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WORKING PAPER

**E-COMMERCE, AND THE INDIAN
RETAIL AND MANUFACTURING
SECTORS - AN EMPIRICAL
ANALYSIS WITH A SPECIAL
FOCUS ON ORGANISED SECTOR
MSMES**

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E-Commerce, and the Indian Retail and Manufacturing Sectors
- An Empirical Analysis with a Special Focus on Organised Sector MSMEs

Nibha Bharti¹, Sugandha Huria², Ashley Jose³ & Kanika Pathania⁴

Abstract

The sudden boom in the e-commerce sector (due to its key players) has been questioned in several economies in the world, particularly so in India. The country's Traders associations have complained that the sector has been growing at the expense of the offline retail sector, primarily the MSMEs. In this context, this study is one of the first attempts to analytically evaluate the significance of booming online retail on India's production economy (including both manufacturing and retail segments). The results indicate while e-commerce has assumed a significant role in positively impacting the sales of the overall retail and manufacturing sector of the country (on average) during the period 1992-2020, the same does not hold true for its MSMEs. The impact on MSMEs has been positive, though not significant – indicating the untapped potential of the MSMEs to take advantage of the growing online commerce. Similar results hold true for the overall retail and MSME retail when it comes to their GVC intensity. The findings advocate re-considering the country's e-commerce policy, which is still in its draft stage presently.

Key Words: *E-commerce, India, Retail Sector, Manufacturing Sector, MSMEs*

JEL Codes : F14, F23, L86, D22

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1. Introduction

The fourth industrial revolution has led to the digitalization of economic activities around the globe. Big e-commerce firms have been the leaders on this front. Like most countries in the world, India too has been witnessing an expansion in its e-commerce sector in recent years. Factors such as the growing penetration of smartphones, cheap modes of communication, better logistics systems, digital payments, and an expanding workforce, among others, have contributed significantly to the growth of its e-commerce sector. E-commerce earlier have limited capture of products but today they have multiple product ranges including electronics, apparel, grocery, loan to Kirana stores, etc. E-commerce share in India comprises a small share of the total retail market. According to the Economic Survey, the e-commerce market has been estimated at USD 43 billion for 2018-19, at a growth rate of 12 per cent. The latest report by the IBEF estimated that the overall e-commerce market will reach USD 75 billion in 2022, experiencing a growth rate of 21.5 per cent. The sector is expected to attain USD 350 billion by 2030. This will help India's vision to become a trillion-dollar digital economy by 2025.

In the context of the Indian economy, however, there exists contrasting evidence as identified from the literature and media reports. The first evidence supports the e-commerce sector since it contributes to job creation, provides wider choices for consumers, creates a new platform for marketing products, and hence, contributes to the overall growth of the economy. A study by Sarkar & Bhattacharya (2020) claimed that the e-commerce sector involves advanced technology with a higher innovation rate and increasing returns to scale with low marginal cost, which, in turn, creates higher profits for several businesses. This highlights the potential gains to the Indian economy if more of its firms go online. As regards the Indian Micro, Small, and Medium Enterprises (MSMEs), as well, several studies have claimed that MSMEs who sell their products through e-commerce platforms have benefited greatly from doing so. For example, according to a Yes Bank survey conducted in 2018 of over 2700 Indian MSMEs across 20 industries, MSMEs engaging in e-commerce practices have the potential to improve the sector's GDP (Gross Domestic Product) contribution as well as increase the employment opportunities for the country's growing workforce (Economic Times (2019)). A report by KPMG (2015) also argues in favour of the impact of the e-commerce sector on online MSME firms. Very recently, an attempt has been made by the 'Indian Council for Research on International Economic Relations' (Goyal et al., (2022)) to assess the impact of the e-commerce sector on the MSMEs in India. However, the study considered only a subset of the online MSMEs and utilizes data that covers only a single year. The Covid-19 pandemic has acted as another catalyst for the expansion of the e-commerce sector not only in India but in most countries in the world (World Trade Organization (WTO), 2020). While digitalized firms survived and even thrived during the pandemic, a good proportion of their offline counterparts witnessed a decline in their revenues with some offline firms even shutting down their operations (Economic Times, 2022). This evidence clearly spells out the importance of the growing e-commerce in the country.

On the contrary, the second evidence put forth several allegations raised against the country's e-commerce sector, more specifically the two leading foreign players, viz. Flipkart (or Walmart) and Amazon. Together, these two e-commerce majors contribute to around 63.10 per cent of



the total e-retail segment in India.⁵ The complaints have primarily been raised by the country's Traders Associations⁶ (representing a group of small and medium businesses) regarding un-fair monopolistic practices that big e-commerce players practice in the country. Some of these practices are predatory pricing, deep discounting, preferential treatment for some sellers, and among others (Competition Commission of India (CCI), (2019), (2020); Sarkar & Bhattacharya (2020); Aparna (2021)). The Traders' Associations have claimed that such practices have been abating the pool of business opportunities available (especially) for Indian retail MSMEs (Bundhun, 2020), due to which their survival is now at stake, specifically post the first two main waves of the Covid-19 pandemic. Additionally, as reported in Business Today.In (2021, June), more than 40,000 trade organizations in the country together argued that such practices would ultimately result in a large e-commerce sector (which is growing at a rapid rate) leading the entire Indian retail market in the long run. Citing the importance of the associations' campaign against e-commerce majors, one of the Confederation of All India Traders (CAIT's) officials also said that,

"Therefore, there is an urgent need to purify the e-commerce landscape of the country so that even a small trader can also adopt and accept the e-commerce business as an additional avenue for raising his revenue and make Prime Minister Narendra Modi's Atmanirbhar Bharat campaign a success"

With MSMEs assuming a crucial role in India contributing to nearly 30 per cent of the country's GDP, 40 per cent of its non-agricultural employment, and approximately half of its exports, it is thus imperative for the country's government to take note of such cases. However, with the first set of evidence in place (i.e., in favour of the e-commerce sector), in conclusion, it seems that a balanced view needs to be considered by the government whilst formulating relevant policies, as more and more of both MSME and non-MSME firms are also expanding their online operations in the country (MSME, 2021-22).

Against this backdrop, the present study adds to the literature in three novel ways. The first is by understanding the problem at hand and attempting to conduct an international comparison of the problems being raised against e-commerce majors. Second, given the limited data on online marketplaces in India, this paper makes one of the first attempts to quantitatively assess the impact of the Indian e-commerce sector on the performance of its retail MSMEs, the retail sector as a whole, the manufacturing MSMEs and also the manufacturing sector as a whole. The effects on the latter two segments have been considered since e-commerce platforms are a part of the retail sector, which, in turn, has prominent backward linkages to the manufacturing sectors since it utilizes manufacturing products for its business operations.

The existing literature suggests that there is a dearth of studies analytically examining the effect of the e-commerce sector on the retail sector and specifically its MSMEs in the Indian context, even though it has garnered growing attention in recent years. As cited above, the attempts made

⁵ Dayalani, V. (2021). Amazon Vs Flipkart: Who led the Indian E-commerce War in 2021?. Retrieved from <https://inc42.com/datalab/amazon-vs-flipkart-who-led-the-indian-ecommerce-war-in-2021/>

⁶ Traders Associations such as Confederation of All India Traders (CAIT), All India Online Vendors Associations (AIOVA), Micro Small Medium Enterprises (MSME) associations. Retrieved from <https://www.financialexpress.com/sector/sme/msme-eodb-traders-body-cait-invites-150-associations-trade-bodies-to-forge-bigger-alliance-for-e-commerce-fight/2426856/>



by KPMG (2005), Yes Bank (2018), and ICRIER (2022) do not specifically analyze the impact of the growth of online commerce on India's production economy over the years. Moreover, only online MSMEs have been considered for the assessment. Given that the recent complaints against the e-commerce sector have been raised by the Traders Associations representing not only the online but also the offline MSMEs, it becomes crucial to assess the impact of e-commerce on the MSME sector as a whole and not just on the online ones. It is also important to note that whilst there is growing evidence with regards to the benefits of digitalization, digitalization without the promotion of e-commerce channels (that play a pivotal role in accessing new markets among other benefits), may only have limited benefits for the country. There are, however, a few studies that inspect whether the presence of online retail or e-commerce firms has a negative impact on their offline counterparts in countries such as the United Kingdom (UK), the United States of America (USA), the Netherlands, etc. (Deleersnyder et al., (2002); Biyalogorsky & Naik (2003); Weltevreden (2007); Pozzi (2013); Reitnarz et al., (2019) and Ratchford et al., (2022)).

Further, the adoption of e-commerce practices should also boost the trade participation of Indian firms due to the benefits they offer such as efficient payment systems, better access to information, greater market access, etc. Some studies such as Gautam (2017), and Takkar & Sharma (2021) show that e-commerce has facilitated the export participation of Indian firms, they do not, however, analyze the same for the Indian MSMEs or the retail sector in particular. While the role of digitalization in promoting the Global Value Chains (GVCs) participation of firms has been explored substantially before (Lanz et al., (2018); Sasidharan & Reddy (2021); VuPhu et al., (2022); Gopalan et al., (2022)), to the best of our knowledge, no study explores the role of the *e-commerce sector* in facilitating the GVC intensity of the Indian retail and manufacturing sectors particularly when it comes to their MSMEs. Against this backdrop, the present study also assesses the impact of the e-commerce sector on the performance of the four segments of the production side of the Indian economy (retail, retail MSMEs, manufacturing, and manufacturing MSMEs) in GVCs (or their GVC intensity). If it turns out that e-commerce has a positive impact on improving India's international position by facilitating GVC intensity along with potentially supplementing the growth rates of its domestic sectors, then it becomes even more vital to formulate appropriate policies that not only help the country's MSMEs to take advantage of the same but also ensure robust growth of the country's e-commerce sector.

It is worth pointing out here that such a study is especially imperative in the current scenario when India's e-commerce policy is still in its draft stage. Knowledge about the Indian e-commerce sector's impact on its retail sector, the country's manufacturing sector, and their MSMEs would help guide the present policy-making process by aiding those responsible for the same to better understand the potential areas for further improvement. This is also particularly critical at a time when developing countries such as India which still lag significantly when it comes to digitalization, vis-a-vis their developed peers, are being pressured to engage in e-commerce free trade that is bound to prove costly for them (ETNOW, 2022). Our findings indicate that without the e-commerce sector, the incremental growth of the Indian retail and manufacturing sector during the last two decades would have been lower. However, the country's MSMEs have not been able to (significantly) take advantage of the growing e-



commerce and keep pace with the so-called digital globalization. A similar result holds true when it comes to the facilitation of GVC intensity of these firms. This mandates a robust policy framework that can concomitantly ensure the growth of both the e-commerce sector and the MSME retail sector while creating positive spillover effects for the other sectors of the country.

This section (1) delved into the background and motivation for the present study. The rest of the paper is organized as follows: the next section (2) discusses the issues raised by the Traders Associations against the e-commerce majors and simultaneously assesses whether similar challenges exist in other countries. Section 3 puts forth the data and methodology used and attempts a preliminary graphical analysis to answer the questions of interest, while section 4 presents the main empirical results of the study. The last section (5) concludes and presents policy recommendations based on our findings.

2. Issues Faced by MSMEs due to E-commerce Majors

In this section, this study attempts to assess the kind of complaints being raised by the MSME firms against the e-commerce majors in India and inspects if such problems exist in other comparative economies. An assessment of this nature is paramount since as stated earlier, on one hand, e-commerce is being touted to be something extremely beneficial to the Indian MSME sector, while on the other, there are several allegations pertaining to the costs that the sector is inflicting on the MSMEs of the country.

In particular, we investigate the complaints being raised in 12 different countries (a mix of six developed and six developing economies) apart from India. Most of these countries have been selected on the basis of the presence of both Walmart and Amazon (the two leading e-commerce players in India) in their respective economies, apart from the fact that they have a huge e-commerce market. Table 1 lists all these countries. As is well-known, China, the US, and the UK occupy the top three positions globally in terms of the size of their e-commerce market; while South Korea is touted to lead the e-commerce market in the future. Therefore, it becomes important to consider these countries whilst understanding the issues being raised against the Indian e-commerce sector by its MSME firms.

While there is a diverse range of complaints being raised against the e-commerce sector, such complaints can broadly be classified into two distinct categories. The first relates to *General issues* and the second category sheds light on some *Specific issues* that have been raised by the MSMEs. The general issues pertaining to structural weaknesses of MSMEs, vis-à-vis that of large firms. For instance, inadequate access to technology, lack of skills, low inventory base, etc. Such issues have an inevitable existence in any economy and not just in India, as in every sphere, there exist both small and large firms with access to different resource bases. However, it is more critical to discuss the ‘specific’ complaints that have been raised recently. In the case of India, such specific issues have been raised by both the supply and demand sides of the country (mostly) against two e-commerce majors, viz. Walmart and Amazon. The demand side (i.e., consumer) issue mainly pertains to misleading advertisements with incorrect information that prevent optimal decision-making on their end while the supply side issues primarily pertain



to issues such as predatory pricing, deep discounting, and preferred sellers, all of which come under the gambit of unfair business practices.

Table 1 provides a snapshot of these specific issues faced by MSMEs around the world due to certain practices by the e-commerce majors in their country.⁷ Column 1 of Table 1 provides the description of the issues being raised while row 2 shows the countries that have been considered for the comparative analysis. Each consecutive row (3 to 7) lists the nature of the problem followed by a tick mark if any particular complaint described in column 1 of the table is being raised in the country under consideration.

[Insert Table 1 here]

Amongst the complaints raised by Traders Associations against e-commerce majors in 13 countries (including India) under consideration, *predatory pricing* is the most commonly found complaint,⁸ whereby the seller adopts an anti-competitive business practice of selling a product below its marginal cost by a dominant firm in the market so as to eliminate its competition. While 11 countries (including China, Costa Rica the US, the UK, and others) report this to be a severe issue impeding their business atmosphere, however, such a complaint has not been raised by the Indian competition commission board. The CCI continues to probe anti-competitive evidence against the Indian e-commerce majors. Nevertheless, other complaints such as preferred sellers and deep discounts⁹ have been repeatedly reported in the country, and also in countries such as the US, China, and South Korea. Preferred sellers are a business practice adopted by e-commerce majors which involves giving preferential treatment to certain sellers. These sellers are given an advantageous position in the e-commerce platform as their name appears on the initial display page as compared to non-preferred sellers. This provides higher visibility of the product of preferred sellers. On the other side, business practices such as deep discounts are the practices wherein the e-commerce platforms offer heavy discounts on goods/services with an aim to sell them in large quantities. This is in contrast with predatory pricing, which is done with the intention of eliminating competition from the market by offering products at lower prices sold by a dominant firm.

In addition, from Table 1, we find that the other sets of complaints pertaining to “choosing only one” have been reported in China specifically, wherein they often end up levying costs on sellers who choose to sell their products on rival e-commerce platforms as well. Such a practice has not been reported in the rest of the countries that have been considered for the assessment, including India, which proves that e-commerce majors in China are deliberately strengthening their market position and trying to gain an unfair competitive advantage. Further, it is worthwhile to point out that there are not many complaints about preferential treatment for certain sellers, deep discounting, or misleading advertisements against e-commerce majors in countries such as Costa Rica, Mexico, Germany, EU, Vietnam, Brazil, and Canada. Additionally, in some of these such as China and Germany, the e-commerce sector has been

⁷ Further details on the same can be availed from the authors on request.

⁸ Predatory pricing denotes the anti-competitive business practice of selling a product below its marginal cost by a dominant firm in the market so as to eliminate its competition.

⁹ Deep discounts are business practices adopted by e-commerce majors, wherein the e-commerce platforms offer heavy discounts on goods/services that are sold in high quantities.



witnessing a higher growth rate and they have positioned as 10th and 6th positions respectively in the United Nations Conference on Trade and Development (UNCTAD) B2C E-commerce Index 2020.

However, while a qualitative investigation such as this helps one to understand the nature of the problems being raised and draw some parallels, it cannot provide an effective conclusion in terms of the actual effect (whether it is positive or negative) of the e-commerce sector without a quantitative inspection of the same. Given the growing amount of discord between offline firms and e-commerce majors, an empirical exercise becomes paramount for further deliberation and consideration of the problems being raised by the different agents in the country. The following section documents the empirical exercises conducted in this regard.

3. Data and Methodology

To evaluate the effect of the online retail sector or the e-commerce sector on the retail sector as a whole, the MSME retail firms, in particular, the manufacturing sector as a whole, and lastly its effect on manufacturing MSMEs in particular, this study utilizes the Centre for Monitoring Indian Economy's (CMIE) Prowess Database. The CMIE prowess is a firm-level database that has a wide array of information on a company's business aspects such as sales, exports, imports, profits, expenses (in terms of both goods and services), debt and equity, etc. It collects information from balance sheets and income statements of companies, covering both publicly listed and unlisted firms. The data, however, only has information on the organized sector and not on the unorganized sector firms. The data on unorganized sector firms is available in the NSS (National Sample Survey) database, but it does not identify the e-commerce firms separately and also lacks yearly data. Nonetheless, it is important to note here that while in terms of the number of firms the organized sector is much smaller than the unorganized sector in India, it still has a greater share in the country's GDP, exports, taxes, etc., vis-à-vis the unorganized sector.

The present study utilizes data on 49,847 organized sector firms comprising both manufacturing and services firms, out of which 34,077 firms belong to the MSMEs (about 68.36 per cent). While the latest definition of an MSME in India was put forth in the year 2020, the present study utilizes the 2006 MSME definition since the analysis entails the time period up to 2020. According to the 2006 MSME definition, a manufacturing firm is an MSME if its total investment is less than Rs. 10 crores while a services firm is an MSME if its total investment is lower than Rs. 5 crores. There are 16,164 firms that belong to the manufacturing sector out of which 9991 are MSME firms. The retail sector belongs to the services sector. There are 640 firms belonging to the retail sector, out of which 60 belong to the online retail sector specifically. It is worth pointing out here, that whilst the CMIE Prowess database has information on a reasonable number of firms in the online sector, it still lacks data on many such firms. Henceforth, the term 'online retail sector' or 'e-commerce sector' would denote the 'organized online retail sector'.

The purpose of using the CMIE database is to inspect whether there has been any significant shift in the retail sector's performance post and pre the rise of the e-commerce platforms in India. Before setting the model framework, a few preliminary analyses have been conducted to



understand the trends in the performance indicators of the retail sector. Various performance indicators such as sales, gross fixed assets, and the number of firms have been considered in this regard. Sales and Gross Fixed Assets have been widely used as a variable in the literature to assess the size of operations of a firm. The indicator based on the ‘number of firms’, while can be used as a ‘size’ variable for a sector, is also helpful in analyzing whether the growth of e-commerce has incentivized more firms to enter the sector under consideration, or forced some firms to shut down their operations, as highlighted in the introductory section. A preliminary correlation analysis has also been conducted between e-commerce sector sales and the performance indicators of the overall and the manufacturing sector to inspect if there is any significant association between the two. This has been done since the e-commerce/online retail sector has backward linkages on the total sector (comprising of both manufacturing and services sector) as well as the various manufacturing subsectors since retail utilizes a lot of manufacturing products as well as services, and also delivers the products to end customers. The preliminary graphical and correlation analysis is followed by regression analysis to establish causality (if any) of e-commerce sector sales on the retail sector as a whole, the manufacturing sector as a whole, and also on MSMEs in particular for both these sectors. The variable construction and data sources for the various variables utilized in the regression are given in table 2.

[Insert Table 2 here]

We take the sum of the deflated sales of all e-commerce sector firms in a year as our key explanatory variable. Here, it is important to point out that data on e-commerce indicators is quite scarce for India. Hence, the above measure is an attempt to construct an appropriate indicator that would best reflect the Indian e-commerce sector. The CMIE Prowess includes data for major Indian e-commerce firms such as Amazon, Snapdeal, Myntra, Tata Unistore, etc. It was noted, however, that the dataset does not include information on all e-commerce firms as pointed out earlier. For example, Flipkart which is a major Indian e-commerce entity has not been included in the online retail or e-commerce category. Against this backdrop, we construct two versions of the e-commerce proxy variable, one with online retail sales that exclude sales from Flipkart and the second wherein we include sales from Flipkart in online retail sales. It is likely that the data for total e-commerce sales in a year may be underestimated to some extent as there may be more online firms such as Flipkart that have online operations but are not included in the e-commerce sector category in the CMIE Prowess database.

First, we look at the trends of some of the key performance indicators of the retail sector and contrast them with the performance of the overall sector in aggregate. We compare the two to understand if retail has been performing better or worse than the overall sector in aggregate. This would help us to gauge whether the advent of e-commerce firms has had any negative implications for retail as a whole at least at an indicative level.

[Insert Figure 1 here]

Figure 1 shows the sales of the overall sector (given by the purple line) and the growth in the proportion of retail sales to sales of the overall sector (given by the grey columns) over the years. It can be observed from the figure that total sales have shown an increase for all years



except from 2015-2016 and for the year 2020. It can also be noted from the figure that the proportion of retail sales in total sales has witnessed an increase for most years. This has been more so from about the year 2012. These observations are reflective of the growing importance of the retail sector in the overall economy since its share has increased from about 0.8 per cent in 2012 to more than 3 per cent in the year 2020. The year 2012 is near the time when the e-commerce sector started to take off in a significant manner in the Indian economy. Another point pertains to the performance of the proportion of the retail sales to the total sales in the year 2020. While the total sales dipped in the year 2020, most likely due to the Covid-19 pandemic, the proportion of the retail sales to the total sales in the year 2020 shows a sharp increase. This somewhere shows that the retail sector (as a whole) has been less affected due to the pandemic, vis-à-vis the other sectors. Thus, we see that the emergence of online retail has not negatively impacted the performance of the total retail sector but may have rather improved its performance over the years.

Next, we explore how gross fixed assets and the number of firms have fared in the retail sector so as to get an idea about the growth in the size of the sector over the years (Figure 2). This is because sales as an indicator for growth is a bit dicey as the indicator may fluctuate substantially within a short period of time. Indicators such as gross fixed assets and the total number of firms indicate a more permanent expansion or contraction for any sector under consideration.

[Insert Figure 2 here]

Figure 2 shows that the gross fixed assets of both the overall sector and the proportion of retail in the overall sector have experienced a consistent expansion over the years. It can be seen from the figure that the total number of firms in the overall sector increased on an average till about 2016, post which it stagnated and saw a decline in the year 2020. The trend in the proportion of retail firms to total firms has been slightly volatile till about 2006, post which it saw a steady increase till about 2016, a small decline till 2019, and a sharper one in 2020. This means that while the gross fixed assets have been witnessing an increase over the years, the number of firms has been on a decline in recent years. This implies that some firms in the retail sector have been growing quite fast while others have shut down their businesses. Another important point is that the proportion of retail firms in total firms has been declining against an overall decline in total firms. This is important as it means that the decline in the total number of firms for the retail sector has been more prominent than the overall sector. Thus, the firms gaining leadership in the retail sector have been doing so at a faster pace when compared to the pace of the overall organized sector. A possible reason for the same may be the increasing importance of supermarkets and hypermarkets in both the online and offline retail sector, leading to large firms replacing the small ones. Hence, large retail firms may have been replacing the small ones.

To further explore the possible impact of the e-commerce sector on the total sector, correlations have been run between the sales of the e-commerce sector with performance indicators such as exports, assets, and number of firms for the overall sector level and the manufacturing sector specifically. It is expected, keeping in mind the graphs above, that the association between these sectors would be positive. The lag of the e-commerce sector sales has been used for the analysis since it makes more sense to link present period performance indicators of the sectors of interest



to previous period e-commerce sales performance, as in this case, we would be exploring the effect of something that has already unfolded in the past (e-commerce sales) on the present period attributes of the other sectors.

[Insert Table 3 here]

An inspection of Table 3 reveals that the lag of sales of the e-commerce sector has a positive and significant association with fixed assets and total firms of both the overall sector and the manufacturing sector specifically. The correlation with exports, on the other hand, has not been high. This could be due to e-commerce still not being used adequately as a tool to facilitate international trade thus highlighting the untapped potential of the sector. The scope of e-commerce is not only limited to exports but it can also be utilized as a platform to channelize imports of intermediate inputs or final goods as well. Putting the two together, e-commerce may have the potential to foster the GVC performance of a country. In sub-section 4.2, an attempt has been made to assess the causal relation if any between the boom of the e-commerce sector and the GVC intensity of Indian retail and manufacturing firms, controlling for other important determinants of GVC intensity.

It can consequently be concluded that the co-movement between the variables in consideration has been positive, which means that the boom of the e-commerce sector does not seem to have negative effects on the overall sector or the manufacturing sector in particular. This may be because retail utilizes the output of the overall sector, and especially so of the manufacturing sector.

While the analysis above has traversed the correlation between e-commerce sales and performance indicators of the overall economy and for the manufacturing sector specifically, to conclude concretely, however, a rigorous empirical exercise is in order. The succeeding section attempts the same to draw reasonable conclusions on the problem explored thus far in the paper.

4. Estimation Results

The graphical and correlation analysis in the previous section indicated the absence of negative effects on the retail sector, the overall sector, and the manufacturing sector due to the emergence of the e-commerce sector. However, a sound empirical analysis becomes imperative to reach any robust conclusion. In this regard, a regression exercise has been conducted to establish causal relations between the sectors, if any, with regard to their sales and GVC intensity. Section 4.1 presents the impact of the e-commerce sector on the sales of the retail and manufacturing sectors along with their MSMEs while section 4.2 presents the same for their GVC intensity.

4.1 E-commerce and Total Sales by Firms

In order to explore the impact of the booming Indian e-commerce sector, a regression model has been set up based on an extensive literature review. The model specification for the empirical exercise is as follows:

$$\text{Sales of a Firm}_{i,t} = \alpha + \beta_1 E\text{-commerce sales in a year}_{(t-1)} * \text{Firm Size}_{(t-1)} + \sum \phi X_{i,t} + \sum \phi Z_{i,t-1} + \gamma_i + \delta_j + \mu_t + \epsilon_{it}$$



Various iterations of the above-given model have been run to analyze the effect of the e-commerce sector on the retail and manufacturing sectors of India along with a special focus on their MSMEs. Preliminary testing revealed the presence of autocorrelation and heteroscedasticity problems in the data. Thus, Pooled Ordinary Least Squares regression would lead to spurious results. Hausman test revealed the fixed effects model to be the suitable model for our analysis as the p-value was less than 0.05. We use clustered standard errors to mitigate the problems of autocorrelation and heteroscedasticity in our data. To account for endogeneity problems, we have taken lags of all the explanatory variables except for the age of the firm. In addition, we also control for γ_i , i.e., firm fixed effects, and μ_t , i.e., time fixed effects. Firms fixed effects account for characteristics that are unique to a firm that does not change over time. Time-fixed effects on the other hand control for the effects that are present for all firms at different points in time. The manufacturing sector regression also controls for industry-fixed effects (δ_j) i.e., factors that differ across different industries within the manufacturing sector but are constant over time. Table 4 gives the summary statistics of the variables utilized for the regression exercise while Table 5 reports the results of the empirical exercise.¹⁰

[Insert Table 4 here]

[Insert Table 5 here]

The regression results reveal that the advent of e-commerce firms even after controlling for factors that impact firm sales has had a positive impact on the retail sector in India as can be seen from row 1 column 1 & row 2 column 2. Moreover, the greater the size of the firm, the greater this effect. This result is in line with the graphical analysis conducted in the previous section, which showed that the share of the retail sector in the total sector has been on a rise since the emergence of the e-commerce sector in a prominent manner in India. As explained by Huang et al., (2016) for China, the e-commerce sector may have had a positive effect on the growth of the retail sector by stimulating demand in the Indian economy. This may be due to e-commerce platforms offering better marketing strategies, easier payment systems, better customer grievance redressals, no transportation costs for consumers, easier return and exchange policies, lower storage costs to sellers, etc. Additionally, computer intensity which can be considered to be representative of the digitalization levels of a firm is also found to be an important determinant of firm sales. Digitalization is a tool that facilitates e-commerce. Digitalization of firms facilitates effective communication with consumers, suppliers, and distribution networks, (Jean et al., (2010); Marchi et al., (2018); Sasidharan & Reddy (2021)), all of which are likely to have an indirect positive impact on sales of a firm. Further, it has been shown to be effective in improving the sales performance of MSMEs in both developed and developing countries around the globe (Bogavac & Cekerevac (2021)).

The analysis further reveals that the expansion of the e-commerce sector also has positive effects on the manufacturing sector of the country (row 1 column 5 & row 2 column 6). This may be, as previously discussed, because the retail sector primarily sells manufactured products, apart from agricultural items. Thus, a boom in the retail sector is bound to have positive implications for the manufacturing sector of a country thereby adding a new facilitator for ensuring (on

¹⁰ Detailed description of these tests is available with the authors.



average) higher growth of the country. Hence, here it is important to note that the absence of a booming e-commerce sector in India would have led to a lower growth rate in its retail and manufacturing sectors. Thus, the positive spillover effect of the country's e-retail sector is not just limited to overall retail but has been diffused to its manufacturing sector as well thus adding a new facilitator for ensuring (on average) higher growth of the country. In other words, what these findings imply is that, on average, the year-on-year incremental growth of the Indian retail and manufacturing sector would have been lower in the absence of a booming e-commerce sector in the country, than in its presence. This observation, while missing from the existing studies assessing the firm-level determinants of sales/turnover, holds a crucial prominence today when the Indian government is re-considering its policy stance on e-commerce firms (whether domestic or foreign) and drafting the country's e-commerce policy.

As regards the other covariates, it can also be observed from rows 4,7, and 10 of Table 5 that utilization of services and profit after tax are other important variables that also significantly influence the sales of Indian retail and manufacturing firms. Greater utilization of services may boost sales by allowing firms to not get involved in multiple aspects of a business but rather devote the majority of their resources to focus upon aspects that a foreign entity cannot do more efficiently. A higher profit after tax not only acts as an incentive for firms to expand their businesses but also often increases the faith of the investors in a company (Chowdhury & Chatterjee (2020)). Hence, greater profits are likely to expand the sales of a firm.

Next, it is imperative to assess the impact of the growing e-commerce on MSME retailers and manufacturers since they have been the prime source of complaints against Indian e-commerce majors in recent times. The estimation results, however, show that the emergence of the e-commerce sector has not had any significant positive impact on retail and manufacturing MSMEs though there is a positive association between the two as can be seen from row 1 column 7 & row 2 column 8. This may be due to the MSMEs being unable to substantially utilize the benefits provided by the e-commerce platforms due to reasons such as lack of technical acumen, inability to utilize economies of scale because of their small size, inability to hold sufficient inventory capacity, etc. Similar results have also been found in other countries (Nugroho & Nugraha (2020); Purba et al., (2021)). The absence of any significant impact of the e-commerce sector on MSME retail firms may also be due to its differential impact on online and offline MSME firms. While big e-commerce firms may boost the growth of an online MSME firm by way of providing them with a large pool of consumers and an organized system for transactions, offline MSME retail firms are unable to reap these benefits. However, since the regression coefficient represents the average value of the effect of the e-commerce sector on both the online and offline retail MSMEs, it turns out to be insignificant but positive. It may also be possible that they may have negative effects on MSME offline retail firms due to practices such as predatory pricing or deep discounts as has been alleged in recent years (Economic Times, 2022). Another reason may be due to the e-commerce majors having better economies of scale (which has a direct effect on the profits of a firm and its product prices) in the form of an efficient logistics system and lower advertisement costs, than the offline retail MSME firms find hard to compete with.



Thus, there may not be any net significant positive impact of the e-commerce sector on retail MSMEs. This is also in line with the graphical analysis presented in the preceding section of this study wherein it was seen that while online MSME firms boomed in recent years, this was not true for offline MSME retail firms. However, it is also critical to note that the impact has not been negative either. This implies that, given the limited data on the e-commerce sector in the Indian economy, none of our empirical analyses seem to support the claim that the key online players in India have been killing MSME businesses specifically. Our analysis also reinforces the role of service input intensity (Chowdhury (2017); Zhou et al. (2021)) and profits on the sales of a firm (Jain & Jain (2021)). Therefore, the advent of the e-commerce major seems to have a positive impact on the Indian retail industry and also on the manufacturing sector of the country due to the possible backward linkages that retail has with the manufacturing sector of a country.

It is also important to note that whilst the e-commerce sector had some presence in India from the early 1990s, the sector did not contribute greatly to its economy. It is only in recent times, that the e-commerce sector of India has started clocking in high growth rates. Keeping this in mind, a test for the presence of any possible structural break in the data was conducted and the year 2014 came out to be the watershed year. It thus made sense to conduct a similar analysis but only for the period that witnessed substantial e-commerce expansion to see if such isolation would have any different impact upon the sectors in consideration.

The regression analyses had similar results (see Table A1, Appendix) as the prior analyses considering all years, with the exception of the effect of the e-commerce sector on manufacturing MSMEs turning out to be positive and significant. This result could indicate three things. Firstly, it is quite plausible that MSMEs take a longer amount of time to adopt up-and-coming technologies. This may be due to reasons such as low levels of digitalization, inadequate technical know-how, problems pertaining to finance in Indian MSMEs, etc. (Huria et al. (2022)). Thus, manufacturing MSMEs garnering non-negligible benefits from the e-commerce sector may be a relatively recent phenomenon. Secondly, it may add some substance to the complaints being raised by retail MSMEs in recent years. This is because even after isolating the period that witnessed a substantial e-commerce boom (i.e., from 2014 onwards), its effect on retail MSMEs though positive is still not significant. Lastly, it may be the implication of e-commerce majors having better economies of scale (which has a direct effect on the profits of a firm and its product prices) in the form of an efficient logistics system and lower advertisement costs, that the offline retail MSME firms find hard to compete with. A lot of these arguments, however, are the same arguments that fuel the ‘big firms vs the small firms’ debate, which is quite prevalent in the Indian economy since the early 2000s. Henceforth, it may not be far-fetched to conclude that a good proportion of the complaints that are being raised by the MSMEs against the e-commerce majors in the country may be arising due to the differing economic scales of the two sides. The fundamental reason for many of the issues being raised still may be dissimilar economies of scale, though their nature is now distinct due to the involvement of a relatively new and evolving component called e-commerce.



Whilst it has been seen from the discourse above that e-commerce has a positive impact on the sales growth of the retail and manufacturing firms in aggregate, it would also be fruitful to explore whether it has had any impact on the GVC intensity of these firms. The succeeding section presents the results of the empirical exercise conducted in this regard for the Indian retail and manufacturing firms.

4.2 E-commerce and the GVC Intensity of Firms

Whilst it has been seen from the discourse above that e-commerce has a positive impact on the growth of the retail and manufacturing firms in aggregate, an inspection of whether the sector can facilitate trade would help in taking into account its effects in a more comprehensive manner. To accomplish the same, a regression exercise has been conducted to determine the effect of e-commerce on the GVC intensity of firms using the CMIE prowess database for the years 1988-2020. The model framework that has been set up on the basis of an extensive literature review is as follows:

GVC intensity of a Firm, $i,t = \alpha + \beta_1 \text{ Previous period GVC intensity } (t-1) + \beta_2 \text{ E-commerce sales in a year } t + \sum \phi X_{i,t} + \sum \phi Z_{i,t-1} + \epsilon_{it}$

For estimating the above model, the System Generalized Method of Moments (GMM) has been deployed. Using the fixed effects estimator will lead to biased results due to the presence of the lagged dependent variable in the model. System GMM mitigates this problem and also takes into account the problems of endogeneity, heteroscedasticity, and autocorrelation. Additionally, it mitigates the issue of time-invariant firm effects correlated with regressors. As before, other variables that can affect the GVC intensity of a firm have been accounted for on the basis of the existing literature. Table 6 reports the results of the empirical exercise.

[Insert Table 6 here]

The regression exercise establishes that the expansion of the Indian e-commerce sector has positive effects on the GVC intensity of its retail and manufacturing firms as can be inferred from rows 1 and 2 of Table 6. These results are in concordance with studies such as Li et. al., (2019), Ladrière et. al., (2022), Pan et. al., (2022), etc., among others, that provide somewhat similar evidence for countries such as China, Japan, South Korea, and the US. The e-commerce sector facilitates the internationalization of MSMEs due to its relatively lower costs for entering the international market and also due to the greater control it offers over the entire trading process (Pan et. al (2022)). These results also further highlight the importance of digitalization amongst MSMEs, since the digitalization of firms is the first step towards a firm engaging in e-commerce activities. Additionally, the regression results highlight the importance of past period GVC intensity as a significant factor influencing the present period GVC intensity. Total factor productivity also turns out to be an important determinant of the GVC intensity of Indian retail and manufacturing firms.

Akin to the results observed in the previous analysis whilst the effect of e-commerce on GVC intensity is positive and significant in the case of the entire retail sector, the manufacturing



sector as a whole and the manufacturing MSMEs, its effect on retail MSMEs though positive is not significant. There are two key points that emerge. First, the development of the e-commerce sector in India has positively contributed to the GVC trade intensity of retail and manufacturing firms. According to the World Bank (2022), countries that target GVC-driven development, create growth by switching to activities with a greater level of value addition and by incorporating more technology and knowledge into all of their service, industrial, and agricultural production. Thus, e-commerce via the route of facilitating GVC performance is likely to bolster the Indian government's objectives such as that of achieving a \$500 billion export target by the year 2023. This, in turn, further highlights the importance of the e-commerce sector to the country. The second point pertains to the lower impact on retail MSMEs. It is imperative to point out here that a plausible reason for the same may be due to the limited number of observations present in the case of retail MSMEs. The lower number of observations affects the degrees of freedom and hence, lowers the robustness of the empirical exercise. A second reason for the same, as proposed in the previous analysis may be due to the differential impact on online and offline retail MSME firms, due to which the coefficient turns out to be positive though not significant. Here, it is important to note that the same logic cannot be applied in the case of manufacturing MSMEs, this is because while online manufacturing MSMEs may have benefitted more than their offline counterparts, offline manufacturing MSMEs also get the benefits of an expanding e-commerce sector simply in the form of backward linkages. On the other hand, offline retail MSMEs do not get any such benefits. Another reason as also pointed out earlier may be the lower infrastructural capacities of Indian MSMEs vis-à-vis its prominent international competitors. Since digital activities have been increasingly taking precedence in most spheres around the globe including businesses, the need of the hour is increased digitalization of firms whilst simultaneously ensuring a set-up that reduces any friction between e-commerce platforms and the enterprises that sell on these platforms.

5. Conclusion and Policy Recommendations

The paper found two contrasting pieces of evidence where one side the e-commerce sector has been flourishing around the world, and on the other, it has also been facing growing complaints from its offline counterparts and MSMEs/Traders Associations. This paper found that most of these complaints are not unique to India but rather exist in many countries around the globe. In this light, it is critical to find a common ground that addresses these challenges effectively and optimizes the gains for the economy. Specially in the case of India, the empirical exercises conducted in the study found that the e-commerce sector has positive effects on sales and GVC intensity of the retail and manufacturing sectors of India though it is less so for the retail MSMEs. This calls for provisions that will simultaneously ensure the growth of both the e-commerce sector and the MSME sector as both are quite vital to the country's economy. In this regard even though the e-commerce sector has started taking initiatives, the issue is that the Indian e-commerce policy is still in its draft and the government is coming up with different press releases then and now. These press releases restrict the activity of the e-commerce players in the Indian economy. So, if these restricted practices continue then ultimately as far as our results are concerned it would start showing up in the performance of the manufacturing and



retail sectors also. Because what we have come across from our results is that the e-commerce sector has a positive effect in impacting the sales and the GVC intensity of the manufacturing and retail sectors. Thus, the policy should be modified in such a way that it provides a fair playing field for both MSMEs and e-commerce.

When it comes to the Indian e-commerce policy scenario, it is important to note that the regulations governing the same are being looked over by various departments. This seems to act as a deterrent to its optimal efficacy when compared with the regulatory framework guiding its international peers. Another aspect could involve the re-inspection of the e-commerce business model allowed in the country. While India allows only a marketplace-based e-commerce model in the country, its international peers with flourishing e-commerce sectors such as China, the US, and South Korea follow a hybrid model that allows both marketplace and inventory-based models based on certain conditions. Such a policy relook based on robust research may help further boost the e-commerce sector of India, and eventually ensure positive spillover effects on the other sectors of the country.

Finally, it is important to note that while this paper attempted to establish the impact of the e-commerce sector on the retail and manufacturing sectors of the economy by utilizing the existing data, a more extensive dataset that can help further understand the growing Indian e-commerce sector is the need of the hour. Additionally, in order to fully capture the effects of the e-commerce sector, it is also important to understand its impact on the consumption sector of the economy as well. Future research addressing these issues is pivotal for better understanding the impact of the Indian e-commerce sector and aiding the country's e-commerce policy-making process.



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Table 1: Specific Issues Raised Against E-commerce Majors: Evidence from India and its Comparative Economies

Specific Issues	Developing Economies							Developed Economies					
	India	China	Costa Rica	Mexico	South Korea	Vietnam	Brazil	United States	United Kingdom	Germany	Canada	European Union	Italy
Predatory Pricing		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Preferred Sellers/ Choosing only one *	✓	✓			✓			✓				✓	✓
Deep Discounts	✓	✓						✓	✓				
Misleading Advertisement/ Fake Reviews	✓	✓			✓	✓		✓	✓		✓		

Source: Compiled from country-specific news reports and the existing literature.

*Note: Choosing only one is an anti-monopolistic strategy adopted by e-commerce majors which were uniquely identified in China and not in other countries.



Table 2: Construction/ Definitions of variables used for regression analysis¹¹

Name	Variable	Construction/ Definition	Measurement Unit
Deflated Sales of a Firm	Deflated Sales	Sales deflated by the sector deflator	INR Billion
Sum of Online retail sales	Deflated yearly online retail sales	Sum of the deflated sales of all online firms in a year	INR Million
Global Value Chain (GVC) Intensity of a Firm	GVC Intensity	(Sum of imports and exports/Sales) *100	Proportion
Extent of digitalization	ICT Spending	Computer and IT spending by a firm deflated using computer deflator	INR Million
Gross Value Added	GVA	Nominal output minus nominal value of intermediate inputs (materials, energy and services), deflated using two-digit sector-level price deflators.	INR Million
Total Factor Productivity	Total Factor Productivity	Calculated using the Levinsohn Petrin technique using gross value added, capital intensity and deflated compensation to employees.	Index
Size of the firm	Size	Log of deflated total assets	INR Million
Age of the firm	Age	Reporting year -year of incorporation	Years
Servicification	Service input intensity	(Services purchased/sales) * 100 , where services purchased includes the sum of expenses on heterogeneous services comprising rent and lease, repair and maintenance, outsourced manufacturing jobs, outsourced professional jobs, insurance, selling and distribution expenses, financial services and advertising and marketing expenses measured in current prices.	Proportion
Innovation	R&D intensity	(R&D expenditure/sales) *100	Proportion
Leverage	Debt/equity ratio	Total debt of the firm/total equity of firm	INR Million
Profits	Profits	Total income + Change in stocks - Total expenses = Profit after tax	INR Million
Competition Index	Herfindahl Hirschman Index	Sum of square of sales of a firm divided by total industrial sales in a year	Proportion

Source: Authors' calculation using CMIE Prowess

¹¹ Detailed description on construction of these variables is available with authors.



Table 3: Correlation of Lag of Retail Online Sales with Exports of Goods, Exports of Services and Gross Fixed Assets for Overall Sector without Retail Sector and the Manufacturing Sector in Particular

E-commerce Sales on	Total Exports	Gross Fixed Assets	Total Firms
Overall sector	0.296	0.776***	0.522***
Manufacturing sector	0.345	0.784***	0.538***

Note: *=significant at 10%, **=significant at 5%, ***=significant at 1%

Source: Authors' calculation using CMIE Prowess

Table 4: Summary Statistics for Prowess Analysis

Variable	Observations	Mean	Std. Dev.	Min	Max
Deflated Sales (INR Billion)	362,958	2.557	30.527	.0000344	3669.438
Sum of online sales in a year	514,127	30827.230	46010.340	40.534	149885.9
Sum of online sales in a year (Including Flipkart Sales)	514,127	68948.820	103767.800	40.533	325519
Firm Size (Deflated Total Assets)	516,277	6352.555	131551.5	0	28100000
Total Factor Productivity	297,403	.271	3.585	0	724.312
Expenditure on IT and computer systems	519,609	14.172	310.329	0	51794.620
Competition index (Herfindahl-Hirschman Index)	180,575	.053	.074	0	1.000
Age square	519,258	724.065	1481.131	0	24649
R & D Intensity	362,958	.658	99.879	0	42400
Service Intensity	362,958	1613.762	107417.500	0	2.98e+07
Advertising and Marketing Intensity	362,958	2228.869	33896.630	0	4686000
Leverage (Debt to Equity)	443,508	11.796	479.072	-1	126978
Profit after Tax	480,892	79.492	2087.838	-380421.900	183819.500

Source: CMIE Prowess Database



Table 5: Effect of Online Retail Sales on Retail Sector, the MSME Retail Sector, the Manufacturing Sector and the MSME Manufacturing Sector

Variables	Col.	Retail without Flipkart	Retail with Flipkart	Retail MSME without Flipkart	Retail MSME with Flipkart	Manufacturing without Flipkart	Manufacturing with Flipkart	Manufacturing MSME without Flipkart	Manufacturing MSME with Flipkart
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Deflated sales of a firm							
L.E-commerce Sector * L.Firm Size	(1)	0.000*** (0.000)		0.000 (0.000)		0.000*** (0.000)		0.000 (0.000)	
L.E-commerce Sector (With Flipkart)*L.Firm Size	(2)		0.000*** (0.000)		0.000 (0.000)		0.000*** (0.000)		0.000 (0.000)
L.Total Factor Productivity	(3)	0.085 (0.156)	0.085 (0.157)	0.075 (0.048)	0.075 (0.048)	0.082 (0.110)	0.083 (0.110)	0.035*** (0.013)	0.035*** (0.013)
L.Expenditure on IT and computer systems	(4)	0.838*** (0.281)	0.835*** (0.280)	0.144 (0.135)	0.144 (0.134)	0.175** (0.088)	0.173* (0.089)	0.011 (0.015)	0.011 (0.015)
L.Competition index (Herfindahl-Hirshman Index)	(5)	-5.175*** (1.442)	-5.272*** (1.451)	-0.193 (0.372)	-0.194 (0.388)	0.086 (0.299)	0.085 (0.299)	-0.013 (0.012)	-0.013 (0.012)
Age	(6)	-0.687*** (0.189)	-0.690*** (0.188)	0.015 (0.024)	0.015 (0.027)	-0.267* (0.161)	-0.264 (0.161)	0.009 (0.013)	0.009 (0.013)
L.Service Intensity with L.Advertising and Marketing Intensity	(7)	0.786*** (0.275)	0.796*** (0.278)	0.185*** (0.052)	0.185*** (0.052)	0.805*** (0.170)	0.815*** (0.170)	0.092*** (0.012)	0.092*** (0.012)
L.R & D Intensity	(8)	-2.344*** (0.835)	-2.360*** (0.838)	-0.203 (0.255)	-0.202 (0.256)	0.000 (0.0148)	0.000 (0.014)	-0.000 (0.002)	-0.000 (0.002)
L.Leverage (Debt to Equity)	(9)	-0.013 (0.110)	-0.014 (0.110)	0.056 (0.034)	0.056 (0.034)	-0.019 (0.044)	-0.019 (0.045)	0.010** (0.004)	0.010** (0.005)
L. Profit after Tax	(10)	0.009**	0.009**	0.007*	0.007*	0.002*	0.002*	0.000	0.000



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Constant	(0.005)	(0.005)	(0.004)	(0.004)	(0.001)	(0.001)	(0.001)	(0.001)
	-6.798***	-6.968***	-0.769	-0.769	-4.297	-4.367	-0.270	-0.270
	(2.503)	(2.517)	(1.060)	(1.070)	(3.743)	(3.743)	(0.345)	(0.345)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector Fixed Effects	-	-	-	-	Yes	Yes	Yes	Yes
Observations	2,088	2,088	1,061	1,061	54,394	54,394	16,501	16,501
R-squared	0.419	0.418	0.162	0.162	0.185	0.184	0.091	0.091
Number of firms	398	398	258	258	8,770	8,770	3,945	3,945

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.10; L: Lag

Source: Authors' Calculation using CMIE Prowess Database



Table 6: Effect of Online Retail Sales on the GVC intensity of the Retail Sector, the MSME Retail Sector, the Manufacturing Sector and the MSME Manufacturing Sector using System GMM

Variables	Col.	Retail without Flipkart	Retail with Flipkart	Retail MSME without Flipkart	Retail MSME with Flipkart	Manufacturing without Flipkart	Manufacturing with Flipkart	Manufacturing MSME without Flipkart	Manufacturing MSME with Flipkart
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		GVC Intensity	GVC Intensity	GVC Intensity	GVC Intensity	GVC Intensity	GVC Intensity	GVC Intensity	GVC Intensity
L.E-commerce sales in a year	(1)	0.000** (0.000)		0.000 (0.000)		0.000** (0.000)		0.000** (0.000)	
L.E-commerce sales in a year (With Flipkart)	(2)		0.000** (0.000)		0.000 (0.000)		0.000** (0.000)		0.000** (0.000)
L.GVC Intensity	(3)	0.748*** (0.106)	0.749*** (0.105)	0.600*** (0.164)	0.596*** (0.163)	0.016 (0.024)	0.017 (0.024)	0.242*** (0.088)	0.242*** (0.088)
L2.GVC Intensity	(4)	0.065 (0.082)	0.063 (0.083)	-0.139 (0.252)	-0.145 (0.263)	0.001 (0.001)	0.001 (0.001)	0.104* (0.062)	0.103* (0.062)
L3. GVC Intensity	(5)	-0.002 (0.014)	-0.002 (0.015)	0.046 (0.127)	0.052 (0.121)	-0.000 (0.000)	-0.000 (0.000)	-0.005 (0.009)	-0.005 (0.009)
L.Total Factor Productivity	(6)	0.248* (0.143)	0.248* (0.143)	0.261 (0.545)	0.270 (0.528)	2.645*** (0.943)	2.571*** (0.923)	3.402** (1.541)	3.373** (1.533)
age	(7)	-0.149 (0.135)	-0.144 (0.137)	-0.100 (0.425)	-0.074 (0.450)	-0.647** (0.256)	-0.643** (0.255)	-0.257*** (0.084)	-0.256*** (0.085)
L.R & D Intensity	(8)	5.071*** (1.930)	4.336** (1.656)	112.966 (512.129)	114.406 (542.062)	0.078 (0.342)	0.073 (0.348)	-0.380 (1.163)	-0.406 (1.165)
L.Total Assets (size)	(9)	5.502 (4.598)	5.467 (4.643)	-0.807 (9.003)	-1.181 (9.951)	13.004* (7.887)	13.338 (8.184)	-1.301 (6.818)	-1.277 (6.733)



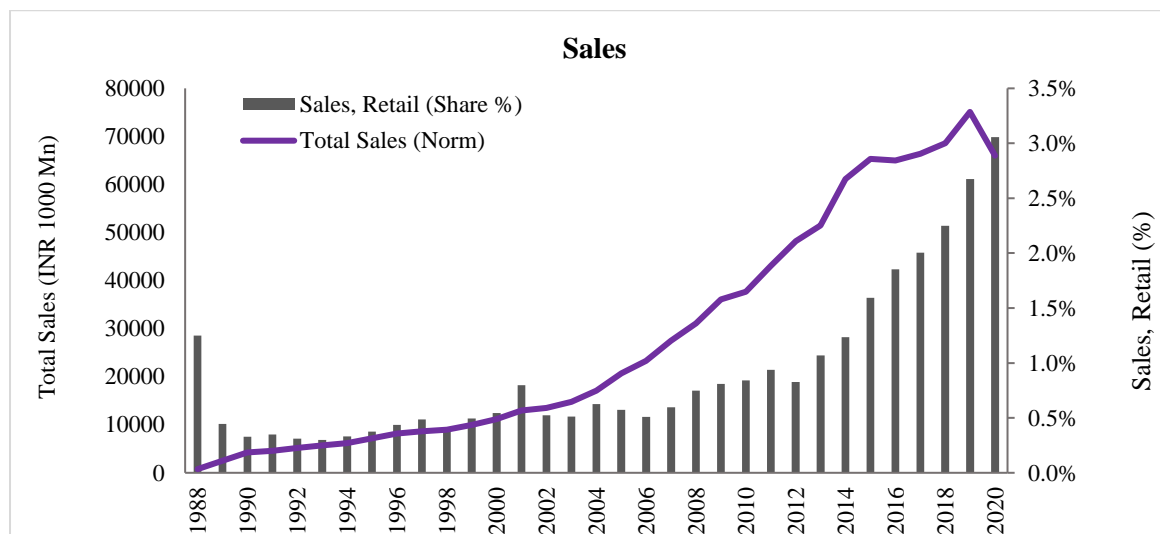
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Constant	-30.902 (31.720)	-30.950 (31.944)	16.879 (44.678)	18.303 (49.167)	-42.924 (48.939)	-45.093 (50.969)	33.679 (38.010)	33.610 (37.606)
Observations	618	618	91	91	42,519	42,519	4,834	4,834
Number of Firms	114	114	31	31	5,648	5,648	1,295	1,295

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.10

Source: Authors' Estimation using CMIE Prowess Database

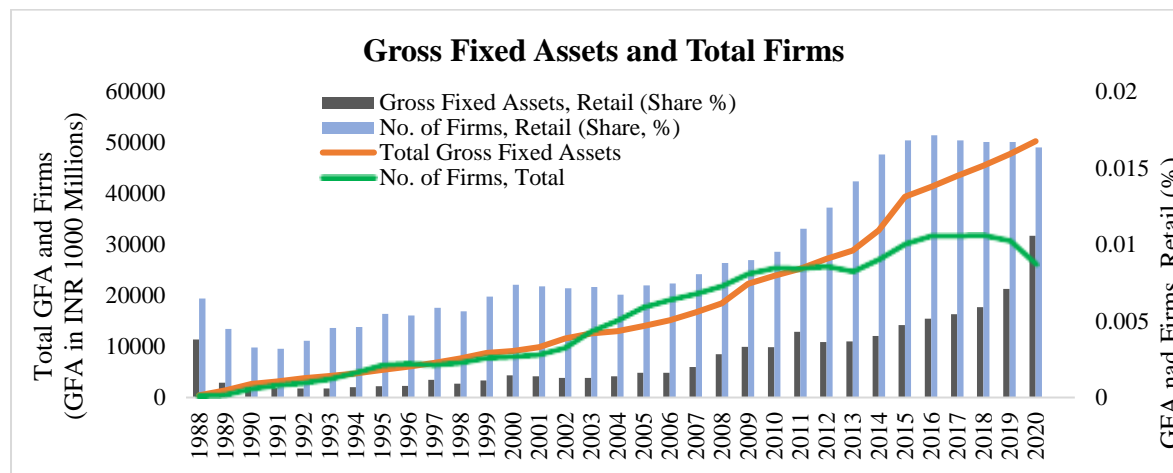
Figure 1: Trend in Overall Sales, Source: CMIE Prowess; Authors' estimations



Source: Authors' estimation using CMIE Prowess Database



Figure 2: Trend in Overall Gross Fixed Assets and Total Firms, Source: CMIE Prowess; Authors' estimations



Source: Authors' estimation using CMIE Prowess Database



Appendix A

Table A1: Effect of Online Retail Sales on Retail Sector, the MSME Retail Sector, the Manufacturing Sector and the MSME Manufacturing Sector for Years after 2014

Variables	Col.	Retail without Flipkart	Retail with Flipkart	Retail MSME without Flipkart	Retail MSME with Flipkart	Manufacturing without Flipkart	Manufacturing with Flipkart	Manufacturing MSME without Flipkart	Manufacturing MSME with Flipkart
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Deflated Sales	Deflated Sales	Deflated Sales	Deflated Sales	Deflated Sales	Deflated Sales	Deflated Sales	Deflated Sales
L.E-commerce sales in a year* L.Firm Size	(1)	0.000*** (0.000)		0.000 (0.000)		0.000*** (0.000)		0.000*** (0.000)	
L.E-commerce sales in a year (With Flipkart) *L.Firm Size	(2)		0.000*** (0.000)		0.000 (0.000)		0.000*** (0.000)		0.000*** (0.000)
L.Total Factor Productivity	(3)	0.0518 (0.106)	0.050 (0.106)	-0.004 (0.053)	-0.003 (0.054)	0.322** (0.150)	0.323** (0.150)	0.031*** (0.011)	0.031*** (0.011)
L.Expenditure on IT and computer systems	(4)	0.495** (0.209)	0.486** (0.207)	0.0816 (0.153)	0.082 (0.151)	0.123** (0.050)	0.120** (0.050)	0.014 (0.009)	0.014 (0.009)
L.Competition index (Herfindahl-Hirshman Index)	(5)	-3.442*** (1.221)	-3.475*** (1.215)	-0.304 (0.255)	-0.298 (0.274)	0.280 (0.338)	0.279 (0.338)	0.011 (0.017)	0.0108 (0.017)
age	(6)	-0.259** (0.129)	-0.303** (0.141)	-0.041 (0.032)	-0.042 (0.031)	-0.766*** (0.191)	-0.784*** (0.204)	-0.041*** (0.014)	-0.043*** (0.015)
L.Service Intensity with Advertising and Marketing Intensity	(7)	0.074	0.077	0.167***	0.167***	0.374**	0.378**	0.031***	0.032***
L.R & D Intensity	(8)	-0.169 -0.731**	-0.167 -0.734**	-0.057 0.019	-0.057 0.021	-0.170 -0.027	-0.170 -0.027	-0.008 -0.003***	-0.007 -0.003***



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L.Leverage (Debt to Equity)	(9)	-0.361	-0.362	-0.185	-0.186	-0.030	-0.030	-0.001	-0.001
		-0.010	-0.012	0.014	0.014	0.011	0.012	0.005	0.005
L. Profit after Tax	(10)	-0.101	-0.101	-0.018	-0.018	-0.026	-0.025	-0.003	-0.003
		0.007	0.007	0.009	0.009	0.001*	0.001*	0.001	0.001
Constant		-0.004	-0.004	-0.006	-0.006	-0.001	-0.001	-0.001	-0.001
		-5.978	-5.281	-0.193	-0.146	19.444***	19.986***	1.125***	1.160***
		-3.941	-3.873	-0.927	-0.857	-3.937	-4.219	-0.265	-0.290
Time Fixed Effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector Fixed Effects		No	No	No	No	Yes	Yes	Yes	Yes
Observations		1,321	1,321	696	696	28,948	28,948	7,624	7,624
R-squared		0.343	0.343	0.144	0.144	0.073	0.072	0.065	0.065
Number of firms		341	341	205	205	6,815	6,815	2,193	2,193

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.10

Source: Authors' Estimation using CMIE Prowess Database



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