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Investment behavior of MSMEs during the downturn periods: Empirical evidence from Vietnam

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ABSTRACT

This paper analyzes panel data of micro, small, and medium-sized enterprises (MSMEs) in Vietnam, covering five two-year periods from 2003 to 2012, in order to understand how MSMEs’ investments in their own productive fixed assets and their financial investment changed during and after the global financial crisis of 2008. It finds that MSMEs decreased productive investment and increased financial investments substantially in these periods. This, along with other findings, suggests that the global financial crisis marked the beginning of reallocation of hitherto proliferating MSMEs’ resources away from their own businesses to some rapidly growing listed firms in the Vietnamese economy.

1. Introduction

In emerging market economies (EMEs), non-financial firms can invest in other firms as well as their own production capacities and innovative activities unlike their counterparts in low-income developing countries that are without stock markets (Demir 2009a, 2009b). As investors, such firms can contribute to economic growth and shape future industrial structure. Their contribution could be more important than that of their counterparts in advanced economies, where the financial market is dominated by institutional investors. However, not all emerging-market firms are able and willing to invest, especially during economic downturns when firms tend to face financial constraint. Using firm-level data from EMEs in Central and Eastern Europe, Kolasa et al. (2010) and Burger et al. (2017) revealed that domestic firms, younger firms, smaller firms, export-oriented firms, and service-sector firms tended to cut investment more drastically than foreign-owned, older, and larger manufacturing firms during the global financial crisis (GFC) of 2008, which was said to be the worst financial crisis since the Great Depression of the 1930s until it was dwarfed by the COVID-19 crisis. This finding raises a question as to whether it applies to any other EMEs in East Asia. Emerging economies in East Asia sailed over the GFC relatively smoothly because they had learned their lesson from the Asian financial crisis of 1998 and built up financial firewalls (Pempel 2014). Firms in this region could expect a relatively quick recovery from the economic downturn and high capital gains from investing in financial and real estate assets of which prices had precipitated from a height in the early phase of the GFC.

Bo et al. (2014) point to another dimension of heterogeneity, namely country-specific economic institutions. They find that, during the GFC, state-controlled firms in China significantly increased their investment in financial assets, whereas non-state firms did not because the Chinese Government’s large-scale economic stimulus package together with the state-dominated financial system allowed state-controlled firms to invest in these assets with high expected capital gains. Whether significant increases in financial investment in the midst of a crisis are limited only to state-controlled firms in a particular institutional setting or also possible for non-state firms in EMEs remains an open question.

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This paper addresses this question by analyzing the panel data of approximately 2500 micro, small, and medium enterprises (MSMEs) in the manufacturing sector of Vietnam’s economy, an emerging market in Southeast Asia, which covers the 2005–2013 period and includes the period of the GFC. Just like the Shanghai Stock Exchange Composite Index, the Ho Chi Minh Stock Exchange Index peaked in 2007 and plunged in 2008. In 2008, China and Vietnam had much higher real GDP growth rates compared with advanced economies and emerging and developing Europe. As Bo et al. (2014) included real estate investment in financial investment in their empirical analysis, it is natural in the Vietnamese context to classify speculative investments in financial assets and real estate assets into one category and investment in investors’ own production capacities into another. While Bo et al. (2014) analyzed the data of listed firms in China, the present paper focuses on MSMEs, which constitute the vast majority of both formally registered firms and informal firms in Vietnam, in order to investigate whether these ordinary firms—as opposed to state-controlled firms—increased financial investment during the economic downturn.

Although the data used for the current study do not include observations of foreign-owned firms, state-owned firms, or other large firms, the MSMEs in our sample are sufficiently diverse in terms of firm size, firm age, formality, amount of external finance, and export orientation for the purpose of testing the hypotheses on the characteristics of those firms that are more resilient to negative shocks. The sample includes not only small family businesses using owners’ houses as workshops or factories but also medium-sized firms of different ownership types, such as joint stock, private limited businesses, partnerships, and collectives. Among those characteristics found important in the studies by Kolas et al. (2010) and Burger et al. (2017), foreign ownership is the only characteristic missing in the data from Vietnamese MSMEs.

Among other findings, this study finds that MSMEs in Vietnam increased financial investment, including investment in real estate assets, and decreased investment in equipment and other productive fixed assets for their own use during the GFC. Thus, increasing financial investment during periods of economic downturn is not unique to state-controlled firms that were favorably treated by the Chinese Government, as described by Bo et al. (2014); rather, it can be classified as common investment behavior among MSMEs in some EMEs. This study also finds that, compared with other MSMEs, financial investment is greater among those MSMEs with larger amounts of external finance, experience of engaging in foreign trade, and 12 to 35 employees. This, however, does not mean these firms increased financial investment more than other MSMEs; rather, the increase in financial investment during the economic downturn is not significantly related to any particular firm characteristics.

By contrast, the magnitude of decrease in productive investment due to the economic downturn is found to be significantly and negatively correlated with employment size and the amount of external finance. Specifically, firms with larger employment sizes and external finance reduced productive investment more than other firms, but firm age and other characteristics were not significantly related with the magnitude of decrease in productive investment. These results are consistent with and add new elements to those results concerning investment behavior during the crisis that were obtained by Kolas et al. (2010) from the data of Polish firms and differ slightly from the results obtained by Burger et al. (2017, p. 586) from the data of Central and Eastern European firms. Apart from changes in investment from normal times to a downturn period, the present paper highlights that the longer-term relationship between productive investment and various firm characteristics over the entire data period is consistent with the common finding in the literature that younger, larger, formal, and exporting firms with more favorable access to external finance invest more.

The remainder of the paper is organized as follows. Section 2 provides a brief literature review. Section 3 documents some characteristics of the Vietnamese economy and its MSME sector. Section 4 discusses empirical strategy and reports the results of the descriptive analysis of the data. Section 5 reports the empirical results. Section 6 concludes the paper with a summary of the findings and policy implications.

2. Literature review and testable hypotheses

This paper is closely related to two strands of the economic literature on firm investment behaviors. These two strands correspond with two types of firm investment: 1) investment in their production capacity and 2) investment in financial assets. Although firms’ decisions on the two types of investment may be interlinked, this review treats the two strands of the literature separately, for the sake of simplicity.

A firm’s investment in their production capacity depends on their expected future net cash flow and associated risks, as well as financial constraints. Firms are highly heterogenous with to these aspects. Thus, an immense body of literature has been developed to understand such heterogeneity by linking investment behaviors with firm characteristics, such as firm size, firm age, ownership structure, and external finance (see, e.g., Nugent and Yhee 2002; Diamond 1989; Jensen and Merkling 1976). The relationship between firm characteristics and financial constraints together with expected growth performance may vary from time to time. Thus, a growing number of studies investigate how firms change their investment behaviors, productivity growth, and entry and exit from normal times to recessions and how such changes are related to firm characteristics. Among important examples are studies by Kolas et al. (2010) and Burger et al. (2017), who link changes in firm behaviors with firm characteristics by using firm-level data from Central and Eastern Europe before and during the GFC. The present paper investigates whether a similar linkage between changing investment behaviors and firm characteristics existed in an Asian EMEs before and after the GFC.

Turning to studies of firms’ investment in financial assets, it seems useful to begin with Demir’s (2009a, 2009b) studies based on

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1 While the advanced economies and the emerging and developing Europe recorded negative real GDP growth rates in 2008 (-3.3 percent and -5.7 percent, respectively), China and Vietnam maintained much higher growth rates (9.7 percent and 5.4 percent, respectively) in the same year, according to the International Monetary Fund’s World Economic Outlook.
data from Argentina, Mexico, and Turkey. These studies find that de-industrialization took place in the three EMEs in the 1990s, as firms decreased investment in their own production capacity to increase financial investment when the financial liberalization opened the window of opportunity for alternative investment in financial assets. It does not follow, however, that the reallocation of firms’ investment funds away from investment in their own productivity capacity to financial investment always leads to de-industrialization. This is because, if increased financial investment is mostly equity investments in other firms that have high growth prospects, reallocation can result in creative destruction, as defined by Schumpeter (1934).

Extending the creative destruction argument, Davis and Haltiwanger (1992) and Caballero and Hammour (1994), among others, argue and present evidence that economic downturns accelerate the process of “cleansing”, where less efficient firms are replaced by more efficient firms. Recent studies, however, point out that recessions exacerbate financial constraints and labor market frictions, making it difficult for more productive firms to replace less productive ones. For example, Hallward-Driemeier and Rijkers (2013) analyze firm-level data from Indonesia before and after the Asian financial crisis and find that the crisis induced relatively productive firms to exit. Similarly, Carreira and Teixeira (2016) find that a “non-negligible fraction of high-productivity firms actually shut-down” in Portugal during the GFC. These studies did not find evidence lending strong support to the cleansing hypothesis.

As Carreira and Teixeira (2016) argue, whether the cleansing effect prevails or is reversed by labor and financial market failures exacerbated during an economic downturn period may depend on the nature and extent of the downturn. According to the International Monetary Fund’s World Economic Outlook (WEO), the average annual GDP growth rate in Emerging and Developing Europe went down by 12.9 percentage points, from 7.2% in 2007 to −5.7% in 2009, and that in Emerging and Developing Asia went down by only 4.6 percentage points, from 11.2% to 7.6%. The GFC might not scar the Asian EMEs as much as their European counterparts where the GFC destroyed productive firms. To the extent that this is the case, MSME owners in Asian EMEs might find the stock price plunges at the beginning of the economic downturn a favorable opportunity to invest in those listed firms they expected to be more profitable in future than their own businesses. This scenario constitutes the basic hypothesis of the present paper.

To our knowledge, the most closely related study is Bo et al.’s (2014) study investigating the investment behaviors of listed firms in China. One of their main results is that non-government firms did not significantly increase financial investment during the GFC, even though state-controlled, non-financial firms did increase financial investment, expecting high capital gains, which is likely because the latter were treated favorably by the financial sector as well as the Chinese government. We wonder if this is the case in other Asian EMEs. According to the WEO data, while the annual GDP growth rate in China declined by 4.9 percentage points, from 14.3% in 2007 to 9.4% in 2009, that in Vietnam declined only by 1.7 percentage points, from 7.1% to 5.4%. Still, both the Shanghai Stock Exchange Composite Index and the Ho Chi Minh Stock Index plunged by approximately 70 percentage points. Thus, it is not difficult to imagine that ordinary private firms in Vietnam would invest in listed firms that they expected to have high capital gains.

Based on the above review of the two strands of literature, one on firms’ investment in their own production capacity and the other in their financial investment, we hypothesize the following. First, Vietnamese MSMEs’ investment in their own production capacity in normal times is related to their observable characteristics in the same way as many existing studies have found because there is no reason to expect otherwise. Second, and similarly, the change in this type of investment during the GFC is related to observable characteristics in the same way as Kolas et al. (2010) and Burger et al. (2017) find. Third, and by contrast, the increase in financial investment is not related to any of their observable characteristics. A part of the reason is that their increased financial investment is motivated by the high expected performance of listed firms, not themselves. The other reason is that their financial investment would be financed mostly by owners’ assets, of which abundance would not be closely associated with firm age, size, formality, or other characteristics. For example, a new, small, informal firm owned by an affluent business person who also owns many other firms may answer to the survey that the firm’s owner increased financial investment considerably soon after stock prices plunged.

One may think the second and third hypotheses are contradictory for those MSMEs, which are financially constrained so that the sum of financial investment and productive investment must be equal to a given amount of investment fund. For such a firm, if productive investment increases with a particular characteristic, financial investment must decrease, as that characteristic takes a larger value and cannot be independent of all characteristics as hypothesized above. However, the two types of investment may face different extents of financial constraint. If MSMEs in EMEs and developing countries are poorly managed, as attested by Bloom et al. (2017) for example, both financial institutions and MSME owners may be reluctant to finance increases in the working capital or equipment of MSMEs, but they may be willing to finance financial investment that is expected to have high returns and low risks. Therefore, there is no contradiction among the hypotheses above.

Before closing this section, it is useful to elaborate on the first and second hypotheses above because they simply state that the relationship between observable firm characteristics and investment behavior (or its change) is expected to be the same as existing studies have reported. As to firm size, when the economy turns downward, relatively large firms reduce investment in their own production capacity to adjust to the declining demands for their products, whereas smaller firms do not reduce productive investment because they rarely invest in production capacity even in normal times. With regard to firm age, we follow Das (1995) to hypothesize that the investment behavior of relatively old firms during a downturn period does not differ from that of relatively young
firms with otherwise similar characteristics, business performance, and financial conditions. As to external finance, MSMEs with more external finance invest more during normal periods and reduce investment more during downturn periods than otherwise similar MSMEs with less external finance. This is because high debt makes borrowing expensive, especially in downturn periods, as argued by Petersen and Rajan (1995). As to formality, we hypothesize that formal MSMEs are already so well-equipped that their investment rates tend to be lower in normal periods and even lower in downward periods, compared with informal firms with, for example, similar employment sizes, ages, and amounts of external finance.

3. Vietnamese economy and its MSME sector

Since the opening-up of the economy in 1988, Vietnam has enjoyed high economic growth in most years. During the 1990s, the growth rate remained around 7% per year and the poverty rate reduced from 58% to 25%. During the period of 2000–08, the economy grew at 7.5–7.8% per year, except for year 2007 - the year it joined the World Trade Organization (WTO) - and grew at 8.5%. From 1999 to 2007, the country adopted an expansionary policy to support high growth by means of rapid investment. As soon as Vietnam joined WTO, it experienced a huge surge of foreign direct investment (FDI) inflows. Presumably, these policies are responsible for an inflationary pressure and an asset price bubble as well as the high economic growth. Triggered by the GFC of 2008, however, an economic downturn started in 2008 and the downturn was prolonged for several years. The industry and construction sector, which accounted for 40% of GDP and was viewed as the engine of the country's growth, suffered the most. The average growth rate of this sector declined from 10.2% in 2000–2006 to 7% in 2007–2011. The GDP growth rate in the latter period was 5.4% to 6% per year.

As in other developing countries, MSMEs are a major driver of economic development in Vietnam. In 2017, formally registered MSMEs contributed around a third of GDP and the country's total investment. According to the General Statistics Office (GSO) of Vietnam, 98% of a total of 0.5 million formal enterprises in the economy are MSMEs and their average growth rate is approximately 14% per year(GSO 2018). Beside these formal MSMEs, there are about 5.1 million “individual establishments” in which 8.7 million persons engaged. Of these establishments, about 75% are informal while the rest are formally registered as “household businesses” (GSO 2018). Thus, MSMEs are dominant in this economy.

MSMEs in Vietnam are characterized by limited access to finance, limited business skills and managerial capabilities, low levels of technological advancement, and inadequate support from the government. For example, nearly 80% of MSMEs surveyed in a study (CIEM, DoE, ILSSA, 2014) financed their investment projects by using internal rather than external sources. The vast majority of MSMEs are micro and small enterprises, while medium-sized enterprises tend to have more favorable access to finance.

4. Empirical approach and descriptive analysis

4.1. Data source

As mentioned in the introductory section, we use panel data of MSMEs collected jointly by the University of Copenhagen, the Central Institute for Economic Management (CIEM) in Vietnam, and the Institute for Labor Studies and Social Affairs (ILSSA) in Vietnam through surveys conducted in 2005, 2007, 2009, 2011, and 2013 in four northern provinces, three central provinces, and three southern provinces. The survey team used the General Statistics Office (GSO) of Vietnam's Industrial Survey 2004–2006 and its Establishment Census 2002 to design a stratified sampling scheme and to select sample enterprises. Since the Establishment Census dataset covers household businesses and other firms that are excluded from the Industrial Survey, our dataset includes a wide range of MSMEs in Vietnam, including private firms, collectives, partnerships, private limited enterprises, and joint stock enterprises.

About 2500 firms were selected for the survey in 2005. They were repeatedly surveyed in the subsequent four rounds. The survey in 2005 asked about the situations of the sample enterprises in 2003 and 2004, which may be referred to as period 1 in the data analysis below. Similarly, the survey in 2007 was concerned with the situations in 2005 and 2006, or period 2 and the survey in 2013 was concerned with 2011 and 2012 or period 5. Thus, the panel data cover the five two-year periods from 2003 to 2012. The questionnaire used in the surveys asks questions about firms' general characteristics, production and costs, sale revenues, export activities, employment, investments, assets, liabilities, and taxes in the previous two years.

After each survey round, the sample firms that had ceased operation or stopped cooperating with the survey team were replaced by both formal MSMEs selected from a list compiled by the GSO and informal MSMEs selected in each province. Thus, the number of firms remained almost constant around 2500 for every survey round. Not all sample firms answered all the questions, however. Only about 1500 sample firms per survey round provided complete information necessary to carry out the regression analysis specified below.

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3 Younger firms invest less because of lack of reputation and credibility (Binks and Ennew 1996; Beck et al. 2006; Diamond 1989). However, Fort et al. (2013), Siemer (2014), Criscuolo et al. (2014), and Lee et al. (2017) argued that younger firms invest more during normal times even though they invest less during periods of recession.

4 Similar arguments were made by Garcia-Appendini and Montoriol-Garriga (2013), Yang (2011), and Love and Zaidi (2010).

5 Harhoff et al. (1998), Poschke (2013), Vivarelli (2013), and Farazi (2014) found that informal firms invest less than formal firms because the former are more risk-averse or face severer credit constraints.
4.2. Regression specification

As mentioned earlier, most empirical studies of firms’ investment behaviors use either the Q model or the accelerator model (e.g. Lensink and Sterken 2000; Bo and Zhang 2002). While the panel data we use do not have sufficient data points in the time series direction to construct Q for each sample firm, the data do allow us to estimate an accelerator model, which may be written as follows:

\[
\frac{I_t}{K_t - 1} = \alpha_1 \text{Size}_{t-1} + \alpha_2 \text{Age}_{t-1} + \alpha_3 \text{Fin}_{t-1} + \alpha_4 \text{Formal}_{t-1} + \alpha_5 D_t \text{Size}_{t-1} + \alpha_7 D_t \text{Age}_{t-1} + \alpha_8 D_t \text{Fin}_{t-1} + \alpha_9 D_t
\]

where \( I_t/K_t - 1 \) is either productive or financial investment rate of firm \( i \) at period \( t (t = 2, ..., 5) \); \( \text{Size}_{t-1} \) is the logarithm of the number of full time workers; \( \text{Age}_{t-1} \) is firm age as of the first survey round; \( \text{Fin}_{t-1} \) is the logarithm of the amount of external finance; \( \text{Formal}_{t-1} \) is a dummy variable indicating whether firm \( i \) is formally registered or not; \( D_t \) is a dummy variable that is equal to 1 if period \( t \) was either period 4 or period 5, when the Vietnamese economy was caught in the economic downturn and 0 otherwise; \( \text{Acc}_{it} \) is a vector of accelerator variables as explained below; \( X_{it - 1} \) is a vector of control variables also explained below; \( u_t \) is a firm fixed effect; \( \lambda_i \) is a time effect common to all firms; and \( \varepsilon_{it} \) is an error term. Coefficients \( \alpha_1 \) to \( \alpha_9 \) are scalars and \( \alpha_{10} \) and \( \alpha_{11} \) are vectors.

Because of the inclusion of lagged variables, eq. (1) covers four periods starting from period 2. The time effect \( \lambda_i \) is captured by three period dummies: Period 3, Period 4, and Period 5, where Period 1 is 1 if \( t = T \) and 0 otherwise. While the second period (i.e. 2005-2006) is referred to as the normal period and used as reference point for comparison, the third period (i.e. 2007-2008) is the period when the GFC took place, and the fourth and fifth periods (i.e. 2009-2012) are referred to as the downturn period.

The use of panel data and the fixed effect model has an advantage. The fixed-effect term \( u_t \) captures any fixed (or time-invariant) part of unobserved heterogeneity among sample firms, thereby mitigating omitted variable biases. There remain, however, possible biases arising from the correlation between an explanatory variable and time-variant unobservable variations among firms. To mitigate this problem, we include in vector \( X \) those variables representing export markets and foreign direct investments as well as industry dummies and province dummies that indicate which industry and province a firm belonged to.

As we will see below, however, a number of observations have no productive investments; that is, the dependent variable is censored from below at zero and has frequent zero-valued observations. The regression analysis below applies the random-effect (RE) Tobit estimator to cope with this problem as well as the fixed-effect (FE) estimator to the panel data to check the robustness of the results of the FE estimation.

We are particularly interested in estimating the coefficients on \( \text{Size} \), \( \text{Age} \), \( \text{Fin} \) and \( \text{Formal} \), and the coefficients on the terms that interact these variables with the economic downturn dummy \( D_t \); because these coefficients are closely related to the hypotheses discussed in Section 3 above. The inclusion of the square of \( \text{Size} \) is intended to capture the concavity or convexity of the relationship between the investment rate and employment size. The firm age variable is included as the age at a particular point in time because all firms grow older at the same pace. The effect of aging from period \( T-1 \) to period \( T \), if any, is absorbed by time effect \( \lambda_T \) or period dummy. Since the cross-section variation of firm age as of period 1 is absorbed by the firm fixed effect \( u_t \), coefficient \( \alpha_3 \) cannot be estimated with the fixed-effect model specification (i.e., within estimator) if the balanced sample is used in regression. Still it could be estimated with the random-effect model specification.

The accelerator investment model could be specified in different ways in empirical analyses. We adopt a standard specification highlighting sales revenue and profit, following the lead of Harris et al. (1994), Lensink and Sterken (2000), Lensink et al. (2001), and Bo and Zhang (2002) among others. As Harris et al. (1994) argue, sales revenue is one of the major determinants of a firm’s investment decisions because it is a signal of the size of market demand for the firm’s products and services. As Lensink et al. (2001) argue, retained profit should also play an important role in investment decisions because it is a signal of future profitability and is related to the availability of internal funding for investment. Thus, \( \text{Acc}_{it} \) in our model is a vector consisting of the ratio of sales revenue in period \( t \) to fixed asset \( K_t - 1 \), and the ratio of retained profit to fixed asset \( K_t - 1 \).

We now turn to the specification of the portfolio choices model made by MSMEs between productive and financial investments. To capture this choice, we consider the proportion of productive investment to the sum of productive and financial investments in period \( t \). This proportion may be explained by the same variables that appear on the right-hand side of eq. (1), that is, lagged values of employment size, age, external finance, and formality, downturn dummy \( D_t \), interaction terms, \( X_{it - 1} \), firm fixed effects, and period dummies, which may be denoted by vector \( Z_{it} \). In other words, we consider a regression with the percentage of productive investment as the dependent variable and \( Z_{it} \) as the explanatory variables.

The estimation of this equation, however, may suffer from a serious selection bias. This is because a number of the sample MSMEs did not invest at all, which makes the denominator of the dependent variable zero, thereby making it impossible to include these enterprises in the analysis. To the extent that the portfolio choice between productive and financial investments is related to the choice of undertaking non-zero investment, ignoring those enterprises with zero-investment leads to a selection bias. To address this concern, we include the inverse Mills ratio in the equation explaining the percentage of productive investment. The Mills ratio can be obtained by estimating the probit model that predicts the probability of positive investment. This probit model may be written as

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5 We categorize firms into seven industries: food-processing, garment and textiles, wood and furniture, chemicals, non-metal materials, machinery and other industries based on the 2-digit code in the Vietnam Industrial Code 1993, which corresponds with ISIC 3 revision.
follows:

\[
\text{Prob}(\text{total investment of firm } i \text{ at time } t > 0 | Z_{it}) = \Phi(Z_{it} \beta).
\]  

(2)

where \( \Phi \) is the cumulative distribution function of the standard normal distribution, and \( \beta \) is the vector of coefficients to be estimated. We estimate the probit model period-by-period following the suggestion of Wooldridge (1995). This is why coefficients \( \beta \) in Eq. (2) have subscript \( t \), allowing that the coefficients vary over time. The estimated coefficients are used to calculate the inverse Mills ratio, \( \theta_{it} \).

The next step is to estimate the fixed- or random-effect models of the percentage of productive investment, denoted PPI:

\[
PPI_{it} = Z_{it}\gamma + \gamma_0\delta_{it} + \omega_{it}
\]  

(3)

where \( \omega_{it} \) is an error term. Eq. (3) has the firm fixed effects and the time effects as well. They, however, are not explicitly expressed in the equation and instead included in \( Z_{it}\gamma \).

### 4.3. Descriptive statistics

Table 1 presents the descriptive statistics of the dependent and explanatory variables in Eqs. (1) to (3). The amount of external finance and FDI inflows are real values in the 2005 constant Vietnamese Dong. The table also shows the basic statistics of a few variables that are not included in the equations but may be useful for understanding changing situations of MSMEs.

It is interesting to observe that while the productive investment rate declined gradually in period 3 and further in periods 4 and 5, the financial investment rate jumped up in period 3, stayed high in period 4 and decreased in period 5 to a level a little higher than that in period 2. The mean values of the productive and financial investment rates in period 1 are missing because the data on \( K_{it-1} \) is not available for period 1. The percentage of firms that had positive investment of either type declined sharply in period 2, but it went...
The percentage of productive investment declined sharply in period 3 and stayed low in the subsequent period. The number of employees (that is, Size) decreased sharply in period 3 and stayed at low levels. The mean amount of external finance varied wildly in periods 2 and 3. The average values of the accelerator variables - that is, sales revenues/fixed assets and profits/fixed assets - decreased only a little in the crisis period and the subsequent downturn periods. This finding lends support to the view that Asian emerging economies were rather insulated from the GFC, even though FDI inflows and export growth decreased considerably. Presumably, the reason why sales revenues and the profits of firms in the sample did not decrease much was that less than 8 of sample firms were engaged in external trade and FDI inflows decreased in period 3, but returned to the previous level quickly in periods 4 and 5.

5. Results of regression analyses

5.1. Productive investment rate

Table 2 presents the fixed-effect model estimates of eq. (1). The coefficients on the three period dummies in column 1 indicate that the productive investment rate went down in period 3, when the GFC took place, and that it went down further in the subsequent downturn periods. The number of employees (that is, Size) decreased sharply in period 3 and stayed at low levels. The mean amount of external finance varied wildly in periods 2 and 3. The average values of the accelerator variables - that is, sales revenues/fixed assets and profits/fixed assets - decreased only a little in the crisis period and the subsequent downturn periods. This finding lends support to the view that Asian emerging economies were rather insulated from the GFC, even though FDI inflows and export growth decreased considerably. Presumably, the reason why sales revenues and the profits of firms in the sample did not decrease much was that less than 8 of sample firms were engaged in external trade and FDI inflows decreased in period 3, but returned to the previous level quickly in periods 4 and 5.

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and (6) has a negative and highly significant coefficient, but the coefficient on employment size in these columns is insignificant. These results are consistent with the hypothesis that larger enterprises tend to decrease their productive investment rates more than smaller ones in a downturn period.

While the interaction of D and external finance has a negative and highly significant coefficient in both columns (4) and (6), the coefficients on external finance (i.e. the term not interacted with $D$) in these columns and other columns are positive and highly significant. These results lend strong support to the hypothesis that firms with higher debt tend to invest more in normal periods but reduce productive investment in downturn periods. The coefficient on the interaction of $D$ and the formal firm dummy in columns (5) and (6) is negative and highly significant, and that on the formal firm dummy in these and other columns is also negative and significant. These results might be surprising at first glance, but they are the result obtained after controlling for the associations between the dependent variable and the other explanatory variables, including firm size, age, and external finance, in particular. A possible interpretation is that formal firms are so well-equipped already that their investment rates are lower in normal periods and even lower in downturn periods, compared with informal firms that are otherwise similar.

The estimated coefficients are stable across columns (1) to (6). One of the two accelerator variables has a highly significant coefficient, which suggests that our choice of the accelerator model is not invalid. The estimated coefficient on the foreign trade dummy is negative and significant. Although we are not sure about the reason, a possible interpretation is that foreign export markets were more deeply scurred by the GFC than the domestic market, and another is that exporting MSMEs specialize in less capital-intensive areas of trade in accordance with their additional income from foreign markets and hence invest less than MSMEs catering for domestic markets.

Table 3 reports the random-effect Tobit estimates of eq. (1). The coefficients shown in the table are marginal effects. The qualitative results shown in Table 3 are generally similar to those in Table 2, but there are some differences in column (6), the three estimates of the period dummy coefficients are all significant, whereas only one is significant in the same column of Table 2. While

Table 3
RE Tobit Estimates of function explaining productive investment rate (marginal effects).

|                  | (1)       | (2)       | (3)       | (4)       | (5)       | (6)       |
|------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Period 3 dummy   | $-0.009^{***}$ | $-0.009^{***}$ | $-0.009^{***}$ | $-0.012^{***}$ | $-0.010^{***}$ | $-0.011^{***}$ |
|                  | [0.003]   | [0.003]   | [0.003]   | [0.003]   | [0.003]   | [0.003]   |
| Period 4 dummy   | $-0.028^{***}$ | $-0.012^{***}$ | $-0.039^{***}$ | $-0.029^{***}$ | $-0.025^{***}$ | $-0.014^{***}$ |
|                  | [0.003]   | [0.004]   | [0.007]   | [0.003]   | [0.003]   | [0.007]   |
| Period 5 dummy   | $-0.027^{***}$ | $-0.012^{***}$ | $-0.038^{***}$ | $-0.029^{***}$ | $-0.025^{***}$ | $-0.014^{***}$ |
|                  | [0.003]   | [0.004]   | [0.007]   | [0.003]   | [0.003]   | [0.007]   |
| $D \times \log \text{employment size}$ | $-0.008^{***}$ | $-0.008^{***}$ | $-0.008^{***}$ | $-0.008^{***}$ | $-0.008^{***}$ | $-0.008^{***}$ |
|                  | [0.002]   | [0.002]   | [0.002]   | [0.002]   | [0.002]   | [0.002]   |
| $D \times \text{firm age}$ | 0.004* | 0.004* | 0.004* | 0.004* | 0.004* | 0.004* |
|                  | [0.002]   | [0.002]   | [0.002]   | [0.002]   | [0.002]   | [0.002]   |
| $D \times \log \text{external finance}$ | $-0.001^{***}$ | $-0.001^{***}$ | $-0.001^{***}$ | $-0.001^{***}$ | $-0.001^{***}$ | $-0.001^{***}$ |
|                  | [0.000]   | [0.000]   | [0.000]   | [0.000]   | [0.000]   | [0.000]   |
| $D \times \text{formal dummy}$ | $-0.010^{**}$ | $-0.010^{**}$ | $-0.010^{**}$ | $-0.010^{**}$ | $-0.010^{**}$ | $-0.010^{**}$ |
|                  | [0.004]   | [0.004]   | [0.004]   | [0.004]   | [0.004]   | [0.004]   |
| $\log \text{employment size}$ | 0.015*** | 0.015*** | 0.015*** | 0.015*** | 0.015*** | 0.015*** |
|                  | [0.003]   | [0.003]   | [0.003]   | [0.003]   | [0.003]   | [0.003]   |
| $\log \text{employment size squared}$ | $-0.002^{**}$ | $-0.002^{**}$ | $-0.002^{**}$ | $-0.002^{**}$ | $-0.002^{**}$ | $-0.002^{**}$ |
|                  | [0.001]   | [0.001]   | [0.001]   | [0.001]   | [0.001]   | [0.001]   |
| $\text{firm age}$ | $-0.002$ | $-0.002$ | $-0.004^{**}$ | $-0.002$ | $-0.002$ | $-0.002$ |
|                  | [0.001]   | [0.001]   | [0.002]   | [0.001]   | [0.001]   | [0.001]   |
| $\log \text{external finance}$ | 0.003*** | 0.003*** | 0.003*** | 0.003*** | 0.003*** | 0.003*** |
|                  | [0.000]   | [0.000]   | [0.000]   | [0.000]   | [0.000]   | [0.000]   |
| $\text{formal dummy}$ | $0.007^{**}$ | $0.007^{**}$ | $0.007^{**}$ | $0.007^{**}$ | $0.007^{**}$ | $0.007^{**}$ |
|                  | [0.003]   | [0.003]   | [0.003]   | [0.003]   | [0.003]   | [0.003]   |
| $\text{Revenue/Asset}$ | 0.000** | 0.000** | 0.000** | 0.000** | 0.000** | 0.000** |
|                  | [0.000]   | [0.000]   | [0.000]   | [0.000]   | [0.000]   | [0.000]   |
| $\text{Profit/Asset}$ | $-0.000$ | $-0.000$ | $-0.000$ | $-0.000$ | $-0.000$ | $-0.000$ |
|                  | [0.001]   | [0.001]   | [0.001]   | [0.001]   | [0.001]   | [0.001]   |
| $\text{Urban dummy}$ | $-0.006^{***}$ | $-0.006^{***}$ | $-0.006^{***}$ | $-0.006^{***}$ | $-0.006^{***}$ | $-0.006^{***}$ |
|                  | [0.002]   | [0.002]   | [0.002]   | [0.002]   | [0.002]   | [0.002]   |
| $\text{Log FDI inflow to province}$ | $-0.003^{***}$ | $-0.003^{***}$ | $-0.003^{***}$ | $-0.003^{***}$ | $-0.003^{***}$ | $-0.003^{***}$ |
|                  | [0.000]   | [0.000]   | [0.000]   | [0.000]   | [0.000]   | [0.000]   |
| $\text{Foreign trade dummy}$ | $-0.002$ | $-0.003$ | $-0.003$ | $-0.003$ | $-0.002$ | $-0.003$ |
|                  | [0.004]   | [0.004]   | [0.004]   | [0.004]   | [0.004]   | [0.004]   |
| $\text{Number of observations}$ | 7731 | 7731 | 7731 | 7731 | 7731 | 7731 |
| $\text{Number of censored observations}$ | 5252 | 5252 | 5252 | 5252 | 5252 | 5252 |

Notes: The same notes as those of Table 2 apply. Firm age, which is a time-invariant variable, is included.
Source: The University of Copenhagen-CIEM-ILSSA data and the authors’ calculation.

7 The coefficient on Period 4 dummy and that on Period 5 dummy are significantly different from the coefficient on Period 3 dummy.
firmsize and external finance interacted with D have negative and significant coefficients in both tables, the interaction of D and formality is insignificant in Table 3. The coefficients on employment size and its squared term are statistically insignificant in Table 2 but significant in Table 3. The positive coefficient on employment size and the negative coefficient on the employment size squared in Table 3 suggest that the investment rate increases with size until the number of employees reaches six persons and then decreases as the employment size increases further. Similarly, the coefficients on the urban dummy and FDI inflows are insignificant in Table 2 but negative and highly significant in Table 3. These increases in significance levels are considered to result either from correlations between these explanatory variables and the unobserved firm fixed-effect or from the better treatment of the zero-observations problem or from both.

5.2. Financial investment rate

Tables 4 and 5 present the FE model estimates and the RE Tobit model estimates of eq. (1) with financial investment rate being the dependent variable. These tables are structured similar to Tables 2 and 3. The results reported in Column 6 in both tables are our preferred results. In both Tables 4 and 5, the coefficients on the three period dummies in Column 1 indicate the financial investment rate increased in periods 3 and 4 and stayed at a significantly higher level in period 5 than in period 1. This result further lends support to the view that financial resources of MSME sector were diverted to the stock market and real estate during the GFC and ensuing economic downturn.

The qualitative differences between the results reported in Tables 4 and 5 include the significance of the coefficient on the interaction of D and size and that on the interaction of D and firm age . . . Other major differences exist in the significance of the coefficients on size, that on the size squared, and that on firm age. There are no grounds to determine whether Table 4 or Table 5 is closer to the true relationship between the financial investment rate and the explanatory variables. However, if Table 5, in which these coefficient estimates are significantly different from zero, is closer to the truth than Table 4, however, they may be interpreted as follows. First, the financial investment rate is higher for firms with two or three employees than other firms in normal times, and it increased during the economic downturn more for even smaller firms than other firms. Second, relatively young firms tend to have a

| Table 4  |
|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| **FE Estimates of function explaining financial investment rate.** | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** |
| Period 3 dummy | 0.049*** | 0.049*** | 0.049*** | 0.049*** | 0.049*** | 0.049*** |
| | [0.005] | [0.005] | [0.005] | [0.005] | [0.005] | [0.005] |
| Period 4 dummy | 0.038** | 0.052*** | 0.042** | 0.037*** | 0.041*** | 0.064*** |
| | [0.005] | [0.008] | [0.014] | [0.005] | [0.005] | [0.016] |
| Period 5 dummy | 0.012** | 0.025*** | 0.017 | 0.011** | 0.016** | 0.038** |
| | [0.005] | [0.008] | [0.014] | [0.006] | [0.006] | [0.017] |
| D * log employment size | −0.008** | 0.000 | −0.000 | 0.000 | 0.000 | 0.000 |
| | [0.003] | [0.005] | [0.005] | [0.005] | [0.005] | [0.005] |
| Log employment size | −0.010 | −0.004 | −0.010 | −0.010 | −0.010 | −0.010 |
| | [0.009] | [0.010] | [0.009] | [0.009] | [0.010] | [0.011] |
| Log employment size squared | −0.000 | −0.001 | −0.000 | −0.000 | −0.000 | −0.000 |
| | [0.002] | [0.002] | [0.002] | [0.002] | [0.002] | [0.002] |
| Log external finance | 0.010*** | 0.010*** | 0.010*** | 0.010*** | 0.010*** | 0.010*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Formal dummy | −0.004 | −0.001 | −0.005 | −0.004 | 0.003 | 0.002 |
| | [0.014] | [0.014] | [0.014] | [0.014] | [0.014] | [0.014] |
| Revenue/Asset | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Profit/Asset | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| | [0.001] | [0.001] | [0.001] | [0.001] | [0.001] | [0.001] |
| Urban dummy | 0.036 | 0.033 | 0.036 | 0.035 | 0.034 | 0.033 |
| | [0.032] | [0.032] | [0.032] | [0.032] | [0.032] | [0.032] |
| Log FDI inflow to province | −0.001 | −0.001 | −0.001 | −0.001 | −0.001 | −0.001 |
| | [0.001] | [0.001] | [0.001] | [0.001] | [0.001] | [0.001] |
| Foreign trade dummy | 0.008 | 0.009 | 0.008 | 0.008 | 0.009 | 0.009 |
| | [0.011] | [0.011] | [0.011] | [0.011] | [0.011] | [0.011] |
| Intercept | 0.039 | 0.032 | 0.039 | 0.040 | 0.039 | 0.032 |
| | [0.032] | [0.032] | [0.032] | [0.032] | [0.032] | [0.032] |
| Number of observations | 7731 | 7731 | 7731 | 7731 | 7731 | 7731 |

Notes: The dependent variable is financial investment rate. Otherwise, the same notes as those of Table 2 apply.

Source: The University of Copenhagen-CIEM-ILSSA data and the authors' calculation.

Table 4 and 5 present the FE model estimates and the RE Tobit model estimates of eq. (1) with financial investment rate being the dependent variable. These tables are structured similar to Tables 2 and 3. The results reported in Column 6 in both tables are our preferred results. In both Tables 4 and 5, the coefficients on the three period dummies in Column 1 indicate the financial investment rate increased in periods 3 and 4 and stayed at a significantly higher level in period 5 than in period 1. This result further lends support to the view that financial resources of MSME sector were diverted to the stock market and real estate during the GFC and ensuing economic downturn.

The qualitative differences between the results reported in Tables 4 and 5 include the significance of the coefficient on the interaction of D and size and that on the interaction of D and firm age . . . Other major differences exist in the significance of the coefficients on size, that on the size squared, and that on firm age. There are no grounds to determine whether Table 4 or Table 5 is closer to the true relationship between the financial investment rate and the explanatory variables. However, if Table 5, in which these coefficient estimates are significantly different from zero, is closer to the truth than Table 4, however, they may be interpreted as follows. First, the financial investment rate is higher for firms with two or three employees than other firms in normal times, and it increased during the economic downturn more for even smaller firms than other firms. Second, relatively young firms tend to have a
higher financial investment rate in normal times, and they increased this rate even more during the economic downturn.

5.3. Probit model explaining non-zero investment

The results of the probit model estimation of eq. (2) are presented in Table 6. The major purpose of estimating this equation is to obtain the inverted Mills ratio (IMR), which is used to correct possible sample selection bias in estimation of the function that explains the proportion of productive investment to total investment, which we will turn to in the next sub-section. According to Wooldridge (1995), the sample selection bias in panel data analysis is mitigated more effectively if IMR is obtained by estimating the probit model in a period-by-period manner. Thus, the vector of coefficients in eq. (2), $\beta_t$, has subscript $t$, and Table 6 has four columns, each reporting the estimated probit model within one period. The estimated IMR is given by the following formula:

$$IMR = \frac{\phi(Z_{it}\hat{\beta})}{\Phi(Z_{it}\hat{\beta})}$$

where $\phi(Z_{it}\hat{\beta})$ is the standard normal density, $\Phi(Z_{it}\hat{\beta})$ is the standard cumulative distribution, and $\hat{\beta}$ is the vector of estimates reported in Table 6.

Some of the estimates reported in Table 6 are noteworthy. First, just as in Tables 3 and 5, the employment size and its squared term have positive and negative coefficients, respectively, and the coefficients on both the urban dummy and FDI inflows are negative. Throughout the four periods, these coefficients are highly significant. Thus, both micro-sized firms and SMEs in urban areas or provinces competing with foreign firms tend to have relatively low propensity to invest. Second, just like Tables 2 and 3, Table 6 reports that external finance is positively associated with the likelihood of positive investment, as one would expect.

### Table 5

|                           | (1)         | (2)         | (3)         | (4)         | (5)         | (6)         |
|---------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Period 3 dummy            | 0.066***    | 0.066***    | 0.066***    | 0.065***    | 0.066***    | 0.067***    |
|                           | [0.004]     | [0.004]     | [0.004]     | [0.004]     | [0.004]     | [0.004]     |
| Period 4 dummy            | 0.068***    | 0.079***    | 0.064***    | 0.064***    | 0.068***    | 0.101***    |
|                           | [0.004]     | [0.005]     | [0.008]     | [0.004]     | [0.004]     | [0.008]     |
| Period 5 dummy            | 0.048***    | 0.059***    | 0.044***    | 0.048***    | 0.049***    | 0.081***    |
|                           | [0.004]     | [0.006]     | [0.008]     | [0.004]     | [0.004]     | [0.008]     |
| D * log employment size   | −0.006***   | −0.006***   | −0.006***   | −0.006***   | −0.006***   | −0.007***   |
|                           | [0.002]     | [0.002]     | [0.002]     | [0.002]     | [0.002]     | [0.002]     |
| D * firm age              | 0.001       |             |             |             | −0.008***   |             |
|                           | [0.003]     |             |             |             | [0.002]     |             |
| D * log external finance  | −0.000      |             |             | −0.000      |             |             |
|                           | [0.000]     |             |             | [0.000]     |             |             |
| D * formal dummy          |             |             | −0.005      |             | 0.002       |             |
|                           |             |             | [0.005]     |             | [0.006]     |             |
| Log employment size       | 0.015***    | 0.019***    | 0.015***    | 0.015***    | 0.016***    | 0.021***    |
|                           | [0.004]     | [0.004]     | [0.004]     | [0.004]     | [0.004]     | [0.004]     |
| Log employment size squared | −0.003***   | −0.003***   | −0.003***   | −0.003***   | −0.003***   | −0.003***   |
|                           | [0.001]     | [0.001]     | [0.001]     | [0.001]     | [0.001]     | [0.001]     |
| Firm age                  | −0.008***   | −0.008***   | −0.009***   | −0.008***   | −0.008***   | −0.008***   |
|                           | [0.002]     | [0.002]     | [0.002]     | [0.002]     | [0.002]     | [0.002]     |
| Log external finance      | 0.006***    | 0.006***    | 0.006***    | 0.006***    | 0.006***    | 0.006***    |
|                           | [0.000]     | [0.000]     | [0.000]     | [0.000]     | [0.000]     | [0.000]     |
| Formal dummy              | 0.000       | 0.000       | 0.000       | 0.000       | 0.000       | 0.000       |
|                           | [0.004]     | [0.004]     | [0.004]     | [0.004]     | [0.004]     | [0.005]     |
| Revenue/Asset              | 0.000       | 0.000       | 0.000       | 0.000       | 0.000       | 0.000       |
|                           | [0.000]     | [0.000]     | [0.000]     | [0.000]     | [0.000]     | [0.000]     |
| Profit/Asset               | 0.001       | 0.001       | 0.001       | 0.001       | 0.001       | 0.001       |
|                           | [0.001]     | [0.001]     | [0.001]     | [0.001]     | [0.001]     | [0.001]     |
| Urban dummy               | −0.005      | −0.005*     | −0.005      | −0.005      | −0.005      | −0.005      |
|                           | [0.003]     | [0.003]     | [0.003]     | [0.003]     | [0.003]     | [0.003]     |
| Log FDI inflow to province| −0.001      | −0.001      | −0.001      | −0.001      | −0.001      | −0.001      |
|                           | [0.001]     | [0.001]     | [0.001]     | [0.001]     | [0.001]     | [0.001]     |
| Foreign trade dummy        | 0.007       | 0.007       | 0.007       | 0.007       | 0.007       | 0.007       |
|                           | [0.004]     | [0.004]     | [0.004]     | [0.004]     | [0.004]     | [0.005]     |
| Number of observations     | 7731        | 7731        | 7731        | 7731        | 7731        | 7731        |
| Number of censored observations | 5252      | 5252        | 5252        | 5252        | 5252        | 5252        |

Notes: The same notes as those of Table 4 apply. Firm age, which is a time-invariant variable, is included.

Source: The University of Copenhagen-CIEM-ILSSA data and the authors’ calculation.
5.4. Proportion of productive investment

Tables 7 and 8 show the fixed-effect estimates and the random-effect Tobit estimates of eq. (3), respectively. These tables are designed to look similar to Tables 2 and 3 with the only difference being the inclusion of the inverse Mills ratio. Again column (6) is our favorite result. Note, however, the dependent variable in Tables 7 and 8 is percentage, not fraction. Thus, the magnitude of coefficients in these two sets of tables cannot directly be compared.

In both Tables 7 and 8, the coefficients on the three period dummies are all negative and highly significant across columns, indicating that the proportion of productive investment went down considerably in the period of the GFC and further down in the subsequent downturn periods. While the coefficients on Period 3 and Period 4 dummies are significantly different in Tables 2 and 3, this is not so in Tables 7 and 8. These results are obtained because there was a massive increase in financial and speculative investments in the third period, which was followed by the sizable decline in productive investments in the ensuing downturn periods.

Unlike Tables 2 and 3, Tables 7 and 8 report insignificant coefficients on the interaction terms throughout the columns. These results, together with results presented in Tables 4 and 5, indicate that the proportions of productive investment were considerably lower after the GFC than before for most MSMEs across the board - small or large, young or old, formal or informal, debt-laden or unable to borrow.

While the coefficient on external finance in Tables 2, and 3 is positive and significant, that in Tables 7 and 8 is negative and significant because financial investment was more closely associated with external finance as shown in Tables 4 and 5. These results lend support to the view that MSMEs used external finance more for the purpose of financial investments than for productive investments over the entire periods of study.

As to the urban dummy and FDI inflows, the estimated coefficients have different signs in Tables 7 and 8 and they are different to interpret. The participation of MSMEs in foreign trade is negatively associated with the percentage of productive investment in both Tables 7 and 8, which is consistent with the result obtained in Table 2. This may be related with specialization in accordance with comparative advantage, and that MSMEs located in urban areas or provinces with large FDI inflows tend to undertake less productive investment or more financial investment, probably because MSMEs surviving in congested urban areas and those catering for foreign firm subsidiaries are less capital-intensive.

Finally, the robustness of the estimation results reported in Tables 2 to 7, are checked by looking at sub-samples and trying different regression specifications with some alternative explanatory variables in the Appendix and associated Appendix Tables A1 to A6.

6. Concluding remarks

Our analysis of the panel data of about 2500 Vietnamese MSMEs covering the period 2003–2012 has revealed that they decreased productive investments and increased financial investment drastically around the time when the GFC took place and began to be
transmitted to Vietnamese economy and remained high during the subsequent period of economic downturn. It also revealed that the reduction in the productive investment rate was larger for those firms that had relatively large employment sizes and those formally registered as companies than for relatively small and informal ones. We have also found that external funds were used more for financial investment than for productive investment in normal times.

Our finding that Vietnamese MSMEs increased financial investment significantly stands in contrast with the result obtained by Bo et al. (2014) that state-controlled firms but not non-state, listed firms in China increased financial investment in the same periods. A possible reason for the difference is that the negative impact of the GFC was less deep in Vietnam than in China. A possible interpretation of the finding that MSMEs increased financial investment in response to a negative shock is that many of them, if not all, shifted their resources away from their own businesses to some listed firms through financial investment. In other words, the negative shock triggered or intensified the cleansing process in which less efficient firms are replaced by more efficient firms, not through firm exit and entry but reallocation of investible fund.

This trend for resource reallocation, or structural transformation, was activated by finance and trade liberalization and especially driven by entry in the WTO, which exposed many MSMEs to greater competition from imports, thereby discouraging them from expanding their own businesses. Further liberalization will deliver benefits to the country, at least in the long run. A caveat is that it may overheat financial investments and lead to an asset-inflated bubble economy along with rampant market monopolization. Thus, further liberalization in finance and trade ought to be accompanied by prudent macroeconomic management and effective enforcement of antitrust and competition policy.

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Table 8
RE Tobit estimates of function explaining the percentage of productive investment (marginal effects).

|                  | (1)                | (2)                | (3)                | (4)                | (5)                | (6)                |
|------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Period 3 dummy   | −0.260***          | −0.261***          | −0.261***          | −0.262***          | −0.260***          | −0.263***          |
|                  | [0.016]            | [0.016]            | [0.016]            | [0.017]            | [0.016]            | [0.017]            |
| Period 4 dummy   | −0.365***          | −0.384***          | −0.389***          | −0.365***          | −0.368***          | −0.422***          |
|                  | [0.016]            | [0.023]            | [0.036]            | [0.016]            | [0.017]            | [0.043]            |
| Period 5 dummy   | −0.262***          | −0.281***          | −0.285***          | −0.261***          | −0.265***          | −0.318***          |
|                  | [0.015]            | [0.023]            | [0.035]            | [0.015]            | [0.016]            | [0.043]            |
| D * log employment size | 0.009          |                    |                    |                    |                    | 0.012              |
|                  | [0.008]            |                    |                    |                    |                    | [0.011]            |
| D * firm age     | 0.010              |                    |                    |                    |                    | 0.013              |
|                  | [0.013]            |                    |                    |                    |                    | [0.013]            |
| D * log external finance | −0.000          |                    |                    |                    |                    | −0.001             |
|                  | [0.001]            |                    |                    |                    |                    | [0.001]            |
| D * formal dummy | 0.012              |                    |                    |                    |                    | 0.001              |
|                  | [0.020]            |                    |                    |                    |                    | [0.026]            |
| Log employment size | −0.030*          | −0.035*            | −0.030*            | −0.030*            | −0.031*            | −0.037***          |
|                  | [0.017]            | [0.018]            | [0.017]            | [0.017]            | [0.018]            | [0.018]            |
| Log employment size squared | 0.006**          | 0.006**            | 0.006**            | 0.006**            | 0.006**            | 0.006**            |
|                  | [0.003]            | [0.003]            | [0.003]            | [0.003]            | [0.003]            | [0.003]            |
| Firm age         | 0.010              | 0.011              | 0.005              | 0.010              | 0.010              | 0.004              |
|                  | [0.007]            | [0.007]            | [0.010]            | [0.007]            | [0.007]            | [0.010]            |
| Log external finance | −0.009***         | −0.009***          | −0.009***          | −0.008***          | −0.009***          | −0.008***          |
|                  | [0.001]            | [0.001]            | [0.001]            | [0.001]            | [0.001]            | [0.001]            |
| Formal dummy     | 0.024              | 0.023              | 0.025              | 0.024              | 0.019              | 0.023              |
|                  | [0.015]            | [0.015]            | [0.015]            | [0.015]            | [0.018]            | [0.019]            |
| Revenue/Asset     | −0.000             | −0.000             | −0.000             | −0.000             | −0.000             | −0.000             |
|                  | [0.000]            | [0.000]            | [0.000]            | [0.000]            | [0.000]            | [0.000]            |
| Profit/Asset      | 0.009*             | 0.009*             | 0.009*             | 0.009*             | 0.009*             | 0.009*             |
|                  | [0.005]            | [0.005]            | [0.005]            | [0.005]            | [0.005]            | [0.005]            |
| Urban dummy       | 0.027**            | 0.028**            | 0.027**            | 0.027**            | 0.027**            | 0.028**            |
|                  | [0.012]            | [0.012]            | [0.012]            | [0.012]            | [0.012]            | [0.012]            |
| Log FDI inflow to province | −0.008***        | −0.008***          | −0.008***          | −0.008***          | −0.008***          | −0.008***          |
|                  | [0.002]            | [0.002]            | [0.002]            | [0.002]            | [0.002]            | [0.002]            |
| Foreign trade dummy | −0.035*           | −0.034*            | −0.035*            | −0.035*            | −0.035*            | −0.035*            |
|                  | [0.020]            | [0.020]            | [0.020]            | [0.020]            | [0.020]            | [0.020]            |
| Inverse Mills Ratio | −0.098***         | −0.098***          | −0.099***          | −0.099***          | −0.098***          | −0.100***          |
|                  | [0.026]            | [0.026]            | [0.026]            | [0.026]            | [0.026]            | [0.026]            |
| Number of observations | 3730            | 3730              | 3730              | 3730              | 3730              | 3730              |
| Number of censored observations | 1001          | 1001              | 1001              | 1001              | 1001              | 1001              |

Notes: The same notes as those of Table 7 apply. Firm age which is a time-invariant variable is included.
Source: The University of Copenhagen-CIEM-ILSSA data and the authors’ calculation.

CRediT authorship contribution statement

Trinh Q. Long: Conceptualization, Methodology, Formal analysis, Investigation, Writing - original draft, Writing - review & editing. Peter J. Morgan: Conceptualization, Resources, Validation, Supervision. Tetsushi Sonobe: Conceptualization, Methodology, Resources, Validation, Writing - review & editing, Supervision.

Declaration of Competing Interest

None.

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Appendix A. Appendix

Several attempts to check the robustness of our major findings are made as shown in Tables A1 to A6. Table A1 is intended to check the robustness of the results shown in Table 2 by using a balanced panel. That is, the fixed-effect model estimation of eq. (1) is carried out by using only the sample firms without any missing data for any variables specified for any
period. As a result of eliminating those firms without complete data, the number of observations reduced from 7733 to 3760. The estimation results remain qualitatively similar to the results presented in Table 2.

Table A2 reports the robustness check of the results shown in Table 3 by using a balanced sample. Similar to the Appendix A1, the estimation results presented in Appendix Table A2 are also qualitatively consistent with the results presented in Table 3. This suggests that although there is some quantitatively difference between balanced and unbalanced samples, our estimates have generally not suffered from attrition bias. Tables A3 and A4 are intended to check the robustness of the results shown in Tables 4 and 5 by using a balanced panel. Similar to the Appendices A1 and A2, the estimation results remain qualitatively similar to the results presented in Tables 4 and 5.

Tables A5 and A6 are used to check the robustness of results presented in Tables 2 and 7, by using the different but related variables. More specifically, we replace the log of employment size with a dummy variable ("SME dummy") which is equal to 1 if the firm has more than ten workers and hence is not micro-sized. Firm age is also replaced by older firm dummy which is equal to 1 if firm age is 15 years or above and 0 otherwise (15 years is the median age in our sample). The log of the amount of external finance is replaced by external finance dummy which is equal to 1 if the firm has external finance and 0 otherwise.

Table A5 shows that SME firms (relatively large MSMEs) tend to decrease their investment rates more than micro firms in downturn periods. Meanwhile, there is no difference in productive investment rate between younger firms and older firms in downturn periods. Firms with external finance tend to invest more in a normal period but reduce productive investment in a downturn period. Finally, formal firms have lower investment rates in both normal periods and (even lower) in downward periods. The results in Table A6 suggest that changes in firms’ portfolio choice occurred in the same manner regardless of their characteristics. This suggests that the empirical results presented in Table 2 and Table 7 are reliable regardless of measurement of each firm’s characteristics.

Table A1
Robustness check of Table 2: Balanced panel (FE estimates).

|                  | (1)       | (2)       | (3)       | (4)       | (5)       | (6)       |
|------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Period 3 dummy   | −0.010*   | −0.009*   | −0.010*   | −0.015*** | −0.010*   | −0.014*** |
|                  | [0.005]   | [0.005]   | [0.005]   | [0.005]   | [0.005]   | [0.005]   |
| Period 4 dummy   | −0.025*** | 0.009     | −0.044*** | −0.033*** | −0.019*** | −0.008    |
|                  | [0.005]   | [0.008]   | [0.014]   | [0.005]   | [0.005]   | [0.017]   |
| Period 5 dummy   | −0.028*** | 0.005     | −0.047*** | −0.037*** | −0.021*** | −0.012    |
|                  | [0.005]   | [0.008]   | [0.014]   | [0.005]   | [0.005]   | [0.017]   |
| D * Log employment size | −0.019*** |   |   |   |   |   |
|                  | [0.003]   |           |           |           |           |           |
| D * firm age     |           |           |           |           |           | −0.011*** |
|                  |           |           |           |           |           | [0.004]   |
| D * Log external finance | −0.004*** |   |   |   |   |   |
|                  | [0.001]   |           |           |           |           |           |
| D * Formal dummy |           |           |           |           |           | −0.019    |
|                  |           |           |           |           |           | [0.012]   |
| Log employment size | −0.004   | 0.013     | −0.005   | −0.001   | −0.000    | 0.010    |
|                  | [0.010]   | [0.010]   | [0.010]   | [0.010]   | [0.010]   | [0.010]   |
| Log employment size squared | −0.002   |   | −0.002   | −0.002   | −0.003   | −0.004*   |
|                  | [0.002]   |   | [0.002]   | [0.002]   | [0.002]   | [0.002]   |
| Log external finance | 0.004*** | 0.004*** | 0.006*** | 0.004*** | 0.006*** |           |
|                  | [0.000]   | [0.000]   | [0.000]   | [0.000]   | [0.000]   | [0.000]   |
| Formal dummy     | −0.036**  | −0.027**  | −0.036**  | −0.031**  | −0.015    | −0.018    |
|                  | [0.015]   | [0.015]   | [0.015]   | [0.015]   | [0.015]   | [0.015]   |
| Revenue/Asset     | 0.002***  | 0.002***  | 0.002***  | 0.002***  | 0.002***  | 0.002***  |
|                  | [0.000]   | [0.000]   | [0.000]   | [0.000]   | [0.000]   | [0.000]   |
| Profit/Asset      | −0.004*** | −0.004*** | −0.004*** | −0.004*** | −0.004*** | −0.004*** |
|                  | [0.001]   | [0.001]   | [0.001]   | [0.001]   | [0.001]   | [0.001]   |
| Urban dummy       | 0.131***  | 0.129***  | 0.129***  | 0.131***  | 0.125***  | 0.122***  |
|                  | [0.042]   | [0.042]   | [0.042]   | [0.041]   | [0.041]   | [0.041]   |
| Log FDI inflow to province | −0.001   | −0.001   | −0.001   | −0.001   | −0.001   | −0.001   |
|                  | [0.001]   | [0.001]   | [0.001]   | [0.001]   | [0.001]   | [0.001]   |
| Foreign trade dummy | −0.015   | −0.009   | −0.014   | −0.015   | −0.011   | −0.010   |
|                  | [0.013]   | [0.013]   | [0.013]   | [0.013]   | [0.013]   | [0.013]   |
| Intercept         | 0.028     | 0.009     | 0.029     | 0.030     | 0.025     | 0.017     |
|                  | [0.021]   | [0.022]   | [0.021]   | [0.021]   | [0.021]   | [0.022]   |
| Number of observations | 3960   | 3960   | 3960   | 3960   | 3960   | 3960   |

Notes: The same notes as those of Table 2 apply. The sample used here consists of only those firms with no missing data of the variables in the model for each period.
Source: The University of Copenhagen-CIEM-ILSSA data and the authors’ calculation.

Table A2
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Robustness check of Table 3: Balanced panel (RE Tobit estimates, marginal effects).

|                | (1)    | (2)    | (3)    | (4)    | (5)    | (6)    |
|----------------|--------|--------|--------|--------|--------|--------|
| Period 3 dummy | −0.006** | −0.006* | −0.006** | −0.008** | −0.007** | −0.008** |
|                | [0.003]  | [0.003]  | [0.003]  | [0.003]  | [0.003]  | [0.003]  |
| Period 4 dummy | −0.025*** | −0.016*** | −0.039*** | −0.026**  | −0.023*** | −0.014   |
|                | [0.003]  | [0.005]  | [0.010]  | [0.005]  | [0.004]  | [0.009]  |
| Period 5 dummy | −0.022*** | −0.013**  | −0.036*** | −0.024**  | −0.020*** | −0.011   |
|                | [0.004]  | [0.005]  | [0.009]  | [0.004]  | [0.004]  | [0.009]  |
| D * log employment size | −0.005**  | −0.005**  | −0.005**  | −0.005**  | −0.003   |         |
|                | [0.002]  |         |         |         | [0.003]  |         |
| D * firm age   | 0.005   |        |        |        | −0.012*  | −0.006   |
|                | [0.003]  |         |         |         | [0.006]  | [0.007]  |
| D * log external finance | −0.001**  | −0.001*  |         |         | −0.001*  |         |
|                | [0.000]  | [0.000]  |         |         | [0.000]  |         |
| D * formal dummy |         |        |        |        | −0.012*  | −0.006   |
|                |         | [0.006]  | [0.006]  |         | [0.007]  |         |
| Log employment size | 0.016*** | 0.019*** | 0.016*** | 0.017*** | 0.017*** | 0.019*** |
|                | [0.004]  | [0.004]  | [0.004]  | [0.004]  | [0.004]  | [0.004]  |
| Log employment size squared | −0.002**  | −0.002**  | −0.002**  | −0.002**  | −0.002**  | −0.002**  |
|                | [0.001]  | [0.001]  | [0.001]  | [0.001]  | [0.001]  | [0.001]  |
| Firm age       | −0.005*** | −0.005**  | −0.008*** | −0.005**  | −0.005**  | −0.005**  |
|                | [0.002]  | [0.002]  | [0.003]  | [0.002]  | [0.002]  | [0.002]  |
| Log external finance | 0.003*** | 0.003*** | 0.003*** | 0.004*** | 0.003*** | 0.004*** |
|                | [0.000]  | [0.000]  | [0.000]  | [0.000]  | [0.000]  | [0.000]  |
| Formal dummy   | 0.008*  | 0.009*  | 0.009*  | 0.009*  | 0.014**  | 0.013**  |
|                | [0.005]  | [0.005]  | [0.005]  | [0.005]  | [0.005]  | [0.005]  |
| Revenue/Asset  | 0.001*** | 0.001*** | 0.001*** | 0.001*** | 0.001*** | 0.001*** |
|                | [0.000]  | [0.000]  | [0.000]  | [0.000]  | [0.000]  | [0.000]  |
| Profit/Asset   | −0.002** | −0.002** | −0.002** | −0.002** | −0.002**  | −0.002**  |
|                | [0.001]  | [0.001]  | [0.001]  | [0.001]  | [0.001]  | [0.001]  |
| Urban dummy    | −0.008*** | −0.008*** | −0.008*** | −0.008*** | −0.008*** | −0.008*** |
|                | [0.003]  | [0.003]  | [0.003]  | [0.003]  | [0.003]  | [0.003]  |
| Log FDI inflow to province | −0.003*** | −0.003*** | −0.003*** | −0.003*** | −0.003*** | −0.003*** |
|                | [0.000]  | [0.000]  | [0.000]  | [0.000]  | [0.000]  | [0.000]  |
| Foreign trade dummy | 0.001  | 0.001  | 0.001  | −0.000  | 0.001  | 0.001 |
|                | [0.006]  | [0.006]  | [0.006]  | [0.006]  | [0.006]  | [0.006]  |
| Number of observations | 3960  | 3960  | 3960  | 3960  | 3960  | 3960 |

Notes: The same notes as those of Table 3 apply. The sample used here consists of only those firms with no missing data of the variables in the model for each period.

Source: The University of Copenhagen-CIEM-ILSSA data and the authors’ calculation.

Table A3
Robustness check of Table 4: Balanced panel (FE estimates).

|                | (1)    | (2)    | (3)    | (4)    | (5)    | (6)    |
|----------------|--------|--------|--------|--------|--------|--------|
| Period 3 dummy | 0.053*** | 0.053*** | 0.053*** | 0.052*** | 0.053*** | 0.053*** |
|                | [0.006]  | [0.006]  | [0.006]  | [0.006]  | [0.006]  | [0.006]  |
| Period 4 dummy | 0.044*** | 0.062*** | 0.064*** | 0.042**  | 0.047*** | 0.092*** |
|                | [0.006]  | [0.009]  | [0.017]  | [0.006]  | [0.006]  | [0.020]  |
| Period 5 dummy | 0.014**  | 0.032**  | 0.034**  | 0.012*  | 0.018*** | 0.063**  |
|                | [0.006]  | [0.009]  | [0.017]  | [0.006]  | [0.006]  | [0.020]  |
| D * log employment size | −0.011*** |         |         |         | −0.010*  |         |
|                | [0.004]  |         |         |         | [0.005]  |         |
| D * firm age   |        | −0.008  |        |        | −0.022** | −0.012*  |
|                |         | [0.006]  |         |         | [0.011]  | [0.014]  |
| D * log external finance |        | −0.001  |        |        | −0.000  | −0.000   |
|                |         | [0.001]  |         |         | [0.001]  |         |
| D * formal dummy |        |        |        |        | −0.022** | −0.010   |
|                |        |         |         |         | [0.011]  | [0.014]  |
| Log employment size |        |        |        |        | −0.008  | 0.001    |
|                |        | [0.011]  | [0.012]  | [0.011]  | [0.012]  | [0.012]  |
| Log employment size squared |        |        |        |        | −0.000  | −0.000   |
|                |        | [0.003]  | [0.003]  | [0.003]  | [0.003]  | [0.003]  |
| Log external finance |        |        |        |        | 0.009**  | 0.010**  |
|                |        | [0.000]  | [0.000]  | [0.001]  | [0.000]  | [0.001]  |
| Formal dummy   | −0.002  | 0.003  | −0.002  | −0.001  | 0.008  | 0.007   |

(continued on next page)
### Table A3 (continued)

|                          | (1)          | (2)          | (3)          | (4)          | (5)          | (6)          |
|--------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Revenue/Asset            | [0.017]      | [0.017]      | [0.017]      | [0.017]      | [0.018]      | [0.018]      |
| Profit/Asset             | [0.000]      | [0.000]      | [0.000]      | [0.000]      | [0.000]      | [0.000]      |
| Urban dummy              | [0.002]      | [0.002]      | [0.002]      | [0.002]      | [0.002]      | [0.002]      |
| Log FDI inflow to province | −0.001      | −0.001       | −0.001       | −0.001       | −0.001       | −0.001       |
| Foreign trade dummy      | [0.001]      | [0.015]      | [0.001]      | [0.015]      | [0.015]      | [0.015]      |
| Intercept                | [0.021]      | [0.021]      | [0.022]      | [0.021]      | [0.018]      | [0.016]      |
| Number of observations   | 3969         | 3969         | 3969         | 3969         | 3969         | 3969         |

Notes: The same notes as those of Table 4 apply. The sample used here consists of only those firms with no missing data of the variables in the model for each period.

Source: The University of Copenhagen-CIEM-ILSSA data and the authors’ calculation.

### Table A4

Robustness check of Table 5: Balanced panel (RE Tobit estimates, marginal effects).

|                          | (1)          | (2)          | (3)          | (4)          | (5)          | (6)          |
|--------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Period 3 dummy           | 0.066***     | 0.068***     | 0.067***     | 0.067***     | 0.068***     | 0.068***     |
| Period 4 dummy           | 0.068***     | 0.084***     | 0.070***     | 0.070***     | 0.072***     | 0.115***     |
| Period 5 dummy           | 0.047***     | 0.059***     | 0.046***     | 0.046***     | 0.048***     | 0.091***     |
| D * log employment size  | −0.007***    | −0.007***    | −0.007***    | −0.007***    | −0.008***    | −0.011***    |
| D * firm age             | −0.000       | −0.000       | −0.000       | −0.000       | −0.000       | −0.000       |
| D * log external finance | 0.004        | [0.008]      | [0.012]      | [0.005]      | [0.005]      | [0.011]      |
| D * formal dummy         | −0.008       | −0.000       | −0.008       | −0.000       | −0.008       | −0.000       |
| Log employment size      | 0.018***     | 0.023***     | 0.018***     | 0.018***     | 0.019***     | 0.025***     |
| Log employment size squared | −0.003***   | −0.003***    | −0.003***    | −0.003***    | −0.003***    | −0.003***    |
| Firm age                 | −0.005***    | −0.011***    | −0.011***    | −0.011***    | −0.011***    | −0.011***    |
| Log external finance     | 0.007***     | 0.006***     | 0.006***     | 0.006***     | 0.006***     | 0.006***     |
| Formal dummy             | 0.001        | 0.003        | 0.003        | 0.003        | 0.003        | 0.003        |
| Revenue/Asset            | [0.000]      | [0.000]      | [0.000]      | [0.000]      | [0.000]      | [0.000]      |
| Profit/Asset             | 0.001        | 0.003        | 0.001        | 0.001        | 0.001        | 0.001        |
| Urban dummy              | −0.012***    | −0.014***    | −0.014***    | −0.014***    | −0.014***    | −0.014***    |
| Log FDI inflow to province | −0.001      | −0.001       | −0.001       | −0.001       | −0.001       | −0.001       |
| Foreign trade dummy      | [0.000]      | [0.000]      | [0.001]      | [0.001]      | [0.001]      | [0.001]      |
| Number of observations   | 3969         | 3969         | 3969         | 3969         | 3969         | 3969         |
| Number of censored observations | 2797        | 2797         | 2797         | 2797         | 2797         | 2797         |

Notes: The same notes as those of Table 5 apply. The sample used here consists of only those firms with no missing data of the variables in the model for each period.

Source: The University of Copenhagen-CIEM-ILSSA data and the authors’ calculation.
Robustness check of Table 2: Replacement of some variables (FE estimates).

|                | (1)       | (2)       | (3)       | (4)       | (5)       | (6)       |
|----------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Period 3 dummy| −0.019*** | −0.019*** | −0.020*** | −0.027*** | −0.020*** | −0.026*** |
|                | [0.004]   | [0.004]   | [0.004]   | [0.004]   | [0.004]   | [0.004]   |
| Period 4 dummy| −0.032*** | −0.019*** | −0.039*** | −0.020*** | −0.024*** | −0.013*   |
|                | [0.004]   | [0.005]   | [0.006]   | [0.005]   | [0.005]   | [0.007]   |
| Period 5 dummy| −0.038*** | −0.025*** | −0.044*** | −0.026*** | −0.029*** | −0.019*** |
|                | [0.005]   | [0.005]   | [0.006]   | [0.005]   | [0.005]   | [0.007]   |
| D * SME dummy  | −0.054*** | [0.007]   | −0.015*   | [0.008]   | [0.007]   | [0.008]   |
| D * Older dummy| 0.010     | [0.006]   | 0.010     | [0.007]   | [0.007]   | [0.007]   |
| D * External finance dummy | −0.045*** | [0.007]   | −0.043*** | [0.008]   | [0.008]   | [0.008]   |
| D * Formal dummy| −0.044*** | [0.008]   | −0.027*** | [0.009]   | [0.009]   | [0.009]   |
| SME dummy      | −0.016**  | 0.008     | −0.016**  | −0.016**  | −0.016**  | −0.016**  |
|                | [0.007]   | [0.008]   | [0.007]   | [0.007]   | [0.007]   | [0.007]   |
| External finance dummy | 0.055*** | 0.056*** | 0.055*** | 0.082*** | 0.055*** | 0.079**   |
|                | [0.004]   | [0.004]   | [0.004]   | [0.006]   | [0.004]   | [0.006]   |
| Formal dummy   | −0.035*** | −0.029**  | −0.034*** | −0.031**  | −0.017    | −0.019    |
|                | [0.012]   | [0.012]   | [0.012]   | [0.012]   | [0.012]   | [0.012]   |
| Revenue/Asset  | 0.001***  | 0.001***  | 0.001***  | 0.001***  | 0.001***  | 0.001***  |
|                | [0.000]   | [0.000]   | [0.000]   | [0.000]   | [0.000]   | [0.000]   |
| Profit/Asset   | 0.001     | 0.001     | 0.001     | 0.001     | 0.001     | 0.001     |
| Urban dummy    | 0.004     | 0.004     | 0.004     | 0.005     | −0.009    | −0.000    |
|                | [0.028]   | [0.028]   | [0.028]   | [0.028]   | [0.028]   | [0.028]   |
| Log FDI inflow to province | −0.001    | −0.001    | −0.001    | −0.001    | −0.001    | −0.001    |
|                | [0.001]   | [0.001]   | [0.001]   | [0.001]   | [0.001]   | [0.001]   |
| Foreign trade dummy | −0.022** | −0.019** | −0.022** | −0.023** | −0.020** | −0.021**   |
|                | [0.010]   | [0.009]   | [0.010]   | [0.009]   | [0.010]   | [0.009]   |
| Intercept      | 0.062***  | 0.057***  | 0.062***  | 0.058***  | 0.062***  | 0.059***   |
|                | [0.015]   | [0.015]   | [0.015]   | [0.015]   | [0.015]   | [0.015]   |
| Number of observations | 7743     | 7743     | 7743     | 7743     | 7743     | 7743     |

Notes: The same notes as those of Table 2 apply. However, several variables are replaced by related but different variables. The log of employment size is replaced by SME dummy which is equal to 1 if the firm has more than ten workers and hence is not micro-sized. Firm age is replaced by older firm dummy which is equal to 1 if firm age is 15 years or above and 0 otherwise. The log of the amount of external finance is replaced by external finance dummy which is equal to 1 if the firm has external finance and 0 otherwise.

Source: The University of Copenhagen-CIEM-ILSSA data and the authors’ calculation.

Table A6
Robustness check of Table 7: Replacement of some variables (FE estimates).

|                | (1)       | (2)       | (3)       | (4)       | (5)       | (6)       |
|----------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Period 3 dummy| −0.389*** | −0.390*** | −0.389*** | −0.388*** | −0.390*** | −0.386*** |
|                | [0.041]   | [0.041]   | [0.041]   | [0.042]   | [0.041]   | [0.042]   |
| Period 4 dummy| −0.443*** | −0.428*** | −0.460*** | −0.446*** | −0.432*** | −0.459*** |
|                | [0.035]   | [0.038]   | [0.040]   | [0.042]   | [0.037]   | [0.049]   |
| Period 5 dummy| −0.352*** | −0.338*** | −0.371*** | −0.355*** | −0.341*** | −0.368*** |
|                | [0.028]   | [0.031]   | [0.035]   | [0.036]   | [0.030]   | [0.044]   |
| D * SME dummy  | −0.040    | [0.036]   | 0.021     | [0.037]   | [0.042]   | [0.042]   |
| D * Older firm dummy | 0.032     | [0.034]   | 0.030     | [0.035]   | [0.042]   | [0.042]   |
| D * External finance dummy | 0.006     | [0.041]   | 0.011     | [0.042]   | [0.042]   | [0.042]   |
| D * Formal dummy| −0.037    | −0.045    | [0.036]   | [0.042]   | [0.042]   | [0.042]   |
| SME dummy      | −0.028    | −0.010    | −0.027    | −0.028    | −0.027    | −0.026    |
|                | [0.040]   | [0.043]   | [0.040]   | [0.042]   | [0.040]   | [0.040]   |
| External finance dummy | −0.285*** | −0.284*** | −0.285*** | −0.288*** | −0.285*** | −0.291*** |
|                | [0.023]   | [0.023]   | [0.023]   | [0.031]   | [0.023]   | [0.031]   |
| Foreign trade dummy | −0.029    | −0.027    | −0.028    | −0.029    | −0.017    | −0.016    |
|                | [0.056]   | [0.056]   | [0.056]   | [0.056]   | [0.057]   | [0.058]   |
| Revenue/Asset  | −0.000    | −0.000    | −0.000    | −0.000    | −0.000    | −0.000    |
|                | [0.001]   | [0.001]   | [0.001]   | [0.001]   | [0.001]   | [0.001]   |

(continued on next page)
Table A6 (continued)

|                      | (1)          | (2)          | (3)          | (4)          | (5)          | (6)          |
|----------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Profit/Asset         | 0.015        | 0.014        | 0.015        | 0.015        | 0.015        | 0.015        |
|                      | [0.012]      | [0.012]      | [0.012]      | [0.012]      | [0.012]      | [0.012]      |
| Located in urban area| −0.217*      | −0.216*      | −0.217*      | −0.217*      | −0.221*      | −0.220*      |
|                      | [0.121]      | [0.121]      | [0.121]      | [0.121]      | [0.121]      | [0.121]      |
| Log FDI inflow to province| 0.003        | 0.003        | 0.003        | 0.003        | 0.003        | 0.003        |
|                      | [0.005]      | [0.005]      | [0.005]      | [0.005]      | [0.005]      | [0.005]      |
| Foreign trade dummy  | −0.128***    | −0.126***    | −0.128***    | −0.128***    | −0.126***    | −0.127***    |
|                      | [0.046]      | [0.046]      | [0.046]      | [0.046]      | [0.046]      | [0.046]      |
| Inverse Mills ratio  | −0.198*      | −0.201*      | −0.193*      | −0.198*      | −0.200*      | −0.193*      |
|                      | [0.111]      | [0.111]      | [0.111]      | [0.111]      | [0.111]      | [0.111]      |
| Intercept            | 1.227***     | 1.223***     | 1.222***     | 1.228***     | 1.228***     | 1.222***     |
|                      | [0.119]      | [0.119]      | [0.119]      | [0.119]      | [0.119]      | [0.120]      |
| Number of observations| 3730         | 3730         | 3730         | 3730         | 3730         | 3730         |

Notes: The same notes as those of Appendix Table A5 apply. Inverse Mills ratio is obtained by using the estimated probit model shown in Table 6.

Source: The University of Copenhagen-CIEM-ILSSA data and the authors’ calculation.

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