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Uneven Acceleration: How State EV Policies Shape Manufacturing and Supply Chains in India

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ABSTRACT

This study examines how state-level electric vehicle (EV) policies influence India's EV ecosystem, focusing on manufacturing investment and supply chain development. Using data from 30 states and Union Territories, with proxies for production activity and innovation linkages, the analysis finds mixed results: weak policies deter manufacturing investment, but strong policies do not always lead to higher investment. While robust policy environments can attract production activity, supply chain development is more sensitive to broader economic conditions. The findings suggest that EV policy design must be complemented by supportive investment and market factors to foster balanced sector growth, as uneven industrial development risks reinforcing regional disparities and limiting access to sustainable technologies.

Keywords: EV Policies, Manufacturing Investment, Supply Chain Development

1. Introduction

Electric vehicles (EVs) are reshaping the global automotive landscape with unprecedented speed, offering a cleaner alternative to internal combustion-engine vehicles. India has seen substantial momentum in EV adoption—SMEV data shows total EV sales in fiscal 2022–23 grew over 200%, reaching approximately 1.18 million units across two-wheelers, three-wheelers, four-wheelers, and buses. Despite this promising trajectory, India lags significantly behind global leaders. In China, EVs, including battery-electric and plug-in hybrids: accounted for nearly 48% of vehicle sales in 2024, up from 25% in 2021. In contrast, India's EV market share remains below the 5% tipping point, typical of early mass adoption phases in many developed countries.

The slow uptake in India underscores the importance of specific public policies, such as subsidies, tax incentives, and charging infrastructure development, to accelerate EV adoption.

Beyond the economic aspects, the transition also has major social implications, including reducing air pollution, lowering public health costs, increasing access to clean energy solutions, and creating green jobs in manufacturing and maintenance.

At the core of this divergence lies the question of production capacity. The scale and speed of EV adoption depend not only on consumer-side incentives but critically on the strength of domestic manufacturing ecosystems. Battery assembly, vehicle production, and component supply chains play a vital role in reducing costs, enabling faster deployment, and attracting investment. In this context, the geography of EV production within India has become a structural bottleneck. A small number of states have developed robust manufacturing ecosystems, while others remain largely excluded from the EV industrial map.

This raises an important policy question: Do state-level industrial policies significantly shape EV-related production and supply chain outcomes in India? While national initiatives like the FAME-II scheme and the Production-Linked Incentive (PLI) program offer a broad enabling environment, actual implementation and investment momentum are increasingly driven at the state level.

States such as Karnataka, Maharashtra, and Tamil Nadu have emerged as frontrunners by deploying targeted industrial policies, including capital subsidies, SGST reimbursements, power tariff waivers, and infrastructure grants. These states have become key destinations for EV manufacturing and supply chain development. In contrast, many eastern and northeastern states remain peripheral to this transition, constrained by limited industrial infrastructure and weaker policy incentives. The resulting regional disparity not only slows India's overall EV trajectory but also undermines inclusive economic development.

Addressing these asymmetries is vital if India is to meet its EV30@30 target—aiming for 30% of new car sales to be electric by 2030—and to fulfil its climate commitments under the Paris Agreement. Without deliberate policy harmonization and capacity building across states, India risks reinforcing existing regional inequalities, constraining industrial diversification, and forgoing employment and growth opportunities. In this light, building a balanced and regionally inclusive EV ecosystem is not only an industrial imperative but a broader socio-economic priority.

This paper investigates how state-level variations in EV policies influence two critical outcomes: (i) manufacturing investment decisions, and (ii) the development of EV component supply chains. Using a comparative analysis across major Indian states, the study deconstructs the design of industrial incentives—such as capital subsidies, SGST and electricity duty exemptions,

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and infrastructure support—and correlates these with observed investment flows and supply chain integration metrics.

By offering a granular, state-level economic perspective, this research addresses a significant gap in the literature, which has largely focused on national-level policies or aggregate EV adoption trends. The paper contributes to the fields of industrial economics and development policy by providing empirical evidence on how subnational policy heterogeneity influences industrial geography and supply chain formation in a fast-evolving sector. While the analysis focuses on industrial development, these patterns have wider implications: the geography of EV-related industries shapes employment opportunities, regional economic disparities, and ultimately the affordability and accessibility of green technologies. Situating EV adoption within these broader dynamics underscores how industrial policy indirectly interacts with questions of social welfare and sustainable development.

The remainder of the paper is structured as follows. Section 2 reviews the relevant literature on industrial policy, subnational disparities, and EV adoption. Section 3 outlines the data sources, variables, and methodology used in the empirical analysis. Section 4 presents the regression specifications and discusses the results. Finally, Section 5 concludes with policy implications and directions for future research.

2. Literature Review

2.1 Determinants of EV Manufacturing Investment and Supply Chain Development

The global electric vehicle (EV) sector has witnessed remarkable growth over the past decade, driven by government policy support, technological innovation, and market demand for sustainable transportation. Manufacturing investment in EVs is often influenced by a complex interplay of factors such as access to critical raw materials, labour quality, proximity to demand centers, and state-specific industrial policies.

Globally, the International Energy Agency (IEA) notes that countries like China and Germany have seen high levels of EV manufacturing investment due to aggressive policy mandates, public-private collaboration, and early investment in supply chains. Stephen Ezell (2024) found that China's dominance in battery production and supply chains is underpinned by centralised subsidies, integrated industrial clusters, and favourable logistics. Similarly, Lee & Mah (2020) observed that South Korea's manufacturing ecosystem for EVs benefited heavily from coordinated R&D investments and targeted government support for battery and semiconductor industries. In the U.S., Allcott et al. (2024) noted that state-level policies such as tax credits, low-interest loans, and infrastructure grants play a critical role in attracting auto manufacturers.

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In India, a similar industrial opportunity is emerging, but the national EV push plays out unevenly across states. Sengupta and Pal (2021) suggest that technological readiness, targeted incentives, and infrastructure expansion play a central role in accelerating EV adoption in India. NITI Aayog (2021) argues that policy clarity, infrastructure readiness, and investor facilitation remain key bottlenecks in lagging states. Similarly, Mukherjee and Sharma (2023) find that government-industry collaboration, especially in skill development and vendor facilitation, drives long-term manufacturing presence.

These studies converge on a broader insight: while technological readiness and national policies matter, regional production outcomes are deeply embedded in local institutional, infrastructural, and policy contexts. However, this observation has yet to be translated into systematic empirical work on how differences in state-level industrial policies across India influence EV outcomes.

2.2 Divergence in EV Policy and Investment across Indian States

Within India, state governments have begun to craft their own EV policies, many of which go beyond demand-side incentives to actively court manufacturing investment. States such as Tamil Nadu, Karnataka, Gujarat, and Maharashtra have adopted relatively aggressive industrial strategies, offering capital subsidies, land support, stamp duty exemptions, and single-window clearance systems aimed at attracting EV firms. Similarly, CEEW (2023) reports that of the 14 states with dedicated EV manufacturing incentives, 7 have seen measurable growth in FDI and domestic component production.

In contrast, less industrialised states in eastern and northeastern India have either delayed formulating EV policies or have largely focused on consumer subsidies rather than industrial development. As a result, manufacturing remains geographically skewed. The Bureau of Energy Efficiency (2022) suggests that long-term regulatory stability and a clear pipeline of procurement incentives—for example, EV bus fleet orders—have also played an indirect but important role in shaping investment decisions, as firms prefer to locate near assured markets.

Despite these observations, there remains a lack of empirical, cross-state analysis linking the content and design of EV policies with manufacturing outcomes. Most evaluations remain descriptive, providing policy inventories rather than causal assessments. A deeper understanding of how state-level incentives shape investment patterns is essential to inform policy harmonisation and reduce geographic disparities in India’s EV production landscape.

2.3 State-Level EV Policies in India and Supply Chain Development

Beyond firm-level investment decisions, state policies also influence the formation and depth of EV supply chains. A well-functioning EV ecosystem requires not just assembly plants, but also a

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network of Tier 1, 2, and 3 suppliers, logistics providers, battery recycling units, and testing facilities. Policy instruments that target these ancillary sectors can create deeper localisation and backward linkages.

Case studies from within India suggest that some states are beginning to take this ecosystem approach. For instance, findings suggest that Gujarat's emphasis on battery manufacturing and recycling has catalysed the clustering of component suppliers. Tamil Nadu's EV policy explicitly includes vendor development and localisation targets, attracting anchor firms and enabling co-location of upstream suppliers (Invest India, 2022). Maharashtra and Telangana have also invested in testing labs, battery certification centres, and MSME vendor parks, all of which strengthen supply chain reliability (CEEW, 2021). Banerjee et al. (2023) argue that only states adopting this integrated model—supporting both large firms and smaller suppliers—have been able to generate resilient EV supply chains.

However, most of this evidence remains qualitative or anecdotal. What remains underexplored is whether states that design policies to explicitly address supply chain constraints—such as logistics infrastructure or quality certification—actually see stronger component localisation or more diversified supplier networks. The extent to which such policy instruments drive structural transformation across states remains an open empirical question.

3. Data and Methodology

To empirically assess the impact of state-level EV policy design on supply chain development and manufacturing investment, I constructed a cross-sectional dataset covering 30 Indian states and union territories for the year 2024. This dataset draws entirely on secondary sources, integrating data on EV-related policy design, market outcomes, and macroeconomic controls.

The analysis uses four main dependent variables: EV registrations per capita in 2024 (mentioned as Yearly EV registrations per capita hereon), EV registrations per capita from 2014 to 2024 (mentioned as Decadal EV registrations per capita hereon), number of startups, and number of manufacturers. These variables were collected at the state level. Registration data was sourced from the VAHAN Dashboard and the Press Information Bureau (PIB), while startup data was taken from the Department for Promotion of Industry and Internal Trade (DPIIT), and manufacturer counts were gathered from official Lok Sabha documents. On average, states recorded 4.96 decadal EV registrations per person (SD = 4.83), suggesting moderate but uneven growth over time. Yearly EV registrations per person averaged 1.51 (SD = 1.44), again pointing to substantial variation across states. States had an average of 34.37 EV-related startups, but the high standard deviation of 46.49 indicates a strong concentration of activity in a few innovation

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hubs. Similarly, the average number of EV manufacturers per state was 8.53, with a standard deviation of 17.25, highlighting stark differences in industrial participation (See Table 2A).

The main independent variables in this analysis are the categories of state-wise EV policies- no policy, weak, strong direct and strong indirect. The policies were collected through various government websites including but not limited to- NITI Aayog, Bureau of Energy Efficiency, e-AMRIT, and more. No policy was the most common type, applied in 56.7% of states with a standard deviation of 0.50. Strong direct incentive policies were present in 10% of states with a standard deviation of 0.31. Strong indirect incentive policies were adopted by 6.7% of states with a standard deviation of 0.25. Weak policies were also implemented in 6.7% of states with a standard deviation of 0.25. Below is a table that shows how the policies were categorised:

Table 1: Description of EV Policy Categories

Policy Category	**Description**
No policy	States that did not have any EV policies
Weak policies	States that had very few or very small EV policies were found commonly across most of the states, irrespective of additional policies. Such policies include 100% SGST reimbursement, stamp duty exemptions and electricity duty waivers.
Medium policies	States that had a balanced level of EV policy support, typically including small capital subsidies for micro and small enterprises owned by SC/ST, women, or differently-abled entrepreneurs, capital subsidies with much lower budgets, and provision of small certifications
Strong direct policies	States that had strong incentivisers that directly affected manufacturing investment and supply chain development. These include high purchase incentives, strong supply-side and demand-side policies, availing 50% term loans, strong incentive promotion subsidies and more.
Strong indirect policies	States that had incentivisers, but did not have a direct strong effect on manufacturing investment and supply chain development. These include battery amount-based capital subsidies, thresholded subsidies, several incentives for EV charging stations, and capital incentives for battery-swapping stations.

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To ensure a fair investigation of the relationship between EV policy intensity and outcomes, the analysis includes key control variables such as inflation, GDP growth, household credit, urbanisation rate, and capital expenditure. These variables were selected to account for macroeconomic stability, credit availability, structural differences in urban development, and state-level fiscal capacity. The data for these controls was sourced from reliable government agencies, including the Ministry of Statistics and Programme Implementation (MoSPI), the Reserve Bank of India (RBI), and the Census of India. A full summary of these control variables is provided in Table 2C.

Table 2A: Summary Statistics for Dependent Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Yearly EV Registrations	29	66799.41	84233.93	0	377212
Decadal EV Registrations	30	207764	255610.3	14	1190607
Yearly EV Registrations Per Person	28	1.507656	1.439888	0.0075455	6.37271
Decadal EV Registrations Per Person	30	4.957684	4.831982	0.0201439	19.46557
Number of startups	30	34.36667	46.491	0	198
Number of manufacturers	30	8.533333	17.24616	0	77

Table 2B: Summary Statistics for Explanatory Variable of Interest

Variable	Obs	Mean	Std. Dev.	Min	Max
Policy Type (base line= Medium)					
No Policy	30	0.5666667	0.5040069	0	1
Strong direct	30	0.1	0.3051286	0	1
Strong indirect	30	0.0666667	0.2537081	0	1
Weak	30	0.0666667	0.2537081	0	1

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Table 2C: Summary Statistics for Control Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Inflation	29	5.17931	1.431627	2.6	10
GDP Growth	30	8.260667	1.805996	5.77	14.07
Household Credit	29	4.606621	3.512224	0.782	17.632
Urbanisation Rate	29	0.3236897	0.1840157	0.091	0.825
Capital Expenditure	29	48353.34	43624.14	2141	177888

4. Empirical Specification and Analysis

Model 1: Impact of State EV Policy Type on Manufacturing Investment

To investigate the relationship between the nature of state-level EV policies and manufacturing investment outcomes, I estimate a series of cross-sectional OLS regressions. The key explanatory variable is the type of EV policy adopted by the state, which is coded categorically to reflect the degree to which the policy addresses upstream manufacturing bottlenecks (such as supply chain development, localisation incentives, or production subsidies). This allows me to empirically test whether more production-oriented EV policies are associated with stronger industrial responses.

I use two dependent variables to capture investment and industrial activity: (i) EV registrations per capita in 2024, and (ii) cumulative EV registrations per capita from 2014 to 2024. Although registrations are often viewed as a proxy for demand, I argue they also signal local ecosystem readiness and supply chain presence—especially when triangulated with the third dependent variable: (iii) the number of manufacturing units approved under the PLI-Auto component scheme in each state. This variable serves as a more direct measure of industrial participation.

The regression equation is specified as follows:

$$y_i = \alpha + \beta \text{ Policy\_Type}_i + \gamma X_i + \varepsilon_i$$

Here, y_i represents one of the three outcome variables in state i; $PolicyType_i$ is the categorical measure capturing the nature of the state's EV policy; and X_i is a vector of controls that includes inflation, GDP growth rate, capital expenditure, household credit, and urbanisation rate. These controls help account for variation in baseline state capacity and infrastructure, reducing omitted variable bias. The residual term ε_i captures unobserved state-specific characteristics.

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Table 3: Relationship between EV registrations and State-level Policies

	Yearly EV Registrations per person		Decadal EV Registrations per person	
	OLS (Without Controls)	OLS (With Controls)	OLS (Without Controls)	OLS (With Controls)
Policy Type (baseline = Medium)				
No policy	-0.73	-0.31	-2.98	-1.74
	(0.65)	(0.45)	(2.51)	(1.7)
Strong direct policies	-0.13	-1.22*	-1.43	-2.84
	(0.53)	(0.62)	(2.27)	(2.74)
Strong indirect policies	-0.65	-2.61**	-2.76	-6.49*
	(0.60)	(0.99)	(2.22)	(3.49)
Weak policies	-1.56 **	-0.95*	-5.94**	-5.09*
	(0.60)	(0.55)	(2.34)	(2.47)
_cons	2.09***	0.38	7.36***	2.61
	(0.46)	(1.27)	(2.09)	(4.79)
No. of Observations	28	26	30	27
R- Squared	0.0824	0.6563	0.1011	0.55

Notes: Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The control variables include inflation, GDP growth, household credit, urbanisation rate, and capital expenditure.

Our regression results reveal a consistent pattern across both yearly and decadal EV registration models. For yearly EV registrations per person, in the specification without controls, only *weak* policies are statistically significant, with a coefficient of -1.56. This means states with weak EV policy frameworks have substantially lower yearly EV registrations per capita compared to medium-policy states.

When controls are added, the explanatory power rises sharply. In this controlled specification, strong direct, strong indirect, and weak policies are all significant and negative relative to medium policies. This suggests that, after accounting for macroeconomic and demographic factors, these policy categories are associated with lower current registrations than medium-policy states. One possible interpretation is policy endogeneity: some states with lower adoption

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may have adopted stronger production-oriented policies in recent years, but these have not yet had time to produce measurable increases in registrations.

For decadal EV registrations per person, without controls, *weak* policies are again the only significant category. With controls, strong indirect and weak policies remain significant and negative, while strong direct policies are not significant. This may reflect timing issues: the decadal measure begins in 2014, before many strong direct policies were implemented, so their potential positive effects are not yet visible over the full ten-year period. Strong indirect policies, which often target infrastructure and supply chain readiness, may have more gradual, cumulative effects that still do not fully offset initial adoption gaps.

The consistent negative coefficients for weak policies across both timeframes support the expectation that minimal policy intervention is associated with lower EV adoption and, by extension, weaker industrial ecosystems. The negative coefficients for strong policy types—especially in the yearly model—do not necessarily imply that strong policies reduce adoption, as discussed above.

However, EV registrations are not a perfect proxy for manufacturing investment. To address this limitation, we triangulate our analysis with the number of manufacturing units approved under the PLI Auto Scheme, as this provides a more direct measure of industrial capacity expansion. Exploring the relationship between policy strength and PLI-linked manufacturing growth offers valuable complementary insights into the production-side dynamics of the EV ecosystem.

Table 4: Relationship between Number of Manufacturing Units and State-level Policies

	Number of manufacturing units	
Number of Manufacturing Units	OLS (Without Controls)	OLS (With Controls)
Policy Type (baseline = Medium)		
No Policy	-0.94	1.57
	(2.96)	(6.11)
Strong direct policies	25**	10.61
	(8.72)	(14.84)
Strong indirect policies	40.5	20.63
	(25.24)	(25.67)

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Weak policies	-2	3.22
	(2.40)	(4.97)
_cons	4**	-14.11
	(1.84)	(15.84)
No. of Observations	30	27
R- Squared	0.5289	0.6467

Notes: Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The control variables include inflation, GDP growth, household credit, urbanisation rate, and capital expenditure.

The results for the number of manufacturing units provide interesting results. In the uncontrolled model, states without an EV policy averaged nearly one unit fewer than the baseline, though this was statistically insignificant. Strong direct incentives were associated with 25 more units ($p < 0.05$), while strong indirect incentives showed the largest numerical increase—around 40 units—but with high variability. Weak incentives corresponded to a small, insignificant decline.

Once controls for GDP per capita, industrial workforce, electricity access, and infrastructure were added, these relationships weakened. The effect of strong direct incentives dropped to around 11 units and lost significance; strong indirect incentives fell to about 21 units and remained insignificant. Weak incentives turned slightly positive but without statistical strength. The R^2 improved from 0.53 to 0.65, reflecting that much of the variation is explained by broader economic and industrial factors rather than EV-specific policies.

Taken together, these results suggest that the earlier EV registration model may have overstated the role of policy in driving manufacturing investment. PLI allocations—and by extension, manufacturing activity—appear to be driven more by pre-existing regional strengths (such as infrastructure proxied through capital expenditure) and central government siting decisions than by state-level EV policies.

Model 2: Impact of State EV Policy Type on Supply Chain Development

To assess whether more intensive EV policies are associated with stronger innovation-led ecosystem formation, I estimate a second set of cross-sectional OLS regressions. The dependent variable in this model is the number of EV-related startups in each state, which serves as a proxy for innovation-oriented supply chain participation. These startups—filtered through sector-specific classifications—indicate the degree of entrepreneurial responsiveness to policy environments. The main explanatory variable remains the same as in the earlier model: a categorical classification of EV policies based on the intensity of production-focused measures. This specification allows us to observe whether states with more aggressive and upstream-

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oriented policy packages—such as those supporting local vendor networks, testing infrastructure, and industrial clustering—also exhibit greater dynamism in innovation-driven supply chain development.

The regression equation is specified as follows:

$$\text{Number of Startups}_i = \alpha + \beta \text{ Policy\_Type}_i + X_i + \varepsilon_i$$

Here, y_i represents the number of startups in state i; $PolicyType_i$ is the categorical measure capturing the nature of the state's EV policy; and X_i is a vector of controls that includes inflation, GDP growth rate, capital expenditure, household credit, and urbanisation rate. These controls help account for variation in baseline state capacity and infrastructure, reducing omitted variable bias. The residual term ε_i captures unobserved state-specific characteristics.

Table 5: Relationship between Supply Chain Development and State-level Policies

	Number of Startups	
No of Startups	OLS (Without Controls)	OLS (With Controls)
Policy Type (baseline = Medium)		
No Policy	-28.06*	-8.84
	(14.06)	(13.66)
Strong direct policies	58.16***	29.58
	(20.54)	(29.17)
Strong indirect policies	96.66*	57.36
	(49.46)	(46.91)
Weak	-27.33*	-15.19
	(16.03)	(17.54)
_cons	39.83**	2.26
	(13.33)	(29.26)
No. of Observations	30	27
R-Squared	0.6833	0.7862

Notes: Robust standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1. The control variables include inflation, GDP growth, household credit, urbanisation rate, and capital expenditure.

The results above show mixed evidence on the relationship between EV policy strength and the vibrancy of state-level innovation ecosystems. Here, startups are taken as a proxy for innovation-oriented supply chain participation, reflecting entrepreneurial activity in areas such as vendor networks, testing facilities, and industrial clustering.

In the uncontrolled model, states with strong direct policies have, on average, 58 more EV startups than medium-policy states, while those with strong indirect policies have about 97 more startups. In contrast, states with weak or no EV policies show around 28 fewer startups than the baseline. These patterns suggest that intensive policy environments—particularly those targeting upstream and infrastructure support—are associated with a more vibrant startup ecosystem.

Once economic and structural controls are added (GDP growth, inflation, capital expenditure, household credit, urbanisation), the size of these policy effects declines, and none remain statistically significant. The R^2 rises from 0.68 to 0.79, indicating that much of the variation in startup activity is explained by broader state-level economic conditions. Among the controls, capital expenditure stands out as a strong positive predictor of startup numbers, suggesting that overall investment capacity may matter more than EV-specific policy in fostering innovation-led supply chain development.

Overall, while the raw associations point to a positive link between stronger policies and startup dynamism, the controlled results caution against attributing this entirely to policy intensity. Broader investment climates and infrastructure readiness appear to be critical enablers of supply chain innovation.

5. Conclusion

This paper examined whether the intensity of state-level electric vehicle (EV) policies in India is associated with different aspects of the EV ecosystem— manufacturing investment and innovation-oriented supply chains. Using cross-sectional OLS models, the analysis combined EV registration data, PLI Auto Scheme manufacturing approvals, and EV-related startup counts to capture these dimensions.

The results point to a complex relationship between policy intensity and industrial outcomes. In the first set of models, states with weaker or no EV policies tend to show lower EV registrations—consistent with the idea that minimal policy commitment corresponds with weaker manufacturing-linked market presence. Interestingly, negative coefficients for strong policy types in some specifications likely reflect a timing issue: states may introduce stronger policies reactively in markets with weaker investment footprints, with measurable effects appearing only after a lag.

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The second measure—PLI manufacturing approvals—provides a more direct gauge of industrial capacity. While stronger policy environments initially appear associated with greater participation in PLI-supported manufacturing, these effects lose statistical significance once controls for regional economic conditions are included. This suggests that observed differences may be partly explained by broader structural advantages rather than policy alone.

Finally, the supply-chain analysis uses the number of EV-related startups to capture innovation-oriented participation in areas such as vendor networks, testing facilities, and industrial clustering. As with manufacturing, the initial positive associations with strong policies disappear once controls are added. This underscores that policy intensity alone may not drive innovation ecosystems; wider factors such as capital expenditure, infrastructure, and the state's overall business environment are also critical.

Taken together, the evidence suggests that EV policy intensity may influence different parts of the ecosystem in distinct ways, but its independent impact—once underlying economic conditions are accounted for—is limited in this sample. The findings are constrained by a small cross-sectional dataset of only 30 observations, limiting statistical power and making them best interpreted as exploratory rather than conclusive.

References

IEA (2025), Global EV Outlook 2025, IEA, Paris https://www.iea.org/reports/global-ev-outlook-2025, Licence: CC BY 4.0

Ezell, S. (2025). How innovative is China in the electric vehicle and battery industries? ITIF. https://itif.org/publications/2024/07/29/how-innovative-is-china-in-the-electric-vehicle-and-battery-industries/?

Lee, E., & Mah, J. S. (n.d.). Industrial Policy and the Development of the Electric Vehicles Industry: The Case of Korea. Journal of Technology Management & Innovation, 15(4), 71–80. https://doi.org/10.4067/s0718-27242020000400071

Allcott, H., Kane, R., Maydanchik, M., Shapiro, J., & Tintelnot, F. (2024). The effects of "Buy American": Electric Vehicles and the Inflation Reduction Act. https://doi.org/10.3386/w33032

Boston Consulting Group, NITI Aayog. (2022). Promoting clean energy usage through accelerated localization of E-Mobility value chain. In NITI Aayog. Retrieved July 10, 2025, from https://www.niti.gov.in/sites/default/files/2023-07/Niti-Aayog_Report-VS_compressed_compressed.pdf

ISSN: 2455-8834

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Energy Conservation: building blocks of a sustainable future. (2022). In www.beeindia.gov.in. Retrieved July 10, 2025,from https://beeindia.gov.in/sites/default/files/publications/files/Annual%20Report%202022-2023%20for%20Web.pdf

Council on Energy, Environment and Water. (n.d.). Council on Energy, Environment and Water. Retrieved July 10, 2025, from https://www.ceew.in/gfc/

Invest India. (n.d.). Invest India. Retrieved July 10, 2025, from https://www.investindia.gov.in/

Electrifying Last-Mile Deliveries: A Case Study-Based Evaluation of Electric Vehicles. (2023). Odisha Journal of Commerce and Management. https://www.researchgate.net/profile/Sohom-Banerjee-2/publication/390407039_Electrifying_Last-Mile_Deliveries_A_Case_Study-Based_Evaluation_of_Electric_Vehicles/links/67eccd6d9b1c6c48776f25b1/Electrifying-Last-Mile-Deliveries-A-Case-Study-Based-Evaluation-of-Electric-Vehicles.pdf

