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The role of ownership and competition in
Vietnamese firms' productivity**

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From central planning toward a market economy: The role of ownership and competition in Vietnamese firms' productivity

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Abstract

This paper examines the role of ownership and market competition in Vietnamese firms' total factor productivity (TFP) from 2001 to 2011. Making use of a large panel dataset of manufacturing firms, we find that, on average, both foreign-owned enterprises (FOEs) and state-owned enterprises (SOEs) have performed better than privately owned enterprises (POEs) in terms of their TFP levels. However, while FOEs ranked the highest in terms of TFP in the period 2001–2006, SOEs “closed the gap” with FOEs in the period 2007–2011. SOEs' good performance may be the result of the state-led development policies undertaken during the 2000s. We also find that market competition has been effective in enhancing average firm productivity and reducing the gaps in efficiency across firms of different ownership types. Based on these results, we compare Vietnam's transition path with those followed by other countries.

Keywords: Ownership, market competition, TFP, Vietnamese manufacturing, transition economies

JEL classification: D24, L33, O53, N60, P27

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1. Introduction

Vietnam has achieved tremendous economic growth since the 1986 launch of the *doi moi* (“renovation”) program, which set the country on a path of gradually turning away from central planning in order to transition toward a market economy (Pincus, 2016, p. 380). Over this period, the growth rate of Vietnam’s gross domestic product (GDP) has been, on average, around 7% on a year-on-year basis (see Minh and Long, 2008, p. 106; World Bank, 2012; Malesky and London, 2014, p. 203).

The *doi moi* policy is based on three main pillars (Pincus, 2016, pp. 380–382). The first pillar aims to achieve the mobilization of under-utilized land and labor in the production and export of goods. Indeed, agriculture and labor-intensive manufacturing – conducted by small firms and household enterprises – have spurred Vietnamese growth during this period. The second pillar aims to expand the space allowed for incoming foreign investments (whose number and value gained momentum mostly after the revision of the Investment Law in 2005). Finally, from the mid-1980s, the state has retreated from an omnipresence in the economy while maintaining strategic control over several industries (see Vu Thanh, 2014, p. 16) via state-owned enterprises (SOEs).¹

Recently, Vietnam’s development has puzzled scholars for several reasons, making the explanation for the country’s success less than clear-cut. As for its institutions, the political system is a Communist, single-party regime, where participation in political decisions is limited to a few people (Malesky and London, 2014, p. 202) and property rights protection and legal institutions remain under-developed. As for the economy, the expansion of the private sector has gone hand in hand with the state-led development policy intended to consolidate several SOEs as the leading engine of the economy (Malesky and London, 2014, p. 2018).² Moreover, the growth model followed by Vietnam from the mid-1980s has been more based on the accumulation of resources

¹ Pincus (2016, p. 381) lists these sectors. By looking at the share of SOEs in the total firms in our database (Table A.2 in the Appendix) we observe that SOEs were relevant in 2001 in the following manufacturing sectors: tobacco products; machinery and equipment; chemicals and pharmaceuticals. The state held fewer but still significant shares in textiles, apparel, leather products and footwear and non-metallic mineral products. A quick look at the figures for 2011 shows that in the 2000s, SOEs have been decreasing in number in most of these industries. Ngoc and Ramstetter (2004, p. 393) confirm these figures.

² In terms of GDP, the private sector consistently represented 60% of the economy in 1995, 2005, and 2010 (Malesky and London, 2014, p. 209).

than it has been on the growth of productivity (labor and capital accumulation accounts for around 80% of GDP growth during this period).³

Even if the less than impressive productivity figure, together with low wages, widespread underemployment, and the relevance of the agricultural sector⁴ may suggest that the *doi moi* model has not yet been fully exploited (see Malesky and London, 2014, p. 207; Pincus, 2016 pp. 390–392), in the long run, Vietnam’s growth will be maintained only through sound productivity dynamics. Given this, it is timely to inquire into the determinants of productivity in Vietnam.

Two features of the *doi moi* program in particular may have had an effect on Vietnamese firms’ productivity. First, is the recognition and promotion of heterogeneity in ownership types. After 2000, several changes in the legal environment (see Section 2) incentivized the establishment of many privately owned enterprises (POEs) and the entry of foreign-owned enterprises (FOEs) and applied a single unified legal framework to all firms. During the same period, state-led development policies led to changes in the governance and the equitization of several SOEs (Minh and Long, 2008, pp. 99–100). Second, the number of firms active in Vietnam, and therefore, market competition, has increased precisely because of these legal changes. The accession of Vietnam to the World Trade Organization (WTO) in 2007 has further enhanced market competition.

Despite the debate over Vietnamese firms’ performance has gained momentum in the last fifteen years, thanks to the increasing availability of firm-level data (see Ngoc and Ramstetter, 2004; Nguyen and Le, 2005; Ha and Kiyota, 2014; Nguyen, 2016; among others), general evidence on the role of ownership and market competition in productivity remains sparse and inconclusive (see Huang and Yang, 2016; Baccini et al. 2017; among others). This is unfortunate, because at this stage of Vietnam’s development, it is necessary to deepen our knowledge in terms of these two major determinants of firm productivity.

In this paper, we take advantage of a large panel dataset of Vietnamese manufacturing firms observed over an entire decade (from 2001 to 2011) to empirically assess the role of ownership and competition in firm productivity. The period analyzed is one of major changes in the firms’ playing field, because of the reforms promoting the private sector, the restructuring of the SOEs,

³ For example, Nguyen (2004) calculated the total factor productivity (TFP) growth rate to be around 1.5% (on average) in the period 1985–2004 (with respect to an average GDP growth rate of 6.7%); in line with this result, Minh and Long (2008) have found that TFP growth contributes about 19.7% to the country’s GDP growth during the period 1985–2006.

⁴ In 2012, almost 50% of the labor force was employed in the primary sector.

and the accession of the country to the WTO. The focus on manufacturing allows us to analyze the relative performance of different ownership types in sectors characterized by relatively low levels of regulation and exposed to international competition.

This yields two main results. First, we find that – once controlled for a large set of firm, industry, and province characteristics – both FOEs and SOEs show, on average, higher TFP levels than POEs during the period 2001–2011. Actually, while FOEs ranked the highest in terms of TFP in the period 2001–2006, SOEs “closed the gap” with FOEs in the period 2007–2011. We submit that the remarkable performance of SOEs may be the result of the effect of the restructuring process undertaken by the Vietnamese government to preserve and consolidate the internal competences of these corporations. However, we discuss the possibility that this result may also stem from the easier access to factors of production (capital and land) gauged by SOEs in the period 2007–2011. Second, we find that market competition has enhanced average firm productivity and reduced gaps in productivity across firms of different ownership types (*viz.*, FOEs, SOEs and POEs), providing some evidence of the role that competition has played in Vietnam’s recent transition path (Pincus, 2016; Nguyen, 2016). The results are robust to Heckman’s 2-stage procedure to control for the possible selection (non-randomness) of businesses kept in the hands of the state. Moreover, we control for simultaneity and unobserved heterogeneity, and the main results of the analysis are confirmed. Finally, we explore the possibility that a higher relevance of SOEs in a POE’s industry and province may hinder the private firm’s productivity growth, but we do not find evidence of this.

This study contributes to the literature on Vietnam’s growth path and its determinants (see Minh and Long, 2008; Malesky and London, 2014; Pincus, 2016; among others) by providing a comprehensive overview of TFP in Vietnamese manufacturing during the period 2001–2011, when relevant institutional and economic changes took place. In addition, this work contributes to the empirical literature on the joint role of private ownership and market competition in firms’ productivity. Indeed, the two have been considered by both scholars and policy makers as the major forces behind effective transitions from central planning to market economies (for an assessment of these two factors on Chinese firms’ efficiency, see Zhang and Zhang, 2001; for an analysis of manufacturing establishments in Indonesia, see Bartel and Harrison, 2005; for an inquiry into Romanian firms see Asaftei et al., 2008; and for some evidence regarding Central and

Eastern European countries, see Driffield et al. 2013).⁵ Finally, by comparing the evidence we find with other countries' experiences from a comparative perspective, our paper makes a contribution to the literature on the role and the evolution of state ownership in transition countries (see Hsieh and Song, 2016, among others).

The rest of this paper is organized as follows. Section 2 describes some of the major institutional reforms that have occurred in Vietnam in the last three decades. Section 3 defines the framework of analysis and the research hypotheses. Section 4 describes the data. Section 5 presents the econometric results, while Section 6 discusses them. Section 7 concludes the paper.

2. Reforms in the 1990s and 2000s: The rise of private firms and state-led development policies

Since the launch of the “renovation” program in 1986, Vietnam has followed in the footsteps of its larger socialist neighbor, China, to transition to a mixed market economy (Pincus, 2016, p. 380).

The main ingredient of the economic reforms promoted through the *doi moi* plan (which successfully lasted for three decades until the crisis that affected the Vietnamese economy in 2011) was the liberalization of property rights, which was further strengthened by the Vietnamese Constitution of 1992. This institutional change freed under-utilized factors of production and allowed the entry of small POEs into the market. In parallel with this entry process, the government started to adopt an “open door” policy to attract foreign direct investments (FDIs). However, the relevance of both POEs and FOEs has been increasing since the second wave of reforms began in 2000. Indeed, after 2000, the new versions of the Enterprise Law and the Investment Law granted a single unified legal framework to all firms (either domestic or foreign, private or state-owned). These laws removed many administrative barriers and made it easier to establish new private enterprises in the country. Since coming into effect, the number of POEs and FOEs in Vietnam has sharply increased, as Figure 2 shows. Accession to the WTO in 2007 has further prompted market liberalization.⁶

⁵ As underscored by Estrin et al. (2009, p. 5), “The so-called Washington Consensus emphasized [...] that private ownership together with market forces would ensure efficient economic performance.”

⁶ Indeed, Vietnam had to adjust its legal framework to suit the underlying values of the WTO such as free trade (i.e., via reduction of tariff and non-tariff barriers), fair competition (i.e., via a promise to eliminate prohibited subsidies to SOEs and foster competition in domestic financial markets), and non-discrimination (through the “national treatment” principle). An in-depth discussion of the reforms that Vietnam had to start to deal with in order to join the WTO is presented in Vu Thanh (2014, pp. 5–11).

The second ingredient of the transition process was the role assigned by the government to both SOEs and the sectors in which they were most relevant as tools to maintain the commanding heights of the economy (Malesky and London, 2014; Pincus, 2016). Specifically, the government boosted its scheme to “revitalize” SOEs in the 2000s. In the first years of the twenty first century (2000–2006), SOEs were converted into limited liability companies or joint stock companies in order to have a more modern governance system. Moreover, small and non-strategic SOEs were privatized. These reforms aimed at strengthening SOEs’ efficiency by improving their internal incentive systems. State-led development policies were geared up in the period 2007–2011. In the face of three consecutive crises (in 2007, 2009, and 2011, respectively) and the exposure to tougher international competition imposed by Vietnam’s accession to the WTO, the government has promoted the consolidation of several SOEs into state business groups (SBGs) or state economic groups (SEGs), with the aim of reaching economies of scale and scope and consolidating their main managerial and technological competences.

3. Framework of analysis and hypotheses

The framework of analysis draws on that of Park et al. (2006) and is based on the two main forces that have re-shaped the economic landscape in Vietnam throughout the 2000s, i.e., the liberalization of private property rights and state-led development policies.

[Insert Figure 1 about here]

The liberalization of private property rights may have had a direct impact on firm productivity via an ownership (*per se*) effect. Megginson and Netter (2001) and Estrin et al. (2009, p.7) review the advantages that private ownership ensures to firms. Indeed, it reduces managerial discretion via better incentives (Morck et al., 1989) and clearer monitoring chains (Driffield et al., 2013), and by exposing firms to the market for corporate control. Furthermore, the state, as a firm’s owner, may impose targets other than profit maximization (Shleifer and Vishny, 1997; Hanousek, Kočenda and Svenjar, 2009). Finally, poorly performing SOEs may be granted easier access (a “soft budget constraint”) to external resources than their private counterparts (Brandt and Li, 2003). All these factors may positively affect privately owned firms’ efficiency with respect to that of their state-owned counterparts.

As a countervailing force, state-led development policies in the 2000s had the aim of strengthening SOEs, which worked along two main lines. First, there was the dismissal and privatization of small SOEs, where residual claims and decision rights were re-assigned from the government to private individuals; consequently, managers have been better incentivized to foster efficiency (Zhang, 1997). Second, there was a modernization of governance and a consolidation of medium and large SOEs into state conglomerates where economies of scale and scope may have been better exploited.⁷

Overall, in the period 2001–2011, the co-occurrence of the liberalization of property rights and state-led development policies may have had uneven effects on the efficiency of firms characterized by different ownership types. On the one hand, a strengthened protection of private ownership may have granted an advantage to POEs; on the other hand, SOEs may have improved their efficiency thanks to the government action. Thus, we propose a pair of contradicting hypotheses, allowing the empirical analysis to reveal which one is supported by the evidence.

H1a. POEs outperform SOEs in terms of TFP levels.

H1b. SOEs outperform POEs in terms of TFP levels.

Theoretical works have established the advantage of foreign firms over domestic ones (Markusen, 1991; Dunning, 1993; Caves, 1996). This is linked to firm-specific, knowledge-based, and intangible assets that ensure FOEs' superior management practices and technological know-how. Indeed, several empirical papers have proved that FOEs are more productive than domestic firms (Griffith, 1999; Harris and Robinson, 2002; Takii, 2004; Benfratello and Sembenelli, 2006). Given that, we expect FOEs to be more productive than both POEs and SOEs.

H2. FOEs outperform domestic enterprises (POEs and SOEs) in terms of TFP levels.

Apart from the ownership effect, the liberalization of private property rights in the early 2000s has implied a rise in the number of POEs and FOEs across industries in Vietnam. This, together with Vietnam's accession to the WTO, may have bolstered managerial efforts to enhance firms' efficiency due to fiercer market competition. Backus (2014) suggests that there are two channels through which this may work. First, more competitors allows the owner of a firm to better compare

⁷ Apart from the effect of state-led development policies, some authors have suggested that non-private ownership may be advantageous in the context of transition economies (such as China and Vietnam), where market transactions can be blocked due to government regulations (Li, 1996) and property rights are insecure (Che and Qian, 1998).

the performance of its own managers to those of other managers in the same industry (Holmström, 1982). Second, the generation of a business-stealing effect creates the necessity to invest in cost reduction (Raith, 2003). As a result of the increase in the number of firms, we expect that firms that are active in more competitive industries will be more efficient.

H3. In industries characterized by a higher degree of market competition, the productivity of the “average” firm is higher.

Through exposure to fiercer competition, less efficient firms –regardless of their ownership type– will be forced to exit the market. Thus, another consequence of the increase in the number of firms is the expected convergence in productivity toward “sufficient” levels by all firms belonging to the same industry (Hopenhayn, 1992). We expect market competition to reduce gaps in productivity across ownership types.

H4. In industries characterized by a higher degree of market competition, the gaps in productivity across different ownership types is lower.

4. Data and descriptive analysis

4.1. Data

Since 2000, the General Statistics Office (GSO) has conducted an annual Survey on Vietnamese Enterprises (VES) that has essentially covered all Vietnamese firms operating in all economic sectors (*census*) in the period 2000–2012. The VES survey is rich in terms of the demographic and balance sheet information it provides on firms, and these data have been used in a number of scientific papers (e.g., Ha and Kiyota, 2014; Newman et al., 2015; Kyburz and Nguyen, 2016; Nguyen, 2016; Baccini et al., 2017).

Each firm in the VES is classified as belonging to an industry following the Vietnamese standard industrial classification system (VSIC). In order to build our analysis on the longest time series feasible, we had to develop a probabilistic method to adjust the industrial classification before 2006 (VSIC 93) to the new industrial classification (VSIC 07).⁸ This has allowed us to exploit a longer panel of data than those employed in previous studies using the same survey. A time-invariant (modal) industry code is assigned to each firm.

⁸ Supplementary Section 1 furnishes additional details about the procedure.

In order to clean the data and get the final sample, we take the following steps. We select manufacturing firms; we exclude duplications (a unique ID –which is derived from the tax code– is assigned to each firm over time), inactive enterprises, and enterprises with no tax code or missing values on key information; we exclude observations with illogical figures such as negative values on sales, total assets, total wages, and material input costs; and only observations with a leverage ratio (total debts over total assets) of between 0 and 100 are maintained in the database. Thus, our final sample is an unbalanced panel of Vietnamese manufacturing firms, which comprises 282,764 firm-year observations from 2001 to 2011.⁹ It essentially covers about 88.23% of the total population of manufacturing firms in Vietnam.

As for the information regarding ownership, all Vietnamese enterprises are classified (each year) into 14 ownership types. We regroup these 14 types into three mutually exclusive categories: state-owned enterprises (SOEs), privately owned enterprises (POEs), and foreign-owned enterprises (FOEs). SOEs are the firms with at least 50% state participation in equity. POEs are the firms with entirely private ownership or the ones where state ownership is less than 50%. FOEs comprise both fully owned foreign subsidiaries and joint ventures established between foreign and local partners in Vietnam.¹⁰ Firms can shift from one categories to another on a year-on-year basis.

As shown in Figure 2, there has been remarkable growth in the population of POEs in Vietnam since 2001. Meanwhile, the number of FOEs has increased fourfold from 1096 firms in 2001 to 4595 firms in 2011, while the number of SOEs has halved from 1231 firms in 2001 to 622 firms in 2011 (see also Table A.2 in the Appendix).

[Insert Figure 2 about here]

4.2. Variables and descriptive analysis

4.2.1 Productivity

We employ firm TFP (in log) as the dependent variable in the econometric model by measuring it using the IV–GMM-modified Levinsohn–Petrin estimator (Levinsohn and Petrin, 2003) developed by Wooldridge (2009).¹¹ Output in the production function is proxied by real value added, which

⁹ As we use the entry and exit rates as regressors in the econometric model, the first (2000) and the last years (2012) of the panel are not usable.

¹⁰ Our classification is in line with those employed by Asafei et al. (2008) and Huang and Yang (2016). See Table A.1 in the Appendix for further details about the adopted classification system.

¹¹ The estimation of firms' TFP is discussed at length in Supplementary Section 2.

is calculated using the addition method; specifically, it equals the sum of total wage, depreciation,¹² operating profit before tax, and indirect taxes. Capital input is proxied by the value of real fixed assets, while labor is measured by the total number of employees, both at the end of the year. Material input is calculated by subtracting value added from deflated sales.¹³

4.2.2 Ownership and market competition

Two out of three mutually exclusive dummies for firm ownership (the baseline/omitted category is the dummy referring to POEs) are included in the empirical model to capture the differences in productivity levels across ownership types.

We use two variables to measure the toughness of market competition in the 4-digit industry to which a firm belongs. First, the Herfindahl–Hirschman index (HHI) is included, which equals the sum of squares of market shares (in terms of sales) of all firms in the 4-digit industry: the higher the HHI, the more concentrated, and therefore less competitive, the industry. Second, the annual entry rate at the 4-digit level is included, which captures the threat by entrants.

In order to test for the effect of competition in reducing the gaps in productivity across firms with different ownership, we also include the interactions between ownership and competition by multiplying each dummy (SOEs and FOEs) with each proxy for market competition.

4.2.3 Control variables

In order to minimize the risk of getting biased coefficients referring to ownership and market competition due to omitted variables, we extend the empirical model and include a vector of controls at the firm, industry, and province levels.

Relying on the previous literature on the determinants of productivity at the firm-level, we include, as controls, measures of firm age (see Jovanovic, 1982; Ericson and Pakes, 1995, among others), firm size (Garicano et al., 2016), and firm export status (see Bernard and Jensen, 1999; Roberts and Tybout, 1997; Melitz, 2003, among others). Firm leverage ratio (debt over total assets)

¹² As the VES does not have information about depreciation, by following Ha and Kiyota (2014), we approximate depreciation by the difference in accumulated depreciation between the end of the year and the beginning of the year.

¹³ We use different deflators to convert nominal values into real values (base year: 2010). Value added is deflated by using the producer price indexes (PPI) of each 2-digit industry (source: www.gso.gov.vn), while capital is deflated by using the gross fixed capital formation deflators (source: World Bank's World Development Indicator). Finally, annual GDP deflators taken from World Bank's World Development Indicator are used to deflate material inputs. Real values in Vietnamese Dong (VND) are then converted into US dollars (USD) using the official annual exchange rate in 2010: 18612.92 VND/USD.

is also included as a first attempt to control for the fact that SOEs might have benefited from “softer budget constraints” than their private counterparts in the period 2001–2011 (Kornai et al., 2003; Asaftei et al., 2008).

Industry and province heterogeneity have been also controlled for. Specifically, we include the exit rate of the 4-digit industry to which the firm belongs; indeed, together with the entry rate, this variable captures the overall dynamism characterizing the industry in which the firm is active (Geroski, 1995; Bartelsman et al., 2005). The import penetration ratio (as the ratio of imports to the sum of total domestic production and imports in the same 4-digit industry) is also included to control for competition coming from abroad.¹⁴ Moreover, the provincial annual GDP growth rate is inserted into our empirical model in order to control for demand shocks and phases of the economic cycle that may have affected Vietnamese provinces (in which the firms are located) in asymmetric ways. We have further included a vector industry and province dummies to account for unobserved and time-invariant factors affecting all firms belonging to the same industry and province in the same way. Finally, a vector of year dummies has been included to control for common shocks to productivity that may have affected all firms in each particular year.

Table 1 defines all the variables employed.

[Insert Table 1 about here]

4.2.4 Descriptive analysis

Table 2 presents the basic characteristics of the firms in our sample by ownership type. In general, SOEs are about four times older than both POEs and FOEs. SOEs and FOEs are more comparable in terms of employment, and they are typically large firms, while POEs are more often small firms.

From 2001 to 2011, the capital–labor ratio (expressed in terms of thousands USD per employee) of SOEs increased about threefold (from 5.0 to 17.2); POEs only marginally increased their capital–labor ratio, while FOEs decreased it. This evidence is in line with the process of capital accumulation undertaken by SOEs since 2005 (see Vu Thanh, 2014, p. 17), possibly boosted by the credit stimulus and easier access to capital granted by the government, especially to this group of firms, as a reaction to the 2008–2009 US mortgage loans crisis (Pincus, 2016, p. 387).

¹⁴ Details about the calculation of the import penetration measure are provided in Supplementary Section 3.

Keeping in mind that from Table 2 we can only appreciate the unconditional (to other factors) differences in productivity across ownership types, some interesting preliminary results emerge. During the period 2001–2011, the productivity level of SOEs is rather comparable to that of FOEs, while the productivity of POEs is far below the other two groups (in line with Nguyen and Le, 2005; Huang and Yang, 2016). Moreover, all three groups of firms improved their productivity over the years, which is coherent with the country’s growth path in the 2000s. However, firms have improved their productivity at different rates, depending on ownership type: while SOEs increased (on average) their TFP by around 8%, POEs’ growth has been around 5%, and the FOEs have grown their TFP by 4% on a year-on-year basis. These figures on TFP growth rates at the firm level are comparable to those shown by Ha and Kyiota (2014, p. 208).

Overall, this initial descriptive evidence is in line with both (i) the dynamism of the economy caused by the entry of many new private firms and (ii) a restructuring process of SOEs. In particular, the increase in the capital–labor ratio by SOEs seems to go hand in hand with a noticeable growth in TFP, thus indicating that some technological advancement, and not simply capital deepening, has characterized the evolution of state enterprises in the period 2001–2011. Given that firms with different ownership types may also be different in other dimensions, we conduct a multivariate analysis in the next section, estimating regressions of firm TFP (in log) on ownership and market competition, controlling for a large vector of firm, industry, and province characteristics.

[Insert Table 2 about here]

5. Econometric analysis

5.1. Baseline results

We estimate variants of the following model, by ordinary least squares (OLS):

$$\begin{aligned}
 tfp_{ijpt} = & \alpha + \beta' OWNERSHIP_{ijpt} + \gamma' COMPETITION_{jt} + \delta'(OWNERSHIP_{ijpt} * COMPETITION_{jt}) + \varphi' X_{ijpt} \\
 & + \theta' V_{jt} + \vartheta' Z_{pt} + \mu_j + \rho_p + \tau_t + \varepsilon_{ijpt}, \quad (1)
 \end{aligned}$$

where tfp_{ijpt} is the (log of the) TFP of the i^{th} firm, belonging to the j^{th} industry and located in the p^{th} province in year t ; $OWNERSHIP_{ijpt}$ stands for the types of ownership that characterizes the i^{th} firm in year t ($OWNERSHIP = \{POE, SOE, FOE\}$); $COMPETITION_{jt}$ stands for the degree of market competition characterizing the j^{th} (4-digit) industry in year t and proxied by both the

Herfindahl–Hirschman index and the entry rate ($COMPETITION = \{HHI, Entry Rate\}$); coefficients δ' capture the interaction effects. We extend our baseline model by including a vector of firm-level (X_{ijpt}), industry-level (V_{jt}), and province-level (Z_{pt}) time-variant characteristics and vectors of industry, province and year fixed effects. Thus, the empirical model gives us information regarding the statistical relationships between the firm productivity level and ownership (coefficients β'), the degree of competition of the industry (coefficients γ') and their interplay (coefficients δ'), conditional on a large vector of firm, industry and province characteristics.

Table 3 shows our first set of results. The specification in column (1) includes only ownership dummies, year, industry, and province fixed effects. We then extend the empirical model by including proxies for market competition (HHI and Entry Rate) and the vector of controls, respectively, in columns (2) and (3). Results in column (3) show that, on average, both FOEs and SOEs exhibit significantly higher productivity levels than POEs (omitted category) during the period 2001–2011, and that FOEs are the most productive firms.

As for market competition, the coefficient of HHI is negative (-0.2) and significant, while the coefficient of entry rate is negative (-0.05) and not statistically significant. This suggests that, *ceteris paribus*, while firms are more productive in less concentrated (more competitive) industries, no statistical relationship is found between productivity and the indicator capturing the threat of potential competition. Overall, the results in column (3) support hypotheses 1b, 2, and 3, while hypothesis 1a is rejected. As for the control variables, the results shown in column (3) suggest that firms that are older, bigger, and undertake export activities are more productive. Meanwhile, a higher leverage ratio is associated with higher productivity. This could be explained by the fact that, in order to perform better, firms need to make productive investments that are financed through debt. Coefficients on exit rate and provincial GDP growth rate both show the expected positive sign even though they are not significant. Finally, in industries characterized by a higher import penetration, firms are — on average — less productive. In their recent study on import competition and productivity in Vietnam from 2001 to 2009, Doan et al. (2016) found a similar result.¹⁵

¹⁵ This result is in line with both theoretical predictions in Aghion et al. (2005) and the empirical evidence in Ding et al. (2015) and Ben Yahmed and Dougherty (2017). In their seminal article, Aghion et al. (2005) propose that import competition only encourages innovation and improves productivity in sectors or firms that are on the global technology frontier, but hurt productivity in sectors or firms that are lagging behind. It means that import penetration may

Given that the period from 2001 to 2011 has been characterized by institutional reforms aimed at improving the competitive environment of Vietnam, it is essential to study the role of market competition in reducing gaps in productivity across firms with different ownership. Thus, in columns (4) and (5), we separately add the interactions between ownership dummies and HHI and between ownership dummies and entry rate, while in column (6), both groups of interactions are included in the regression. The results support hypothesis 4, as the gaps in TFP between POEs and SOEs and between POEs and FOEs, are smaller in industries characterized by a lower concentration (HHI) and a higher entry rate.

[Insert Table 3 about here]

In Section 2, we have sketched the main institutional and economic changes witnessed by Vietnam in the early 2000s. The first half of the decade has been characterized by rapid growth in the private sector (2001–2006), thanks to relevant changes in the legal framework for businesses, while in the second half of the decade, both accession to the WTO and state-led development policies have taken place. Given that, it is relevant to check how those changes mapped into different SOE, POE, and FOE performances, so we repeat our regression analysis for the two sub-periods, i.e. 2001–2006 and 2007–2011. The results – as shown in Table 4 – are in line with those shown in Table 3, but some differences between the two periods are worthy of note.

[Insert Table 4 about here]

The advantage in the productivity of SOEs, as compared to POEs in the period 2007–2011, is much bigger (ranging from 33% to 52%, depending on the specification) when compared to that in the period 2001–2006 (ranging from 9% to 11%, depending on the specification). Furthermore, the results also show that while FOEs still exhibit higher productivity levels than SOEs in the first sub-period, SOEs “closed the gap” with FOEs in the second sub-period. The control variables show coefficients that are consistent with those reported in Table 3.

These results, which are in line with some previous studies (Ngoc and Ramstetter, 2004; Nguyen and Le, 2005; Huang and Yang, 2016), suggest a good productivity performance of the Vietnamese state-owned sector with respect to POEs, especially in the period 2007–2011, and

discourage productivity growth in less advanced countries whose industries and firms are below the technology frontier.

therefore deserve a more in-depth discussion. First, this may be the result of the state-led development policies undertaken by the Vietnamese government during the 2000s with the aim of consolidating several SOEs. The promotion of large groups of SOEs may have granted to these the economies of scale needed to improve their productivity, the result of which is even more relevant after the WTO accession in 2007 (Vu Thanh, 2014, p. 12). Concurrently the transformation of governance in SOEs to limited liability companies or joint stock companies may have improved their internal incentive systems, with positive consequences for their productivity. Of course, there could also be a “selection” issue: the government may have non-randomly maintained in “its hands” the companies with better characteristics in terms of their management practices, technology, and human capital. If these characteristics were correlated with firm productivity, our results would be biased. We will explicitly deal with the “selection” issue in Section 5.2.1.

Second, the lagging behind of POEs may be explained by a lack of commercial experience and entrepreneurialism in Vietnam (Pincus, 2016; p. 382). We may put this into perspective using the evidence provided in Bloom and Van Reenen (2010, p. 211) regarding China (which has followed a similar path of development to Vietnam), and by hypothesizing that there is an issue related to the relative youth of Vietnamese POEs and their corresponding inferior managerial practices.

Third, it is possible that our measure of productivity—which cannot be corrected to account for prices of output and input at the firm level—may (partially) reflect the market power of the firm both in the product and the input markets (Van Beveren, 2012). The possibility that SOEs systematically charge higher prices in the product market should be rather low in this work. Indeed, given the analysis is restricted to manufacturing firms—that sell tradable goods—, it is not obvious that these may act as natural monopolists in their industries; moreover, if that would be the case, then we should not have found a negative relationship between the degree of market concentration and firm “average” performance. Conversely, there is evidence (see the discussion in Nguyen and Le, 2005, pp. 306–309) that SOEs in Vietnam have had preferential access to land and capital than private firms for a long period of time, for example via subsidies (Vu Thanh, 2014, p. 7). In particular, after the WTO accession in 2007, and the 2008 mortgage crisis in the US, the state provided additional loans to help SOEs through the state-owned banks (Pincus, 2016, p. 387). This third possibility may affect our main results in two ways. On the one hand, we may have simply over-estimated the TFP of SOEs due to price bias. On the other hand, a preferential credit

allocation to SOEs could imply a “true” higher productivity with respect to POEs, if the “cheaper” capital borrowed by SOEs is invested in more advanced technology (Nguyen and Le, 2005, p. 306).

Obviously, the first possibility is the one we need to worry about more. Unfortunately, we cannot properly test whether the results are robust to the price bias correction. We can instead rely on an indirect test by taking advantage of firm age variability in our sample. Similar to the idea put forward by Li (2008, p. 221) in the case of Chinese SOEs, the younger the SOE, the lower the probability of having benefited from “soft budget constraints” for a long period of time should be. We thus re-run the regressions in the sub-sample of firms 10 years old and younger.¹⁶ Interestingly, as shown in Table 5, the good performance of SOEs is confirmed and even strengthened in the sub-sample of younger firms (especially for the period 2007–2011), thus being in favor of the idea that this is the result of the effective restructuring policies undertaken by the Vietnamese government, rather than just a consequence of the price bias.

[Insert Table 5 about here]

Overall, the three explanations suggested above are not mutually exclusive, and at the same time, we cannot exclude the possibility that (part of) our results are affected by the price bias in the input markets. Thus, we submit the good performance in productivity by SOEs in relative terms as the result of state-led development policies combined with a lack of experience in POEs, “gross of” the price bias.

5.2. Further results and robustness checks

5.2.1. Controlling for the selection of SOEs

Based on the literature on ownership in transition economies, (Estrin et al., 2009, pp. 9–10) and the literature on the development of Vietnam (see Malesky and London, 2014; Pincus, 2016; among others) it is reasonable to think that firms are not maintained as SOEs at random. Thus, the impressive productivity of SOEs observed in the period from 2007 to 2011 might reflect a selection of SOEs, rather than reflect the outcome of the modernization process undertaken by the government during the 2000s.

¹⁶ We have also performed the analysis in the sub-samples of (i) firms younger than 15 years and (ii) firms younger than 5 years. The main results are confirmed and available from the authors upon request.

The Vietnamese government may have retained the firms with better management, technology and human capital. Thus, our results so far might be biased, and we need to properly control for it. In order to do that, we conduct several checks. First, we compare the average *tfp* of privatized SOEs (i.e., those firms that became POEs during the period under analysis) both before and after privatization with that of those remaining SOEs over the entire period. Table 6 shows that privatized firms improved their average productivity level after privatization. However, the average productivity of privatized firms both before and after privatization (1.73 and 1.98) is still lower than that of those remaining SOEs (2.01). This first evidence is coherent with the idea that a selection of SOEs based on firm productivity may have taken place.

[Insert Table 6 about here]

Second, we compare the average *tfp* of those firms that remained SOEs over the period 2001–2011 with that of privatized firms, but before privatization, and control for a vector of firm, industry, and province characteristics in a regression framework (Table 7). Interestingly, the difference in *tfp* between firms that were always SOEs and privatized SOEs (before privatization) disappears when industry fixed effects are included in the regression (column 2 of Table 7). This result suggests that if the government engaged in selection, it was more based on strategic (productive) industries rather than on strategic (productive) SOEs. Thus, this evidence partially reassures us that the higher productivity of SOEs over POEs (observed especially in the period from 2007 to 2011) is not entirely due to firms' selection, but also to the restructuring policies of the government.

[Insert Table 7 about here]

Third, as the probability of being maintained as SOEs is not a random event, we use a Heckman 2-stage procedure (Heckman, 1979) to correct for the selection of SOEs. The first stage is a probit model to predict the probability that a firm will be retained as an SOE in year t (Table 8).¹⁷ In the

¹⁷ The dependent variable of the probit model is a dummy being one if a firm is an SOE in year t and zero otherwise. The explanatory variables include (1-year lagged) firm, sector, and province characteristics. Firm-level characteristics include a dummy for whether the firm is managed by the central government, export status, *tfp*, number of employees, firm age, the leverage ratio, and their squared terms. As suggested by Bai et al. (2009), we also include year, industry and province fixed effects plus employment shares of SOEs in each 3-digit industry sector and province, and the 1-year changes in these shares.

second stage, we include the inverse of Mills' ratio retrieved from the first stage in the main empirical model. Results are shown in Tables 9 and 10 and they are in line with those shown in Tables 3 and 4. After having taken selection into account, SOEs still exhibit a higher productivity than POEs, and they also have statistically significant higher productivity than FOEs in the period from 2007 onwards. Market competition is effective, as the gaps in TFP between POEs and SOEs and between POEs and FOEs, are smaller in industries characterized by a lower concentration and a higher entry rate.

[Insert Tables 8, 9, and 10 about here]

5.2.2. *Are SOEs constraining the productivity growth of POEs?*

While the Vietnamese government's policies aimed at improving the state sector, there is a concern that SOEs may have constrained the development of the private sector. For example, Thang and Freeman (2009) show that in the period 2000–2003, the greater the presence of SOEs in a province, the lower the proportion of bank lending to POEs located in that province and the longer it took for these firms to have access to land.

Therefore, we check if SOEs are constraining the development of POEs by regressing the 1-year TFP growth rate of POEs on the employment share of SOEs that belong to the same 3-digit industry and are located in the same province (Table 11). If that were the case, we should get two negative coefficients referring to the employment shares of SOEs. Overall, after controlling for a large vector of covariates that are included as 1-year lagged to reduce simultaneity, we find no evidence of SOEs constraining the development of POEs. Conversely, Table 11 shows that, *ceteris paribus*, the employment share of SOEs in the same industry exhibits a positive correlation with the productivity growth of POEs during the whole period (2001–2011) and even more so in the sub-period from 2007 to 2011.

5.2.3 *Further checks*

We run three additional robustness checks and present the results in the Appendix. First, we extend the empirical model and include the first lag of firm *tfp* as a further control (Table A.3). Indeed, we may have captured a spurious correlation if (i) a higher productivity level in the previous year is the reason for either being retained by the government or being acquired by a foreign investor, and (ii) there is a persistence in firm TFP over time. Second, in order to reduce the simultaneity

issue, we estimate the model with all independent variables included as 1-year lagged (Table A.4). The main results are robust to both checks. Third, we run a firm fixed-effect (FE) model. Some features of the FE model are worth pointing out. The identification of both SOEs' and FOEs' coefficients are based on the within-firm variation in ownership type during the period under analysis. Thus, the results of the FE model tell us something about the sub-sample of firms with an observed change in ownership. Specifically, as changes in ownership type concerning SOEs mostly go in one direction –from SOEs to POEs but not the other way around–, the SOEs' coefficient should give us a hint about the effect of privatization. As shown in Table A.5, while the coefficient referring to FOEs is still positive and significant (supporting a productivity advantage in becoming an FOE over those firms remaining POEs), the coefficient referring to SOEs is negative. A change in ownership from an SOE to a POE (privatization) grants a productivity improvement to the firm, but not in the period 2007–2011, where both accession to the WTO and the consolidation of SOEs into larger groups took place. Nonetheless, the results of the FE model are not in contrast with the higher average productivity level of SOEs as compared POEs (and shown in Table 6), and it suggests that, in Vietnam, privatizations may well be complementary to other policies, such as pro-competitive reforms and policies to restructure and modernize SOEs.

6. Discussion: The Vietnamese transition from a comparative perspective

The results provide an opening to reconsider the role of SOEs in the process of transition, both with respect to the Vietnamese case and to other countries' historical experiences.

In the case of Vietnam, our results do not support the view that the maintenance by the state of a long-lasting control over part of the business sector impairs the effects of competition on firm productivity. Vu Thanh (2014) is critical of the policies undertaken to modernize SOEs through the creation of state economic groups (SEGs). The author puts forward the idea that big SEGs were used to disable the effects of WTO accession and to disguise national protection over wide sectors of the economy. This was done by ensuring SOEs had favorable access to both land and capital (Nguyen and Le, 2005). Along the same lines, Baccini et al. (2017) claim that inefficient SOEs hindered the re-allocation of resources and reduced the productivity gains that the opening up of international trade (through WTO accession) could have ensured to the national economy. In a counterfactual exercise, they find that the aggregate productivity growth would have been roughly 50% higher, had SOEs been privatized in Vietnam. They also estimate a gap in the productivity growth of industries dominated by SOEs as compared to POE-dominated ones.

Actually, our results on firm performance (both pre- and post-accession into the WTO) do not support Vu Thanh's criticism of the reforms of SOEs. Moreover, while the role of competition in fostering productivity is confirmed by our empirical analysis, the lower productivity growth in SOE-dominated industries found by Baccini et al. (2017) is compatible with the fact that the productivity level of SOEs is higher than that of POEs in those industries.

Moreover, our results for the pre-2007 period, which show that FOEs have a productivity advantage over SOEs and POEs, are in line with those obtained by Huang and Yang (2016). Even if their analysis covers a shorter period of time (2000–2008), they show that WTO accession is positively related to SOEs' productivity in a stronger manner than it is to the productivity of POEs and FOEs. Consistently, our study highlights remarkable productivity levels of SOEs after 2007 (Table 2). Given the simultaneousness of WTO accession and the state-led development policies, we cannot disentangle which phenomenon has contributed the most to the observed effect. However, we provide some general empirical evidence in favor of the joint effect of ownership and market competition in a period of increasing openness of the Vietnamese economy and governmental reforms undertaken to improve the governance of SOEs.

As for the general debate on the role of SOEs in the transition from central planning to market economies, it is worth noting that, after 2000, a critical view of the early approaches to privatization has taken hold. First, a poor institutional environment and a weak market for corporate control do not prevent appropriation in big firms enjoying monopolistic power. A comparison of ex-communist European Union and Commonwealth of Independent State countries offers clear evidence of the role that institutional environment plays in determining privatization outcomes (Estrin et al., 2009). Second, how privatization is carried out also matters: rapid privatization without an efficient financial infrastructure in place creates the risk of putting major firms into the hands of criminals and enables the creation of a kleptocracy that spoils big firms and adversely affects the selection of competent technicians and managers (Black et al., 2000). The impressive rent appropriation and tax evasion demonstrated by new owners convinced the Russian governments to launch a re-nationalization program (Chernykh, 2011). The major critique of state ownership is based on the relative advantage of private property rights in aligning managerial incentives with efficiency goals. However, this relative advantage depends on the functioning of a market for corporate governance, and also on the institutions that regulate the state's control over business. The balance, in terms of cost and time, is not clear.¹⁸

In this paper, we proposed that the role of state ownership in transition countries remains a question open to debate: SOEs were once predicted to become extinct, but instead they evolved (even in western countries) as hybrids and have accounted for 10% of global GDP in recent years (Peng et al., 2016). Hsieh and Song (2016), for example, have found that from 1998 to 2007 – based on the assumption that the aggregate supply of capital is elastic –, the productivity growth and the release of surplus labor by surviving Chinese SOEs were responsible for a bigger percentage of aggregate productivity growth (13%) than the market exit and privatization of SOEs (3.2%). We submit that the high level of productivity shown by Vietnamese SOEs in the period 2007–2011 may have been an outcome of the state-led development policies undertaken by the government. Moreover, we find that market competition has been a major driver for reducing productivity gaps across ownership types within industries, and that episodes of privatization positively contributed to firm productivity in Vietnam during the period 2001–2011.

¹⁸ A similar tradeoff has been encountered in western countries dealing with the problem of re-nationalization since the financial crisis (Clò et al., 2017).

As pointed out in Section 5.1., given the evidence of the more favorable conditions according to which SOEs have had access to land and capital for a long period of time (Nguyen and Le, 2005, pp. 306–309), and the unavailability in the VES database of information regarding prices at the firm level, we interpret our results as being “gross of” the price bias.

7. Concluding remarks

In this paper, we empirically examine the role of ownership and market competition in Vietnamese firms’ TFP in the period 2001–2011 and find two main results. First, both FOEs and SOEs have performed better than POEs in terms of their TFP levels. While FOEs exhibited the highest TFP level in the period 2001–2006, SOEs “closed the gap” with FOEs in the period 2007–2011. We posit that the remarkable performance of SOEs from 2007 onwards is the result of the policies undertaken by the Vietnamese government to restructure them. Second, competition improves firm average productivity and reduces the gaps in productivity across firms of different ownership types. These findings are consistent with a series of robustness checks.

The first result suggests that the state-led development policies have been effective in Vietnam. A gradual restructuring of SOEs buffers them from an abrupt exposure to market selection when institutions are still weak. During the transition toward a market economy, government intervention can work well to preserve firm-specific resources in SOEs. However, SOEs – whether privatized or not– should be fully exposed to market competition once supporting institutions fully emerge.

The second result indicates that, in Vietnam during the period 2001–2011, market competition was effective for improving average firm productivity and reducing the gaps in productivity across ownership types. Moreover, it has played a complementary role in firm efficiency to both the restructuring of SOEs and the episodes of privatization. Consequently, we may expect further improvements in market competition and the business environment to boost POEs’ ability to catch up in terms of their productivity levels when compared to the performance of both FOEs and SOEs.

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Tables and figures

Figure 1

Framework of analysis: reforms and productivity (adapted from Park et al., 2006)

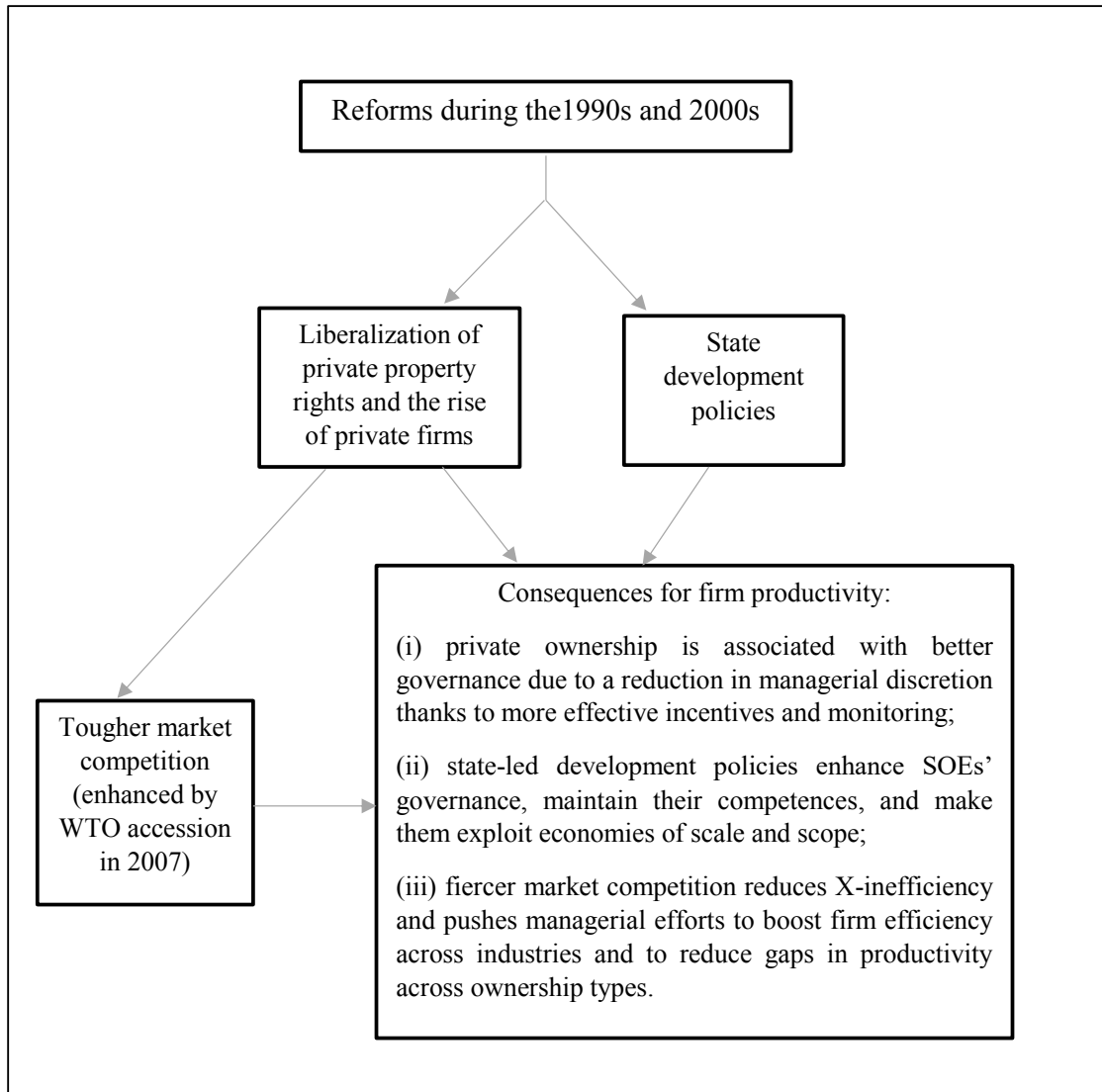


Figure 2
 Number of firms by ownership type; Vietnamese manufacturing; 2001-2011

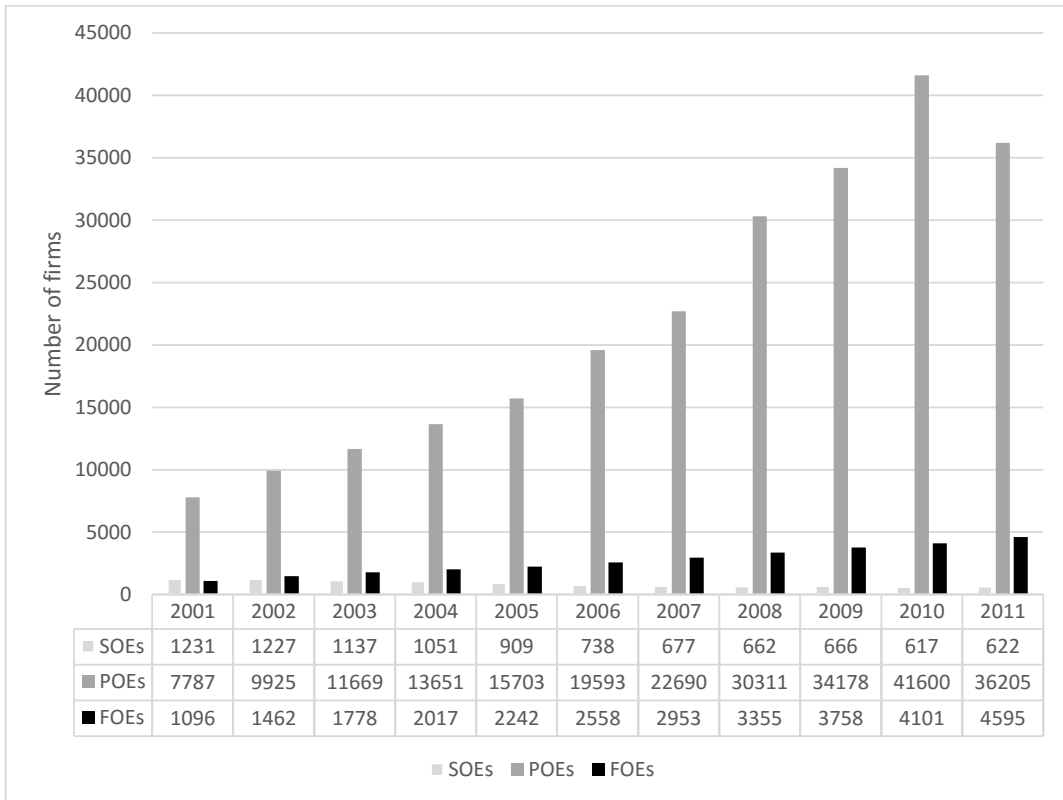


Table 1

List and definition of variables

| Variables | Definition |
|--|--|
| <i>Productivity</i> | |
| <i>tfp</i> | Logarithm of firm's TFP, estimated by using the IV–GMM–modified Levinsohn–Petrin estimator (Levinsohn and Petrin, 2003) developed by Wooldridge (2009). See Supplementary Section 2. |
| <i>Ownership and market competition</i> | |
| SOE | Dummy variable equal to 1 for state-owned firms (and 0 otherwise) |
| FOE | Dummy variable equal to 1 for foreign-owned firms (and 0 otherwise) |
| HHI | Sum of squares of market shares of all firms in the 4-digit industry to which a firm belongs |
| Entry Rate | Entry rate of the 4-digit industry to which a firm belongs |
| SOE*HHI | Interaction term |
| FOE*HHI | Interaction term |
| SOE*Entry Rate | Interaction term |
| FOE*Entry Rate | Interaction term |
| <i>Control variables</i> | |
| Import penetration | Ratio of imports to the sum of total domestic production and imports in the 4-digit industry to which a firm belongs. See Supplementary Section 3. |
| Exit Rate | Exit rate of 4-digit industry to which a firm belongs |
| Leverage Ratio | Debt over total assets |
| Firm size | Number of employees at the end of the year (in log) |
| Firm age | Number of years since the firm establishment (in log, +1) |
| Export status | Dummy variable equal to 1 if the firm exports (and 0 otherwise) |
| Province GDP growth | 1-year growth rate of the provincial GDP |
| Year FE | Year fixed effects |
| Industry FE | Industry fixed effects |
| Province FE | Province fixed effects |
| Firm FE | Firm fixed effects |

Table 2
Descriptive statistics

| Firm-characteristics | 2001 | | | | | |
|----------------------|--------|---------|-------|--------|--------|---------|
| | SOEs | | POEs | | FOEs | |
| | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| Firm age | 21.4 | 13.4 | 6.5 | 8.4 | 5.0 | 3.7 |
| Value added | 2156.1 | 8729.0 | 154.8 | 668.0 | 2597.6 | 10918.1 |
| No. of employees | 510.9 | 807.2 | 79.1 | 282.8 | 367.3 | 1140.1 |
| Capital-labor ratio | 5.0 | 9.0 | 5.2 | 73.3 | 34.0 | 134.3 |
| <i>tfp</i> | 1.6 | 1.1 | 0.7 | 1.0 | 1.8 | 1.5 |
| | 2006 | | | | | |
| | SOEs | | POEs | | FOEs | |
| | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| Firm age | 23.9 | 15.4 | 5.7 | 7.6 | 5.7 | 4.4 |
| Value added | 4249.0 | 15097.0 | 183.0 | 885.8 | 2311.1 | 9080.9 |
| No. of employees | 630.8 | 956.5 | 72.4 | 262.3 | 493.4 | 1656.1 |
| Capital-labor ratio | 9.0 | 21.4 | 4.8 | 23.3 | 14.6 | 29.5 |
| <i>tfp</i> | 2.0 | 1.1 | 0.9 | 0.9 | 1.8 | 1.3 |
| | 2011 | | | | | |
| | SOEs | | POEs | | FOEs | |
| | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| Firm age | 23.5 | 17.0 | 6.2 | 7.1 | 7.1 | 5.1 |
| Value added | 7089.9 | 35378.9 | 303.7 | 2657.0 | 3515.5 | 21823.2 |
| No. of employees | 488.9 | 794.6 | 58.1 | 229.4 | 487.3 | 1843.2 |
| Capital-labor ratio | 17.2 | 67.4 | 6.1 | 23.0 | 14.9 | 32.5 |
| <i>tfp</i> | 2.4 | 1.1 | 1.2 | 1.1 | 2.2 | 1.2 |

Notes:

Value-added in real terms is calculated as the sum of total wage, depreciation, operating profit before tax, and indirect taxes. Capital input is measured as real fixed assets while labor is measured as the number of firm employees, both at the end of the year. All monetary variables are expressed in constant 2010 value in units of 1000 USD.

Table 3
Ownership, competition and firm productivity; 2001-2011

| | Dependent variable: <i>tfp</i> | | | | | |
|---------------------------|--------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Ownership | | | | | | |
| SOE | 0.99*** (0.01) | 0.99*** (0.01) | 0.21*** (0.01) | 0.16*** (0.01) | 0.30*** (0.02) | 0.25*** (0.02) |
| FOE | 0.79*** (0.01) | 0.79*** (0.01) | 0.31*** (0.01) | 0.22*** (0.01) | 0.36*** (0.01) | 0.28*** (0.01) |
| Market competition | | | | | | |
| HHI | | -0.13*** (0.04) | -0.20*** (0.04) | -0.43*** (0.04) | -0.20*** (0.04) | -0.43*** (0.04) |
| Entry Rate | | -0.05 (0.04) | -0.05 (0.04) | -0.05 (0.04) | 0.02 (0.04) | 0.03 (0.04) |
| Interactions | | | | | | |
| SOE*HHI | | | | 0.76*** (0.10) | | 0.80*** (0.10) |
| SOE*Entry Rate | | | | | -0.31*** (0.05) | -0.34*** (0.05) |
| FOE*HHI | | | | 1.52*** (0.06) | | 1.54*** (0.06) |
| FOE*Entry Rate | | | | | -0.21*** (0.04) | -0.28*** (0.04) |
| Controls | | | | | | |
| Exit Rate | | | 0.02 (0.05) | 0.04 (0.05) | 0.01 (0.05) | 0.02 (0.05) |
| Import Penetration | | | -0.34*** (0.04) | -0.30*** (0.04) | -0.33*** (0.04) | -0.29*** (0.04) |
| Leverage Ratio | | | 0.15*** (0.00) | 0.15*** (0.00) | 0.15*** (0.00) | 0.15*** (0.00) |
| Firm size | | | 0.23*** (0.00) | 0.23*** (0.00) | 0.23*** (0.00) | 0.23*** (0.00) |
| Firm age | | | 0.13*** (0.00) | 0.13*** (0.00) | 0.13*** (0.00) | 0.13*** (0.00) |
| Export status | | | 0.16*** (0.01) | 0.16*** (0.01) | 0.16*** (0.01) | 0.16*** (0.01) |
| Province GDP growth | | | 0.06 (0.05) | 0.05 (0.05) | 0.06 (0.05) | 0.06 (0.05) |
| Constant | 0.81*** (0.03) | 0.89*** (0.04) | 0.16*** (0.04) | 0.19*** (0.04) | 0.15*** (0.04) | 0.17*** (0.04) |
| Observations | 282,764 | 282,764 | 282,764 | 282,764 | 282,764 | 282,764 |
| Adjusted R-squared | 0.27 | 0.27 | 0.38 | 0.38 | 0.38 | 0.38 |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Region FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes |

Notes:

Omitted ownership category: POE

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4
Ownership, competition and firm productivity; 2001-2006 and 2007-2011

| | Dependent variable: <i>tfp</i> 2001-2006 | | | | Dependent variable: <i>tfp</i> 2007-2011 | | | |
|---------------------------|---|--------------------|--------------------|--------------------|---|--------------------|--------------------|--------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Ownership | | | | | | | | |
| SOE | 0.09*** (0.01) | 0.05*** (0.02) | 0.15*** (0.02) | 0.11*** (0.03) | 0.33*** (0.02) | 0.27*** (0.02) | 0.56*** (0.04) | 0.52*** (0.04) |
| FOE | 0.43*** (0.01) | 0.32*** (0.01) | 0.50*** (0.02) | 0.39*** (0.02) | 0.23*** (0.01) | 0.15*** (0.01) | 0.68*** (0.02) | 0.59*** (0.02) |
| Market competition | | | | | | | | |
| HHI | -0.33*** (0.11) | -0.61*** (0.11) | -0.33*** (0.11) | -0.62*** (0.11) | -0.03 (0.06) | -0.16*** (0.06) | -0.02 (0.06) | -0.15*** (0.06) |
| Entry Rate | -0.02 (0.06) | -0.03 (0.06) | 0.04 (0.06) | 0.04 (0.06) | -0.36*** (0.07) | -0.35*** (0.07) | -0.07 (0.07) | -0.06 (0.07) |
| Interactions | | | | | | | | |
| SOE*HHI | | 0.57*** (0.14) | | 0.59*** (0.14) | | 0.94*** (0.15) | | 1.04*** (0.15) |
| SOE*Entry Rate | | | -0.19*** (0.06) | -0.21*** (0.06) | | | -1.16*** (0.21) | -1.33*** (0.21) |
| FOE*HHI | | 1.52*** (0.10) | | 1.53*** (0.10) | | 1.44*** (0.07) | | 1.42*** (0.07) |
| FOE*Entry Rate | | | -0.20*** (0.06) | -0.23*** (0.06) | | | -2.25*** (0.11) | -2.22*** (0.11) |
| Controls | | | | | | | | |
| Exit Rate | 0.11* (0.07) | 0.13* (0.07) | 0.09 (0.07) | 0.10 (0.07) | 0.12 (0.11) | 0.14 (0.11) | 0.19* (0.11) | 0.20* (0.11) |
| Import Penetration | -0.22*** (0.08) | -0.20** (0.08) | -0.21*** (0.08) | -0.19** (0.08) | -0.19*** (0.07) | -0.11 (0.07) | -0.16** (0.07) | -0.08 (0.07) |
| Leverage Ratio | 0.13*** (0.01) | 0.13*** (0.01) | 0.13*** (0.01) | 0.13*** (0.01) | 0.15*** (0.01) | 0.15*** (0.01) | 0.16*** (0.01) | 0.15*** (0.01) |
| Firm size | 0.24*** (0.00) | 0.24*** (0.00) | 0.24*** (0.00) | 0.24*** (0.00) | 0.22*** (0.00) | 0.22*** (0.00) | 0.22*** (0.00) | 0.22*** (0.00) |
| Firm age | 0.17*** (0.00) | 0.17*** (0.00) | 0.17*** (0.00) | 0.17*** (0.00) | 0.10*** (0.00) | 0.10*** (0.00) | 0.10*** (0.00) | 0.10*** (0.00) |
| Export status | 0.11*** (0.01) | 0.11*** (0.01) | 0.11*** (0.01) | 0.11*** (0.01) | 0.22*** (0.01) | 0.22*** (0.01) | 0.20*** (0.01) | 0.20*** (0.01) |
| Province GDP growth | 0.14** (0.06) | 0.14** (0.06) | 0.14** (0.06) | 0.14** (0.06) | 0.01 (0.09) | -0.01 (0.09) | 0.06 (0.09) | 0.04 (0.09) |
| Constant | 0.02 (0.07) | 0.09 (0.07) | 0.00 (0.07) | 0.07 (0.07) | 0.61*** (0.05) | 0.60*** (0.05) | 0.51*** (0.05) | 0.49*** (0.05) |
| Observations | 95,774 | 95,774 | 95,774 | 95,774 | 186,990 | 186,990 | 186,990 | 186,990 |
| Adjusted R-squared | 0.38 | 0.38 | 0.38 | 0.38 | 0.37 | 0.37 | 0.37 | 0.37 |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Region FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Notes:

Omitted ownership category: POE

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5Ownership, competition and firm productivity; firms ≤ 10 y.o.; 2001-2011 and sub-periods

| | Dependent variable: <i>tfp</i> | | | | | |
|---------------------------|--------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | 2001-2011 | | 2001-2006 | | 2007-2011 | |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Ownership | | | | | | |
| SOE | 0.43*** (0.02) | 0.53*** (0.04) | 0.31*** (0.03) | 0.39*** (0.05) | 0.55*** (0.03) | 0.88*** (0.09) |
| FOE | 0.27*** (0.01) | 0.25*** (0.01) | 0.38*** (0.01) | 0.33*** (0.02) | 0.19*** (0.01) | 0.59*** (0.03) |
| Market competition | | | | | | |
| HHI | -0.15*** (0.04) | -0.32*** (0.05) | -0.33*** (0.12) | -0.58*** (0.12) | 0.02 (0.06) | -0.05 (0.06) |
| Entry Rate | 0.01 (0.04) | 0.07 (0.04) | 0.08 (0.06) | 0.13** (0.06) | -0.33*** (0.07) | -0.07 (0.07) |
| Interactions | | | | | | |
| SOE*HHI | | 1.47*** (0.22) | | 1.58*** (0.38) | | 1.35*** (0.28) |
| SOE*Entry Rate | | -0.66*** (0.10) | | -0.52*** (0.12) | | -2.09*** (0.41) |
| FOE*HHI | | 1.30*** (0.07) | | 1.41*** (0.11) | | 1.07*** (0.09) |
| FOE*Entry Rate | | -0.22*** (0.05) | | -0.18*** (0.06) | | -2.25*** (0.12) |
| Constant | 0.10** (0.04) | 0.10** (0.04) | -0.08 (0.08) | -0.04 (0.08) | 0.42*** (0.06) | 0.32*** (0.06) |
| Controls | | | | | | |
| Observations | Yes | Yes | Yes | Yes | Yes | Yes |
| Adjusted R-squared | 229,390 | 229,390 | 74,986 | 74,986 | 154,404 | 154,404 |
| Year FE | 0.33 | 0.33 | 0.35 | 0.35 | 0.32 | 0.33 |
| Region FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes |

Notes:

Omitted ownership category: POE

Coefficients of the control variables were not reported to save space

Full tables are available from the authors upon request

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6Average *tfp* of privatized SOEs *versus* always remaining SOEs

| Privatized SOEs | | Always remaining SOEs |
|----------------------|---------------------|-----------------------|
| Before privatization | After privatization | |
| 1.73 | 1.98 | 2.01 |

Table 7Difference in *tfp* between privatized SOEs (before privatization) and always remaining SOEs

| | Dependent variable: <i>tfp</i> | |
|--|--------------------------------|--------------------|
| | 1 | 2 |
| Dummy (=1) for those firms always remaining SOEs | 0.12*** (0.02) | 0.02 (0.02) |
| Leverage Ratio | -0.36*** (0.02) | -0.31*** (0.02) |
| Firm size | 0.27*** (0.01) | 0.38*** (0.01) |
| Firm age | 0.02* (0.01) | -0.06*** (0.01) |
| Export status | 0.02 (0.03) | 0.11*** (0.02) |
| Constant | 0.20*** (0.07) | 0.23*** (0.07) |
| Observations | 10,867 | 10,867 |
| Adjusted R-squared | 0.27 | 0.49 |
| Year FE | Yes | Yes |
| Region FE | Yes | Yes |
| Industry FE | No | Yes |

Notes:

Neither FOEs nor privatized SOEs after privatization are included in these regressions

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 8

Heckman selection model: first stage (probit); the probability for firms to be maintained as SOEs

| Dependent variable: dummy =1 for SOEs | |
|--|--------------------|
| Firm managed by central Gov. $_{(t-1)}$ | 2.48*** (0.05) |
| tfp $_{(t-1)}$ | 0.15*** (0.02) |
| $(tfp)^2$ $_{(t-1)}$ | -0.01*** (0.00) |
| Firm size $_{(t-1)}$ | 1.38*** (0.04) |
| (Firm size) 2 $_{(t-1)}$ | -0.09*** (0.00) |
| Firm age $_{(t-1)}$ | -0.43*** (0.04) |
| (Firm age) 2 $_{(t-1)}$ | 0.21*** (0.01) |
| Leverage Ratio $_{(t-1)}$ | 0.42*** (0.03) |
| (Leverage Ratio) 2 $_{(t-1)}$ | -0.04*** (0.01) |
| Export status $_{(t-1)}$ | -0.18*** (0.02) |
| Employment share by industry $_{(t-1)}$ | 1.42*** (0.08) |
| Employment share by province $_{(t-1)}$ | 1.81*** (0.12) |
| Δ Employment share by industry $_{(t-1)}$ | 1.10*** (0.23) |
| Δ Employment share by province $_{(t-1)}$ | 1.08*** (0.20) |
| Constant | -7.76*** (0.15) |
| Observations | 194,503 |
| Year FE | Yes |
| Region FE | Yes |
| Industry FE | Yes |

Notes:

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 9

Heckman selection model: second stage; ownership, competition and firm productivity; 2001-2011

| | Dependent variable: <i>tfp</i> | | | |
|-----------------------------|--------------------------------|--------------------|--------------------|--------------------|
| | 1 | 2 | 3 | 4 |
| Ownership | | | | |
| SOE | 0.43*** (0.02) | 0.38*** (0.02) | 0.59*** (0.02) | 0.54*** (0.03) |
| FOE | 0.37*** (0.01) | 0.27*** (0.01) | 0.45*** (0.02) | 0.36*** (0.02) |
| Market competition | | | | |
| HHI | -0.17*** (0.05) | -0.42*** (0.05) | -0.17*** (0.05) | -0.42*** (0.05) |
| Entry Rate | 0.11*** (0.04) | 0.10** (0.04) | 0.25*** (0.05) | 0.25*** (0.05) |
| Interactions | | | | |
| SOE*HHI | | 0.68*** (0.11) | | 0.71*** (0.11) |
| SOE*Entry Rate | | | -0.59*** (0.07) | -0.61*** (0.07) |
| FOE*HHI | | 1.67*** (0.07) | | 1.68*** (0.07) |
| FOE*Entry Rate | | | -0.36*** (0.06) | -0.40*** (0.06) |
| Inverse Mills' ratio | | | | |
| | -0.18*** (0.01) | -0.18*** (0.01) | -0.19*** (0.01) | -0.19*** (0.01) |
| Constant | 0.18*** (0.05) | 0.22*** (0.05) | 0.15*** (0.05) | 0.18*** (0.05) |
| Controls | | | | |
| | Yes | Yes | Yes | Yes |
| Observations | 194,503 | 194,503 | 194,503 | 194,503 |
| R-squared | 0.41 | 0.41 | 0.41 | 0.41 |
| Year FE | Yes | Yes | Yes | Yes |
| Region FE | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes |

Notes:

Omitted ownership category: POE

Coefficients of the control variables were not reported to save space

Full tables are available from the authors upon request

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 10

Heckman selection model: second stage; ownership, competition and firm productivity; 2001-2006 and 2007-2011

| | Dependent variable: <i>tfp</i> | | | |
|-----------------------------|--------------------------------|--------------------|--------------------|--------------------|
| | 2001-2006 | | 2007-2011 | |
| | 1 | 2 | 3 | 4 |
| Ownership | | | | |
| SOE | 0.44*** (0.02) | 0.49*** (0.03) | 0.66*** (0.03) | 0.84*** (0.05) |
| FOE | 0.52*** (0.01) | 0.48*** (0.03) | 0.29*** (0.01) | 0.60*** (0.03) |
| Market competition | | | | |
| HHI | -0.00 (0.14) | -0.34** (0.14) | -0.06 (0.06) | -0.20*** (0.07) |
| Entry Rate | 0.11 (0.07) | 0.21*** (0.08) | -0.34*** (0.08) | -0.03 (0.08) |
| Interactions | | | | |
| SOE*HHI | | 0.48*** (0.15) | | 1.00*** (0.16) |
| SOE*Entry Rate | | -0.30*** (0.08) | | -1.34*** (0.23) |
| FOE*HHI | | 1.68*** (0.12) | | 1.52*** (0.08) |
| FOE*Entry Rate | | -0.29*** (0.08) | | -1.95*** (0.12) |
| Inverse Mills' ratio | | | | |
| | -0.26*** (0.02) | -0.25*** (0.02) | -0.22*** (0.02) | -0.21*** (0.02) |
| Constant | 0.18** (0.08) | 0.23*** (0.09) | 0.51*** (0.06) | 0.41*** (0.06) |
| Controls | | | | |
| | Yes | Yes | Yes | Yes |
| Observations | 60,471 | 60,471 | 134,032 | 134,032 |
| R-squared | 0.43 | 0.44 | 0.40 | 0.40 |
| Year FE | Yes | Yes | Yes | Yes |
| Region FE | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes |

Notes:

Omitted ownership category: POE

Coefficients of the control variables were not reported to save space

Full tables are available from the authors upon request

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 11

Are SOEs constraining the productivity growth of POEs?

| | Dependent variable: 1-year TFP growth rate of POEs | | |
|---|--|--------------------|--------------------|
| | 2001-2011 1 | 2001-2006 2 | 2007-2011 3 |
| Presence of SOEs | | | |
| Emp. share by SOEs same 3-digit ind. (t-1) | 0.11*** (0.03) | 0.02 (0.07) | 0.20*** (0.07) |
| Emp. share by SOEs same province (t-1) | 0.03 (0.02) | 0.09 (0.06) | 0.23*** (0.06) |
| Controls | | | |
| <i>tfp</i> _{t-1} | -0.52*** (0.00) | -0.51*** (0.00) | -0.53*** (0.00) |
| Emp. share by FOEs same 3-digit ind. (t-1) | 0.46*** (0.04) | 0.17* (0.09) | 0.47*** (0.10) |
| Emp. share by FOEs same province (t-1) | 0.10*** (0.03) | -0.22** (0.09) | 0.34*** (0.06) |
| Firm size _{t-1} | 0.17*** (0.00) | 0.18*** (0.00) | 0.17*** (0.00) |
| Firm age _{t-1} | -0.04*** (0.00) | -0.08*** (0.00) | -0.02*** (0.00) |
| Export status _{t-1} | 0.12*** (0.01) | 0.05*** (0.01) | 0.20*** (0.01) |
| Constant | 0.04 (0.04) | 0.21*** (0.08) | 0.01 (0.05) |
| Observations | 196,429 | 61,442 | 134,987 |
| Adjusted R-squared | 0.29 | 0.32 | 0.28 |
| Year FE | Yes | Yes | Yes |
| Region FE | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes |

Notes:

Only POEs are included in these regressions

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Appendix

A.1. Ownership classification

Table A.1. lists the 14 ownership types defined by the GSO and how we re-classify them into 3 mutually exclusive groups. SOEs are firms with at least 50% state ownership. POEs are firms with entirely private ownership and ones where state ownership is less than 50%. Cooperatives enter into the POE category because they are essentially private business in Vietnam. These should be distinguished from collectives/cooperatives in China, which are enterprises collectively owned by employees and local governments. FOEs comprise both fully owned foreign subsidiaries and joint ventures established between foreign and local partners in Vietnam.

Table A.1. Classification scheme

| Code | Ownership types as defined by GSO | Our classification |
|------|--|--------------------|
| 01 | Central SOEs (supervised by the central government) | SOEs |
| 02 | Local SOEs (supervised by the provincial government) | |
| 03 | Central state-owned limited liability companies | |
| 04 | Central state-owned limited liability companies | |
| 05 | Joint stock companies with more than 50% state ownership | |
| 06 | Cooperatives | POEs |
| 07 | Private enterprises (sole proprietorship) | |
| 08 | Partnership companies | |
| 09 | Private limited companies | |
| 10 | Joint stock companies without state ownership | |
| 11 | Joint stock companies with less than or equal to 50% state ownership | FOEs |
| 12 | Wholly-owned foreign subsidiaries | |
| 13 | Joint ventures (between SOEs and foreign partners) | |
| 14 | Joint ventures (between private companies and foreign partners) | |

Notes:

Our classification scheme is similar to the one adopted by Huang and Yang (2016).

A.2. Breakdown of firms by ownership and industry in 2001 and 2011

Each cell has three rows. First row shows the frequency, the second is “row” percentage while the third one shows “column” percentage.

Table A.2. Frequency distribution of firms by ownership and sector in 2001 and 2011

| VSIC 07 (2-digit industry) | 2001 | | | | 2011 | | | |
|------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | SOEs | POEs | FOEs | Total | SOEs | POEs | FOEs | Total |
| 10 Food | 176 | 2,137 | 110 | 2,423 | 60 | 4,204 | 308 | 4,572 |
| | 7.26 | 88.2 | 4.54 | 100 | 1.31 | 91.95 | 6.74 | 100 |
| | 14.3 | 27.44 | 10.04 | 23.96 | 9.65 | 11.61 | 6.7 | 11.04 |
| 11 Beverages | 75 | 452 | 21 | 548 | 27 | 1,408 | 35 | 1,470 |
| | 13.69 | 82.48 | 3.83 | 100 | 1.84 | 95.78 | 2.38 | 100 |
| | 6.09 | 5.8 | 1.92 | 5.42 | 4.34 | 3.89 | 0.76 | 3.55 |
| 12 Tobacco | 18 | 5 | 1 | 24 | 16 | 3 | 2 | 21 |
| | 75 | 20.83 | 4.17 | 100 | 76.19 | 14.29 | 9.52 | 100 |
| | 1.46 | 0.06 | 0.09 | 0.24 | 2.57 | 0.01 | 0.04 | 0.05 |
| 13 Textiles | 55 | 257 | 69 | 381 | 27 | 1,370 | 289 | 1,686 |
| | 14.44 | 67.45 | 18.11 | 100 | 1.6 | 81.26 | 17.14 | 100 |
| | 4.47 | 3.3 | 6.3 | 3.77 | 4.34 | 3.78 | 6.29 | 4.07 |
| 14 Wearing apparel | 88 | 382 | 118 | 588 | 35 | 2,789 | 605 | 3,429 |
| | 14.97 | 64.97 | 20.07 | 100 | 1.02 | 81.34 | 17.64 | 100 |
| | 7.15 | 4.91 | 10.77 | 5.81 | 5.63 | 7.7 | 13.17 | 8.28 |
| 15 Leather processing | 35 | 151 | 65 | 251 | 15 | 695 | 244 | 954 |
| | 13.94 | 60.16 | 25.9 | 100 | 1.57 | 72.85 | 25.58 | 100 |
| | 2.84 | 1.94 | 5.93 | 2.48 | 2.41 | 1.92 | 5.31 | 2.3 |
| 16 Wood Processing | 48 | 633 | 34 | 715 | 17 | 3,120 | 117 | 3,254 |
| | 6.71 | 88.53 | 4.76 | 100 | 0.52 | 95.88 | 3.6 | 100 |
| | 3.9 | 8.13 | 3.1 | 7.07 | 2.73 | 8.62 | 2.55 | 7.86 |
| 17 Paper product | 41 | 372 | 25 | 438 | 17 | 1,487 | 126 | 1,630 |
| | 9.36 | 84.93 | 5.71 | 100 | 1.04 | 91.23 | 7.73 | 100 |
| | 3.33 | 4.78 | 2.28 | 4.33 | 2.73 | 4.11 | 2.74 | 3.94 |
| 18 Printing | 119 | 190 | 6 | 315 | 65 | 2,526 | 66 | 2,657 |
| | 37.78 | 60.32 | 1.9 | 100 | 2.45 | 95.07 | 2.48 | 100 |
| | 9.67 | 2.44 | 0.55 | 3.11 | 10.45 | 6.98 | 1.44 | 6.41 |
| 19 Refined Petroleum | 2 | 9 | 2 | 13 | 2 | 57 | 5 | 64 |
| | 15.38 | 69.23 | 15.38 | 100 | 3.13 | 89.06 | 7.81 | 100 |
| | 0.16 | 0.12 | 0.18 | 0.13 | 0.32 | 0.16 | 0.11 | 0.15 |
| 20 Chemicals | 47 | 206 | 82 | 335 | 37 | 1,212 | 280 | 1,529 |
| | 14.03 | 61.49 | 24.48 | 100 | 2.42 | 79.27 | 18.31 | 100 |
| | 3.82 | 2.65 | 7.48 | 3.31 | 5.95 | 3.35 | 6.09 | 3.69 |
| 21 Pharmaceutical | 31 | 68 | 12 | 111 | 12 | 253 | 32 | 297 |
| | 27.93 | 61.26 | 10.81 | 100 | 4.04 | 85.19 | 10.77 | 100 |
| | 2.52 | 0.87 | 1.09 | 1.1 | 1.93 | 0.7 | 0.7 | 0.72 |
| 22 Rubber and plastics | 30 | 408 | 86 | 524 | 23 | 2,350 | 473 | 2,846 |
| | 5.73 | 77.86 | 16.41 | 100 | 0.81 | 82.57 | 16.62 | 100 |
| | 2.44 | 5.24 | 7.85 | 5.18 | 3.7 | 6.49 | 10.29 | 6.87 |
| 23 Non-metallic mineral | 182 | 840 | 50 | 1,072 | 81 | 2,912 | 132 | 3,125 |
| | 16.98 | 78.36 | 4.66 | 100 | 2.59 | 93.18 | 4.22 | 100 |
| | 14.78 | 10.79 | 4.56 | 10.6 | 13.02 | 8.04 | 2.87 | 7.54 |
| 24 Basic metals | 19 | 105 | 20 | 144 | 20 | 768 | 85 | 873 |
| | 13.19 | 72.92 | 13.89 | 100 | 2.29 | 87.97 | 9.74 | 100 |
| | 1.54 | 1.35 | 1.82 | 1.42 | 3.22 | 2.12 | 1.85 | 2.11 |
| 25 Fabricated metal products | 74 | 618 | 101 | 793 | 45 | 5,640 | 524 | 6,209 |
| | 9.33 | 77.93 | 12.74 | 100 | 0.72 | 90.84 | 8.44 | 100 |
| | 6.01 | 7.94 | 9.22 | 7.84 | 7.23 | 15.58 | 11.4 | 14.99 |
| 26 Computer and electronics | 15 | 45 | 42 | 102 | 13 | 300 | 226 | 539 |
| | 14.71 | 44.12 | 41.18 | 100 | 2.41 | 55.66 | 41.93 | 100 |
| | 1.22 | 0.58 | 3.83 | 1.01 | 2.09 | 0.83 | 4.92 | 1.3 |
| 27 Electrical equipment | 27 | 110 | 52 | 189 | 17 | 611 | 187 | 815 |
| | 14.29 | 58.2 | 27.51 | 100 | 2.09 | 74.97 | 22.94 | 100 |
| | 2.19 | 1.41 | 4.74 | 1.87 | 2.73 | 1.69 | 4.07 | 1.97 |

| VSIC 07 (2-digit industry) | 2001 | | | | 2011 | | | |
|------------------------------|-------|-------|-------|--------|------|--------|-------|--------|
| | SOEs | POEs | FOEs | Total | SOEs | POEs | FOEs | Total |
| 28 Other machinery | 44 | 136 | 19 | 199 | 14 | 765 | 113 | 892 |
| | 22.11 | 68.34 | 9.55 | 100 | 1.57 | 85.76 | 12.67 | 100 |
| | 3.57 | 1.75 | 1.73 | 1.97 | 2.25 | 2.11 | 2.46 | 2.15 |
| 29 Motor vehicles | 14 | 41 | 31 | 86 | 14 | 159 | 135 | 308 |
| | 16.28 | 47.67 | 36.05 | 100 | 4.55 | 51.62 | 43.83 | 100 |
| | 1.14 | 0.53 | 2.83 | 0.85 | 2.25 | 0.44 | 2.94 | 0.74 |
| 30 Other transport equipment | 58 | 139 | 38 | 235 | 44 | 395 | 122 | 561 |
| | 24.68 | 59.15 | 16.17 | 100 | 7.84 | 70.41 | 21.75 | 100 |
| | 4.71 | 1.79 | 3.47 | 2.32 | 7.07 | 1.09 | 2.66 | 1.35 |
| 31 Furniture | 18 | 350 | 45 | 413 | 5 | 2,106 | 225 | 2,336 |
| | 4.36 | 84.75 | 10.9 | 100 | 0.21 | 90.15 | 9.63 | 100 |
| | 1.46 | 4.49 | 4.11 | 4.08 | 0.8 | 5.82 | 4.9 | 5.64 |
| 32 Other manufacturing | 4 | 89 | 62 | 155 | 4 | 535 | 236 | 775 |
| | 2.58 | 57.42 | 40 | 100 | 0.52 | 69.03 | 30.45 | 100 |
| | 0.32 | 1.14 | 5.66 | 1.53 | 0.64 | 1.48 | 5.14 | 1.87 |
| 33 Repair of machinery | 11 | 44 | 5 | 60 | 12 | 540 | 28 | 580 |
| | 18.33 | 73.33 | 8.33 | 100 | 2.07 | 93.1 | 4.83 | 100 |
| | 0.89 | 0.57 | 0.46 | 0.59 | 1.93 | 1.49 | 0.61 | 1.4 |
| Total | 1231 | 7,787 | 1096 | 10,114 | 622 | 36,205 | 4595 | 41,422 |
| | 12.17 | 76.99 | 10.84 | 100 | 1.5 | 87.41 | 11.09 | 100 |
| | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

Table A.3. Ownership, competition and firm productivity; adding the first lag of *tfp* in the vector of regressors

| | Dependent variable: <i>tfp</i> | | | | | |
|----------------------------|--------------------------------|--------------------|-------------------|-------------------|-------------------|--------------------|
| | 2001-2011 | | 2001-2006 | | 2007-2011 | |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Ownership | | | | | | |
| SOE | 0.12*** (0.01) | 0.15*** (0.02) | 0.14*** (0.01) | 0.14*** (0.02) | 0.18*** (0.01) | 0.29*** (0.04) |
| FOE | 0.21*** (0.01) | 0.21*** (0.01) | 0.28*** (0.01) | 0.26*** (0.02) | 0.17*** (0.01) | 0.35*** (0.02) |
| Market competition | | | | | | |
| HHI | -0.04 (0.04) | -0.19*** (0.04) | 0.10 (0.12) | -0.10 (0.12) | -0.00 (0.06) | -0.08 (0.06) |
| Entry Rate | 0.16*** (0.04) | 0.23*** (0.04) | 0.17*** (0.06) | 0.21*** (0.07) | -0.05 (0.07) | 0.13* (0.07) |
| Interactions | | | | | | |
| SOE*HHI | | 0.53*** (0.09) | | 0.48*** (0.13) | | 0.67*** (0.15) |
| FOE*HHI | | 0.92*** (0.06) | | 0.89*** (0.10) | | 0.90*** (0.08) |
| SOE*EntryRate | | -0.27*** (0.06) | | -0.10 (0.07) | | -0.77*** (0.20) |
| FOE*EntryRate | | -0.27*** (0.05) | | -0.13* (0.07) | | -1.14*** (0.11) |
| Lagged productivity | | | | | | |
| <i>tfp</i> _{t-1} | 0.46*** (0.00) | 0.46*** (0.00) | 0.47*** (0.00) | 0.47*** (0.00) | 0.45*** (0.00) | 0.45*** (0.00) |
| Constant | 0.15*** (0.04) | 0.15*** (0.04) | 0.22*** (0.07) | 0.25*** (0.07) | 0.41*** (0.06) | 0.35*** (0.06) |
| Controls | | | | | | |
| Observations | 194,503 | 194,503 | 60,471 | 60,471 | 134,032 | 134,032 |
| Adjusted R-squared | 0.54 | 0.54 | 0.58 | 0.58 | 0.52 | 0.52 |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Region FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes |

Notes:

Omitted ownership category: POE

Coefficients of the control variables were not reported to save space

Full tables are available from the authors upon request

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A.4. Ownership, competition and firm productivity; regressors as 1-year lagged variables

| | Dependent variable: <i>tfp</i> | | | | | |
|---------------------------------|--------------------------------|--------------------|-------------------|--------------------|-------------------|--------------------|
| | 2001-2011 | | 2001-2006 | | 2007-2011 | |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Ownership | | | | | | |
| SOE _(t-1) | 0.21*** (0.01) | 0.23*** (0.02) | 0.13*** (0.02) | 0.12*** (0.02) | 0.32*** (0.02) | 0.55*** (0.05) |
| FOE _(t-1) | 0.34*** (0.01) | 0.24*** (0.01) | 0.49*** (0.01) | 0.38*** (0.02) | 0.26*** (0.01) | 0.63*** (0.03) |
| Market competition | | | | | | |
| HHI _(t-1) | -0.14*** (0.05) | -0.39*** (0.05) | 0.00 (0.11) | -0.32*** (0.11) | -0.05 (0.06) | -0.19*** (0.06) |
| Entry Rate _(t-1) | 0.12*** (0.04) | 0.14*** (0.04) | 0.09* (0.05) | 0.09* (0.05) | -0.10 (0.07) | 0.25*** (0.07) |
| Interactions | | | | | | |
| SOE*HHI _(t-1) | | 0.90*** (0.10) | | 0.73*** (0.14) | | 1.18*** (0.16) |
| FOE*HHI _(t-1) | | 1.57*** (0.06) | | 1.49*** (0.10) | | 1.49*** (0.08) |
| SOE*EntryRate _(t-1) | | -0.27*** (0.04) | | -0.10** (0.04) | | -1.52*** (0.22) |
| FOE*EntryRate _(t-1) | | -0.01 (0.04) | | -0.01 (0.04) | | -2.20*** (0.12) |
| Constant | 0.23*** (0.05) | 0.25*** (0.05) | 0.11 (0.09) | 0.17** (0.09) | 0.46*** (0.06) | 0.35*** (0.06) |
| Controls_(t-1) | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 209,614 | 209,614 | 66,598 | 66,598 | 143,016 | 143,016 |
| Adjusted R-squared | 0.39 | 0.39 | 0.41 | 0.41 | 0.38 | 0.39 |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Region FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes |

Notes:

Omitted ownership category: POE

Coefficients of the control variables were not reported to save space

Full tables are available from the authors upon request

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A.5. Ownership, competition and firm productivity; firm fixed effects model

| | Dependent variable: <i>tfp</i> | | | | | |
|---------------------------|--------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | 2001-2011 | | 2001-2006 | | 2007-2011 | |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Ownership | | | | | | |
| SOE | -0.14*** (0.02) | -0.13*** (0.02) | -0.11*** (0.03) | -0.13*** (0.04) | 0.06 (0.04) | 0.01 (0.07) |
| FOE | 0.18*** (0.04) | 0.31*** (0.04) | 0.23 (0.16) | 0.40** (0.17) | 0.23*** (0.05) | 0.47*** (0.06) |
| Market competition | | | | | | |
| HHI | -0.15*** (0.04) | -0.09** (0.04) | -0.28*** (0.10) | -0.12 (0.11) | -0.05 (0.05) | -0.04 (0.05) |
| Entry Rate | -0.08** (0.03) | 0.01 (0.03) | -0.16*** (0.05) | -0.04 (0.05) | -0.22*** (0.06) | -0.07 (0.06) |
| Interactions | | | | | | |
| SOE*HHI | | 0.14 (0.15) | | 1.23*** (0.29) | | 0.03 (0.27) |
| FOE*HHI | | -0.54*** (0.12) | | -1.24*** (0.24) | | -0.11 (0.17) |
| SOE*EntryRate | | -0.09* (0.05) | | -0.23*** (0.05) | | 0.20 (0.28) |
| FOE*EntryRate | | -0.40*** (0.04) | | -0.36*** (0.05) | | -1.18*** (0.14) |
| Constant | 0.31*** (0.03) | 0.28*** (0.03) | -0.05 (0.04) | -0.11** (0.05) | 0.65*** (0.03) | 0.61*** (0.03) |
| Controls | | | | | | |
| | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 282,764 | 282,764 | 95,774 | 95,774 | 186,990 | 186,990 |
| Adjusted R-squared | 0.60 | 0.60 | 0.66 | 0.66 | 0.61 | 0.61 |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |

Notes:

Omitted ownership category: POEs

Coefficients of the control variables were not reported to save space

Full tables are available from the authors upon request

*** p<0.01, ** p<0.05, * p<0.1

Supplementary material (on-line)

Supplementary Section 1. Procedure to convert the old Vietnamese standard industrial classification system (VSIC 93) into the most recent one (VSIC 07).

We develop a probabilistic method to convert the old industrial classification system (VSIC 93), no longer used after 2010, into the new industrial classification system (VSIC 07). Any researchers who want to combine VES's data before and after 2010 need to overcome this issue in order to have a panel of firms based on a consistent industrial classification system.

Each firm in the VES database (with a unique ID, derived from the firm's tax code) is classified as belonging to an industry following the VSIC. There are two versions of the VSIC: VSIC 93 (the 1993 version) and VSIC 07 (the 2007 version), which were built based on the United Nation's International Standard Industrial Classification (ISIC) 3 and ISIC 4, respectively. The old version (VSIC 93) was applied to enterprises surveyed from 2000 to 2005, while the new version (VSIC 07) has been applied since 2006. A conversion of the VSIC 93 into VSIC 07 is thus needed for the cohorts prior to 2006. The procedure we follow for the conversion is based on two steps.

First, we make use of the fact that the GSO still keeps assigning both the old VSIC 93 code and the new VSIC 07 code to each enterprise surveyed between 2006 and 2010. From this co-assignment, we build the concordance table, which captures every possible correspondence between the VSIC 93 and VSIC 07 codes. There are both one-to-one and one-to-many correspondences. In the case of a one-to-many correspondence, an empirical probability distribution is built based on the frequencies at which each industry in the old system is associated with the corresponding industries in the new system.

Second, if an enterprise belongs to an industry X in VSIC 93, which is associated with three industries Y_1, Y_2, Y_3 in VSIC 07, it will be randomly assigned to either $Y_1, Y_2,$ or Y_3 by using the empirical probability distribution of X being associated with $Y_1, Y_2,$ and Y_3 described above.

There are some cases (about 0.5%) where there is no information about the VSIC 93 for a firm in the VES from 2000 to 2005, and gives us no clues to assign the corresponding code in the VSIC 07. We fill in the missing information by using the same VSIC 07 code that was assigned to such enterprises in the next available year from 2005 onwards. In particular, information for 2006 will be used to fill in the missing information for 2005, and that which is used for 2005 will in turn be used to fill in the missing information for 2004, and so on and so forth.

By doing this, we assume that enterprises do not change their industry over time. Indeed, a time-invariant (modal) industry code is assigned to each firm. As a robustness check, we also calculate TFP and repeat the analysis for the cases in which firms are allowed to switch industries over time. The main results are confirmed.

The Stata code for this procedure is available from the authors upon request.

Supplementary Section 2. The modified Levinsohn and Petrin (2003) estimator developed by Wooldridge (2009).

We start with a Cobb–Douglas production function:

$$y_{it} = \beta_0 + \beta_1 k_{it} + \beta_2 l_{it} + \beta_3 m_{it} + \omega_{it} + e_{it} \quad (1)$$

where lowercase letters refer to natural logarithms of y_{it} (deflated-sales), k_{it} (capital), l_{it} (labor), and m_{it} (material). Among the inputs for production function, k_{it} (capital) is the quasi-fixed state variable accumulated from past investments, while l_{it} or m_{it} (log of labor or material) are free-adjustment inputs which can be correlated with ω_{it} (i.e., the firm knows its implicit productivity when taking decisions on labor and materials). While Levinsohn and Petrin (2003) assume that m_{it} is the only free-adjustment input, we follow Akerberg et al. (2006) by assuming that both l_{it} or m_{it} are free-adjustment inputs. It means that firms also determine l_{it} based on k_{it} , ω_{it} or $l_{it}=l(k_{it}, \omega_{it})$.

It is assumed that e_{it} is independent of all current and past inputs, k_{it} , l_{it} , m_{it} ($t=1,2, \dots,T$): $E(e_{it}|k_{it}, l_{it}, m_{it}, k_{it-1}, l_{it-1}, m_{it-1}, \dots) = 0$ with $t=1,2, \dots,T$. We also assume that productivity (ω_{it}) is (i) a monotonic function of m_{it} , k_{it} : $\omega_{it}=g(m_{it}, k_{it})$ and (ii) follows an autoregressive process of order 1 (AR(1)): $\omega_{it} = E(\omega_{it}|\omega_{it-1}) + a_{it}$. The innovation in productivity AR(1) process, a_{it} , is not only independent of $\omega_{it-1}=g(k_{it-1}, m_{it-1})$, but also independent of k_{it} as k_{it} is quasi-fixed and determined based on past periods.

Hence, we can write: $\omega_{it} = E(\omega_{it}|\omega_{it-1}) + a_{it} = f[g(k_{it-1}, m_{it-1})] + a_{it} = h(k_{it-1}, m_{it-1}) + a_{it}$ where $h()=f[g()]$ is assumed to be monotonic function of k_{it-1} and m_{it-1} . Then (1) becomes:

$$y_{it} = \beta_0 + \beta_1 k_{it} + h(k_{it-1}, m_{it-1}) + \beta_2 l_{it} + \beta_3 m_{it} + \varepsilon_{it} \quad (2)$$

where $\varepsilon_{it} = a_{it} + e_{it}$ is independent of k_{it} , k_{it-1} , m_{it-1} but can be correlated with l_{it} and m_{it} (i.e., l_{it} and m_{it} are endogenous).

If we approximate $h()$ by the sum of polynomials order 2 of k_{it-1} and m_{it-1} , we can estimate (2) using a generalized method of moments (GMM) in Stata:

$$ivreg2 \ y_{it} \ k_{it} \ k_{it-1} \ m_{it-1} \ k_{it-1} * m_{it-1} \ k_{it-1}^2 \ m_{it-1}^2 \ (l_{it} \ m_{it} = l_{it-1} \ m_{it-2}), \ gmm2s \ cluster(firm_id)$$

We can approximate $h()$ by polynomials of k_{it-1} and m_{it-1} up to order 3 (Wooldridge, 2009).

The function $h()$ is represented by $k_{it-1} \ m_{it-1} \ k_{it-1} * m_{it-1} \ k_{it-1}^2 \ m_{it-1}^2$ in the command line. l_{it} and m_{it} are endogenous (i.e., they can be correlated with ε_{it}) and instrumented by their own lags l_{it-1} and m_{it-2} , while the other variables are exogenous and instrumented by themselves. Then, the vector of instrument is $\mathbf{z}_{it} = [1 \ k_{it} \ k_{it-1} \ m_{it-1} \ k_{it-1} * m_{it-1} \ k_{it-1}^2 \ m_{it-1}^2 \ l_{it-1} \ m_{it-2}]$. The moment equation used to identify parameters in (2) in the Stata command line is $E(\mathbf{z}'_{it} * \varepsilon_{it}) = 0$.

In this paper, we use the production function with value added on the left-hand side. The equivalence of (2) when value is added on the left-hand side is:

$$v_{it} = \beta_0 + \beta_1 k_{it} + h(k_{it-1}, m_{it-1}) + \beta_2 l_{it} + \varepsilon_{it} \quad (2')$$

In this case, we only have one endogenous variable l_{it} which will be instrumented by its own lag l_{it-1} . The vector of instrument $\mathbf{z}'_{it} = [1 \ k_{it} \ k_{it-1} \ m_{it-1} \ k_{it-1} * m_{it-1} \ k^2_{it-1} \ m^2_{it-1} \ l_{it-1}]$ is then used to identify the parameters in (2') from the following moment equation $E(\mathbf{z}'_{it} * \varepsilon_{it}) = 0$. The command line in Stata is:

```
ivreg2 vit kit kit-1 mit-1 kit-1*mit-1 k2it-1 m2it-1 (lit = lit-1), gmm2s cluster(firm_id)
```

We estimate the coefficient $\widehat{\beta}_1, \widehat{\beta}_2$ separately for each 2-digit manufacturing sector, and the firm's TFP (in log) is calculated as $\widehat{\omega}_{it} = v_{it} - \widehat{\beta}_1 k_{it} - \widehat{\beta}_2 l_{it}$. It should be noted that we also include dummies for the year in the *ivreg2* command to control for the differences in technology across years.

Supplementary Section 3. The measure of import penetration.

Import penetration is the ratio of imports to the sum of sales and imports at the 4-digit VSIC 07 industry level. Data on imports have been extracted from the UN Comtrade Database and classified by the HS classification system of traded products (HS 1 to HS 4). We use the following procedure to convert import data at HS's 6-digit product level into 4-digit VSIC 07 industrial sectors.

First, we obtain the concordance tables between HS systems and ISIC Rev.3 from World Integrated Trade Solution's website (http://wits.worldbank.org/product_concordance.html). Vietnam reports trade data in different versions of HS (HS 1 to HS 4) from year to year. As World Integrated Trade Solution only provides the concordance between HS 1, HS 2, and HS 3 and ISIC Rev.3, we will convert the import values of HS 4 to HS 3 by using the conversion table between HS 4 and HS 3 provided by the World Customs Organization (http://www.wcoomd.org/en/topics/nomenclature/instrument-and-tools/hs_nomenclature_2012/correlations-tables.aspx).

When an HS 4 category is associated with more than one HS 3 category, we split the import value of the HS 4 category equally between all associated HS 3 categories. Moreover, since VSIC 93 was developed on the basis of ISIC Rev.3, we therefore have concordance tables between HS systems (1 to 3) and VSIC 93.

Second, we map the import data classified by HS products to VSIC 07's 4-digit sectors using the HS to VSIC 93 concordance above and the concordance of VSIC 93 to VSIC 07 provided by the GSO. We manually input the associated VSIC 07 codes for five specific VSIC 93 codes, viz. 1911, 2330, 2412, 3313, and 3720, which are missing in the concordance from the GSO. When a VSIC 93 category maps into two or more VSIC 07 categories, we split the import value equally between all VSIC 07 categories linked to the VSIC 93 category.

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