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Working Paper

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Copenhagen Discussion Papers, No. 2016-60

Provided in Cooperation with:
Asia Research Community (ARC), Copenhagen Business School (CBS)

Suggested Citation: Roy, Indrajit; Narayanan, K. (2016) : Outward FDI from India and its impact on the performance of firms in their home country, Copenhagen Discussion Papers, No. 2016-60, Copenhagen Business School (CBS), Asia Research Centre (ARC), Frederiksberg, https://hdl.handle.net/10398/9295

This Version is available at:
https://hdl.handle.net/10419/208658

60 2016 April

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Outward FDI from India and its impact on the performance of firms in their home country[1]

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Abstract

Indian OFDI has increased and diversified substantially in the last 10 years. This paper uses quantile difference-in-difference measure to estimate home country effects of the OFDI decision of Indian corporate on their firm level characteristics reflected in various financial/non-financial ratios. Quantile coefficients inform us about differential effects of OFDI on different segments of the probability distributions of these firm characteristics and also change in within group inequality.

It is observed that in the Indian context, the 'home' effect of OFDI is a slow process and the true effect of OFDI is revealed as time progresses. Also the effects (dimension, intensity and significance level) of OFDI are not same across segments (top, median or bottom) of the distribution of the selected variables and effects are found to be mostly muted when they are analysed on the bases of mean of the distribution (i.e. general DiD effect). OFDI leads to (a) reduction of inequality of firms (b) improvement in R&D expense of firms except those firms with already relatively high expenditure (3rd quartile) (c) exports to sales initially improve for three years and then worsen for small firms (first quartile), however, for the mid-size firms (median) it worsens after one year and (d) median of operating ratio (expense/sales) as well as after tax profit margin (PAT/sales) worsened over the year.

[1] *Views expressed in this paper are those of the authors' alone and not of the institution to which they belong.*

1. Introduction: In recent years Outward Foreign Direct Investment (OFDI) from emerging market economies (EME) has increased rapidly. Globalization generally starts with exports, and its natural extension is foreign direct investment (FDI). While export is perceived to be good for the economy, the effects of the transfer of economic activities abroad, either through foreign investment or through arm-length contracts, is a widely debated issue. General apprehension associated with OFDI is loss of employment or decrease in low skilled workers' real wages. A great deal of attention has therefore been given to the impact of OFDI on the home (country of origin) performance such as labour intensity, skill composition, substitution of employment between parent company employment and foreign affiliate, total factor productivity, etc. The impact, to a large extent depends on the nature such as horizontal or vertical (backward/forward) FDI and also motive of FDI.

As the productivity of a firm exceeds a certain threshold limit, the firm self-selects to become a multinational enterprise or MNE (Helpman et al. (2004)). Therefore, if firms are not selected at random, differences in home performance of OFDI firms (MNEs) and Non-OFDI firms (national firms) may be due to the combined effect of their foreign activities as well as due to changing maturity (differential reaction to environment) over time. These issues are handled by way of estimating difference in difference (DiD) estimate as proposed by Heckman et al. (1997), on matching sample of national firms which are to some extent similar (closest neighbour) to MNEs. The differences in their ex-post performance of these matching firms may be due to their internationalization decision.

Further, effects of OFDI on its home performance are likely to differ across firms due to firm heterogeneity. In order to account for such possibilities, estimation of DiD effect at different points of the distribution using quantile[2] regression method is

[2] *Quantile $T(0,1)$ refers to a specified proportion of an ordered sample of a population e.g. $\tau(0.5)$ is the median value. Distribution function $F_Y(y)$ can determine the probability (τ) of occurrence of Y=y, whereas, quantiles do exactly the opposite*

useful to understand the effect for under-achievers (those firms at the lower end of the distribution) and over-achievers (those firms at the upper end). Further, as OLS regression focuses only to the mean (as a measure of location) of the distribution, information about the tails and other parts of a distribution is ignored. Quantile-difference in difference (qDiD) effect estimation technique involves a comparison of treatment and control groups and a comparison of before and after time periods. It estimates the causal effect of a binary variable (e.g. OFDI decision) for any section (quantile/decile) of the distribution of the variable of interest. qDiD can identify the cases if the treatment only affects part of the distribution, i.e. there may be other segments of the distribution which are unaffected. Importantly, quantile coefficients inform us about effects on distributions and not on individuals.

Integration of Indian economy with the rest of the world has strengthened in recent years as it has witnessed an uptrend in both inward and outward FDI. OFDI has provided better access to technology, knowledge, markets, natural resource to Indian firm and also helps the domestic corporate sector to improve their brand value and enable them to be closer to their strategic clients.

In this paper, we use detailed firm-level data to analyse whether the internationalization of Indian firms has caused any change to their firm level characteristics at home such as exports-to-sales, operating ratio (expense-to-sales), profitability ratio (PAT-to-sales) and R&D expense to total expense ratios.

This paper attempts to address the following research questions:

a. Identifying the differences, if any, in the performance of OFDI and Non-OFDI companies.

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i.e. for a given probability τ it provides the corresponding value $y_\tau = F_Y^{-1}(\tau)$ *of the sample data/distribution. The entire conditional distribution of the dependent variable Y can be characterized through different values of* τ.

b. Analyse the impact of OFDI on different segments of the probability distribution.
   Specifically, does OFDI affect inequality among firms?
c. Analyse whether home effect of OFDI changes over the years and identifying threshold value, if any.

The rest of the paper is organized as follows. Section 2 discusses the theoretical and empirical literature on FDI and its effect on domestic economic activities. The framework for the empirical analysis to estimate the effects of OFDI on domestic economic activities are discussed in section 3. Data and empirical results are presented in section 4. Finally, summary and conclusion is presented in section 5.

2. Literature review: Numerous theories have attempted to explain the reasons for OFDI decision of firms. MNEs spread out their activities abroad for multiple reasons, such as, the exploitation of economies of scale/scope; the use of firm-specific advantages (Hymer, 1960); often due to a life-cycle pattern of their products (Vernon, 1966); to avoid contracting problems and associated transactions costs (Coase 1937, Teece, 1986) companies prefer internal transactions rather than arm's-length market transactions i.e. internalisation advantages (Dunning, 1981).The main motives behind FDI decision of enterprise (Jack Behrman, 1972, Dunning & Lundan, 2008) are market-seeking, resource-seeking, efficiency-seeking and strategic asset seeking which they are lacking in the home country. Literatures also suggest various institutional factors of a country that cause OFDI.

The issue of whether there are any significant effects (beneficial/detrimental) of OFDI on its home activities is not very clear. The home effects may largely depend on motive of OFDI such as horizontal or vertical FDI or strategy involving complex combination of horizontal and vertical form of FDI. Moreover, motives of OFDI of firms from EME may be different than that of firms of developed countries.

In horizontal FDI, firms exploit their existing advantages and replicate approximately the same activities in many locations with the intention to reap benefits of the market opportunities abroad and also to avoid trade barriers. Therefore, horizontal FDI may lead to a substitution of employment as well as exports between home and foreign countries (Braconier and Ekholm 2000). In Vertical FDI, MNEs split the production process and locate production stages in countries where it can be conducted at the lowest costs i.e. MNE separates the production process vertically by outsourcing some production stages at foreign locations. With vertical OFDI, there are complementarities between a firm's foreign and home operations, because both are required to produce the final goods. When one of the activities expands, it causes the expansion of other activities (Brainard and Riker 1997).

As in many cases, OFDI would transfer part of private domestic savings abroad; domestic investment of countries with scarce capital might be impacted negatively. FDI decisions of MNEs are often influenced by technology characteristics (firm specific advantages) such as firm-level and plant-level economies of scale as well as country characteristics such as market sizes, differences in marginal costs, and trade costs, (Caves, 1971; Helpman,1984, and Markusen, 1984). MNEs have certain disadvantages too, such as, the need to set up a plant or a sales network at foreign land and try to overcome cultural and legal differences, bear the risk of expropriation/ confiscation, and exchange rate risks. Also MNEs choose FDI over exports because by setting up a production unit in foreign country, the firm is able to avoid trade barriers, such as tariffs or transportation costs and at the same time benefit from lower factor costs in foreign markets.

Literature survey suggests that the effect of OFDI on home employment depends on several factors such as the motive of investment (horizontal vis-à-vis vertical); the income gap between the home and host country; the differences in factor

intensities ; the size of the parent company; the home country's labour market regulations; the size of the home economy; and access to the global networks (Kokko, 2006, Braconier and Ekholm 2000, Braunerhjelm et al. 2005, Oxelheim and Thulin 2005, Pennings and Sleuwaegen 2000). Blomstrom et al. (1997) examine the effects of affiliate net sales on employment of the parent companies using firm-level data from US and Swedish multinationals and observed that when U.S. parent firms shift the production facilities to developing countries, home employment reduces but this is not the case for foreign production in developed countries. On the other hand, in case of Swedish firms, they observed that foreign affiliate production raises the demand for home labour, regardless of FDI locations. On the other hand, Desai, Foley and Hines (2005) observed that foreign and domestic investments are positively correlated for U.S. MNEs. In Indian context, Das (2013) empirically investigates average treatment effect to treated (ATT) effect of OFDI on home-country performance of Indian manufacturing firms during 2008-09 to 2011-12 and observed that Indian OFDI has positive ATT impact on export and research & development (R&D) intensity, whereas, no significant impact could be found on domestic investments, output, employment, and import of raw materials (and import of capital goods).

Further, there may be bi-directional relationship between the rate of domestic investment and outward FDI. Empirical evidence, both based on aggregated macro-level data as well as firm-level data, provides inconclusive result on impact of outward FDI on domestic activity of firms. Some studies observed that OFDI reduces the country's rate of domestic investment, while others find that OFDI stimulates domestic investment, and yet some other studies observed no effect. List of select studies and their summary findings are presented in Table 1 (Annex). This paper adds to the literature by examining the causal effect of Indian OFDI on its home performance at different points of the distribution and over the years in post-ofdi period.

3. Framework for the empirical analysis

The estimation of the distributional effects due to OFDI decision of companies involves the comparison of the observed post-change distribution of the outcome variable with an estimate of the counterfactual distribution. In basic difference-in-difference (DiD) setup entities are divided into two groups and are observed for two time periods. Entity in one group (the treatment group) is affected by the policy change (treatment) and those in the other group (the control group) are not. The two time periods are before (t= 0) and after (t= 1) the policy change. The estimated effect of the treatment is the double difference i.e. difference between change in outcome for the treatment group in t=0 and t=1 and change in outcome for the control group in t=0 and t=1. Under certain assumptions DiD estimate removes time-invariant group differences and common time effects. The DiD framework can also be used to measure the effect of control on whole distribution of the target variable. Angrist and Pischke (2008) describe in detail Quantile Treatment Effects, Meyer et al. (1995) uses specific quartiles, Athey and Imbens (2006) generalized to the full distribution.

In this paper, to estimate the OFDI effect we group the firms (firm types; p=0 and1) that have invested abroad as treated group (OFDI firms; p=1), and those who never invested abroad called the untreated group (national firms; p=0). To control for possible selection bias we use kernel based propensity score matching which runs logit model of the treated on set of firm level characteristics to generate propensity score from the kernel density function which subsequently used in the Di D equation (PSM - Rosenbaum and Rubin 1983, Barba Navaretti and Castellani 2004). The OFDI effects on economic performance of firms are measured by ATT and DiD techniques.

3.1 **Average treatment effect on the treated (ATT):** is defined as

$\alpha_{ATT} = \bar{y}_1^1 - \bar{y}_0^1$…… (1)

Where $\bar{y}_t^p$ is the mean performance of firms of type 'p' during time 't' (t=0,1 and p=0,1)

The effect of OFDI in terms of mean difference in the performance (y_i) between treated and the control group due to OFDI is obtained through following OLS regression

$y_{i,t}^p = c + \alpha_{ATT} \times Treat_i + \varepsilon_i$.... … (2)

Where $y_{i,t}^p$ is the performance of i^{th} firm of type 'p' during time 't=1'

$Treat_i$ is dummy variable which assumes value '1' for OFDI firms and '0' otherwise, the coefficient 'α_{ATT}' is the intent to treat (ITT) or average treatment effect on the treated (ATT) i.e. effect of OFDI on targeted performance variable y_i.

3.2 Difference-in-Differences (DiD) estimate is used when for example there are two groups of entities and their characteristics are observed in two different time points and only one group (treatment group) is exposed to a certain treatment only during the second period. Unobserved heterogeneity which may be due to firm specific characteristics (organizational structures, special market condition or management skills) could impact ATT estimator and may be biased. Therefore, DiD estimate, which compares the mean differences in pre-OFDI and post-OFDI performances of both groups, improves the performance of testing of hypothesis. DiD estimator (β_{DiD}) is defined as

$\beta_{DiD} = (\bar{y}_1^1 - \bar{y}_0^1) - (\bar{y}_1^0 - \bar{y}_0^0)$ ……(3)

DiD as well as ATT effect of OFDI can be estimated through the following OLS regression (Meyer 1995)

$y_{it}^p = c + \beta_1 d_t + \beta_2 d^p + \beta_{DID} d_t * d^p + \lambda x_{it}^p + e_{it}^p$ ……(4)

dummies (d)take values: $d_t = 1$ if $t = 1$ and zero otherwise; $d^p = 1$ if $p = 1$ and zero otherwise.

X_{it} represents exogenous variables for 'i'th firm and β_{DID} is estimated DiD effect[3], β_2 is estimated ATT effect and β_1 is unknown coefficient.

The effect of OFDI on its home performance is most likely to differ across firms due to firm heterogeneity. Therefore, to account such possibilities, we also estimate DiD at different points using quantile regression methods to understand effect for under-achievers (those firms at the lower end of the distribution) and over-achievers (those firms at the upper end). Further, probability distribution of the effected variable may spread out or become more compressed, and may not be revealed by investigating only change in averages. For example, in post-OFDI period, upper strata (3rd quartile) of the probability distribution of firm's characteristics, may shift upward, whereas, lower strata (1st quartile) may fall i.e. inequality among firms with respect to that parameter widens, but average earning of firms may have unchanged. In OLS regression by focusing on the mean as a measure of location of the distribution, information about the tails and other parts of a distribution is ignored.

Also, OLS regression is sensitive to extreme values (outliers) which can distort the results significantly. Sometimes OLS estimates can even be misleading about the correct association between an explanatory and a dependent variable as it may be very different for different subsection (quantile) of the sample. Quantile regression explain complete description of the conditional distribution (rather than only conditional mean analysis as in OLS) e.g. how the median, or perhaps the 25th or 75th percentile of the dependent variable, are affected by the explanatory variables. There may be instances when a macroeconomic variable considered having positive influence on OFDI based on OLS based regression; may not be true for some segments (higher/lower strata) of OFDI distribution which may have, on the contrary, insignificant or even opposite effect.

[3] $\beta_{DID}=(Y_{treatment,\ after} - Y_{treatment,\ before}) - (Y_{contreol,\ after} - Y_{control,\ before}) = (y_{i1}^{1} - y_{i0}^{1}) - (y_{i1}^{0} - y_{i0}^{0})$
$= (c + \beta_1 + \beta_2 + \beta_{DID} - c - \beta_2) - (c + \beta_1 - c) = \beta_{DID}$

Let us denote the cumulative distribution functions of variable of Interest in these two periods (t=0 and t=1) and for control (p=1 for OFDI and p=0 for counterfactual) by $F_{tp}(.)$. Evaluating at a specified quantile $\theta \in (0, 1)$, the qDiD estimator is (Stewart, M.B. 2011)

$$\Delta^{QDID}(\theta) = [F^{-1}_{11}(\theta) - F^{-1}_{10}(\theta)] - [F^{-1}_{01}(\theta) - F^{-1}_{00}(\theta)]$$

4. Data Description and empirical results: OFDI Information (in the form of equity, loan or guarantee) on Indian firms is available in the Reserve Bank of India website (www.rbi.org.in) since July 2007 (monthly series). The firm level financial data (2003-04 to 2013-14) are obtained from PROWESS database of Centre for Monitoring Indian Economy (www.CMIE.com). As the data was obtained from two different sources, one of the important tasks of this paper is to match the company name from the list of outward investing company obtained from RBI-OFDI database to prowess database for firm level characteristics and also selecting only those firms which have less missing data points and after treating for outliers. Strata software package is used to estimate qDiD effects (Villa, J.M. 2012).

4.1 Trend of Indian OFDI

Indian OFDI steadily increased and diversified across industries and countries over the years. Annual average of Indian OFDI during last 5 years is around 35 billion USD. OFDI in the form of 'guarantee' issued has increased sharply especially after the recent global financial crisis period. Since 2010-11 Indian OFDI in the form of guarantee issued has surpassed other two channels of OFDI combine i.e. the 'equity' and 'loan' form of OFDI. However, guarantee invocation is negligible (0.2%) as compared to guarantee issued (Khan, 2012). The guarantee, which is provided by the Indian bank to the corporate so as to obtain financing abroad, do not necessitate an immediate outflow of funds or show up in the balance of payments statistics. Although guarantees are rarely invoked, however, significant rise in issuance of guarantee indicates highly leveraged nature of acquisitions by Indian

companies and could be a potential concern for banks/companies (khan, 2012). The available data on Indian OFDI reveal only to the immediate recipient of the investment, most of the time intermediaries or shell companies that do not have any operations and are located in the offshore financial centre (OFC) such as Singapore, Mauritius, Netherlands, British Virgin Islands, Cyprus etc.–i.e. countries which provide an attractive 'tax neutral' regime for holding companies. Nearly, 70 per cent of the total Indian OFDIs are directed to OFC. Multi-tiered intermediate structures located across multiple countries may be necessary for the companies to take advantage of tax treaties between different countries, used to mobilise funds and invest in other countries, but at the same time may be due to 'Round tripping' of investment (i.e. taking the investment out of country and bringing it back under the wrap of inward foreign direct investment) to get tax advantages in some cases.

Table 1: Share of different types of Indian OFDI and its component -Trend

Indian OFDI[#] (in million US$)	Equity (a)	Loan (b)	Guarantee issued (c)	Total (a+b+c)
2000-01	602	71	113	785
2001-02	879	121	156	1156
2002-03	1746	102	140	1988
2003-04	1250	317	441	2007
2004-05	1482	513	316	2311
2005-06	6658	1195	547	8400
2006-07	12063	1247	2261	15571
2007-08	15432	3075	6553	25060
2008-09	10714	3329	3105	17147
2009-10	6763	3620	7604	17987
2010-11	9352	7347	27231	43929
2011-12	6288	8325	16249	30863
2012-13	5856	4351	16665	26872
2013-14	10194	3726	22980	36900
2014-15	4435	3575	27611	35621

#financial year: April to March; Data source: RBI

4.2 Select Financial parameters of Indian companies: The paper studies the effect of OFDI decision on firm level characteristics in terms of various ratios such as exports-to-sales, expense-to-sales, PAT-to-sales and R&D expense to total expense ratios. The descriptive statistics including quartiles of overall industry level and its sub-industry segregated by OFDI firm in pre and post OFDI period (p=1, t=0 and p=1, t=1) and for national firm for the corresponding two periods (p=0, t=0 and p=0, t=1) are presented in table 2. It is observed that dynamics across the industry groups are quite different.

Exports to sales: Average as well as other quartiles is substantially higher for the OFDI firms as compared to national firms. Inequalities among national firms in terms of exports intensity is much higher than OFDI firms as it is reflected in the inter quartile difference to median ratio i.e. $(Q_3-Q_1)/ Q_2$ which is much higher for national firms as compared to OFDI firms. While median of OFDI firms declined in all years in the post-ofdi periods, however, first quartile and upper quartile of OFDI firms broadly increased in the initial years and decline subsequently.

Expense to sales: operating ratio (Expense to sales) of OFDI firms are relatively better than national firms. However, operating ratios has generally worsened in post OFDI period across the distribution for both national as well as OFDI firms; but it is worse for OFDI firms. Firm inequality in terms of expense/sales is generally lower than other financial ratios under study. However, within group inequality has increased in period 2. Level of inequality is higher for OFDI firms than that of national firms.

PAT to sales (profitability ratio): average of PAT to sales (in percent) is significantly higher for OFDI firms than that of national firms. Average of PAT to sales has declined in post OFDI periods for all the years under study and across the distribution of both types of firm. Inequality in terms of inters quartile difference to median ratio i.e. $(Q_3-Q_1)/ Q_2$ has increased in post OFDI periods for all the years under study for both OFDI as well as national firm. However, inequality is lower for

OFDI firms as compared to national firms in corresponding pre-ofdi as well as post-ofdi periods.

R&D expense to total expense: average of R&D expense to total expense is significantly higher for OFDI firms than that of national firms. Median of R&D expense to total expense has increased in post OFDI periods for all the years under study and across the distribution of both types of firm. Inter quartile difference to median ratio has declined in post OFDI periods for all the years under study for both OFDI as well as national firm. However, inequality is higher for OFDI firms as compared to national firms in corresponding pre-ofdi as well as post-ofdi periods for first four years, thereafter, it get reverse. OFDI causes decline in inequality in 5-6 year, as smaller firms increase their spending in R&D, whereas, firms which were spending higher in the pre-ofdi period did not increase spending on R&D significantly (3rd quartile did not change significantly in post ofdi period).

Table 2: Distribution of characteristics (select ratios in percent) of Indian firms under study[4]

Table 2.1: PAT/Sales

	Lag 1				Lag 2			
	p=0		p=1		p=0		p=1	
PAT / Sales	t=0	t=1	t=0	t=1	t=0	t=1	t=0	t=1
Q_1	1.076	0.241	3.689	1.737	1.075	0.855	3.815	1.802
Q_2	4.006	2.574	7.833	5.256	4.014	3.600	7.951	5.490
Q_3	9.289	7.382	15.015	11.984	9.299	8.519	15.877	11.934
Mean	5.226	3.530	10.387	6.888	5.176	4.485	10.771	5.628
$R=Q_3 - Q_1$	8.214	7.141	11.326	10.247	8.224	7.664	12.062	10.132
R / Q_2	2.050	2.774	1.446	1.950	2.049	2.129	1.517	1.845
#Obs	2690	2690	315	315	2699	2699	280	280

[4]Q1, Q2, Q3 are 1st, 2nd and 3rd quartile. #Obs: Number of firms – different across ratios due to unavailability of data and outlier correction; all ratios are in percent.

	Lag 3				Lag 4			
	p=0		p=1		p=0		p=1	
PAT / Sales	t=0	t=1	t=0	t=1	t=0	t=1	t=0	t=1
Q_1	1.070	0.798	3.812	1.224	1.065	0.241	4.678	0.517
Q_2	4.003	3.344	8.028	5.348	3.996	2.455	8.431	4.907
Q_3	9.301	8.037	16.927	12.891	9.276	6.979	17.136	11.963
Mean	5.129	4.063	11.066	5.588	5.108	2.806	12.033	4.639
$R=Q_3 - Q_1$	8.231	7.239	13.116	11.667	8.211	6.737	12.457	11.446
R / Q_2	2.056	2.165	1.634	2.181	2.055	2.744	1.478	2.333
#Obs	2702	2702	243	243	2693	2693	210	210

	Lag 5				Lag 6			
	p=0		p=1		p=0		p=1	
PAT / Sales	t=0	t=1	t=0	t=1	t=0	ct=1	t=0	t=1
Q_1	1.062	0.118	4.695	0.825	1.059	-0.004	6.266	0.095
Q_2	3.988	2.147	9.040	4.502	3.979	1.873	10.423	5.854
Q_3	9.271	6.242	17.508	11.385	9.246	5.946	18.282	13.927
Mean	5.118	2.478	12.489	4.213	4.968	1.416	13.800	1.853
$R=Q_3 - Q_1$	8.210	6.124	12.813	10.561	8.187	5.950	12.017	13.832
R / Q_2	2.059	2.852	1.417	2.346	2.057	3.177	1.153	2.363
#Obs	2781	2781	177	177	2656	2655	85	85

Table 2.2: R&D Expense/ Total Expense

R&D Expense/ Total Expense	Lag 1				Lag 2			
	p=0		p=1		p=0		p=1	
	t=0	t=1	t=0	t=1	t=0	t=1	t=0	t=1
Q_1	0.000	0.000	0.011	0.041	0.000	0.000	0.000	0.047
Q_2	0.091	0.104	0.289	0.335	0.091	0.101	0.281	0.479
Q_3	0.417	0.434	1.861	1.936	0.417	0.438	1.713	2.884
Mean	0.658	0.639	1.899	1.925	0.658	0.675	1.928	1.964
$R=Q_3 - Q_1$	0.417	0.434	1.850	1.895	0.417	0.438	1.713	2.837
R / Q_2	4.565	4.180	6.390	5.664	4.565	4.351	6.093	5.923
#Obs	2781	2781	318	318	2781	2781	283	283

R&D Expense/ Total Expense	Lag 3				Lag 4			
	p=0		p=1		p=0		p=1	
	t=0	t=1	t=0	t=1	t=0	t=1	t=0	t=1
Q_1	0.000	0.000	0.018	0.085	0.000	0.000	0.000	0.120
Q_2	0.091	0.106	0.389	0.557	0.091	0.130	0.398	0.503
Q_3	0.417	0.419	2.262	2.343	0.417	0.521	2.694	2.615
Mean	0.658	0.632	2.117	2.191	0.658	0.674	2.296	2.262
$R = Q_3 - Q_1$	0.417	0.419	2.244	2.258	0.417	0.521	2.694	2.494
R / Q_2	4.565	3.940	5.768	4.057	4.565	4.003	6.767	4.960
#Obs	2781	2781	247	247	2781	2781	216	216

R&D Expense/ Total Expense	Lag 5				Lag 6			
	p=0		p=1		p=0		p=1	
	t=0	t=1	t=0	t=1	t=0	ct=1	t=0	t=1
Q_1	0.000	0.003	0.002	0.118	0.000	0.000	0.018	0.198
Q_2	0.091	0.125	0.527	0.757	0.091	0.135	0.553	0.877
Q_3	0.417	0.567	2.973	3.312	0.417	0.565	3.348	3.220
Mean	0.658	0.681	2.394	2.496	0.658	0.694	2.817	2.754
$R = Q_3 - Q_1$	0.417	0.564	2.971	3.193	0.417	0.565	3.329	3.022
R / Q_2	4.565	4.507	5.639	4.218	4.565	4.181	6.020	3.444
#Obs	2781	2781	177	177	2781	2781	89	89

Table 2.3: Exports/ Sales:

Exports/ Sales	Lag 1				Lag 2			
	p=0		p=1		p=0		p=1	
	t=0	t=1	t=0	t=1	t=0	t=1	t=0	t=1
Q_1	0.00	0.00	3.65	3.78	0.00	0.00	2.85	3.82
Q_2	0.42	0.60	20.72	20.11	0.42	0.30	20.69	20.56
Q_3	13.29	14.71	53.56	56.33	13.29	11.99	54.68	56.46
Mean	12.95	13.29	31.76	31.75	12.95	12.26	31.97	31.68
$R = Q_3 - Q_1$	13.29	14.71	49.91	52.56	13.29	11.99	51.83	52.64
R / Q_2	31.446	24.640	2.409	2.614	31.446	40.225	2.505	2.560
#Obs	2781	2781	318	318	2781	2781	283	283

Exports/ Sales	Lag 3				Lag 4			
	p=0		p=1		p=0		p=1	
	t=0	t=1	t=0	t=1	t=0	t=1	t=0	t=1
Q_1	0.00	0.00	2.85	3.30	0.00	0.00	4.34	2.71
Q_2	0.42	0.32	22.38	17.75	0.42	0.37	23.18	20.46
Q_3	13.29	12.84	61.07	56.04	13.29	12.52	62.26	58.35
Mean	12.95	12.27	33.99	31.39	12.95	12.38	34.66	31.81
$R = Q_3 - Q_1$	13.29	12.84	58.23	52.75	13.29	12.52	57.92	55.64
R / Q2	31.446	39.639	2.601	2.971	31.446	33.729	2.499	2.720
#Obs	2781	2781	247	247	2781	2781	216	216

Exports/ Sales	Lag 5				Lag 6			
	p=0		p=1		p=0		p=1	
	t=0	t=1	t=0	t=1	t=0	ct=1	t=0	t=1
Q_1	0.00	0.00	4.69	3.81	0.00	0.00	6.56	4.81
Q_2	0.42	0.19	22.18	18.98	0.42	0.12	23.26	22.31
Q_3	13.29	12.39	55.99	58.88	13.29	13.35	69.01	65.47
Mean	12.95	12.11	33.92	31.80	12.95	12.35	37.42	35.03
$R = Q_3 - Q_1$	13.29	12.39	51.30	55.07	13.29	13.35	62.45	60.66
R / Q2	31.446	63.608	2.313	2.902	31.446	113.126	2.685	2.719
#Obs	2781	2781	177	177	2781	2781	89	89

Table 2.4: Expense/ Sales

Expense/ Sales	Lag 1				Lag 2			
	p=0		p=1		p=0		p=1	
	t=0	t=1	t=0	t=1	t=0	t=1	t=0	t=1
Q_1	94.529	94.889	91.790	93.592	94.552	94.072	90.750	93.078
Q_2	98.756	99.321	96.454	98.196	98.768	98.647	95.882	97.717
Q_3	102.969	104.001	101.075	103.716	102.995	102.906	100.688	104.269
Mean	100.657	101.017	96.300	99.584	100.739	100.319	95.677	99.677
$R=Q_3 - Q_1$	8.440	9.112	9.285	10.124	8.443	8.834	9.938	11.191
R / Q2	0.085	0.092	0.096	0.103	0.085	0.090	0.104	0.115
#Obs	2781	2781	318	318	2781	2781	283	283
Expense/	Lag 3				Lag 4			

Sales	p=0		p=1		p=0		p=1	
	t=0	t=1	t=0	t=1	t=0	t=1	t=0	t=1
Q_1	94.525	95.303	90.600	92.669	94.553	95.891	89.157	92.471
Q_2	98.742	99.352	95.832	99.068	98.771	99.817	95.512	98.552
Q_3	102.970	103.649	100.986	104.735	102.999	105.156	100.299	105.233
Mean	100.708	101.238	95.988	100.998	100.754	102.158	95.041	100.847
$Q_3 - Q_1$	8.445	8.346	10.386	12.066	8.446	9.265	11.142	12.762
R / Q2	0.086	0.084	0.108	0.122	0.086	0.093	0.117	0.129
#Obs	2781	2781	247	247	2781	2781	216	216

Expense/ Sales	Lag 5				Lag 6			
	p=0		p=1		p=0		p=1	
	t=0	t=1	t=0	t=1	t=0	ct=1	t=0	t=1
Q_1	94.554	96.071	87.915	93.652	94.529	96.330	85.237	89.953
Q_2	98.765	99.882	94.704	98.224	98.751	100.028	92.995	98.411
Q_3	102.992	104.795	99.642	104.559	102.941	105.367	98.559	109.857
Mean	100.712	102.448	93.495	101.586	100.652	103.540	92.052	105.375
$R=Q_3 - Q_1$	8.439	8.724	11.727	10.907	8.413	9.037	13.323	19.903
R / Q2	0.085	0.087	0.124	0.111	0.085	0.090	0.143	0.202
#Obs	2781	2781	177	177	2781	2781	89	89

Table 3: qDiD effect of OFDI on select ratios (not in percent) of Indian firms

	Profit After Tax/Sales					
Post-OFDI #year	1	2	3	4	5	6
1st Quartile	-0.010(0.001***)	-0.017(0.000***)	-0.023(0.000***)	-0.032(0.000***)	-0.028(0.000***)	-0.049(0.000***)
Median	-0.009(0.183)	-0.019(0.000***)	-0.020(0.003***)	-0.017(0.030**)	-0.025(0.002***)	-0.022(0.003***)
3rd Quartile	-0.010(0.450)	-0.030(0.050**)	-0.026(0.034**)	-0.028(0.044**)	-0.032(0.036**)	-0.007(0.766)
mean	-0.018(0.008***)	-0.046(0.000***)	-0.046(0.000***)	-0.053(0.000***)	-0.057(0.000**)	-0.083(0.000***)

	Research & development expenses (capital & current account)/Expense					
Post-OFDI #year	1	2	3	4	5	6
1st Quartile	0.000(0.000***)	0.000(0.000***)	0.001(0.000***)	0.001(0.000***)	0.001(0.000***)	0.002(0.000***)
Median	0.000(0.618)	0.002(0.003***)	0.001(0.069*)	0.001(0.566)	0.002(0.019**)	0.003(0.000***)
3rd Quartile	0.000(0.858)	0.011(0.000***)	0.001(0.814)	-0.002(0.414)	0.002(0.554)	-0.003(0.206)
mean	0.001(0.765)	0.001(0.814)	0.001(0.647)	-0.000(0.973)	0.001(0.767)	-0.001(0.840)

	Exports of goods and services/ Sales					
Post-OFDI #year	1	2	3	4	5	6
1st Quartile	0.005(0.000***)	0.010(0.000***)	0.004(0.000***)	-0.016(0.000***)	-0.009(0.000***)	-0.018(0.000***)
Median	-0.008(0.474)	0.000(0.995)	-0.045(0.001***)	-0.027(0.022**)	-0.030(0.006***)	-0.006(0.657)
3rd Quartile	0.007(0.891)	0.023(0.620)	-0.054(0.360)	-0.040(0.432)	0.027(0.661)	-0.045(0.372)
mean	-0.005(0.713)	0.002(0.888)	-0.022(0.123)	-0.025(0.073*)	-0.016(0.256)	-0.020(0.180)

	Total expense / sales					
Post-OFDI #year	1	2	3	4	5	6
1st Quartile	0.013(0.255)	0.026(0.011**)	0.012(0.210)	0.020(0.096*)	0.042(0.000***)	0.028(0.108)
Median	0.012(0.068*)	0.020(0.007***)	0.027(0.000***)	0.020(0.009***)	0.025(0.000***)	0.041(0.002***)
3rd Quartile	0.014(0.230)	0.035(0.001***)	0.030(0.011**)	0.028(0.020**)	0.032(0.018**)	0.092(0.000***)
mean	0.026(0.000***)	0.043(0.000***)	0.043(0.000***)	0.042(0.000***)	0.062(0.000***)	0.106(0.000***)

p-values are in parentheses. Inference:*** p<0.01; ** p<0.05; * p<0.1

4.3 Estimate of quantile difference in difference (qDiD) effect

It is observed that in the Indian context 'home' effect of OFDI is a slow process and in certain cases direction may change over the year. Effects (dimension, intensity and significance level) of OFDI are not same across segments (upper, median or lower) of the distribution of the selected variables and effect is found to be mostly muted when it is analysed on the bases of mean of the distribution (i.e. general DiD effect).

PAT/Sales: negative DiD effect of OFDI on PAT/sales intensified over the period for small firms (lower segment of the distribution). Negative DiD effect of OFDI is also witnessed for the median of the Pat/sales distribution which intensifies over the periods for five years after initiation of OFDI, however, negative effect softens in the sixth year. Similarly upper segment of the distribution also witnessed negative effect of OFDI which deepen over the periods for five years; however, effect of OFDI is insignificant in the sixth year. Mean of the distribution also witnessed negative effect of OFDI for all six years, however, negative effect was smallest in the first year and increase in second year and remain at that level till 5th year and again surge to highest negative effect in the sixth year mainly due to negative effect witnessed by the first quartile in the sixth year. In sixth year after initiation of OFDI firms in lower segment of PAT/Sales distribution witnessed

highest negative effect which is much higher than the negative effect witnessed by the median, whereas, upper quartile witnessed insignificant effect.

R&D/Expense: Lower segment (first quartile) of the firms 'R&D expenditure to total expense' distribution experiences positive DiD effect of OFDI which maximised in sixth year years. Median segment also experiences positive effect of OFDI, marginally higher than lower segment and maximised in 6th year. Largely insignificant effect of OFDI observed for upper segment (third quartile) of the distribution except for the second year after initiation of OFDI when positive effect is observed. DiD effect is insignificant for mean of the R&D expenditure distribution for all six lag years (after initiation of OFDI) under study.

Export/sales: OFDI induces higher exports for lower segment of export/sales distribution in the initial years and thereafter, exports declines. Lower segment of export/sales distribution witnessed successive positive DiD effect of OFDI in first three years and peaked in second year, however, it declines successively and becomes negative effect fourth years onwards. Median of export/sales distribution experiences negative effect of OFDI in third year onwards. Upper segment (and also mean) of the distribution witness insignificant effect for all the lag periods under study.

Expense/Sales: Positive and significant effect of OFDI is observed for mean of expense/sales ratio of firms and across different lags and the positive effect is highest in sixth year. Positive and significant effect of OFDI is also observed for median and upper segment of expense/sales ratio of firms and across different lags and the positive effect is higher for the upper segment than median class which maximised in sixth year. Lower segment witnessed both positive and negative effect over the year and effect is insignificant in sixth year.

5. Summary and Conclusion:

The Indian corporate as part of their future growth plan aggressively look for the globalization opportunity through OFDI to acquire strategic asset, expansion of market base, improvement of managerial skill, access and absorption of technological know-how. Indian OFDI (in the form of 'Equity', 'Loan', 'Guarantee') has increased and diversified substantially in the last 10 years. Annual average of Indian OFDI during last 5 years is around 35 billion USD which is more than double the average of Indian OFDI during the previous five years. OFDI in terms of equity and loan combine in last five years is much lower than OFDI in the form of guarantee issued. However, guarantee invocation is negligible as compared to recent surge in guarantee issued. Uptrend in issuance of guarantee indicates highly leveraged nature of acquisitions by Indian companies and could be a potential concern for banks/companies.

We analyse the effect of OFDI decision of Indian corporate on firm level characteristics in terms of various financial ratios such as exports-to-sales, expense-to-sales, PAT-to-sales and R&D expense to total expense ratios. Characteristics of OFDI firms are significantly different from non-OFDI firms in many aspects. To estimate the effect of OFDI on home performance of Indian corporate we focus on difference in difference (DiD) estimates. Moreover, as effect of OFDI decision of firms on its home performance is likely to differ across firms, due to firm heterogeneity, we also investigate effects of OFDI on the whole distribution (DiD effect on various quartiles) to better understand differential effect of OFDI on different segment of the distribution.

It is observes that Indian MNEs are relatively superior to the Indian national firms in terms of average of exports-to-sales, expense-to-sales, PAT-to-sales and R&D expense to total expense ratios also OFDI leads to reduction of inequality of firms.

Group of firms with relatively high level of operating ratio (3rd quartile) as well as median of the Operating ratio distribution witness deterioration in post OFDI period and maximum negative DiD effect is observed in the sixth year. OFDI also intermittently affect firms which are relatively in sound footing (first quartile) in terms of operating ratios and no significant DiD effect is observed in the 6th year. Intensity of DiD effect due to OFDI to 1st quartile is twice as stronger the effect to median.

OFDI also negatively impact profit margin of group of firms with relatively low level of pre-ofdi profit margin (1st quartile) as well as median of the distribution which worsen and maximum DiD effect is observed in 5th to 6th year of post-ofdi period. Intensity of effect due to OFDI to 1st quartile is twice as stronger the effect to median. OFDI also affect intermittently to groups of firms having high level of profitability ratios (3rd quartile) and no significant DiD effect is observed in the 6th year.

OFDI negatively affect exports of group of firms with relatively low level of pre-ofdi exports (1st quartile) and maximum negative effect is observed in 6th year of post-ofdi period, however, DiD effect was positive in the first three years. No significant impact of OFDI to group of firms with relatively high level (3rd quartile) of exports, however, OFDI occasionally affect median and no significant DiD effect is observed in the 6th year.

However, OFDI leads to increase in R&D expense of group of firms with relatively low level of pre-ofdi R&D expense (1st quartile) as well as median of the distribution and maximum effect is observed in 6th year of post-ofdi period. Intensity of DiD effect due to OFDI is stronger for the median. No significant DiD effect is observed due to OFDI to group of firms with relatively high level of R&D expenses (3rd quartile).

'Home' effect of Indian OFDI is a slow process and true effect of OFDI is revealed as time progress. Also effects (dimension, intensity and significance level) of OFDI

are not same across segments (top, median or bottom) of the distribution of the selected variables and effect is found to be mostly muted when it is analysed on the bases of mean of the distribution (i.e. general DiD effect). Indian OFDI leads to (a) reduction of inequality of Indian firms (b) improvement in R&D expense of firms except those firms with already relatively high expenditure (3rd quartile) (c) exports to sales initially improve for three years and then worsen for small firms (first quartile), however, for the mid-size firms (median) it worsens after one year and (d) median of operating ratio (expense/sales) as well as after tax profit margin (PAT/sales) worsened over the year.

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Annex

Table 1: Literature survey

#	Author	Findings
1	Feldstein (1995)	OFDI reduces domestic investment (one-to-one ratio). Data from OECD countries for the 1970s and 1980s
2	Andersen and Hainaut (1998)	OFDI reduces domestic investment, (may not be one-to-one ratio). Data for the US, Japan, Germany, and the UK from the 1960s and 1990s
3	Herzer and Schrooten (2007)	For Germany Long-run: OFDI has a negative effect on domestic investment, but in Short-run effect is positive. For the US a positive long-run effect on domestic investment observed.
4	Desai et al. (2005)	Firms whose foreign operations expand simultaneously expand their domestic operations (US)
5	Sauramo (2008)	outward FDI decreases the domestic investment rate by a one-to-one ratio (aggregative data for Finland over the period 1965–2006)
6	Stevens and Lipsey (1992),	strong positive correlation between OFDI and domestic investment (data for seven US MNEs, 16-20 years)
7	Hejazi and Pauly (2003)	Impact of OFDI varies according to the investment partner. For example, Canada's OFDI to the US increases, OFDI to the UK has a neutral effect for home country, however, Canadian OFDI to the rest of the world reduces its domestic investment (industry level data for Canada 1984–95)
8	Imbriani et al. (2011)	Negative effect of OFDI on employment in services sector, however, positive effect in productivity in the manufacturing sector (firm-level data for Italy for the period 2003-2006).
9	Lee et al. (2009)	FDI outflows to China raise the source country's unemployment rate and decrease the exports to GDP ratio for small source countries (Hong Kong, Singapore, Taiwan, and Korea)
10	Al-Sadig, 2013	FDI outflows negatively impact the rate of domestic investment (Macro-economic data data from 121 developing and transition economies over the period 1990–2010)
11	Globerman	OFDI promoted faster revenue growth for the Canadian MNEs which

	(2012)	stimulated increased domestic investment in later time periods (22 Canadian MNEs 2000-10: Complementary effects)
12	Navaretti and Castellani (2004)	They examine the effects of foreign investment on the home activities of MNEs in Italian manufacturing. They observed that investing abroad significantly boosts performance at home. The rate of growth of total factor productivity and output is significantly higher for investing firms, and it accelerates after the investment.
13	Ayumu (2012)	higher employment growth, overall sales and/or exports for firms that initiated FDI than those that remained exclusively domestic (For Japanese manufacturing, wholesale, and service sector firms that initiated OFDI during 2003-2005)
14	Simpson (2012)	"Relocating low-skill activity to relatively low-wage economies could enable a firm to expand output, with potential positive effects on investment, employment and output in complementary (high-skill) activities at home (UK: firm level data 1998-2004)"
15	Herzer (2012)	For Germany: Observed a positive relationship (bidirectional causality) between outward FDI and domestic output as well as between outward FDI and total factor productivity (productivity-enhancing, and thus growth-enhancing, effects of outward FDI).
16	Pradhan and Singh (2009)	For Indian automotive industry: favorable impacts on R&D intensity appear to be stronger for developed vs. developing host nations, and for joint venture vs. wholly-owned ownership OFDI
17	Kim (2000)	For Korea. No significant negative effect on home country performance. However, due to high share in OFDI of developing countries and close associations between parents and foreign subsidiaries seem to have contributed to the positive effect on exports through increased exports from parents to foreign subsidiaries.
18	Chen and Yang (2013)	For Taiwan: technological advances and the technical efficiency of Taiwan's manufacturing firms are positively correlated with their OFDI activity (firm-level panel data from Taiwan's manufacturing industries from 1987 to 2000).
19	Herzer (2011)	(i) outward FDI has, on average, a positive long-run effect on total

		factor productivity in developing countries, (ii) increased factor productivity is both consequence and a cause of increased outward FDI, and (iii) there are large differences in the long-run effects of outward FDI on total factor productivity across countries (for a sample of 33 developing countries over the period 1980-2005)
20	Masso et al. (2008)	for Estonia: OFDI had a positive impact on the home-country employment Growth and also OFDI from low-cost transition and developing economies differs from that of high-income countries
21	Falzoni and Grasseni (2005)	For Italy: found mixed results. Effect of OFDI on parents' performance (measured in terms of total factor productivity, labour productivity and employment) varies across firms in different quintiles of the performance distribution and across foreign affiliates' geographical locations. Firms do not benefit from FDI in less developed county. However, parent firms in the upper quintile of productivity positively affected by foreign expansion in developed countries.
22	Herzer (2008b)	In the long-run, however, OFDI has positive effects on domestic investment, however, in short-run OFDI substitutes foreign for domestic activities (for Italy using macroeconomic time series)
23	Markusen, 2002	Argued that OFDI can raise the demand and wages for skilled labour in both the home and host country (positive for both countries) as activities transferred by multinationals to low-cost countries are unskilled-labour intensive from the point of view of the home economy, but skilled-labour intensive from the point of view of the host country.
24	Hijzen et al. (2007)	Japanese FDI tends to boost both output and employment at Japanese parent firms (Firm level data 1995 and 2000)
25	Imbriani, C., Pittiglio, R. and Reganati, F. 2011	Italian OFDI has limited effects on domestic employment and performance. However, results differ significantly for manufacturing and services sector. In the manufacturing sector, OFDI improves productivity and to some extent to employment, in the service sector a negative effect on employment (firm-level data for Italy for the period 2003-2006) was observed.

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