Productivity and outbound FDI in software services: A reversal of the HMY model

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Abstract

The HMY model makes the prediction that in a static setting, high-productivity firms self-select themselves to do FDI. This reflects a trade off between the fixed costs of FDI versus the costs of transportation which are encountered in exporting. Software services have two unique features: near-zero transportation costs, and non-commoditised products. We propose a model of the optimisation of the firm in this setting. This yields a reversal of the HMY prediction: it predicts that the least productive firms will self-select themselves to do FDI. The empirical evidence supports this prediction.

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1 Introduction

The New Trade Theory has emphasised a firm-optimisation perspective on the linked decisions by firms to export or to do outbound FDI. It sees FDI as serving foreign customers through other means. Firms choose between serving domestic customers vs. producing at home to serve foreign customers vs. producing abroad to serve foreign customers, as three alternative paths towards maximising profit. This approach has given new insights into international trade and FDI.

Helpman *et al.* (2004b) place heterogeneity in firm productivity at the heart of these questions. If embarking on exporting involves a certain fixed cost, then only more productive firms will cross this threshold, and their payoffs from exporting will pay for this fixed cost. In equilibrium, firms will self-select themselves so that more efficient firms will export while less efficient firms will serve the domestic market. The models in the HMY tradition generate predictions about which firms export and which firms do FDI based on the interplay between transportation cost and fixed cost.

In this paper, we explore the decision to export and to do outbound FDI by software services companies. We identify two key characteristics which are unique to this problem. First, transportation costs for software services are near-zero. This should encourage production at home. Second, software services are non-commoditised, have myriad intangible characteristics, and customers may feel it is risky to buy software services from a firm in a distant country. This should encourage FDI.

We integrate these features into a model of the optimisation of a software services company. The predictions of this model are a reversal of the standard HMY setting: it predicts that *less* efficient software services companies should be more keen to engage in outbound FDI.

We test these predictions using a rich firm-level dataset for export and outbound FDI by Indian Software Services companies. Across alternative strategies for productivity measurement, there is significant support for the prediction of this model: that less productive companies are more likely to do outbound FDI.

We contrast these results against a symmetric empirical analysis for a manufacturing industry where a traditional HMY style result should obtain. We choose the two-digit manufacturing industry with the most outbound FDI, namely, Chemicals. We find that the HMY hypothesis holds for that sector.

2 The problem of outbound FDI by software services companies

Why do some firms decide to export or invest abroad while others produce for domestic markets? The recent literature has emphasised the role of differences in productivity, size, capital and skill intensity between firms in shaping these choices. When the cost of producing abroad is high, then exports might be preferred (Melitz, 2003; Helpman *et al.*, 2004a). Heterogeneity in productivity levels generates self-selection, as firms are faced with different costs in serving domestic and foreign markets. Only the most productive firms invest abroad. Less productive firms export, while the least productive ones serve their domestic markets. These arguments have found support in empirical evidence presented in Head and Ries (2003, 2004); Kimura and Kiyota (2006); Tomiura (2007); Girma *et al.* (2004b,a).

In the context of FDI from industrialised countries Helpman *et al.* (2004a) (HMY) show that there is a hierarchy of firms sorted by productivity where more productive firms export and the most productive firms invest abroad. Head and Ries (2003) find empirical support for the HMY model from Japanese firms. Similar results are found in a small empirical literature on outbound FDI by Indian firms also (Demirbas *et al.*, 2009; Pradhan, 2004, 2006; Kumar, 2007).

The standard HMY framework would predict that the firms to engage in outward FDI would be the most productive firms. However, when we turn to the problem of exporting and FDI by software services companies, two key features loom large. The first is the issue of transportation cost. Transportation cost is roughly zero for software. If the only reason to do FDI was to avoid the cost of transportation, then there should be no FDI for software services companies.

The second issue is the acutely non-commoditised nature of software servises. In a commodity such as steel, there are objective technical standards that define a certain grade of steel. The buyer of steel is fully confident in the steel that he has purchased, once it has passed certain technical tests, regardless of the nationality of the producing firm or the location of production. In contrast, software services have myriad intangible characteristics. Customers sometimes take on strategic risk impacting on the future of the entire firm, when they buy software services. There is significant uncertainty about the true characteristics of the software services that are being purchased. The risk perceived by customers is likely to be greater when software services are purchased from a foreign company, as opposed to purchase from a local provider.

These two features distinguish the software services industry from the standard HMY setting. The uncertainty problem encourages software services companies to do FDI while the transportation cost dimension discourages FDI. The interplay between productivity, uncertainty and transportation cost is not obvious. In order to understand the problem, we setup a model of the optimisation of the firm.

We now develop a model in the HMY framework to accommodate the unique features of zero transport cost, and risk associated with the non-commoditisation of the product in the software services.

2.1 Preferences

Consider an open economy where a continuum of differentiated goods is consumed. The representative consumer's utility is defined over a composite good Q given by U = Q. The composite good Q is given by a C.E.S function:

$$Q = \left[\int_{i \in \Omega} q(i)^{\epsilon} di \right]^{(1/\epsilon)} \quad 0 < \epsilon < 1$$
(1)

where the measure of the set Ω denotes the mass of available goods and the elasticity of substitution between any two goods is $\sigma = 1/(1 - \epsilon) > 1$.

2.2 Firms

There is a continuum of firms, each producing a different variety. The production technology uses only one factor, labor l, and exhibits constant marginal cost and fixed over head cost. Firms are heterogeneous in terms of their productivity. We assume that firms are productive enough to operate in the domestic market. We focus on the choice that firms make about the mode of serving the foreign market. The foreign demand faced by a firm is:

$$q(i) = \begin{cases} 0, & \text{with prob} & \gamma_j \\ Dp(i)^{-\sigma}, & \text{with prob} & 1 - \gamma_j \end{cases} \quad j = X, I$$
(2)

where D is given from an individual firm's perspective and j = X, I. The consumer's perceived risk about the quality of imported software is greater when compared with that purchased from a local firm (Lee and Tan, 2003), so $\gamma_X > \gamma_I$.

The cost of transportation of software services is zero. There is a fixed cost of exporting F_X , and F_I is the fixed cost associated with setting up a production unit abroad. The production function is given by

$$q(i) = A(l_i - F_k), \quad k = D, I \tag{3}$$

depending on whether the firm is exporting or investing abroad (k stands for production location). The parameter A denotes the productivity of the firm.

The firm, taking the demand for a variety as given, sets the price for that variety which maximises expected profit :

$$E(\Pi) = (1 - \gamma_j)[q(i)p_i - w(l_i - F_k) - F_j] + \gamma_j[-w(l_i - F_k) - F_j]$$
(4)

where j = X if k = D; j = I if k = I, and it is assumed that there is no wage difference.

Using equations 2 and 3 and normalising the wage rate to 1, the expected profit is:

$$E(\Pi) = DA_i^{\sigma-1} \frac{1}{\sigma-1} \left(\frac{\sigma}{(1-\gamma_j)(\sigma-1)}\right)^{-\sigma} - F_j$$

Firms maximise $E(\Pi)$ and if the optimised profit in a certain activity is negative, they do not undertake that activity. The threshold productivity level associated with zero expected profit through export and FDI are:

$$A_X^{*\sigma-1} = \frac{F_X(\sigma-1)(\frac{\sigma}{\sigma-1})^{\sigma}}{D(1-\gamma_X)^{\sigma}}$$
$$A_I^{*\sigma-1} = \frac{F_I(\sigma-1)(\frac{\sigma}{\sigma-1})^{\sigma}}{D(1-\gamma_I)^{\sigma}}$$

This graph shows the optimised profit (on the y axis) associated with alternative values of firm productivity (on the x axis).

The left panel shows the prediction of HMY theory. Firms below and at the lowest productivity threshold A_D^* , are not operational. Firms with productivity higher than A_D^* and below and at the productivity threshold A_X^* , choose to serve the domestic market only. Firms with productivity above A_X^* and up to the threshold A_I^* choose to serve the foreign market through export. For firms with productivity above A_I^* , it is efficient to do outbound FDI.

The right panel depicts the reversal of HMY under non-zero transport cost and uncertainty about realisation of foreign demand. It is efficient for firms with productivity level higher than A_I^* and up to the threshold A_X^* to do outbound FDI, while firms above the threshold A_X^* choose export as the mode of serving foreign market.



These expressions indicate that for any finite value of F_X , F_I and γ_I , we can find a value of $\gamma_X \approx 1$, so that $A_X^* > A_I^*$. Thus, when the risk perception associated with export is large, the exporting firm that endogenises the risk of facing zero demand has to be more productive than a firm that does outbound FDI. The right panel in Figure 1 illustrates these relationships.

3 Empirical analysis

3.1 Data

The standard HMY framework predicts that the most productive firms would engage in outward FDI. However, in the case of the software services industry, the model above – which focuses on the two unusual features of the software services industry: zero transportation cost and the risk borne by customers owing to the non-standardised nature of software services – yields the reverse prediction. We now turn to the empirical evidence to discriminate between these alternative explanations.

We analyse FDI by the Indian Software Services industry. We also explore the validity of the HMY hypothesis in the Indian manufacturing sector, where the standard model is applicable. Productivity measurement is best done within one narrow industry. Hence, we choose the two-digit manufacturing industry with the most outward FDI, namely, Chemicals.

The Indian Software Services and Chemicals industies have long a strong export orientation. However, they could not engage in outbound FDI owing to capital controls. In 1999, these controls were eased, leading to a rise in the number of firms who did outbound FDI in both industries. The Software Services industry experienced a phenomenal rise in the number of OFDI) firms immediately after the liberalisation. We seek to measure the productivity of these firms, compared with that of exporting firms who did not choose to do outward FDI.

The dataset that we utilise is based on the firm-level database maintained by Centre for Monitoring Indian Economy (CMIE).¹

CMIE observes most large firms present in the country in a given year. The exact set of firms who make up the dataset fluctuates from year to year, given birth and death processes, and non-observation of the firm by CMIE.

The period under consideration is 2000-2008, i.e., the period after capital

¹India has a long tradition of sound accounting standards. Publicly traded corporations face pressures from public shareholders and the securities regulator. Owing to these factors, Indian firm level data is of a high quality by the standards of emerging markets. CMIE has a well developed 'normalisation' methodology which ensures inter-year and inter-firm comparability of accounting data. This database has encouraged an empirical literature, starting with papers such as Khanna and Palepu (2000); Bertrand *et al.* (2002); Ghemawat and Khanna (1998).

Figure 2 Density plot of OFDI to Total Asset ratio: Software Services vs. Chemicals

This graph shows the Kernel density plots of the OFDI to Total Asset ratio of firms in Software Services and Chemicals. The firms having OFDI greater than 1% of the total assets (corresponding to the thick vertical line) are considered as OFDI firms in the analysis. The numbers 0.12 and 0.06 corresponding to the other two vertical lines indicate median values for Software Services and Chemicals respectively.



controls were eased. Our dataset consists of all firms who serve foreign customers, whether through export or FDI or both.

Given that the median value of the OFDI to Total Assets ratio for the Software Services firms is twice that of Chemicals firms, we define three categories of firms in Software Services: non-OFDI, low-OFDI and high-OFDI firms where as firms are classified as non-OFDI and OFDI firms in Chemicals. We may conjecture that low-OFDI firms in Software Services are the exporters who have small scale OFDI activities undertaken mainly for marketing, advertising and export-promotion purpose. High-OFDI, in other words 'true OFDI' firms in Software Services are the exporters having more than 50% of the assets as OFDI and the non-exporters serving foreign market only through subsidiaries.

Figure 3 shows the time-series of the number of exporting Software Services

This graph shows the time-series of the number of firms in our database broken down into three groups: non-OFDI, low-OFDI and high-OFDI firms.



companies, and the number of software services companies having low and high ratio of OFDI to total assets. We see a sharp rise in the number of companies which did FDI in 2000, 2001 and 2002. Table 1 shows summary statistics about these firms.

Figure 4 shows the time-series of the number of exporting chemical companies, and the number of exporting chemical companies who also have FDI, in the sample. Table 2 shows summary statistics about these firms.

3.2 Methodology

The CMIE dataset identifies firms with OFDI status. We seek to measure whether OFDI firms were productive when compared with the firms who did not do FDI during 2000-20008. This requires measurement of productivity at the firm level.

We use stochastic frontier analysis (henceforth SFA) developed by Aigner *et al.* (1977) and extended for panel data by Battese and Coelli (1992, 1995).

U				-
	Extent of FDI			
	Units	None	Low	High
Sales	Bln. Rs.	8.803	7.068	0.859
Total assets	Bln. Rs.	5.883	10.81	3.205
Gross fixed assets	Bln. Rs.	4.105	5.87	5.87
Exports to sales	Percent	28.1	34.02	72.32
OFDI to total assets	Percent		9.116	68.69

 Table 1 Summary statistics about Software Services companies: 2000-2008

We apply the Efficiency effect SFA model developed by Battese and Coelli (1995).

This involves estimating a model of the form:

$$y_{it} = \exp(x'_{it}\beta - u_{it} + v_{it}), \quad u_{it} \ge 0$$
(5)

The noise component v_{it} is i.i.d. $N(0, \sigma_v^2)$ and represents a systematic error which is not under control of the firm. The other component u_{it} accounts for the firms failure to produce maximal output given the set of inputs used, due to some factors which are unobserved but are under the firm's control such as managerial ability. It provides a measure of technical inefficiency of the firm. It is assumed that u_{it} follows a truncated normal distribution $N^+(z_{it}\delta, \sigma_u^2)$ where u_{it} can be explained by firm-specific characteristics.

$$u_{it} = z_{it}\delta + w_{it}, \quad w_{it} \ge -z_{it} \tag{6}$$

The coefficients of inputs and factors determining inefficiency are simultaneously determined by maximum likelihood. Technical efficiency of production for the *i*th firm at the *t*th observation is defined by

$$TE_{it} = \frac{\exp(x_{it}^{'}\beta - u_{it} + v_{it})}{\exp(x_{it}^{'}\beta + v_{it})} = \exp(-u_{it})$$
(7)

We estimate the SFA model using sales as a proxy for output. Total wages paid is used as a proxy for the labour input. Gross fixed asset of the firm less the land and building assets are used as a measure of capital input of the firm. The production frontier is estimated using these two inputs in Software Services, while expenses on raw material are used as an additional input for Chemicals.

The firm-specific factors that may affect inefficiency of the firm include age of the firm; size, proxied by the Total Asset; a dummy indicating whether



This graph shows the time-series of the number of firms in the database broken down into two groups: non-OFDI and OFDI firms.



the firm invests abroad or not; a dummy indicating whether the firm is listed or not; the firm's investment activity can influence its efficiency level, which is proxied by the ratio of gross investment to capital; market power of the firm captured by the ratio of the sales of an individual firm over the industry sales by year. In a second specification for the Software Services industry, the OFDI status of the industry is captured by two dummy indicators, i.e., whether the firm belongs to the low-OFDI or the high-OFDI category.²

3.3 Results

In the first specification, shown in the first column of Table 3, OFDI status significantly increases inefficiency. This reversal of the HMY hypothesis for Software Services is predicted by our model. We also find that older firms are more inefficient. Size and investment activities reduce inefficiency. However

²We interact the dummy indicators with firm-specific factors to test whether the effect of these these factors on efficiency vary significantly depending on the OFDI status. However the interaction terms are not significant and hence dropped.

able 2 Summary statistics about Chemicals companies: 2000-2					
	Extent of FDI				
	Units	Non OFDI	OFDI		
Sales	Bln. Rs	8.803	7.068		
Total Assets	Bln. Rs	5.883	10.81		
Gross Fixed Assets	Bln. Rs	4.105	5.87		
Exports to sales ratio	Percent	28.1	34.02		
OFDI to total assets ratio	Percent		9.116		

the results indicate that market power tends to raise inefficiency.

In the second specification shown in the second column of the Table 3, the results are qualitatively similar to that in the first specification. Moreover, they indicate that high-OFDI firms are more inefficient than the low-OFDI firms which is consistent with the idea that some low-OFDI firms are primarily based on production in India.

The coefficient $\sigma_u^2/(\sigma_u^2+\sigma_v^2)$ is highly significant for both specifications, which suggests that frontier analysis is required.

The Chemicals industry shows starkly different relation between inefficiency and OFDI status of the firm compared to the Software Services industry. The results are shown in Table 4.

Figure 5 shows productivity rankings of OFDI and non-OFDI firms in the Software Services and Chemicals industry for years 2001, 2004 and 2007. The cumulative distribution of productivity of non-OFDI firms lying to the right of the OFDI firms indicates that the former stochastically dominates the latter in Software Services, establishing the reversal of HMY in this industry. In contrast, the productivity of OFDI firms in the Chemicals stochastically dominates the non-OFDI firms, showing that the HMY prediction holds in manufacturing.

We test for first order stochastic dominance of the distribution of estimated productivities of one category over the other using the Kolmogorov-Smirnov test. To test whether x_1 stochastically dominates x_2 , the null and alternative hypothesis are the following:

$$H_0: F(x_1) - F(x_2) = 0$$
, vs $H_1: F(x_1) < F(x_2), \forall x_1, x_2 \in R$ (8)

For the Software Services industry, we test the stochastic dominance of non-OFDI firms over OFDI firms:

$$H_0: F_{\text{Ex}}(z) - F_{\text{FDI}}(z) = 0, \quad \text{vs} \quad H_1: F_{\text{Ex}}(z) < F_{\text{FDI}}(z), \forall z \in R$$
(9)

	Model 1		Model 2	
Variable	Estimate	S. E.	Estimate	S. E.
Intercept	2.0460***	0.08	2.2382***	0.08
Log wages	0.4821^{***}	0.01	0.5046^{***}	0.01
Log capital	0.3850^{***}	0.02	0.3210^{***}	0.02
Age	0.0423^{***}	0.01	0.0086^{**}	0.003
Log total assets	-0.3578***	0.07	-0.1287^{***}	0.02
Ratio of investment to capital	-1.9993^{**}	0.75	-0.1640**	0.06
OFDI dummy	1.0966^{***}	0.23		
High OFDI dummy			0.5337^{***}	0.09
Low OFDI dummy			0.4570^{***}	0.07
Listed dummy	0.7914^{***}	0.17	0.5364^{***}	0.04
Market share	0.0297^{**}	0.01	0.0123^{**}	0.01
$\frac{\sigma_u^2}{\sigma_u^2 + \sigma_v^2}$	0.4724***	0.09	0.0012***	6.36e-06
No. of firms	375		375	
No. of observations	1677		1677	

Table 3 Model explaining inefficiency with stochastic frontier analysis: Software Services

and for Chemicals, we test the stochastic dominance of OFDI firms over non-OFDI firms:

$$H_0: F_{\text{FDI}}(z) - F_{\text{Ex}}(z) = 0, \quad \text{vs} \quad H_1: F_{\text{FDI}}(z) < F_{\text{Ex}}(z), \forall z \in R \quad (10)$$

The rejection of the null hypothesis implies the reversal of HMY hypothesis in the Software Services and validity of the HMY hypothesis in the Chemicals. The p-value of the test-statistics are reported in Table .

The reversal of HMY is more evident for non-OFDI firms versus high-OFDI firms compared to non-OFDI versus low-OFDI firms in the Software Services. This is shown in Figure 6. The results of the stochastic dominance tests are reported in Table 6

4 Sensitivity analysis

We conduct the entire analysis using other methods of productivity estimation as well. We apply fixed effect regression analysis and the Olley and Pakes (1996) method for both Software Services and Chemicals. Both these methods takes into account the simultaneity problem of productivity of a

Figure 5 Stochastic dominance of OFDI vs. non-OFDI firms: Software Services vs. Chemicals

This graph shows cumulative distribution function of productivity of OFDI and non-OFDI firms in Software Services and Chemicals in 2001, 2004 and 2007.



Table 4 Model explaining inefficiency with stochastic frontier analysis:Chemicals

Variable	Estimate	S.E.
Intercept	1.6289***	0.02
Log wages	0.3516^{***}	0.01
Log capital	0.0319^{***}	0.01
Log of raw material expense	0.6362^{***}	0.01
Age	23.5980^{*}	10.29
Size (Log Total Assets)	-782.4200*	340.65
Ratio of investment to capital	-2260.0000*	263.76
OFDI dummy	-603.5900*	263.76
Listed dummy	-1268.0000*	552.47
Market share	-44.5010*	19.36
$\frac{\sigma_u^2}{\sigma_u^2 + \sigma_v^2}$	0.9999***	5.7106e-05
No. of firms	976	
No. of observations	5098	

firm and its input allocation decision. The firms can observe productivity shocks early enough so as to allow it to change input allocation decision.

Olley and Pakes (1996) employs the law of motion of capital $(1-\delta)K_t + I_t = K_{t+1}$ as a solution of the endogeneity problem. This method assumes that a positive productivity shock today leads to a rise in investment today, which again raises the next period capital stock. Thus lagged values of investment is used as an instrument for capital.

A third method of production function estimation is conducted for Chemicals, namely Levinsohn and Petrin (2003) method, which uses raw material expenses as an instrument for capital. All these different methods confirm the reversal of HMY in the Software Services and the validity of HMY in Chemicals. The results are given in Table 7 and 8

5 Conclusions

In this paper we attempt to explain the international business organisation by firms in a sector with near-zero transport cost of exporting, and where non-standardisation of the product implies that risk as seen by customers is greater when buying from an overseas supplier.

In our model, contrary to the HMY hypothesis, the exporting firms' threshold productivity level to break even is higher compared to OFDI firms. We find

Table 5 Testing for stochastic dominance: Software Services and Chemicals

This table reports the *p*-value of the Kolmogorov-Smirnov test of stochastic dominance of non-OFDI firms over OFDI firms in Software Services and stochastic dominance of OFDI firms over non-OFDI firms in Chemicals.

Year	Software Services	Chemicals
2000	0.334	0.0566
2001	0.00686	0.000571
2002	0.00128	0.00113
2003	0.00405	9.81e-05
2004	0.0224	3.73e-06
2005	0.019	2.73e-06
2006	0.0566	8.86e-10
2007	0.029	2.65e-10
2008	0.0625	2.32e-07

Table 6 Testing for stochastic dominance:Non-OFDI vs.low/high OFDIfirms in Software Services

This table reports the *p*-value of the Kolmogorov-Sirnov test of stochastic dominance of non-OFDI firms over low and high OFDI firms.

Year	Low ofdi	High OFDI
2000	0.0164	0.22
2001	1.1e-05	0.278
2002	0.00487	0.0179
2003	0.0375	0.0378
2004	0.033	0.00249
2005	0.0139	0.0573
2006	0.0259	0.0046
2007	0.0259	0.00577
2008	0.0725	0.00366

Figure 6 Stochastic dominance of low/high OFDI vs. non-OFDI firms: Software Services

This graph shows cumulative distribution function of productivity of OFDI (low/high) versus non-OFDI firms in Software Services in 2001, 2004 and 2007.



	Fixed Effect		Olley & Pakes (1996	
Variable	Estimate	S. E.	Estimate	S. E.
Intercept	-4.2058***	0.08	0.0222*	0.01
Age	-0.0016	0.003	0.0004	0.0003
Size (Log Total Assets)	0.2190^{***}	0.01	0.0068^{***}	0.001
Ratio of investment to capital	0.1507^{**}	0.05	0.0120^{*}	0.01
OFDI dummy	-0.3148^{***}	0.04	-0.0263***	0.004
Listed dummy	-0.1847^{***}	0.04	-0.0137**	0.005
Market share	-0.0079	0.01	-0.0006	0.0006
No. of firms	375		289	
No. of observations	1677		1269	

 Table 7 Software Services: HMY reversal with alternative methods of productivity measurement

support of our hypothesis with the Software Services industry of India, where we examine the characteristics of the firms who setup FDI outside the country when capital controls were eased. We find that the exporting firms are more productive compared to OFDI firms.

In contrast to Software Services, Chemicals, which belong to the manufacturing industry yields results which are consistent with the standard HMY predictions about export and OFDI decision of the firms.

hod 3	Petrin (2004)	S. E.	0.03 0.0003 0.004 0.03 0.03 0.01 0.011 0.011
Met	Levinsohn &	Estimate	-3.9782*** -3.0782*** 0.001 0.0214*** 0.1004** 0.2585*** -4.2777e-06 -0.0347** 965 5042
od 2	xes (1996)	S. E.	6.2355e-05 8.3481e-07 9.1146e-06 8.0340e-05 4.5391e-05 3.2800e-05 1.7237e-06
Metho	Olley & Pal	Estimate	1.6037*** 3.7358e-06*** -0.0002*** 0.0003*** 0.0001 - -5.5508e-07 733 3809
11	fect	S. E.	$\begin{array}{c} 0.03\\ 0.004\\ 0.004\\ 0.031\\ 0.09\\ 0.01\\ 0.006\\ 0.01\end{array}$
Methoc	Fixed Ef	Estimate	-4.3081*** 0.0017*** 0.1204*** 0.1406*** 0.2805** 0.09765*** 6.3499e-05 -0.0433*** 965 5042
	•	Variable	Intercept Age Size (Log Total Assets) Ratio of investment to capital OFDI dumny Listed dumny Market share Size interacted with OFDI dummy No. of firms No. of observations
	Method 1 Method 2 Method 3	Method 1Method 2Method 3Fixed EffectOlley & Pakes (1996)Levinsohn & Petrin (2004)	$\begin{tabular}{cccc} Method 1 & Method 2 & Method 3 \\ Fixed Effect & Olley \& Pakes (1996) & Levinsohn \& Petrin (2004) \\ Variable & Estimate & S. E. & Estimate & S. E. & Estimate & S. E. \\ \end{tabular}$

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