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FOREIGN DIRECT INVESTMENT, PRODUCTIVITY AND CROWDING-OUT: DYNAMIC PANEL EVIDENCE ON VIETNAMESE FIRMS

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ABSTRACT

This paper investigates the direct effect of FDI on productivity of firms with foreign capital in Vietnam; and whether the presence of firms with foreign capital has a crowding-out effect on domestically-owned firms. We utilize a rich dataset compiled by the Vietnamese General Statistical Office (GSO) from 2001–2010. An unbalanced panel consisting of 168,493 firms with a total of 504,643 observations in 28 industries is utilized in 3 different estimators: OLS, Fixed Effects and Generalized Method of Moments (GMM). The dynamic panel data approach GMM proposed by Arellano and Bond (1991) and Blundell and Bond (1998) is employed to control for firms' unobserved heterogeneity, inputs and ownership endogeneity as well as measurement errors. We report that the share of foreign capital in firm equity has a positive and significant effect on productivity of foreign-owned firms in Vietnam. With respect to crowding-out/crowding-in effects, we identify opposing dynamics at work. On the one hand, we observe a firm-level crowding-out effect due to higher shares in turnover as the level of foreign capital increases. On the other hand, we observe an industry-level crowding-in effect as the share of foreign-owned firms in turnover is lower when the industry-level of foreign capital intensity increases. The findings indicate that domestically-owned Vietnamese firms tend to lose market share to their foreign-owned competitors when they compete head to head; but they also tend to benefit from higher levels of foreign capital invested in their industry. When evaluating crowding-in/crowding-out effects at both firm and industry level simultaneously, we conclude evidence of crowding-out effect of FDI on turnover share of domestically-owned Vietnamese firms. Finally, we report that the crowding-in/crowding-out effects do not differ as the level of foreign capital share differs between firms and industries.

Keywords: *dynamic panel, foreign direct investment, market-stealing effect, productivity, Vietnamese enterprises.*

JEL codes: *C8, F23*

1. INTRODUCTION

Foreign Direct Investment (FDI) has long been seen as a driver that fosters competition and facilitates the transfer of new technologies (Griffith, *et al*, 2004). Many countries have made efforts to attract foreign direct investment (FDI) as part of their industrialization and technological development policies. Moreover, it is well recognized that economic growth depends not only on the use of factors of production such as labor and capital but also on the efficiency in resource use and technical progress. The efficiency-driven productivity gains have captured a great deal of interest and have been used as benchmarks for ranking firms and countries (Biesebroeck, 2003).

When multinational enterprises (MNEs) launch their subsidiaries overseas, they encounter some disadvantages in terms of access to production resources and domestic demand compared to local enterprises as domestic firms are more experienced in serving the home markets and hold more information on product types, consumer tastes and distributional networks relative to multinational enterprises. With a view to competing successfully with domestic counterparts, MNEs need to posses "superior knowledge" (Cave, 1971) that helps to compensate for those disadvantages. Hymer (1976) defines superior knowledge as a set of "intangible productive assets" such as specialized know-how about production, superior management and marketing capabilities, export contacts and coordinated, quality-orientated relationships with suppliers and customers, which provide MNEs with a competitive advantage over indigenous firms. Those intangible assets are internalized within the MNEs, which are expected to do 'better' than domestically-owned firms that lack access to such assets.

The traditional theory of multinational enterprises (MNEs) suggests that a larger presence of MNEs may play an important role in increasing productivity levels of host country (Dunning & Lundan, 2008). The entry of MNEs may affect overall productivity levels of host country by bringing in new ideas, advanced technology, better managerial skills that may improve the allocation of resources in the host country (Kindleberger, 1969). Furthermore, to compete with the foreign affiliates, the indigenous firms are forced to be more competitive, hence the level of competition is increased in the local market.

Nevertheless, host country may incur costs in technology dispersion from the entrance of MNEs. MNEs may induce inappropriate or out of date technology that work against the interest of host countries (Lall and Streeten, 1977; Winters, 1991; Moosa, 2002). Moreover, the entry of foreign investors might raise the level of concentration in local market of host country as their presence might exert pressure for mergers among domestic firms, or even exit of indigenous firms in the market (Reuber *et al*., 1973; Lall and Streeten, 1977; Newfarmer and Mueller, 1975). Besides, MNEs may do harm to the environment of host country through over exploiting of resources (OECD, 1999).

Although we note the early debate on the relationship between FDI and macro-level productivity, our aim here is to investigate the direct and market-stealing effects at the micro level. To be specific, we aim to investigate the effects of FDI on the productivity of host-country firms (firms with and without foreign partnership) using firm-level data collected by the General Statistical Office (GSO) of Vietnam. The micro-level focus is informed by increased availability of firm-level data and the scope for augmenting the Cobb-Douglas production function with measures of FDI presence and a range of firm or industry covariates that allow for estimating the effects of moderating factors. As unit of analysis, the firm in the host country can be either a firm with foreign capital (thereafter, foreign-owned firm or FDI-firm) or a firm without foreign capital (thereafter, non-FDI firm or domestically-owned firm).

The effect of FDI on firm productivity can be either direct or indirect. The direct effect applies to FDI-firms and allows for inference about whether the foreign capital invested (or a proxy thereof) is conducive to higher levels of productivity among FDI-firms relative to domestically-owned firms. It also allows for inference about the rate of increase in the productivity of FDI-firms when the level of foreign capital invested (or proxies thereof) increases by one unit. Hence, one aim of this paper is to establish whether higher levels of FDI are associated with higher productivity. The second aim is complementary and addresses the question: are the effects of FDI on the productivity of foreign-owned firms at the expense of domestically-owned firms in terms of their market shares? Stated differently, the second aim of this paper is to investigate whether FDI is conducive to crowding-out or crowding-in effects on domestically-owned firms; and whether the effects differ at the firm and industry levels.

We think this analysis should be conducted before one examines the indirect (spill-over) effects of FDI on domestically-owned firms. In this strand of the literature, the within-industry effect is due to horizontal spillovers (externalities), which occur as a result of skill or technology diffusion from FDI-firms to non-FDI firms. The inter-industry effects, on the other hand, occurs as a result of skill or technology spillovers (externalities) from FDI-firms to non-FID firms that act suppliers of the FDI-firms (i.e., through backward linkages) or as a result of spillovers (externalities) from FDI-firms to non-FDI firms that act as users of intermediates produced by FDI-firms (i.e., through forward linkages). Although the spill-over effects of FDI constitute interesting research questions, this paper aims to bridge the evidence gap on the crowding-out and crowding-in effects that have remained below the radar of many studies on developed and developing countries. The paper also aims to enhance the knowledge base by addressing the problem of endogeneity in the estimation of production functions, in the context of an under-researched country (Vietnam) for which rich firm-level data exists.

The paper is organized as follows: section 2 provides theoretical underpinnings of FDI and productivity, especially the direct effects of FDI and productivity nexus and FDI and the market-stealing effects nexus. Section 3 reviews empirical evidence on direct effects and crowding-in/crowding-out effects of FDI. In the fourth section, the dataset and the model used as well as the estimation issues are explained. The fifth section is devoted to the analysis of econometric findings while the last section recapitulates and suggests some further research avenues.

2. THEORETICAL UNDERPINNINGS OF FDI AND PRODUCTIVITY

2.1. Direct effects of FDI and Productivity

In the conventional approach, FDI influences productivity in an industry directly by bringing in new capital and by improving the average skill level and efficiency of the industry. FDI can also bring in "relatively" advanced technology, which may not be imported directly due to market imperfections and high transaction costs (Buckley and Casson, 1976, Caves 1996, Teece 1981). Finally, MNEs have to compete in foreign markets, where local firms have better knowledge of local markets, consumer preferences, and business practices. Given this constellation factors, MNEs draw on their mostly intangible advantages, which are internalized through expansion abroad rather than through market mechanisms (Buckley and Casson, 1976).This theory of

internalization suggests that MNEs' foreign subsidiaries can be expected to enjoy higher productivity or profitability levels compared to local firms.

However, Hymer (1960) also draws attention to the dual nature of FDI. On the one hand, he agrees with the conventional argument that MNEs investing abroad have to compete with domestic firms that have advantages in terms of culture, language, legal system, and consumer preferences. The MNEs offset their disadvantage by exploiting their market power and firm-specific advantages. Stated differently, MNE subsidiaries may have higher levels of productivity compared to domestically-owned firms as the former draw on their market power to compete against the latter who benefit from better knowledge of the local market. The market power of the MNEs and their subsidiaries consists of patent-protected superior technology, brand names, marketing and managerial skills, economies of scale and cheaper sources of finance.

On the other hand, Hymer (1960; 1970) also draws attention to potentially adverse effects of FDI in terms of own-firm productivity and/or development of the host countries by distinguishing between exogenous and endogenous market imperfections and the implications of the latter for productivity (Dunning and Rugman, 1985, p230). Caves (1996) and Rugman and Verbeke (1998) concur with Hymer that the MNEs' strategic perspective on government policy reflects the extent to which they view the policy as exogenous or endogenous. If government policy is viewed as exogenous, MNEs will work within the rules and deploy their intangible advantages to compete within the host-country market. However, if the policy environment is considered as endogenous, MNEs have the option of securing market positions by engaging in strategic actions aimed at influencing or changing the policy environment in their favour.

The differential productivity effects of exogenous and endogenous market imperfections can be placed into sharp relief by focusing on two sources of productivity: efficiency gains and gains due to technological change (Fare et al., 1994). The productivity effects under different combinations of market imperfection types and sources of productivity gains are summarized in Table 1 below.

Table 1: Direct and indirect productivity effects of FDI:
Type of market imperfection and source of productivity change

	Sources of productivity change		
Type of market imperfection	***Efficiency change***	***Technological change***	***Total change***
Exogenous market imperfection	+	+	+
Endogenous market imperfection	+/-	+/-	+/-
Total change	+/-	+/-	+/-

When market imperfections are exogenous, MNEs deploy higher levels of technology and know-how to survive in the foreign market. In this case, FDI-firms are more likely to be more productive than domestic firms for two reasons: increased efficiency and higher level of technology. Stated differently, under the condition of exogenous market imperfections FDI-firms are likely to be more productive than domestic firms – i.e., the *direct effect* of FDI on subsidiaries' productivity is positive. By the same logic, the *indirect (spillover) effect* on the domestically-owned or typical firm is also expected to be positive.

However, the outcomes are less certain when market imperfections are endogenous – i.e., when the policy environment is a product of interactions between the MNEs and the host-country government. Under this scenario, MNEs compete within the host country not only by drawing on their intangible- and tangible-asset advantages, but also by deploying their asymmetric bargaining powers with a view to secure concessions or preferential treatments with respect to tax/subsidy regimes, environmental or labour protection obligations or reduced cost of access to land and infrastructure. In this scenario, the returns on FDI investment may be sufficient for MNEs to invest in the host country, but the profitability reflects a mixture of both real productivity gains and rents associated with the endogenous nature of the MNEs market power. Hence, the direct or indirect productivity gains can be either positive or negative. This is the case whether the productivity gains are due to efficiency improvements or higher levels of technology. The implications of the processes summarized above can be followed in the last column and row of Table 1 – which indicates that the partial and overall productivity effects may be uncertain. The magnitude and sign of productivity effects depend on the extent to which MNEs deploy their market powers to extract rents as opposed to introducing better technologies.

2.2. Beyond productivity: FDI and crowding-out effect

When MNEs enter the host-country market, their advanced technologies and know-how may attract demand away from domestic enterprises, particularly in the short-run (Aitken and Harrison, 1999). This is called the "market-stealing effect" or "crowding-out effect". Conversely, when the foreign presence enhances the demand for domestic enterprises, this can be referred as to "crowding-in effect". The crowding-out/crowding-in effects imply relatively higher/lower output by FDI-firms compared to domestically-owned firms.

In the presence of crowding-out effect, domestically-owned firms have lower levels of productivity as their fixed costs are spread over a smaller scale of production. Putting in different way, the crowding-out effect is the reallocation of market share from less productive (domestic firms) to more productive (foreign firms). Aitken and Harrison depicted the market-stealing effect/crowding-out effect in the figure below.

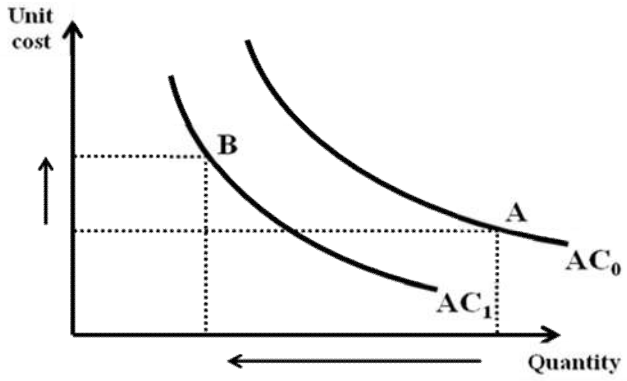

Figure 1: Output response of domestic firms to foreign entrants

(Source: Aitken and Harrison, p607, 1999)

Initially, a domestically-owned firm operates along the average cost curve depicted with AC_0. The entry of foreign-owned firms generates positive spillover effects on domestic firms, leading to a downward shift the in the latter's average cost curve form AC_0 to AC_1. However, foreign firms enter the market with firm-specific advantages in terms of tangible and intangible assets and may be operating at lower marginal costs compared to domestic firms. To the extent that this is the case, and if the existing market is only imperfectly competitive, the foreign firm with lower

marginal costs will increase production at the expense of its domestically-owned competitor. As the latter spreads its fixed costs over a smaller market, it moves up along the new average cost curve (AC_1), with the consequence of lower market share (or smaller turnover).

Caves (1996) and Blomstrom, Kokko and Zejen (2000) argue that the possibility that MNEs will crowd out local firms in host country is more evident in developing than developed countries because of a higher technology gap between indigenous firms and foreign affiliates in the developing countries. From a policy perspective, these arguments alarm a concern whether the attempt to attract FDI is justified, especially in developing or transitional countries, where shortage of capital to modernize the countries usually induces the temptation of FDI. Dawar and Frost (1999) discuss that foreign presence may represent a "sentence death" for local firms in emerging markets as the indigenous usually cannot compete successfully with MNEs that possess financial and technological advantages. Another concern is about the domination of foreign firms that might complicate the restructuring process in many transitional countries as the case of the restructuring of banking sector in Russia (Cordonnier, 2002)

3. REVIEW OF EMPIRICAL EVIDENCE ON DIRECT EFFECTS AND MARKET-STEALING EFFECTS OF FDI ON PRODUCTIVITY

3.1. Review of empirical evidence on direct effect of FDI

The summary of empirical findings on direct effect of FDI would be found in Table 1 of the Appendices. In the table, we present summary information on author(s)' name(s), studied country; studied period; data type; level of data aggregation; size of sampling; measure of productivity; measure of foreign presence; econometric method used; and main result obtained for direct effect. In this section, we will summarize the findings and discuss the extent of similarity/variation, with a view to take stock of the existing evidence and inform the estimations that will be conducted in part 4 of this paper.

Brief review on measurements of productivity and foreign ownership in empirical studies

Direct effects of FDI are estimated by regressing a measure of productivity on a variable that depicts foreign ownership (FO) in a given firm. The general form used for estimation can be stated as follows:

$$Y = \alpha_0 + \alpha_1 K + \alpha_2 L + \alpha_3 FO + \varepsilon \qquad (1)$$

The dependent variable (Y) in equation (1) is usually measured by output, sales or value added in levels or as ratios per employee; or as total factor productivity of all firms. Researchers commonly use a dummy variable to observe foreign ownership (FO). The variable FO takes the value 1 if the company is foreign-owned in partly or fully and 0 if purely domestically-owned. Direct effects of FDI are productivity differences in firms with and without foreign participation. A positive coefficient α_3 would indicate that firms with foreign ownership have higher productivity compared to purely domestically –owned firms, implying that foreign ownership has positive direct effects on productivity of foreign invested firms. Reversely, a negative coefficient α_3 would imply lower productivity of firms with foreign ownership compared to pure domestic firms, reflecting negative direct effects of FDI on productivity of FDI firms.

Some researchers use equity share, sales share or asset share of foreign invested firms as measure of foreign ownership. In this case, positive/negative coefficient α_3 would indicate that firms with foreign capital have a higher/lower productivity level than average firms in the economy. It suggests positive/negative effects of FDI on productivity of firms with foreign capital.

Main findings from empirical studies

Compared to number of studies on indirect effects, studies on direct effects of FDI are small in number. Most papers on the topic employ firm-level panel data to analyze the effects (17 out of 19 studies in this literature review). The pattern of the empirical evidence on direct effects seems to be clear: most papers present the positive effect of foreign ownership on productivity of firms with foreign capital in host country while several papers find no or negative evidence.

The majority of papers on direct effects of FDI report that foreign ownership is associated with higher productivity of FDI firms (more specifically, in this literature review, 13/19 studies on confirm the positive direct effects.). Aitken and Harrison (1999) measured the direct impact of FDI in Venezuela by employing a large firm-level panel data of more than 43,000 firms from 1976-1989. After controlling for differences in the labour force, materials, capital and industry differences, the scholars found a 10.5 per cent productivity advantage of foreign owned plants over domestic plants. Konings (2001) replicates Aitken and Harrison (1999) to investigate the direct impact of foreign direct investment on firms in Poland, Bulgaria and Romania. Using a panel data of 2,321 Bulgarian firms; 3,844 firms Romanian firms and 262 firms in Poland in the period of 1993-97, the author reveals no statistically significant effect of foreign ownership on productivity of Bulgaria and Romania while the results for Poland confirm that foreign invested firms perform better than firms without foreign participation. Konings attributes his finding by a justification about Poland as the country was further down the path of transition at that time. Sgard (2001) utilizes firm-level data in Hungary with more than 33,000 observations, reporting that the productivity is larger in foreign-owned firms compared to firms in the rest of the economy. Vahter (2004) use fixed effects and random effects to obtain the effects of foreign ownership on the ration of sales per employee in Estonia (1996-2001) and Slovenia (1994-2000). His main finding indicates that both foreign-invested firms in Estonia and Slovenia are more productivity than domestic firms in both countries. With the sample of 2026 firms in Italy from 1992-1999, Benfratello & Sembenelli (2006) apply System-GMM estimator. After controlling for unobserved heterogeneity, input simultaneity and measurement errors, foreign ownership by no means has effect on productivity. More recently, Taymaz & Yilmaz (2008); Batool *et al,* (2009) corroborates their findings with previous empirical evidence analyzed above whilst confirms for the result that firms with foreign ownership outperform domestic firms both in Turkey and Pakistan.

However, there are some papers that cast doubt on the positive relationship between foreign ownership and productivity of FDI firms. Globerman *et al* (1994) examined the relative economic performance of foreign affiliates in 21 Canadian industries and domestic counterparts. The authors found that, having controlled specifically for capital intensity and size of foreign partners, there was no significant difference in labour productivity (measured by value added per worker) between foreign-owned firms and domestic firms. Using firm-level panel data of firms

in Morocco from 1985-89, Haddad and Harrison (1993) conclude that foreign firms lag behind domestic firms in productivity growth in protected market.

To summarize, a positive relationship between foreign ownership and productivity of FDI firms is documented in a large proportion of number of papers on direct effects of FDI. However, negative results may be obtained as ownership structures of and type of activity undertaken by MNEs may differentiate the results. Moreover, the use of lower-skilled workers and possibly older technology from MNEs will decrease productivity of foreign-owned firms in a host country as suggested by Harris & Robinson (2001).

3.2. Review of empirical evidence on crowding-in/crowding-out effects and FDI

Empirical study for crowding-out/crowding-in effects from foreign entrance to domestic firms tends to be scant.

The ground-breaking study of Aitken and Harrison (1999) on the topic confirms a temporal negative impact on domestic firm's productivity through a market-stealing effect, and positive FDI spillover dominates in the long-run. Followed Aitken and Harrison, Hu and Jefferson (2002) corroborate the finding of market-stealing effects in Chinese textile industry in the five year period, from 1995 to 1999. By utilizing a unique firm-level data from the Chinese Annual Survey of Industries conducted annually by China's National Bureau of Statistics from 1998 through 2004, Hsieh (2006) estimates that a 10 percent increase in foreign ownership share decrease the output of domestic firms by 3.5 percent, suggesting that foreign presence force domestic firms to contract. Using 1994-2001 firm-level Czech data, Kosova (2010) reinforce the finding of crowding-out effect from FDI to domestic firms in the country. Moreover, the author also analyzes whether the crowding-out effect is dynamic, that is, domestic firms are taken demand over time as foreign firms grow, or a static effect only. Kosova witnesses that market-stealing effect appear only in short-term, and after initial entry shakeout, growing foreign sales increase domestic firm growth and survival, indicating domestic demand creation effect.

Obviously, the common theme of above studies on market-stealing effect is all of them dedicated to developing or transitional countries as discussed in theoretical framework of FDI and market-stealing effect in section 2.2 above.

4. DATA, MODEL, AND ESTIMATION ISSUES

4.1. Overview of Vietnam Annual Enterprises Survey Dataset

This research employs firm-level panel data in Vietnam from 2001-2010. The dataset is compiled from the Annual Enterprises Survey (AES) conducted by GSO. The surveys collect comprehensive data on Vietnamese enterprises, including industry and ownership type of enterprises, output, assets and liabilities, capital stock, investment, employment, location, wages, sales, obligations of firms to the government, etc. Our sample, which consists of all surveyed firms in 28 industries, is an unbalanced panel consisting of 168,493 firms over a period of 10 years from 2001 to 2010 with a total of 504,643 observations. The included firms are from four main clusters, consisting of Manufacturing, Utilities, Construction, Science & Technology Activities and Computer & Related Activities. The dataset also contains two-digit Vietnamese Standard Industrial Classification 1993 (VSIC 1993) codes for all firms. Although the dataset lacks data on intermediate inputs, working hours, and employee skills, it contains value-added data and a wide range of variables needed for conducting productivity analysis. More specific information on the dataset can be found on Table 2 of the Appendices.

This study focuses only on firms in the five industrial groups of Manufacturing, Utility (Electricity, Gas and Water Supply); Construction; Science & Technology Activities; Computer & Related Activities including 28 industries totally (23 industries in Manufacturing, 2 industries in Utility; 1 industry each in Construction, Science & Technology Activities and Computer & Related Activities) based on the sectoral classification of enterprises at the two digit level of Vietnamese Standard Industrial Classification 1993 (VSIC 1993) with a long dataset from 2001–2010. The dataset comprises 168,493 firms over the studied period. Table 2 below compares domestically-owned firms and foreign-invested firms in 28 studied industries in terms of number of firms; sales; employment; capital-labor ratio; value-added per worker and profitability, in the two selected years 2005 and 2010.

Table 2: A comparison between Domestically-owned and Foreign-invested Firms in 28 studied industries in 2005 and 2010

	Domestically-owned		Foreign-invested	
	2005	2010	2005	2010
Number of units	37,852	89,309	2,878	5,269
Total nominal Sales (million VND)	569,972,146	2,076,101,123	321,509,391	1,124,063,501
Employment	2,891,749	3,946,703	976,345	1,784,275
Capital-labor ratio	87.45	259.38	115.08	215.41
Value added per worker	12.9	12.12	17.42	16.5
Profitability (profit/sales)	0.028	0.034	0.041	0.048

Source: Author's calculation from the database

As can be seen from the table, the number of foreign-invested firms reaches only small proportions, $1/13^{th}$ and $1/17^{th}$ of number of domestically-owned firms in 2005 and 2010, respectively; however, sales of foreign-invested firms are a half of those of domestically-owned counterparts. More interesting, domestic firms hire a three time larger in number of employees compared to foreign invested firms, however, the value added per worker in foreign invested sectors are outnumbered than that in domestic sector. Also, the profitability rates of foreign invested firms are higher than of indigenous firms.

4.2. Model & Estimation Issues

Model

With a view to examining the direct effect of FDI on productivity, we follow the approach that has been used extensively in the literature (see Konings, 2001; Damijan, 2003; Vahter, 2005). The method follows the seminal paper by Griliches (1992), who postulates a Cobb-Douglas augmented production function including both internal and external factors of production. The presence of such external influences on the firm is the consequence of externalities in

production, due to formal or informal linkages between firms. Hence, the traditional production function is extended through introducing FDI as a source of capital accumulation as well as a generator of knowledge.

We therefore build an empirical model as bellows:

$$y_{ijt} = \alpha_0 + \alpha_1 k_{ijt} + \alpha_2 l_{ijt} + \alpha_3 FDI\_firm_{ijt} + \delta_i + \gamma_j + \varphi_t + \varepsilon_{ijt} \quad (2)$$

In which subscript *i* denotes firms; *j* denotes industry and *t* denotes year.

The dependent variable y_{ijt} is the real value added output of firm *i* operating in industry *j* at the end of each year of study. We follow Nickell (1996) and Griffith et al (2006) to calculate value added output as the sum of total employment cost, operating profit before tax, accumulated depreciation and interest payment. Then real value added output is obtained by deflated value added output with Producer Price Index (PPI). The PPI is supplied by Vietnam General Statistic Office by industry over years.

k_{ijt} is the real values of fixed assets of firm *i* operating in industry *j* at the beginning of each year of study;

l_{ijt} is total employees of firm *i* operating in industry *j* at the beginning of each year of study;

y_{ijt}, k_{ijt} and l_{ijt} are all in natural logs

FDI_firm_{ijt} is the firm-level FDI, measured by the foreign share of a firm's equity. It presents the foreign ownership participation in total equity of a firm

The three set of dummy variables $\delta_i; \gamma_j; \varphi_t$ are made use of to control for the firm-; industry-, and time-specific effects, respectively. Firms and industry dummy variables used in the regression model in order to capture firm and industry specific effects and year dummy variables are included with a view to accounting for trend effects.

The direct effect of FDI on productivity is captured from α_3 in equation (2). A positive and significant α_3 suggests that foreign-invested firms are more productive than domestic firms, meaning foreign presence enhance the productivity of foreign-invested firms; signalizing a positive direct effect of FDI on productivity.

When multinational enterprises (MNEs) invest in the host-country market, their subsidiaries or joint ventures may attract demand away from domestically-owned enterprises due to superior technological, marketing and branding capabilities. This is the "market-stealing effect" (Aitken and Harrison, 1999). It is measured by the turnover size of the FDI firms relative to domestically-owned firms. As domestic firms reduce production, they may experience a higher average cost as fixed costs are spread over a smaller scale of production, therefore leading to less productivity of those firms.

In this research, we replicate Aitken and Harrison (1999) test of the "market-stealing effect" by estimating turnover equation, which omits the input factors of production. The input factors are excluded with a view to examining the effect of foreign presence on the production scale of domestic firms, rather than productivity as shown in equation (3)

$$y_{ijt} = \beta_0 + \beta_1 FDI\_firm_{ijt} + \beta_2 FDI\_industry_{jt} + \beta_3 (FDI\_firm_{ijt} * FDI\_industry_{jt}) + \delta_i + \gamma_j + \varphi_t + \varepsilon_{ijt} \quad (3)$$

In which subscript *i* denotes firms; *j* denotes industry and *t* denotes year.

The dependent variable y_{ijt} is the real turnover of firm *i* operating in industry *j* at the end of each year of study. y_{ijt} is deflated by Producer Price Index and measured in Vietnamese *Dong*. It is then taken in natural log.

FDI_firm_{ijt} is the firm-level FDI, measured by the foreign share of a firm's equity. It presents the foreign ownership participation in total equity of a firm.

$FDI\_industry_{jt}$ measures the extent of foreign presence in industry j at time t, is computed as the tunover weighted average of firm-level FDI at the two digit industry level of Vietnamese Standard Industrial Classification 1993 (VSIC 1993).

The coefficient on the interaction between firm level and industry level of FDI is captured through FDI_firm_{ijt}* $FDI\_industry_{jt}$. It allows us to determine whether the effects of foreign presence on other foreign firms differ from the effects on domestic firms.

The three set of dummy variables $\delta_i; \gamma_j; \varphi_t$ are also used to control for the firm-; industry-, and time-specific effects, respectively

The crowding-out/crowding-in effect is captured through β_1 and β_3 in equation (3).

A positive and significant β_1 suggests that firms with foreign capital tend to have relatively larger turnover compared to average firms, indicating crowding-out effect of FDI firms to domestic firms.

A positive and significant β_3 indicates further crowding-out through FDI concentration in the industry.

It should be noted that a positive and significant β_2 indicates that, on average, turnover of both FDI and domestic firms is higher in industries with higher FDI intensity. However, it does not allow inferring crowding-out/crowding-in effect. Higher average turnover in industries with higher FDI intensity may be due to higher turnover by FDI firms, domestic firms or both.

Unlike other researchers that conclude on crowding-out/crowding-in effect solely from the individual estimated coefficients of β_1 and β_3, we go further than that when calculating the total effect of crowding-out/crowding-in from the estimation of the linear model.

Apparently, from equation (10): $\frac{\Delta real\ turnover}{\Delta FDI\_firm} = \beta_1 + \beta_3 FDI\_industry$

We evaluate the total effect of crowding-out/crowding-in effect at mean or median of FDI intensity at industry level. As such:

$\frac{\Delta real\ turnover}{\Delta FDI\_firm} > 0$ indicating crowding-out effect of FDI

$\frac{\Delta real\ turnover}{\Delta FDI\_firm} < 0$ indicating crowding-in effect of FDI

$\frac{\Delta real\ turnover}{\Delta FDI\_firm} = 0$ indicating no crowding-out/crowding-in effect of FDI.

This study focuses only on firms in the five industrial groups of Manufacturing, Utility (Electricity, Gas and Water Supply); Construction; Science & Technology Activities; Computer & Related Activities including 28 industries totally, based on the sectoral classification of enterprises at the two digit level of Vietnamese Standard Industrial Classification 1993 (VSIC 1993) with study period from 2001–2010. Firms in the top and bottom one percentiles of log of real value added of output are excluded from the sample to detect outliers.

Table 3 below shows descriptive statistics of main variables used in this empirical estimation.

Table 3: Data Descriptive Statistics

No	Variable	Description	Obs	Mean	Std Dev.	Min	Max
1	Real_VA_ouput	Real value added of output	273,140	8,051.005	303,220.5	-5,942,976	97,800,000
2	Ln_real_VA_ouput	Log of real value added of output	266,556	6.433833	1.808955	-5.15513	18.39809
3	Real_turnover	Real turnover	502,306	19450.11	260688.8	-251,483	56,000,000
4	Ln_real_turnover	Log of real turnover	482,089	7.31317	2.146829	-1.061602	17.8414
5	Ln_net_fa	Log of net value of fixed asset	260,571	0.6848566	1.793865	-5.669881	12.24165
6	Ln_ld11	Log of number of employees	463,297	2.97092	1.440226	0	11.30159
7	FDI_firm	Firm level of FDI	504,261	6.048411	23.45223	0	100
8	FDI_industry	Industry level of FDI	504,642	19.75882	18.87001	0	99.37131

Source: Author's calculation from the database

Estimation Issues

With a view to obtaining consistent results from estimating the production function, *endogeneity or simultaneity bias* needs to be tackled. Griliches and Mairesse (1998), Nickell (1996) propose that inputs should be treated as endogenous variables since producers choose the level or usage rate based on cost and productivity considerations. These considerations are observed by producers but not by econometrician. Simultaneity bias occurs because productivity is known to firms when they make their inputs choices but unobservable to the econometricians (Marschak and Andrews, 1944). Putting in a technical way, most of the estimation issues arise from the nature of the equation error ε_{it}. If the error term is independently and identically distributed and therefore uncorrelated with input choices, the OLS estimator will be consistent but inefficient, while the fixed effects and random effects are both consistent and efficient. Under this circumstance, the Hausman test is employed to choose between Fixed and Random effects. Conversely, if input choices are correlated with unobservable factors, which are known to a firm's manager but unknown to econometricians, both OLS and Fixed effects/Random effects will be inconsistent. According to Bwalya (2006), unobservable factors emerge from difficulties in observing and quantifying differences in the quality of human capital, capital intensity and productivity shock across firms and industries. Because the differences are hardly captured by the survey method, thus, they accumulate in random term, causing input variables to be correlated with error term. Moreover, researchers cannot directly observe how firms react to firm-specific productivity shock. For instance, a firm might respond to a positive productivity shock by enlarging its inputs used and vice verse (which the researchers have no chances to obtain). With impacts from positive productivity shocks, firms will enlarge their use of inputs and vice verse. As a result, estimating production functions by employing OLS will lead to bias results as OLS takes no account for the unobserved productivity shocks. It should be noted that the fixed effect method may solve the simultaneity problem only when the unobserved, firm-specific productivity is assumed time-invariant. Hence, the necessity of employing other methods, including instrumental variable or system generalized method of movements, to detect this endogeneity problem while estimating the parameters of production functions is adequate.

Input endogeneity or simultaneity bias is solved by two ways: first, by employing semi-parametric method, and second is by implementing an instrumental variable method, in which lagged levels are used as instruments in the production function. Semi-parametric methods which allow for firm-specific productivity differences to exhibit idiosyncratic changes over time are often used in recent literature. This method can address the simultaneity bias between productivity shocks and input choices. The aim of the semi-parametric methods is to find a proxy variable that monotonically replicates productivity dynamics. The two popular Semi-parametric methods are Olley & Pakes (1996) using investment and Levinsohn & Petrin (2003) employing the intermediate input cost as proxies to quantify the change in total factor productivity. Olley & Pakes (1996) estimate productivity effects of restructuring in the telecommunications equipment industry in the US. The two assumptions are used in this approach. Firstly, productivity, which is a state variable in the firm's dynamic problem, is supposed to follow a Markov process that unaffected by the firm's control variables. Secondly, one of the firm's control variables, which is investment in this approach, grows to be part of the capital stock with a one period lag. According to Biesebroeck (2007), the pros of Olley & Pakes (1996) study originates from its flexibility of characterization of productivity when assuming to follow the Markov process. Apart from that, the demerit is the requirement for non-zero investment observations which many dataset fail in building a large number of observations. This weakness is overcome by Levinsohn & Petrin (2003) while employing material input as an alternative for productivity proxy.

According to Arelleno and Bond (1991), if the error term ε_{it} is found to be non-persistent, a standard generalized method of moments estimator (GMM) will be both consistent and efficient. If, however, the dynamic error processes are highly persistent, lagged levels supposed to be poor instruments for contemporaneous differences and result in finite sample biased (Blundell and Bond, 1998; Blundell *et al*., 2000). As Blundell and Bond (1998) point out, both lagged levels and lagged differences are used as instruments in estimating parameters of the production function. Besides, the resulting system GMM estimator is both consistent and efficient.

In this paper, we employ the general method of movements (GMM) approach proposed by Arellano and Bond (1991) and Blundell and Bond (1998) to deal with the problematic simultaneity bias. The lag structure of dependent variables is included as additional explanatory

variables in estimation equation. As an empirical matter, specification tests proposed by Arellano and Bover (1995) are applied to test the validity of the instruments in our GMM estimation. First, the Arellano–Bond test for the serial correlation is adapted to test whether there is a second-order serial correlation in the first-differenced residuals. The null hypothesis is that the residuals are serially uncorrelated. If the null hypothesis cannot be rejected, it provides the evidence that there is no second-order serial correlation and the GMM estimator is consistent. Second, the Hansen J-test and the Diff-in-Hansen test are applied to test the null hypothesis of instrument validity and the validity of the additional moment restriction necessary for system GMM, respectively. Failure to reject this null hypothesis means that the instruments are valid.

Furthermore, we adopt some approaches to improve the efficiency of system GMM estimation. Firstly, according to Roodman (2009), we collapse the instrument sets and take orthogonal option. Secondly, industry-specific and time-specific effects are included in our regression equations in order to capture industry specific effects and trend effects.

We also run the OLS levels and Fixed Effects estimator in order to make a justification for the GMM results obtained. The econometrics package used is Stata 13.

5. ESTIMATION RESULTS

5.1. Empirical evidence on direct effects of FDI

The panel estimation results are reported in Table 4. The three columns of Table 4 report the results using the OLS levels, Fixed Effects and one-step System GMM, respectively.

As mentioned by Bond et al. (2001), omitting variables (i.e. unobserved firm-specific effects) will give an estimate of the coefficient on lagged real value added which is biased upward. The FE will cause an estimate of this coefficient to be seriously downward biased. However, the OLS levels will produce upward bias. Thus, the estimated coefficient on lagged real value added from OLS and FE can be regarded as an approximate upper bound and lower bound, respectively. A consistent estimate of the coefficient can be expected to lie in these two bounds.

Table 4: Direct effects of FDI on productivity in Vietnam (2001-2010)

Dep. variable: Ln real value added	OLS	FE	SYS GMM
Ln lagged real value added	.338***	-.047***	.130***
	(.003)	(0.004)	(.022)
Ln fixed asset	.194***	.146***	.191***
	(.002)	(.003)	(.027)
Ln employment	.558***	.589***	.647***
	(.003)	(.007)	(.034)
FDI_firm	.003***	0.001	.0063**
	(.0001)	(0.001)	(.0027)
Constant	2.35***	5.837***	3.10***
	(.019)	(0.246)	(.178)
Firm/year observations	109,279	109,279	109,279
Firms	54,869	54,869	54,869
Adjusted R-squared	0.879	0.435	.906
Instrument			43
Hansen test			[0.341]
AR(1)			[0.000]
AR(2)			[0.689]

Notes:
Dependent variable is log of real value added of firm. All industry and time dummies are included but not reported to save space.
Standard Errors are in parenthesis; p-values in brackets.
GMM regression uses robust standard errors and treats the lagged real turnover measure, fixed asset and FDI intensity at firm level as endogenous. The values reported for the Hansen test and the Diff-in-Hansen test are the p-values for the null hypothesis of instrument validity and the p-values for the validity of the additional moment restriction necessary for one-step systemGMM, respectively. The values reported for AR(1) and AR(2) are the p-values for first-and second-order auto-correlated disturbances in the first differences equations.
*,,** and *** denote significance at the 10%, 5% and 1% level, respectively.

Beginning with OLS results, the estimated coefficients on lagged real value added, capital, employment, foreign presence are statistically significant and with the expected sign. Then when a FE estimator is employed, the coefficients on lagged real value added and foreign presence become negative. The estimated coefficients on capital and employment are significant with the expected sign.

The last column of Table 4 illustrates the one-step system GMM estimator. The results of the Arellano-Bond tests indicate that there is no second-order serial correlation. We do not reject the

null hypothesis of the Hansen test which indicates the test statistics present a proper specification. The estimated coefficient on lagged real value added (0.130) is significant and lies above the corresponding FE estimate (-.047) and below the corresponding OLS estimate (.338). The estimated coefficient on foreign presence is significant and positive, indicating a positive direct effect on productivity of FDI firms in Vietnam. As GMM estimator is less bias and more efficient than OLS, we rely on the estimation produced by GMM to interpret the result. More specifically, one unit of increase in FDI intensity at firm level can result in 0.63% increase in productivity of FDI firms. This evidence of direct effect is consistent in sign and magnitude with the findings in previous studies such as Konings (2001); Schoors and Tol (2002); Damijan *et al* (2003); Lutz and Talavera (2003); Sgard (2001); Vahter (2005).

It is noticeable that in the estimation above, all firms with foreign equity are defined as foreign firms. However, there is another approach that defines foreign firms with at least 10% foreign equity (OECD, 2008). We apply this 10% threshold to check the robustness of the result of estimated direct effect above using OLS, FE and GMM. This robustness check can be found in Table 3 in the Appendices. As reported from the table, all coefficients are positive and significant as expected, but the GMM result for FDI-firm intensity that satisfies the 10% threshold are the same with the estimated direct effect without the threshold. This finding may result from the fact that the number of FDI firms with less than 10% foreign presence takes up only a tiny proportion in total number of FDI firms (23/7006), therefore the sign and magnitudes of the estimation results does not change when the threshold is implied.

Moreover, we also check if quadratic specification is valid through including square values of FDI intensity at firm level in estimations with/without 10% threshold. The GMM test results reveal that the quadratic terms are not significant in both cases, indicating that quadratic specification is not valid. Hence, we can conclude the linear relationship of FDI intensity at firm level and productivity of FDI firms. It reaffirms the linear direct effect of FDI on productivity as examined above. The test results for quadratic specification could be found in Table 4 and Table 5 in the Appendices.

5.2. Empirical evidence on crowding-out/crowding-in effect

The panel estimation results of crowding-out/crowding-in effect are reported in Table 5 using the OLS levels, Fixed Effects estimator and one-step System GMM, respectively.

Table 5: Market-stealing effects of FDI in Vietnam (2001-2010)

Dep. variable: Ln real turnover	OLS	FE	SYS GMM
Ln real turnover			
L1	.717***	.150***	.686***
	(.004)	(.005)	(.128)
L2	.202***	.010***	.153*
	(.004)	(.004)	(.090)
FDI_firm	.002***	.0009	.049***
	(.00019)	(.001)	(.011)
FDI_industry	-.0002	-.003***	.082***
	(.00039)	(.0003)	(.015)
FDI_firm* FDI_industry	.000015***	.000015**	-.0013 ***
	(4.45e-06)	(6.65e-06)	(.00033)
Constant	.808***	6.64***	-.641
	(.016)	(.091)	(.416)
Firm/year observations	214,581	214,581	214,581
Firms	66,205	66,205	66,206
Adjusted R-squared	0.788	0.039	0.907
Instrument			41
Hansen test			[0.816]
AR(1)			[0.000]
AR(2)			[0.821]

Notes:
All firms are without a minimum threshold of 10% for FDI intensity. All industry and time dummies are included but not reported to save space.
Standard Errors are in parenthesis; p-values in brackets.
One-step GMM regression uses robust standard errors and treats the lagged real turnover measure, FDI intensity at firm level, FDI intensity at industry level and the interaction term between firm and industry FDI intensity as endogenous. The value reported for the Sargan test is the p-values for the null hypothesis of instrument validity. The values reported for AR(1) and AR(2) are the p-values for first-and second-order auto-correlated disturbances in the first differences equations.
*,** and *** denote significance at the 10%, 5% and 1% level, respectively.

Regarding to GMM estimation, sum of in estimated coefficients on lagged log of real turnover in GMM (0.686 +0.153 =0.839) lies above the corresponding FE estimate (0.150+0.010=0.16) and below the corresponding OLS estimate (0.717+0.202=0.919). The results of the Arellano-Bond tests indicate that there is no second-order serial correlation. The values in Sargan test confirm that we do not reject the null that the instruments are valid. To sum up, our test statistics hint at a proper specification.

As can be seen from Table 5, all estimated coefficients on lagged log of real turnover are significant. Besides, we can see the evidence of crowding-out effect at firm-level through positively significant coefficients of FDI_firm in OLS and GMM estimations. As OLS tends to produce upward bias result, we rely more on the estimation from GMM. On average, 1 unit of increase in FDI intensity at firm level leads to 4.9% increase of FDI firms' turnover. This result coincides with findings of Aitken and Harrison, 1999; Hu and Jefferson, 2002; Hsieh, 2006; Kosova, 2010 on crowding-out effect of FDI on market share in transitional economies.

The estimated coefficients on interaction between FDI_firm and FDI_industry are reported significantly in both OLS and GMM, although the signs are opposite. The GMM estimation indicates crowding-in effect through FDI concentration in the industry.

As analyzed before, we evaluate the total effect of crowding-out/crowding-in effect at mean or median of FDI intensity at industry level. As such, the crowding-out/crowding-in effect would be:

$$\frac{\Delta \text{real turnover}}{\Delta \text{FDI\_firm}} = \beta_1 + \beta_3 \text{FDI\_industry} = 0.049 + (-0.0012).(14.27383) = 0.03$$ (In this case median of FDI_industry is employed to calculate)

$$\frac{\Delta \text{real turnover}}{\Delta \text{FDI\_firm}} = \beta_1 + \beta_3 \text{FDI\_industry} = 0.049 + (-0.0012).(19.75878) = 0.025$$ (In this case mean of FDI_industry is employed to calculate)

Overall, there is evidence of crowding-out effect of FDI presence on firms in Vietnam in the period of study from 2001-2010.

6. CONCLUSION

This paper investigates the direct effect of FDI on productivity of firms with foreign capital in Vietnam; and whether the presence of firms with foreign capital has a crowding-out effect on domestically-owned firms. We utilize a rich dataset compiled by the Vietnamese General Statistical Office (GSO) from 2001–2010. An unbalanced panel consisting of 168,493 firms with a total of 504,643 observations in 28 industries is utilized in 3 different estimators: OLS, Fixed Effects and Generalized Method of Moments (GMM). The dynamic panel data approach GMM proposed by Arellano and Bond (1991) and Blundell and Bond (1998) is employed to control for firms' unobserved heterogeneity, inputs and ownership endogeneity as well as measurement errors. We report that the share of foreign capital in firm equity has a positive and significant effect on productivity of foreign-owned firms in Vietnam. With respect to crowding-out/crowding-in effects, we identify opposing dynamics at work. On the one hand, we observe a firm-level crowding-out effect due to higher shares in turnover as the level of foreign capital increases. On the other hand, we observe an industry-level crowding-in effect as the share of foreign-owned firms in turnover is lower when the industry-level of foreign capital intensity increases. The findings indicate that domestically-owned Vietnamese firms tend to lose market share to their foreign-owned competitors when they compete head to head; but they also tend to benefit from higher levels of foreign capital invested in their industry. When evaluating crowding-in/crowding-out effects at both firm and industry level simultaneously, we conclude evidence of crowding-out effect of FDI on turnover share of domestically-owned Vietnamese firms. Finally, we report that the crowding-in/crowding-out effects do not differ as the level of foreign capital share differs between firms and industries.

Looking forward, we will verify if the results above are robust on firms in different industries, size classes, and geographical regions and with different types of ownership in future research.

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APPENDICES

Table 1: Studies investigating the direct effects of foreign ownership on FDI-firm productivity

Authors	Country	Period	Data type	Level of aggregation	Sampling	Dependent variable	Foreign ownership measure	Estimation method	Direct effects
Haddad and Harrison (1993)	Morocco	1985-1989	Panel	Firm	n.a	Output per worker	Asset share	OLS	-
Globerman et al (1994)	Canada	1986	Cross section	Firm	n.a	Value added per worker	Dummy FDI	OLS	+ n.s while controlling for capital intensity and size of firms
Aitken and Harrison (1999)	Venezuela	1976-1989	Panel	Firm	43,010 obs	Output	Share of foreign equity at firm level	OLS	+
Konings (2001)	Bulgaria Romania Poland	1993-1997 1994-1997 1993-1997	Panel Panel Panel	Firm Firm Firm	2,321 firms 3,844 firms 262 firms	Sales	Sales share	OLS	n.s Bulgaria + Romania + Poland
								GMM	n.s Bulgaria n.s Romania + Poland
Sgard (2001)	Hungary	1992-1999	Panel	Firm	33,033 obs	Output	Share of foreign equity at firm level	OLS	+
								First difference	+
								Long difference	+
Vahter (2004)	Estonia	1996-2001 1994-2000	Panel Panel	Firm Firm	326 firms 982 firms	Sales per employee	Dummy variable FDI	FE	+ Estonia + Slovenia

	Slovenia							RE	+ Estonia + Slovenia
Benfratello & Sembenelli (2006)	Italy	1992-1999	Panel	Firm	2026 firms	Output	Dummy variable FDI	GMM	n.s
Taymaz & Yilmaz (2008)	Turkey	1990-1996	Panel	Firm	29,513 obs	Total factor productivity	Dummy variable FDI	OLS	+
Batool *et al,* (2009)	Pakistan	1994-2007 (Food & Tobacco) 1995-2007 (Financial Business)	Panel	Firm	12 firms 32 firms	Output	Dummy variable FDI	RE	+ +

Source: Author's summary

Table 2: The major indicators of firms over years in the dataset

Principle Indicators	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1. Total number of surveyed enterprises	**51680**	**62908**	**72012**	**91755**	**112950**	**131318**	**155771**	**205732**	**248842**	**291299**
By type of ownership (%)										
State owned enterprise	10.36	8.53	6.73	5.01	3.62	2.82	2.24	1.62	1.36	1.13
Non-state enterprise	85.75	87.80	89.60	91.55	93.11	93.97	94.57	95.65	96.01	96.38
Foreign investment enterprise	3.89	3.67	3.67	3.44	3.27	3.21	3.19	2.73	2.63	2.49
By kind of economic activity (%)										
Agriculture and forestry and fishing	6.65	5.37	3.34	2.58	2.15	1.83	1.57	4.14	3.52	3.05
Mining and quarrying	1.23	1.40	1.43	1.30	1.13	1.04	1.08	1.10	1.01	0.88
Manufacturing	23.90	23.52	23.49	22.38	21.26	20.46	19.41	18.30	17.69	16.00
Electricity, gas and water supply	0.26	0.29	0.35	1.60	2.13	1.94	2.42	2.03	1.22	0.95
Construction	11.02	12.47	13.49	13.42	13.50	13.54	13.48	13.73	14.29	14.86
Trade, repair of motor vehicles and household goods	40.10	39.41	39.43	39.32	39.54	39.98	39.09	39.10	39.00	38.90
Hotels and restaurants	4.65	4.52	4.56	4.31	4.19	3.90	3.90	3.44	3.58	3.52
Transport, storage and communications	4.92	5.15	5.52	5.83	5.98	5.86	5.35	3.76	4.05	5.23
Financial intermediation	2.00	1.66	1.46	1.23	1.01	1.33	1.22	1.01	0.86	0.92
Science and technology activities	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.06	0.05	0.07
Real estate activities	0.66	0.73	0.80	0.95	1.09	1.31	1.54	1.62	1.70	1.88
Training and education	0.17	0.20	0.26	0.32	0.35	0.60	0.63	0.67	0.72	0.79
Human health and social work activities	0.09	0.13	0.12	0.15	0.18	0.19	0.23	0.23	0.27	0.29
Other activities	4.30	3.59	4.40	5.48	6.52	7.17	7.99	9.13	11.21	12.05
By size of employee (%)										
Less than 5 persons	23.09	19.20	18.18	19.59	20.64	12.82	22.38	21.62	22.04	26.75
From 5 to 9	26.89	28.83	28.38	28.84	30.66	44.15	32.77	34.25	37.31	34.51
From 10 to 49	30.45	32.93	35.02	35.36	34.42	29.98	32.48	33.89	31.30	29.77
From 50 to 199	12.20	11.99	11.85	10.69	9.65	8.89	8.56	7.19	6.69	6.42
From 200 to 299	2.31	2.15	1.95	1.67	1.43	1.32	1.26	1.04	0.94	0.88
From 300 to 499	2.24	2.15	1.95	1.65	1.37	1.16	1.09	0.85	0.74	0.73
From 500 to 999	1.71	1.66	1.64	1.31	1.05	0.96	0.82	0.64	0.56	0.54
From 1000 to 4999	1.04	1.01	0.95	0.83	0.71	0.66	0.60	0.46	0.38	0.36
From 5000 and above	0.08	0.07	0.08	0.06	0.06	0.06	0.06	0.04	0.04	0.03

Principle Indicators	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
By regions (%)										
Red River Delta	22.60	25.43	27.02	27.44	26.92	27.4	28.05	29.7	29.21	29.89
Northern midlands and mountain areas	6.33	6.81	7.24	7.89	7.61	7.12	5.87	5.62	4.67	4.6
North Central and Central coastal areas	12.9	13.57	13.16	12.68	13.26	13.8	15.07	15.08	14.71	14.07
Central Highlands	3.75	3.40	3.21	3.14	3.14	3.07	2.95	3.19	2.93	2.62
Southeast	33.92	33.39	33.77	34.73	36.34	36.89	36.6	35.9	39.08	40.38
Mekong River Delta	20.08	17.33	15.32	13.90	12.58	11.67	11.32	10.41	9.33	8.38
2. Average employees per one enterprise	***76***	***74***	***72***	***63***	***55***	***52***	***48***	***41***	***36***	***35***
State enterprises	395	421	467	490	499	513	505	519	516	515
Non-state enterprises	30	31	32	29	28	28	27	24	23	23
Foreign enterprises	243	299	326	331	330	343	340	326	294	298
3. Average capital per enterprise (bill. VND)	***24***	***23***	***23.9***	***23.6***	***23.7***	***23.1***	***26.5***	***29.8***	***31.2***	***36.7***
State enterprises	153	167	210.2	264.7	355	425.2	554.9	824.2	892.3	1063.8
Non-state enterprises	4	4	5.2	5.9	6.7	6.9	9.8	12.2	14.9	19.7
Foreign enterprises	133	134	139.6	142.4	142.8	143.3	153	176.6	186.6	232.7
4. Profit rate (%) compared with capital	***3.8***	***4.3***	***4.5***	***4.9***	***4.4***	***4.94***	***4.62***	***3.40***	***3.64***	***2.94***
State enterprises	2.5	2.9	2.8	3.1	3.4	3.50	3.55	2.94	3.76	2.87
Non-state enterprises	2.3	2.3	2.1	1.6	1.4	2.0	2.57	1.32	1.8	1.86
Foreign enterprises	8.7	10	11.6	13	11.2	13.15	11.66	9.66	9.08	6.58
5. Profit rate (%) compared with turnover	***5***	***5.1***	***5.4***	***6***	***5.3***	***6.10***	***6.26***	***4.02***	***5.39***	***4.53***
State enterprises	4.2	4.2	4.2	5.3	5.7	6.12	6.75	5.13	7.89	5.31
Non-state enterprises	1.3	1.5	1.5	1.3	1.2	1.72	2.79	1.21	2.27	2.71
Foreign enterprises	13	13.6	14.6	15.4	11.8	14.19	13.11	10.57	10.96	8.84

Source: GSO, Statistical Yearbook (various years) & The situation of enterprises 2006-2011

Table 3: Direct effects of FDI on productivity in Vietnam (2001-2010) with 10% threshold for FDI firms

Dep. variable: Ln real value added	OLS	FE	SYS GMM
Ln lagged real value added	.338***	-.046***	.13***
	(.003)	(0.004)	(.022)
Ln fixed asset	.194***	.146***	.191***
	(.002)	(.003)	(.027)
Ln employment	.558***	.589***	.647***
	(.003)	(.006)	(.033)
FDI_firm	.003***	0.0004	.0063**
	(.0001)	(0.001)	(.0027)
Constant	2.35***	4.405***	3.28***
	(.019)	(.0709)	(.186)
Firm/year observations	109,279	109,279	109,279
Firms	54,869	54,869	54,869
Adjusted R-squared	0.879	0.435	.906
Instrument			43
Hansen test			[0.341]
AR(1)			[0.000]
AR(2)			[0.689]

Table 4: Direct effects of FDI on productivity in Vietnam (2001-2010) with quadratic specification

Dep. variable: Ln real value added	OLS	FE	SYS GMM
Ln lagged real value added	.335***	-.047***	.134***
	(.003)	(.004)	(.024)
Ln fixed asset	.193***	.145***	.182***
	(.002)	(.003)	(.030)
Ln employment	.561***	.589***	.654***
	(.003)	(.006)	(.035)
FDI_firm	.019***	.004	.087
	(.001)	(004)	(.058)
FDI_firm_square	-.00017***	-.00003	-.0008
	(.000018)	(.00003)	(.0006)
Constant	2.35***	4.40***	3.24***
	(.019)	(.071)	(.20)
Firm/year observations	109,071	109,071	109,071
Firms	54,784	54,784	54,784
Adjusted R-squared	.880	.435	.890
Instrument			45
Hansen test			[0.537]
AR(1)			[0.000]
AR(2)			[0.693]

Table 5: Direct effects of FDI on productivity in Vietnam (2001-2010) with quadratic specification and 10% threshold for FDI firms

Dep. variable: Ln real value added	OLS	FE	SYS GMM
Ln lagged real value added	.335***	-.046***	.145***
	(.003)	(.004)	(.022)
Ln fixed asset	.193***	.145***	.188***
	(.002)	(.003)	(.028)
Ln employment	.560***	.589***	.671***
	(.003)	(.006)	(.034)
FDI_firm_adjusted	.019***	.004	-.024
	(.001)	(.004)	(.048)
FDI_firm_adjusted_square	-.0001***	-.00003	.0003
	(.00001)	(.000035)	(.0004)
Constant	2.35***	5.837***	3.14***
	(.019)	(0.246)	(.186)
Firm/year observations	109,279	109,279	109,279
Firms	54,868	54,868	54,868
Adjusted R-squared	0.88	0.435	.890
Instrument			45
Hansen test			[0.132]
AR(1)			[0.000]
AR(2)			[0.514]