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State owned enterprises and capital misallocation in Vietnam

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ABSTRACT

This study uses the first comprehensive data on Vietnamese manufacturing firms and quantifies the allocative efficiency improvement due to massive entry of private firms amid a simultaneous contraction of state-owned enterprises (SOEs) in the period 2000–2008. It finds that allocative efficiency improvement contributes considerably to the sector's annual Total Factor Productivity growth, and firm's entry and exit exerts an increasingly important role in the second half of this period. The productivity dispersion within narrowly-defined industries remains, however, large and persistent. Such effect is attributed to the fact that SOEs disproportionately absorb credit in a period marked with unprecedented growth in domestic credit supply. This paper finds that commercial and subsidized credit *per se* exhibits a capital distortion reducing effect, but awarding more commercial and subsidized credit to the SOEs, in reference to the private counterparts, yields the *anti*-capital distortion reducing effect that intensifies with the distribution of higher quantiles.

KEYWORDS

Misallocation; total factor productivity; allocative efficiency; state-owned enterprises; Vietnam

JEL CLASSIFICATION

L16, O11, O47, O53

1. Introduction

The misallocation and growth literature with pioneered works by Restuccia and Rogerson (2008), Hiesh and Klenow (2009) has related growth to firm specific distortions, and conjectures that more growth could be attained by removing distortions that prevent smooth reallocation of production resources from low- to high-efficient firms. This framework provides an indirect measure of misallocation by modelling the effect of any idiosyncratic distortions confronting a firm through the introduction of firm-specific taxes on output and/or input factors.[1] A firm facing 'positive taxes' on capital input have, for example, higher marginal product of capital as it has to equate this arbitrarily high cost of capital to the marginal product. More aggregate output could be obtained by removing this capital distortion facing high-productive firms, and thus facilitating the reallocation of capital resource from low- to high-productive firms. In Hiesh and Klenow (2009) the indirect line of misallocation

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accounting is applied to manufacturing firms in China and it is suggested that the potential TFP gains from reallocation are from 30%–50% in referencing to the U.S. benchmark and from 86%–115% in a case of complete liberalization.

This study follows Hiesh and Klenow (2009)'s framework but contributes to the misallocation and growth literature in the following important dimensions. First, it decomposes misallocation into contributions of intensive and extensive margins in a period marked with massive entry of privately-owned firms whilst a simultaneous shrinkage of SOEs. In this perspective, Vietnamese manufacturing sector during the period of 2000–2008 is an interesting case for the empirical study of misallocation.[2] Bach (2013) indicates that firm's dynamics plays an increasingly important role in the aggregate productivity improvement in the sector during that entry liberalization period, but how we could relate firm's dynamics to any allocative efficiency improvements during this particular period remains an open question. Second, I take advantage of a rich data set on firm-specific investment and, particularly, information on firms' investment funded by commercial and subsidized credits, to examine one of important sources of misallocation prevailing in a country with a considerable stake of SOEs like Vietnam. In this country credit deems to play an important role in determining resource misallocation in Vietnamese manufacturing sector provided that the banking industry is dominated by state-owned commercial banks (SOCBs) (World Bank 2011).[3] Third, this study employs the quantile regression estimator to examine the misallocation effects of the credit policy in the Vietnamese manufacturing sector. This method is believed to provide richer information on the extent of misallocation as this effect might differ greatly across firms confronting various levels of distortions.

The study's empirical findings suggest that the productivity dispersion in Vietnamese manufacturing industry is large and persistent. By the end of the entry liberalization period, 2008, the productivity of the 75th percentile firm is 3.7 times as high as the 25th percentile firm, which is even higher than the gap of 2.3 in 2005 in the Chinese manufacturing as reported in Hiesh and Klenow (2009). The wide and persistent productivity dispersion between the best and worst performing firms results in a corresponding high potential TFP gains from the removal of distortions. Vietnamese manufacturing's TFP could have been increased by 226% in 2000, and by 181% in 2007, exhibiting an annual improvement in allocation efficiency of 2.3%. Regarding the sector's annual TFP growth of 6% during the period 2000-2007 (Bach 2013), about two-fifths of the annual TFP growth should be attributed to the across-firm allocative efficiency improvement.[4] Additionally, the improvement in allocative efficiency is better captured by intensive margins, or all continuing firms, over the period 2000–2004, and by extensive margins, or entering and exiting firms, over the period 2005 to 2008. In comparison with private domestic firms, SOEs and foreign owned firms (FOFs) exhibit *less* capital distortions in level. In a period marked with unprecedented increases in credit supply, obtaining larger commercial credit *per se* is associated with less capital distortions, but such capital reducing effect differs greatly across firm ownership. The attainment of commercial credit by SOEs and FOFs brings less capital distortion reducing effect, compared to privately owned firms (POFs). This anti-capital distortion reducing effect among SOEs yields noteworthy

policy implications provided that commercial credit is disproportionately awarded to the SOEs sector. With respect to the subsidized credit, the relevant empirical findings to SOEs are qualitatively the same, but there are no marked differences between the OLS and quantile regression estimates for the interaction terms with firm ownership.

The remaining sections of this study are organized as follows. Section 2 provides the methodology for misallocation accounting. Section 3 presents the data and some parameter choices for the measurement of misallocation. Section 4 reports the potential gains from a complete hypothetical removal of distortions, and the contributions of intensive and extensive margins to the improvement of allocative efficiency during the entry liberalization period 2000–2008. Section 5 examines why productivity dispersion remains large and persistent in Vietnamese manufacturing industry by relating capital distortions to the credit policy during this period. Finally, Section 6 takes stock of the study by providing conclusions and some policy implications.

2. Methodology

The methodology for measuring misallocation is adopted from Hiesh and Klenow (2009) which is basically the monopolistic competition model with heterogeneous firms. Firms in this line of model not only differ in their productivity levels like in the spirit of Melitz (2003), but also differ in firm-level output and capital distortions. On the aggregate level there is a single final aggregate good Y that is produced by a representative firm in a perfectly competitive final good market using Cobb-Douglas production technology:

$$Y = \prod_{s=1}^{S} Y_s^{\theta_s} \tag{1}$$

where $\sum_{s=1}^{S} \theta_s = 1$; Y_s is the output of industry s, $s = 1, ..., S$; and θ_s is the output share of industry s.

The output Y_s is in turn produced by M_s differentiated products Y_{si} using CES production technology:

$$Y_s = \left(\sum_{i=1}^{M_s} Y_{si}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}} \tag{2}$$

where, Y_{si} is produced by individual firm i, $i = 1, ..., M_s$; and σ is the elasticity of substitution between firm value-added Y_{si}.

On the micro level, Y_{si} is in turn produced by firm i in industry s using Cobb-Douglas production function with Total Factor productivity (TFP) A, capital $K$and labor L ! :

$$Y_{si} = A_{si} K_{si}^{\alpha_s} L_{si}^{1-\alpha_s} \tag{3}$$

where, α_s and $1 - \alpha_s$ are respectively capital and labor income shares that differ across industries, rather than across firms within an industry.

2.1. Firm's decision

In defining the output and capital distortions, Hiesh and Klenow (2009) follow the 'indirect' approach suggested by Restuccia and Rogerson (2008) by assuming that each individual firm faces an idiosyncratic proportional tax rate on output, τ_{Ysi}, and an idiosyncratic proportional tax rate on capital, τ_{Ksi}. Given these, the profit maximization problem governing individual firm behaviour is defined as follows:

$$\max_{P_{si},K_{si},L_{si}} \pi_{si} = (1-\tau_{Ysi})P_{si}Y_{si} - \omega L_{si} - (1+\tau_{Ksi})RK_{si} \tag{4}$$

$$s.t.\ Y_{si} = Y_s\left(\frac{P_s}{P_{si}}\right)^{\sigma} \tag{5}$$

where τ_{Ysi} and τ_{Ksi} are relative concepts, since τ_{Ysi} denotes distortions that increase the marginal products of capital and labor by the same proportion, and τ_{Ksi} represents distortion that raises the marginal product of capital relative to labor. τ_{Ysi} and τ_{Ksi} can be either positive or negative, where positive values of τ_{Ysi} indicate that firms face, among other factors, government restrictions on size or high transportation costs, and negative values of τ_{Ysi} indicate that firms face government output subsidies. Similarly, positive values of τ_{Ksi} exhibit firm's access to high interest rate credit (without political connections), and negative values of τ_{Ksi} exhibit firm's access to subsidized credit (with political connections). Noticeably, all firms face the same wage ω, and R is the rental price of capital.

By first order condition, the capital-labor ratio is derived as

$$\frac{K_{si}}{L_{si}} = \frac{\alpha_s}{1-\alpha_s}\frac{\omega}{R}\frac{1}{1+\tau_{Ksi}} \tag{6}$$

2.2. Aggregate TFPs and the measure of misallocation

The aggregate productivity on industry s, TFP_s, is obtained as follows:

$$TFP_s \triangleq \frac{Y_s}{K_s^{\alpha_s}L_s^{1-\alpha_s}} = \left[\sum_{i=1}^{M_s}\left(A_{si}\frac{\overline{TFPR_s}}{TFPR_{si}}\right)^{\sigma-1}\right]^{\frac{1}{\sigma-1}} \tag{7}$$

where, $TFPR_{si}$ is revenue Total Factor Productivity (TFP) of firm i in industry s, and $\overline{TFPR_s}$ is the average TFP of industry s.

In the absence of distortions, we have $\tau_{Ysi} = \tau_{Ksi} = 0$ and $TFPR_{si} = \overline{TFPR_s}$. As a result, from Equation (7), we have the efficient productivity on the aggregate industry s as

$$TFP_s^E = \overline{A_s} = \left(\sum_{i=1}^{M_s}A_{si}^{\sigma-1}\right)^{\frac{1}{\sigma-1}} \tag{8}$$

Using Equation (1), on the sector/economy level we have the actual and efficient productivities that are derived as

$$TFP = \prod_{s=1}^{S} TFP_s^{\theta_s} = \prod_{s=1}^{S} \left[\sum_{i=1}^{M_s} \left(A_{si} \frac{\overline{TFPR_s}}{TFPR_{si}} \right)^{\sigma-1} \right]^{\frac{\theta_s}{\sigma-1}}, \quad and \tag{9}$$

$$TFP^E = \prod_{s=1}^{S} \left(TFP_s^E \right)^{\theta_s} = \prod_{s=1}^{S} \left(\overline{A_s} \right)^{\theta_s} \tag{10}$$

Thus, we have following ratio relating the actual and efficient productivities on the sector/economy as a whole:

$$\frac{TFP}{TFP^E} = \prod_{s=1}^{S} \left[\sum_{i=1}^{M_s} \left(\frac{A_{si}}{\overline{A_s}} \frac{\overline{TFPR_s}}{TFPR_{si}} \right)^{\sigma-1} \right]^{\frac{\theta_s}{\sigma-1}} \tag{11}$$

Equation (11) is the key equation for calculating the potential TFP gain from reallocation, where the gain equals to the inverse of the efficiency ratio $\frac{TFP}{TFP^E}$ minus 1.

3. The data, parameter choices, and the measurement of wedges

3.1. The data

The data used in this study is derived from the annual Enterprise Survey conducted annually by the Vietnamese General Statistics Office (VGSO) for the period from 2000 to 2008. The survey was conducted nationwide in all 63 provinces of the country. It collected diverse and rich firm-level information of various registered types of firms, including the state-, foreign, and private-owned ones. The information collected is related to firm performance, the use of inputs, contributions to the state, investment, and various sources of investment funding. Details about variable descriptions and the corresponding questions asked in the Enterprise Survey are presented in Appendix Table A1. This is the most up-to-date and comprehensive data spanning the entry liberalization period 2000–2008 that allows a massive entry of private firms accompanied by a simultaneous contraction of SOEs. The focus of this study is on, however, the manufacturing industries that are defined under the International Standard Classification of Industry revision 3.1 (ISIC Rev.3.1) with a detailed classification up to 4-digit industry.

Table 1 provides summary statistics of the data set on Vietnamese manufacturing firms with valid information on employment, fixed asset, and value-added.[5] This table represents averages and standard deviations (SD) of the variables of interest. Among them, firm size in labor and firm size in capital stand for the number of labors and inflation-adjusted fixed capital assets per firm (referred to the base year 2000). Capital intensity denotes the ratio of fixed assets over the number of labors, and value-added labor productivity is the inflation-adjusted value added per labor. Firm size in capital, capital intensity, and labor productivity are in million Vietnam *dong*. The last row indicates the ratios of valid sample observations over the total number of firms reported by VGSO. According to this table, firm sizes in terms of both labor

Table 1. Summary statistics.

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
Firm size in labor	147	147	143	149	148	140	127	123	106
SD	490	515	533	590	612	636	602	587	563
Firm size in capital	11,237	10,589	9845	9686	9645	9389	9461	9651	9129
SD	91,618	91,169	82,826	77,366	78,209	76,310	75,097	73,714	74,034
Capital intensity	71	71	69	63	63	63	70	71	70
SD	290	403	288	183	188	188	218	211	253
Value-added labor productivity	83	82	78	90	93	93	109	133	129
SD	214	307	287	249	290	322	287	451	439
N (this study)	9,092	10,569	12,974	15,064	17,651	19,480	24,011	27,595	34,776
N (VGSO)	10,399	12,353	14,794	16,916	20,531	24,017	26,863	31,057	38,384
Sample ratio	87%	86%	88%	89%	86%	81%	89%	89%	91%

This table represents averages and standard deviations (SD) of the variables of interest. Among them, firm size in labor and firm size in capital stand for the number of labors and inflation-adjusted fixed capital assets per firms (referred to the base year 2000). Capital intensity denotes the ratio of fixed assets over the number of labors, and value-added labor productivity is the inflation-adjusted value added per labor. Firm size in capital, capital intensity, and labor productivity are in million Vietnam dong.

Table 2. Choice of parameters.

Parameters	Parametrization
The rental price of capital, of which	$R = 0.064$
The real interest rate	1.4%
The depreciation rate	5%
The between-firm elasticity of substitution for value added	$\sigma = 3$
The actual capital and income shares	Compiled from the U.S.

and capital (fixed asset) generally shrank over the study period, of which a more contracting rate is given to labor. The capital intensity, the ratio of firm-fixed asset over labor, was relatively stable, peaking up at about 70 million Vietnam *dong* (in 2000 constant price) in the first 2 years and the last 2 years of the study period. The labor productivity (the ratio of firm's value-added over labor) reached 129 million Vietnam *dong* (in 2000 constant price) in 2008, which is equivalent to a 55% surge over 2000's figure.

3.2. Parameter choices and the measurement of wedges

Some key parameters need to be prior-specified to calculate the effects of resource misallocation. Among them are the rental price of capital, the elasticity of substitution between firm value-added, the capital and labor income shares, and the output and capital wedges. In Table 2, I follow Hiesh and Klenow (2009) to set the rental price of capital to $R = 0.064$, and the between-firm elasticity of substitution for value added to $\sigma = 3$. $R = 0.064$ has an implication of the real interest rate equal to 1.4% and depreciation rate equal to 5%.[6] $\sigma = 3$ is a conservative case as the gains from reallocation increase in σ. Since distortions are prevalent in a transition economy like Vietnam, I follow Hieash and Klenow (2009) to use the U.S. manufacturing industry's actual capital and labor income shares compiled from the NBER-CES manufacturing industry database.[7]

When it comes to other parameters governing firm specific output and capital distortions, they are defined as idiosyncratic taxes that drive the wedges in marginal revenue products of labor and capital. The respective capital and output wedges are inferred as

$$1 + \tau_{Ksi} = \frac{\alpha_s}{1-\alpha_s}\frac{\omega L_{si}}{RK_{si}} \tag{12}$$

$$1 - \tau_{Ysi} = \frac{\sigma}{\sigma-1}\frac{\omega L_{si}}{(1-\alpha_s)P_{si}Y_{si}} \tag{13}$$

The capital and output distortions are relative concepts. The capital distortion from (12) is high when the ratio of labor compensation over the capital stock is high compared to the ratio inferred from the industry output elasticities of capital and labor. Similarly, the output distortion is high when the labor compensation is low compared to the one inferred from the industry output elasticity of labor.

The firm physical productivity, A_{si}, is not readily measured due to the lack of firm specific price. It is inferred instead from Equations (3) and (5) which yield a measure of firm specific productivity as follows:

$$A_{si} = \gamma_s \frac{(P_{si}Y_{si})^{\frac{\sigma}{\sigma-1}}}{K_{si}^{\alpha_s} L_{si}^{1-\alpha_s}}$$

where $\gamma_s = (P_s Y_s)^{\frac{-1}{\sigma-1}}/P_s$. For the sake of simplicity, I follow Hiesh and Klenow (2009) to set $\gamma_s = 1$ as the gains from resource misallocation do not depend of a particular value of γ_s. It is noticeable that the common wage rate ω does not appear in γ_s because my definition of revenue and physical Total Factor Productivity uses the number of labors as labor input instead of the labor compensation as used in Hiesh and Klenow (2009).

4. Productivity dispersion and TFP gains from reallocation

Before presenting the productivity dispersion and the potential TFP gains from hypothetical complete liberalization, some measures need to be undertaken to mitigate the potential effects of measurement errors. I follow Hiesh and Klenow (2009) by trimming 1% tails of $\log(\frac{TFPR_{si}}{\overline{TFPR_s}})$, denoted as *TFPR*, and 1% tails of $\log(\frac{A_{si}M_s^{\frac{1}{\sigma-1}}}{\overline{A_s}})$, denoted as *TFPQ*, to control any potential outliers. Some industry aggregates like ωL_s, K_s, $P_s Y_s$, θ_s, as well as $\overline{TFPR_s}$ then need to be recalculated with the new number of firms in each industry *s*. In the following subsection, the data are presented without outliers.

4.1. Productivity dispersion

Table 3 shows a number of indicators capturing *TFPR* dispersions overtime. A general feature among these measures is that they all contracted over the period 2000–2008. The log ratio of 75th to 25th percentile firms started, for example, with 1.7 in 2000, and fell noticeably to 1.3 in 2008. If we take anti-log of this numbers, we can infer that the 75th percentile firm' productivity, in terms of *TFPR*, was 3.7 times as high as the 25th percentile firm's one in 2008, a noticeable fall from the year 2000's figure of 5.5. The 90th–10th percentile ratio is wider at 2.5 in log scale in 2008, which is equivalent to 12.2 times as high of the 90 percentile firms' *TFPR* over

Table 3. TFPR dispersion.

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
75–25 percentile (in log)	1.7	1.6	1.6	1.5	1.5	1.5	1.4	1.4	1.3
In level (anti-log)	5.5	5.0	5.0	4.5	4.5	4.5	4.1	4.1	3.7
90-10 percentile (in log)	3.3	3.1	3.2	3.1	3.1	3	2.8	2.7	2.5
In level (anti-log)	27.1	22.2	24.5	22.2	22.2	20.1	16.4	14.9	12.2

75–25 percentile is the log ratio of 75th to 25th percentile firms and 90–10 percentile is the log ratio of 90th to 10th percentile firms.

Table 4. TFPR dispersion by firm ownership.

75–25 percentile (in log)									
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
State	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.0
Private	1.8	1.6	1.7	1.6	1.6	1.5	1.4	1.4	1.2
Foreign	1.3	1.3	1.4	1.3	1.3	1.3	1.3	1.3	1.2
Collective	1.6	1.6	1.7	1.5	1.5	1.6	1.6	1.5	1.7
90–10 percentile (in log)									
State	2.3	2.3	2.4	2.3	2.3	2.2	2.1	2.1	2.1
Private	3.5	3.3	3.4	3.2	3.2	3.1	2.7	2.7	2.4
Foreign	2.6	2.6	2.7	2.6	2.6	2.6	2.6	2.5	2.5
Collective	3.0	3.0	3.2	3.0	3.1	3.1	3.0	3.0	3.1

75–25 percentile is the log ratio of 75th to 25th percentile firms and 90–10 percentile is the log ratio of 90th to 10th percentile firms.

the 10 percentile's one. The productivity dispersions in 2008 are much larger than those reported by Hsieh and Klenow (2009) for Chinese data in 2005, where the ratios of 75th to 25th and 90th to 10th percentiles are respectively 0.82 and 1.59 in log-scale.

Table 4 further elaborates the evolution of *TFPR* dispersion over the period from 2000 to 2008 across different types of firm ownership: state or SOEs (central- and local-state owned firms, and those equitized firms with more than 50% shares owned by the state), private (domestic and privately-owned firms, and those equitized firms with more than 50% shares owned by the private parties), foreign (foreign owned firms and some joint ventures), and collective (firms jointly owned by the local governments and private parties)[8]. Among these, over the period from 2000 to 2008, private firms are the most successful in narrowing the productivity dispersion, while the other three types of firm ownership, the state-owned, foreign, and collective firms, experience the least noticeable contraction of productivity dispersion (the collective firms even exhibit greater dispersion over 2006 and 2008). For example, the log ratio of 75th to 25th percentile private firms reduced remarkably from 1.8 in 2000 to 1.2 in 2008. It is likely that the massive entry of private firms during the period 2000–2008 contributes significantly to narrowing productivity gaps within these types of firms. In a more competitive environment due to entry liberalizations, inefficient private firms are under more pressure to exit than other types of firms. Although state firms are subject to the equitization process during the study period, there is no discernible sign of narrowing productivity dispersion among these firms. It is likely that SOEs, though greatly decreased in the number over the period 2000–2008, still receive massive favourable treatments from the state in obtaining credit for

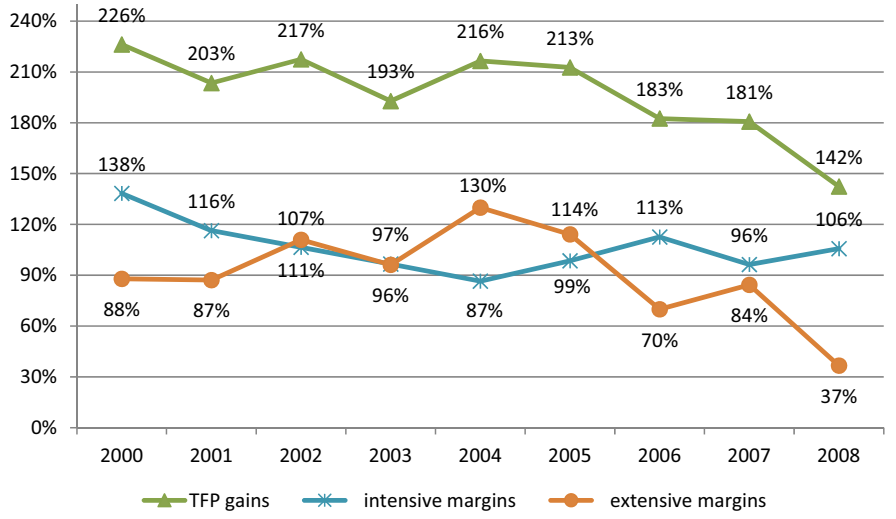

Figure 1. TFP gains from reallocation and the contribution of extensive and intensive margins.

investment and the exercise of the state monopoly power in some protected industries. Section 5 will further examine this conjecture by relating the misallocation in the credit market with capital distortions across firms' ownership.

4.2. TFP gains from reallocation

Section 4.1 indicates that the *TFPR* dispersion within 4-digit ISIC Rev.3.1 manufacturing industries is larger than that in China, implying greater potential gains from equalizing *TFPR* in Vietnam. Figure 1 quantifies the TFP gains from equalizing *TFPR* within 4-digit ISIC Rev.3.1 Vietnamese manufacturing industries over the period 2000–2008. The benefit from this complete hypothetical removal of distortions (the output and capital distortions as defined in the theoretical section) is huge over the period 2000–2008; i.e. TFP would have been improved by 226% in 2000, and this potential gain decreases to 181% in 2007 and 142% in 2008. There is no improvement in allocative efficiency in 2002 and 2004, as total TFP gains from reallocation switched to increase upon the previous years. However, the overall decreasing trend of TFP gains over the period 2000–2008 implies a corresponding improvement in allocative efficiency in the manufacturing sector. Specifically, the allocative efficiency improvement can be quantified at a rate of 2.3% annually over the period 2000-2007.[9] To signify the impact of this allocative efficiency improvements, provided that the average annual aggregate TFP growth over the same period in Vietnamese manufacturing is 6% (Bach, 2013), about two fifths of the aggregate productivity growth in this sector over the period 2000-2007 is contributed by allocative efficiency improvements (2.3%/6%). This reveals a better allocation of labor and capital resources overtime in the sector.

The potential TFP gains from the complete hypothetical removal of distortions in the Vietnamese manufacturing are particularly high during the study period, ranging from 142% to 226%, which are even larger than those reported for Chinese

manufacturing over 1998–2005 in Hiesh and Klenow (2009), ranging from 86.6% to 115.1%. In addition, the allocative efficiency improvement contributes a larger part in Vietnamese manufacturing than in Chinese manufacturing, two-fifths versus one-third. The greater contribution on Vietnamese side might reflect the distinguishing period of study where there are high firm's turnover rates due to the deregulation of entry embarked by the Enterprise Law in 2000. The following paragraph will further shed light on the contribution of firm's entry and exit to the allocative efficiency in the Vietnamese manufacturing.

One distinguished feature of the period 2000–2008 is that it marks with massive entrance of private firms particularly due to the removal of many entry barriers facing the private sector with the introduction of the Enterprises Law in 2000. Figure 1 also shows the decomposition of the TFP gains over the period 2000–2008 into the intensive and extensive margin components.[10] The intensive margin component is computed by equalizing *TFPR* within industries with balanced data, or 9-year continuing firms, over the period 2000–2008. In the year 2000, the potential TFP gain is, for example, 138% by the intensive margins, while the remaining 88% is contributed by the extensive margins, or firm's entry and exit. The contribution of the intensive margins decreases over the period 2000–2004, and remains fairly constant in the following period 2005–2008. The extensive margin's contribution increases, on the contrary, during the former period and then decreases in the latter period. Given these trending patterns, the improvements in allocative efficiency is better captured by the intensive margins, or the continuing firms, during the period 2000–2004, and then this role is switched to the extensive margins, or firm's entry and exit, during the period 2005–2008. It thus takes time for firm's entry and exit to contribute positively to the contraction of productivity dispersions, and to raise, as a result, the aggregate productivity in the sector. This finding is consistent with a more active role of firm's dynamics in the sector's aggregate productivity improvements during 2005–2008 (Bach, 2013).

According to Figure 1, the allocative efficiency improvement is realized mostly in the second half of the study period, 2005–2008. In the early years from 2000 to 2004, the allocative efficiency improvement is not firmly established as TFP gains reduce in some years and reverse their course in the other years. It is not until the period 2005–2008 do TFP gains exhibit a decreasing trend and is most of the allocative efficiency improvement over study period realized (TFP gains decrease from 213% in 2005 to 142% in 2008). As indicated above, the driver of this change is the extensive margins, where firm's entry and exit play an important role in narrowing across-firm productivity dispersion. Bach (2013) shows that the contribution of firm's dynamics to the across-firm allocative efficiency improvement is though the exit of less efficient firms and the entry of more efficient firms in the manufacturing sector overtime. It is thus the 'churning' process that contributes to the allocative efficiency improvement in the sector, particularly in the second half of the study period. Appendix Table A2 details summary statistics of the 9-year continuing and the other entering and exiting firms in the three years of 2000, 2004, and 2008. It is noticeable that the 9-year continuing firms are much larger in terms of labor and capital, but are not so much different in terms of capital intensity per labor and value-added labor productivity.

5. Credit policy and misallocation

Although the state-owned enterprises (SOEs) are under the equitization process throughout the period 2000–2008, they receive tremendous favourable treatments from the state. One vivid example is credit support. SOEs are normally large in scale, have monopoly power in some protected industries, and are subject to the state's implicit back-up whenever in trouble. They deem to bring competitive edges to the SOEs over the privately-owned firms (POFs) in obtaining credit that is an essential source of funding for development investment. Obtaining credit is even more troublesome for POFs provided that the banking sector is dominated by state-owned commercial banks and the economy is on low level of financial development. Since capital distortions are one of the two sources of misallocation in this paper, examining the advantages of SOEs in obtaining credit deems to yield additional insights of resource misallocation in Vietnamese manufacturing, provided that the potential TFP from reallocation remains high over the period 2000 to 2008. To this end, Section 5 is first to highlight some of the comparative advantages of the SOEs, and, to some extent, foreign-owned firms (FOFs), over the POFs in access to credit.[11] This section then provides some regression results to relate resource distortions, represented by capital wedges, to firms' attainment of commercial and subsidized credits as part of funding for their development investment over the period 2000–2008.

5.1. The attainment of credit by ownership

The state-owned and foreign firms are much bigger than private firms in size, both in terms of labor and capital (fixed asset). Table 5 brings details on this matter by providing relative size of the state-owned, foreign, and collective firms over the private counterparts over the period 2000–2008. The state-owned and foreign firms in 2000 are respectively 6.3 and 4.9 times larger than the private firms in terms of labor. These figures increase respectively to 8.9 and 7.5 times in 2008. Regarding capital, the state-owned and foreign firms are even much bigger; i.e. in 2008, they are 21.1 and 12.7 times larger than the private counterparts. One distinguished feature of the state-owned firms is that, compared to the private firms, they are more capital-intensive overtime as the firm size by capital grows faster than that by labour over the period 2000–2008. The foreign firms, on the other hand, are relatively more labor-intensive overtime. The relatively larger size of state-owned firms in terms of capital is supported by the fact that these firms undertake lots of investment, which are not only larger in scale but also tentatively more funded by commercial and subsidized credits than the private firms. Table 6 exhibits the relative average size of total investment, commercial credit-funded investment and subsidized credit-funded investment by the state-owned, foreign and collective firms relative to the private counterparts. For instance, total investment, commercial and subsidized credit-funded investments undertaken by the average state firms in 2000 are 2.7, 2.8, and 3.5 times larger than those undertaken by the average private firms. These respective figures jump to 16, 45.1, and 11.8 in 2008. The state-owned firms do not only receive greater volumes of investment funded by both the commercial and subsidized credits but also are more inclined to benefit from this kind of funding. There is on average 25.3% of the state-

Table 5. Firm size by ownership 2000–2008 (relative to private firms).

By labor									
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
State	6.3	6.0	6.9	7.4	7.8	7.7	8.1	7.9	8.9
Foreign	4.9	4.2	5.0	5.1	5.4	5.5	6.2	6.5	7.5
Collective	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6
By capital									
State	10.8	9.3	10.6	11.6	14.5	15.1	17.6	17.5	21.1
Foreign	41.2	28.4	22.5	18.2	16.2	15.4	14.0	11.5	12.7
Collective	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3

Table 6. Size of investment, commercial credit, and subsidized credit (relative to private firms).

Total investment									
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
State	2.7	5.2	4.4	4.2	8.9	5.5	9.0	9.4	16.0
Foreign	19.1	9.0	12.5	6.8	7.6	7.0	9.1	7.7	8.5
Collective	0.3	0.2	0.3	1.1	0.3	0.3	0.3	0.3	0.4
Commercial credit-funded investment									
State	2.8	4.1	3.0	3.5	9.1	5.0	13.3	15.3	45.1
Foreign	4.2	9.2	14.4	5.8	5.7	7.3	12.4	12.3	24.0
Collective	0.4	0.2	0.2	0.7	0.2	0.3	0.3	0.3	0.3
Subsidized credit-funded investment									
State	3.5	4.0	6.0	4.1	7.5	5.8	12.1	31.4	11.8
Foreign	5.4	–	6.1	5.0	6.1	14.8	12.5	23.0	13.8
Collective	0.3	0.1	0.2	0.9	0.4	0.3	1.1	2.2	0.1

owned firms having investment partially funded by commercial credit over the period 2000–2008, while those of private and foreign firms are respectively 17.6% and 12.3%. The difference is starker in terms of subsidized credit. The figure over the same period for the state firms is 8.5%, whereas those for the private and foreign firms are 2.1% and 0.8%, respectively (see Figure 2).

As mentioned above, the state firms are not only inclined to invest more, but also have higher possibility of getting investment funded by both commercial and subsidized credits. As consequences, the allocation credit is disproportionately allocated across firm ownership. Specifically, the number of SOEs by 2008 is accounted for 2% of total manufacturing firms, but they made up 15.3% of total investment, 26.8% of total commercial credit, and 48% of total subsidized credit absorbed by the manufacturing sector. In contrast, the private firms in the same year made up 84.8% of total manufacturing firms, accounted for 44.9% of total investment, but merely received 38.4% of total commercial credit and 42.9% of subsidized credit absorbed by the manufacturing sector (see Figure 3).

5.2. The attainment of credit by ownership and Capital distortions

Table 7 presents the log-linear regressions of the capital wedges on firms' commercial credit-funded investment and its interaction terms with different ownership structures of state-owned, foreign, and collective firms. The inclusion of three dummy variables *Sta*, *For*, and *Col* captures any *ex-ante* capital distortions across SOEs, FOFs, and collective firms, in reference to private firms. All the regression equations control for the year-specific and industry-specific effects. Additionally, the regression estimates are undertaken by both OLS and quantile regressions for the 25th, 50th, and 75th

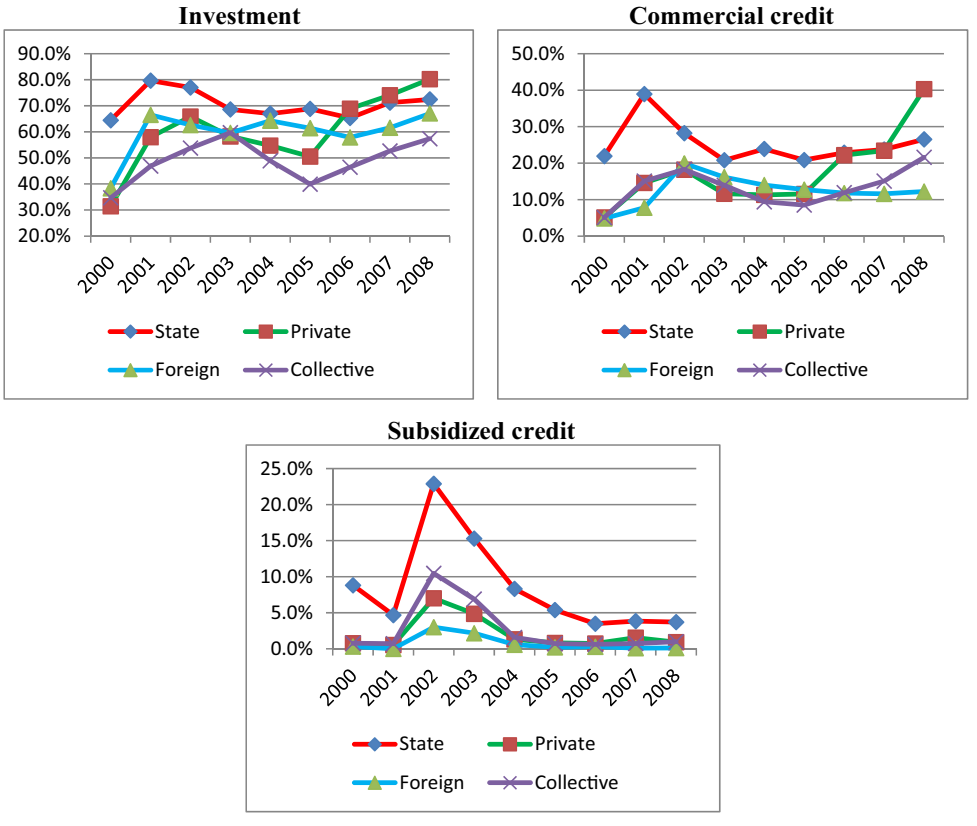

Figure 2. Investment and the attainment of commercial and subsidized credit by ownership.

percentiles. The negative values of the estimated coefficients for *Sta* and *For* indicate that SOEs and FOFs encounter less capital distortion than private firms. Collective firms face, on the contrary, higher capital distortion than the private counterparts. As analysed first in Section 5.1, private firms are usually small-sized and more severely subject to the credit constraint than SOEs and FOFs. In a transition economy like Vietnam, SOEs can easily get an investment project funded by the commercial banking that is dominated by state-owned commercial banks. FOFs are less likely affected by the domestic credit market as they are subsidiaries of multi-national corporations (MNCs). Since private firms are major entrants during the period 2000–2008, their relatively higher capital distortion may prevent this type of firms from reaching the most efficient scale and hinder their long-tern survival.

The estimated coefficient for $Log(Cre_{Com})$ *per se* measures the expected general impact of a one percentage increase in commercial credit-funded investment on the capital wedges, or the elasticity of capital distortion with respect to commercial credit-funded investment. The negative sign of this estimate indicates that more investment funded by commercial credit is associated with *less* capital wedges, or less capital distortions. In Table 7, the OLS estimate indicates that obtaining 1% increase in commercial credit-funded investment is accompanied with 0.074% fall in the capital wedges. This capital distortion reducing effect differs, however, remarkably across

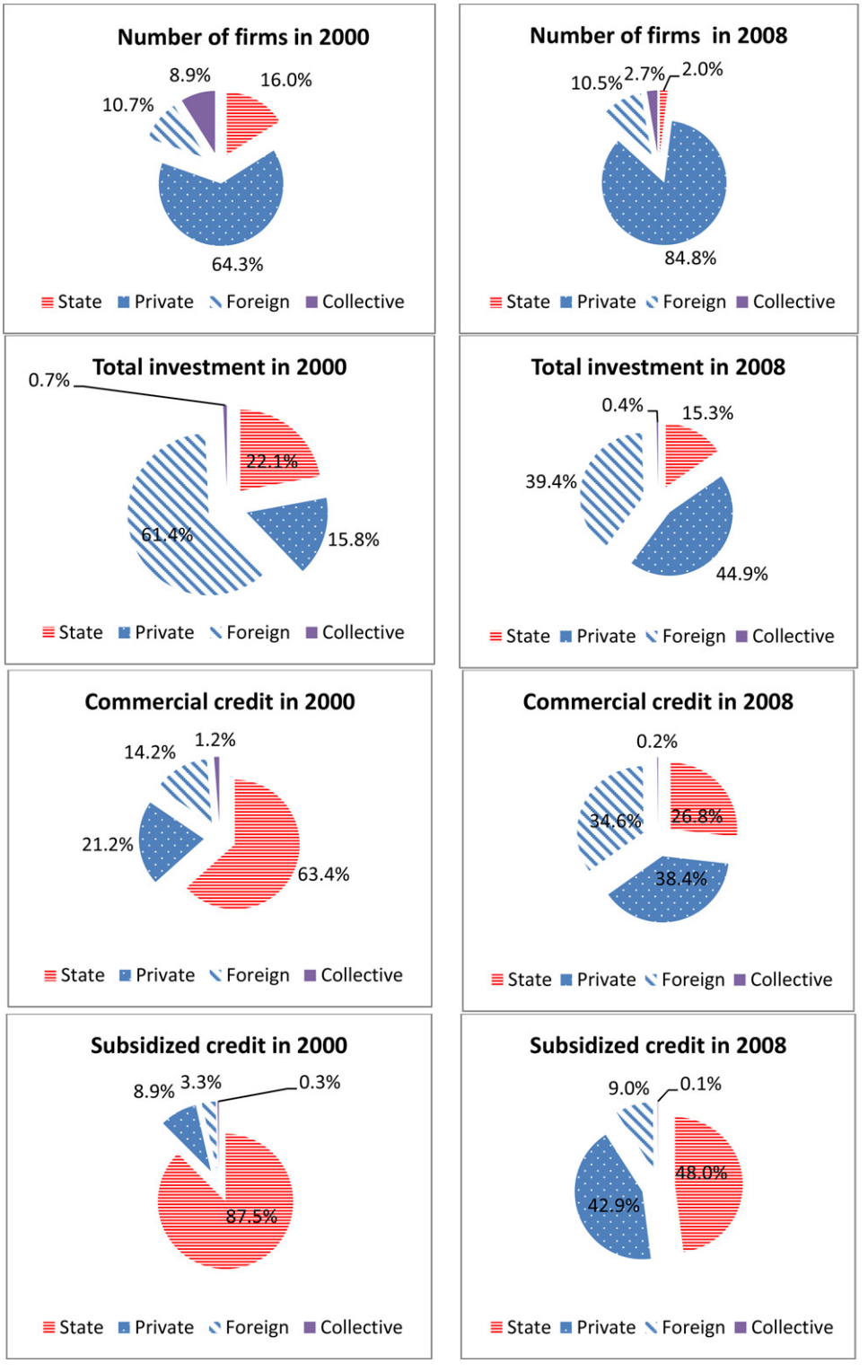

Figure 3. Allocation of credit by ownership.

Table 7. Allocation of commercial credit and capital distortion.

Dependent variable: *Log(Cap_Wed)*	OLS	QR_25	QR_50	QR_75
Sta	−0.201***	−0.117***	−0.098***	−0.176***
	(0.017)	(0.021)	(0.017)	(0.023)
For	−0.800***	−0.759***	−0.765***	−0.804***
	(0.012)	(0.014)	(0.012)	(0.015)
Col	0.177***	0.103***	0.203***	0.199***
	(0.017)	(0.021)	(0.017)	(0.023)
$Log(Cre_{Com})$	−0.074***	−0.040***	−0.068***	−0.102***
	(0.002)	(0.002)	(0.002)	(0.002)
$Log(Cre_{Com})*Sta$	0.056***	0.042***	0.050***	0.072***
	(0.004)	(0.005)	(0.004)	(0.006)
$Log(Cre_{Com})*For$	0.017***	0.001	0.018***	0.033***
	(0.004)	(0.004)	(0.004)	(0.005)
$Log(Cre_{Com})*Col$	0.012	−0.014	−0.001	0.022**
	(0.008)	(0.010)	(0.008)	(0.011)
Year-specific effect	Yes	Yes	Yes	Yes
Industry-specific effect	Yes	Yes	Yes	Yes
R^2	0.187[a]	0.118[b]	0.123[b]	0.104[b]
N	164,936	164,936	164,936	164,936

SE is in parentheses.
***, **, and * indicate significance levels of 1%, 5%, 10%, respectively.
[a]Adjusted R^2.
[b]Pseudo R^2.
OLS stands for ordinary least square estimates, and QR_x stands for quantile estimates of the quantile $x = 25$, 50, and 75.

different types of firm ownership. In comparison with the private firms, by OLS, one-percentage increase in commercial credit is associated with *less* capital distortion reducing effects by 0.056% of capital wedge if this credit is given to SOEs (see the estimated coefficient for $Log(Cre_{Com})*Sta$ in the first column). A qualitatively similar effect, but smaller in magnitude, is recorded for FOFs in its reference to the private firm (see the estimated coefficient for $Log(Cre_{Com})*For$). Specifically, a one-percentage increase in commercial credit-funded investment allocated to FOFs yields an anti-capital distortion reducing effect, in reference to private firms, which is equivalent to 0.017% of the capital wedge. The anti-capital distortion reducing effect is also associated with commercial credits awarded to collective firms, though this effect is not statistically significant (see the estimated coefficient for $Log(Cre_{Com})*Col$ in the 'OLS' column).

With respect to the quantile estimates, the estimated coefficients for *log(Cre_Com)* are greater in absolute value with higher quantiles, indicating that capital distortion reducing effect of commercial credit is larger in firms confronting with higher capital distortion. The top left panel of Figure 4 illustrates this property.[12] In this panel, the downward sloping line indicates that, by the quantile estimator, the capital distortion reducing effect of commercial credit is stronger with firms confronting higher capital wedges, or greater capital distortions. In addition, the top right panel and the two bottom panels of this figure exhibits the estimated coefficients of the interaction terms between commercial credit-funded investment and various types of firm ownership. The upward slopping curves of the estimates for *log(Cre_Com)*Sta* and for *log(Cre_Com)*For* reiterate the anti-capital distortion reducing effects of commercial credits in SOEs and FOFs in comparison with the reference group of private firms,

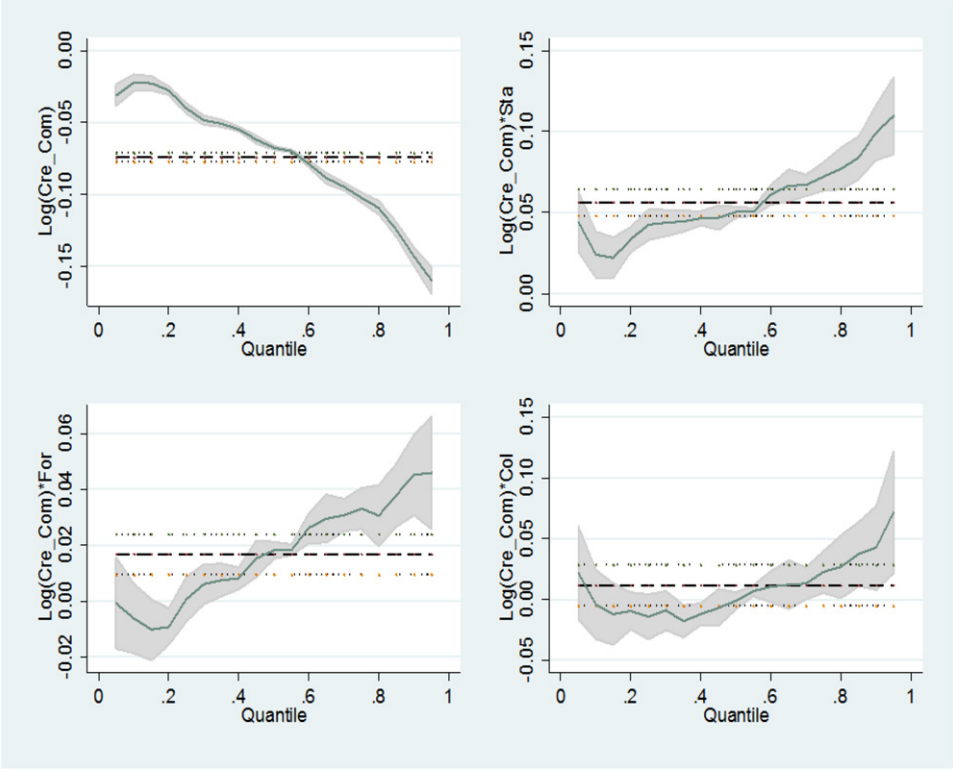

Figure 4. OLS and quantile estimates for the model of capital distortions with commercial credit.

and add that these counter-effects are stronger with the distribution of higher quantiles – in firms facing greater capital distortions. The quantile estimates for $Log(Cre_{Com})*Col$ are weak in a sense that the solid line indicating quartile estimates rarely moves outside the confidence interval established by the OLS estimator (see the bottom right panel of Figure 5). In addition, the estimated quantile coefficients for $Log(Cre_{Com})*Col$ are statistically insignificant in most of the case, except for the 75^{th} percentile estimators (see the 'QR_75' column in Table 6).

Table 8 and Figure 5 provide OLS and quantile regression estimates for subsidized credit-funded investment and its interactions with different types of firm ownership, in comparison with the reference group of private firms, after controlling for any *ex-ante* differentials in capital distortion across firm ownership. The subsidized credit *per se* has similar capital distortion-reducing effect as commercial credit (see the estimated coefficient for $Log(Cre_{Fav})$ in Table 7. This capital distortion reducing effect of subsidized credit is statistically significant and robust across OLS and quantile estimates. The top left panel of Figure 5 adds that this effect intensifies with the distribution of higher quantiles, particularly in the top quantile segment of 0.7–0.95. In the lower quantiles the general effect of subsidized credit does not differ significantly from the OLS estimate. With respect to the other interaction terms, the quartile estimates are not noticeably different from the OLS estimates across all types of

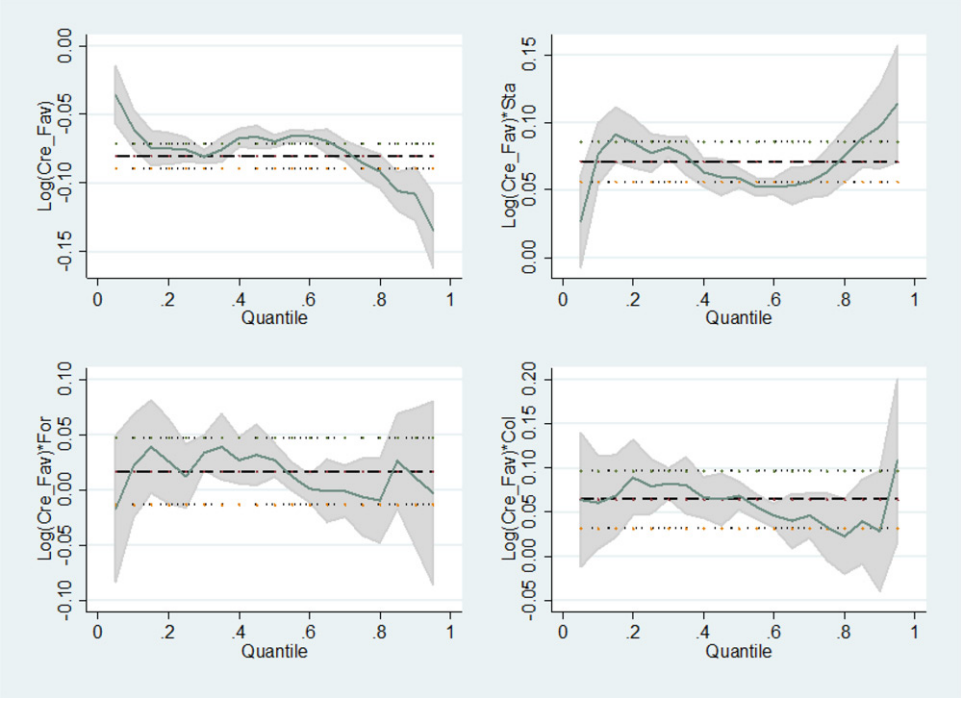

Figure 5. OLS and quantile estimates for the model of capital distortions and allocation of subsidized credit.

ownership: state-owned, foreign, and collective (in reference to the private firms), as they are within the respective confidence intervals of OLS estimates (see the top right and the two bottom panels in Figure 5). The sign effects of these interaction terms are, however, qualitatively the same as the above interactions between commercial credit and ownership; i.e. anti-capital distortion reducing effect is present if subsidized credit is given to the state-owned, foreign, and collective firms, except for the fact that this effect is insignificant with respect to the foreign firms. The role of subsidized credit in reducing capital distortions needs to argue with great caution as the supply of this special credit is very limited in scope. The beneficiaries of this credit are narrowed overtime as Vietnam further integrates into the world economy. Since 2007, which marked the year Vietnam became an official member of WTO, the rates at which firms benefit from subsidized credits have barely exceeded 5% across all ownership types. For instance, only 3.8% of the state firms in 2007 were awarded with this type of credit, whereas the figures for the private, foreign, and collective firms were respectively 1.9%, 0.1%, and 0.7% (see the bottom panel of Figure 2).

6. Conclusions

This study uses the misallocation accounting framework suggested by Hsieh and Klenow (2009) to examine the potential gains from misallocation during an entry liberalization period marked with a massive entry of privately-owned firms, and a simultaneous contraction of SOEs (though in number of firms, not the size). This allows

Table 8. Allocation of subsidized credit and capital distortion.

Dependent variable: *Log(Cap_Wed)*	OLS	QR_25	QR_50	QR_75
Sta	−0.168***	−0.071***	−0.067***	−0.139***
	(0.016)	(0.019)	(0.016)	(0.022)
For	−0.784***	−0.761***	−0.734***	−0.782***
	(0.011)	(0.013)	(0.011)	(0.015)
Col	0.205***	0.096***	0.228***	0.262***
	(0.017)	(0.020)	(0.017)	(0.023)
$Log(Cre_{Fav})$	−0.080***	−0.076***	−0.070***	−0.086***
	(0.005)	(0.006)	(0.005)	(0.007)
$Log(Cre_{Fav})*Sta$	0.071***	0.078***	0.059***	0.063***
	(0.007)	(0.009)	(0.008)	(0.011)
$Log(Cre_{Fav})*For$	0.017	0.012	0.027*	−0.006
	(0.015)	(0.019)	(0.016)	(0.022)
$Log(Cre_{Fav})*Col$	0.064***	0.079***	0.068***	0.033
	(0.017)	(0.020)	(0.017)	(0.023)
Year-specific effect	Yes	Yes	Yes	Yes
Industry-specific effect	Yes	Yes	Yes	Yes
R^2	0.175[a]	0.115[b]	0.116[b]	0.091[b]
N	164,936	164,936	164,936	164,936

SE is in parentheses.
***, **, * indicate significance levels of 1%, 5%, 10%, respectively.
[a]Adjusted R^2.
[b]Pseudo R^2.
OLS stands for ordinary least square estimates, and QR_*x* stands for quantile estimates of the quantile $x = 25$, 50, and 75.

us to capture the dynamics of misallocation in general and the contribution of the intensive and extensive margins in particular to any allocative efficiency improvements during this distinguished period. In addition, given the availability of rich data on firms' investments, the study is for the first time able to quantify the distortionary impacts of credit in the period marked with excessive supply of credit that is biased across firm ownership. Relevant empirical results would, therefore, deem to bring some important implications on deregulation and the credit policy in a country where the state economic sector plays a considerable role.

The empirical results indicate that the potential TFP gains from the complete hypothetical removal of distortions in the manufacturing sector remain high over the period 2000–2008. By fully equalizing *TFPRs* within 4-digit ISIC Rev3.1 industries, the sector's growth could have increased by 226% in 2000, 181% in 2007, and 142% in 2008. This is equivalent to a 2.3% annual improvement in across-firm allocative efficiency during 2000-2007, accounted for about two-fifths of the annual TFP growth in the sector. The contribution of allocative efficiency improvement is remarkable, given other determinants of TFP growth such as technology diffusion and R&D investment are limited in a developing country like Vietnam. By decomposing the contributions of allocative efficiency into the intensive and extensive margins components, the results suggest that the intensive margins better capture the allocative efficiency improvement over the period 2000–2004, so does the extensive margin in the subsequent period 2005–2008. With regard to the extensive margins' contribution, one important implication is on the dynamic forces of entry and exit, particularly during a period marked with a massive entry in the period 2000–2008. Policies that help facilitate the smooth entry of efficient firms and the smooth exit of inefficient ones would benefit allocative efficiency and yield fruitful growth outcomes in reality.

Policies that retard, on the other hand, this 'churning' process by retaining a lot of inefficient firms in the market while preventing further entrance of new efficient firms would harm allocative efficiency and they are bad for growth.

Although there are some considerable improvements in allocative efficiency in the Vietnamese manufacturing sector in the period 2000–2008, the TFP dispersions in the sector remain high and persistent. This suggests some underlined problems that prevents TFP dispersions from narrowing overtime, notwithstanding there is a huge entry of private firms during the entry liberalization period 2000–2008. By making use of the available firm data on commercial credit-funded investment and subsidized credit-funded investment, I relate firm's capital distortions to the attainment of these sources of funding for investment. The empirical results indicate that both kinds of credit are associated with capital distortion reducing effect, but marginal effects differ remarkably across firm ownership. Awarding a given amount of commercial credit to SOEs or FOFs would yield less capital distortion reducing effect than otherwise awarding it to the private counterparts. Interestingly, the magnitude of this anti-capital distortion reducing effect is much larger in SOEs. The quantile regression results show that this anti-distortion reducing effect is more severe in the distribution of higher quantiles, or in the case firms facing greater capital distortion. These findings are qualitatively the same as those associated with subsidized credit, though the effect associated with FOFs is no longer statistically significant. Provided that SOEs disproportionately absorb credit against the private firms, this biased credit policy definitely harm the reallocation process as credit is inclined to favour the sector that is more inclined with the anti-capital distortion reducing effect. This calls for the need to comprehensively reform the SOEs sector by not only reducing the number of firms under the equitization process but also creating an equal playing field for all sorts of firms, where a fair undertaking of credit policy plays an important role.

Notes

1. For an extensive discussion of the indirect versus direct approaches in measuring misallocation, see Restuccia and Rogerson (2013).
2. Since the introduction of the Enterprise Law in 2000, there were high firm's annual turnover rates of some 50% until 2008. Firm entry during the period 2000 to 2008 was dominated by private firms, and, as a result, by the year 2008 these 'recent' private entrants made up almost 90% of the total number of operating firms.
3. According to the ADB's *Key Indicators for Asian and Pacific Countries*, the average annual growth of domestic credit supply over 2000–2008 in Vietnam was 37%, while a similar figure in China, which pursues the same investment-led growth model, was 15%.
4. The article avoids quantifying the contribution of allocative efficiency improvement up to the year 2008, as it experiences a drop in the aggregate TFP (Bach, 2013) partly as consequences of the Global Financial Crisis.
5. Although the Enterprise Census cover all the firms that are in operation at the time of survey, for the purpose of this study, I only retain those observations that have positive values of labor, capital (fixed asset), value-added (provided that value-added is greater than total compensation of labors).
6. The real interest rate of 1.4% is the average annual figure drawn from the World Development Indicators for Vietnam during 2000–2008. It is believed to better reflect the real situation in Vietnam than the corresponding figure of 5% as used in Hiesh and

Klenow (2009). However, some robustness checks have indicated that the TFP gains from reallocation is not much affected by changes in R.

7. The NBER-CES database is presented under the 1997 North American Industrial Classification System (NAICS 1997), so I use the relevant concordance table to convert the data under NAICS 1997 to ISIC Rev.3.1.
8. For the rest of this article the state firms are used interchangeably with state-owned enterprises (SOEs), so the foreign firms with foreign owned firms (FOFs) are, and so the private firms with privately owned firms (POFs). For those firms jointly owned by the local government and private party, they are referred to collective firms. The unreported figure on *TFPQ* has the same characteristics as Figure 1.
9. As argued in the introduction section, the article avoids quantifying allocative efficiency improvement up to the year 2008 due to the effect of the GFC. The total allocative efficiency improvement over 2000–2007 is equivalent to 16.2%, which is calculated as $(1 + 2.26)/(1 + 1.81) - 1$. For this 7-year period the average annual improvement is measured at a rate of $16.2\%/7 = 2.3\%$.
10. The intensive margins represent the contribution of continuing firms in the period 2000 to 2008, 3,012 firms. The extensive margins accounts, on the other hand, the contribution of entering and exiting firms to the allocative efficiency improvement, or firm's dynamics, which is equal to the total TFPs gains minus the contribution by the intensive margins.
11. The FOFs are normally foreign affiliates of multinational corporations, so their investment decisions are more subject to their parent companies' discretion.
12. In this quantile diagram the solid line in each panel represents quantile estimate for the full distribution of regressor, the firm-level capital distortion. The actual values of quantile estimate range from 0.05 to 0.95 quantile of the capital distortion. The horizontal dash line in each pane is the OLS estimate, which is constant across all the levels of quantile. The two parallel dotted lines in each panel represent the 95% confidence interval of the OLS estimate.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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Appendix A

Table A1. Definition of variables.

Variable	Definition	Question in the survey
Firm size in labor	Firms' average number of labors at the beginning and at the end of the year	The employment section: The total number of labors at the beginning and at the end of the year
Firm size in capital	Firms' average fixed assets at the beginning and at the end of the year, deflated to the base year 2000	The assets and liabilities section: The total fixed assets at the beginning and at the end of the year
Capital intensity	The ratio of firm size in capital over firm size in labor	See above
Value-added labor productivity	The ration of firms' deflated value added over firm size in labor. Firms' value added is defined as the total revenue minus the total intermediate input costs.	The income statement section: Total revenue in the year
Sta	The central- and local-state owned firms, and those equitized firms with more than 50% shares owned by the state	The ownership structure and registered firm types section
For	The 100% foreign-owned firms and some joint ventures	The ownership structure and registered firm types section
Col	The firms jointly owned by the local governments and private parties	The ownership structure and registered firm types section
Pri	The domestic and privately-owned firms, and those equitized firms with more than 50% shares owned by the private parties	The ownership structure and registered firm types section
Log(Cap_Wed)	Natural logarithm of capital wedges defined by Hieash and Klenow (2009)	
Log(Cre_Com)	Natural logarithm of commercial credit-funded investment	The investment section: various loan sources from domestic- and foreign-owned commercial banks
Log(Cre_Fav)	Natural logarithm of subsidized credit-funded investment	The investment section: various loan sources from the state budget, government bonds, and credit for development investment
Log(Cre_Com)*Own	The interaction term of Log(Cre_Com) and various firm ownership structures, such as Sta, For, Col, and Pri, which are defined above	See above
Log(Cre_Fav)*Own	The interaction term of Log(Cre_Fav) and various firm ownership structures, such as Sta, For, Col, and Pri, which are defined above	See above

Table A2. Summary statistics of 9-year continuing, entering and exiting firms.

	2000		2004		2008	
Variable	Mean	SD	Mean	SD	Mean	SD
9-year continuing firms						
Firm size in labor	240	677	332	1,277	339	1,578
Firm size in capital	17,599	124,096	21,532	134,717	26,474	137,001
Capital intensity per labor	85	261	74	183	87	149
Value-added labor productivity	74	139	93	176	148	312
Other entering and exiting firms						
Firm size in labor	112	392	119	399	87	374
Firm size in capital	8,342	74,272	7,258	56,630	7,029	55,587
Capital intensity per labor	61	244	59	167	64	170
Value-added labor productivity	70	164	74	158	107	190