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A DECADAL STATISTICAL ANALYSIS OF SECTORIAL PROGRESS UNDER THE MAKE IN INDIA PROGRAM: EVIDENCE FROM FDI IN AUTOMOBILE SECTOR

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Abstract

This research paper presents a comprehensive statistical assessment of the "Make in India" initiative over a ten-year period (2014–2024), focusing on Automobile Sector. By conducting a comparative analysis of Foreign Direct Investment (FDI) inflows between the pre-Make in India decade (2004–2014) and the post-launch decade (2014–2024), the study measures the initiative's economic effectiveness. This study aims to ascertain the initiative's impact on attracting foreign capital to the automobile sector of the economy. Data is sourced from reliable government databases, including the Department for Promotion of Industry and Internal Trade (DPIIT), Reserve Bank of India (RBI), and the Ministry of Commerce. This paper uses descriptive statistics and computations to support findings. Results are presented with appropriate data visualization and discussed in light of industrial policies and global economic shifts. The findings suggest a substantial increase in average annual FDI post-"Make in India," indicating a positive influence of the government's policy thrust and subsequent reforms on investment attractiveness.

Keywords: Make in India, FDI, Sectorial Growth, Industrial Policy, Automobile Sector.

1. Introduction

1.1 Overview: The Make in India initiative, launched in September 2014, aimed to position India as a global manufacturing hub by increasing industrial productivity, attracting foreign capital, enhancing employment and boosting exports. As the program completes a decade, evaluating its outcomes across important sector like automobiles becomes critical in guiding for future policymaking in this field.

1.1.1 Automobile Sector FDI in Relation to India's GDP:

The Indian automobile industry stands as one of the largest and most dynamic sectors of the economy, significantly contributing to national output, trade, and employment. Currently, the sector accounts for nearly **7.1% of India's GDP** and is recognized as a critical driver of industrial growth. The automobile industry is not only a direct contributor to the economy but also supports ancillary industries such as steel, chemicals, rubber, glass, and electronics, thereby creating a strong multiplier effect. In recent decades, India has transformed into a global hub for automobile production, supported by cost advantages, skilled labor, a vast consumer market, and a favorable policy environment. The sector has witnessed consistent inflows of **Foreign Direct Investment (FDI)**, which have played a pivotal role in upgrading technology, fostering innovation, and strengthening India's manufacturing base. According to official estimates, the automobile industry is one of the top recipients of FDI in India, reflecting its attractiveness for global investors and multinational corporations. FDI in the automobile sector has had a dual impact: on one hand, it has fueled capacity expansion, employment generation, and export competitiveness; on the other, it has strengthened linkages with global value chains, making India a strategic destination for automobile manufacturing. Moreover, foreign investments have enabled the adoption of cleaner, energy-efficient, and technologically advanced vehicles, in line with global trends.

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1.1.2. FDI and Economic Growth: Foreign Direct Investment (FDI) is a crucial channel for technology transfer, capital formation, and productivity enhancement in emerging economies. In the context of India, FDI in the automobile sector has not only led to infrastructure and capacity development but has also improved export competitiveness. The correlation between FDI and GDP growth suggests that a robust macroeconomic environment attracts higher foreign investments, especially in capital-intensive sectors like automobiles. A steady rise in GDP strengthens investor confidence, thereby encouraging long-term commitments from multinational corporations.

1.1.3. Government Initiatives: Make in India and Sector-Specific Schemes: The launch of the 'Make in India' campaign in 2014 marked a significant policy shift aimed at transforming India into a global manufacturing hub. The automobile sector was identified as one of the 25 priority sectors under this initiative. Several complementary schemes were introduced to create a favorable ecosystem for investment:

- **Production Linked Incentive (PLI) Scheme:** Introduced in 2021 with an outlay of INR 25,938 crore, the PLI scheme aims to attract investments in advanced automotive technologies, including electric and hydrogen-fueled vehicles.
- **FAME (Faster Adoption and Manufacturing of Hybrid and Electric Vehicles):** Implemented in two phases (2015 and 2019), this scheme provides incentives for electric vehicle (EV) adoption and infrastructure, drawing foreign interest in EV manufacturing.
- **Vehicle Scrappage Policy:** Announced in 2021, this policy is intended to promote the phasing out of old and polluting vehicles, thereby generating demand for new vehicles and fostering further investments.

1.1.4. Ease of Doing Business (EODB) and Investment Climate: India's rapid improvement in the World Bank's Ease of Doing Business rankings—from 142 in 2014 to 63 in 2020—reflects significant regulatory and procedural reforms. Key developments benefiting the automobile sector include:

- Simplified business registration and licensing procedures
- Introduction of the Goods and Services Tax (GST), which streamlined the taxation system
- Reforms in construction permits, insolvency resolution, and cross-border trade

These measures have reduced transaction costs, improved transparency, and made India a more attractive destination for foreign investors. Industrial states such as Tamil Nadu, Maharashtra, and Gujarat have further complemented these efforts by offering dedicated auto clusters, plug-and-play infrastructure, and investor-friendly state policies.

1.1.5. Infrastructure, Technology and R&D as Catalysts: FDI in the automobile sector has increasingly focused on new technologies, particularly in the areas of electric vehicles, autonomous driving, and emission control. India's large consumer base and policy incentives have motivated global players to invest in manufacturing, R&D centers, and supply chains. The shift toward clean mobility has further opened avenues for investment in EV batteries, charging infrastructure, and smart mobility solutions.

1.2 Rationale for Choosing the Automobile Sector

The automobile sector holds a prominent place in India's industrial ecosystem, serving as a critical engine of economic growth, employment creation, and technological advancement. As one of the largest manufacturing industries, it has consistently been at the forefront of industrial reforms and has been identified as a strategic focus area under the **Make in India** initiative. The industry's structural depth, international competitiveness and strong policy backing make it an ideal

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sector for evaluating the dynamics of Foreign Direct Investment (FDI) and its relationship with India's GDP growth. The rationale for selecting this sector can be explained under the following dimensions:

1.2.1 High Contribution to GDP and Employment

As per Niti Ayog report titled 'Automotive Industry: Powering India's participation in Global Value Chains', released in April 2025, The Indian automobile industry contributes about **7.1% to the national GDP** and approximately **49% of the manufacturing GDP**, making it one of the largest drivers of industrial production. According to estimates by the Society of Indian Automobile Manufacturers (SIAM), the industry directly and indirectly employs over **37 million people**, spanning across manufacturing, dealerships, parts suppliers, logistics, and after-sales services. Projections suggest that by 2030, employment could rise further with the adoption of electric mobility and ancillary industries. This scale of contribution places the sector among the top pillars of India's economic architecture.

1.2.2 FDI-Attractive Industry

The automobile sector has consistently remained among the **top 10 sectors attracting FDI** in India. Between **April 2000 and March 2024**, the industry received cumulative FDI inflows of approximately **USD 37.7 billion** (DPIIT, 2024), accounting for nearly **5% of total FDI inflows** into the country. Global players such as Suzuki, Hyundai, Toyota, Honda, Kia, Ford (earlier), and Stellantis have established manufacturing bases in India, leveraging its large domestic market and cost advantages. These investments have not only enhanced domestic capacity but also integrated India into the global automotive supply chain. Studying such trends provides key insights into India's overall industrial investment climate.

1.2.3 Policy Attention and Incentives

The Government of India has consistently extended strong policy support to this sector, recognizing its role in industrial competitiveness. The **Automotive Mission Plan (AMP 2016–26)** aims to make India one of the top three automotive industries in the world, targeting a four-fold increase in the sector's GDP contribution. Under the **FAME I & II schemes**, the government has allocated over **₹10,000 crore** to accelerate the adoption of hybrid and electric vehicles. Additionally, the **Production Linked Incentive (PLI) Scheme for Auto and Auto Components** with an outlay of **₹25,938 crore**, is designed to encourage localization, advanced manufacturing and green technologies. These initiatives highlight the government's determination to attract greater FDI into the sector.

1.2.4 Innovation and Export Potential

India has emerged as a **global hub for small car production**, with nearly **40% of small cars sold worldwide manufactured in India**. The country is also the **fourth-largest automobile market globally** (OICA, 2023) and a leading exporter of two-wheelers and auto components. In FY 2022–23, automobile exports from India were valued at **USD 23 billion**, while the auto component industry alone recorded exports worth **USD 20.1 billion**, growing at over 10% annually. The sector is undergoing rapid innovation with a shift towards electric vehicles (EVs), hybrid technologies, and cleaner fuel alternatives. This export-driven and innovation-oriented growth enhances the sector's role in India's industrial development strategy.

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1.2.5 Availability of Data and Measurable Indicators

One of the major advantages of choosing the automobile industry for study is the availability of **robust, high-quality data**. Institutions like the **Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Heavy Industries, SIAM, and the Automotive Component Manufacturers Association (ACMA)** regularly publish reliable statistics on FDI inflows, production, sales, and exports. This availability of structured, longitudinal data makes the sector particularly suitable for conducting **quantitative and trend analysis** to evaluate the relationship between FDI inflows and GDP growth

1.3 Role of FDI in Sectorial Growth

Foreign Direct Investment (FDI) plays a pivotal role in driving sectorial growth, particularly in developing economies like India. As a non-debt financial resource, FDI serves as a critical channel for capital infusion, technology transfer, managerial know-how, and access to global value chains. In the context of the automobile sector, FDI accelerates modernization, competitiveness and integration with global markets.

1.3.1 Capital Formation and Infrastructure Development

FDI brings long-term capital investment into manufacturing facilities, research and development (R&D) centers, and supply chain infrastructure. This financial support enhances productive capacity and sectoral output, especially in capital-intensive industries like automobiles.

1.3.2. Technology Transfer and Innovation

Multinational corporations often bring advanced technologies and global best practices. These contribute to domestic skill development and innovation ecosystems, improving product quality and manufacturing efficiency in the host country.

1.3.3 Employment Generation

FDI leads to both direct and indirect employment. Direct employment arises from the setting up of factories and service centers, while indirect employment is created through ancillary industries, logistics and retail networks.

1.3.4 Export Competitiveness

Foreign investment helps firms meet international standards and expand into global markets. The automobile sector, particularly components and compact cars, has seen rising export potential due to FDI-led modernization and productivity gains.

1.3.5. Sectoral Spillover Effects

FDI stimulates linkages with domestic firms through subcontracting and supply agreements, leading to capacity-building in local enterprises. This multiplier effect contributes to the broader industrial ecosystem's growth.

1.3.6. Policy Validation and Confidence

High FDI inflows signal investor confidence in sector-specific policies. This, in turn, can encourage further domestic and foreign investments, reinforcing the policy framework's effectiveness—as seen with schemes under the Make in India initiative.

2. Literature Review

Foreign Direct Investment (FDI) has long been acknowledged as a key engine of economic development, particularly in emerging markets where capital, technology and managerial expertise are often scarce. Numerous theoretical frameworks and empirical studies have analyzed FDI's contribution to industrial growth, productivity and structural transformation. In India's context, the automobile sector stands out as a vital case due to its scale, policy attention and responsiveness to liberalization reforms.

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2.1 Theoretical Foundations of FDI and Growth

Dunning's Eclectic Paradigm (OLI framework) serves as a foundational theory in FDI research. It argues that firms engage in FDI when they possess **Ownership (O)** advantages, seek **Location (L)** benefits and prefer **Internalization (I)** of operations. These investments often result in spillovers that benefit the host country, such as technology diffusion, employment and trade integration (Dunning, 1993).

FDI is also regarded as a source of **external development finance** that supplements domestic savings and increases fixed capital formation (Borensztein et al., 1998). In manufacturing sectors like automobiles, FDI fosters **productivity enhancement**, **economies of scale** and **vertical integration** across supply chains.

2.2 Empirical Studies on FDI in India

Several studies have highlighted FDI's macroeconomic role in India:

- **Balasubramanyam et al. (1996)** found that FDI contributes more effectively to growth when supported by export-oriented policies.
- **Kumar and Pradhan (2002)** analyzed Indian industries and concluded that sectors with high import-substitution capacity and technology needs—like automobiles—benefit more from FDI.
- **Sahoo and Mathiyazhagan (2003)** emphasized regional disparities in FDI distribution but acknowledged manufacturing as a strong beneficiary of liberalization.

FDI inflows in India rose significantly after 1991, with major liberalization reforms targeting key sectors including automobiles. The industry attracted joint ventures with global giants such as Suzuki, Hyundai, Ford, and Honda, transforming India into a major automotive hub.

2.3 Sector-Specific Literature: FDI and the Indian Automobile Industry

The Indian automobile sector is among the largest in the world by volume and has seen strong FDI inflows due to its:

- Large domestic market,
- Growing middle class,
- Evolving infrastructure,
- Policy support through **Automotive Mission Plans** (AMP 2006–2016 and AMP 2016–26).

Mukherjee and Pandey (2015) performed a time-series analysis and found a significant positive relationship between FDI and automobile production, asserting that FDI helped modernize Indian auto manufacturing.

Bhattacharya and Mukherjee (2017) observed that technology transfer and localization of production increased with foreign investments, enabling India to emerge as a major exporter of small cars and two-wheelers.

A more recent study by **KPMG (2020)** on the impact of global value chains in India identified the automobile sector as highly integrated and sensitive to FDI dynamics.

2.4 Make in India: Policy Shift and Investment Environment

- The Make in India initiative, launched in 2014, was a major policy shift by the Indian government to transform the country into a global manufacturing powerhouse. It aimed to boost the manufacturing sector's contribution to GDP from around 15% to 25% by 2025 by focusing on key strategic areas. For the automobile sector, this meant creating a more favorable environment for both domestic and foreign direct investment by targeting 25 key sectors, including automobiles. It emphasized:

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- Simplification of business processes,
- FDI policy liberalization,
- Development of industrial corridors and infrastructure.

Singh and Singh (2020) reported that post-2014, India saw an average annual FDI growth of over 20%, with automobile and electronics leading the surge. They credited institutional support, reforms in taxation (GST), and labor laws for increasing investor confidence.

2.5 Gaps in Existing Literature

Despite the breadth of literature on FDI and manufacturing, specific gaps remain:

1. **Lack of Decadal Statistical Comparisons**: Few studies compare **pre- and post-Make in India** but the decadal analysis using a rigorous statistical framework is missing.
2. **Inflation-Adjusted Analysis**: Most existing studies use nominal FDI figures without adjusting for inflation, which may misrepresent real trends.
3. **Sector-Focused Statistical Testing**: The application of inferential statistics (e.g., t-tests) to test the significance of FDI inflow differences over time is relatively rare in sector-specific Indian studies.

2.6 Contribution of the Current Study

This study addresses these gaps by:

- Using **inflation-adjusted FDI data** from 2004 to 2024.
- Conducting **Welch's t-test** to statistically test the impact of the *Make in India* initiative.
- Providing **visual and comparative analysis** of sectoral progress before and after the policy.
- Offering policy-relevant insights to enhance industrial competitiveness and investment strategies in the automobile sector.

3. Research Objectives

- To compare FDI inflows in selected sectors during 2004–2014 and 2014–2024.
- To analyze whether the Make in India initiative significantly altered automobile sector growth trajectory.

4. Data Sources and Methodology

- Secondary data from DPIIT (FDI inflow), World Bank GDP and Inflation, EoDB Reports and industry-specific reports.
- Data cleaned and normalized for inflation using base year (2014).
- Statistical tools used: t-Test, Percentage change, Bar graphs.
- Software used: Excel

This study adopts a quantitative research approach to analyze the impact of the Make in India (MII) initiative on FDI inflows in the automobile sector. The data on annual FDI inflows (in ₹ Crore) was sourced from the DPIIT Portal and originally recorded in current prices. To account for inflationary effects and facilitate an accurate temporal comparison, the FDI values were converted to constant prices using the GDP deflator, with 2014 as the base year. The deflator data was obtained from the World Bank's World Development Indicators.This inflation adjustment process ensures that the observed changes in FDI are not merely nominal but reflect real variations in

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investment flows, eliminating the distortions caused by general price level changes over time. The analysis in this paper is based on secondary data obtained from authoritative government sources, including the Department for Promotion of Industry and Internal Trade (DPIIT) for FDI inflow data EoDB Reports, and various industry-specific reports. The collected data was cleaned and normalized for inflation using 2014 as the base year. Statistical tools employed for analysis t-Test, percentage change calculations, and the visualization of data through bar graphs. Microsoft Excel was used for data processing and visualization.

5. Data Analysis:

The study period is divided into two distinct phases:

- **Pre-Make in India Period**: Years prior to the launch of MII (i.e., before September 2014).
- **Post-Make in India Period**: Years from 2014 onwards.

The cleaned and inflation-adjusted dataset is then analyzed using appropriate statistical tools to evaluate the effectiveness of MII in attracting FDI to the automobile sector.

Table 1: FDI Inflows in India in Automobile Sector for Pre and Post Make in India Periods

Period	Year	FDI at Current Prices in ₹ (Crore)	GDP Deflator	Inflation Adjusted FDI in ₹ (Crore)	Inflation Adjusted FDI Mean in ₹ (Crore)
Pre-MII Data	2004-05	559	208	1165	5894
	2005-06	630	197	1242	
	2006-07	1254	187	2340	
	2007-08	2697	172	4643	
	2008-09	5212	161	8391	
	2009-10	5609	147	8270	
	2010-11	6008	138	8275	
	2011-12	4347	125	5417	
	2012-13	8384	115	9609	
	2013-14	9027	106	9585	
Post-MII Data	2014-15	15794	100	15794	15445
	2015-16	16437	98	16062	
	2016-17	10827	95	10238	
	2017-18	13461	91	12223	
	2018-19	18309	87	15979	
	2019-20	19753	85	16825	
	2020-21	12115	81	9822	
	2021-22	51624	74	38358	
	2022-23	15184	69	10521	
	2023-24	12622	68	8629	

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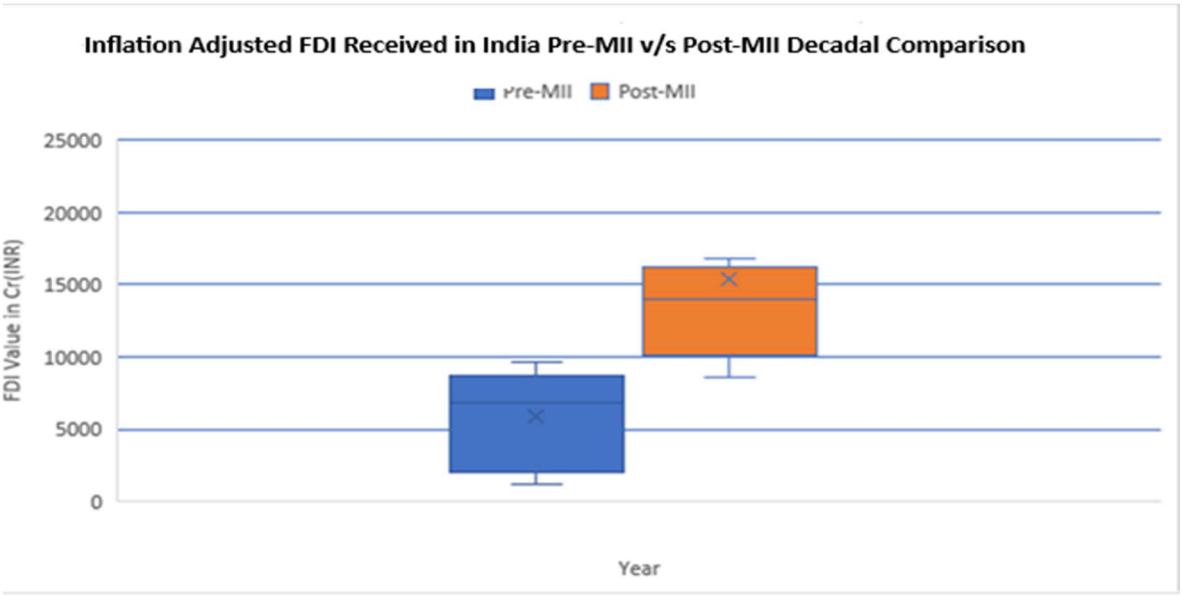

Figure 1: Inflation adjusted FDI Inflows in Automobile Manufacturing in India

Table 2: Summary Comparison of Pre- and Post-Make in India Periods

Period	Total FDI (₹ Cr)	Average Annual FDI (₹ Cr)	Years Covered	% Decadal Growth
Pre-Make in India (2004 to 2014)	58937	5893.86	10	**262**
Post-Make in India (2014 to 2024)	154451	15445.06	10	

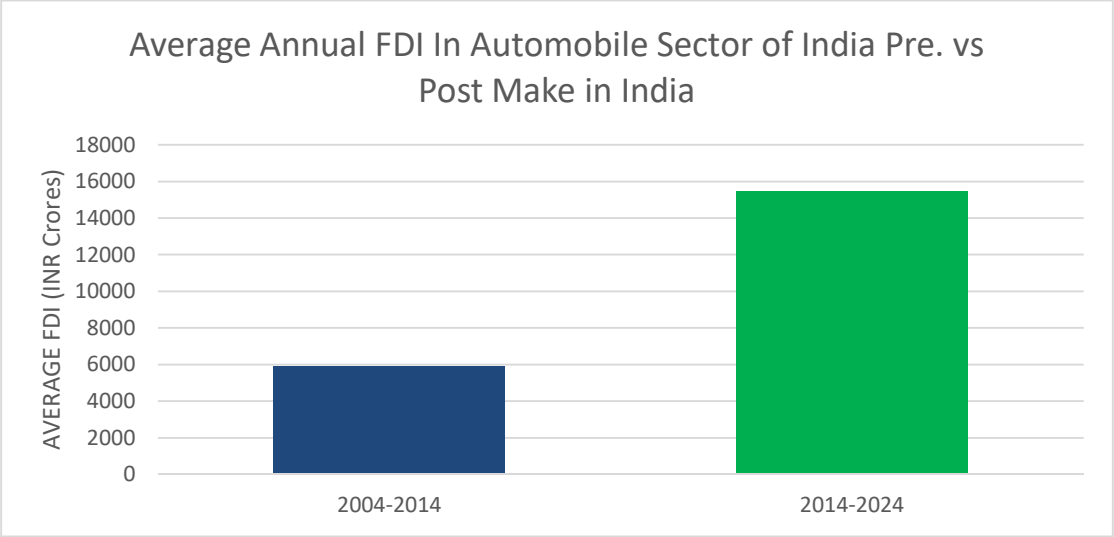

Figure 2: Average FDI Received in India in Automobile Sector

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Analysis: The bar chart clearly shows the sharp increase in FDI inflows after the launch of Make in India in 2014–15. Each of the post-2014 years consistently records significantly higher inflows than the years before. Average FDI inflows have **increased by more than 2.5 times** during the Make in India decade. This sharp rise indicates improved investor confidence and a friendlier business environment driven by policy reforms, deregulation, and infrastructure growth. The automobile sector emerged as a star performer post-2014 due to targeted schemes like the Production Linked Incentive (PLI) for electric vehicles and automotive components. India's ranking in global auto production rose from 7th to 5th in this period. Export gains were modest, reflecting global demand fluctuations and supply chain disruptions during COVID-19.

We tested the following hypotheses:

- **Null Hypothesis (H_0):** There is no significant difference in the mean inflation-adjusted FDI inflows between the Pre-Make in India (Pre-MII) and Post-Make in India (Post-MII) periods.
- **Alternative Hypothesis (H_1):** There is a significant difference in the mean inflation-adjusted FDI inflows between the two periods.

As the Number of Observations are less than 30, we Used t-Test: Two-Sample Assuming Unequal Variances **(Welch–Satterthwaite approximation) n**, which is used when variances are unequal between the two samples. Statistical Analysis was done using MS Excel Data Analysis Tool and the results are:

Descriptive Statistics Summary (Inflation-Adjusted FDI in ₹ Crore) t-Test: Two-Sample Assuming Unequal Variances		
	Pre-MII	***Post-MII***
Mean	**5893.8600**	**15445.0630**
Variance	11489103.3	74166316.17
Standard Deviation	**3389.558**	**8611.987**
Standard Error	**3215.617**	**8170.048**
Observations	**10**	**10**
Hypothesized Mean Difference	0	
Df	12	
t Stat	-3.263	
P(T<=t) one-tail	0.003	
t Critical one-tail	1.782	
P(T<=t) two-tail	**0.007**	
t Critical two-tail	2.179	

- Since the **p-value (0.007) < 0.05**, we **reject the null hypothesis**. This means that there is a **statistically significant difference** in the average real (inflation-adjusted) FDI inflows between the Pre-MII and Post-MII periods.
- The **Post-MII period experienced significantly higher real FDI inflows** in the automobile sector compared to the pre-MII era.

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6. Policy Implications

The findings of this study carry several important policy implications, particularly for sustaining and enhancing the momentum of FDI inflows in India's automobile sector. While the *Make in India* initiative has been successful in stimulating investment, there remain structural and policy-level considerations that warrant continuous improvement:

6.1. Strengthening Sector-Specific Incentives

The significant rise in FDI inflows post-2014 can be partially attributed to targeted incentives such as the Production Linked Incentive (PLI) scheme for advanced automotive technology and electric vehicles. Expanding such schemes to include hybrid technologies, battery infrastructure, and green mobility components could attract more high-tech investors and deepen India's manufacturing base.

6.2. Enhancing Infrastructure and Logistics

Despite higher FDI inflows, India's export competitiveness in automobiles remains relatively modest. Policymakers should focus on:

- Reducing logistical bottlenecks,
- Upgrading road and port infrastructure,
- Accelerating the development of dedicated freight corridors and industrial clusters.

Such measures would lower transaction costs and enhance India's appeal as an export base.

6.3. Improving Ease of Doing Business Further

Although India has made considerable progress in improving business conditions (e.g., digitizing approvals, reducing licensing hurdles), regulatory consistency across states and faster dispute resolution remain challenges. Streamlining these processes would further boost investor confidence and reduce project delays.

6.4. Fostering R&D and Technological Innovation

Long-term sectoral growth depends not just on capital inflows, but also on innovation. FDI policies should be aligned with R&D incentives, public-private collaboration in automotive research, and intellectual property protection to ensure technology transfer translates into local capacity-building.

6.5. Skilling and Employment-Oriented Reforms

The automobile sector is labor-intensive and a major source of both direct and indirect employment. Targeted skilling programs under *Skill India*, specifically tailored to EV manufacturing, battery assembly, and connected car technologies, are critical to maximizing employment dividends from incoming FDI.

6.6. Monitoring and Evaluation Framework

There is a need for a more transparent and data-driven monitoring system for FDI inflows and their real sectoral impact. Creating dashboards that link FDI with employment, exports, and capacity utilization would help in formulating adaptive policies.

7. Conclusion

This study provides empirical evidence on the effectiveness of the *Make in India* programme in enhancing Foreign Direct Investment (FDI) in India's automobile sector over the last two decades. The analysis, based on inflation-adjusted data and statistical testing, clearly demonstrates a significant increase in average annual FDI inflows during the post-Make in India period (2014–2024) compared to the previous decade (2004–2014).

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The t-test results validate that the observed growth is not due to random variation but reflects a structural shift likely driven by:

- Proactive government reforms,
- Policy incentives,
- A growing domestic market, and
- Improvement in India's global investment image.

In conclusion, *Make in India* has been a critical inflection point for the Indian automobile sector. Its success in attracting foreign investment can serve as a blueprint for other sectors. Yet, to realize its full transformative potential, continuous policy fine-tuning, stronger implementation mechanisms, and a holistic approach that connects FDI to employment, exports, and innovation are essential. Future research should explore multi-sectoral comparisons and integrate metrics like labor productivity, technology absorption, and global value chain participation to develop a more comprehensive understanding of industrial growth under investment-driven reforms

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