of female workers is comparatively higher for firms remaining in the informal sector at 41 per cent, relative to firms opting out of the informal sector (34 per cent) and incumbent formal firms (37 per cent).

Sixth, whether or not the firm owns a CLUR is used to proxy property rights. Rand and Torm (2012) typically control for this variable in their empirical model, based on the fact that household firms in Vietnam generally are able to use their CLUR as collateral for a loan, thereby easing potential financial constraints for increased investments and performance. The percentage of firms owning a CLUR is 73 per cent for informal non-switchers, 69 per cent for switchers, and 53 per cent for formal non-switchers respectively.

Seventh, for firms in Peru, Jaramillo (2009) finds inspection visits to be a major disadvantage of formalization, which negatively impacts the decision to formalize, being rated even more negatively than paying taxes. While inspections are likely to increase compliance with costly government regulations and affect profits (Rand and Torm 2012), they also increase the probability of registering (de Andrade et al. 2013). The government inspection variable takes a value of 0 if the firm has received no inspection in a given year, 1 if the number of inspection is equal to or more than 1. Regarding government inspections, only 13 per cent of the informal non-switchers received a compliance visit. This rate goes to 28 per cent for switchers and 47 per cent for formal non-switchers, indicating that formal firms are more 'visible'.

Finally, dummy variables are used to control for industry, location, and time factors. The industry dummy variable equals 0 if the firm is in low-technology manufacturing, and 1 if the firm is in the medium-low and medium-high technology category.[10] The share of firms in the medium-high technology sector is lowest among firms that remain informal. Location dummies account for the fact that Vietnamese provinces are relatively autonomous, and have implemented centrally planned initiatives with varying degrees of speed and enthusiasm (Nguyen et al. 2007; Rand and Torm 2012). Time dummies are included to control for potential time effects.

[9] As noted previously, the sampling strategy may have led to an over-representation of relatively more competitive (and profitable) informal firms, given the relatively large average size of the informal firms in the sample (compared to 1.5 in Cling et al. 2010).

[10] We use the Organisation for Economic Co-operation and Development (OECD) technology classification.

5 Results

In this section, we present results relative to the impact of formalization of firm performance, the time effect of formalization, as well as possible transmission channels. The discussion is based on estimates from the 'standard' random effects regression, unless otherwise specified.

5.1 On the impact of formalization on revenue, value added, and profits

A first objective of this paper is to analyse the effects of formalization on the performance of informal firms opting out of informality. In this regard, Table 5A shows OLS and random effects regressions for (log) gross profit and (log) gross profit per employee. Tables 5B and 5C show similar regressions, respectively for (i) log of value added and log of value added per employee, and (ii) log of revenue and log of revenue per employee. This makes a total of six dependent variables measuring firm outcome. The results for profit, value added, and sales are qualitatively similar, both by level and per employee.

Our first result provides evidence that switching firms are different from informal non-switching firms. In most of the previous studies, such a difference was assumed but not assessed. Looking at the coefficient of *Switcher*, we find that the profit, value added, and revenue levels of switchers are significantly higher by respectively 18 per cent, 32 per cent, and 29 per cent compared to those of informal non-switchers.[11] Likewise, per employee, the levels of profit, value added, and revenue are significantly higher by respectively 20 per cent, 32 per cent, and 39 per cent.[12] By comparing the regression coefficients between switchers and formal non-switchers, it can also be noted that firms that switch from informal to formal have significantly lower profit, value added, and revenue (both in total and per employee) compared to non-switching formal firms.

Our second result indicates that becoming formal leads to an increase in revenue, value added, and profits, as shown by the coefficient of 'Switcher (after formalization)'. Indeed, formalization increases total amount of profit, value added, and revenue of switchers significantly, by respectively 10 per cent, 8 per cent, and 15 per cent, compared to when they were informal. Similarly, per employee, the levels of profit, value added, and revenue are significantly higher by respectively 8 per cent, 7 per cent, and 10 per cent, thanks to formalization. In comparing the performance of switchers (after formalization) and formal non-switchers, we find that the performance of switching firms remains lower compared to that of incumbent formal firms, for all performance indicators except revenue level.[13]

Several other control variables are noteworthy in Tables 5 (A, B, and C). These variables tend to have the same effects on profits, value added, and revenues (on both total and per capita levels). First, the share of female employees has a negative impact, but the channel through which this

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[11] As we are using a semi-logarithmic functional form, we estimate the effect of a dummy variable coefficient on the dependent variable as: $g^* = \exp\left(\hat{c} - \frac{1}{2}V(\hat{c})\right) - 1$,

where $\hat{c}$ is the dummy variable coefficient and $V(\hat{c})$ its variance (see Halvorsen and Palmquist 1980; Kennedy 1981). Finally, estimating Equation (2) used fixed-effect gives results that are similar to those obtained with the 'standard' random effects and the Mundlak models, relative to the benefits of formalization for switching firms (results available upon request). Of course, time-invariant observable characteristics such as formal, informal, and switching status are differenced out with fixed effect regression.

[12] Because informal firms in the sample may be relatively more competitive (and profitable), these numbers can be seen as lower bounds.

[13] More precisely, we test the hypothesis that: $Coeff._{Formal\ non\ switcher} = Coeff._{Switcher} + Coeff._{Switcher\ (after\ formalization)}$.

happens is unclear, as previously mentioned. Second, firm size has a positive impact on profits, although at a decreasing rate given that the square of firm size is negative and significant. Third, receiving at least one compliance inspection is positively related to profits, value added, and revenue, both in total amount or per employee. As suggested by Rand and Torm (2012), although this may seem counterintuitive, it may be the case that inspections enhance labour productivity by forcing firms to comply with labour regulations, thereby attracting more productive workers; or improve product quality by pushing firms to comply with hygiene and safety standards. Whether the owner or manager of the firm has completed secondary school matters positively, while the share of production workers has a negative impact; highlighting the importance of human capital and skills.

Following McKenzie and Sakho (2010), we divided the sample in groupings of 0 to 1, 2 to 5, and 6 or more workers (for comparability) to analyse the impact of formalization on different firm size category. Results are presented in Tables 6A, 6B, and 6C. Looking at the coefficient of 'Switcher (after formalization)', we find that, for very small firms, the benefits of switching from informal to formal are positive but not significant. For firms in the middle and large size group, the benefits of formalization are positive.[14] Overall, these results suggest that formalization is beneficial for firms that choose to do so, irrespective of their size; which is somehow consistent with firms making rational decisions relative to formalization.

5.2 On the persistence of formalization effects

A second objective of this study is to analyse the effects of formalization over time, an aspect that is absent in most previous studies. Given that registration costs can affect performance outcomes (negatively) in the year immediately following formalization, the potential benefits of formalization can materialize with a delay. It is therefore important to analyse both the short-term and longer-term effects of formalization.

To analyse persistence, we start by including a variable 'Time since Switching', which measures the number of years since a firm has shifted out of the informal sector in our sample. In the first survey year, 2005, all firms were either formal or informal. The first switchers are recorded in 2007, with formalization having taken place between 2005 and 2007.[15] For all switching firms, we assume that formalization took place in the year between the two surveys. As a result, for firms that were informal in 2005 but formal in 2007, the year of formalization is 2006; and the numbers of years since switching is 1 given that the survey took place in 2007. For these firms that switched in 2007, the number of years since switching becomes 1 in 2007, 3 in 2009, 5 in 2011, and 7 in 2013.[16] For firms that switched in 2009, the number of years since switching is 1 in 2009, 3 in 2011, and 5 in 2013. Finally, for firms that became formal in 2011, the number of years since switching is 1 in 2011 and 3 in 2013, the year of the last survey. In total, the number of firms that switched from the informal to the formal sector for 3, 5, and 7 years is, respectively, 325, 183, and 89.

The results are shown in Tables 7A, 7B, and 7C, under the 'Time trend' column, for OLS and standard random effects.[17] It can be noted that the coefficient of the variable *Switcher* remains

[14] This result contrasts with McKenzie and Sakho (2010) who find a negative impact of formalization on larger firms.

[15] We do not have information about the precise year of formalization.

[16] These numbers can also be interpreted in terms of ranges, that is, between [0,2] in 2007, [2,4] in 2009, [4,6] in 2011 and [6,8] in 2013.

[17] Firms that remained formal throughout the sample have been excluded from this analysis as we do not know the date they became formal. Yet including those firms (using a dummy variable) does not change the results (available upon request).

positive and significant for all outcome indicators, confirming that they are different from firms that remain informal. The coefficient of 'Time since Switching' is positive and significant for all six outcome variables, indicating increasing benefits from formalization as time goes by. A second way to analyse time effect is by looking at formalization benefits after a specific length of time (1, 3, 5, and 7 years). To do so, we create a dummy variable for each length of time using the variable 'Time since Switching'. For profits, we find that the coefficients are positive and significant for all lengths of time (1, 3, 5, and 7), as well as for value added. For total amount of revenue, the effect is positive and significant for lengths 1, 3, and 5 years, but not for length 7; while for revenue per employee, the effects of formalization are positive and significant at all lengths. Our results are therefore supportive of the fact that the benefits of formalization materialize in the short term (length 1) and persist over time (length 3 to 7 years).

5.3 On the transmission channels

There are a number of possible channels through which formality can have a positive impact on firm outcome. These channels include, for example, access to credit, greater opportunities to engage with large firms and the government, or greater access to training and support programmes (Joshi et al. 2012); opportunity to enlarge customer base and lower the costs of corruption (McKenzie and Sakho 2010); ability to lower the cost of contracting labour (Fajnzylber et al. 2011). These channels can be used in designing policies intended to promote registration.

This section analyses some channels through which formalization can benefit firms, namely access to better equipment, to a larger customer pool, to formal credit, to business association membership, and to more advertising (see Table 8). We also look at whether formalization has some behavioural implications relative to formal loan applications. We focus on switchers and their behaviour before and after formalization.

We find that switchers differ from informal non-switchers as they tend to have increased access to powered equipment, particularly when they shift out of the informal sector. In the latter case, the probability of using powered equipment (or both manual and powered equipment) increases significantly, but by a mere 2 per cent. The customer base of switchers tends to be smaller than that of informal non-switching firms, but increases significantly when they formalize, by 13 per cent.[18] This suggests that some firms may switch out of the informal sector in order to alleviate the constraint of a small customer base.

With regard to access to credit, we find that switchers have greater probability of accessing formal loans compared to informal non-switchers.[19] Yet access to credit does not increase with formalization (as in Fajnzylber et al. 2011; McKenzie and Sakho 2010; Rand and Torm 2012). A similar result applies to formal loan applications: switchers are more likely to apply for formal loans than informal non-switchers, but formalization does not change their behaviour, in line with de Andrade et al. (2013).

Our results suggest that switchers have an increased likelihood of being a member of a business association, which can introduce the entrepreneur to new technologies or ways of doing business (Fajnzylber et al. 2011), but only after they become formal (not before). Similarly, the likelihood of advertising increases for switchers, compared to informal non-switchers, after they shift out of the informal sector (see also de Andrade et al. 2013).

[18] Customer base is dummy variable: 0 if less than 20, 1 otherwise.

[19] As noted in Rand and Torm (2012), the CLUR can be used to obtain formal loans, even for informal firms.

In summary, we find that formalization can benefit informal firms through better access to improved equipment, larger customer base, advertising, and business association membership. However, we find no evidence of increased likelihood of applying for formal loans or improved access to credit, a key reason often put forward to explain formalization of informal firms.

6 Conclusion

Using a panel dataset consisting of five waves of SME surveys in Vietnam, this paper analyses the impact of formalization on firm performance, the persistence of these effects in the longer term, and the channels through which these impacts materialized. Such an analysis has been challenging because of potential selection bias and endogeneity, due to the fact that firms choosing to formalize can have different underlying characteristics, such as the owner's abilities or firm preferences, compared to those that remained informal.

To control for unobserved heterogeneity, we created dummy variables that distinguish between three groups of firms: those that remain informal, those that switch to the formal sector, and those that were formal in the first place. Moreover, through the interaction of the variables for firm status (formal vs informal) and the dummy variable for firms that shift out of the informal sector, we obtain the net effects of formalization on informal switchers, after they opt out of the informal sector.

Our results show that switching firms are different from informal non-switching firms. Such heterogeneity is typically assumed in most previous studies. Second, we find that becoming formal leads to an increase in profits, value added, and revenue, in total amount or per employee. Third, formalization is found to be beneficial for firms, irrespective of their size. While the performance of switching firms is higher compared to firms that remained informal, it remains lower compared to non-switching formal firms. Fourth, the benefits of formalization materialize in the short term and persist over time. Finally, we show that benefits of formalization run through better access to improved equipment, a larger customer base, advertising, and business association membership; interestingly, not through improved access to credit.

Our results are broadly consistent with the hypothesis that firms rationally make the decision to formalize by comparing the costs and the benefits. The firms that formalize, on average, made the right decision. Consequently, the results of this study highlight the need for a policy mix that reduces the cost of registration, showcases the potential benefits of formalization, and further increases the attractiveness of the formal sector. The latter strategy could put into place supportive measures to facilitate access to credit, to production equipment, or production facilities. Yet policy makers should also be aware that, for some firms, formalization may simply not be an option.

References

Bell, A., and K. Jones (2015). 'Explaining Fixed Effects: Random Effects Modeling of Time-series Cross-sectional and Panel Data'. *Political Science Research and Methods*, 3(1): 133-53.

Bruhn, M. (2011). 'License to Sell: The Effect of Business Registration Reform on Entrepreneurial Activity in Mexico'. *The Review of Economics and Statistics*, 93(1): 382-86.

Bruhn, M. (2013). 'A Tale of Two Species: Revisiting the Effect of Registration Reform on Informal Business Owners in Mexico'. *Journal of Development Economics*, 103: 275-83.

Bruhn, M., and D. McKenzie (2014). 'Entry Regulation and the Formalization of Microenterprises in Developing Countries'. *World Bank Research Observer*, 29(2): 186-201.

Cling, J.P., M. Razafindrakoto, F. Roubaud, H.T.T. Nguyen, C.H. Nguyen, and T.T.N. Phan (2010). *The Informal Sector in Vietnam: A Focus on Hanoi and Ho Chi Minh City*. Hanoi: Thé Giói Editions.

de Andrade, G.H., M. Bruhn, and D. McKenzie (2013). 'A Helping Hand or the Long Arm of the Law? Experimental Evidence on What Governments Can Do to Formalize Firms'. Policy Research Paper WPS6435. Washington, DC: World Bank.

de Mel, S., D. McKenzie, and C. Woodruff (2011). 'What is the Cost of Formality? Experimentally Estimating the Demand for Formalization'. Working Paper. Coventry: University of Warwick.

de Mel, S., D. McKenzie, and C. Woodruff (2013). 'The Demand for, and Consequences of, Formalization among Informal Firms in Sri Lanka'. *American Economic Journal: Applied Economics*, 5(2): 122-50.

de Soto, H. (1989). *The Other Path: The Invisible Revolution in the Third World*. New York: Harper and Row.

de Vries, G.J. (2010). 'Small Retailers in Brazil: Are Formal Firms Really More Productive?' *Journal of Development Studies*, 46(8): 1345-66.

Fajnzylber, P., W. Maloney, and G. Montes Rojas (2009). 'Releasing Constraints to Growth or Pushing on a String? Policies and Performance of Mexican Micro-firms'. *Journal of Development Studies*, 45(7): 1027-47.

Fajnzylber, P., W. Maloney, and G. Montes Rojas (2011). 'Does Formality Improve Micro-firm Performance? Evidence from the Brazilian SIMPLES Program'. *Journal of Development Economics*, 94(2): 262-76.

Gennaioli, N., R. La Porta, F. Lopez-de-Silanes, and A. Shleifer (2013). 'Human Capital and Regional Development'. *Quarterly Journal of Economics*, 105: 164.

GSO (2004). *Results of Establishment Census of Vietnam 2002: Business Establishments*. Hanoi: Statistical Publishing House.

GSO (2008). *The Real Situation of Enterprises through the Results of Surveys Conducted in 2005, 2006, 2007*. Hanoi: Statistical Publishing House.

Halvorsen, R., and R. Palmquist (1980). 'The Interpretation of Dummy Variables in Semilogarithmic Equations'. *American Economic Review*, 70(3): 474-5.

Jaramillo, M. (2009). 'Is There Demand for Formality among Informal Firms? Evidence from Microfirms in Downtown Lima'. Discussion Paper 12/2009. Bonn: German Development Institute.

Joshi, A., W. Prichard, and C. Heady (2012). 'Taxing the Informal Economy: Challenges, Possibilities and Remaining Questions'. ICTD Working Paper 4. Brighton: Institute of Development Studies

Kaplan, D.S., E. Piedra, and E. Seira (2011). 'Entry Regulation and Business Start-ups: Evidence from Mexico'. *Journal of Public Economics*, 95(11): 1501-15.

Kennedy, P.E. (1981). 'Estimation with Correctly Interpreted Dummy Variables in Semilogarithmic Equations'. *American Economic Review*, 71(4): 801.

La Porta, R., and A. Shleifer (2008). 'The Unofficial Economy and Economic Development'. Brookings Papers on Economic Activity. Washington, DC: Brookings Institution.

Larsen, A.F., J. Rand, and N. Torm (2011). 'Do Recruitment Ties Affect Wages? An Analysis Using Matched Employer–Employee Data from Vietnam'. *Review of Development Economics*, 15(3): 541-55.

Maloney, W.F. (2004). 'Informality Revisited'. *World Development*, 32(7): 1159-78.

McKenzie, D. and Y. Seynabou Sakho (2010). 'Does It Pay Firms to Register for Taxes? The Impact of Formality on Firm Profitability'. *Journal of Development Economics*, 91(1): 15-24.

Monteiro, J., and J.J. Assunção (2012). 'Coming Out of the Shadows? Estimating the Impact of Bureaucracy Simplification and Tax Cut on Formality in Brazilian Microenterprises'. *Journal of Development Economics*, 99(1): 105-15.

Mundlak, Y. (1978). 'On the Pooling of Time Series and Cross Section Data'. *Econometrica*, 46: 69-85.

Nguyen, B.T., J.W. Albrecht, S.B. Vroman, and M.D. Westbrook (2007). 'A Quantile Regression Decomposition of Urban-Rural Inequality in Vietnam'. *Journal of Development Economics*, 83(2): 466-90.

Perry, G., W. Maloney, O. Arias, P. Fajnzylber, A. Mason, and J. Saavedra-Chanduvi (2007). *Informality: Exit and Exclusion*. Washington, DC: World Bank Publications.

Rand, J., and F. Tarp (2011). 'Does Gender Influence the Provision of Fringe Benefits? Evidence from Vietnamese SMEs'. *Feminist Economics*, 17(1): 59-87.

Rand, J., and N. Torm (2012). 'The Benefits of Formalization: Evidence from Vietnamese Manufacturing SMEs'. *World Development*, 40(5): 983-98.

Sharma, S. (2014). 'Benefits of a Registration Policy for Microenterprise Performance in India'. *Small Business Economics*, 42(1): 153-64.

Tables

Note: All tables are based on the author's analyses using data and methods as described in the text.

Table 1: Frequency of firm types

	Overall		Between	
Firm type	Freq.	%	Freq.	%
Informal non-switcher	3,170	26.6	896	26.8
Switcher (informal to formal)	1,859	15.6	458	13.7
Formal non-switcher	6,894	57.8	1,989	59.5
Total	11,923	100.0	3,343	100.0

Source: Author's calculation.

Table 2: Summary statistics of dependent variables

Variable	Year	Obs.	Mean	SD	Min.	Max.
Profits (log, real 1,000 Vietnamese Dong [VND])	2005	2,283	10.50	1.41	6.72	18.40
	2007	2,546	10.72	1.51	5.91	18.45
	2009	2,533	10.74	1.54	0.00	16.89
	2011	2,427	10.84	1.48	6.87	18.20
	2013	2,024	10.55	1.45	0.00	16.85
	All	11,813	10.68	1.49	0.00	18.45
Profits per employee (log, real 1,000 VND)	2005	2,282	8.51	0.89	3.12	15.14
	2007	2,545	8.78	0.94	4.63	13.00
	2009	2,530	8.88	0.84	6.21	13.63
	2011	2,414	9.03	0.89	5.26	14.07
	2013	2,014	8.85	0.86	3.78	12.42
	All	11,785	8.81	0.90	3.12	15.14
Value added (log, real 1,000 VND)	2005	2,293	11.05	1.53	6.72	18.40
	2007	2,555	11.20	1.61	5.91	18.48
	2009	2,537	11.23	1.64	6.80	16.89
	2011	2,433	11.34	1.64	0.00	18.22
	2013	2,040	11.09	1.62	0.00	16.90
	All	11,858	11.19	1.61	0.00	18.48
Value added per employee (log, real 1,000 VND)	2005	2,292	9.06	0.75	5.85	15.14
	2007	2,554	9.26	0.81	5.22	13.05
	2009	2,536	9.36	0.79	6.31	13.63
	2011	2,419	9.54	0.78	6.17	14.09
	2013	2,029	9.39	0.74	5.46	12.45
	All	11,830	9.32	0.79	5.22	15.14
Revenue (log, real 1,000 VND)	2005	2,295	12.25	1.68	7.61	19.05
	2007	2,555	12.39	1.71	8.05	19.52
	2009	2,539	12.45	1.71	0.00	18.23
	2011	2,434	12.52	1.65	7.53	21.51
	2013	2,095	11.94	2.52	0.00	18.15
	All	11,918	12.32	1.87	0.00	21.51
Revenue per employee (log, real 1,000 VND)	2005	2,294	10.26	0.96	6.42	16.32
	2007	2,554	10.45	0.99	6.23	14.85
	2009	2,536	10.59	0.93	7.07	14.90
	2011	2,421	10.71	0.92	6.50	17.39
	2013	2,031	10.55	0.87	6.73	14.58
	All	11,836	10.51	0.95	6.23	17.39

Source: Author's calculation.

Table 3: Summary statistics of independent variables

Variable	Year	Obs.	Mean	SD	Min.	Max.
Share of female employees	2005	2,296	0.36	0.28	0.00	1.00
	2007	2,555	0.37	0.27	0.00	1.00
	2009	2,539	0.37	0.27	0.00	1.00
	2011	2,435	0.37	0.26	0.00	1.00
	2013	2,097	0.39	0.26	0.00	1.00
	All	11,922	0.37	0.27	0.00	1.00
Share of production workers	2005	2,296	0.83	0.17	0.00	1.00
	2007	2,555	0.65	0.22	0.00	0.99
	2009	2,539	0.65	0.21	0.00	0.98
	2011	2,435	0.63	0.22	0.00	0.97
	2013	2,097	0.60	0.23	0.00	1.00
	All	11,922	0.67	0.22	0.00	1.00
Firm size (log (1+employment))	2005	2,296	2.18	1.02	0.69	6.80
	2007	2,555	2.14	1.04	0.00	7.17
	2009	2,539	2.08	1.00	0.00	6.22
	2011	2,435	2.03	1.02	0.00	5.77
	2013	2,097	1.95	0.99	0.00	7.44
	All	11,922	2.08	1.02	0.00	7.44
Firm size square (log (1+employment))	2005	2,296	5.80	5.69	0.48	46.27
	2007	2,555	5.66	5.83	0.00	51.42
	2009	2,539	5.32	5.29	0.00	38.65
	2011	2,435	5.16	5.33	0.00	33.35
	2013	2,097	4.79	5.06	0.00	55.34
	All	11,922	5.36	5.47	0.00	55.34
Gender of owner/manager (female = 0, male = 1)	2005	2,296	0.69	0.46	0.00	1.00
	2007	2,555	0.67	0.47	0.00	1.00
	2009	2,539	0.66	0.47	0.00	1.00
	2011	2,435	0.63	0.48	0.00	1.00
	2013	2,096	0.61	0.49	0.00	1.00
	All	11,921	0.65	0.48	0.00	1.00
Own land use right certificate, CLUR (no = 0, yes = 1)	2005	2,101	0.60	0.49	0.00	1.00
	2007	2,555	0.57	0.50	0.00	1.00
	2009	2,539	0.61	0.49	0.00	1.00
	2011	2,435	0.66	0.47	0.00	1.00
	2013	2,098	0.70	0.46	0.00	1.00
	All	11,728	0.63	0.48	0.00	1.00

Variable	Year	Obs.	Mean	SD	Min.	Max.
Compliance inspections (no = 0, yes = 1)	2005	2,296	0.47	0.50	0.00	1.00
	2007	2,555	0.58	0.49	0.00	1.00
	2009	2,539	0.57	0.49	0.00	1.00
	2011	2,435	0.06	0.24	0.00	1.00
	2013	2,098	0.01	0.10	0.00	1.00
	All	11,923	0.35	0.48	0.00	1.00
Owner/manager completed secondary school	2005	2,296	0.57	0.50	0.00	1.00
	2007	2,555	0.55	0.50	0.00	1.00
	2009	2,539	0.58	0.49	0.00	1.00
	2011	2,435	0.62	0.49	0.00	1.00
	2013	2,098	0.70	0.46	0.00	1.00
	All	11,923	0.60	0.49	0.00	1.00
Medium-high tech sector dummy	2005	2,291	0.36	0.48	0.00	1.00
	2007	2,555	0.34	0.47	0.00	1.00
	2009	2,539	0.34	0.47	0.00	1.00
	2011	2,435	0.34	0.47	0.00	1.00
	2013	2,095	0.33	0.47	0.00	1.00
	All	11,915	0.34	0.47	0.00	1.00
Year since switching to formal	2005	2,296	0.00	0.00	0.00	0.00
	2007	2,555	0.00	0.00	0.00	0.00
	2009	2,539	0.10	0.44	0.00	2.00
	2011	2,435	0.25	0.88	0.00	4.00
	2013	2,098	0.50	1.44	0.00	6.00
	All	11,923	0.16	0.77	0.00	6.00

Source: Author’s calculation.

Table 4: Summary statistics of dependent and independent variables, by firm types

	Informal non-switcher			Switcher (informal to formal)			Formal non-switcher		
VARIABLES	N	Mean	SD	N	Mean	SD	N	Mean	SD
Dependent									
Profit (log, real 1,000 VND)	896	9.59	0.95	458	10.27	0.82	1989	11.34	1.26
Profit per employee (log, real 1,000 VND)	896	8.57	0.59	458	8.73	0.56	1989	8.96	0.69
Value added (log, real 1,000 VND)	896	9.87	1.14	458	10.79	0.95	1989	11.96	1.32
Value added per employee (log, real 1,000 VND)	896	8.85	0.62	458	9.24	0.47	1989	9.58	0.54
Revenue (log, real 1,000 VND)	896	11.01	1.23	458	11.94	1.01	1989	13.08	1.50
Revenue per employee (log, real 1,000 VND)	896	10.04	0.74	458	10.41	0.63	1989	10.78	0.73
Independent									
Share of female employees	896	0.41	0.26	458	0.34	0.25	1989	0.37	0.22
Share of production workers	896	0.61	0.19	458	0.70	0.15	1989	0.69	0.14
Firm size (number of full-time workers)	896	5.53	32.92	458	7.30	11.25	1989	23.78	49.42
Gender of owner/manager (female = 0, male = 1)	896	0.67	0.40	458	0.72	0.36	1989	0.62	0.40
Own land use right certificate, CLUR (no = 0, yes = 1)	896	0.73	0.36	458	0.69	0.37	1989	0.53	0.41
Compliance inspections (no = 0, yes = 1)	896	0.13	0.20	458	0.30	0.27	1989	0.47	0.31
Owner/manager completed secondary school	896	0.42	0.41	458	0.52	0.39	1989	0.72	0.37
Medium-high tech sector dummy	896	0.23	0.41	458	0.32	0.46	1989	0.39	0.46

Note: The time-series average of each variable is first calculated by firm, before the average group statistics are computed.

Source: Author's calculation.

Table 5A: Effects of formality on profits

	(1)	(2)	(3)	(4)	(5)	(6)
	Log profit (real 1,000 VND)			Log profit per employee (real 1,000 VND)		
VARIABLES	OLS	GLS	MUNDLAK	OLS	GLS	MUNDLAK
Formal non-switcher	0.32***	0.43***	0.19***	0.31***	0.42***	0.18***
	(0.03)	(0.03)	(0.04)	(0.03)	(0.03)	(0.04)
Switcher (from informal to formal)	0.15***	0.17***	0.07*	0.16***	0.18***	0.09**
	(0.04)	(0.04)	(0.04)	(0.03)	(0.04)	(0.04)
Switcher (after formalization)	0.06	0.10**	0.10**	0.03	0.08**	0.08**
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Share of female employees	-0.34***	-0.23***	0.01	-0.32***	-0.21***	0.03
	(0.03)	(0.04)	(0.05)	(0.03)	(0.04)	(0.05)
Share of production workers	-0.32***	-0.16***	0.14***	-0.42***	-0.25***	0.07
	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	(0.05)
Firm size (log (1+employement))	1.12***	0.98***	0.65***	-0.29***	-0.44***	-0.82***
	(0.05)	(0.05)	(0.06)	(0.04)	(0.05)	(0.06)
Firm size square (log (1+employment))	-0.02***	-0.01	-0.01	0.03***	0.05***	0.06***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Gender of owner/manager (female = 0, male = 1)	-0.02	0.00	0.04	-0.02	-0.00	0.03
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Own land use right certificate, CLUR (no = 0, yes = 1)	0.04**	0.03	0.06***	0.03*	0.02	0.06**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Compliance inspections (no = 0, yes = 1)	0.22***	0.19***	0.17***	0.21***	0.19***	0.18***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Owner/manager completed secondary school	0.15***	0.13***	0.02	0.15***	0.13***	0.03
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Medium-high tech sector dummy	-0.03	-0.02	-0.06**	-0.02	-0.01	-0.05**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Constant	8.29***	8.32***	8.23***	9.15***	9.18***	9.09***
	(0.07)	(0.08)	(0.08)	(0.06)	(0.07)	(0.08)
Observations	11,506	11,506	11,506	11,478	11,478	11,478
R-squared	0.68			0.16		
Time dummies included	Yes	Yes	Yes	Yes	Yes	Yes
Province dummies included	Yes	Yes	Yes	Yes	Yes	Yes
Number of panels		3,303	3,303		3,303	3,303

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. In Mundlak's model, the panel mean of independent variables is included in the regression, except:
Formal non-switcher, Switcher (from informal to formal), Switcher (after formalization).

Source: Author's calculation.

Table 5B: Effects of formality on value added

	(1)	(2)	(3)	(4)	(5)	(6)
	Log value added (real 1,000 VND)			Log value added per employee (real 1,000 VND)		
VARIABLES	OLS	GLS	MUNDLAK	OLS	GLS	MUNDLAK
Formal non-switcher	0.39***	0.50***	0.24***	0.36***	0.48***	0.23***
	(0.02)	(0.03)	(0.03)	(0.02)	(0.03)	(0.03)
Switcher (from informal to formal)	0.24***	0.28***	0.16***	0.24***	0.28***	0.16***
	(0.03)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)
Switcher (after formalization)	0.06*	0.08**	0.08***	0.04	0.07**	0.07**
	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Share of female employees	-0.39***	-0.27***	-0.02	-0.39***	-0.27***	-0.02
	(0.03)	(0.03)	(0.04)	(0.03)	(0.03)	(0.04)
Share of production workers	-0.06	0.02	0.20***	-0.20***	-0.11***	0.11***
	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Firm size (log (1+employment))	1.60***	1.44***	1.06***	0.22***	0.05	-0.38***
	(0.04)	(0.05)	(0.05)	(0.03)	(0.04)	(0.05)
Firm size square (log (1+employment))	-0.07***	-0.06***	-0.04***	-0.03***	-0.01	0.02*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Gender of owner/manager (female = 0, male = 1)	-0.02	-0.01	0.02	-0.03*	-0.01	0.01
	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)
Own land use right certificate, CLUR (no = 0, yes = 1)	-0.00	-0.01	0.01	-0.01	-0.01	0.02
	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)
Compliance inspections (no = 0, yes = 1)	0.17***	0.15***	0.13***	0.16***	0.15***	0.13***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Owner/manager completed secondary school	0.16***	0.14***	0.03	0.17***	0.14***	0.04*
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)
Medium-high tech sector dummy	0.01	0.03*	-0.01	0.01	0.03	-0.02
	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)
Constant	7.88***	7.98***	7.74***	8.75***	8.86***	8.63***
	(0.06)	(0.07)	(0.07)	(0.05)	(0.06)	(0.06)
Observations	11,550	11,550	11,550	11,522	11,522	11,522
R-squared	0.82			0.31		
Time dummies included	Yes	Yes	Yes	Yes	Yes	Yes
Province dummies included	Yes	Yes	Yes	Yes	Yes	Yes
Number of panels		3,303	3,303		3,303	3,303

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. In Mundlak's model, the panel mean of independent variables is included in the regression, except:
Formal non-switcher, Switcher (from informal to formal), Switcher (after formalization).

Source: Author's calculation.

Table 5C: Effects of formality on revenue

	(1)	(2)	(3)	(4)	(5)	(6)
	Log revenue (real 1,000 VND)			Log revenue per employee (real 1,000 VND)		
VARIABLES	OLS	GLS	MUNDLAK	OLS	GLS	MUNDLAK
Formal non-switcher	0.43***	0.50***	0.29***	0.46***	0.67***	0.30***
	(0.04)	(0.05)	(0.05)	(0.03)	(0.04)	(0.04)
Switcher (from informal to formal)	0.24***	0.25***	0.16***	0.27***	0.33***	0.18***
	(0.04)	(0.05)	(0.06)	(0.04)	(0.04)	(0.04)
Switcher (after formalization)	0.11**	0.14***	0.14**	0.05	0.09***	0.09***
	(0.05)	(0.04)	(0.05)	(0.04)	(0.04)	(0.03)
Share of female employees	-0.43***	-0.33***	-0.12	-0.49***	-0.27***	-0.03
	(0.05)	(0.05)	(0.08)	(0.03)	(0.04)	(0.05)
Share of production workers	-0.20**	-0.11	0.18***	-0.57***	-0.32***	-0.04
	(0.09)	(0.09)	(0.07)	(0.05)	(0.04)	(0.04)
Firm size (log (1+employement))	1.49***	1.39***	0.98***	0.18***	-0.09*	-0.44***
	(0.07)	(0.07)	(0.08)	(0.04)	(0.05)	(0.05)
Firm size square (log (1+employment))	-0.06***	-0.05***	-0.03**	-0.02**	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Gender of owner/manager (female = 0, male = 1)	-0.03	-0.03	-0.02	-0.04**	-0.01	0.01
	(0.03)	(0.03)	(0.04)	(0.02)	(0.02)	(0.02)
Own land use right certificate, CLUR (no = 0, yes = 1)	-0.01	-0.03	-0.03	-0.03	-0.03*	0.01
	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)
Compliance inspections (no = 0, yes = 1)	0.26***	0.23***	0.21***	0.22***	0.18***	0.16***
	(0.03)	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)
Owner/manager completed secondary school	0.15***	0.14***	0.06*	0.17***	0.13***	0.03
	(0.02)	(0.03)	(0.04)	(0.02)	(0.02)	(0.02)
Medium-high tech sector dummy	0.08***	0.12***	0.09***	0.00	0.04	-0.02
	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)
Constant	9.32***	9.35***	9.18***	10.25***	10.34***	10.17***
	(0.10)	(0.11)	(0.11)	(0.06)	(0.07)	(0.09)
Observations	11,605	11,605	11,605	11,528	11,528	11,528
R-squared	0.60			0.22		
Time dummies included	Yes	Yes	Yes	Yes	Yes	Yes
Province dummies included	Yes	Yes	Yes	Yes	Yes	Yes
Number of panels		3,303	3,303		3,303	3,303

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. In Mundlak's model, the panel mean of independent variables is included in the regression, except:
Formal non-switcher, Switcher (from informal to formal), Switcher (after formalization).

Source: Author's calculation.

Table 6A: Effects of formality on profit, by size category

	(1)	(2)	(3)	(4)	(5)	(6)
	Log profit (real 1,000 VND)			Log profit per employee (real 1,000 VND)		
VARIABLES	Q. 1	Q. 2	Q. 3	Q. 1	Q. 2	Q. 3
Formal non-switcher	0.49***	0.55***	1.16***	0.34**	0.31***	0.36***
	(0.14)	(0.05)	(0.07)	(0.13)	(0.04)	(0.06)
Switcher (from informal to formal)	-0.08	0.35***	0.25***	0.13	0.20***	0.12
	(0.31)	(0.04)	(0.09)	(0.16)	(0.04)	(0.07)
Switcher (after formalization)	0.24	0.08*	0.21***	0.10	0.04	0.11*
	(0.32)	(0.05)	(0.08)	(0.17)	(0.04)	(0.06)
Share of female employees	-0.03	-0.20***	0.18**	-0.12	-0.10**	-0.46***
	(0.15)	(0.05)	(0.08)	(0.13)	(0.05)	(0.06)
Share of production workers	0.25**	0.26***	0.26**	0.20*	-0.24***	-1.09***
	(0.12)	(0.06)	(0.11)	(0.12)	(0.06)	(0.09)
Gender of owner/manager (female = 0, male = 1)	0.16	-0.01	0.01	0.02	0.04	-0.00
	(0.13)	(0.03)	(0.04)	(0.09)	(0.03)	(0.03)
Own land use right certificate, CLUR (no = 0, yes = 1)	0.07	-0.01	-0.09**	0.05	-0.01	0.09***
	(0.07)	(0.03)	(0.03)	(0.07)	(0.02)	(0.03)
Compliance inspections (no = 0, yes = 1)	0.24**	0.21***	0.27***	0.17*	0.18***	0.18***
	(0.10)	(0.03)	(0.04)	(0.10)	(0.03)	(0.03)
Owner/manager completed secondary school	0.01	0.12***	0.32***	0.09	0.08***	0.12***
	(0.07)	(0.02)	(0.04)	(0.07)	(0.02)	(0.03)
Medium-high tech sector dummy	-0.03	-0.02	-0.01	0.03	-0.03	-0.01
	(0.11)	(0.03)	(0.04)	(0.09)	(0.03)	(0.03)
Constant	8.40***	9.52***	9.74***	8.92***	8.78***	8.97***
	(0.72)	(0.09)	(0.13)	(0.28)	(0.08)	(0.11)
Observations	728	5,122	5,656	705	5,121	5,652
Number of panels	444	2,000	2,059	430	2,000	2,059
Time dummies included	Yes	Yes	Yes	Yes	Yes	Yes
Province dummies included	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Q. 1 corresponds to 0 to 1 workers; Q. 2 corresponds to 2 to 5 workers; Q. 3 corresponds to 6 workers and more.
Source: Author's calculation.

Table 6B: Effects of formality on value added, by size category

	(1)	(2)	(3)	(4)	(5)	(6)
	Log value added (real 1,000 VND)			Log value added per employee (real 1,000 VND)		
VARIABLES	Q. 1	Q. 2	Q. 3	Q. 1	Q. 2	Q. 3
Formal non-switcher	0.58***	0.74***	1.22***	0.51***	0.48***	0.38***
	(0.18)	(0.05)	(0.07)	(0.14)	(0.04)	(0.05)
Switcher (from informal to formal)	0.03	0.47***	0.34***	0.19	0.31***	0.15***
	(0.31)	(0.05)	(0.07)	(0.17)	(0.04)	(0.06)
Switcher (after formalization)	0.16	0.10**	0.16***	0.08	0.06	0.11**
	(0.30)	(0.04)	(0.06)	(0.17)	(0.04)	(0.05)
Share of female employees	-0.01	-0.42***	0.30***	-0.16	-0.35***	-0.29***
	(0.16)	(0.05)	(0.07)	(0.13)	(0.05)	(0.04)
Share of production workers	0.39***	0.50***	0.66***	0.26**	0.02	-0.66***
	(0.13)	(0.06)	(0.11)	(0.12)	(0.06)	(0.07)
Gender of owner/manager (female = 0, male = 1)	0.16	-0.03	0.01	0.02	0.02	-0.02
	(0.13)	(0.03)	(0.03)	(0.10)	(0.02)	(0.02)
Own land use right certificate, CLUR (no = 0, yes = 1)	0.03	-0.05**	-0.11***	0.02	-0.04*	0.01
	(0.08)	(0.03)	(0.03)	(0.07)	(0.02)	(0.02)
Compliance inspections (no = 0, yes = 1)	0.22**	0.20***	0.22***	0.18*	0.17***	0.14***
	(0.11)	(0.03)	(0.03)	(0.10)	(0.02)	(0.02)
Owner/manager completed secondary school	-0.01	0.16***	0.27***	0.10	0.12***	0.14***
	(0.07)	(0.02)	(0.03)	(0.07)	(0.02)	(0.02)
Medium-high tech sector dummy	0.07	0.05*	0.03	0.06	0.03	0.01
	(0.14)	(0.03)	(0.05)	(0.10)	(0.02)	(0.02)
Constant	8.33***	9.72***	10.17***	8.86***	8.97***	9.39***
	(0.74)	(0.09)	(0.14)	(0.28)	(0.08)	(0.08)
Observations	729	5,129	5,692	705	5,129	5,688
Number of panels	445	2,002	2,059	430	2,002	2,059
Time dummies included	Yes	Yes	Yes	Yes	Yes	Yes
Province dummies included	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Q. 1 corresponds to 0 to 1 workers; Q. 2 corresponds to 2 to 5 workers; Q. 3 corresponds to 6 workers and more.

Source: Author's calculation.

Table 6C: Effects of formality on revenue, by size category

	(1)	(2)	(3)	(4)	(5)	(6)
	Log revenue (real 1,000 VND)			Log revenue per employee (real 1,000 VND)		
VARIABLES	Q. 1	Q. 2	Q. 3	Q. 1	Q. 2	Q. 3
Formal non-switcher	0.45	0.72***	1.34***	0.61***	0.51***	0.68***
	(0.33)	(0.07)	(0.09)	(0.16)	(0.05)	(0.07)
Switcher (from informal to formal)	-0.19	0.54***	0.37***	0.26	0.38***	0.25***
	(0.39)	(0.06)	(0.09)	(0.21)	(0.05)	(0.08)
Switcher (after formalization)	0.38	0.09	0.24***	0.10	0.02	0.18***
	(0.40)	(0.06)	(0.07)	(0.23)	(0.05)	(0.06)
Share of female employees	0.14	-0.39***	0.22**	-0.24	-0.31***	-0.38***
	(0.24)	(0.07)	(0.10)	(0.15)	(0.06)	(0.06)
Share of production workers	0.29	0.38***	0.71***	0.10	-0.13**	-0.99***
	(0.21)	(0.09)	(0.24)	(0.13)	(0.07)	(0.08)
Gender of owner/manager (female = 0, male = 1)	0.22	-0.03	-0.07	-0.04	0.02	-0.03
	(0.20)	(0.04)	(0.05)	(0.11)	(0.03)	(0.03)
Own land use right certificate, CLUR (no = 0, yes = 1)	-0.12	0.01	-0.27***	-0.06	0.00	-0.03
	(0.15)	(0.04)	(0.04)	(0.08)	(0.03)	(0.02)
Compliance inspections (no = 0, yes = 1)	0.26	0.25***	0.30***	0.10	0.21***	0.14***
	(0.17)	(0.03)	(0.04)	(0.12)	(0.03)	(0.03)
Owner/manager completed secondary school	-0.17	0.15***	0.45***	0.06	0.10***	0.13***
	(0.12)	(0.03)	(0.05)	(0.08)	(0.02)	(0.03)
Medium-high tech sector dummy	0.45**	0.06	0.19***	0.08	0.02	0.02
	(0.20)	(0.05)	(0.06)	(0.11)	(0.03)	(0.03)
Constant	8.86***	10.83***	11.25***	9.98***	10.08***	10.70***
	(1.03)	(0.11)	(0.22)	(0.38)	(0.09)	(0.11)
Observations	737	5,146	5,722	704	5,131	5,693
Number of panels	449	2,005	2,059	430	2,001	2,059
Time dummies included	Yes	Yes	Yes	Yes	Yes	Yes
Province dummies included	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Q. 1 corresponds to 0 to 1 workers; Q. 2 corresponds to 2 to 5 workers; Q. 3 corresponds to 6 workers and more.
Source: Author's calculation.

Table 7A: Persistence of the effects of formality on profits

	Log profit (real 1,000 VND)				Log profit per employee (real 1,000 VND)			
	Time trend		Time dummy		Time trend		Time dummy	
VARIABLES	OLS	GLS	OLS	GLS	OLS	GLS	OLS	GLS
Switcher (from informal to formal)	0.13***	0.14***	0.07*	0.08*	0.16***	0.17***	0.10***	0.10***
	(0.03)	(0.04)	(0.04)	(0.04)	(0.03)	(0.04)	(0.03)	(0.04)
Share of female employees	-0.32***	-0.22***	-0.32***	-0.22***	-0.31***	-0.21***	-0.31***	-0.21***
	(0.05)	(0.06)	(0.05)	(0.06)	(0.05)	(0.05)	(0.05)	(0.05)
Share of production workers	-0.23***	-0.16***	-0.21***	-0.14***	-0.29***	-0.21***	-0.27***	-0.19***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Firm size (log (1+employement))	1.27***	1.12***	1.25***	1.11***	-0.32***	-0.50***	-0.34***	-0.51***
	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.10)	(0.09)	(0.10)
Firm size square (log (1+employment))	-0.07***	-0.06***	-0.07***	-0.05***	0.01	0.04	0.02	0.04
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Gender of owner/manager (female = 0, male = 1)	0.01	0.02	0.01	0.01	-0.01	-0.00	-0.01	-0.01
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Own land use right certificate, CLUR (no = 0, yes = 1)	0.06**	0.05*	0.07***	0.05*	0.06**	0.05*	0.06**	0.05*
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.03)	(0.02)	(0.03)
Compliance inspections (no = 0, yes = 1)	0.07**	0.07**	0.06**	0.07**	0.06*	0.07**	0.05*	0.06**
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Owner/manager completed secondary school	0.11***	0.10***	0.11***	0.09***	0.11***	0.10***	0.10***	0.10***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Medium-high tech sector dummy	-0.08***	-0.07**	-0.08***	-0.07*	-0.07***	-0.05	-0.07***	-0.05
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Time since becoming formal – Trend	0.04***	0.05***			0.03***	0.05***		
	(0.01)	(0.01)			(0.01)	(0.01)		
Time since becoming formal (dummy, 1 year)			0.20***	0.22***			0.20***	0.23***
			(0.05)	(0.04)			(0.04)	(0.04)
Time since becoming formal (dummy, 3years)			0.24***	0.26***			0.22***	0.26***
			(0.05)	(0.05)			(0.05)	(0.05)
Time since becoming formal (dummy, 5 years)			0.27***	0.34***			0.26***	0.33***
			(0.06)	(0.06)			(0.06)	(0.06)
Time since becoming formal (dummy, 7 years)			0.14**	0.20***			0.11	0.18**
			(0.07)	(0.07)			(0.07)	(0.07)
Constant	8.53***	8.63***	8.53***	8.63***	9.56***	9.68***	9.56***	9.69***
	(0.11)	(0.12)	(0.11)	(0.12)	(0.09)	(0.10)	(0.09)	(0.10)
Observations	4,906	4,906	4,906	4,906	4,894	4,894	4,894	4,894
R-squared	0.50		0.50		0.13		0.14	
Time dummies included	No	No	No	No	No	No	No	No
Province dummies included	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of panel		1,354		1,354		1,354		1,354

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Source: Author's calculation.

Table 7B: Persistence of the effects of formality on value added

	Log value added (real 1,000 VND)				Log value added per employee (real 1,000 VND)			
	Time trend		Time dummy		Time trend		Time dummy	
VARIABLES	OLS	GLS	OLS	GLS	OLS	GLS	OLS	GLS
Switcher (from informal to formal)	0.16***	0.19***	0.11***	0.13***	0.18***	0.21***	0.12***	0.15***
	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.03)	(0.03)	(0.04)
Share of female employees	-0.46***	-0.33***	-0.46***	-0.33***	-0.46***	-0.33***	-0.46***	-0.33***
	(0.04)	(0.05)	(0.04)	(0.05)	(0.04)	(0.05)	(0.04)	(0.05)
Share of production workers	-0.17***	-0.12**	-0.15***	-0.10**	-0.23***	-0.17***	-0.22***	-0.15***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Firm size (log (1+employement))	1.79***	1.56***	1.78***	1.55***	0.22***	-0.03	0.20***	-0.05
	(0.08)	(0.09)	(0.08)	(0.09)	(0.06)	(0.07)	(0.06)	(0.07)
Firm size square (log (1+employment))	-0.11***	-0.08***	-0.11***	-0.08***	-0.02*	0.01	-0.02*	0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Gender of owner/manager (female = 0, male = 1)	-0.02	0.00	-0.02	-0.00	-0.03	-0.01	-0.03	-0.01
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Own land use right certificate, CLUR (no = 0, yes = 1)	0.01	0.00	0.01	0.01	0.00	-0.00	0.00	0.00
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Compliance inspections (no = 0, yes = 1)	0.05**	0.06**	0.05*	0.06**	0.05*	0.06**	0.04*	0.05**
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Owner/manager completed secondary school	0.15***	0.12***	0.14***	0.12***	0.15***	0.13***	0.14***	0.12***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Medium-high tech sector dummy	0.01	0.05	0.01	0.05	0.02	0.06*	0.02	0.06**
	(0.02)	(0.03)	(0.02)	(0.03)	(0.02)	(0.03)	(0.02)	(0.03)
Time since becoming formal – Trend	0.05***	0.06***			0.05***	0.06***		
	(0.01)	(0.01)			(0.01)	(0.01)		
Time since becoming formal (dummy, 1 year)			0.19***	0.21***			0.21***	0.23***
			(0.04)	(0.04)			(0.04)	(0.03)
Time since becoming formal (dummy, 3 years)			0.25***	0.28***			0.25***	0.28***
			(0.04)	(0.04)			(0.04)	(0.04)
Time since becoming formal (dummy, 5 years)			0.32***	0.39***			0.32***	0.39***
			(0.05)	(0.05)			(0.05)	(0.05)
Time since becoming formal (dummy, 7 years)			0.23***	0.30***			0.21***	0.29***
			(0.05)	(0.06)			(0.05)	(0.06)
Constant	8.20***	8.38***	8.20***	8.38***	9.23***	9.42***	9.23***	9.43***
	(0.11)	(0.12)	(0.11)	(0.12)	(0.07)	(0.09)	(0.07)	(0.09)
Observations	4,912	4,912	4,912	4,912	4,901	4,901	4,901	4,901
R-squared	0.69		0.69		0.20		0.21	
Time dummies included	No	No	No	No	No	No	No	No
Province dummies included	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of panel		1,354		1,354		1,354		1,354

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Source: Author's calculation.

Table 7C: Persistence of the effects of formality on revenue

	Log revenue (real 1000 VND)				Log revenue per employee (real 1000 VND)			
	Time trend		Time dummy		Time trend		Time dummy	
VARIABLES	OLS	GLS	OLS	GLS	OLS	GLS	OLS	GLS
Switcher (from informal to formal)	0.25***	0.27***	0.19***	0.21***	0.24***	0.27***	0.18***	0.21***
	(0.04)	(0.05)	(0.04)	(0.05)	(0.03)	(0.05)	(0.04)	(0.05)
Share of female employees	-0.43***	-0.28***	-0.43***	-0.28***	-0.53***	-0.36***	-0.53***	-0.36***
	(0.07)	(0.09)	(0.07)	(0.09)	(0.05)	(0.06)	(0.05)	(0.06)
Share of production workers	-0.13	-0.08	-0.11	-0.06	-0.40***	-0.29***	-0.39***	-0.26***
	(0.09)	(0.08)	(0.09)	(0.08)	(0.06)	(0.05)	(0.06)	(0.05)
Firm size (log (1+employement))	1.71***	1.50***	1.70***	1.49***	0.10	-0.21**	0.08	-0.23***
	(0.13)	(0.13)	(0.13)	(0.13)	(0.08)	(0.09)	(0.08)	(0.09)
Firm size square (log (1+employment))	-0.12***	-0.09***	-0.12***	-0.09***	-0.02	0.01	-0.02	0.02
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
Gender of owner/manager (female = 0, male = 1)	-0.02	-0.01	-0.02	-0.01	-0.03	-0.01	-0.03	-0.01
	(0.04)	(0.05)	(0.04)	(0.05)	(0.03)	(0.03)	(0.03)	(0.03)
Own land use right certificate, CLUR (no = 0, yes = 1)	0.06	0.05	0.07*	0.05	0.02	0.02	0.02	0.02
	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)
Compliance inspections (no = 0, yes = 1)	0.16***	0.16***	0.16***	0.16***	0.12***	0.12***	0.12***	0.12***
	(0.04)	(0.03)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Owner/manager completed secondary school	0.09***	0.07*	0.09***	0.06*	0.15***	0.12***	0.14***	0.11***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.03)	(0.02)	(0.03)
Medium-high tech sector dummy	0.00	0.13*	0.00	0.13**	-0.07**	-0.01	-0.07**	-0.01
	(0.04)	(0.07)	(0.04)	(0.07)	(0.03)	(0.04)	(0.03)	(0.04)
Time since becoming formal – trend	0.03**	0.04***			0.04***	0.05***		
	(0.01)	(0.01)			(0.01)	(0.01)		
Time since becoming formal (dummy, 1 year)			0.20***	0.23***			0.20***	0.24***
			(0.06)	(0.05)			(0.05)	(0.04)
Time since becoming formal (dummy, 3years)			0.16**	0.19***			0.20***	0.23***
			(0.07)	(0.06)			(0.05)	(0.04)
Time since becoming formal (dummy, 5 years)			0.34***	0.40***			0.31***	0.38***
			(0.07)	(0.06)			(0.06)	(0.06)
Time since becoming formal (dummy, 7 years)			0.06	0.14			0.17**	0.25***
			(0.17)	(0.16)			(0.08)	(0.08)
Constant	9.28***	9.42***	9.28***	9.42***	10.60***	10.83***	10.60***	10.83***
	(0.17)	(0.20)	(0.17)	(0.20)	(0.10)	(0.11)	(0.10)	(0.11)
Observations	4,928	4,928	4,928	4,928	4,901	4,901	4,901	4,901
R-squared	0.45		0.45		0.14		0.14	
Time dummies included	No	No	No	No	No	No	No	No
Province dummies included	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of panel_id		1,354		1,354		1,354		1,354

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Source: Author's calculation.

Table 8: Transmission channels of the effects of formality

VARIABLES	(1) Type of machinery	(2) Size of customer base	(3) Firm has access to formal credit	(4) Firm has applied for formal credit	(5) Firm is member of business association	(6) Firm advertises
Formal non-switcher	0.99***	-0.05	0.42***	0.39***	0.74***	1.60***
	(0.21)	(0.10)	(0.14)	(0.13)	(0.25)	(0.28)
Switcher (from informal to formal)	0.45*	-0.45***	0.41***	0.32**	-0.38	0.51
	(0.24)	(0.12)	(0.16)	(0.15)	(0.31)	(0.38)
Switcher (after formalization)	0.53**	0.56***	-0.14	-0.03	0.82***	0.89***
	(0.22)	(0.12)	(0.14)	(0.13)	(0.28)	(0.32)
Share of female employees	-1.67***	0.28***	-0.66***	-0.66***	0.81***	0.51**
	(0.21)	(0.11)	(0.14)	(0.14)	(0.24)	(0.21)
Share of production workers	-0.36*	0.23*	0.52***	0.51***	-1.47***	-2.33***
	(0.21)	(0.12)	(0.16)	(0.15)	(0.30)	(0.26)
Firm size (log (1+employment))	1.27***	-0.19*	1.07***	1.06***	2.44***	2.33***
	(0.23)	(0.12)	(0.16)	(0.16)	(0.27)	(0.24)
Firm size square (log (1+employment))	-0.14***	0.01	-0.02	-0.02	-0.20***	-0.17***
	(0.04)	(0.02)	(0.03)	(0.03)	(0.04)	(0.04)
Gender of owner/manager (female = 0, male = 1)	0.06	0.04	-0.30***	-0.29***	0.21*	-0.10
	(0.11)	(0.06)	(0.07)	(0.07)	(0.11)	(0.10)
Own land use right certificate, CLUR (no = 0, yes = 1)	0.03	0.17***	-0.06	-0.09	0.07	0.05
	(0.11)	(0.05)	(0.07)	(0.07)	(0.11)	(0.10)
Compliance inspections (no = 0, yes = 1)	0.02	-0.60***	0.52***	0.48***	0.35***	0.01
	(0.10)	(0.05)	(0.06)	(0.06)	(0.10)	(0.09)
Owner/manager completed secondary school	0.25**	0.01	-0.03	-0.04	0.23*	0.62***
	(0.11)	(0.06)	(0.07)	(0.07)	(0.13)	(0.12)
Medium-high tech sector dummy	0.22	0.15**	-0.03	-0.02	0.08	0.12
	(0.14)	(0.06)	(0.08)	(0.08)	(0.14)	(0.11)
Constant	2.04***	-0.12	-4.37***	-4.08***	-8.86***	-7.70***
	(0.38)	(0.18)	(0.26)	(0.25)	(0.47)	(0.44)
lnsig2u	1.62***	0.01	0.91***	0.81***	1.32***	0.84***
	(0.09)	(0.08)	(0.07)	(0.07)	(0.10)	(0.11)
Observations	11,577	11,466	11,608	11,592	11,607	11,605
Number of panels	3,303	3,301	3,303	3,303	3,303	3,303
Time dummies included	Yes	Yes	Yes	Yes	Yes	Yes
Province dummies included	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: Author's calculation.