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Antecedents of R&D Intensity for Emerging Economy Firms: Evidence from India[1]

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Antecedents of R&D Intensity for Emerging Economy Firms: Evidence from India[2]

I study the industry-level antecedents that determine the R&D intensity of the incumbent firms. Specifically, I examine the effect of industry export orientation, industry capital intensity, and dominance of foreign MNCs. I also study the moderating effect of the business group affiliation of incumbent firms on these relationships. By using random-effects GLS regression to study the private sector non-financial firms of India for the time period of 1999-2015, I find that industry export orientation (positively), capital intensity (negatively) and dominance of foreign MNCs (negatively) impact the R&D intensity of incumbent domestic firms. Moreover, business group affiliation positively moderates the innovativeness of affiliates. I conclusively establish the importance of industry characteristics on the R&D intensity of domestic firms of emerging market economies. The results also highlight the compounding effect of business group affiliation on the relationship between industry characteristics and a firm's R&D intensity.

Keywords ó R D intensity industry export intensity industry capita intensity foreign MNCs

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Introduction

A p ethora of papers have studied the antecedents and outco es of fir sø innovativeness and this strea of research is a centra the e in the do ain of strategic anage ent research Innovation is deter ined by the eadership both at individua eve and group eve the pper Eche on heory anageria evers organisation eve Resource Based Qiew and Dyna ic Capabi ities Qiew and business processes process eve Process heory Crossan Apaydin 2 he process and outco e constitute the two di ensions of the concept of innovation hi e the distinction is b ur the for er dea s with the anner in which innovation ta es p ace and the atter is concerned with the nature ind and type Crossan Apaydin 2 Fo owing the Penrosian approach Penrose 9 9 broad y these studies probed fir eve heterogeneity and ost y o itted the effects of externa environ ents such as industry contexts on fir sø

the fir eve R D intensity I a so posit that industry capita intensity wi negative y re ate to the fir sø R D intensity because techno ogy upgradation in these industries require heavy invest ents hus incu bent fir s wi have a higher propensity to focus on exp oitative activities as against exp oration whi e in capita intensive industries OøRei y ush an 2 4 I a so hypothesize that the do inance of foreign u tinationa s wi i pe the do estic fir s to reduce their R D co it ent to focus on conso idating their existing ar et position Moreover business groups do inate the corporate andscape of e erging

Theory and Hypotheses

he structure conduct perfor ance S C P paradig in its conventiona understanding argued that the industry structure dictates the conduct of fir s in the industry and this conduct drives fir perfor ance Bain 9 , Mason 9 9 It is the sa ient characteristics of the industry environ ent that critica y decides the conduct of fir s such as innovativeness and in turn perfor ance of the fir s However subsequent research high ighted the static nature of the conventiona understanding of the S C P paradig McGahan 2 4, Porter 9 he institutiona transitions i e the e aborate changes that redefine the ru es of the ga e for incu bent fir s in an industry ay be either incre enta or discontinuous Peng 2 he si u taneous interp ay between incre enta and discontinues transitions is understood as õ*although institutions evolve through relatively long periods of stability during which incremental changes occur, such an evolution is also likely to be punctuated by discontinuous transformation*ö Peng 2 · 2 9 Industry change on the other hand is a bit restrictive and is a subset of the institutiona transitions he tra ectory of industry change depends on whether the incu bentsø core assets or core activities if not both are threatened and ta es one of the paths ó progressive creative inter ediating or radica McGahan 2 4 In a re ative y stab e environ ent when core activities are not threatened a fir can rep y on exp oitation However fir s face axi a difficu ty in addressing inter ediating

export orientation a beit in an inverse fashion on the fir sø innovativeness in e erging
ar et econo ies

shou d be pro   oted in a nationø

et a 2 , Khanna Pa epu 2 b and or transitioning Guo et a 2 , O para 2 9, sang 2 2 whi e achieving a higher growth tra ectory However this a so resu ted in the

his argu ent is a so consistent with the iterature on positive spi over that is that the do estic fir s benefit as co petition fro foreign and other do estic fir s force the to upgrade their productivity and techno ogy Sinani Meyer 2 4 hi e entry of those p ayers has been proven to i prove the productivity of host country incu bent fir s the spi over has been found to be positive on y at advanced eve of econo ic deve op ent K aus E Meyer Sinani 2 9 Further ongitudina studies in the context of e erging and transitioning econo ies actua y conc uded the presence of either no or negative spi over to do estic fir s For exa p e research on India found that on y MNCs gain fro either othersø R D spi overs Feinberg Ma u dar 2 and that oca fir s donøt benefit fro foreign presence at a Kathuria 2 Li ewise whi e no evidence of spi over was found in Morocco Haddad Harrison 99 and Qenezue a actua y indicated the presence of negative spi over na e y ÷ ar et stea ingø Ait en Harrison 999 Si i ar resu ts of negative or non existent spi overs were found for Bu garia Ro ania Po and Konings 2 and Czech fir s D an ov Hoe an 2

The Role of Business Groups

In a recent review paper Ho es et a Forthco ing e phasised the i portance of business groups on econo ic deve op ent and innovation in e erging ar et econo ies It is worth noting that e erging ar ets ac in ter s of strong entrepreneuria sectors and business groups p ay a ead ro e in deve oping soft infrastructures for innovation Dunning Lundan 2 , Mah ood Mitche 2 4 Chang Chung Mah ood 2 find that group affi iated fir s are ore innovative in South Korea but not in aiwan and exp ain these differences through the institutiona differences between these two countries Si i ar y Be enzon Ber ovitz 2 a so observe that business groups pro ote corporate innovation especia y in industries that depend on externa finance and characterised by high

infor ation asy etry In other words business groups pro ote affi iates innovativeness in the presence of wea factor ar ets and institutions Li Kozhi ode 2 9 o su up institutiona context does atter More i portant y not on y business groups faci itate innovation by providing institutiona infrastructure for affi iated fir s but a so groups create entry barriers for non affi iated fir s in these econo ies Mah ood and Mitche 2 4

A p ethora of studies fo owing the se ina wor s of Khanna and Pa epu 2 a,

affi iated fir s wi be in a better position to i port techno ogy fro advanced econo ies and their reputation wi he p the to estab ish oint ventures with foreign MNCs Khanna Pa epu 2 b, Zhao Anand Mitche 2 hus Chari Dixit 2 · 9 argue that the i e ihood of *"business start-up by business groups … is greater in industries privatised by reforms and in industries with greater foreign firm presence"* with respect to stand a one fir s hus I hypothesise

> ***Hypothesis 4:*** *Business group affiliation will positively moderate the relationship between industry export orientation and the R&D intensity of a firm.*

> ***Hypothesis 5:*** *Business group affiliation will positively moderate the relationship between industry capital intensity and the R&D intensity of a firm.*

> ***Hypothesis 6:*** *Business group affiliation will weaken the negative relationship between the dominance of foreign MNCs and the R&D intensity of a firm.*

Data and Methods

I set the study in India an e erging ar et econo y where the process of econo ic ibera isation has sharp y changed the institutiona context in the post refor era Since ear y 99 s India has e bar ed on a path of econo ic refor s that has ed to substantia changes in the institutiona context For exa p e India has achieved a pheno ena growth o entu in internationa trade suggesting greater participation by Indian fir s in foreign ar ets as we as foreign fir s in Indian ar ets in the years to co e hus these ar et oriented institutiona changes in Indian context provide an idea context to exp ore the innovation orientation of Indian fir s Moreover the existence of nu erous business groups in Indian corporate andscape and the avai abi ity of reasonab y detai ed data a so provide an

idea setting to exp ore how business group affi iation oderates the innovation orientation of fir s It is worth to note that business groups have continued to re ain a do inant force even during the post refor era an outco e quite at odds with the predictions of a series of papers by researchers exa ining the ro e of business groups in the new institutiona environ ent

I extract data fro the Centre for Monitoring Indian Econo y CMIE database which is a wide y accepted secondary database for Indian fir s CMIE database provides detai ed infor ation on the financia perfor ance of fir s co pi ed fro their audited

eve export intensity of a fir s in the sa e 2 digit NIC code I operationa ized fir sø export intensity as foreign exchange earnings through exports of goods and services divided by the net sa es of the sa e year Si i ar y I operationa ize industry capita intensity *Ind_Tang* as a year wise edian of tangibi ity fir sø net fixed assets of a fir divided by the tota assets of the sa e year of a fir s in the sa e 2 digit NIC code I ca cu ate do inance of foreign MNCs *MNC_Share)* as cu u ative sa es of a MNCs divided by the cu u ative sa es of a private sector fir s i e Indian private sector fir s as we as MNCs in the sa e 2 digit NIC code

he next set of hypotheses investigates how business group affi iation BGA oderate the re ationship between various industry characteristics and fir sø innovation orientation So to test the oderating effects of BGA I use a du y variab e if the fir is affi iated with a business group and otherwise CMIEøs c assification of fir s into groups based on õ í hkt o øs history onitoring its announce ent c ose y and exa ining directorate inter oc sö Khanna Riv in 2 · is used for assigning the group affi iation to individua fir s his CMIE group affi iation has been used by prior e pirica studies on Indian business groups Khanna Pa epu 2 b, Oissa et a 2

Next I have considered an exhaustive set of fir eve contro variab es Prior studies observe a positive inf uence on intangib e resources and innov a ff d ti ss p b ds ria2 MNCs R 2 Fin R sI L P d ang R

as an i portant deter inant of fir øs export intensity So I contro ed for age *(Ln_Age)* by

around fir s in

characteristics atter even after contro ing industry eve R D orientation I set the study in India and considered an exhaustive dataset of around 4 fir year observations for a year period fro 999 2 to test the hypotheses My e pirica evidence strong y suggests that industry eve export orientation positive y i pacts fir eve R D intensity whereas the industry effect is reverse in capita intensive industries It is a so worth noting Indian business groups are ost y in capita intensive industries Interesting y the innovation orientation is i peded when the do estic fir s face do inance of foreign MNCs in the industry However this is not the case for business group affi iated fir s Broad y deve oping econo y fir s are at a co petitive disadvantage when it co es to techno ogica sophistication but business group affi iated fir s are not fraught with this pitfa his paper de onstrates that business group affi iation positive y i pacts the innovativeness of affi iates o su up I conc usive y estab ish the i portance of industry characteristics on the innovation orientation of do estic fir s of e erging ar et econo ies he resu ts a so high ight the co pounding effect of business group affi iation on the re ationship between industry characteristics and a fir øs innovation orientation

I a so ac now edge certain i itations of this study In the CMIE database I was constrained to e i inate any fir s as they did not report any R D intensity Incidenta y this a so resu ted in the e i ination of fir s with a s a er sca e Moreover except the trend variab e which is a crude proxy of institutiona transitions c n t ter nsive 9or 4 f 99 44 c 4 onsi

of free ar et echanis s i e ar ∅s ength transactions hese issues need to be exp ored further

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Table 2: Effects of Industry Characteristics on R&D Intensity & Moderating Effects of BGA

	M1	M2	M3	M4	M5	M6	M7
Ind_ExpInt		2					
Ind_Tang							
MNC_Share							
*BGA*Ind_ExpInt*							
*BGA*Ind_Tang*						2	
*BGA*MNC_Share*							
BGA							
Fin_Resource							
Intang_Resource	4	4	4	4	4	4	4
Leverage							
ROA							
Ln_Sales							
Ln_Age							