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How to Promote Manufacturing with Inward FDI in Developing Countries? Lessons from China

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Abstract: Inward foreign direct investment (FDI) has been prioritized as a key instrument for promoting manufacturing in developing economies, yet its expected gains have not materialized in many countries. As an exception, China represents the most prominent case of a developing country that strategically harnessed FDI to achieve large-scale manufacturing upgrading. Using the Chinese manufacturing data, this paper shows how effective outcomes depend on strategic policy direction, coordinated institutions, and sustained investments in human capital, infrastructure, and supplier development. The policy implications include (a) shifts attention from FDI attraction to FDI absorption, (b) emphasizing performance-based incentives, (c) targeted industrial policies, (d) strengthened local capability systems, and (e) improved infrastructure.

Keywords: Foreign direct investment (FDI), manufacturing development (MD), multinational corporations (MNCs), domestic capabilities, absorptive capacity, and technological upgrading, **JEL code:** F21; F23; O14; O53

INTRODUCTION

Foreign direct investment (FDI) has become one of the most powerful forces shaping global manufacturing landscape (Markusen & Venables, 1999).* Since the 1990s, the relocation of manufacturing by western multinational corporations (MNCs) has fueled hopes that FDI can accelerate industrialization, create employment, and transfer technology in the developing world (UNIDO, 2002). Despite decades of liberalization and growing FDI inflows (World Bank, 2025; UNCTAD, 2025), many developing countries have failed or been struggling to translate foreign capital into sustained manufacturing upgrading (Gereffi, 2009; Zhang, 2024).† While so many developing countries remain locked in low-skill assembly or resource-based enclaves, China has used FDI as a springboard for upgrading into high-value manufacturing (UNIDO, 2025; Zhang, 2025). FDI in China can serve as a powerful driver of manufacturing growth when coupled with targeted policies, strong institutions, and active capability building.‡ The stark divergence between these outcomes underscores a central challenge of

* While FDI is viewed to benefit manufacturing in developing host countries, recently it is recognized as a key factor of deindustrialization in developed source countries.

† The problem lies less in attracting investment than in converting it into domestic capability. In much of sub-Saharan Africa, South Asia, and Latin America, such as Nigeria, Kenya, Bangladesh, and Brazil, FDI has often concentrated in resource-based or low-skill assembly sectors with limited technology transfer or local linkages. MNCs frequently operate as self-contained enclaves, importing inputs, repatriating profits, and leaving few spillovers for domestic firms (Zhang, 2025; UNIDO, 2002). Weak absorptive capacity, inconsistent industrial policies, and limited coordination between states and investors have further undermined learning and upgrading.

‡ China has been deeply engaged with the world economy through FDI since 1979. China has become the 2nd largest FDI recipient in the world, with inward FDI stock of $3.6 trillion US dollars by the end

contemporary development: openness to FDI is necessary but insufficient for industrial transformation. More importantly, China's experience raises a central question for both scholars and policymakers: under what conditions does FDI transform host-country manufacturing, and when does it merely entrench dependency?

Theoretical literature offers mixed arguments on how and when FDI enhances host-country manufacturing performance (Caves, 1996; Grossman & Helpman, 2016). Classical and neoclassical economic theories emphasize the role of FDI in capital accumulation, technology transfer, and productivity spillovers (Lu et al., 2017; Markusen & Venables, 1999;), while critical perspectives warn of dependency, crowding-out, and limited local learning (Rodriguez-Clare, 1996; Ram & Zhang, 2002; Harrison & Rodriguez-Clare, 2010; Zhang, 2025). Empirical findings mirror this tension: positive effects are observed where local firms possess sufficient absorptive capacity and where policies strategically guide FDI toward industrial upgrading, negative or negligible outcomes arise under weak institutions and passive liberalization (Aitken, & Harrison, 1999; Blomstrom & Sjoholm, 1999; Potterie & Lichtenberg, 2001; Javorcik, 2004; Fu, 2008; Zhang, 2010 & 2014; Zhao & Zhang, 2010).

Despite extensive scholarship, important gaps remain in understanding the conditions, mechanisms, and policy frameworks that determine whether FDI acts as a catalyst for manufacturing transformation or a constraint on it. Addressing these gaps is vital for both theory and practice, as many developing economies continue to rely on FDI as a cornerstone of their industrialization strategies. Using China as a case study, this paper seeks to explain the divergent effects of FDI on manufacturing performance by identifying the institutional, structural, and policy conditions that shape these outcomes. It argues that FDI enhances manufacturing most effectively when host countries combine high absorptive capacity - in the form of infrastructure, skilled labor, and supplier networks - with strategic FDI policies that promote local linkages, technology transfer, and upgrading.

The remainder of the paper proceeds as follows: Section 2 explains what China did in using FDI as a catalyst of manufacturing transformation and identifies five key approaches to its success. Section 3 develops empirical hypotheses and models based on theoretical discussions. Section 4 reports estimation results and robustness checks, focusing on the evidenced derived from regressions. The last section concludes with a summary and policy implications.

HOW DOES CHINA ENHANCE MANUFACTURING THROUGH FDI?

China represents the most prominent case of a developing country that strategically harnessed FDI to achieve large-scale manufacturing upgrading (Zhang, 2014 & 2025). Since the late 1970s, China has combined openness to foreign investment with active state intervention to align FDI inflows with national industrial goals. Rather than relying on passive liberalization, China embedded foreign enterprises within a framework of learning, linkage, and localization. The outcome has been a remarkable transformation from low-wage

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of 2023, next to the U.S. (UNCTAD, 2025). The role of FDI in the Chinese economy has burgeoned in ways that no one anticipated. FDI has played a crucial role in facilitating technology transfer, industrial development, and manufactured exports. China's manufacturing value added (MVA) ranked the first in the world in 2010. By the end of 2022, China's global MVA share was 31% (Baldwin, 2024; UNIDO, 2025).

assembly to a globally competitive manufacturing powerhouse. The trend of FDI into China and its role in manufacturing development are presented in Table 1, from which two points emerge as follows: (a) China has become a leading FDI host-country in the world since the early 1990s, with rising FDI flows from $11 billion to $163 billion over 1992-2023 and FDI stock from $36 billion to $3660 billion in the same period. (b) FDI plays a key role in the Chinese manufacturing. The share of foreign-invested enterprises (FIEs) in China's total manufacturing output increased 3.6% to 22.1% in over 1990-2023, and FIEs' share of total manufactured exports rose from 13.5% to 28.6%.

Table 1: Role of FDI in the Chinese Manufacturing: 1992-2024

	1990	2001	2012	2020	2024
FDI flows (billions of US dollars)	3.5	46.9	121.1	149.3	163.3
FDI stock (billions of US dollars)	21.0	203.1	831.9	1918.8	3659.6
Share of FIEs' manufacturing output in total (%)	3.6	31.3	27.5	22.8	20.1
Share of FIEs' manufacturing exports in total (%)	13.5	50.1	49.9	36.0	26.6

Sources: Computed from Statistics on FDI in China (MOC 2025), China Statistics Yearbook (SSB, 2025a), China Foreign Economic Statistics Yearbook (SSB, 2025b), and UNCTADstat (UNCTAD 2025).

According to United Nations Industrial Development Organization (UNIDO, 2025), China's global rank of competitive industrial performance rose by 33 positions, from the 35th in 1990 to the 2nd in 2020, and China is only developing economy in top 10 of the 2020 ranking. Table 2 presents major indicators of China's manufacturing performance over 1990-2020. (a) Manufacturing value-added (MVA) share in GDP rose from 22.5% to 32.5%, and manufacturing exports (MX) share in total exports grew from 83.6 to 95.9%. (b) MVA per capita rose from $137 to $2844 and MX per capita from $59 to $1727. (c) Manufacturing composition has shifted from low-tech to medium- and high-tech sectors. MVA share of medium- and high-tech in total MVA rose from 37% to 43%, and MX share of medium- and high-tech MX in total MX from 28% to 61% in 1990-2020. (d) China has emerged as a world factory, being the largest manufacturing producer and largest manufactured exporter in the world (Baldwin, 2024). China's share in world MVA increased from 3% to 30% over 1990-2020, and from 3% to 19% for its share in world MX.

At least five aspects can be identified as China's approach to its remarkable success: (a) strategic and gradual opening to FDI, (b) policy design linking FDI to industrial upgrading, (c) institutional coordination and state capacity, (d) building domestic capabilities and absorptive capacity, and I from FDI dependence to indigenous innovation (Zhang, 2025).

Strategic and Gradual Opening to FDI: Unlike many developing economies that liberalized abruptly under structural adjustment, China adopted a gradual and selective approach to FDI (Zhang, 2001& 2025). The government opened specific coastal regions – such as Shenzhen, Zhuhai, and Xiamen – as Special Economic Zones in the early 1980s to attract export-oriented FDI under controlled conditions. These zones served as experimental platforms for testing industrial policies, infrastructure planning, and regulatory systems. As capabilities and confidence grew, the FDI regime was progressively expanded inland, creating spatially diversified industrial clusters. This sequencing allowed China to learn from early experiences, prevent large-scale dependency, and ensure that foreign firms complemented domestic priorities.

Table 2: Manufacturing Development in China: 1990-2024

	1990	2000	2010	2024	Changes in 1990-2024
MVA share in GDP (%)	22.5	27.9	32.0	32.5	10.0
MVAPC (US dollars)	137.0	354.0	1517.0	2844.0	2707.0
MXPC (US dollars)	59.0	177.0	1109.0	1727.0	1668.0
MHT-MVA share in total MVA (%)	36.8	37.9	40.4	44.9	8.1
MT-MX share in total MX (%)	27.8	44.9	60.5	58.8	31.8

Notes: MVA = manufacturing value added; MVAPC = MVA per capita; MX = manufactured exports; MXPC = MX per capita; LT = low-tech; and MHT = medium- and high-tech.

Source: China Statistical Yearbook (SSB, 2025a), China Industry Economy Statistical Yearbook (SSB, 2025b), China Statistical Yearbook (SSB, 2025b), United Nations Industrial Statistics Database (UNIDO, 2025), and UNCTAD

Policy Design Linking FDI to Industrial Upgrading: China's success was not merely due to the volume of FDI but to how policies shaped its direction and quality. The state imposed clear conditions to ensure that FDI contributed to technology transfer, export expansion, and capability building (Tang & Zhang, 2016; Zhang, 2014). Key instruments included: (a) Joint venture requirements in strategic sectors (e.g., automotive, telecommunications, and machinery), which facilitated the transfer of tacit knowledge. (b) Local content and export performance clauses, compelling foreign firms to source domestically and to upgrade production standards. (c) Fiscal incentives tied to performance, rewarding firms that invested in R&D, training, or high-value-added activities. These measures created a structured incentive environment that encouraged foreign investors to embed themselves in China's industrial ecosystem rather than remain isolated.[§]

Institutional Coordination and State Capacity: A critical determinant of China's FDI success was its strong institutional coordination between central planning agencies, local governments, and state-owned enterprises (Zhang, 2001). Local governments played a dual role as facilitators and competitors, competing for FDI while also ensuring that investment served developmental objectives. Bureaucratic performance was often evaluated based on industrial growth and technology upgrading, creating powerful incentives for proactive governance. This system enabled China to avoid many of the governance failures that plagued other developing countries, such as regulatory capture and policy inconsistency. Moreover, China's industrial policy institutions – such as National Development and Reform Commission and Ministry of Commerce – provided coherent strategic guidance and

[§] Over time, the government relaxed restrictions as domestic firms gained strength, moving from protectionist learning to competitive integration.

coordination across sectors. This ensured that FDI was directed toward targeted industries consistent with the country's Five-Year Plans, fostering synergy between foreign capital and domestic capability building.

Building Domestic Capabilities and Absorptive Capacity: China's ability to benefit from FDI also rested on its deliberate investment in human capital and technological infrastructure. Massive public spending on education, vocational training, and research and development (R&D) strengthened China's absorptive capacity (Fu, 2008; Tang & Zhang, 2016; Zhang, 2025). Universities, research institutes, and technology parks were established to facilitate knowledge diffusion and collaboration between foreign and domestic firms. In addition, China's policy of encouraging learning-by-doing – through supplier development programs, local procurement, and reverse engineering – helped domestic firms move up the value chain.** As a result, many Chinese enterprises evolved from contract manufacturers into global producers.†† This evolution underscores the dynamic nature of FDI's contribution: it was a means to build national capability, not an end in itself.

From FDI Dependence to Indigenous Innovation: By the late 2000s, China's development strategy shifted from attracting FDI to fostering indigenous innovation. Programs such as the "Made in China 2025" initiative reflected a transition from imitation to innovation, prioritizing high-tech sectors including robotics, electric vehicles, and semiconductors. FDI continued to play a role but increasingly within a domestic innovation ecosystem dominated by Chinese firms (Zhao & Zhang, 2010; Zhang, 2014). The state's evolving role – from gatekeeper to facilitator – allowed foreign investment to coexist with strong domestic champions (UNATCD, 2025; Zhang, 2025). This transformation demonstrates that FDI can serve as a steppingstone toward self-sustaining industrial development when guided by coherent long-term strategy.

China's experience demonstrates that FDI can drive transformative industrialization when integrated into a broader strategy of state-led capability building and institutional learning. The Chinese case thus offers valuable insights into how developing countries can escape the "enclave trap" and harness globalization for domestic manufacturing growth.

THEORIES, HYPOTHESES, AND EMPIRICAL MODELS

Inward FDI may have multifaceted effects on manufacturing development (MD) in developing countries. The impacts depend on the scale, structure, and nature of investment, as well as domestic absorptive capacity and policy environments. In the context

** By contrast, countries lacking domestic capabilities and absorptive capacity tend to experience "shallow FDI," where foreign investment generates limited spillovers and weak domestic linkages (Zhang, 2025).

†† Many Chinese firms initially learned from joint ventures or original equipment manufacturer (OEM) contracts with foreign firms before developing proprietary technology and brands. For instance, firms like Huawei (telecom and smartphones), BYD (electric vehicles and batteries), CATL (Contemporary Amperex Technology Co., Ltd.) (a global leader in lithium battery manufacturing), Xiaomi (smart devices, now EVs), Haier (consumer electronics), Lenovo (PCs and data centers), DJI (drones). Other notable companies are BOE Technology Group (a display manufacturer) and SMIC (Semiconductor Manufacturing International Corporation) (a leading chipmaker).

of China's FDI-MD nexus, four hypotheses can be formed based on both theoretical and Chinese practice considerations.

- H1: FDI may play a key role in China's MD through raising manufacturing capacity and technology.
- H2: Benefits from FDI to MD may mainly derive from positive spillovers.
- H3: FDI may act as a catalyst to the Chinese high-tech MD through linkages.
- H4: Gains from FDI depend on domestic capabilities and absorptive capacity.

The theoretical literature suggests three hypotheses about the impact of FDI on host-country ID (Zhang & Markusen, 1999; Blomstronm & Sjoholm, 1999; Ram & Zhang, 2002, Javorcik, 2004; and Harrison & Rodriguez-Clare, 2010): (a) FDI could play a critical role in host-country's industrialization, with both positive and negative impacts; (b) FDI could directly and indirectly promote industrialization; and (c) the size of benefits from FDI depends largely on host-country absorption capability.

Theoretically, FDI may play a key role in host-country's MD since FDI comprises a package of assets such as capital, technology, know-how, brand names, and organizational/managerial practices (Markusen & Venables, 1999; Harrison & Rodriguez-Clare, 2010; Grossman & Helpman, 2015).‡‡ FDI may promote host-country's MD through direct and indirect effects or spillovers. Direct effects result from merely FDI appearance, including raising manufacturing capacity and introducing capital goods (equipment), new processing practices, new products, new management skills, and research and development (R&D) centers established in host countries (Potterie & Lichtenberg, 2001; and Zhang, 2014). Not what FDI intends to do, indirect effects are spillovers along with appearance of FDI, including technology transfers through backward and forward linkages; demonstration and competition effects; and trained worker migration (Rodriguez-Clare, 1996; Javorcik, 2004; and Tang & Zhang, 2016).§§

While potential gains from FDI exist, they do not automatically accrue. How much a host country can capture the benefits depends on domestic capabilities and absorptive capability, which are determined by local human capital, infrastructure quality, and R&D capability (Tang & Zhang, 2016; Zhang, 2025). By plugging into global value chains through FDI, a host country may become suppliers of labor-intensive products and components only, without gaining and upgrading their industrial capabilities. Host-country may even have

‡‡ On the other hand, it is sometime suggested that FDI is detrimental to host-country's industrialization (Harrison & Rodriguez-Clare, 2010). Multinational firms may kill indigenous industries through intense competition due to their market power and "crowding-out" effects. Local development in technology deepening and upgrading may be suppressed by FDI, especially multinational firms often act as monopolists in many industries in host developing markets (Ram and Zhang, 2002). Moreover, multinational firms may not intend to transfer technology to host countries because they wish to maintain their status of technological monopoly. In many cases, western multinational firms potentially intend to control host economies by dominating local industries (Harrison & Rodriguez-Clare, 2010).

§§ Backward linkages due to FDI may provide local supplier firms with technical assistance/information in purchasing raw materials and intermediary goods. Forward linkages may benefit local distributors from the marketing, or downstream local firms which can use higher-quality and/or lower-priced intermediate goods in their own production process (Potterie & Lichtenberg, 2001; and Javorcik, 2004).

industrial downgrading in the global production system controlled by multinational firms (Blomstrom & Sjoholm, 1999; Zhang, 2010). The magnitude and extent of technological benefits from FDI thus depend on host absorptive capability that is needed to acquire and work with technology. Such absorptive capability turns out to be critical in capturing gains from FDI (Limao & Venables, 2001; Durham, 2004; Girma, 2005; and Zhang, 2014).

The preceding discussions suggest that the Chinese MD could be affected by FDI as well as conventional determinants. Several empirical specifications can be considered in a study of manufacturing determination. The focus of this paper on the role of FDI, however, necessitates the use of a model that could capture and isolate the basics of FDI-MD links. Therefore, we have following equations for region I in year t.

$$MD_{it} = \alpha_0 + \alpha_{it} FDI_{it} + \beta_{it}(FDI_{it} \times A_{it}) + \delta Z_{it} + \theta_i + \mu_t + \varepsilon_{it}$$
$$i = 1, 2, \dots, N; \;\; t = 1, 2, \dots, T \qquad (1)$$

where A is a vector of variables for domestic-capability and absorptive-capacity, and Z is a vector of control variables of MD. A0 is the constant term and εit as stochastic component. Θi is unobserved region-specific effects and μt for time-specific effects.*** Vector Z may include physical capital (K), human capital (HK), infrastructure (INFR), and research and development (R&D).††† The vector A consists of three variables: human capital (HK), infrastructure (INFR), and research and development (R&D). The complementarity (i.e., domestic absorptive capacity) of FDI with HK, INFR, and R&D has been identified in many studies in the literature (for instance, Ang & Madsen, 2011; Tang & Zhang, 2016), thus three interactive terms (FDI×HK, FDI×INFR, and FDI×R&D) are also included as ID determinants. Equation (1) therefore may read as follows:

$$MD_{it} = \alpha_0 + \alpha_1 K_{it} + \alpha_2 HK_{it} + \alpha_3 INFR_{it} + \alpha_4 R\&D_{it} + \alpha_5 FDI_{it} + \alpha_6 (FDI_{it} \times HK_{it})$$
$$+ \alpha_7 (FDI_{it} \times INFR_{it}) + \alpha_8 (FDI_{it} \times R\&D_{it}) + \theta_i + \mu_t + \varepsilon_{it} \qquad (2)$$

Equations (2) constitutes the basis for our panel analyses for Chinese manufacturing at the regional level in 1990-2024.‡‡‡

*** Note that both θ_i and μ_t are important in this study since China has adopted over time a region-specific industrial policy, which leads to considerable differences in industrialization across regions, especially between coastal and inland areas. μ_t is region-invariant and takes account of any time-specific effect that is not captured in the equation. Failure to take account of such time- and region-specific effects may result in biased estimations.

††† The rationale for each of the variables is same as studies in the literature. For instance, as the capital stock of increases, a nation experiences capital deepening that makes more tools, structures, and equipment available to each worker. Capital deepening provides for a more productive labor force and thus enhances ID. Human capital (*HK*) and innovation (*R&D*) are very well studied in the literature. Both industrial capacity and technology depend critically on the availability and quality of infrastructure, ranging from roads and ports to telecommunication and energy (Limao & Venables, 2001).

‡‡‡ Two points are worth noting. First, it is possible that other determinants may exist but are excluded from the specifications. This work, therefore, should not be treated as an exhaustive study

DATA, EMPIRICAL RESULTS, AND ROBUSTNESS CHECKS

Data on 21 manufacturing sectors for 31 regions in 35 years (1990-2024) are collected from China Statistical Yearbook (SSB, 2025a) and China Industrial Economy and Statistical Yearbook (SSB, 2025b). The period selected here is based on data availability and consistence of all variables used in the work. Independent variables are measured in a way similar to that used in literature. As done by most other researchers, physical capital (K) is proxied by the ratio of domestic capital formation to GDP, the number of patents application granted weighted by GDP for R&D, and the share of tertiary enrollments in gross high school students for human capital (HK).§§§ Infrastructure (INFR) is proxied by an index that is computed as a weighted average the three standardized indicators: length of railways in operation per one hundred square kilometers, length of highways per one hundred square kilometers, and capacity of mobile telephone exchanges per one thousand people. FDI is measured by FDI stock per capita. The data on K, HK, INFR, and R&D are taken and computed from China Statistical Yearbook (SSB, 2025a). The data on T and FDI is computed from China Industrial Economy and Statistical Yearbook (SSB, 2025b).

The dependent variable (MD) is measured by two indicators, manufacturing value added per capita (MVAPC) and manufactured exports per capita (MXPC), that capture both dimensions of domestic and global performance. To reflect industrial technologies, we use shares of medium- and high-tech (MHT) MVA in total (MHT-MVAS) and MX in total (MHT-MXS).**** Taking from China Industrial Economy and Statistical Yearbook (NBSC, 1990-2024b), data on the four MD measures are computed based on 21 manufacturing sectors for 31 regions in China. The technologic classification of manufacturing sectors is based on OECD standard and global technological intensity (OECD, 2008).

Panel estimates of equations (2) for industrial capacity (MVAPC and MXPC) and technology in terms of medium- and high-tech shares (MHT-MVAS and MHT-MVAS) as dependent variables are reported in Table 3. All regressions are conducted with fixed effects because assumptions for ordinary least square (OLS) pooling and random effects are rejected.

For each of the four cases, we run two estimation models: The first one includes FDI as an additional determinant, and the second model further includes FDI absorptive-capacity variables (FDI×HK, FDI×INFR, and FDI×R&D). In general, the regression estimates are reasonable and plausible, and the explanatory power is good. Adjusted R2 of regressions is high in all cases of the industrial capacity model and the industrial technology model. The fact that substantial portions of the variance in MD can be accounted for indicates the predominant role of the independent variables in the models.

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of industrialization, rather, as a narrowly focused investigation of the merits of FDI. Second, using the regional data rather than firm-level data is based on the logic of industrialization and reflects industrial structures in a country/region.

§§§ R&D is measured by the number of patents application granted weighted by GDP, because data on R&D spending share in GDP at China's regional level are unavailable for most years.

**** Distinctions between domestic and global markets and between industrial capacity and technology have economic logics. An import-substituting or inward-looking country/region, characterized by a more complex structure of manufacturing but less competitive manufactured exports, may have a larger value of *MVAPC* but a smaller *MXPC*, thus misleading of industrialization (Zhang, 2010).

Several points are discerned easily from Table 3. First, China's MD indeed benefits from FDI. In all cases of the model with FDI, coefficient of FDI is significantly positive and the value of adjusted R2 of regressions rises substantially, which support the hypotheses of H1, H2 and H3. Moreover, the coefficients of FDI in all regressions are larger in value than those for domestic capital (K), suggesting significant gains from FDI to MD. Second, gains from FDI are larger when FDI works with domestic absorptive capacity together than it is alone.

Table 3: FDI and Manufacturing in China: 1990-2024

Independent Variable	Manufacturing Capacity				Manufacturing Technology			
	MVAPC		MXPC		MHT-MVAS		MHT-MXS	
K	0.091*	0.135	0.221*	0.177*	0.321*	0.155	0.299*	0.186
	(1.801)	(0.99)	(1.797)	(1.780)	(1.807)	(0.912)	(1.781)	(1.349)
HK	0.269	0.261	0.155	0.18	0.126	0.327	0.137	0.236
	(1.362)	(0.795)	(0.988)	(0.767)	(0.912)	(0.451)	(1.801)	(1.120)
INFR	0.652	0.407	0.311*	0.551	0.112	0.127	0.302	0.098*
	(1.604)	(1.313)	(1.814)	(1.020)	(1.363)	(1.033)	(1.351)	(1.807)
R&D	0.083	0.106	0.116	0.270	0.078	0.090	0.123	0.120
	(1.071)	(0.587)	(0.903)	(0.785)	(0.794)	(0.587)	(1.023)	(0.358)
FDI	0.456**	0.644	0.561***	0.787*	0.206**	0.229	0.341***	0.249
	(2.506)	(1.351	(4.336)	(1.782)	(2.356)	(1.059)	(4.796)	(1.061)
FDI×HK		0.342**		0.567**		0.132**		0.367**
		(2.346)		(2.562)		(1.786)		(2.622)
FDI×INFR		0.337**		0.451***		0.320**		0.238**
		(2.789)		(3.812)		(2.531)		(2.325)
FDI×R&D		0.302*		0.261**		0.157*		0.154**
		(1.819)		(2.753)		(1.773)		(2.339)
Regio Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R2	0.321	0.567	0.402	0.603	0.278	0.367	0.323	0.445
Obs.	1085	1085	1085	1085	1085	1085	1085	1085

Notes: MVAPC = manufacturing value added (MVA) per capita; MXPC = manufactured exports (MX) per capita. MH-MVAS = medium- and high-tech MVA share in total MVA; and MH-MXS = medium- and high-tech MX share in total MX. Constant terms are omitted (but available upon request) to save space. Figures in parentheses are t-statistics. The asterisks *, **, and *** indicate significant levels at 10%, 5%, and 1%, respectively.

In each of two models with the interactive variables of Table 3, the explanatory power of regressions increases, with higher adjusted R2 for the industrial capacity model than those for the industrial technology model. The coefficients of most interactive variables of FDI with HK, INFR, and R&D are either more significant or greater in value than those of FDI alone. The estimates support our hypotheses that gains from FDI do not automatically accrue but depend on China's absorptive capacity. Third, the estimates of the four conventional MD determinants (K, HK, R&D, and INFR) are consistent with the theoretical predictions and widely held belief. The parameters for K and INFR are significantly positive in most cases, suggesting an important role of physical capitals and infrastructure in industrialization.[††††]

In sum, the estimates in Table 3 provide relatively strong support to our hypotheses. China's success in MD benefits significantly from FDI in terms of industrial capacity and technology. The benefits, however, depend largely on China's strong absorptive capacity, and FDI alone would not enhance China's MD and industrial upgrading so much (Ram & Zhang, 2002; Gereffi, 2009; UNIDO, 2002; and Tang & Zhang, 2016).

The analyses carried out so far suggest that FDI, combined with domestic absorptive capacity, plays a key role in China's manufacturing development. To check the robustness of our findings, we conduct sensitivity checks with alternative measures of all variables used in regressions of Table 3, like many studies in the literature (Baltagi, 2013; Maddala & Lahiri, 2014). The estimations with annual changes in both dependent and independent variables, reported in Table 4, show how changes in MD may be explained by changes in independent variables year by year. The estimations are in general consistent with those reported in Table 3, confirming the positive effects of FDI on MD and the role of absorptive capacity.

Table 4: Changes in FDI and Manufacturing in China: 1990-2024

Independent Variables	Industrial Capacity				Industrial Technology			
	ΔMVAPC		ΔMXPC		ΔMHT-MVAS		ΔMHT-MXS	
ΔK	0.102*	0.067	0.180	0.162*	0.123*	0.097	0.250*	0.177
	(1.765)	(0.789)	(1.315)	(1.797)	(1.881)	(0.677)	(1.779)	(0.814)
ΔHK	0.109	0.095	0.078	0.011	0.082	0.113	0.062	0.059
	(0.616)	(0.571)	(0.665)	(0.472)	(0.801)	(0.785)	(1.041)	(0.980)
ΔINFR	0.211	0.092	0.193*	0.236	0.210	0.136	0.307	0.055*
	(1.004)	(0.681)	(1.781)	(0.758)	(1.353)	(0.891)	(1.136)	(1.771)
ΔR&D	0.056	0.321	0.081	0.114	0.043	0.087	0.112	0.219
	(0.787)	(0.891)	(0.683)	(0.210)	(0.387)	(0.966)	(1.243)	(0.635)
ΔFDI	0.322*	0.348*	0.426**	0.429	0.213*	0.330*	0.347*	0.302

[††††] In fact, China's mass capital formation and high quality of infrastructure is a solid foundation for its outstanding industrial performance (Gereffi, 2009; Zhang, 2014). Few evidence in favor of positive effects of *HK* and *R&D* suggests that the impact of human capital and R&D alone on ID seems to be limited, although they could strengthen industrial capacity and technology by working with FDI.

	(1.801)	(1.779)	(2.526)	(0.591)	(1.793)	(1.782)	(1.826)	(0.799)
Δ(FDI×HK)		0.457*		0.328*		0.214		0.553
		(1.784)		(1.781)		(1.350)		(1.548)
Δ(FDI×INFR)		0.554**		0.643**		0.312*		0.308**
		(2.655)		(2.871)		(1.862)		(3.550)
Δ(FDI×R&D)		0.121		0.454*		0.327*		0.165*
		(0.796)		(1.813)		(1.776)		(1.820)
Region Dummy Year Dummy	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
Adj. R2 Obs.	0.221 1054	0.358 1054	0.279 1054	0.461 1054	0.123 1054	0.209 1054	0.228 1054	0.349 1054

Notes: Δ denotes changes in two years. Others are same as those in Table 3.

CONCLUSIONS AND POLICY IMPLICATIONS

Main conclusions and policy implications from China may be summarized into three points: rethinking the role of FDI in manufacturing development, from passive recipients to strategic learners, and toward a developmental FDI-manufacturing model.

The evidence from China suggests that FDI is neither inherently beneficial nor detrimental—it is conditional. The developmental impact of FDI depends on the interaction between foreign capital and domestic capability, mediated by state strategy and institutional quality. This leads to a shift from the traditional “FDI-led growth” hypothesis toward a more nuanced “FDI–domestic synergy” framework. In this view, foreign investment acts as a catalyst only when embedded within a host economy capable of learning, adapting, and upgrading.

The key insight from this paper is that developing countries must evolve from passive recipients of FDI into strategic learners. The prevailing policy focus in many developing countries has been FDI attraction - emphasizing liberalization, incentives, and market openness. However, the more decisive challenge is FDI absorption: transforming foreign capital into domestic industrial capability. China’s experience demonstrates that when foreign capital is embedded within a capable state, strong institutions, and a learning-oriented economy, it becomes a vehicle for manufacturing transformation. Without these foundations, FDI risks reinforcing dependency and premature deindustrialization. The challenge for developing economies is thus not whether to attract FDI, but how to govern it - transforming global integration into national industrial upgrading.

China’s approach constitutes a developmental FDI-manufacturing model, distinct from both laissez-faire liberalization and heavy-handed protectionism. Its defining characteristics include selective openness, i.e., gradual and sector-specific liberalization; strategic integration, i.e., linking FDI to export upgrading and technology transfer, institutional alignment, i.e., coordination between central and local governments; and reciprocal discipline, i.e., incentives tied to performance benchmarks for both firms and officials.

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