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EDITORIAL NOTE

- *Editors*

The second issue of Volume VIII of the GNLU Journal of Law & Economics comprises seven carefully curated articles that delve into critical intersections of law and economics. This issue brings forth fresh perspectives and empirical insights on contemporary challenges, demonstrating the Journal's continued commitment to fostering informed discourse that bridges doctrinal frameworks with real-world socio-economic concerns.

The paper titled **"The Currency of Delay: A Political Economy Analysis of Judicial Incentives in Indian High Courts"** authored by Tathagat Sharma challenges the conventional assumption that judicial pendency is caused mainly by lack of resources or institutional capacity. The author instead argues that delay can arise as a rational outcome of existing incentive structures within the judicial system, where the state is both the largest litigant and an influential actor in judicial appointments and career progression. In such a set-up, the author argues that the judges may be encouraged to adopt risk-averse approaches and rely on procedural action rather than prioritizing swift final decisions. The paper, therefore, develops a "Strategic Judge" model that conceptualizes judges as actors balancing considerations such as reputation, workload, prospects of elevation and the potential costs of dissent. Further, the author also proposes an empirical framework to examine whether disposal patterns are shaped by factors such as political cycles, the identity of litigants and proximity to retirement.

The paper titled **"Economic Analysis of Providing Subsidized Public Transport for Women with Reference to Ramesh Kamal v. State of H.P. & Anr."** authored by Suha K, Ashita Sai Manohar & Nehal Verma, examines the economic rationale of Himachal Pradesh's "Nari ko Naman" scheme, which provides subsidised transport for women. The authors situate the scheme within the broader debate on fiscal prudence and welfare "freebies", arguing that mobility subsidies can function as enabling investments rather than consumption-driven expenditures. The authors use primary and secondary sources to evaluate the scheme's impact on women's access to education and employment, along with its efficiency, sustainability and opportunity costs. The paper highlights the importance of careful policy design in translating welfare objectives into durable socio-economic gains.

The paper titled **"Internal Migration as a Driver of Regional Economic Growth: Spatial Spillovers & Policy Implications from Turkey"** authored by Dr. Sinan Çinar offers an empirically grounded reassessment of the relationship between migration and regional development. The author employs spatial econometric techniques and moves beyond region-specific analysis to demonstrate how migration-induced growth effects spill over into neighbouring regions through geographic and economic interdependence. The findings of the author challenge the narrowly framed policy responses that assess migration outcomes in isolation and argue the need for coordinated, regionally integrated

development strategies. This paper therefore adds nuance to migration discourse in emergency economies marked by internal mobility.

The paper titled **"Regulating Market Power: An Empirical and Legal Analysis of Anti-Competitive Practices in India's Pharmaceutical Sector"** authored by Dr. Seema Shrivastava & Arya Shrivastava interrogates the operation of competition law within a market where access and affordability carry immediate welfare implications. The paper focuses on retail-level practices in the city of Bengaluru combined with consumer and pharmacy surveys with a doctrinal analysis of the Competition Act, 2002 and the Drug Price Control Order, 1995. The authors identify patterns such as brand dominance, entry barriers and constrained consumer choice, linking them to structural weakness in enforcement mechanisms and argue that competition regulation in pharmaceuticals must be assessed not only through market metrics but also through its downstream effects on public health and consumer welfare.

The paper titled **"More Ecology or More Economy in International Conventions on Biodiversity?"** authored by Donatella Porrini & Antonio De Lorenzo traces the evolution of biodiversity regulation from conservation-centric approaches to frameworks that increasingly rely on economic instruments. The authors analyze international conventions and policy initiatives since the 1970s and demonstrate how tools such as taxes, subsidies, tradable permits and payments for ecosystem services have become central to implementation strategies. This paper shows a shift from purely normative commitments to economically grounded mechanisms aimed at operationalizing conservation goals, thereby suggesting that future biodiversity governance will depend on an even closer integration of legal obligations and economic incentives.

The paper titled **"Regulating the Indian Thrift Market: An Economic Analysis of the Trade Marks Act, 1999"** authored by Siya Mathur & Isha Katiyar addresses an emerging regulatory challenge at the intersection of sustainability, consumer protection and intellectual property. The paper focuses on India's rapidly expanding second-hand and resale markets and examines whether thrift reselling meaningfully competes with brand manufacturers and how trademark law responds to concerns of reputation, quality assurance and consumer confusion. The authors use an empirical analysis of consumer behaviour and argue for a recalibration of regulatory focus by proposing product-liability obligations for resellers as a mechanism to balance consumer protection with the legitimate interests of trademark holders in a growing circular economy.

The final contribution, **"Economic Analysis of Algorithmic Collusion and Self-Preferencing in Digital Markets: Competition Challenges and Regulatory Responses"** authored by Dr. Shweta Mohan confronts the evolving challenges posed by algorithm-driven coordination and platform conduct in digital markets. The author draws on economic theory and contemporary enforcement concerns and explains how algorithmic pricing and platform self-preferencing can facilitate anti-competitive outcomes even in the absence of explicit human collusion. The paper observes the limitations of

traditional competition-law tools in addressing such conduct and calls for regulatory responses that are technologically informed, forward-looking and capable of preserving consumer welfare without unduly shifting innovation.

This issue reflects the Journal's vision of encouraging interdisciplinary scholarship that meaningfully informs contemporary policy debates. Each paper offers grounded insights and robust analyses that underscore the vital connection between sound economic reasoning and legal frameworks.

The Editorial Board extends its heartfelt gratitude to the Review Process Committee consisting of Ms. Anuradha S Pai, Dr Aman Deep Singh, Dr. Chitra Saruparia, Dr. Manoranjan Kumar, Dr. Himanshu Thakkar, Mr. Ketan Kothadia, Ms. Krishna Agarwal and Dr. Shriram C R, for their diligent and constructive reviews.

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THE CURRENCY OF DELAY: A POLITICAL ECONOMY ANALYSIS OF JUDICIAL INCENTIVES IN INDIAN HIGH COURTS

- Tathagat Sharma[1]

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ABSTRACT

In 2023, the Delhi High Court disposed of more than 87,000 cases, a record-breaking figure. Yet its backlog grew. Across India, governments have doubled judicial strength in some states, built state-of-the-art e-courts, and implemented case management software. Still, over 5.1 crore cases remain pending. The standard explanation treats this as a resource problem: too few judges chasing too many litigants. But what if the real answer is more uncomfortable? What if delay is not a bug in the system, but a feature, a currency that judges spend, save, and strategically deploy? This paper advances a heretical proposition: that for the Indian High Court judge, disposing of cases is not always the rational choice. In a system where the government is simultaneously the largest litigant and the arbiter of judicial careers, where a controversial judgment can trigger a punitive transfer while a "safe" adjournment goes unnoticed, and where forty dismissals at the admission stage count the same as one laboriously reasoned final verdict, delay emerges as the equilibrium strategy. The crisis of pending cases is not an accident of overload; it is the predictable outcome of incentives working exactly as designed.

Employing a political economy framework, we model the High Court judge as a strategic actor maximizing a utility function comprised of reputation (professional prestige), leisure (workload aversion), promotion prospects (chances of elevation or post-retirement appointment), and the cost of dissent (risk of punitive transfer or career backlash). The paper proposes an empirical model to test whether judicial delays correlate with political cycles and the identity of the litigant (State vs. Citizen), suggesting that "strategic delay" is a rational response to the institutional constraints of the Indian judiciary.

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1. INTRODUCTION

The Indian judiciary is often described as operating in a state of perpetual crisis. The statistics are numbing over 5.1 crore cases pending across the hierarchy, with the High Courts, the designated Constitutional courts for the states, choked by a backlog that defies arithmetic solution. Judicial discourse and Government policy have largely treated this "arrears crisis" as a resource problem, too few judges and courts to handle the volume of litigation (Yasir, 2024). The symptom is captured in a stark statistic, India has only about 21 judges per million people, far below the 50 judges per million recommended by the Law Commission (Kumar & Dutt, 2021). The diagnosis is invariably Malthusian (Abramitzky & Braggion, 2003): the population of litigants is growing exponentially, while the population of judges grows arithmetically. Consequently, the prescriptions are technocratic: appoint more judges, digitise registries, increase judicial budget, and modernise court infrastructure (Dutta & Rai, 2021).

Yet, this administrative lens fails to explain a persistent anomaly: why does productivity often stagnate even when vacancies are filled (Kumar & Dutt, 2021)? Why do "sensitive" constitutional challenges languish for years while commercial matters are expedited? To answer this, we must pivot from an administrative viewpoint to a Political Economy view. We must stop viewing the court merely as a dispenser of justice and start viewing it as a marketplace of incentives, constraints, and strategic interactions.

The prevailing discourse on the Indian "arrears crisis" has historically been dominated by a Malthusian diagnosis: an exponential growth in litigation met with an arithmetic increase in judicial capacity. This perspective, supported by the Law Commission's recommendation of increasing judge strength to 50 per million people, treats the judiciary as a production line where delay is simply a byproduct of an underfunded system. However, modern empirical assessments suggest that simply increasing judge staffing levels, while potentially reducing backlog in front-line district courts (Rao, 2024), may not be a panacea for the systemic inefficiencies in High Courts. Recent scholarship highlights that technocratic solutions—such as digitizing registries and increasing budgets—often result in stagnating productivity because they fail to address the fundamental problem of misaligned incentives (Aithala & Suresh, 2025).

Recent scholarship in law and economics has pivoted toward the "Strategic Judge" model to explain this anomaly. Building on the seminal work of Richard Posner, judges are increasingly modeled as rational actors maximizing a multi-variable utility function rather than mere dispensers of justice (Berti & Tarabout, 2018). In the Indian context, this utility is shaped by unique institutional contingencies, including the prospect of elevation to the Supreme Court and the risk of punitive transfers. This creates a "Quantity-Quality" trade-off: as performance metrics prioritize raw disposal counts over the substantive weight of cases, judges are incentivized to substitute "Quality" (labor-intensive final hearings) for "Quantity" (brief admission-stage dismissals) to satisfy administrative requirements (Aithala et al., 2024).

Furthermore, the institutional design of the Indian judiciary introduces significant "Principal-Agent" problems, particularly through the "Master of the Roster" system. The Chief Justice's absolute power to allocate cases is often seen as a source of authority that lacks sufficient structural or legal constraints (Chandra et al., 2025). This unchecked discretion allows for "strategic allocation," where sensitive matters can be directed toward specific benches, potentially serving as a tool to manage the court's political exposure or public image (Sethi, 2025). When combined with the "State as a predatory litigant"—where the government files meritless appeals to avoid bureaucratic audit objections—the court becomes a "Tragedy of the Commons" where strategic delay becomes the most rational equilibrium for a judge facing an insurmountable and politically charged docket (Datta, 2025).

This paper interrogates the "Political Economy of Judicial Delivery" by focusing on the behaviour of the agents (judges) and the rules of the game (institutional design). It hypothesises that delay in the Indian High Courts is not always an accident of workload; in specific contexts, it is a currency, i.e., a tool that can be transacted or deployed for strategic ends (Spurrett, 2014). Delay can be used to manage workload pressure, to signal compliance to the executive without formally ruling in their favour (the "pocket veto" by inaction), or to prioritise "visible" work (admission hearings) over "invisible" work (final hearings for disposal).

By integrating the pioneering work of Richard Posner on judicial utility with the specific institutional realities of the Indian Constitution, transfer threats, the opacity of the Collegium, the "Master of the Roster" system, and a political environment where nearly 50% of litigation is state-sponsored, this paper offers a novel theoretical framework. The paper argues that the Indian High Court judge operates under a unique set of incentives where disposal is not always the utility-

maximising choice.

2.   THE THEORETICAL FRAMEWORK: MODELING THE 'STRATEGIC JUDGE'

To understand judicial output, we must first model the judge as a rational actor. Unlike legislators who maximize votes, or firms that maximize profit, what does a judge maximize?

a.   The Judicial Utility Function

In the Anglo-American tradition, judges are often modeled as maximizing "prestige" or "ideological satisfaction" (Songer, 2012). Public choice and economic analyses, however, treat judges as individuals with utility functions like any other person. Judges derive satisfaction (or disutility) from various aspects of their job. In Posner's seminal account (Posner, 1993), judges are "ordinary people responding rationally to ordinary incentives," and their behavior can be explained by an economic-style utility function (Entermann, 1998). Over time, scholars have refined this model to include factors like effort aversion (preference for leisure), reputation or prestige among peers, ambition for higher office, enjoyment of the judicial work itself, and avoidance of criticism or sanction (Jubelirer, 2013). However, an Indian High Court judge faces a more precarious existence. Indian High Court judges have tenured appointments until retirement, but they face two (or three, if you factor in the differential age of retirement for High Court judges at 63, and Supreme Court judges at 65) significant career contingencies: the prospect of Elevation (promotion to the Supreme Court or appointment to a prestigious post-retirement position) and the risk of Transfer (being shifted to another High Court outside of their Home state, often seen as a punitive measure if done without consent). These contingencies make the Indian judge's utility calculation more complex than that of, say, a U.S. federal judge with life tenure and no higher court ambitions.

We can express the utility function of a representative High Court judge *j* as:

$$U(j) = \alpha(R) + \beta(L) + \gamma(P) - (\delta)C$$

Where:

- **R (Reputation)**: the professional reputation or esteem a judge gains, whether through authoring significant judgments, maintaining high disposal rates (efficiency), or being cited by other courts. Reputation is valuable to judges as much as it is to academics or other

professionals; it can satisfy personal ego, advance prospects of elevation, and confer a lasting legacy. A judge's reputation might be enhanced by bold decisions in important cases or by demonstrating administrative acumen in reducing backlog. The underlying assumption is **$\alpha > 0$**, since judges generally value their standing in the legal community and with the public while writing judgments.

- **L (Leisure)**: the preference for minimising work-related effort. Judges, like anyone in a job, value leisure time and a manageable workload. Importantly, in the judicial context, salary is fixed and does not increase with output, and removal is nearly impossible except in extreme cases (through an impeachment, which has never happened in India; Justice Yashwant Verma's case is sub-judice as we speak). Thus, the opportunity cost of exerting extra effort is largely borne by the judge with little direct pecuniary reward. In our utility function, L captures the disutility of labor, i.e., long hours, heavy reading, writing detailed judgments, and thus **$\beta > 0$** (more leisure contributes positively to utility). This term implies effort aversion: all else equal, a judge might prefer to dispose of cases in a way that conserves effort (e.g. delivering brief orders or seeking shortcuts) rather than through labor-intensive processes

- **P (Promotion/Elevation)**: the likelihood of elevation to the Supreme Court or appointment to lucrative commissions and tribunals after retirement. Ambition can be a powerful motivator: in the Indian system, approximately 30-35 High Court judges (out of several hundred) get elevated to the Supreme Court in their careers, often those perceived as high-performing or in the good graces of the collegium. Moreover, post-retirement opportunities (heading tribunals, commissions, governorships, etc.) are plentiful; by one estimate, 70% of retiring Supreme Court judges have taken government-appointed posts (Aney et al., 2021), Judges know that favorable reputation and avoiding clashes with the executive or collegium may improve their promotion prospects. Thus, P is generally valued positively (**$\gamma > 0$**). Notably, while U.S. judges might not emphasize promotion (since few positions beyond the circuit bench exist), Indian High Court judges often have a careerist orientation much like the "judge as careerist" model Epstein, Landes & Posner (Epstein et al., 2013) describe, seeking advancement to higher courts.

- **C (Cost of Dissent)**: the expected cost or negative repercussions of rulings that displease powerful actors (often the government or one's own judicial superiors). In India's

judiciary, this primarily refers to the risk of punitive transfer or stalled promotion if a High Court judge earns a reputation for being "uncooperative" or too independent in politically sensitive cases. Historically, transfers have been used to penalise or sideline inconvenient judges, famously, during the Emergency (1975-77), 16 High Court judges were abruptly transferred, reportedly as punishment for decisions against the government (Venkatesan, 2025). Even in recent times, there have been instances raising eyebrows: e.g. Justice S. Muralidhar of Delhi HC was transferred to Punjab & Haryana HC days after reprimanding the police during the 2020 Delhi riots, Justice Jayant Patel of Karnataka HC, who ordered a CBI probe into a politically sensitive case, was moved to Allahabad HC, prompting his resignation. Such episodes reinforce a perception among judges that taking on the executive carries career risks. The Chief Justice of India (or of the High Court), who wields the "Master of the Roster" power and influences collegium decisions (Supreme Court Advocates on Record Ass'n v. Union of India, 1993), can affect a puisne judge's future. The cost term **C** thus encompasses fear of transfer, non-elevation, or loss of administrative favour. Rational judges may seek to minimise this cost by avoiding direct confrontation: rather than issuing a bold judgment against the government and risking retaliation, a judge may delay the case (adjourn repeatedly, not deliver a final verdict), effectively a way to 'escape the dilemma' by neither ruling for nor against. In the utility function, **C** enters with a negative sign (since it's a cost), so increasing the risk of incurring displeasure lowers utility. Hence, a larger **δ** means the judge is more risk-averse to displeasing powers thy be.

- α, β, γ, δ are weights assigned by the individual judge to each component. Each judge will weigh these components differently. A judge with strong idealism or integrity might set δ (fear of consequences) near zero, not letting it affect decisions; another with ambition may put heavy weight on P; a complacent judge nearing retirement might prioritize L (a quiet life) over R (making a mark). Crucially, the institutional context influences these weights. In an environment where post-retirement posts are abundant and politicized, **γ (P)** looms large as a carrot. Where transfers are opaque and occasionally punitive, **δ (C)** becomes a real concern. Thus, the hypotheses of the paper that in Indian High Courts, disposal of cases (efficiency) is not always the judge's top priority, because being too efficient or assertive can sometimes undermine other utilities like leisure or avoiding controversy. This stands in contrast to the public expectation that judges single-mindedly pursue timely

justice. Instead, judges balance competing utilities, which can lead to suboptimal outcomes for litigants (like delays) that are nevertheless privately optimal for the judge.

b. The Economics of "Admission" vs. "Final Hearing"

A striking manifestation of judicial incentive effects is the well-documented imbalance between how courts handle preliminary hearings (admissions) and final merits hearings. (National Judicial Data Grid, 2026). In High Courts, most cases begin with an admission or motion stage where the judge decides if the matter warrants a full hearing. These are typically brief proceedings, a few minutes per case (sometimes even seconds), often resulting in interim orders or notices. In contrast, a final hearing on the merits can consume days or weeks of courtroom time and require a lengthy reserved judgment. The institutional metric used for judicial performance in India has historically been the number of cases disposed, not the weight or complexity of cases (Department of Justice & NLUO, 2018). Every case, whether dismissed at admission or decided after trial, counts as a single disposal. This creates a perverse incentive: a judge can maximise disposals (and thus appear "productive") by focusing on admissions rather than final hearings.

From a Game Theory perspective, the Admission stage offers a high payoff for low effort. It is not uncommon for a High Court judge to list 40–50 (some High Courts are notorious for listing cases numbering in 100s) admission matters in a day's docket, disposing of many by dismissing them or granting interim relief. Each such action adds to the statistics of disposals, "gratifying the Chief Justice and the Registry" that measure output in quantitative terms. In contrast, a Final Hearing requires reading bulky evidence, weeks of arguments, and writing a detailed judgment, perhaps months of work, all for "one" disposal unit. In Posner's terms, judges may behave as "lazy maximisers", finding ways to appear busy without doing the hardest work (Landes & Posner, 1975).

If the institutional metric for performance is purely quantitative (number of disposals), the rational judge will substitute Quality (Final Hearings) for Quantity (Admissions). This leads to the "interim order trap," where courts readily grant stays (preserving the status quo) to clear the daily board, pushing the substantive resolution of the dispute years into the future (Asian Resurfacing v. C.B.I., 2018; Imtiyaz Ahmad v. State of U.P., 2017).

Over time, the case languishes in the system. As a consequence, final judgments may come so late that they are effectively meaningless: a recent commentary (Gupta & Bansal, 2022) noted that courts issue interim orders that remain in effect for so long that by the time a contrary final

judgment comes, it has little practical value. The metric problem is key: if judges are evaluated (formally or informally) on numbers, they will maximise numbers. Indeed, the Indian judiciary's own annual reports historically emphasised disposals and pendency figures. Scholars have warned of this exact issue: when incentives are misaligned and focus only on quantitative outputs, judges may engage in "gaming" behaviour, disposing of many easy cases while procrastinating on hard ones. In our utility terms, pursuing R (reputation for efficiency) via raw counts and preserving L (leisure) both push towards heavy admission disposals and light final decision-making.

The interim order trap also serves as a shield against reversal or criticism. An interim order is by nature temporary; it doesn't create a precedent or invite as much scrutiny as a final judgment on merits. Judges know that a poorly reasoned final judgment may be overturned on appeal or draw criticism, harming R (reputation). By contrast, no one appeals an interim adjournment, and interim orders (except in rare high-profile cases) don't usually invite academic critique. Thus, a judge concerned with avoiding potential criticism (a component of C) has an incentive to defer the moment of final decision. Posner observed that judges "enjoy hearing cases and making decisions" in the sense of the power it gives (akin to spectators enjoying a drama), but "they do not enjoy writing opinions", especially knowing that a written judgment exposes them to critique. (Posner, 2008, pp. 174-176) This rings true in our context, a detailed judgment is more work and more risk, whereas an interim order or endless hearing is less risky and can even be enjoyable as an exercise of power without final accountability.

Empirically, one could measure this behaviour by looking at the ratio of interim orders to final judgments per judge, or the average age of pending cases. Data indicate a huge portion of cases pending over 10 years in High Courts (Sinha, 2019), symptomatic of the tendency to grant stays and then let matters lie. This is not simply laziness; it is rational inertia given the incentives.

c. *The Political Business Cycle of the Judiciary*

Judicial behaviour does not occur in a political vacuum. Judges, especially in higher courts, are aware of the political climate and may adjust their decisions in anticipation of or reaction to political events (Cakir, 2018). The paper hypothesizes that High Court assertiveness and speed of decision-making follow a political cycle, analogous to how policymakers alter decisions around elections (the classic "political business cycle" in economics). In particular, consider the tenure of an elected government in a state or at the Centre and its phases: early (honeymoon), mid-term, and late (approaching next election). A rational judge, concerned with both promotion prospects (P)

and avoiding adverse consequences (C), will note the incumbent government's strength and the likelihood of its continuation in power. The hypothesis is that judicial assertiveness follows a U-shaped curve relative to the government's tenure.

1. **Early Tenure (Honeymoon Phase):** Right after an election, when a government is freshly in power (especially if with a strong mandate), the judiciary may exhibit high deference to the executive. This could translate into rulings favoring the government, or more subtly, granting the government more leeway by delaying decisions that could embarrass it. In our utility framework, when the incumbent is strong and expected to remain so, the Cost of Dissent (C) is high, a judge who rules against a powerful government might fear real repercussions (transfer, stalled career). Moreover, early in the term, there is no "next regime" to curry favour with, so the upside of defying the government is minimal. Thus, at Time 0 of a political cycle, judges have incentives to either align with or at least not antagonise the executive. Empirical studies in comparative politics support this idea: for example, in authoritarian Argentina, judges initially aligned with the regime to avoid punishment (Helmke, 2002). In democratic India, overt punishment is rarer but as noted, mechanisms like transfer exist.

2. **Mid-Tenure:** As time passes, the government's invincibility might wane, or the immediate political pressure is less acute. Our hypothesis proposes a more balanced judicial behaviour in the mid-term. Here, judges might decide cases on merits a bit more, being neither too deferential nor too oppositional, call it a normal period of jurisprudence. If a government is mid-term and still appears likely to be re-elected, judges may continue caution, but generally mid-tenure is when courts globally have sometimes asserted themselves (perhaps because any backlash might fade by next election, and there's some distance from the last appointment or transfer round). We characterise this stage as one of "balanced scrutiny", where neither incentive to defer nor to resist is dominant (Flinders, 2001; Burbank, 2009).

3. **Late Tenure (Election Mode):** As the next election approaches, two scenarios arise: (a) The incumbent government appears weak or likely to lose; (b) The incumbent seems strong or likely to return. If the incumbent seems likely to be voted out, judges have an incentive to distance themselves from that regime and demonstrate independence, effectively to signal to the potential incoming power that they were not stooges. This is akin to what political scientists call "strategic defection": judges start ruling against the outgoing

government to ingratiate themselves with the next one (Cakir, 2018). In India, while High Court judges are not openly partisan, we might expect a spate of activist or assertive judgments in the twilight of a weak regime – for instance, quashing arbitrary actions or pushing back on executive policy, thus bolstering the judge's reputation (R) for independence just in time for a new government to notice. Conversely, if the incumbent is likely to return to power (or where the election is very tight and the judge prefers not to gamble wrongly), the safest course might be to avoid deciding highly sensitive cases until after the election. In our terms, when the ruling party is strong, the *Cost of Dissent C* remains high, so a judge might reason: better not to issue a verdict that could anger the powers if they are coming back. Empirically, observers have noted that courts sometimes delay hearings or judgments on politically charged matters around election years. For example, in 2019, the Supreme Court of India held off urgent hearings on certain controversial issues (like the electoral bonds case) until after the general elections, effectively putting them on the back-burner during the campaign (BBC, 2023).

Therefore, our theoretical model views the High Court judge as a strategic utility-maximizer facing multiple objectives and constraints. Delay of cases emerges as a recurring strategy that can serve various ends: conserving effort, avoiding negative repercussions, and timing decisions advantageously.

3.   EMPIRICAL STRATEGY AND MODEL SPECIFICATION

To test the theoretical propositions above, this paper proposes a mixed-methods approach, combining panel data regression with game-theoretic modelling. The goal is to detect patterns consistent with "strategic delay", for instance, whether cases involving the government indeed take longer (especially around election times), or whether judges facing career risks behave differently. The paper also considers how to measure the impact of incentives like transfer threats quantitatively.

a.   *The Regression Model: Determinants of Delay*

As a first step, we specify a regression model to identify factors associated with longer case durations in the High Courts. Let the dependent variable **Delay (D)** represent the time (in days, logged to reduce skewness) from filing to disposal of case *i* that is disposed of in year *t*. Drawing from our theory, we include explanatory variables capturing judicial capacity, political context,

and litigant identity: The baseline econometric specification is:

Log (Delay$_{it}$)= β_0 + β_1 JudgeStr$_{st}$ + β_2 GovLit$_i$ + β_3 Election$_t$ + β_4 (GovLit$_i$ × Election$_t$) + X$_{it}$ β + ϵ_{it}.

Where:

- **Log (Delay$_{it}$)** : The log of days taken from filing to disposal for the case.

- **JudgeStr$_{st}$:** the judge strength or capacity in the state's High Court at time *t*, measured inversely by the vacancy rate (i.e., positions vacant as a percentage of sanctioned strength). This controls for the standard resource hypothesis: more judges per caseload should reduce delay. We expect **β_1 < 0**, meaning the higher the filled judge strength, the shorter the delay (conversely, more vacancies, i.e., fewer judges, lead to longer delays). This is the conventional assumption in policy discussions, although one of our contentions is that simply adding judges may not solve delays if incentives aren't fixed. Still, it's important to account for capacity.

- **GovLit$_i$** : an indicator (dummy) for whether the government (state or central) is a litigant in case *i*. This variable is 1 for cases where a government entity is a party. Our hypothesis, based on the "State as predatory litigant" discussion and judges' incentives, is that government-involved cases might experience systematically different treatment. In particular, we suspect Government cases may face longer delays on average, perhaps because judges accord them lower priority or use adjournments more (as deciding such cases can be politically sensitive). The government, being the largest litigant (~50% of pending cases) (Dutta & Rai, 2021), also tends to file numerous appeals even on settled law. If many of those appeals are ultimately dismissed, they might still clog dockets for years. Thus, we expect **β_2 > 0** (cases with GovLit = 1 take longer, ceteris paribus). This can be empirically verified. Notably, if **β_2** is significantly positive, it provides evidence that delay is not uniform, it correlates with who the parties are, bolstering the notion of strategic delay or at least differential handling.

- **Election$_t$** : a dummy for whether the year (or period) *t* is an election year. We can define this in India's context either at the central level (e.g. 2014, 2019 general elections) or state level (year of the state assembly election for that High Court's state). Ideally, we incorporate both, since High Court judges might respond more to state political changes (especially in matters involving state governments) but also to major national elections if they aspire to the Supreme Court (since the central government's fate changes). For

simplicity, one could start with a parliamentary election year indicator (the Centre's cycle), assuming those are times of heightened political sensitivity nationally. Our interest is in β_3 as it captures whether all cases slow down or speed up during election periods. It could be that courts as a whole slow their pace on controversial matters around elections (hence $\beta_3 > 0$ for delay), or perhaps push to clear certain cases before elections. We hypothesise modest effects unless interacted with GovLit. The more crucial term is the interaction next.

- **GovLit$_i$ × Election$_t$** : The interaction term, i.e., the interaction between government-involved cases and the election year timing. This term β_4 directly tests our political cycle hypothesis: do cases involving the government experience extra delay during election times? A significantly positive β_4 would mean that, after controlling for baseline differences, a government case filed or pending in an election year takes longer to dispose than a similar private case in an election year or a government case in a non-election year. This would be strong evidence of strategic delay, consistent with judges holding back decisions in government matters until the election uncertainty passes (when incumbents are strong), or perhaps an uptick of caution generally. If, conversely, β_4 were zero or negative, it might indicate no special delay (or even faster disposal of government cases during elections, which could hint at courts trying to showcase independence at that time). However, our expectation, drawn from qualitative observation, is $\beta_4 > 0$. For example, consider a High Court hearing a sensitive case on a major policy; if an election is looming and the judges fear either side effects or want to wait for the next government, they might continuously adjourn it, and the data would show that the case is dragging longer than usual.

We would control for other factors via X_{it}, a vector of controls. This could include case-type fixed effects (e.g. criminal vs civil vs writ; some types inherently take longer, like civil suits with evidence vs criminal appeals, etc.), court fixed effects (to capture differences in efficiency culture across High Courts), and possibly time trends. We might also include a variable for case complexity if proxyable (e.g. number of litigants, or whether the case is a constitutional bench matter).

b. Modelling the "Transfer Threat"

To empirically capture the "independence" constraint, we can utilize the "Transfer Probability" index. The idea that judges moderate their decisions due to fear of being transferred (or otherwise

penalised). How can we detect this? One approach is to construct a proxy for judicial independence or dissent in decision-making and see if it correlates with transfer frequency (Chandrachud, 2014). We define a simplistic measure: for each judge *j*, let's say we measure the proportion of their decisions or orders that went against the government's interest (in a defined set of sensitive cases). For example, one might look at all interim orders on writ petitions against the government, did the judge grant stays against government action frequently, or did they routinely side with the government? Call this measure *Dissent$_j$* (though "dissent" is colloquial here for rulings not in the executive's favour). Also consider *Tenure$_j$*, perhaps years of experience or whether the judge is close to retirement. We then model the probability of a transfer T_j as:

$T_j = f\,(Dissent_j,\ Tenure_j)$

If the data shows that judges with higher rates of "anti-government" interim orders have a statistically higher incidence of transfer (controlling for administrative reasons), the term **δ (C)** in our utility function is validated. This creates a "chilling effect," where the rational response for a risk-averse judge is not to dismiss the case, but to adjourn it, using delay as a shield against retribution.

While the data on transfers and individual judge decisions might be hard to compile, anecdotal evidence, as discussed, suggests some pattern: e.g., Justice K. in High Court X was known for ruling against the state government and was suddenly transferred to a smaller High Court with no explanation, which fits (Bhatia, 2019) (examples of Justice Akil Quereshi and Justice Muralidhar from recent times) (Supreme Court Observer, 2022; Bar & Bench, 2023).

c. Limitations of the Data

It must be acknowledged that empirical analysis of judicial behaviour in India faces significant data limitations. The National Judicial Data Grid (NJDG), while revolutionary in opening up court statistics, does not classify cases by "political sensitivity" or by litigant identity in an easily extractable way. One often has to rely on proxies. For instance, one proxy for politically sensitive cases is to look at Article 226 (India Const. art. 226) writ petitions involving government authorities or major statutes (since constitutional or administrative challenges often take this form). Another is to identify PILs (public interest litigations) from titles – though NJDG doesn't label PIL vs others. We may need to merge multiple sources: e.g., cause lists or judgments can be parsed to see if the state is a party. Furthermore, NJDG provides aggregate pendency counts but not always complete life-cycle data for each case. For rigorous analysis, a researcher might need to

manually collect data on sample cases or analyse the collegium recommendation reasoning whenever they are released by the Supreme Court (Supreme Court of India, 2026; BBC, 2023). Another limitation is establishing causality. If we find a correlation between election years and delays, is it due to judges' strategic behaviour or due to, lawyers seeking adjournments more during elections (because some are busy in politics) or governments requesting delays? We would need to rule out alternative explanations. Similarly, if government cases take longer, part of that could be because government litigation often involves more paperwork, or deliberate delay tactics by government lawyers (the state might itself delay proceedings, independent of judges, e.g., counsel asking for more time). In reality, the blame for delay is shared: the bureaucratic culture of appeals means many frivolous appeals clog courts, and government counsels often seek repeated adjournments because the bureaucracy hasn't sent necessary documents or clearances on time. Our focus is on judicial incentives, but the empirical patterns we observe might also reflect these executive-side issues. Distinguishing judge-driven delay from party-driven delay is challenging. However, one might argue that judges have ample tools to curtail party-driven delay (like refusing adjournments, imposing costs, or mandating personal appearances of the bureaucrats), so if those delays persist, it may indicate judicial acquiescence.

In our analyses, we will have to interpret findings in light of these nuances. If, for example, we see a big jump in hazard ratio (Part V) for government cases around elections, we'll argue it's consistent with judicial strategy, though an alternative story could be that governments deliberately drag their feet on certain cases until after elections (requesting the court to defer, etc.). In many scenarios, those alternatives blend; judges might be happy to grant the deferral the government wants.

4. INSTITUTIONAL DESIGN: THE ARCHITECTURE OF INEFFICIENCY

While the utility function of the individual judge explains why they might prefer delay, the institutional design of the Indian High Courts explains how delay is manufactured and sustained. We identify two specific features of the Indian judicial architecture that act as force multipliers for pendency: the "Master of the Roster" system and the "State as Litigant" phenomenon. These structural factors help translate individual incentive problems into systemic backlog and delay.

a. *The 'Master of the Roster' and Principal-Agent Problems*

In Indian jurisprudence, the Chief Justice of the High Court is "Master of the Roster" (State of

Rajasthan v. Prakash Chand, 1998). This is not merely a scheduling role; it is a substantive power to constitute benches and allocate specific subject matters to specific judges. In practical terms, the Chief Justice decides which judge hears what: for example, Judge X may be assigned to tax cases, Judge Y to bail matters, Judge Z to all PILs, etc. This authority is virtually unchecked, it is an accepted convention (affirmed by the Supreme Court) that the Chief Justice's roster-setting power is exclusive and supreme (Campaign for Judicial Accountability & Reforms v. Union of India, 2018). The rationale is administrative need and efficiency. However, from a political economy perspective, this creates a unique Principal-Agent problem.

- The Principal: The Chief Justice (CJ) of the High Court, who has goals that may include managing the court's workload, maintaining the court's public image, and in some cases, currying favour with political authorities or the Supreme Court collegium. The CJ also might have their own utility function, valuing perhaps a promotion to the Supreme Court or a post-retirement post.

- The Agent: The Puisne Judge, who actually hears and decides the cases assigned to them. They have individual incentives as discussed earlier. The CJ, in assigning work, is like a manager distributing tasks to subordinates.

This arrangement can be efficient, the CJ can allocate cases to judges best suited for certain matters (expertise matching) and balance workload. But it also introduces agency costs and opportunities for strategic behaviour. Unlike the US Supreme Court, where all judges sit en banc (together) on critical cases, Indian High Courts sit in varying combinations (Single Judge or Division Bench). The CJ's power to assign a "politically reliable" judge to a sensitive roster (e.g., cases challenging government tenders) or a "slow" judge to a backlog-heavy roster introduces allocation bias. If a Chief Justice wants a particular outcome or delay, he or she can pick a judge known to be sympathetic or known to be very slow.

The agency problem here is that the Chief Justice's interests may not align perfectly with the public interest in prompt justice. If the Executive can influence the Chief Justice (perhaps through the promise of a post-retirement Governorship or Commission Chairmanship), the CJ can essentially "pocket veto" a case by assigning it to a bench known for granting adjournments. Even if the puisne judge is upright and fast, the CJ can always reshuffle the roster. In extreme cases, we have seen bench hunting: right before a judgment is about to be delivered that might displease the powerful, the case gets re-assigned to a new bench, restarting the hearing. In economic terms, the Master of

Roster system introduces a layer of *moral hazard*. The CJ has wide discretion with little transparency; reasons for roster changes are not published. If a Chief Justice quietly ensures that "Case A will be heard by Judge B," there is no requirement to explain or justify this allocation. A Chief Justice inclined to delay a politically sensitive matter need not instruct "please delay"; they can simply pick a judge known for backlog or who is amenable to adjournments, and the outcome (delay) will follow "naturally." In effect, the institutional design allows delay to be engineered top-down. The lack of transparency in roster decisions makes this a serious institutional failing from an accountability perspective (Bhatia, 2017). Thus, delay becomes a product of administrative discretion rather than judicial incapacity (Bhatia, 2019).

b.   The State as the 'Predatory Litigant'

The Government of India (and state governments) are collectively the single largest litigant in the country, accounting for nearly half of all pending cases (The Print, 2023; Tribune India, 2022). This statistic, alarming as it is, has deeper implications when combined with the incentive structures of bureaucracy. In economic terms, a private litigant will settle a dispute if the expected cost of continuing litigation (C_L) exceeds the expected benefit (the value of judgment $\times$ probability of winning). Private parties internalise litigation costs; protracted delay hurts them financially, so they have some incentive to resolve disputes efficiently (or not appeal every single loss).

If, $C_L > P(\text{Win}) \times \text{Amount} \rightarrow \text{Settle}$

However, the State does not behave like a rational private litigant.

The State, however, operates with a soft budget constraint. The decision makers (bureaucrats) authorising the appeal do not pay the legal fees from their own pocket; the Government lawyers, on the other hand, earn their legal fees out of this. Conversely, the bureaucrat faces a high asymmetric risk:

- If they appeal and lose: It is blamed on "the system" or "bad lawyers."
- If they settle or do not appeal: They risk a vigilance inquiry or an audit objection for "causing loss to the exchequer."

This asymmetry, appealing is "safe," not appealing is "risky" to one's career, leads to what we term "Bureaucratic Risk Aversion" (Sneha et al., 2021).

This creates an incentive structure where the State appeals every adverse order, regardless of merit. This floods the High Courts with "dead" cases, appeals where the law is settled, but the government refuses to concede. These include, for example, endless service matters where employees win in

lower tribunal and the government appeals reflexively, tax cases on settled points, routine tort claims where the state's liability is clear, etc. This crowds out genuine private disputes, artificially inflating the "Admission" lists and forcing judges to spend valuable hours dismissing frivolous state appeals (Datta, 2016). Empirical studies have noted, for instance, extremely low success rates for government appeals in certain domains (indicating many should not have been filed). One study of income tax litigation found the tax department lost about 70-80% of appeals, suggesting many were unwarranted to begin with (Mohan, 2023).

Now combine this with judges' incentives. Handling these voluminous government appeals provides the fodder for the admission-stage disposal game: a judge can summarily dismiss dozens of hopeless government appeals in a day's motion list, which boosts the numbers (each dismissal is a disposal). In fact, judges often complain (Live Law, 2025) that they spend a disproportionate amount of time just dismissing meritless government cases, an activity that contributes to statistics but not to substantive justice, since those cases shouldn't have been there in the first place. The government's litigation policy (Ministry of Law and Justice, 2010), or lack thereof, effectively externalises the cost of its risk aversion onto the judiciary and private litigants. Every frivolous appeal the state files uses up court time that could have gone to a serious case. It also inflates the backlog artificially. Nearly half the pending cases might be ones in which the government is a party. It is a key part of the political economy of delay, essentially, a supply-driven backlog. Thus, the state's litigation conduct and the judges' incentive to accumulate disposals can feed off each other in an unhealthy symbiosis.

5. ADVANCED EMPIRICAL SPECIFICATION: A DURATION ANALYSIS APPROACH

To robustly test the "Strategic Delay" hypothesis proposed in Section III, a simple OLS regression is insufficient because judicial delay is a "time-to-event" variable. Data on pending cases is often "right-censored" (the case is sub-judice, so the final duration is unknown).

Therefore, to robustly test the "Strategic Delay" hypothesis, we thus propose using a survival analysis framework, specifically the Cox Proportional Hazards Model, to estimate the probability of a case being disposed of at any given time t.

a. The Hazard Function

In survival analysis, instead of modelling delay length directly, we model the hazard rate **h(t)**, the instantaneous probability that a case that has lasted until time t will be resolved in the next instant,

given it's still pending. For our context, define $h_i(t)$ as the hazard that case i gets disposed at time t (measured perhaps in months since filing), conditional on it being undecided up to time t.

$$h_i(t) = h_0(t) \exp(\beta_1 \text{Gov}_i + \beta_2 \text{Election}_t + \beta_3(\text{Gov}_i \times \text{Election}_t) + \gamma Z_i)$$

Where:

- $h_0(t)$ is the baseline hazard function (the natural speed of the court) if all covariates are zero. This captures the underlying disposition rate of cases over time, which can vary (for instance, courts might dispose a lot of cases at certain ages, some studies find hazard of resolution may increase after a certain waiting time, or decrease as cases get very old and stuck).

- Gov_i is the Dummy variable (1 if the Government is a party, 0 otherwise). β_1 would reflect the factor by which the hazard (i.e. speed of disposal) differs for government cases relative to private cases. If, say, $\beta_1 = 0.8$, it implies at any given time, a government case is only 0.8 times as likely to be disposed as a similar private case, or put inversely, a 20% reduction in the hazard rate (hence slower resolution).

- Election_t is the time-varying covariate indicating an election year. This variable can change value for a given case as time passes (e.g., a case filed in 2017 will see Election=1 in 2019, then 0 again in 2020, etc., for central elections). β_2 captures overall shifts in hazard during election periods.. We will see via β_3 the differential effect.

- $\text{Gov}_i \times \text{Election}_t$ is the interaction of the dummy variable and the time varying covariate for the election year. β_3 measures how the hazard for the government cases specifically changes during election times.

- Z_i is the Vector of controls (Bench strength, Case Type, Writ vs. Appeal).

b. *Interpretation of Coefficients*

The coefficient of interest is the interaction term β_3.

- **Hazard Ratio < 1:** Indicates that the variable reduces the probability of disposal (i.e., increases delay).

- **Hypothesis:** We expect the Hazard Ratio for $\text{Gov}_i \times \text{Election}_t$ to be statistically significantly less than 1. This would confirm that during election cycles, cases involving the government are less likely to be decided than private cases, controlling for all other factors.

One can also test robustness by including fixed effects for High Courts (some High Courts are

more efficient than others, for e.g., data often shows Madras HC disposes faster than, say, Allahabad HC (Sinha, 2019), possibly due to differing processes). Including court dummies would soak up differences like backlog magnitude or local legal culture, letting βs focus on within-court variation.

c.   Robustness Check: The "Retirement Horizon"

We add another dimension to our analysis: the idea that a judge's behavior (and hence case outcomes) may change as they near retirement, especially regarding sensitive matters. Recall our utility function included *P* (post-retirement prospects). A judge about to retire might either hurry to clear work (for legacy or because they finally have nothing to lose) or might become extremely cautious on controversial cases to avoid ending their career with a bang that could jeopardize any last-minute appointments or simply invite backlash in retirement.

We can further refine the model by adding the judge's Remaining Tenure (T_{rem}) as a variable.

$$Delay_{it} = \alpha + \lambda (T_{rem}) + \epsilon_{it}$$

To incorporate this, one approach is to include T_{rem} as a covariate in the hazard model or a separate regression. But T_{rem} is judge-specific, and cases are assigned to judges. This complicates things because, as judges retire, their pending cases get transferred. Perhaps a simpler approach would be to check how disposal probabilities change for cases that were being handled by judges in their last 6 months. Alternatively, use a two-step approach: first see if judges' output composition changes near retirement, or more granularly, an interaction of GovLit with a near-retirement indicator, to see if government cases indeed are disproportionately adjourned by retiring judges.

If judges are seeking post-retirement jobs, we hypothesize a non-linear relationship.

- **High T_{rem}:** Judges with a long horizon might behave in a more moderated way, they have time to engage with big cases (especially mid-career judges who might aim for elevation, they might actually take on significant cases to build reputation up to a point).

- **Very Low T_{rem} (< 6 months):** We expect a sharp drop in the disposal of *sensitive* government matters (to avoid controversy before retirement) but a spike in *routine* matters (to boost disposal statistics).

In any event, adding the retirement horizon consideration serves as a robustness check for our political economy thesis: it's another angle of strategic behavior – here, individual career timeline influencing speed on sensitive vs non-sensitive matters. The paper aims to paint a more dynamic

empirical picture: one that shows how hazards (or speeds) of case resolution vary systematically with who is involved (government or not), what time it is (election or not), and even which judge (nearing retirement or not). A convergence of evidence from these analyses would provide a compelling empirical validation for the "Strategic Judge" model proposed, moving the discussion beyond anecdote to measurable patterns.

6. CONCLUSION

The crisis of judicial delays in the Indian Judiciary is not an arithmetic one. The dominant narrative of backlog, that simply hiring more judges, building more courts, or tweaking procedures will eliminate delays, is incomplete and potentially misleading. Through the lens of political economy and rational choice theory, we have shown that delay is often a rational response by judges operating within a system of perverse incentives. In other words, the persistence of long pendency is not just an administrative failure but in part an equilibrium outcome given how judges' career concerns, the institutional structures, and litigant behaviour intersect.

Our "Strategic Judge" model argues that High Court judges maximise a utility function where factors like reputation, leisure, promotion prospects, and avoidance of sanctions all play a role. In many scenarios, delivering speedy justice is not the utility-maximising choice for the judge. We demonstrated several such scenarios: judges may delay final decisions to handle easier interim matters; they may hold back politically sensitive judgments to avoid conflict or time them for a more opportune moment; they may acquiesce as the State floods the docket with appeals, using delay as a buffer against executive displeasure. These behaviours, individually rational under current incentives, aggregate to systemic delay.

The institutional critique highlights how certain design features entrench these incentives. The unchecked Master of the Roster power means a great deal hinges on the Chief Justice's own incentives; a reform-minded CJ could push through backlog clearance, but a self-interested one can tolerate or even encourage delay on select matters for personal or political reasons. The opacity of the Collegium similarly means judges are often guessing what behaviour will please those who decide their promotion, which likely encourages risk-averse and status-quo behaviour . The transfer threat, constitutionally allowed and sometimes misused, hangs like Damocles' sword, reinforcing cautious adjudication in sensitive cases. The State's litigious nature means the courts are mired in an avalanche of cases that arguably do not even belong, diluting the focus and resources from true disputes.

What, then, is to be done? The analysis suggests that unless the incentive structure is altered, simply adding more judges or courtrooms will yield diminishing marginal returns. Indeed, without incentive reform, increasing capacity could even lead to more filing by the State (faster disposal might encourage more appeals as the opportunity cost drops) or more complacency.

In closing, the paper emphasises the need to move the discourse from "How many judges do we need?" to "What makes judges decide?". The former treats judges as machines where adding more increases output; the latter recognises judges as human actors responding to incentives. By focusing on the latter question, policymakers and court leaders can devise reforms that align judges' incentives with the public interest in swift and fair justice. The analytical clarity provided by the political economy approach helps in pinpointing leverage points for reform that pure resource-based thinking might miss.

In essence, the "arrears problem" of Indian courts is as much about incentive arrears as judge arrears. Addressing it requires not just filling vacancies but filling the gaps in the incentive structure that currently make delay a rational currency in the hands of judges and litigants. Only by re-aligning those incentives towards timely resolution, through institutional, procedural, and cultural changes – can the equilibrium of inefficiency be shifted towards an equilibrium of efficiency and justice. The framework and analysis in this paper aim to contribute to that shift by illuminating the often-unspoken calculus behind the glacial pace of justice, so that reforms can be crafted to change that calculus for the better.

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ECONOMIC ANALYSIS OF PROVIDING SUBSIDIZED PUBLIC TRANSPORT FOR WOMEN WITH REFERENCE TO RAMESH KAMAL V. STATE OF H.P. AND ANR.

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ABSTRACT

This case analysis aims to investigate the pros and cons of the "Nari Ko Naman" scheme launched by the Himachal Pradesh government offering subsidised bus transport to women across the state against which a petition was filed in Ramesh Kamal v. State of H.P (2022). This case study's primary goal will be to critically analyse whether offering subsidised bus transport for women is a case of freebies or if it is a policy that is working towards empowering women and increasing their participation in the economy by incentivising them to pursue education and employment. This case study utilises primary data collected through an online questionnaire and secondary data such as research papers, government reports and news articles. Both qualitative and quantitative data were analysed in the process. This data is critically evaluated by employing various micro and macroeconomic tools, analysing the various features of the scheme brought into question before the court, similar global and Indian practices, and analysing substitutes to the existing scheme.

Keywords: *Macroeconomics and law, gender-sensitive policies, social welfare, economic inclusion, subsidised public transport.*

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1. INTRODUCTION

In this day and age where gender roles have no bounds, it is primarily in the hands of the government to provide a push to the disadvantaged section of the society with incentives that facilitate their participation in mainstream society. According to a study (Deshpande & Singh, 2021), the labour participation force of women in urban areas fell from 22% to 11%, between the period of 2016-2019. Himachal Pradesh has a mixed bag of statistics reported when it comes to the employment and education of women. It was noted by the World Bank that a significant restriction to women's employment and education is caused due to problems of mobility. With a 1.330 rating in the Gender Parity Index (as of 2021), Himachal Pradesh stands second in the nation only behind Kerala (Rajta, 2024). It is also reported that there is a higher rate of female enrolment in education due to changing attitudes. When it comes to employment, the Economic Survey (2022-2023) reports that 54.8% of Himachal Pradesh's women are engaged in some form of employment exceeding the national average of 37% (Sharma, 2024). Among these employed women, it was found that most of them were self-employed and only 11.9% of the women have regularised wages. The last statistic is a bit worrying and the government has also realised this a brought about a slew of schemes to build on the current positive trend and further reduce inadequacies in the states when it comes to women's education and employment observe that women outside the labour force identify obstacles such as lengthy, costly, and unsafe transportation as a barrier to participation in the workforce (Alam et al., 2021). It was observed that gender-specific schemes by the Government go a long way in reducing the mobility problems and encourage workforce participation as well (Kejriwal, 2019). This has resulted in the establishment of the "Nari ko Naman" scheme of the Himachal Pradesh Government, which provided for a 50% concession to the female passengers of the state buses. This scheme however was challenged in the Himachal Pradesh High Court in Ramesh Kamal Versus State of H.P. and Another. We aim to analyse the scheme; it's legislative intent and the judgment addressing a petition against it by means of various economic tools.

2. LITERATURE REVIEW

Chakravarthy, R., Seth, P in their analysis of Karnataka's Shakti Scheme, which offers free bus travel for women, they found increased mobility across the state (Chakravarthy et al., 2024). The paper also found increased financial savings, which helped alleviate the burden of household

expenses. It also found that women were able to access better healthcare facilities and even travel for leisure. One negative found was demoralising behaviour from conductors, bus drivers and other male passengers. Dasgupta, A., & Datta, A in their study on Delhi's Pink Slip Scheme, which offers free bus transport for women found weak overall evidence that the fare-free transit scheme improved female workforce participation, but found significant benefits for economically marginalized women who are the key target of the scheme (Dasgupta & Datta, 2023). Narayanan, S in her study on Tamil Nadu's free bus policy for women found increased participation of women as consumers, labour, and producers, with most of the study's respondents availing the scheme to access their workplace, to fulfil household errands and for leisure. They found increased visibility of women in public spaces (Narayanan, 2023).

3. RESEARCH METHODOLOGY

This paper employs an empirical qualitative research methodology, utilizing a questionnaire to gather responses from beneficiaries of the scheme. The collected data serves to substantiate the scheme's advantages, as discussed in the paper. Additionally, secondary data sources, are analysed to assess the implementation and effectiveness of similar schemes in other states to further corroborate our own findings.

The legal analysis of *Ramesh Kamal v. State of Himachal Pradesh* follows a doctrinal research approach, examining constitutional principles and judicial precedents to evaluate the socio-economic objectives realized through the judgment. Furthermore, the paper applies a law and economics framework to assess the judgment's impact on state policy, ultimately grounding its conclusions in legal-economic research.

4. BACKGROUND NOTE

a. a. Nari ko Naman Scheme

In July 2022, the Chief Minister of Himachal Pradesh, Mr. Jai Ram Thakur launched a welfare scheme by the name of *"Nari ko Naman"*. The commencement of the scheme came right before the election of the state. This scheme targeted women and various accepts that affect them and public transport of the state. This scheme was coupled with certain other schemes which included the "Ride with Pride" scheme which aimed at increasing the posts for female drivers in the "Ride with Pride Government Taxi Service" in the Himachal Road Transport Corporation or the HRTC. What concerns us in this paper is the "Nari ko Naman" scheme where the government promised

to provide all the female passengers with a 50% concession in the bus rides intra-state (rides within the borders of the state). The government also reduce the minimum fare from rupees 7 to rupees 5 only. We aim to analyze this step of the government with economic and legal implications in the light of the case that followed, namely the *Ramesh Kamal v. State of H.P. and Another (*2022).

  b. *b. Himachal Road Transport Corporation*

Founded in 1958, jointly by the Punjab and Himachal Pradesh Government along with the Railways, as the "Mandi-Kullu Transport Corporation", the corporation got merged with the Himachal Government and was named as Himachal Road Transport Corporation in 1974. Himachal Road Transport Corporation is a state-owned corporation under the Himachal Pradesh government. It operates intra-state and Inter-state to provide bus services within the state and neighbouring states namely, J&K, Uttar Pradesh, Punjab, Haryana and Rajasthan. It has a head office and 4 divisional offices to ensure smooth functioning of services. This corporation has brought about multiple novel services such as a range of card schemes that not only provide users discounts but also an easier payment experience. The Corporation also allows for online booking of tickets.

5. FACTS OF CASE

On June 7, 2022, the Himachal Pradesh government announced a notification that approved a 50% fare reduction for women traveling on ordinary intra-state buses run by the Himachal Road Transport Corporation (HRTC), starting July 1, 2022. This move built upon a previous announcement by the Chief Minister during the 75th Statehood celebrations, enhancing an existing 25% discount that had been offered since August 17, 2015. The notification provided for two limitations to the scheme which included 1. This was only applicable to intra-route bus routes of the HRTC and not to the inter-state route buses. And no additional discount would be provided to any women who as already claimed the 50% discount by the way of this scheme.

The contention of the petitioner, Ramesh Kamal, a private bus operator, was that this notification by the way of the discount provided for an arbitrary discrimination under the Article 14; by violating the equality provision of the Indian Constitution and in addition to it, it also adversely affected the private operators of the state financially. On June 18, 2022, in its 151st meeting, the HRTC Board approved this proposal. The State Government mentioned that this project would

incur a financial burden of a significant amount, which is ₹59.69 crores, which it planned on covering.

Kamal also raised issues about the HRTC not paying road taxes and questioned the legality of some concessional passes issued by the corporation. The case was initially brought by the Himachal Niji Bus Operators' Sangh but was later revised to be filed by Ramesh Kamal as an individual operator. The High Court of Himachal Pradesh heard the case, where various arguments were made regarding the government's notification's legality and impact, as well as the broader implications for transport policy in the state.

6. ISSUES

The central issues in this case concern the Himachal Pradesh government's notification granting a 50% fare discount to women traveling on HRTC's ordinary intra-state buses. They can be traced as stated below-

i. Ramesh Kamal, the petitioner, claims that the fare discount creates an arbitrary distinction, violating Article 14 of the Constitution, which ensures equality under the law.

ii. The petitioner argues that the concession negatively affects private transport operators financially by making it difficult for them to compete with the subsidized fares offered by HRTC.

iii. There are concerns about the legal authority under which the government issued the notification, with the petitioner asserting that it exceeded its jurisdiction and violated the Motor Vehicles Act.

iv. The petitioner points out that HRTC has not paid state road taxes since 2012, raising doubts about the legality of its operations and financial responsibilities.

v. The petitioner challenges various promotional schemes and concessional passes provided by HRTC, arguing they are illegal and violate existing laws.

7. JUDGEMENT

The bench consisting of Justice Tarlok Singh Chauhan and Justice Virender Singh decided that offering concessions to specific groups is a policy decision made by the executive branch, and as long as it does not breach any laws, the court cannot intervene. Article 15(3) of the Constitution, provides for affirmative action in favour of the marginalized which permits the state to make special provisions for women and children. The object of Article 15(3) is to make up for the

economic and social losses suffered by the women of India, for centuries. Such an affirmative action, promised under the Fundamental Rights does not breach any laws.

The court acknowledged that the 50% fare discount for women passengers on HRTC ordinary intra-state buses, effective from July 1, 2022, was a legitimate policy decision by the state government. The state is covering the financial impact of about ₹59.69 crores. The court rejected the petitioner's claim that the discount violates Article 14 of the Constitution by creating an arbitrary classification. The court reiterated how Articles 14, 15 and 16 supplement each other to provide for provisions like in the present case.

The court reiterated that as long as the notification does not violate any laws, it cannot be overturned simply because it results in financial loss for the petitioner. The notification was issued by the government under Article 162, which grants the executive the powers to enact such a law.

It emphasized that providing a conditional travel discount to women in HRTC buses is a policy decision. The court also considered the petitioner's other concerns, such as HRTC's unpaid road taxes, concessional passes, and promotional schemes, but found no merit in these arguments.

8. GOAL OF JUDGEMENT

The rationale of the judges was to enable the Directive Principles of State Policy which allows the state to make positively discrimination in favour of women. As discussed by the court, the goal was to achieve social inclusion of women by providing greater mobility and enabling them to use the subsidized transport for the purpose of education, employment, healthcare etc. So, the true intent of the judgement was to empower a weaker section of society by opening opportunities for them by means of subsidized transport, especially to working class women. It also has a complementary objective of improving standards of living because better opportunities mean families also become better off. But is the theme of social justice in line with being economically viable is something this case analysis will aim to find.

9. DATA INTERPRETATION

A questionnaire was shared with 40 female residents of Himachal Pradesh to get an insight into the beneficiaries' demographics and analyse the policy's efficacy in empowering women and encouraging their participation in the economy. A mixture of qualitative and quantitative data was collected to further the goals of this research. We have compared the findings of this study with the larger-scale studies on the implementation of free buses for women in Tamil Nadu, Delhi and

Karnataka to see if there truly is value in implementing this scheme and also to compare and understand if free buses or Himachal Pradesh's subsidiary model is better.

a. *Table 1- Age*

AGE	FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
18-25	15	37.500	37.500	37.500
25-30	2	5.000	5.000	42.500
30-40	7	17.500	17.500	60.000
40-60	16	40.000	40.000	100.000
Missing	0	0.000		
Total	40	100.000		

Table 1: Age

Source: Author's own creation

Table 1 represents that out of the 40 people who responded to the questionnaire, a significant percentage of 40% belonged to the age group between 40-60. The next highest percentage noticed was the age group of 18-25 covering the around 37.5%. About 7% of the respondents belonged to 30–40-year age group, and the lowest percentage was noticed in the age group 25-30 with only 2%.

b. *Table 2- Educational Profile*

EDUCATIONAL PROFILE	FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
Bachelor's degree and above	29	72.500	72.500	72.500
High School	11	27.500	27.500	100.000
Missing	0	0.000		
Total	40	100.000		

Table 2: Educational Profile

Table 2 represents the educational profile of the respondents where 72.5% of the respondents have a bachelor's degree or above, whereas only 27.5% of the respondents have qualified high school.

c. Table 3- Occupation

OCCUPATION	FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
Farmer	1	2.500	2.564	2.564
Government employee	1	2.500	2.564	5.128
Health worker	1	2.500	2.564	7.692
Office employee	16	40.000	41.026	48.718
Professional	1	2.500	2.564	51.282
Self-employed (Eg. Small Business)	3	7.500	7.692	58.974
Student	16	40.000	41.026	100.000
Missing	1	2.500		
Total	40	100.000		

Table 3: Occupation

Table 3 represents the occupation of the respondents, where we find several different forms of employment. The most practiced occupation among the respondents has been noted to be "office employees" and "students" covering about 40% of the data set each. The next highest percentage is that of "self-employed" or small businesses who represent about 7.5% of the respondents. Occupations such as "farmers", "government employees", "health workers" and "professionals" represent about 2.5% each.

d. *Table 4- Purpose of travelling*

PURPOSE OF TRAVELLING	FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
Education	10	25.000	25.000	25.000
Home in Himachal	1	2.500	2.500	27.500
Leisure	2	5.000	5.000	32.500
Personal Chores (shopping, health checkup)	10	25.000	25.000	57.500
Work	16	40.000	40.000	97.500
plus leisure	1	2.500	2.500	100.000
Missing	0	0.000		
Total	40	100.000		

Table 4: Purpose of travelling

Source: Author's own creation

Table 4 represent the purpose of travelling of the respondents by public transport. "Work" being the highest, covers about 40% of the total data set, followed by "education" and "personal chores" with 10% each. Around 7.5% of the respondents use it for "leisure", and the next 2.5% use it to travel to their home.

e. *Table 5- Distance Travelled Daily*

DISTANCE TRAVELLED DAILY	FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
10-20 km	9	22.500	22.500	22.500
20-30 km	5	12.500	12.500	35.000
Less than 10km	20	50.000	50.000	85.000
More than 30 km	6	15.000	15.000	100.000

Missing	0	0.000		
Total	40	100.000		

Table 5: Distance Travelled Daily

Source: Author's own creation

Table 5 represents the distance travelled by the respondents daily using the public bus transport. 50% of the respondents travel less than 10km using the bus followed by 22.5% of the respondents travelling 10-12km, 15% travelling 30 km or more and 12.5% travelling 20-30km.

f. *Table- 6- Frequency of travel*

FREQUENCY OF TRAVEL	FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
Daily	15	37.500	37.500	37.500
Frequently	11	27.500	27.500	65.000
Occasionally	14	35.000	35.000	100.000
Missing	0	0.000		
Total	40	100.000		

Table 6: Frequency of travel

Source: Author's own creation

Table 6 represents how frequently the respondents use the bus to travel, of which 37.5% of the travellers use it daily, frequently used by 27.5% of the respondents, occasionally by 35% of the respondents. It is to note that all respondents have travelled using the bus.

g. *Table- 7- How satisfied are you with the scheme of subsidized bus fares for women?*

HOW SATISFIED ARE YOU WITH THE SCHEME OF SUBSIDIZED BUS FARES FOR WOMEN?	FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
Neutral	10	25.000	25.000	25.000
Satisfied	10	25.000	25.000	50.000

Very dissatisfied	2	5.000	5.000	55.000
Very satisfied	18	45.000	45.000	100.000
Missing	0	0.000		
Total	40	100.000		

Table 7: How satisfied are you with the scheme of subsidized bus fares for women?

Source: Author's own creation

Table 7 represents the satisfaction levels of women with the scheme. A majority of 45% have expressed 'very satisfied' with the scheme followed by 25% of respondents 'satisfied with the scheme, 25% 'neutral', 0 for 'dissatisfied' and 5% for very dissatisfied'.

h. Table-8- Your monthly income as a scheme beneficiary

YOUR MONTHLY INCOME AS A SCHEME BENEFICIARY	FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
Above Rs.15,000	17	42.500	42.500	42.500
Below Rs.5000	18	45.000	45.000	87.500
Rs. 8000-12000	1	2.500	2.500	90.000
Rs.12,000-15,000	3	7.500	7.500	97.500
Rs.5000-8000	1	2.500	2.500	100.000
Missing	0	0.000		
Total	40	100.000		

Table 8: Your monthly income as a scheme beneficiary

Source: Author's own creation

Table 8 represents the monthly income as scheme beneficiaries. Most number of respondents, 45% of them have a monthly income below Rs. 5,000, 42.5% of them having a monthly income of above Rs. 15,000, then 7.5% of respondents having a monthly income of Rs. 12,000-15,000 and 2.5% each having income of Rs. 8,000-12,000 & Rs. 5,000-8,000.

i.   *Table-9- Where is the excess money saved from using public transport used?*

WHERE IS THE EXCESS MONEY SAVED FROM USING PUBLIC TRANSPORT USED?	FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
Education	11	27.500	27.500	27.500
Food	15	37.500	37.500	65.000
Health	7	17.500	17.500	82.500
Leisure	4	10.000	10.000	92.500
Not significant	1	2.500	2.500	95.000
Nowhere	1	2.500	2.500	97.500
Saving Account	1	2.500	2.500	100.000
Missing	0	0.000		
Total	40	100.000		

Table 9: Where is the excess money saved from using public transport used?

Source: Author's own creation

Table 9 represents areas where respondents use the excess money saved from scheme. The largest area is food where 37.5% of the respondents use the money for, followed by 27.5% respondents using it in the area of education, 17.5% respondents use it in health, 10% in leisure, 2.5% for savings, 2.5% using it not significantly and another 2.5% using it nowhere.

10. ECONOMIC ANALYSIS

a.   *Rational Consumer Theory*

Black law's Dictionary defines it as "rational consumer theory is a concept in economics that assumes consumers will make choices that maximize their utility given their preferences, budget constraints, and the available information" (Nolan & Nolan-Haley, 2004). The biggest benefit of subsidised bus travel for a rational consumer would be the income effect it would have on women's finances. While there's no direct income change, the equivalent value of free transport might be considered additional disposable income, potentially affecting consumption patterns. According

to the World Bank, India has one of the lowest rates of female labour participation globally, with fewer than 25 per cent of women over the age of 15 employed as of 2022, down from 27 per cent in 2012.

In India, men often limit the financial opportunities available to women, and while many may oppose their wives working outside the home, free travel provides women with a new option. Although women are allowed to work, they often choose not to if the commute is too costly or unreliable. Governments that have implemented the program report its success and plan to expand it further (Yarlagadda, 2024). The rational consumer will also look for opportunity cost; The time saved on commuting can be seen as an opportunity cost for other activities. Focusing on savings made by women as a result of the combination of faster, more efficient, cheaper modes of transport allowing them to work and practice professions as per their liking and/or getting educated in areas further from their residence.

Another factor is rational families. The study on Tamil Nadu and Karnataka found that women were encouraged to go and sell goods produced by a family enterprise because there are cheaper transport costs associated. The women can also travel extra kilometres to another market if they weren't able to sell it all at the initial site. This is a boon for those selling perishable goods. For example, in a family of farmers, female members are encouraged to go and sell the produce at the Mandi. This provides next level empowerment.

A study by the CAG on the free bus scheme in Tamil Nadu showed that of the 2000 women interviewed, nearly 20% of them reported saving between Rs. 400 and Rs. 600 and another 20% said they saved between Rs. 600 and Rs. 800 per month. In our questionnaire, 40% of the respondents stated they saved more than 500 rupees a month, 16% reported savings from 100-500 rupees a month, 16% reported no significant savings and the rest stated that it was difficult to say. So, we can say that women as rational consumers of transport would pick buses over other modes of transport purely based on price.

b. Preference shaping

Preference shaping is a process of influencing consumer choices as a result of governments or organizations providing free goods and services. It is defined by the Nobel laureate Herbert Simon discussed "how organizations and institutions shape individual preferences and decisions through bounded rationality and satisficing behaviour" (Narayanan, 2021).

In the light of the case of Ramesh Kamal v. State of Himachal Pradesh, one of the expected effects on the consumers is reduced travel costs for women would lead them to relocate their income to other activities they would be interested in like education, and leisure activities that will contribute to the overall economy. Reliance on public transport will lead to encouragement to use it for daily commutes and as a result in lesser impact on car ownership and usage patterns.

Along with financial freedom, women enjoy the social freedom they gain from the burden of transport getting reduced. There is a utility maximization that is seen from the earnings they have. Women might reallocate their time to other activities (work, education, leisure) due to the time saved on commuting. They also can be incorporated into the concept of trade-offs that are being done as a result of this subsidy. Subsidized bus transport could substitute other modes of transport (auto, rickshaw, walking), potentially influencing their usage.

CAG's study aimed to explore how women were utilizing bus services now that they were free. Nearly a quarter of the women surveyed mentioned that the scheme gave them the freedom to enjoy leisure activities, like visiting temples or spending time at the beach or in parks making them more active consumers. It became clear that, before the free bus initiative, the additional cost of transport would have prevented them from engaging in such activities (Narayanan, 2021).

Using incentives, policymakers "nudge" people or shape their preferences into following practices that are in line with policy goals are incentives and disincentives. The target group, in this case, women, are incentivized to opt for public transport to achieve multiple policy goals. One is to increase the participation of women in the economy, be it by selling their wares/produce or travelling for work. It could also be for future participation in the sense that more women can get access to better, higher education as they are no longer geographically restricted. The reasoning for a positive show in these indicators is the multiplier effect- because now they have additional disposable income with this extra income, workers will spend, at least part of it, in other areas of the economy.

From the questionnaire conducted and from results from studies conducted on the efficacy of free bus transport in Tamil Nadu and Karnataka we can see significant amounts of savings per month being made with most respondents reporting 500 or more rupees saved. They further reported that this money goes towards essentials like food, rent and utilities, or goes into education. This leads to a multiplier effect. One there is increased consumption by households because their spending power increases due to the bus subsidy. Another reason is spending on education which will lead

to increased productive capacity of the future labour. It also means that the children who get more money poured into their education and likelier to get better jobs, hence better pay and hence more consumption power. Subsidies empower and incentivise increased participation of women in the economy as consumers, producers and labour which not only benefits the women but also their families and the economy as a whole. Due to similarity in findings, it is highly probable that the success of Tamil Nadu and other states in involving women in the workforce can be replicated to at least some extent in Himachal Pradesh thereby creating positive economic change.

Figure 1: Graph presenting Income multiplier
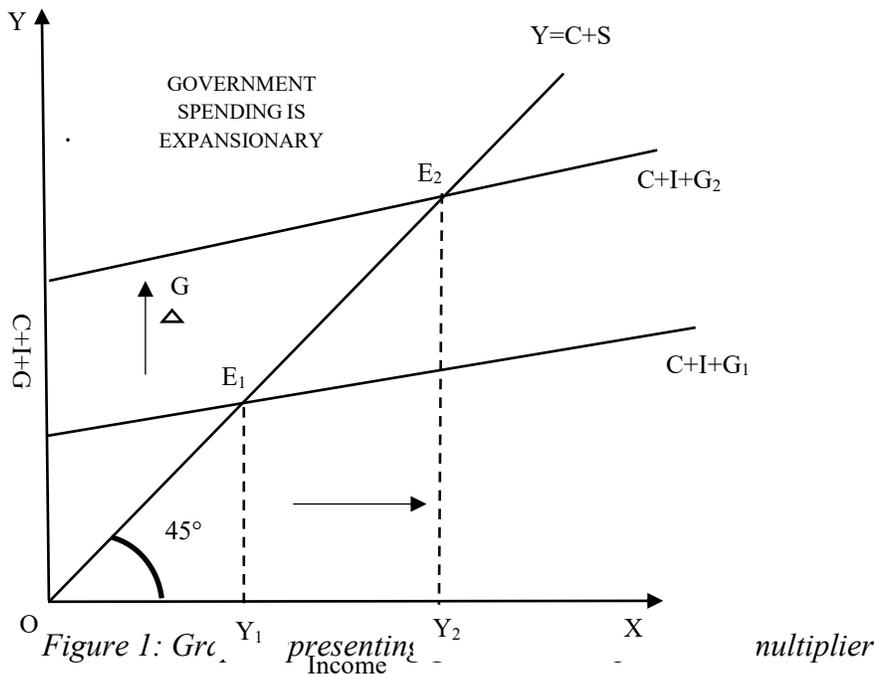
Source: Author's own construction

One argument against subsidized bus transport for women is that some people consider it a freebie policy saying that it will unnecessarily spend a lot of money on a scheme that does nothing for making buses safer which is of bigger interest. There is also the argument of overconsumption which will lead to distortion of market and prices further leading to inefficiency. One more argument in line with the previous arguments is that there is a possibility of households spending this additional disposable income on demerit goods such as lottery, alcohol or cigarettes. It is argued that it shapes consumers preference into one that increasingly relies on the states instead of on self. Taxes and government schemes especially in a welfare state like India, exist to make it a more equitable society for all which is exactly the purpose of the subsidized bus transport.

c. Coase Theorem

The Coase theorem suggests that, regardless of initial resource allocation, efficient outcomes can emerge through private negotiation when transaction costs are low (Coase, 1960). However, as Williamson notes, real-world transaction costs often prevent Coasian bargaining from occurring effectively (Williamson, 1981).
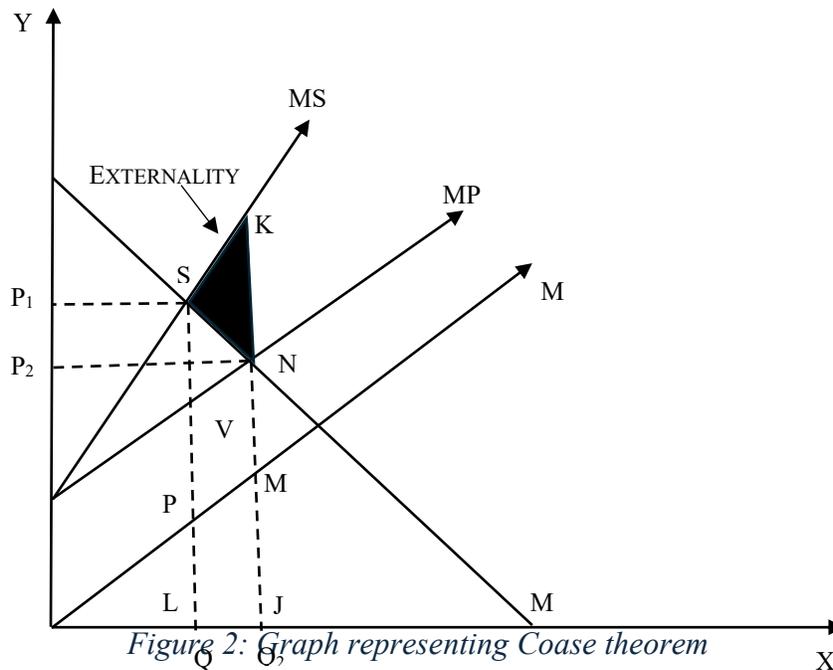

Figure 2: Graph representing Coase theorem

Source: Author's own construction

In this graph, MB represents the marginal benefit men get from using public transport. MPC represents the private costs of men for using the public transport which is the bus fare in this case. MD represents the marginal damage that women experience due to various factors. We then have MSC, or the marginal social cost, which is the addition of the costs of both male and female passengers. The triangle SKN represents the externality caused by the consumption of male passengers, which causes marginal damage to women. Multiple factors cause this externality, as discussed by multiple theorists. One factor is the temporal flexibility penalty as discussed by Claudia Goldin, wherein women disproportionately value temporal flexibility due to caregiving responsibilities, affecting their transportation needs and willingness to accept certain commuting

arrangements (Goldin, 2014). When women must arrange transportation around caregiving responsibilities, they face higher transaction costs in negotiating transportation solutions.

Another factor also highlighted by Goldin is the Pollution Theory of Discrimination, wherein women experience costs in the form of resistance when entering traditionally male-dominated spaces such as public transport at certain hours of the day which causes social friction as social and cultural norms create additional transaction costs when attempt to assert their rights in public spaces as observed by Dunckel-Graglia (Dunckel-Graglia, 2013).

Another significant issue causing costs for women is when it comes to getting their legal rights under anti-discrimination laws and other laws that protect women. Gekoski et al. observed that one reason for this is significant information asymmetries when it comes to knowledge of legal remedies when facing harassment or discrimination (Gekoski et al., 2015). Another cause is the disproportionately high costs of enforcing rights in public places on women due to sexism and institutional barriers, according to Gardner et al (Gardner et al., 2017). Goldin's Pollution Theory of discrimination also found that women face higher hurdles in establishing credibility when reporting harassment or unsafe conditions in public transport systems (Goldin, 2002). Croson, Rachel and Gneezy find that these gender differences in transaction costs significantly impact economic decision-making and outcomes, making Coasian solutions unattainable without intervention (Croson et al., 2009).

Which is why bus subsidies as a form of intervention will help reduce these externalities. By making travel cheaper, it incentivises more women to step out into the public sphere and thereby reduces the temporal flexibility penalty. This would also reduce the impact of the pollution theory of discrimination as rational families and employers encourage women to become active participants in the economy. This also seen in the findings of Goldin's Quiet Revolution, where it was noted that factors such as contraception, increased access to education, and women changed the way they viewed themselves which led to their increased participation in the economy (Goldin, 2006). While laws did not play the biggest role in this change in her studies, studies on free and subsidised bus transport in states like Tamil Nadu, such as the one by CAG, which we discussed earlier, point to a similar mindset in Indian women post this policy change. The same was reflected in our questionnaire as well.

By subsidising bus transport, it reassigns property rights to women and creates protected space where women have clearly defined rights, reduces transaction costs by eliminating the need for

individual negotiations by establishing institutional arrangements and internalised externalities by forcing the transportation system to account for the social cost (MSC) rather than just private costs. This will cause a reduction in externalities and create net social gain. By explicitly allocating property rights through policy intervention, the system moves from the inefficient equilibrium at Q_1 to the socially optimal point Q_s, creating net social welfare gains.

    a. *Positive Externalities and Underconsumption*
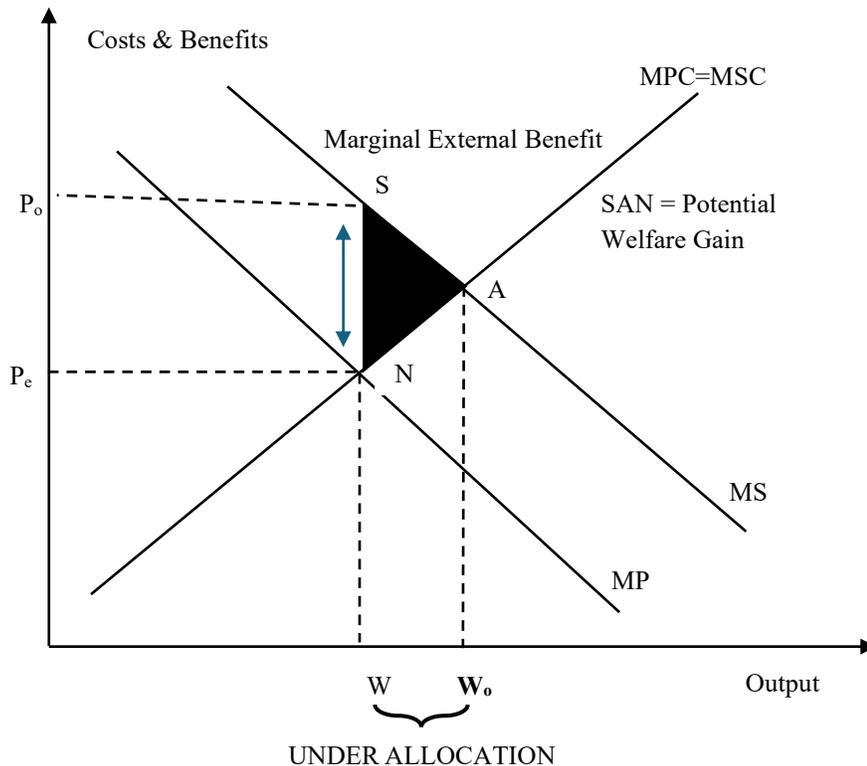
Figure 3: Graph representing government expenditure multiplier

Source: Author's own construction

A positive externality is when an external third party benefits from a transaction unrelated to them. Figure 2 illustrates positive externality caused by subsidized buses. The Marginal Private Benefit (MPB) curve represents the direct benefit to consumers, while the Marginal Social Benefit (MSB) curve accounts for additional benefits to society from subsidized buses for women. The Marginal Private Cost (MPC) is assumed to be equal to the Marginal Social Cost (MSC) in this case, meaning production costs do not generate externalities.

In a free market, equilibrium is reached at point **N**, where **MPB** equals **MPC**, leading to an output level of W_e and a price of P_e. However, the socially optimal level of production occurs at point **A**, where **MSB** equals **MSC**, with a higher output level (W_o) and a higher price (P_o). The vertical distance between the MPB and MSB curves represents the Marginal External Benefit (MEB), which quantifies the additional benefits society gains from the consumption of the good. Due to this external benefit, the free market under allocates the good, leading to lost potential welfare, represented by the shaded triangle **SAN**.

While implementing the free bus transport scheme in Karnataka the government curated an economic analysis of the initiative. They identified 3 positive externality themes (MSB) which are the empowerment of women, reduction in road congestion and improvement in air quality, and improvement of women's overall safety is ensured by using public transport and ensures the security of all passengers (Mint, 2023).

One other externality is health. Due to severe air pollution and poor air quality in households in India, almost 100 million people are suffering from respiratory diseases, with 1 million people dying yearly due to asthma and COPD. A disturbing trend is how deaths owing to asthma have increased steadily over the years in India. This means the government will have to spend excess amounts of money on healthcare facilities. The expected cost of healthcare in India in 2019 was $103.7 billion, according to statistics from the National Health Accounts of which a significant portion of spending is said to be due to air pollution caused ailments. Given that 11.5% of ailments in 2019 were caused by air pollution, treating illnesses linked to it is estimated to cost about $11.9 billion (Prakash, 2021).

Another positive externality is a better public transport infrastructure. The Mohring Effect highlights that as more passengers utilize a public transport system, the system tends to expand by offering more frequent services or additional routes. This expansion benefits existing users, creating external benefits attributed to the new users. Such benefits result in user economies of scale, which, from a welfare economics perspective, suggest that fares should be reduced to reflect these efficiencies (Mohring, 1972).

Buses, as merit goods, are susceptible to underconsumption because there is information disequilibrium between service providers and consumers and because individuals are short-term utility maximisers. This underconsumption can lead to market failure, as the private market doesn't efficiently provide the good or service. This underconsumption is represented through the triangle

SAN in Figure 2. This inefficiency suggests a role for government intervention to address non-monetary incentives to further increase consumption of the bus subsidies for women. By closing the gap between **We** and **Wo**, policymakers can maximize social welfare and address the market failure caused by positive externalities.

The lack of awareness of this initiative can be seen as one reason for its underconsumption. A lot of women are still unaware of the benefits they can enjoy from using this scheme. Also, a reason for underconsumption is severe overcrowding in state buses due to bus shortage.

 Despite fare subsidies, women's safety remains an issue which is another reason for underconsumption. A recent survey highlighted that women are hesitant to use public transport due to fear of harassment and assault. Metropolitan Transport Corporation (MTC) buses have both positive and negative aspects for urban women, says a gender perception survey conducted by the Greater Chennai Corporation (GCC). Of the women surveyed, 89% chose MTC buses as their primary mode of transport, while 82% said the state's free transport programme helped them save money and become more independent. However, 42% of the women who participated in the study said they had been sexually harassed on the bus, while around 35% said they had been sexually harassed while riding or at a bus stop (Omjasvin, 2023).

Another big issue is the lack of last-mile connectivity. Despite subsidized or free bus travel being available in multiple states the policy goals will not be achieved to full capacity unless last-mile connectivity is achieved, especially in rural areas. This issue was highlighted by a study on Karnataka's Shakti Scheme which found that most women travelled, on average, for over 10 kilometres one way ("Victoria Transport Policy Institute", n.d.). Addressing these issues will not only incentivize increased female participation in the workforce but will also nudge people into opting for public transport like buses instead of vehicles like cars, which will not only improve pollution levels but will also reduce road congestion further leading to faster commutes meaning increased economic productivity. In the case of Himachal Pradesh, it is found that 40% of villages in the state do not have proper connectivity, especially in far flung areas like Spiti (Singh, 2015). These issues result in severe overcrowding of buses which is yet another significant disincentive. Lesser pollution means higher costs incurred by the government in a variety of forms.

One more issue is the operation and scheduling of routes as found in a study on the efficacy of subsidised public transport in Bogota (Guzman et al., 2022). The study found the effect of the

subsidy to be vanishing due to changes in bus routes, which led to increased commuting time for users, which acted as a significant disincentive.

To avoid market failure because of underconsumption of the merit good buses, it required for the government to not only stop at incentivising bus travel by making it cheaper but also look at addressing the disincentives which are currently hindering consumers.

b. Why Subsidies instead of Free Bus Transport?

Hodge et al found that the free fares meant that increased customers did not mean increased revenue because of which the issue of overcrowding with arise. This issue was found in the studies conducted in Tamil Nadu and Karnataka. Because of this, Hodge et al recommend that public transport is not made free for all major cities and limiting free travel only in smaller towns or in off-peak periods (Hodge et al., 1994).

c. *Opportunity cost analysis- Why not direct transfers?*

Let's compare direct transfers and subsidies to see what each of them can achieve.
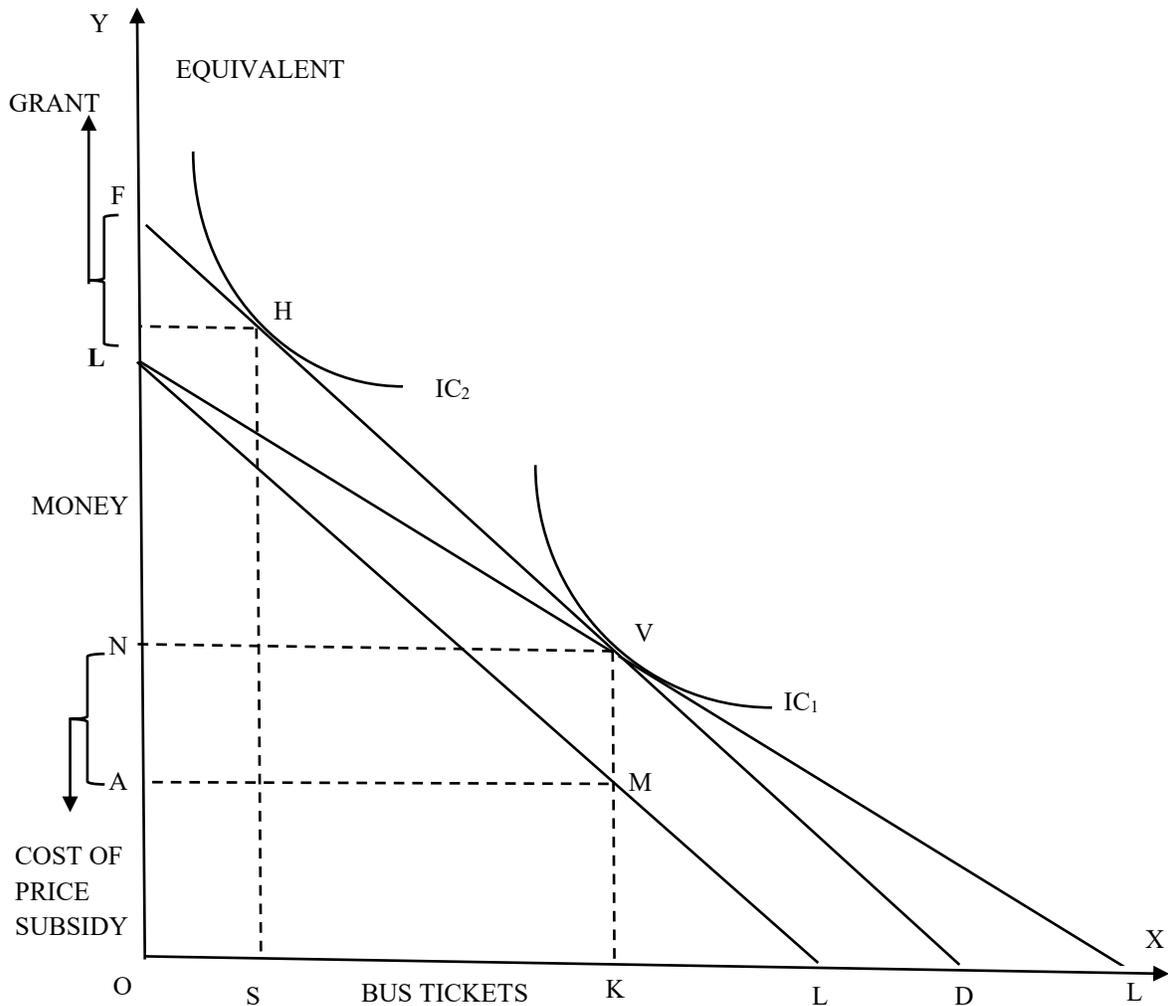
Figure 4: Graph representing lump sum cash grant is better than price subsidy

Source: Author's own construction

It can be understood from the graph that the individual with cash transfer must be better off and his bus consumption must be less as compared with price subsidy on tickets is because indifference curves being convex, the budget line **FD** obtained with cash transfer must intersect the indifference curve **IC₁** at point **V** reached with the equivalent price subsidy. With a cash grant, the consumer's new equilibrium position must lie to the left of point **V** on the budget line **FD**, where it will be

tangent to the higher indifference curve than IC_2, as they are free to spend the money as per their choice. This indicates that in contrast to the equilibrium position under a price subsidy on tickets, the consumer will be better off from a lump-sum cash subsidy and fewer bus journeys will be taken.

Cash grants can contribute more towards the development of individual welfare in a different way. Although both lump-sum cash transfers and commodity price subsidies raise an individual's income and make them better off, cash grants allow the individual to spend money on goods and services based on their tastes and preferences, ensuring a higher level of welfare than bus ticket subsidies, which enforce a particular pattern of consumption that favors travelling through buses.

Because cash relief payments are more economically efficient and provide the government with either a larger benefit at the same cost or a lower cost, they appear to be superior to ticket subsidies. Cash transfers might also be preferred because the cost of a cash grant (**FL**) is much lesser than the cost of the equivalent bus subsidy (**NA**).

However, that is not the goal of the programme. It intends to incentivise increased participation of women in the economy. Providing a cash transfer might not satisfy this longer-term goal. It will be seen from Figure that with bus subsidy **VM**, the individual is having **OK** amount of bus tickets, whereas with equivalent cash payment of **FL** the individual purchases **OS** amount of bus tickets which is less than **OK**. It is apparent that consumption of bus travel will increase with subsidies than direct transfer.

11. PRACTICALITY CONCERNS

As per the Himachal Pradesh Government's recent Gender Budget, they have spent 8370 crore rupees on the Nari Ko Naman scheme for 2022-23 and expect to spend the same amount for 2024-25 as well. This amount might not be very viable in the long run or might increase, enlarging the burden on the government. Instead, there are a few ways to make expenditure of public bus transport cheaper.

One method is maximising the revenue generated from bus services such as advertisement placement on buses and bus stations and allowing for the utilisation of bus station spaces for other commercial activities and collecting rent for the same.

Another method is reducing expenditure by increasing reliance on paying through the various cards offered by the corporation as it encourages prepaid revenue and reduces reliance on daily ticket sales. This is important as it leads to operative efficiencies by eliminating the need for paper tickets,

manual inspection and related expenses. For example, London's Oyster Card lowered operational costs, enhanced service efficiency, and reduced fare evasion (Blythe, 2004).

Yet another method is utilising cluster bus model of Delhi. Cluster buses are buses operated under a public-private partnership (PPP) model, where the government contracts private operators to run services on specific routes while retaining regulatory control. In Delhi, a study found that cluster buses were cheaper than direct government- operated bus services. It was also found that cluster buses earned more revenue which according to the study could cover staffing and operational costs without requiring excessive government subsidies (The Economics Society, 2020). Therefore, prioritizing cluster buses over direct government-operated services presents a more cost-effective and financially sustainable approach to expanding public transport infrastructure. So here, the government could just be billed by the companies for the tickets of women instead of running the entire service by themselves.

A data-driven operational model can also make state-run bus transport more cost-efficient by optimizing routes, resource allocation, and revenue collection. Gurugram's 2018 bus service success highlights the benefits of technical analysis and passenger feedback in improving ridership (DFR, 2017). Intelligent Transport Systems (ITS) enable real-time tracking, predictive maintenance, and dynamic fare adjustments, reducing fuel wastage, maintenance costs, and unnecessary subsidies. By continuously analysing ridership trends, agencies can deploy buses efficiently and maximize revenue. Integrating ITS and data analytics ensures a sustainable, financially viable, and commuter-friendly public transport system adaptable to changing demands.

12. CONCLUSION

From the above analysis, we can come arrive at one main takeaway, that subsidized bus transport for women is not a freebie. Instead, it is an investment to further not only the mobility of women in society in line with the Directive Principles of State Policy but to also induct a larger percentage of women into the economy as labour with increased spending power meaning they also become significant consumers. By directly providing women with a service, the government can direct them to perform more economically and socially desirable activities which ends up boosting the economy and increasing the tax revenue of the government in the form of direct taxes (by increased participation in the labour force) and indirect taxes (by higher consumption). To reduce the burden of the government in covering the subsidies, certain operational amendments can be taken to make

this a more viable option. Observing that the social benefits seem to be higher than social costs, we would like to conclude that subsidized transport for women in Himachal Pradesh is an efficient policy decision and that the Honourable High Court of Himachal Pradesh has also made observations and passed a judgement for Ramesh Kamal v. State of H.P. and Anr. along the same lines.

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INTERNAL MIGRATION AS A DRIVER OF REGIONAL ECONOMIC GROWTH: SPATIAL SPILLOVERS AND POLICY IMPLICATIONS FROM TURKEY

- *Dr. Sinan Çinar*[1]

ABSTRACT

Internal migration constitutes a key mechanism shaping the demographic structure and regional economic dynamics of a country. Migration flows may generate productivity gains and agglomeration advantages in certain regions, while simultaneously imposing socio-economic pressures on others. Through its influence on labour allocation, human capital distribution, regional demand patterns, and investment behaviour, internal migration plays a decisive role in long-term growth trajectories. This study empirically investigates the relationship between internal migration and economic growth across Turkish provinces at the NUTS-3 level for the period 2008–2020. Given the pronounced spatial interdependencies inherent in migration processes, the analysis employs spatial panel data models and extends the Solow–Swan framework by incorporating internal migration as an additional factor. The findings reveal significant spatial dependence in migration patterns and demonstrate that the effects of internal migration on provincial growth vary systematically across regions. While the direct impact of internal migration on economic growth is negative and statistically insignificant, its indirect (spillover) and total effects are positive and statistically significant. These results highlight that the growth implications of internal migration materialize primarily through spatial interaction mechanisms. Accordingly, effective evaluation of migration–growth linkages require policy approaches that account for regional interconnectedness rather than treating provinces as isolated units.

Keywords: *Economic Growth, Internal Migration, Spatial Panel Data, Regional Economics.*

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1. INTRODUCTION

Economic growth constitutes a central component of national development processes and plays a decisive role in enhancing social welfare and strengthening long-term productive capacity. The sustainability of economic growth is shaped not only by physical capital accumulation but also by the dynamics of human capital, technological progress, institutional structures, and demographic movements. In this context, internal migration emerges as a critical spatial mechanism particularly in countries undergoing rapid economic and social transformation. Motivated by the pursuit of improved living standards and greater economic opportunities, individuals relocate across regions, thereby influencing the growth trajectories of both origin and destination areas through multiple economic channels. The economic implications of internal migration have been widely debated in the literature through mechanisms such as the spatial redistribution of human capital, labor market adjustments, production structures, and regional competitiveness (Barro & Sala-i-Martin, 1992). Migration may enhance economic efficiency by reallocating productive labor towards regions with higher returns to skills and capital, and it may further promote productivity and agglomeration economies in receiving regions (Krugman, 1991). However, excessive migration inflows may generate pressures on infrastructure, housing markets, and public services, leading to congestion costs and diminishing marginal benefits (Fujita & Thisse, 2002). Conversely, sending regions often face declines in human capital stocks, contraction in labor markets, reduced agricultural or local production, and losses in economic vitality (Borjas, 1999).

The relationship between internal migration and regional economic growth is thus both a cause and a consequence of persistent regional disparities. More developed regions—characterized by superior infrastructure, larger labor markets, and greater investment capacity—tend to attract migrants, while less developed areas experience cumulative disadvantages associated with the outflow of human capital. This dynamic may intensify interregional imbalances over time and limit the effectiveness of national development strategies (Harris & Todaro, 1970). Therefore, internal migration should be viewed not merely as a demographic adjustment, but as a fundamental force reshaping regional economic structures. A rigorous understanding of this relationship requires an analytical framework that explicitly incorporates spatial dependence and spillover mechanisms. Tobler's First Law of Geography (1970), asserting that "nearby units are more related than distant ones," highlights the interdependence among regional economic outcomes. Internal migration, inherently spatial in nature, implies that economic performance in one province may be influenced not only by its own characteristics

but also by the economic dynamics of adjacent provinces. Ignoring these interactions may lead to biased or inefficient estimates in empirical models. Spatial econometric methods offer a powerful alternative to conventional regression techniques in such contexts. Traditional models are incapable of capturing spatial autocorrelation and may yield misleading inferences when spatial interactions are present (Anselin, 1998). LeSage and Pace (2009) argue that accounting for spatial feedback effects and spillovers is essential for accurately identifying the mechanisms driving regional growth. Because internal migration is embedded in spatial networks, spatial panel data models provide a more robust empirical framework for assessing its direct and indirect effects on regional economic performance. Internal migration has played a particularly prominent role in shaping Turkey's regional development patterns. Large-scale population flows from Eastern and Southeastern Anatolia toward the western provinces have fundamentally reconfigured the economic geography of the country. Official statistics indicate that provinces offering higher income levels, diversified employment opportunities, and advanced infrastructure attract the majority of migrants. While migration inflows may stimulate growth in receiving areas, sending regions often face slower development, labor shortages, and demographic imbalances, thereby deepening regional inequalities.

Against this background, the present study investigates the impact of interprovincial internal migration on regional economic growth in Turkey over the 2008–2020 period using spatial panel data models. Building on the Augmented Solow–Swan framework, internal migration is introduced as an additional determinant of regional growth alongside human capital, physical capital, technology, and labor. This approach enables the simultaneous estimation of both direct effects and spatial spillover effects associated with migration flows. This study addresses two interrelated research questions: (i) whether internal migration exerts a statistically significant effect on regional economic growth in Turkey, and (ii) whether this relationship is conditioned by spatial dependence and interprovincial spillover mechanisms. In line with these questions, the analysis explicitly distinguishes between direct (within-province) and indirect (between-province) effects within a spatial econometric framework. Accordingly, the study advances two testable hypotheses. Hypothesis 1 posits that internal migration has a direct effect on regional economic growth, reflecting the contribution of population movements to local labor supply, human capital accumulation, and agglomeration economies. From a theoretical standpoint, the expected sign of the direct effect is positive, as migration toward economically dynamic provinces is likely to enhance productivity through scale effects and improved factor allocation, consistent with endogenous growth and augmented Solow–Swan

frameworks. Hypothesis 2 asserts that the growth effects of internal migration extend beyond provincial boundaries and are transmitted through spatial interaction channels. In particular, migration flows are expected to generate positive indirect (spillover) effects by influencing neighboring provinces via labor market linkages, commuting networks, knowledge diffusion, and demand-side externalities. These mechanisms imply that internal migration may stimulate growth in adjacent regions even when the direct local impact is weak or statistically insignificant, highlighting the importance of spatial dependence in regional growth processes. By explicitly modeling both direct and indirect effects, this study contributes to the literature through the adoption of a spatially explicit augmented Solow–Swan model applied to a comprehensive province-level dataset for Turkey. This approach allows for a more nuanced interpretation of migration–growth linkages and avoids potential biases arising from omitted spatial interactions. The findings are expected to offer meaningful implications for regional development and migration policy, particularly by emphasizing that the economic consequences of internal migration are not confined to destination provinces but diffuse across space through interconnected regional systems.

2.   INTERNAL MİGRATİON AND ECONOMİC GROWTH İN TURKEY

Internal migration has remained a central subject of inquiry across the social sciences due to its enduring prevalence and the breadth of its economic and societal implications. Population movements motivated by economic opportunities, social dynamics, cultural preferences, or environmental pressures reshape the spatial distribution of individuals and trigger long-term transformations in regional economic structures and institutional arrangements. Because migration flows differ in scale, duration, and direction, the phenomenon demands a multidisciplinary approach. Sociological analyses focus on integration and adaptation processes; geographical perspectives emphasize spatial mobility patterns and regional restructuring; political science highlights governance responses; and historical accounts trace the cumulative effects of mobility on societal change. Within economics, however, internal migration is conceptualized primarily as a mechanism of labor mobility and a determinant of the spatial allocation of human capital, influencing productivity, labor market efficiency, and long-run regional growth potential. Conceptual frameworks developed in the migration literature further emphasize the multidimensional nature of population mobility. While classical models describe migration decisions as responses to push and pull factors, more recent approaches underscore the roles of income disparities, institutional constraints, social expectations, and environmental risks in shaping internal mobility. In this sense, internal

migration emerges as an outcome of heterogeneous regional conditions related to employment prospects, quality-of-life indicators, and differences in access to public services (Çınar, 2025:24-25).

In Turkey, internal migration has become particularly significant due to the country's rapid structural transformation since the mid-twentieth century. The acceleration of rural-to-urban migration in the post-war period coincided with industrialization, the expansion of non-agricultural employment opportunities, and improvements in urban infrastructure. Simultaneously, agricultural mechanization and declining labor demand in rural areas weakened traditional livelihoods, intensifying the incentives for population movement. By the 1980s, industrial expansion, rising educational aspirations, and evolving social norms had consolidated internal migration as a key driver of Turkey's demographic and economic reconfiguration. Despite its economic underpinnings, internal migration in Turkey is shaped by a broader set of factors, including demographic pressures, land scarcity, limited rural services, and localized conflicts. Consequently, development plans since the 1960s have repeatedly emphasized the need to understand and manage the regional implications of migration. Given its role in redistributing human and physical capital, altering labor market structures, and influencing regional productivity, internal migration remains central to debates on spatial inequality and regional development. Analyzing its relationship with economic growth therefore requires a framework that accounts for regional heterogeneity and spatial interdependence, recognizing that migration affects not only sending and receiving provinces but also the broader network of interregional economic interactions.

2008–2020 Arithmetic Average (Provinces)	Net Internal Migration (Positive)	2008–2020 Arithmetic Average (Provinces)	Net Internal Migration (Negative)
Ankara	2370,260	Rize	-19,98224
Antalya	1584,35	Artvin	-27,99408
İzmir	1387,656	Karaman	-31,5147
Kocaeli	1382,946	Kırşehir	-48,63905
Tekirdağ	1288,532	Mersin	-54,63905
Bursa	1156,337	Kilis	-59,76923
İstanbul	1079,402	Amasya	-61,86982

Muğla	686,1242	Osmaniye	-64,30177
Eskişehir	508,721	Nevşehir	-64,36686
Sakarya	402,6035	Aksaray	-84,18934
Aydın	398,5147	Trabzon	-86,61538
Çanakkale	376,1715	Ordu	-97,14201
Balıkesir	332,2130	Gaziantep	-104,0473
Yalova	219,7810	Bingöl	-123,3609
Bolu	153,9053	Samsun	-125,7100
Kayseri	147,8224	Kütahya	-129,6508
Düzce	140,9053	Ardahan	-135,6627
Kırklareli	120,7041	Batman	-143,4378
Denizli	117,8224	Niğde	-144,0591
Karabük	76,66272	Konya	-144,1065
Bilecik	63,52662	Iğdır	-151,591
Manisa	59,5147	Malatya	-162,3491
Sinop	58,32544	Elazığ	-164,5384
Giresun	50,86390	Kırıkkale	-174,2071
Kastamonu	49,57988	Afyonkarahisar	-210,6982
Edirne	49,14792	Şırnak	-232,3491
Isparta	45,86390	Hakkari	-252,1005
Burdur	43,56804	Siirt	-308,6213
Çankırı	34,55029	Sivas	-324,5029
Bartın	27,62721	Tokat	-347,1420
Uşak	18,79881	Bitlis	-373,7633
Erzincan	16,34319	Çorum	-387,8934
Bayburt	5,402366	Zonguldak	-398,9940
Tunceli	3,426035	Kahramanmaraş	-410,3195
Gümüşhane	0,520710	Adıyaman	-446,1005
		Hatay	-468,2189
		Kars	-474,3491
		Yozgat	-572,6213

		Mardin	-595,1656
		Muş	-659,9881
		Adana	-747,9526
		Erzurum	-819,5976
		Diyarbakır	-920,739
		Şanlıurfa	-950,5088
		Ağrı	-1029,183
		Van	-1123,946

Table 1: Provincial Net Internal Migration Arithmetic Averages in Turkey, 2008–2020
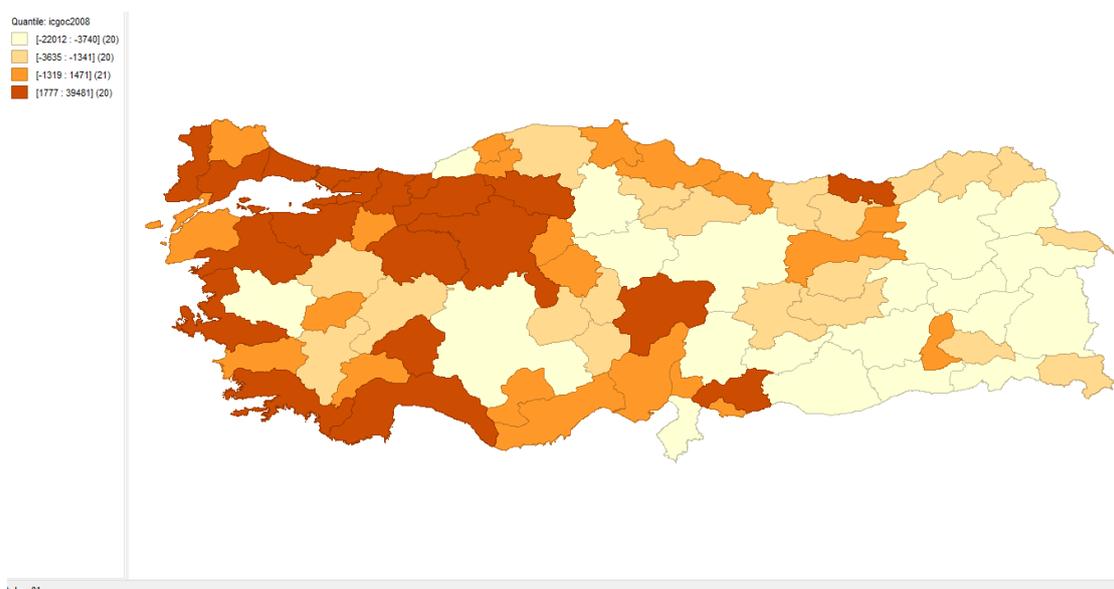
Source: Prepared using data from the Turkish Statistical Institute (TurkStat).

The net internal migration patterns observed across Turkish provinces during the 2008–2020 period reveal a markedly heterogeneous structure shaped by the diverse socio-economic characteristics, demographic profiles, and spatial positions of the regions. As shown in Table 1, metropolitan provinces predominantly exhibit positive net internal migration over the study period. This outcome is closely associated with their relatively advanced labor markets, diversified production structures, and more developed education and health infrastructures, all of which enhance their overall attractiveness. Among these provinces, Istanbul stands out as both the largest origin and destination of internal migration flows, functioning as the core of nationwide population movements. Nevertheless, Istanbul's initially positive net migration position—maintained until 2013—shifted into a pronounced net outflow after 2015. Rising living costs, mounting pressures in the housing market, population density, and the increasing strain on urban infrastructure are key factors underlying this reversal.

In contrast, provinces with weaker economic structures and predominantly rural characteristics consistently record negative net internal migration, underscoring the decisive role of regional development disparities. Limited employment opportunities, relatively low wage levels, and constrained access to social services drive population outflows from these regions toward major metropolitan centers. While metropolitan provinces generally maintained positive net migration between 2008 and 2014, the post-2015 period marks a turning point, with certain large cities—most notably Istanbul—experiencing substantial net migration losses. Provinces such as Kocaeli and Bursa, where manufacturing activity is concentrated, as well as Sakarya, which functions as a regional center for services and trade, report positive net internal migration in most years. These patterns highlight the influence of economic activity and industrial

specialization in shaping migration decisions. Similarly, the positive net migration rates observed in provinces like Mersin and Şanlıurfa point to the role of local economic dynamism and relatively affordable living conditions. Conversely, many provinces in Eastern and Southeastern Anatolia (including Diyarbakır, Van, Ağrı, and Muş) experience persistently negative net migration, illustrating how regional inequalities are continuously reproduced through migration flows.

Overall, the internal migration patterns observed between 2008 and 2020 demonstrate that economic opportunities, cost-of-living dynamics, demographic structures, and the level of regional development jointly shape migration flows across Turkey. The fact that metropolitan provinces simultaneously attract and, in certain periods, lose population illustrates the multidimensional and dynamic nature of internal migration in the country. Persistent outmigration from rural and less developed areas further signals a deepening risk of regional inequality, while population pressures in major urban centers impose substantial demands on urban infrastructure and social services. In this context, a detailed examination of internal migration dynamics is crucial for informing regional development strategies and policy design in Turkey. To provide a clearer visualization of the spatial distribution of internal migration, the study presents a set of maps illustrating the provincial patterns for the period 2008–2020 as well as the rate of change in net internal migration across the same interval.

Map 1: Spatial Distribution of Internal Migration Across Provinces in Turkey (2008)
Source: Prepared using data from the Turkish Statistical Institute (TurkStat).

Map 1 presents the spatial distribution of net internal migration across Turkish provinces in 2008, constructed using data from the Turkish Statistical Institute and visualized in GeoDa. Provinces are classified into four categories based on their net internal migration levels. Those displayed in the darkest shade represent provinces with the highest positive net migration, predominantly concentrated along the Marmara, Aegean, and Mediterranean coastal corridors. Provinces depicted in the second-darkest shade also exhibit positive net migration, albeit at a lower magnitude, and are largely situated in selected subregions of the Black Sea and Mediterranean regions. The third shade corresponds to provinces experiencing negative net migration, indicating areas of population outflow; these provinces cluster primarily in the interior sections of the Black Sea Region and in parts of Central Anatolia. Provinces shaded in the lightest tone represent areas experiencing the most severe levels of negative net migration, located mainly in the eastern portions of Central Anatolia as well as across Eastern and Southeastern Anatolia. Overall, the spatial configuration displayed in Map 1 underscores the extent to which internal migration in Turkey is shaped by regional disparities in economic opportunities, living conditions, and socio-economic development.
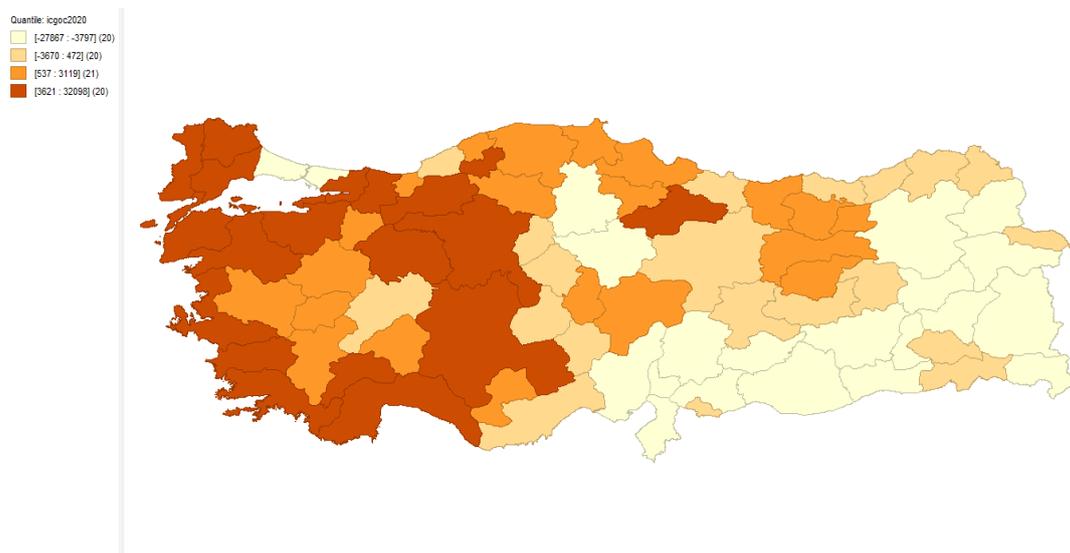
Map 2: Spatial Distribution of Internal Migration Across Provinces in Turkey (2020)
Source: Prepared using data from the Turkish Statistical Institute (TurkStat).

Map 2 illustrates the spatial distribution of net internal migration in 2020, based on Turkish Statistical Institute data and generated through spatial classification procedures in GeoDa. As in Map 1, provinces are grouped into four categories. The darkest shade again represents provinces with the highest levels of positive net migration, concentrated largely in the

Marmara, Aegean, and Mediterranean regions. The second-darkest category includes provinces with moderate but still positive net migration levels, primarily located in specific segments of the Black Sea and Aegean regions. The third shade reflects provinces where low levels of positive net migration coexist with emerging negative values in certain cases, and these provinces cluster mainly in Central Anatolia and parts of the Eastern Black Sea Region. The lightest shade identifies provinces with the highest levels of negative net migration, which are overwhelmingly concentrated in Eastern and Southeastern Anatolia. Taken together, the spatial patterns observed for 2020 reveal a pronounced clustering of migration dynamics, signaling persistent and spatially structured regional disparities.
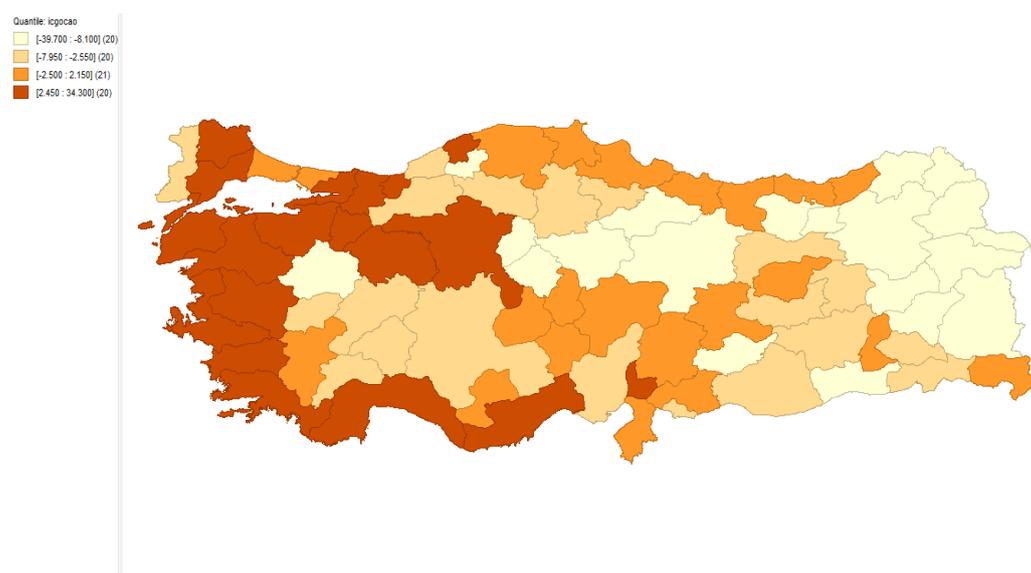

Map 3: Spatial Distribution of Internal Migration Across Provinces in Turkey (Arithmetic Averages)

Source: Prepared using data from the Turkish Statistical Institute (TurkStat).

Map 3 presents the arithmetic average of net internal migration for the period 2008–2020, constructed using Turkish Statistical Institute data and processed in GeoDa. The map classifies provinces into four categories based on their long-term average migration values. Provinces shown in the darkest shade correspond to areas with persistently high positive net migration, which are predominantly located in the western part of the country, particularly across the Marmara, Aegean, and Mediterranean regions. The second-darkest category comprises provinces with moderate positive values or near-zero negative values, clustering mainly in parts of Central Anatolia and the Black Sea Region. The third shade represents provinces with substantial negative average net migration, concentrated largely in Central Anatolia. Finally,

provinces depicted in the lightest tone correspond to areas experiencing the most severe average negative net migration, heavily concentrated in Eastern and Southeastern Anatolia. The long-term spatial distribution documented in Map 3 highlights the stability and persistence of regional migration disparities, confirming the presence of a strong spatial clustering pattern in internal migration throughout the 2008–2020 period.

3. LİTERATURE REVİEW

Two elements are particularly central in economics. In the context of economic analysis, rationality has two key dimensions. First, applicable to both non-strategic and strategic reasoning, rational behaviour involves the ability to give up short-term benefits in favour of longer-term outcomes. Second, as the defining feature of strategic rationality, individuals choose their courses of action based on their preferences and their expectations regarding the behaviour of others (Agarwal, 2025). Within this framework, migration decisions can be understood as rational choices in which individuals weigh immediate costs against anticipated long-term gains, while also forming expectations about labour market conditions, social networks, and institutional responses in destination regions (Snidal, 2016; Murali and Muppidi, 2024: 6). Migration constitutes a multidimensional process that encompasses economic, social, cultural, and political components, positioning the phenomenon at the crossroads of several scholarly fields. As a result, the interaction between migration and economic performance has produced a broad and continually expanding literature, spanning varied historical contexts, regions, methodological designs, and forms of population movement. Although much of this research centers on the contribution of migration to economic growth, empirical outcomes differ substantially across studies due to variations in data quality, sample characteristics, migration types, and econometric methods. Even so, a considerable body of evidence indicates that migration promotes economic growth both directly—by expanding the labor force, increasing human capital, and improving productivity—and indirectly through demographic restructuring, technological dissemination, and gains in total factor productivity.

Foundational studies have laid the groundwork for understanding this relationship. Whyte (1972), analyzing European cases, highlights the productivity-enhancing effects of migrant labor, noting that even temporary movements can yield lasting benefits when they contribute to permanent settlement. Brezis and Krugman (1993), using panel data techniques, show that while migration may initially suppress real wages, productivity improvements lead to long-run wage growth. Incorporating human capital into an Augmented Solow–Swan model, Dolado,

Goria, and Ichino (1994) find that migration's growth effects depend on pre-existing human capital levels in OECD economies. Research inspired by the Walz–Lucas tradition likewise argues that skilled labor mobility accelerates capital formation and strengthens long-term growth paths.

Zlotnik (1998) underscores the increasing importance of international migration in shaping global economic outcomes after 1965. Examining macroeconomic drivers, Jennisen (2003) reports that higher per capita income increases net migration in Western Europe, whereas unemployment discourages it. Evidence from Mete (2004) indicates that migration raises Finland's GDP in the short run despite no long-run cointegration with growth. In China, Fang and Dewen (2007) demonstrate that internal migration played a central role in enhancing labor mobility and stimulating growth during the reform era. Orefice (2010) shows that while migration has limited short-term effects in OECD host countries, it entails human capital losses for sending economies. Studies by Boubtane, et al. (2013), Gonzalez-Gomez and Giraldez (2011), Cooray (2012), Salahuddin and Gow (2015), and Ekanayake and Moslares (2020) further document that migration and remittances support income growth, sustain labor markets, and reduce poverty. From a historical standpoint, Foldvari, Van Leeuwen, and Van Zanden (2013) examine the Netherlands during 1570–1800 and, using VAR methods, report a direct and positive influence of migration on per capita income. Investigating the determinants of migration flows, Ortega and Peri (2013) show that economic prospects are the primary driver of migration to high-income destinations. Incorporating migration into a Solow–Swan framework, Boubtane et al. (2014) find that skilled migrant inflows significantly strengthen economic growth. More recent studies reinforce these conclusions. Bove and Elia (2017) document a positive contribution of labor migration to GDP in advanced economies, whereas Furlaretto and Robstad (2019) show that immigration raises economic growth and lowers unemployment in Norway in the short run. Focusing on high-skilled mobility, Oliinyk (2021) identifies a strong positive association between high-skilled migration and economic growth across EU member states. Similarly, Sazzad and Pedi (2021) conclude that internal migration in India continues to support regional economic growth despite tendencies toward convergence. Among the latest contributions, Ananta et al. (2023) demonstrate that internal migration and ethnic diversity enhance Indonesia's economic performance under specific demographic and institutional settings. Wang (2023) finds that internal migration in China's autonomous regions contributes to growth by reducing poverty. For G7 economies, Akın et al. (2024) identify a one-way causal relationship running from economic growth to outward

migration. Kozlovskyi et al. (2024) confirm the positive developmental effects of migration for European economies, while Pan and Sun (2024) report that remittances accelerate structural transformation and improve social welfare.

A complementary body of work notes that migration may yield adverse outcomes under certain conditions. Lipton (1980) shows that rural–urban migration driven by income disparities increases both intra- and inter-regional inequalities. Amuedo-Dorantes and Pozo (2004) report that remittances transmitted through real exchange-rate appreciation harm competitiveness in Latin American and Caribbean economies. Chami, Fullenkamp, and Jahjah (2005) similarly find that, unlike foreign investment, remittance inflows correlate negatively with GDP. Morley (2006), employing an ARDL approach for Australia, Canada, and the United States, identifies a long-run causal link from income to migration, with no reverse effect. In Europe, Fratesi and Riggi (2007) argue that skill-selective migration may exacerbate income disparities, while Kim (2007) shows that remittances reduce labor-force participation in Jamaica. Additional evidence from Wouters and Taylor (2008), Coulombe and Tremblay (2009), Chletsos and Raoupakias (2012), Nyamongo et al. (2012), and Ager and Brückner (2013) further demonstrates that migration can influence agricultural activity, regional inequality, growth volatility, and cultural polarization in ways that may hinder long-run economic performance. In the South African context, Chamunorwa and Mlambo (2014) identify a positive linkage between migration rates and unemployment, while the effects of migration on other key macroeconomic indicators remain relatively modest. Katsushi et al. (2014), analyzing 24 Asia–Pacific economies, observe that although remittances contribute to economic expansion, instability in these inflows triggers fluctuations in output. Examining rural China, Wang (2014) finds that migration and remittances generate meaningful gains for middle- and upper-income households, yet their benefits for low-income groups are minimal. Likewise, Lim and Simmons (2015) show that in Caribbean economies remittances bolster long-run consumption patterns but do not translate into productivity improvements. Using panel cointegration methods for 17 OECD countries, Ogunleye (2016) reports a negative long-term association between per capita GDP and international labor migration, alongside evidence that unemployment discourages outward mobility. For Croatia, Borozan (2017) documents that internal migration adversely affects economic growth, while Stojanov et al. (2019) demonstrate that remittance instability undermines sustainable development in emerging economies. Islam (2021), studying Bangladesh, identifies a negative relationship between increases in migrant outflows and GDP, and concludes that remittance volatility weakens overall economic performance. More recent

studies reinforce these concerns. İslamoğlu and Çoban (2024), employing a Panel Granger causality model for 20 European economies over 2008–2021, find unilateral causality running from migration to economic growth, with no evidence of reverse causation. Sevinç (2024) further shows that rural–urban migration in Turkey produces significant declines in agricultural and livestock activity, thereby exerting a contractionary influence on aggregate output.

Çınar and Has (2024) Migration refers to the movement of individuals from one region to another, while the agriculture, industry, and services sectors constitute the core pillars of the Turkish economy. In the pursuit of catching up with developed economies, countries attach significant importance to the concepts of economic growth and development. Within this context, this study examines the regional impact of internal migration on economic growth in Türkiye. The analysis covers the period from 2008 to 2021 and focuses on NUTS-3 regions. Using Granger causality analysis, the study investigates the causal relationships between internal migration and economic growth at the provincial level. By employing the most up-to-date data and analyzing the growth effects of internal migration at the disaggregated regional level within a consistent empirical framework, the study makes a distinct contribution to the existing literature. The empirical findings reveal the existence of strong causal relationships at the 1% significance level running from internal migration, agriculture–forestry–fisheries, industry, and services sectors to economic growth. Akın, Dinçer, and Özdemir (2024) investigate the panel causality relationships among migration, economic growth, and carbon emissions in G-7 countries, revealing bidirectional causal linkages between migration and economic growth. Bujor (2025) analyzes the effects of net migration on economic growth, measured by GDP per capita, and employment in selected Eastern European countries, including Romania, Bulgaria, Poland, and Hungary, employing panel data techniques. The results suggest that net migration contributes positively to overall economic performance. Finally, Luz, Neves, Afonso, and Sochirca (2025) conduct a meta-analysis that systematically assesses the effects of immigration on key economic outcomes such as economic growth, productivity, unemployment, and innovation, highlighting the heterogeneous nature of migration's economic impacts across host countries. Çınar (2025) analyzes the impact of migration on economic growth and finds that direct and indirect effects differ, with the indirect effect being statistically significant. Taken together, this body of research highlights that the economic repercussions of migration are not uniform. Under certain structural, demographic, and institutional configurations, migration may generate unequal income effects, compress labor supply, reduce productivity, or heighten macroeconomic volatility—ultimately posing

risks to sustainable growth. Overall, findings suggest that migration can, under some conditions, exert contractionary effects on national or regional economies. Income disparities, remittance instability, labor-market frictions, and sectoral shifts are central mechanisms through which these adverse outcomes may emerge. Despite extensive inquiry, the literature has not reached a definitive consensus, as empirical results vary widely depending on methodological design, geographical and temporal coverage, and the specific migration indicators applied. Within this literature, commonly used indicators include in-migration, net migration, and remittance inflows. Evidence based on in-migration typically indicates that recipient economies benefit when they can attract and integrate highly skilled labor, which enhances human capital accumulation, strengthens labor-market outcomes, and stimulates aggregate demand. Studies employing net migration indicators report more mixed findings, shaped by institutional quality, demographic structure, and country-specific characteristics. Research centered on remittances generally demonstrates that they support growth by easing credit constraints and promoting consumption and investment, although volatility in these inflows can offset their positive effects. Studies identifying positive migration–growth linkages emphasize that rural–urban mobility expands the urban labor pool, raises household income, and reinforces consumption and investment channels, thereby stimulating public investment and strengthening overall economic performance. Conversely, negative findings stress that rapid population inflows may place pressure on social infrastructure, intensify unemployment and poverty, and deepen allocative imbalances. Accordingly, migration is understood not only as an economic process but also as a driver of regional disparities and socio-economic transformation. Against this backdrop, the present study examines the relationship between internal migration and economic growth across Turkey's NUTS-3 regions. The empirical model is grounded in the Augmented Solow–Swan framework developed by Dolado et al. (1994) and Augmented by Boubtane et al. (2014). To the best of our knowledge, this study represents the first application of this expanded growth model to evaluate the migration–growth nexus within Turkey's regional context, thereby offering a novel empirical contribution.

The analysis employs spatial panel econometric models to capture spatial dependence in both migration outcomes and economic performance. Integrating spatial methods is essential for identifying spillover effects, understanding localized dynamics, and guiding more effective regional development strategies. Assessing the economic consequences of internal migration from a spatial perspective thus provides policymakers with a more nuanced basis for regional

planning, resource allocation, and the design of inclusive development frameworks attuned to Turkey's geographic realities.

4. DATA, MODEL AND METHOD

This study investigates the relationship between internal migration and economic growth across NUTS-3 regions in the Turkish economy. The empirical analysis is conducted at the provincial level, covering all 81 provinces of Turkey. While provincial gross domestic product (GDP) serves as the dependent variable, the explanatory variables include net migration (in-migration minus out-migration), technological capacity indicators, measures of human capital, and physical capital variables. Provincial GDP and public investment figures are first deflated to obtain real values; subsequently, GDP, net migration, and real public investment are normalized by population to derive per capita measures, which are used in the econometric analysis. This approach is adopted to more accurately capture regional disparities. The analytical framework is grounded in the Augmented Solow–Swan growth model. Building on the classical economic growth formulation proposed by Mankiw et al. (1992), the model integrates internal migration as an additional factor to assess the spatial implications of migration for Turkey's economic growth. Definitions, descriptions, and data sources of all variables employed in the analysis are presented in Table 2.

Variables	Abbreviation	Description	Source
GDP	lngdp	Provincial Gross Domestic Product (USD)	TURKSTAT
Net Migration	lnmig	Provincial Net Migration	TURKSTAT
Technology	lntech	Number of Registered Patents by Province	TPE
Human Capital	lnhc	Number of Postgraduate Graduates by Provinces	YOK
Physical Capital	lninv	Provincial Public Investments	SBB
Labour	lnpop	Provincial Population	TURKSTAT

Table 2: Descriptions of Variables Used in the Analysis

TURKSTAT: Turkish Statistical Institute

TPE: Turkish Patent Institute

YOK: Council of Higher Education

SBB: Presidency of Strategy and Budget

Mankiw et al. (1992) extend the classical Solow–Swan growth framework by incorporating human capital into the production process, thereby providing a more comprehensive perspective on the determinants of economic growth. While the traditional model explains growth primarily through physical capital accumulation, labor expansion, and technological progress, it falls short of fully accounting for cross-country and long-run growth differentials. The Augmented approach addresses this limitation by treating human capital—particularly education, skills, and accumulated knowledge—as a fundamental component of production, enabling a more refined analysis of growth dynamics. In this framework, the production function is expressed with the parameters α and β, which capture the output elasticities of physical and human capital, respectively:

$$Y(t) = K(t)^{\alpha} H(t)^{\beta} [A(t)L(t)]^{1-\alpha-\beta} \qquad (1)$$

where

Y(t) denotes total output,

K(t) physical capital,

H(t) human capital,

L(t) labor, and

A(t) the level of technological progress.

The Augmented model examines the influence of physical capital accumulation (s_k), investment in human capital (s_h), and population growth (n) on long-run steady-state growth. By explicitly incorporating education, knowledge, and skills into the growth mechanism, it offers a stronger explanatory framework for income differentials across countries and regions, positioning human capital as a central determinant of economic growth potential. Consequently, the model provides policymakers with a robust analytical basis for evaluating how investments in education, health, and innovation shape long-term growth trajectories.

In the empirical application focusing on Turkey, the study analyzes the economic effects of internal migration for 81 provinces over the period 2008–2020. The findings reveal that internal migration exhibits a clustered spatial pattern across provinces, suggesting the presence of spatially sequential dependence driven by neighborhood effects. Such clustering raises the expectation of potential spillover effects across regions. When spatial dependence is inherent in the variables under study, ignoring this structure may undermine the reliability of econometric estimates. Even if OLS estimators remain unbiased and consistent, they lose efficiency in the presence of spatial dependence (Anselin, 1998).

Accordingly, spatial econometric techniques offer a suitable methodological framework for examining how economic, demographic, and social conditions in a given region might influence outcomes in geographically proximate regions. These methods provide substantial advantages for identifying regional heterogeneity, capturing the unique dynamics of each province, and assessing regional policy implications more accurately. While classical cross-sectional models assume independence across observations, spatial models allow for direct and indirect interactions between variables (LeSage & Pace, 2009).

Spatial econometric models distinguish among three main types of interactions: endogenous dependence in the dependent variable, exogenous interactions among explanatory variables, and spatial correlation in the error terms. The core models of spatial econometrics are the Spatial Autoregressive (SAR) model and the Spatial Error Model (SEM). The SAR model—often referred to as the spatial lag model—captures endogenous interaction effects, whereas the SEM model focuses on spatial dependence embedded in the error term (Elhorst, 2014). A more general specification that incorporates both endogenous interaction effects and spatially correlated errors is the Spatial Durbin Model (SDM), as defined by Anselin (1998).

The Spatial Durbin Model (SDM) is specified as follows:

$$y = \rho W y + \alpha \iota_n + X\beta + WX\theta + \varepsilon \qquad (2)$$
$$\varepsilon = \lambda W \varepsilon + u \qquad (3)$$

Within the spatial econometric framework, the SDM is regarded as one of the most general model formulations. In this specification, the parameter λ captures the spatial autoregressive process in the error term, ρ represents the endogenous spatial lag coefficient, and α denotes the intercept term. When the number of explanatory variables is K, W refers to the $n \times n$ spatial weight matrix, y is an $n \times 1$ vector of the dependent variable, and X is an $n \times K$ matrix of explanatory variables. The parameter vectors β and θ are $K \times 1$ vectors of coefficients. The term Wy represents the spatial lag of the dependent variable, while WX denotes the spatially lagged explanatory variables.

When $\theta = 0$ and $\lambda = 0$, the model reduces to the Spatial Autoregressive (SAR) model, also referred to as the spatial lag model, in which spatial dependence arises solely through the endogenous lag of the dependent variable and no spatial lags of the regressors are included. Solving for y yields the SAR representation:

$$y = (I - \rho W)^{-1} X\beta + (I - \rho W)^{-1} \varepsilon \qquad (4)$$

If $\rho = 0$, the model collapses into the Spatial Error Model (SEM) as described in Anselin (1988):

$$y = X\beta + (I - \lambda W)^{-1}u \qquad (5)$$

Introducing the time dimension, denoted by subscript t, transforms these models into panel-data spatial specifications. In the presence of spatial dependence, coefficients obtained from SAR or SDM models cannot be interpreted in the same manner as conventional panel regression estimates. The reason is that structural changes occurring in one region may influence not only its own outcome but also the outcomes of geographically connected neighboring regions through spatial spillovers. This interdependence is embedded in the models via endogenous spatial lags (ρWy) and the spatial lags of explanatory variables (WX) (LeSage and Pace, 2009: 33–36).

Hence, evaluating SAR and SDM results requires more than inspecting structural parameter estimates; it necessitates decomposing the marginal effects implied by these parameters. Marginal effects are typically categorized into direct, indirect (spillover), and total effects. The direct effects measure the impact of a one-unit change in an explanatory variable within a given region on the dependent variable of the same region. The indirect or spillover effects capture how changes occurring in neighboring regions influence outcomes in the region under consideration. The total effects, obtained by summing the direct and indirect components, represent the overall or global influence of the variable of interest (Elhorst, 2014: 17–19).

Accordingly, the decomposition and reporting of marginal effects constitute an essential requirement for deriving economically meaningful, consistent, and comprehensive interpretations of spatial interaction mechanisms within SAR and SDM frameworks.

5. FINDINGS AND EVALUATION OF FINDINGS

The study also reports the results obtained using the Ordinary Least Squares (OLS) estimator. OLS serves as a fundamental benchmark owing to its desirable properties of being the best, linear, and unbiased estimator under the classical assumptions. Although OLS findings are presented, the presence of spatial dependence in Turkey's internal migration data necessitates giving primary emphasis to the panel spatial models that explicitly account for spatial interactions. Because spatial dependence limits the interpretive validity of conventional OLS results, the OLS estimates are provided merely for reference purposes. The non-spatial OLS results are presented in Table 2.

Variables	OLS Coef.	OLS Prob.	FE Coef.	FE Prob.	RE Coef.	RE Prob.
lnmig	-3.286	(0.55)	1.738	(0.40)	1.539	(0.47)
lntech	-0.113**	(0.05)	0.075***	(0.00)	0.066**	(0.01)
lnhc	0.102	(0.80)	1.557***	(0.00)	1.458***	(0.00)
lninv	0.050	(0.86)	0.034***	(0.00)	0.035***	(0.00)

Table 3: Results of Ordinary Least Squares, Fixed Effects, and Random Effects Models

Source: Author's own construction

*Note: *** shows significance at the 1% level, ** at the 5% level, and * at the 10% level.*

Statistic	Degrees of Freedom	Probability (p-value)
Chi-square	4	146.22836 (0.00)

Table 4: Hausman Test (Not Spatial)

Source: Author's own construction

Following the OLS estimations, the Hausman test was conducted to determine whether the fixed-effects or random-effects specification is more appropriate for the panel structure of the data. The resulting p-value indicates that the fixed-effects model should be preferred over the random-effects alternative. Accordingly, the analysis concludes that the fixed-effects specification yields more consistent and reliable estimates for examining the relationship between internal migration and economic growth.

However, given that internal migration flows in Turkey exhibit a notable degree of spatial clustering, incorporating spatial dependence and spatial interactions into the econometric framework is essential for obtaining valid inference. To assess the presence of spatial effects in the migration variable, a set of Spatial Dependence Tests—including the LM Lag, LM Error, and Robust LM statistics—was applied. The results of these tests, detailed in Table 4, indicate statistically significant spatial dependence in the internal migration data. This finding suggests that traditional panel data models may fail to fully capture the inherently spatial structure of migration dynamics, thereby underscoring the analytical necessity of employing spatial econometric models.

Test	Value	Prob. (p)
LMlag	30.55	0.00
LMerr	45.82	0.00
Likelihood Ratio (LR)	36 (Calculated)	7.815 (Chi-Square)

Table 5: Results of Spatial Dependence Tests

Source: Author's own construction

After establishing the presence of spatial dependence, the Hausman test was reapplied to determine whether the fixed-effects or random-effects specification is more appropriate within the spatial modeling framework. The test results indicate that, even after incorporating spatial components into the model, the fixed-effects structure remains the preferred specification. This finding implies that the relationship between internal migration and economic growth at the provincial level is influenced by unobserved, time-invariant regional characteristics. Controlling for such heterogeneity is therefore essential for ensuring the reliability and consistency of the estimated coefficients.

To further identify the most appropriate spatial model specification, a Likelihood Ratio (LR) test was conducted. This test enables a comparison between a relatively parsimonious model and a more comprehensive alternative. In this context, the Spatial Autoregressive Model (SAR) was treated as the simpler specification, whereas the Spatial Durbin Model (SDM) was considered the more general form. The LR test is computed as follows:

$$LR = -2 \times (LL_1 - LL_2)$$

where LL_1 denotes the log-likelihood value of the SAR model and LL_2 represents the log-likelihood of the SDM. The LR statistic was calculated as 36, with 4 degrees of freedom reflecting the four additional parameters included in the SDM relative to the SAR model. Using the chi-square critical value of 7.815 at the 5% significance level, the null hypothesis—*H₀: "The simpler model (SAR) is sufficient"*—is rejected, since the LR statistic substantially exceeds the critical threshold. Accordingly, the results support the adoption of the more comprehensive Spatial Durbin Model.

Taken together, these empirical findings demonstrate that internal migration exhibits a strongly spatially dependent structure, that significant spatial interactions exist across provinces, and that these interactions manifest through complex spatial mechanisms. For these reasons, both

theoretical considerations and statistical diagnostics point to the Spatial Durbin Model with fixed effects (SDM-FE) as the most appropriate specification for the empirical analysis.

$$\ln gdp_{it} = \alpha_i + \rho(W \cdot \log gdp_{it}) + \beta_1 \cdot \ln(tech_{it}) + \beta_2 \cdot \ln(hc_{it}) + \beta_3 \cdot \ln(inv_{it}) + \beta_4 \cdot goc_{it} + \theta_1(W \cdot \ln(tech_{it})) + \theta_2(W \cdot \ln(hc_{it})) + \theta_3(W \cdot \ln(inv_{it})) + \theta_4(W \cdot goc_{it}) + \varepsilon_{it} t_i$$

$= 1 \ldots\ldots\ldots N$	$N = 81$ (represents the cross-sectional dimension)
$t = 13$ (represents the time dimension)	$\varepsilon_{it} \sim N(0, \sigma^2 I)$

The variables and parameters included in the spatial panel specification are defined below within an academic framework:

In this specification, $\ln gdp\_it$ denotes the natural logarithm of real per capita GDP in province *i* at time *t*, serving as the dependent variable and the primary measure of provincial economic performance. The term α_i captures province-specific fixed effects, controlling for unobserved and time-invariant regional characteristics—such as geography, climatic conditions, and natural resource endowments—that may systematically shape growth trajectories. The parameter ρ represents the spatial autoregressive coefficient, indicating the degree to which the economic outcomes of adjacent provinces, reflected in $W \cdot \ln gdp\_it$, influence the growth of province *i*. A statistically significant ρ signals the presence of spatial spillover effects.

The expression $W \cdot \ln gdp\_it$ refers to the spatial lag of the dependent variable, constructed as the weighted average of neighboring provinces' income levels according to the spatial weight matrix *W*. Explanatory variables include $\ln tech\_it$, measuring provincial technological capacity; $\ln hc\_it$, capturing human capital through indicators such as higher-education graduates; and $\ln inv\_it$, reflecting real public investment. $migration\_it$ denotes net internal migration on a per-capita basis and is retained in its non-logarithmic form.

Spatially lagged covariates, $W \cdot X\_it$, are included to identify spillover mechanisms originating from neighboring provinces. The associated coefficients, θ_j, quantify these indirect effects and enable the decomposition of total impacts within the SDM framework. Finally, ε_it represents the idiosyncratic error term, assumed to exhibit zero mean and constant variance.

The spatial weight matrix *W* is constructed using the rook contiguity criterion, based on geographic adjacency among Turkey's provinces. Accordingly, in the 81×81 matrix, each

province is assigned a connection only with those provinces with which it shares a direct border.

Additional model-specific definitions are as follows:

p denotes the spatial autocorrelation coefficient, which serves as a key parameter in assessing the direction and magnitude of spatial dependence within the model.
i represents the cross-sectional dimension and corresponds to the 81 provinces of Turkey.
t indicates the time dimension.

Since the dataset covers the period 2008–2020, the panel spans a total of 13 years. Accordingly, the balanced panel consists of 1,053 observations derived from 81 provinces over 13 years.

Variables	SEM Coefficient (Prob.)	SAR Direct	SAR Indirect	SAR Total	SDM Direct	SDM Indirect	SDM Total
lnmig	-0.49 (0.70)	-0.07 (0.95)	0.006 (0.99)	-0.06 (0.97)	-1.41 (0.33)	9.23 (0.01)**	7.81 (0.03)**
lntech	0.07 (0.00)	0.06 (0.02)	0.05 (0.09)	0.12 (0.04)	0.05 (0.05)*	-0.01 (0.81)	0.03 (0.73)
lninv	0.04 (0.07)	0.04 (0.00)	0.57 (0.00)	1.31 (0.00)	-0.05 (0.79)	1.67 (0.00)***	1.62 (0.00)***
lnhc	1.14 (0.00)	0.74 (0.00)	0.57 (0.00)	1.31 (0.00)	-0.05 (0.79)	1.68 (0.00)***	1.62 (0.00)***

Hausman: chi2(5) = 0.0004   Prob>=chi2 = 0.00***

Spatial Rho: 0.429 (0.00)

JB Test 72.6 Chi (2) 1.7e-16

Table 4: Results of the Spatial Effects of Internal Migration on Economic Growth in Turkey
*Note: Significance levels: *** 1%, ** 5%, * 10%.*
*Note: *** significance at the 1% level; ** significance at the 5% level; * significance at the 10% level.*
ME: Marginal Effects; SEM: Spatial Error Model; SDM: Spatial Durbin Model; SAR: Spatial Autoregressive Model.

The fixed-effects estimates of the Spatial Durbin Model (SDM) reported in Table 7 reveal that the impacts of internal migration, human capital, and public investment on provincial economic growth in Turkey exhibit pronounced spatial heterogeneity. The direct effect of internal migration is –1.418 and statistically insignificant at the 10% level, whereas the indirect effect is estimated at 9.235 and is significant at the 1% level. The resulting total effect of 7.816 is significant at the 5% level, indicating that although migration does not generate a direct growth-enhancing effect within provinces, it exerts a substantial positive influence through spillovers originating from neighboring regions. These results suggest that internal migration produces considerable positive externalities across the regional landscape. For the technology variable (lntech), the estimated direct effect of 0.052, indirect effect of –0.019, and total effect of 0.033 all remain statistically insignificant, implying that the technological capacity measures employed offer limited explanatory power for provincial growth within the prevailing spatial interaction structure. Regarding human capital (lnhc), the direct effect is –0.058 and statistically insignificant, yet the indirect effect is 1.687 and the total effect 1.628, both significant at the 1% level. This pattern indicates that human capital contributes to economic performance primarily through interregional diffusion rather than through direct provincial-level effects.

Public investment (lninv) yields a direct effect of 0.036, an indirect effect of –0.066, and a total effect of –0.029, none of which reach statistical significance, suggesting no measurable influence on economic growth in the spatial framework considered. The spatial autoregressive parameter (ρ), estimated at 0.429 and significant at the 1% level, confirms strong positive spatial dependence in economic activity across provinces. Taken together, the SDM findings underscore that economic growth in Turkey is shaped not only by internal migration, human capital, and technology but also by the spatial interconnections that transmit growth impulses across regions. Building on the contributions of Evcim and Yeşilyurt (2023) and Chen (2025), the literature underscores the pivotal importance of spatial interdependence in shaping both economic growth and migration processes. Evcim and Yeşilyurt (2023) revisit the enduring problem of explaining the Solow residual by adopting spatial econometric growth frameworks for the founding OECD economies over the 1996–2019 period. Through the comparison of alternative spatial weight matrices, they show that incorporating spatial structure improves the robustness of parameter estimates and uncovers meaningful cross-country linkages. Their results indicate that technological progress exerts a statistically significant and positive direct effect on output, while its indirect (spillover) effect remains insignificant. A comparable pattern

is observed for investment growth, which positively affects growth only through direct channels. In contrast, human capital accumulation displays consistently positive and significant effects in both direct and indirect dimensions. From a different but complementary perspective, Chen (2025) treats migration as an intrinsically spatial phenomenon and re-examines classical push–pull mechanisms within the broader cumulative causation framework by employing spatial panel data techniques. Concentrating on subregional and fine-grained geographic units across the European Union, the study enriches standard socioeconomic measures with satellite-based nighttime light indicators to proxy local economic activity more accurately. Estimates from fixed-effects spatial panel models point to strong and statistically significant spillover effects: migration flows themselves generate pronounced spatial externalities, while employment opportunities in adjacent regions constitute the most influential pull factor in both the short and long run. Moreover, contrary to conventional theoretical expectations, population density at the local level is found to be negatively associated with net migration. Considered jointly, these studies reveal that indirect spatial effects may be substantial, though their relevance and intensity differ across variables and empirical settings. By demonstrating that direct and indirect impacts frequently diverge, both contributions highlight the methodological necessity of explicitly accounting for spatial dependence. Ignoring such interactions risks producing incomplete or biased conclusions, thereby reaffirming the fundamental role of spatial effects in empirical analyses of economic growth and migration dynamics. In spatial econometric models, the direct effect refers to the marginal impact of a change in an explanatory variable within a given region (or country) on that same region's dependent variable. In contrast, the indirect effect captures the influence of an increase in the explanatory variable that is transmitted to other regions through neighboring units, reflecting cross-regional spillover mechanisms. This conceptual distinction was first systematically grounded by Anselin (1988) within the theoretical framework of spatial autocorrelation and spatial feedback processes. LeSage and Pace (2009) demonstrate that, in spatial lag–type models, estimated coefficients cannot be interpreted as simple marginal effects. This is because a shock originating in one region propagates to other regions through the spatial weights matrix and subsequently feeds back to the originating region. Consequently, they argue that empirical interpretations that do not explicitly decompose total impacts into direct and indirect components are inherently incomplete and potentially misleading.

6. RESULTS AND POLİCY RECOMMENDATİONS

Migration has historically evolved as a multidimensional phenomenon shaped by shifting economic, social, and demographic forces, and its contemporary manifestations continue to influence development trajectories in complex ways. Beyond the physical relocation of individuals, migration constitutes a transformative process that reconfigures regional labor markets, alters the distribution of human capital, and reshapes patterns of demand for public services. As such, internal migration has become a central concern in development debates, interacting with economic growth through both direct causal pathways and mutually reinforcing feedback mechanisms.

The economic implications of migration are not uniform; rather, they vary across contexts and depend on regional characteristics, institutional capacities, and the nature of labor market adjustments triggered by population mobility. While the movement of skilled workers may enhance productivity, promote innovation, and strengthen agglomeration economies, unmanaged population flows can strain infrastructure, exacerbate mismatches in labor supply and demand, and weaken social cohesion. Empirical evidence in the broader literature suggests that migration's effects operate through a set of channels involving human capital redistribution, consumption dynamics, labor reallocation, and structural changes in regional production systems. These channels are particularly salient in developing economies, where internal migration often represents both a response to and a determinant of regional inequality.

In Turkey, where regional disparities in economic performance are longstanding and pronounced, internal migration plays a decisive role in shaping spatial development patterns. The implications of migration extend beyond the provinces that attract or lose population, influencing neighboring areas through spillover mechanisms embedded in regional production networks and interprovincial labor mobility. This study examines these dynamics by analyzing the spatial effects of internal migration on economic growth at the NUTS-3 level during the 2008–2020 period. By explicitly distinguishing between the direct effects on migrant-receiving provinces and the indirect effects transmitted to neighboring regions, the study situates migration within a broader spatial-economic framework.

Drawing on a balanced panel of 81 provinces, the empirical analysis employs the Spatial Durbin Model (SDM) under a fixed-effects specification. Net internal migration per capita serves as the key explanatory variable, while real GDP per capita represents economic

performance. Measures of human capital, technological capacity, physical capital accumulation, and labor force characteristics are integrated as controls. Spatial interactions are modeled through a contiguity-based spatial weight matrix, allowing the estimation to capture both local effects and cross-border externalities.

The results reveal substantial spatial dependence in Turkey's provincial growth patterns. Although the direct effect of internal migration is negative and statistically insignificant—consistent with short-term adjustment pressures faced by migrant-receiving provinces—the indirect and total effects are positive and statistically robust. These findings indicate that internal migration generates beneficial spatial diffusion effects, enhancing productivity and growth in neighboring provinces through labor mobility, knowledge flows, and regional linkages. This pattern echoes insights from New Economic Geography, which emphasizes the role of spatial interaction mechanisms in strengthening regional economic performance.

Human capital displays a similar structure: while its direct effect on growth is insignificant, its indirect and total effects are positive and significant. This suggests that the movement and interaction of skilled individuals generate knowledge spillovers that extend beyond local boundaries. In contrast, technological capacity exhibits a strong and significant direct effect, but minimal spillovers, implying that innovation outcomes remain geographically concentrated and that technological knowledge diffusion remains spatially constrained. Public investment displays neither significant direct nor indirect effects, underscoring long-standing concerns that resource allocation is insufficiently aligned with regional needs and spatial efficiency principles.

Taken together, the empirical evidence suggests that economic growth in Turkey is shaped not only by local conditions but also by the spatial structure of regional interactions. Internal migration and human capital contribute to growth through network effects and spillovers, while deficiencies in the spatial diffusion of public investment and technology weaken regional development outcomes. These findings highlight the need to reconfigure regional development policies around principles of spatial targeting, place-based capacities, and enhanced knowledge and labor mobility.

The broader policy implications stemming from these findings stress the importance of mitigating the short-term adjustment costs associated with migration while reinforcing its positive externalities. This requires the adoption of place-based development strategies aimed

at strengthening endogenous regional capacities. Key priorities include improving the responsiveness of public investment allocations to local needs, enhancing vocational training systems, supporting rural economic activities, expanding transport networks, and encouraging local entrepreneurship. Effective implementation demands coordinated action among central government institutions, local authorities, the private sector, and civil society.

Addressing socio-economic vulnerabilities in migration-affected regions further requires building crisis-response mechanisms, reinforcing social protection systems, and supporting restructuring strategies that help local economies adapt to population shifts. Policies that expand employment opportunities through innovation hubs, public-private partnerships, and local enterprise development can enhance regional resilience. Complementary measures include investing in digital infrastructure, strengthening local development funds, and promoting green transformation initiatives. The diffusion of renewable energy technologies, digitalization practices, and environmentally sustainable production methods can both reduce regional disparities and support broader structural transformation.

Although the study's temporal scope is limited to the 2008–2020 period due to data constraints, expanding the empirical framework with more recent and comprehensive data would enhance the robustness of policy inferences. Nonetheless, the findings underscore a central conclusion: internal migration generates limited direct effects but substantial positive indirect effects on economic growth, indicating that spatial spillovers are integral to the functioning of regional economies. When supported by well-designed policies, migration represents not merely a demographic process but a potential engine for balanced and sustainable regional development in Turkey.

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REGULATING MARKET POWER: AN EMPIRICAL AND LEGAL ANALYSIS OF ANTI-COMPETITIVE PRACTICES IN INDIA'S PHARMACEUTICAL SECTOR

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ABSTRACT

At the very junction of public health lies the pharmaceutical sector. It is essential to examine the effects of regulations and market structure in line with competition law aspects. Therefore, this study aims to look into the extent and impact of the pharmaceutical sector practices and trends onto the consumers especially at a retail level in the Bengaluru region. How local market dynamics and regulatory weakness have led to price distortion and reduced access to medicine which overall harms an innocent and uninformed consumer. Using a mixed and interactive approach of combining empirically accessed and doctrinally analysed data to assess the impact on consumers. This study draws its conclusions from a structured survey of pharmacies and consumers, including 15 outlets and 35 consumers. The Competition Act of 2002 and the DPCO of 1995 along with landmark cases like Novartis AG v Union of India (2013) have been relied on. Additionally, reliance has been placed on India's situation within the global discussion on pharmaceutical competition policy. The studies have revealed brand favoritism, entry barriers, and limiting of consumer choices. Significant gaps in the legal framework have been strawed out and inclusion of stronger enforcement measures by CCI is recommended for transparency.

Keywords: *Competition Commission of India (CCI) Pharmaceuticals, Market regulation, Consumer behavior, Anti-competitive practices.*

JEL Codes: K21 (Antitrust Law), I18 (Health: Government Policy), L65 (Pharmaceutical Industry)

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1. RESEARCH METHODOLOGY

This present research is conducted with the help of *empirically* analyzed results and insights along with a *doctrinal* analysis of latest legal developments in the pharmaceutical sector. Using a mixed method approach the study combines empirical data from a structured survey of pharmacies and consumers (n=15 outlets, n=35 consumers) with doctrinal and comparative legal analysis of key statutes (e.g., the Competition Act, 2002; DPCO, 1995) and landmark cases, such as (Novartis AG v Union of India, 2013). The sample collection method is *Non- Probability – Convenient sampling*. The sample size is small in case of outlets i.e. 15 as the study is confined to a particular area of Bengaluru city. Thus, the sample is not the representative of the population, so the results cannot be generalized. Also, Convenience samples are at risk for sample bias and selection bias. Though the sample size of Consumes i.e. 30 is as per the Central Limit Theorem (CLT).

Limitation of the Study: This study is limited on account of the fact that the inferences are based on a small sample size (n=15 and n=30). Based on this sample the empirical findings are exploratory and cannot be generalised to the entire Bengaluru market or India. This leaves a scope of further research into the ambit of the wide consumer and supplier base of the pharmaceutical sector.

2. LITERATURE REVIEW

The first paper that has been used to analyse the present study is *"Implications of Competitive Pricing on the Indian Pharmaceutical Industry"* authored by Datta & Kaushal (2025) and published in the *International Journal of Advanced Legal Research*. This paper examines the interaction between competition law and pricing mechanisms within the Indian pharmaceutical market, with particular emphasis on the role of the Competition Act, 2002. The authors analyse how competition law functions as a regulatory tool to ensure fair pricing and ethical market conduct in an industry that directly impacts public health. The study highlights that despite the presence of multiple market players, pricing irregularities persist due to practices such as excessive pricing and lack of effective competition at the consumer level. The legal themes explored in this paper such as competitive pricing and consumer protection, are directly relevant to the overall theme of the present research, as they demonstrate how competition law is instrumental in safeguarding consumer interests and preventing the abuse of market power in the pharmaceutical sector.

The second paper used in the analysis is the *Market Study on the Pharmaceutical Sector in India* conducted by the Competition Commission of India (CCI). This report serves as a foundational regulatory and policy-oriented document that provides an in-depth assessment of market structure, pricing dynamics, and competition-related challenges within the pharmaceutical industry. Although technical in nature, the study offers crucial insights into systemic issues such as high trade margins, the dominance of branded generics, and the lack of effective price competition at the retail level. The CCI identifies areas requiring regulatory and policy intervention, thereby reinforcing the role of competition law authorities in addressing market distortions. The themes emerging from this report align with the overall focus of the paper, as they highlight how regulatory oversight is essential to ensure that competitive forces translate into affordable pricing and enhanced consumer welfare in the Indian pharmaceutical market.

3. INTRODUCTION

The competitive dynamics of the pharmaceutical industry are intricate, and nuances marked by interactions between company objectives, market forces and regulations. The significant influence of the industry on how healthcare is delivered in the country at a both public health and economic growth end. The anti-competitive environment of the pharma sector has a potential to create concerns regarding pricing, innovation incentives and fair access to necessary medications.

The corporations compete to control markets through the creation of innovative drugs, generic alternatives, and biosimilars. Yet, the anti-competitive nature of the industry can heavily and drastically have detrimental effects on patients in the form of higher prescription costs, restricted access to drugs and heavy decline in innovation. These actions have the potential to worsen healthcare disparities. They may also affect the supply and cost of essential medications. This study aims to investigate how the aforementioned anti-competitive practices among local pharmacies affect the availability and pricing of essential medications, ultimately impacting consumer access and choice.

Even though there have been studies conducted previously examining the wider spectrum of competitive aspects in the pharma sector. Yet, in order to shed light on the public health and market regulation aspect of the same, this study has aimed to conduct data-driven research. Market trends and results across geographical locations and various product categories has been conducted.

It is so that the present analysis has been computed and done so with an objective to balance the ends of pharma industry with those of sustainability, affordability, and innovation. In the longer run policymakers, industry stakeholders, and researchers will have to decipher the dynamics of competition in the pharmaceutical sector in order to successfully negotiate the difficulties of guaranteeing an easily accessible healthcare system. The study aims to offer insights that will guide future choices and assist in balancing societal and economic demands. This study is based on empirical approach to investigate the dynamics of competition in the pharmaceutical industry with the goal of identifying the major determinants of market outcomes and competitive behavior. The results highlight how anti-competitive practices among local pharmacies affect the availability and pricing of essential medications, ultimately impacting consumer access and choice. The data collected for analyzing the degree of competitiveness of the pharmaceutical market in the city comprises the following:

1. Products:

a) *Drugs - (Anesthesia, Insulin etc.)*

b) *Over-the-counter medicine (Dolo, Azithromycin etc.)*

c) *Medico products (syringes, oxygen masks & cylinders etc.)*

2. Geographical Boundaries:

Bangalore - Hullahalli Neeladri HSR Layout etc. (6 km Radius)

3. Sample / Respondents

a) *Consumers (patients, family of deceased, elderly consumers etc.)*

b) *Sellers/ Suppliers/ Retailers/ Small Business Owner*

4. THEORETICAL FRAMEWORK

Economic analysis of pharmaceutical market is grounded in the following key theories:

1. Monopoly Rent: Patent exclusivity allows firm to earn economic profit beyond competitive levels. While justified as a reward for innovation, such rent seeking behavior can become harmful when extended through evergreening or licensing manipulation.

2. Information Asymmetry: As highlighted in Akerlof's (1970) theory of "The Market for Lemons," patients are not well positioned to evaluate drug alternatives, making them

vulnerable to overpricing and brand manipulation. Physicians and retailers often act as intermediary, but may have conflicting incentives, specially, when influence by pharmaceutical promotions.

3. Regulatory Capture: As theorized by Stigler (1971), industries, subject to regulation may capture their regulators to act in the industries interest rather than in the public interest. Under enforcement of DPCO, weak price monitoring, and Limited CCI intervention in the Indian pharmaceutical sector may reflect such dynamics.

a. Kaldor-Hicks Efficiency: Reform Evaluation

Unlike Pareto efficiency, the Kaldor-Hicks' criterion allows a change to be deemed efficient if the gains to some parties are large enough to hypothetically compensate the losses of others- even if no compensation actually occurs.

Regulatory reform, such as expanding the Drug Price Control Order (DPCO), imposing supply chain, transparency, or removing brand linked prescribing main post compliance cost on dominant firms, but these are outed by the systematic gains in consumer welfare through reduced prices, increased access and more competitive markets.

b. Game Theory: Modeling Retailer Collusion and Strategy Behavior

In oligopolistic environments like pharmaceutical retail markets, game theory models explain the presence of collusion. Pharmacies and distributors often operate under repeated interactions, where deviation from price fixing or brand favoritism may be punished by exclusion from future supply agreements.

Using the repeated prisoner's dilemma model, collusive price setting emerges as a Nash equilibrium:

     a) *Each player (pharmacy) prefers to maintain collusion (higher prices, stable supply) rather than undercutting others, which may lead to being blacklisted by dominant distributors.*

b) *This dynamic is sustained by the threat of retaliation (cut off of inventory or credit lines), preventing entry of smaller, independent actors, and stiffing market competition.*

Legal rules must increase the payoff of deviation (e.g. incentivizing whistleblowing, reducing dependency on single suppliers) to break the equilibrium that sustains collusion.

Global Scholarship on Antitrust in Pharmaceuticals:

F.M. Scherer (1996) laid a foundational understanding of how patent-based monopoly can lead to price, inflation and innovation, stagnation in the absence of robust competition and law enforcement. Patricia Danzon (1997) further analyzes the role of price controls, and international reference pricing in curbing excessive markup in drug pricing, noting that competition policy must balance innovation incentives with excess objectives. More recent (OECD) report 2021 emphasize how vertical restrain, pay-for- delay agreements and abuse of dominance by large Pharma corporations have become key concerns in both developed and emerging markets.

c. *Indian Context*

In the Indian context, the Drug Price Control Orders (DPCO) have been the principal tool for regulating drug prices since 1970s. However, several scholars have criticized DPCO regime for being reactive arbitrarily applied and poorly enforced. Nayak (2011) points out how the reduction in the number of drugs under price control has corresponded with the rise in consumer level pricing. Articles from the *Indian Journal of Health, Economics,* and NUJS Law Review (2014-2021) have raised concerns about regulatory capture and the limited proactive role of the Competition Commission of India (CCI) in detecting, collusion and abuse in pharmaceutical markets.

The notable case of *Novartis AG v Union of India* (Novartis AG v Union of India, 2013) was a turning point in reaffirming the country's commitment to access over patent exclusivity and it set a precedent against "evergreening" of drug patents. In a similar fashion CCI decision in *Re: M/s Alis Medical Agency* (In re M/s. Alis Medical Agency, n.d.) highlighted collusive behavior and emphasized the dire need for systematic reform in drug distribution practices.

Another notable example is the case of *Roche v. Cipla F* (Hoffmann-La Roche Ltd. & Anr. v. Cipla Ltd., 2015*)*, where Roche, a multinational pharmaceutical company, attempted to prevent Cipla, an Indian generic manufacturer, from selling a cancer drug.

The legislation on competitive practices seeks to balance market efficiency with public health imperatives. CCI actively intervened to curb anti-competitive practices such a s cartelization, abuse of dominance etc. It further regulates exclusionary distribution arrangements, and restrictive trade practices prevalent in the pharma supply chain. By way of making sector-specific enquiries and enforcement actions CCI also clarified that even regulated industries like pharma are not immune from CCI scrutiny. In the Indian context, competition law has emerged as a crucial regulatory tool that complements price control mechanisms and drug regulation frameworks to promote fair competition, affordability of medicines, and consumer protection.

d. *Various Anticompetitive Practices in the Pharmaceutical Industry*

The pharmaceutical sector of India has been one of the largest around the globe. It is ranked third by volume and thirteenth by value and is valued at approximately $50 billion but is expected to grow to $130 billion by 2030. India is a global leader in generic drug production, manufacturing 20% of the world's generics by volume, and supplying over 40% of generics to the U.S. market. The pharma sector is regulated by the Central Drugs Standard Control Organization (CDSCO) which works with the National Pharmaceutical Pricing Authority (NPPA). Both organizations monitor essential drug prices. Due to increasing demand for treatment for chronic diseases like diabetes and cancer, domestic market is witnessing growth (Sindkhedkar et al., 2020).

e. *Trends in the market*

Like any other industry, the Pharma sector also suffers from vices of anticompetitive and unfair trade practices. Anti-competitive practices along the pharmaceutical value chain for profits and high trade margins. A survey conducted on the doctors, pharmaceutical industry, consumer organizations, hospitals and pharmacists in India bring to light various facts about collusion along the pharmaceutical distribution chain at the ground level, Competition Commission of India (CCI, 2011). In a recent study, the majority of the pharmaceutical companies surveyed claimed awareness with respect to the existence of collusive practices in the pharmaceutical industry and a high 32.2 per cent of respondents asserted that such practices prevail in the industry to a great extent (Nayak, 2011).

Some of these unethical practices were about irrational drug prescriptions by doctors motivated by kickbacks received from pharmaceutical companies. As a result, they prescribe expensive drugs that may not be necessary either. What encourages such rent-seeking behavior is the information asymmetry and low elasticity of demand to changes in prices because here the doctors are the influencers and not the consumers. Collusion also takes place along the distribution between drug companies, stockists, retailers, and Medical Representatives (M.R.) which disproportionately inflates the cost of medicines & the overall treatment. Consumers have little or no choice in such a rigged market and buy what is prescribed by doctors or what are sold by chemists (Sengupta, 2010).

Pursuant to the Drug Price Control Order, 1995 (DPCO), a grave concern has been the decreasing number of drugs under statutory control in the wake of liberalization and economic reforms (Mahapatra, 2011). Major efforts need to be made in bringing all essential medicines under price regulation. In response to a petition, the Supreme Court directed the secretaries of Ministry of health and Ministry of chemical and fertilizer to file affidavits in four weeks stating whether the Union government wanted to bring the essential medicines under the ambit of price control. The petitioner had stated that medicines are not being available to the poor at affordable prices (All India Drug Action Network v. Union of India, 2011).

Recently, the Draft National Pharmaceutical Pricing Policy was proposed in 2011, which introduced two significant changes to the existing system of drug pricing. First, to calculate the drug prices based on market demand and not the cost of production. Second, to control bulking of drugs. In India, anti-competitive pricing practices in the pharmaceutical sector have been a significant concern, particularly given the size of the market and its importance to global drug supply.

f.   Anti-competitive Practices in the Industry

Instances of price fixing have been seen and it occurs when pharmaceutical companies collude to set prices at an agreed level, which limits competition and inflates costs. In India, such practices have been detected among both generic and branded drug manufacturers. For instance, similar allegations were investigated by the Competition Commission of India (CCI) against Cipal, Lupin and Dr. Reddy's Laboratories for conspiring to fix prices and led to the imposition of costs (In re M/s Alis Medical Agency v. Federation of Gujarat State Chemists & Druggists Associations, 2014)

The country has also been faced with cases of price gouging when the pharma companies raise prices dramatically, particularly for life-saving drugs and often in response to supply shortages. For medicines, like Remdesivir prices skyrocketed at over 400% in some cases and NAPA had to intervene (National Pharmaceutical Pricing Authority [NPPA], 2020).

Other practices include evergreening (patent trolling) and the Supreme Court of India in the *Novartis AG v. Union of India (Novartis AG v. Union of India, 2013)* addressed this issue in the Indian pharmaceutical market and the protection of public health.

Exclusive distribution agreements limit the competition by restricting the availability of drugs in the market and allowing certain giants to maintain dominance. In 2015, Mylan was investigated for entering to exclusive distribution agreements with its suppliers.

Price discrimination is also seen in the industry as different prices for rural and urban areas was being charged by companies in order to maintain profitability and sale (World Health Organization, 2017).

5. PREVALENT ANTI-COMPETITIVE BEHAVIORS AMONG PHARMACEUTICAL COMPANIES OPERATING IN THE CITY OF BANGALORE

To adjudge the scenario of the pharma sector in the city of Bangalore a geographical area of Neeladri, Electronic City and Hullahalli was picked. The three locations fall within a radius of 6 km and comprise both urban as well as rural populations. A sample size of 15 Medical stores was taken and the following data was gathered:

1. **Names of Pharmacies Surveyed:**

a) *Sri Sai Hospital*

b) *Aashraya Poly Clinic*

c) *Hansika Medical*

d) *Life Care Medical*

e) *Apollo Clinic*

f) *Palash Medico*

g) *Balaji Medical*

h)   *Heera Medical*

i)   *RV Clinic*

j)   *Clinic Medical*

k)   *Nakoda Medical*

l)   *Kalapataru Medical*

m) *Narayana Pharmacy*

n)   *Aster Medico*

o)   *Apollo Pharmacy*

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2. Relationship with Store:

a)   *Owners (33.3%)*

b)   *Relatives of owners (33.3%)*

c)   *Employees (33.3%)*

3. Type of Products Sold:

a)   *Pharmaceuticals (73.3%)*

b)   *Essential drugs (66.7%)*

c)   *Medico products (syringes, masks, etc.) (46.7%)*

4. Perceived Competition:

a)   *Moderately competitive (40%)*

b)   *Highly competitive (26.7%)*

c)   *Limited due to dominant players (33.3%)*

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a. *Anti-Competitive Behaviors Prevalent Among Pharmaceutical Companies in the Sample Area*

Anti-competitive practices within the pharmaceutical sector undermine market fairness in the Electronic city, Neeladri and Hullahalli as well. The inflated drug prices and restrict on consumer choice majorly affected competition in the area. Insights from the survey have revealed the existence of patterns highlighting such practices and their influence on market dynamics.

1. *Brand Favoritism and Pressurization:* It was discovered that around 80% of the pharmacies occasionally or frequently face pressure from distributors to prioritize their products as evident in Figure 1. These brands threaten to discontinue business with any shop which refuses to deal as per their set conditions and completely robs the stores off any autonomy. The consumers are not provided a diverse range of products.
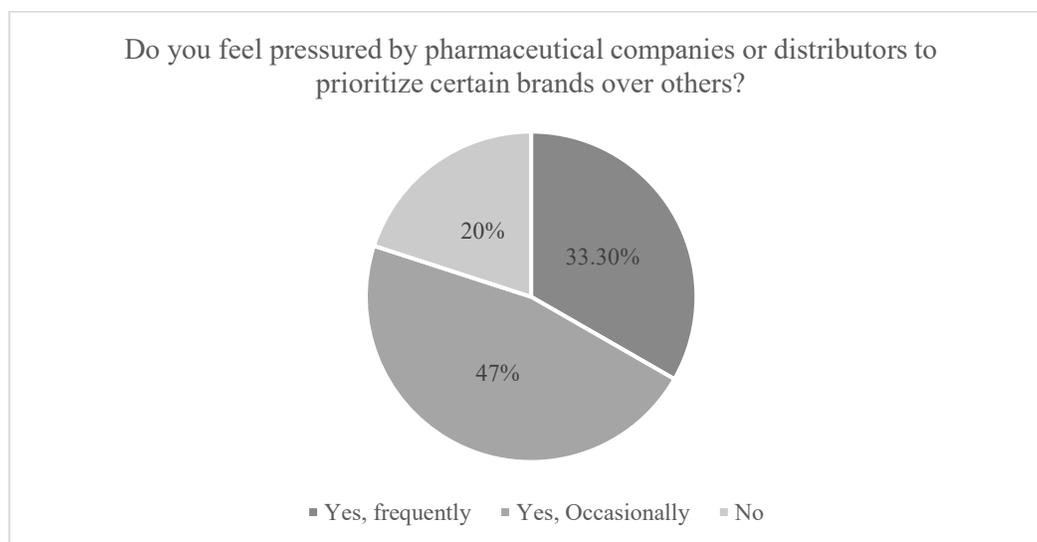

Figure 1: Do you feel pressurized by pharmaceutical companies or distributors to prioritize certain brands over others?

Source: Author's Construction

2. *Restrictive Supply Practices:* Tactics to restrict supply have also been employed by manufacturers and wholesalers of medicine and medico-products. About 42.9% of the participants responded that a significant downscaling of supply was seen during the second and third wave of Covid-19 and it majorly hindered the stores from providing essential drugs to the consumers without challenges. Responses presented in Figure 2.
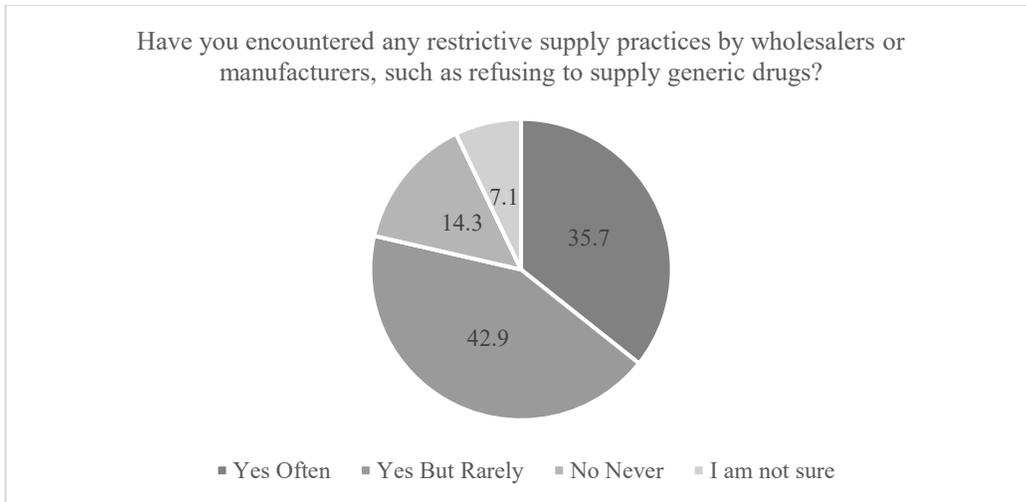
Figure 2: Have you encountered any restrictive supply practices by wholesalers or
manufacturers, such as refusing to supply generic drugs?

Source: Author's Construction

3. Price Fixing: Though not clearly accepted to but respondents have hinted towards the price-fixing agreements among pharmacies that appear occasionally. 28.6% of respondents recognizing this behavior have pointed out price collusion inflating costs, distortion of the competitive landscape and financial burdening on the consumers. Refer to Figure 3 for responses.
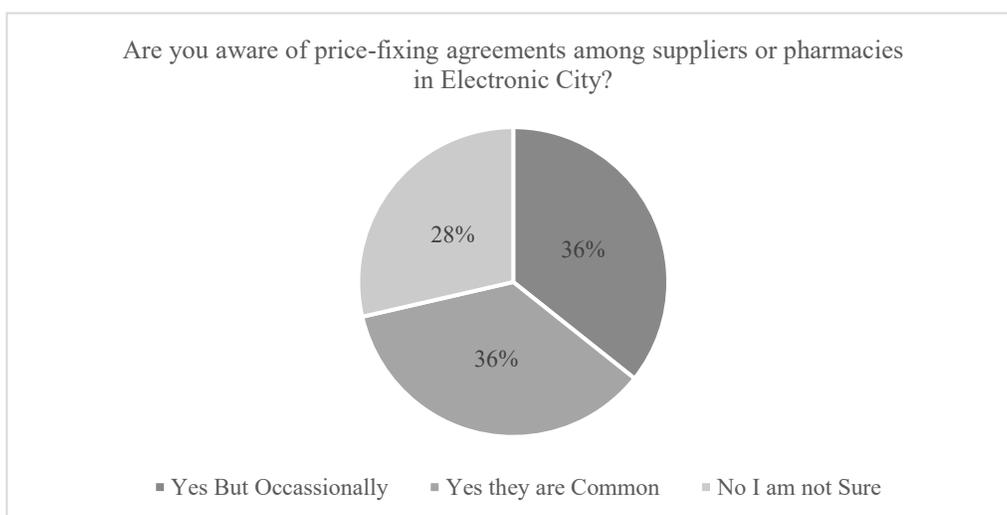
Figure 3: Are you aware of price-fixing agreements among suppliers or pharmacies in Electronic City?

Source: Author's Construction

4. Supply Chain Favoritism: It is pertinent to note that more than 35% of respondents reported occasional difficulties in sourcing medications due to supply restrictions or favoritism. Such practices create artificial scarcity and give undue advantage to certain players, sidelining smaller retailers. Refer to the following Figure 4 for responses.
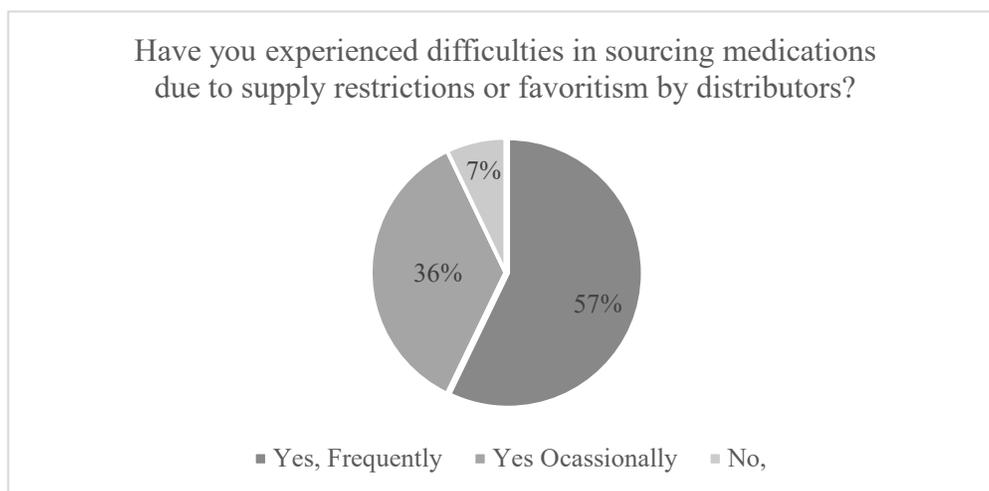

Have you experienced difficulties in sourcing medications due to supply restrictions or favoritism by distributors?

7%

36%

57%

■ Yes, Frequently ■ Yes Ocassionally ■ No,

Figure 4: Have you experienced difficulties in sourcing medications due to supply restrictions or favoritism by distributors?

Source: Author's Construction

5. Market Concentration: The responses classify the competition level as limited due to "presence of dominant players" in the market or similar to a 'monopoly' in 40% of the cases and 53.3% as area specific dominance as shown in Figure 5. Such dominance reduces opportunities for growth and challenges the smaller businesses to thrive. This leads the consumers to lack access to the market with competitive prices.
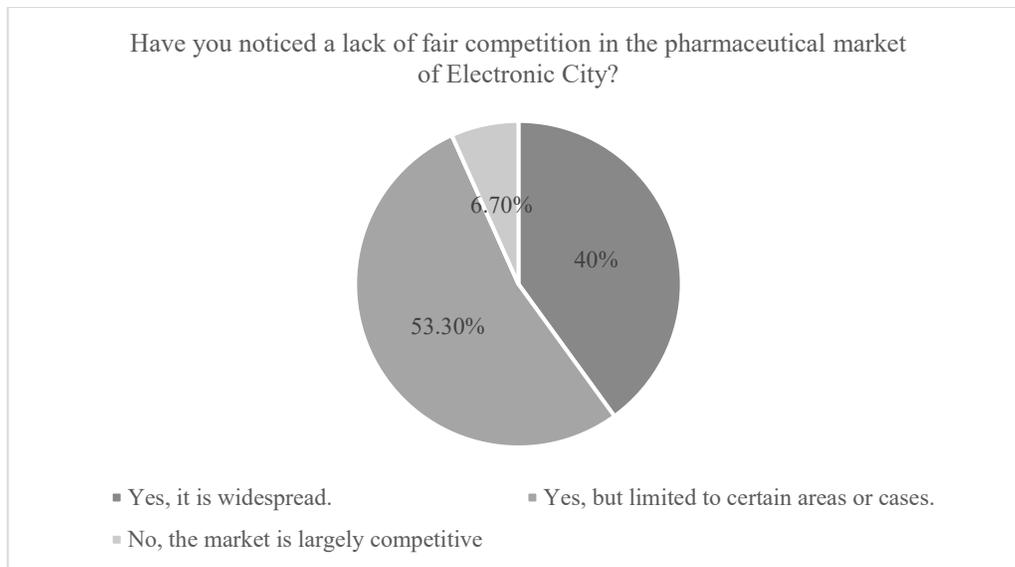
Figure 5: Have you noticed a lack of fair competition in the pharmaceutical market of Electronic City?

Source: Author's Construction

IMPACT OF THESE PRACTICES ON MARKET COMPETITION

1. Erosion of Market Fairness: There is a major prevalence of restrictive supply agreements in this sector which erodes the consumers & suppliers of fairness. Small business owners often lose their customer base due to their inability to match prices with giants like Narayana and Apollo Pharmacy. These giants also enjoy inventory excess and always hold an edge over the other shops.

2. Reduced Consumer Choice: Once the pharmacies push certain brands and limit other brands in the supply of generic OTC Medicines, the consumers face restricted choices. This often forces them to opt for higher-priced branded drugs over cost-effective alternatives, significantly raising healthcare costs.

3. Inflated Drug Prices: Practices such as fixing prices has led to driving up of drug cost because competition with natural price regulation gets diminished. Consumers in the lower tax bracket are harmed and undue restraint is placed onto them.

4. Barriers to Entry: Significant barriers to entry are create by dominant players' anti-competitive practices and harms new businesses. The new entrants have to struggle to break even in the absence

of a reliable supply chain. Their market visibility becomes negligible and leads to a perpetual failure of chance.

5. Undermined Innovation: Decreased and lacky competition disincentivizes the innovation in the pharmaceutical sector. And without such pressure to make amends and improvements, there is no reduction in cost and research and development in deprioritized. Hence, the healthcare industry is often skewed by practices that undermine competition in the market.

Businesses are significantly impacted and so are consumers. A major portion of respondents reported that they had lost customers due to these practices as shown in Figure 6. Smaller businesses were facing challenges in competing due to limited access to products. These practices also restrict consumer choice as pharmacies are unable to stock generic or alternative brands. Options become way fewer and costs for consumers hikes. The effects of price-fixing further inflate drug costs, reducing affordability and squeezing the margins of smaller businesses.
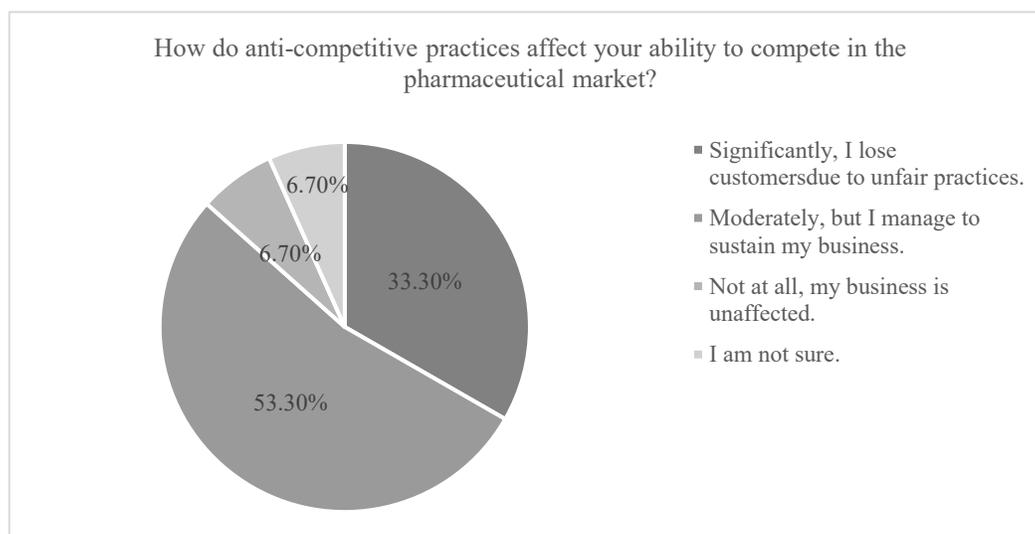

Figure 6: How do anti-competitive practices affect your ability to compete in the pharmaceutical market

Source: Author's Construction

The supply chain manipulation has created operational difficulties for smaller pharmacies. While many respondents highlight challenges in sourcing medications there lies an inequity in the supply chain consolidation. An uneven playing field is set with burdens on the smaller businesses to face

increasing difficulties. These practices distort market dynamics, limiting competition and harming both businesses and consumers (Analysis of anti-competitive practices in the pharmaceutical and healthcare sectors, n.d.).

5.   REFLECTION OF REGULATIONS OF THE MARKET

Only 53.3% % of the respondents found government rule to be 'partially effective' therefore, they need better enforcement. While 26.7% said they were ineffective. These answers highlight the pitfalls between current laws and their implementation, which allows abusive activities to flourish. Refer to the following chart for data.
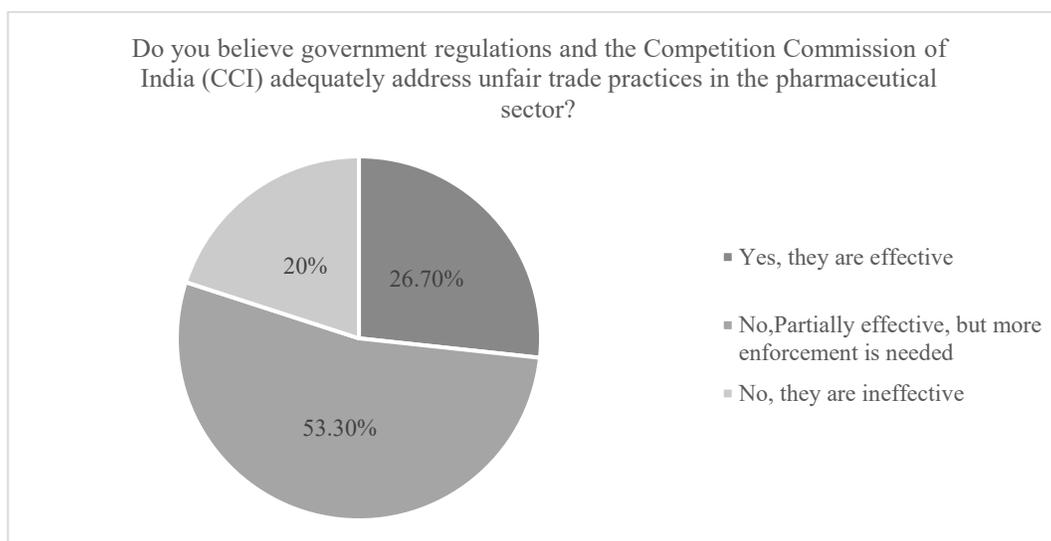
Figure 7: Do you believe government regulations and the Competition Commission of India (CCI) adequately address unfair trade practices in the pharmaceutical sector?

Source: Author's Construction

Respondents were also questioned regarding who is responsible for dealing with anti-competitive behaviour. Equal representation of government agencies, pharmaceutical firms, consumer advocacy groups, and legal authorities in the opinions underscores the recognized shared accountability in addressing these concerns.

6.   IMPACT OF ANTI-COMPETITIVE PRACTICES ON CONSUMERS

Another survey was conducted among the consumers of drugs, medico-products, and OTC medicines. These included the elderly, the families of the elderly and deceased and the sick

consumers of Electronic City, Neeladri and Hullahalli. The consumers have expressed significant concern about the impact of anti-competitive practices on their access to affordable and essential medications. Practices including price-fixing, monopolization, and bundling, are widely seen as direct contributors to rising healthcare costs. This has significantly reduced the consumer's affordability (Agarwal et al., 2022). There has been a steady increase in medication prices over the past year, as reported by the majority of the respondents. The same is attributed to unfair market dynamics and monopolistic behaviors by pharmaceutical companies and distributors.

a. Consumer Insights

Respondents that belong to families of terminally ill or the deceased and are consumers of life-saving drugs or chronic condition treatments have reported that a surge in costs has created financial significant hardships on them. This has led them put off, delay or outright skip of necessary purchases. Nearly 65% as shown in Figure 8 of respondents admitted to postponing or avoiding medication purchases due to high costs, indicating how profoundly these practices affect their healthcare access and overall well-being.
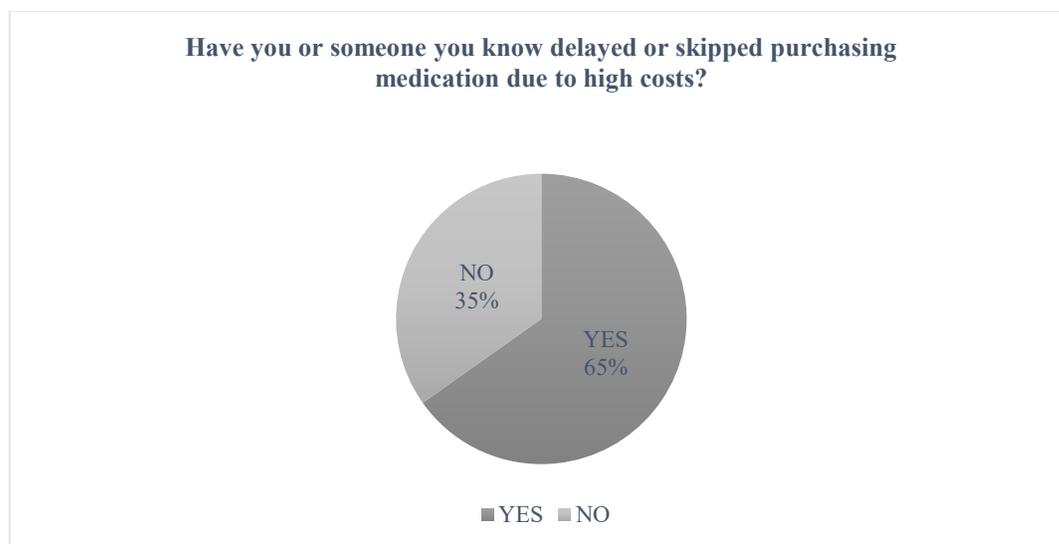

Figure 8: *Have you or someone you know delayed or skipped purchasing medication due to high costs?*

Source: Author's Construction

The affordability of medicine has been poorly rated by consumers with only a minority of the responders satisfied with the current prices that is 4% of the total respondents. The same can be seen in the Figure 9 given below as nearly 48% of the respondents show a very low level of satisfaction of the same. It is also to be noted that the impact of the same extends beyond the financial strain. Majority of the consumers worry about the long-term health consequences of being unable to afford OTC medication or adhere to the prescribed drugs.

Figure 9: How would you rate the affordability of essential medications in Electronic City?

Source: Author's Construction

Many consumers are unsure about the precise role of anti-competitive practices. A notable majority of them have also linked these issues to escalating healthcare expenses for themselves and their families. These consumers view price-fixing, monopolies, and limited competition in the sector as barriers. They have reported to having been deprived of fair pricing that ultimately restricts access to essential medications for vulnerable populations, shown in Figure 10.
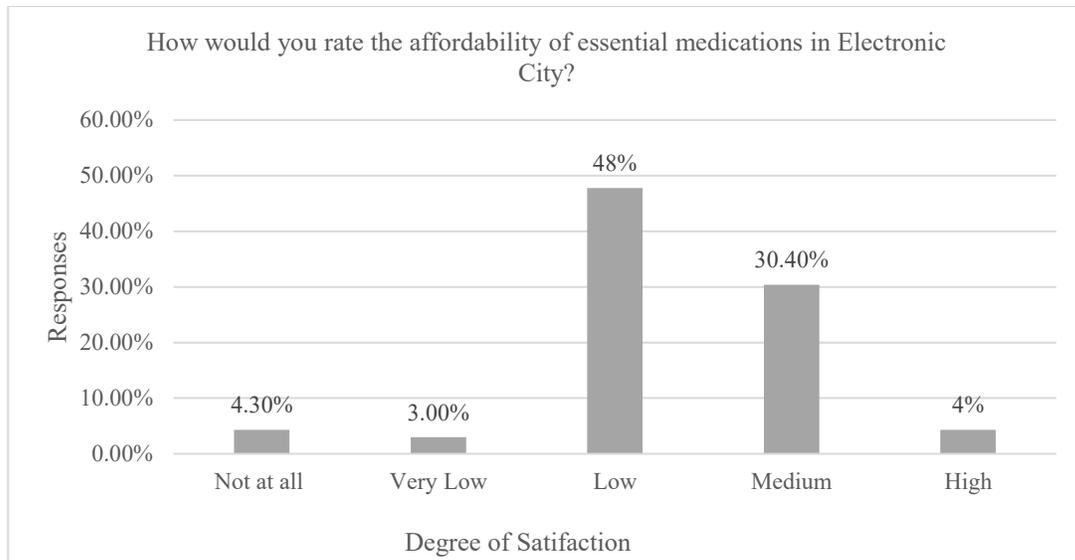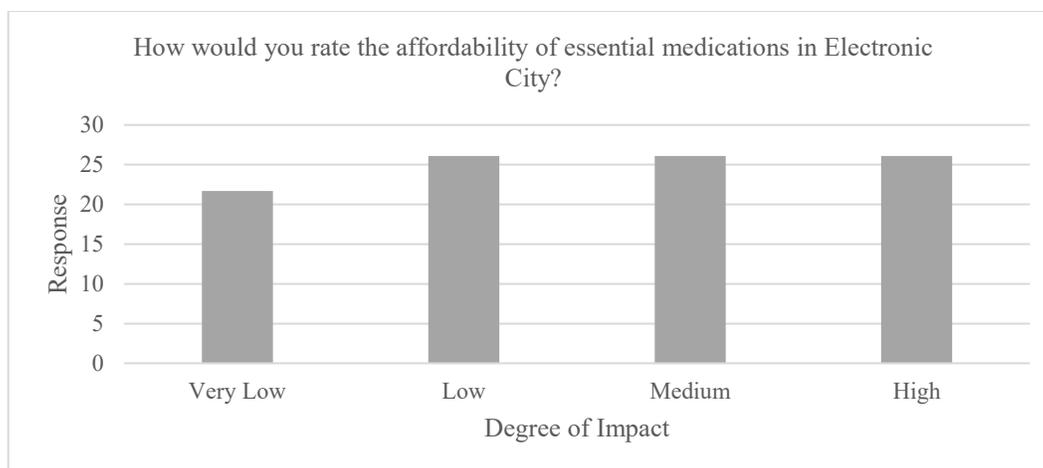
Figure 10: How would you rate the affordability of essential medications in Electronic City?

Source: Author's Construction

b. Regulations of the Market

The sentiment from the above inferences is underscored by the fact that most respondents are aware of the systemic challenges but feel powerless to combat them. Which is why the consumer need stronger regulatory frameworks. The respondents showed support for regulatory intervention in the pharmaceutical industry. This overwhelming response leads one to consider a dire need for regulation in this sector. Over 65% of respondents explicitly called for stronger legal frameworks and enforcement mechanisms to curb anti-competitive practices as shown under Figure 11.
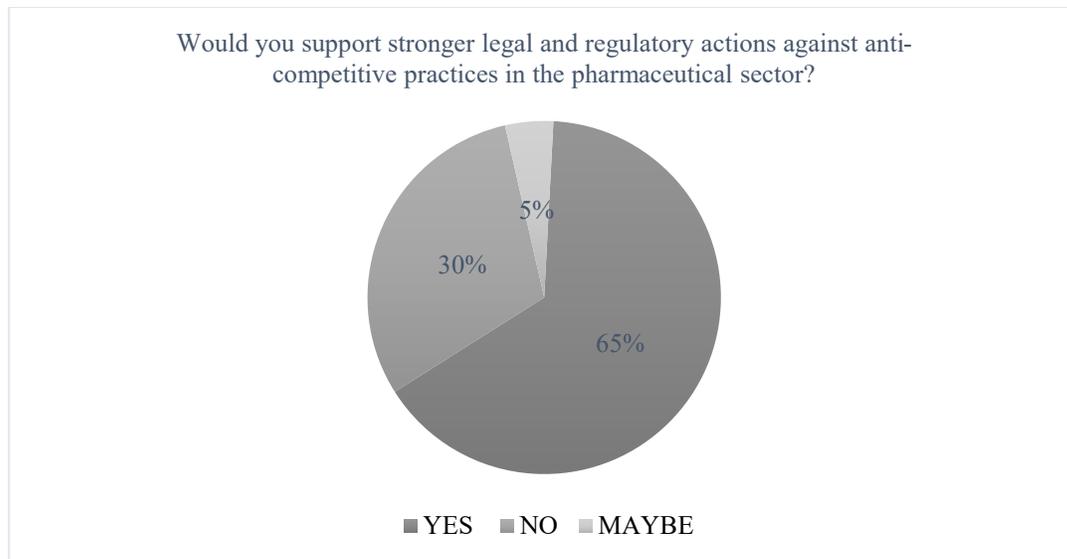
Would you support stronger legal and regulatory actions against anti-competitive practices in the pharmaceutical sector?

5%

30%

65%

■ YES   ■ NO   ■ MAYBE

Figure 11: Would you support stronger legal and regulatory actions against anti- competitive practices in the pharmaceutical sector?

Source: Author's Construction

Many have also suggested that government-imposed price controls on medications are an effective solution. This will ensure fair and consistent pricing for essential drugs. Additionally, respondent have also advocated for increased competition within the market. They want to encourage more pharmacies and manufacturers to operate in the area. This was asserted to help break the monopolistic hold of a few dominant players and give consumers more affordable options. Please refer to the following Figure 12.

Figure 12: What measures do you believe would help reduce medication costs in Electronic City?

Source: Author's Construction

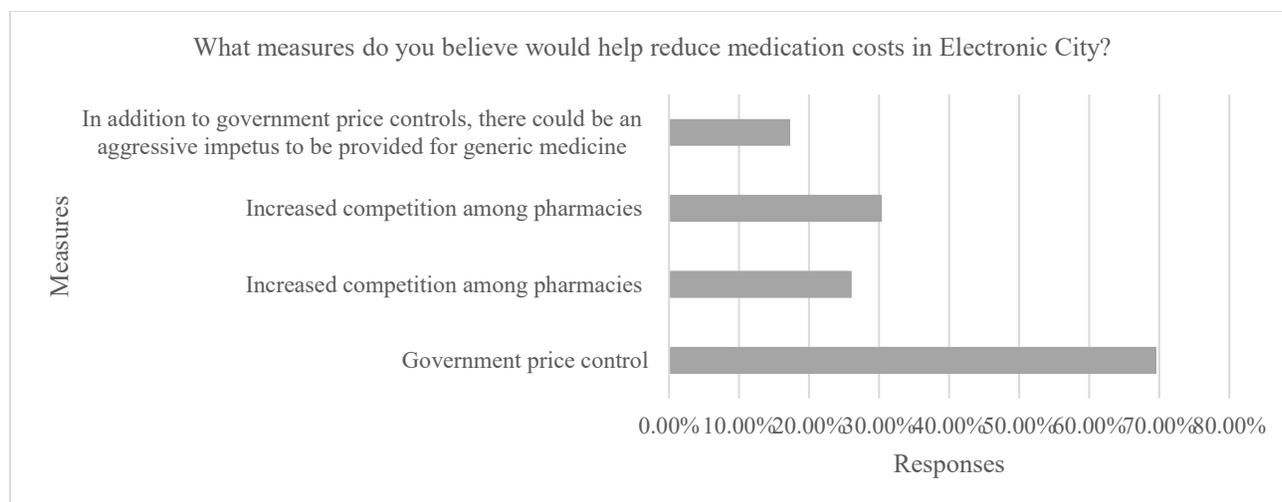Overall, the consumers in Electronic City are acutely aware of the challenges posed by anti-competitive practices but are eager for solutions. They want the government agencies and regulatory to that address the affordability and accessibility of drugs. Consumers are of the belief that a combination of government intervention and consumer education could alleviate the burden of high drug prices. A strong desire for change is therefore, reflected by the obtained results.

7. LAW AND ECONOMIC SYNTHESIS: BRIDGING THE REGULATORY ECONOMIC GAP

It is to be noted that if transaction cost were to be negligible then from a Coasean stand point the consumers, retailers and regulators could bargain to reach efficient outcome. yet the transaction cost incurred in regulatory compliances, litigation and whistleblower exposure keep the private bargain a far- sighted practicality. Furter more Pigouvian interventions such as subsidies for substituting generic medication or taxes on inclusive behaviour may realign private incentive with social welfare.

The public choice theory offers a critical insight in to the rationale outcome of the concentrated industry interest that over power diffused consumer interest. So far so the Indian market goes the lobbying power of large conglomerates will lead to diluted amendments, selective enforcement and competitive neutrality. Economic models have also suggested an increase in the marginal cost of collusion or enhanced investigative autonomy may shift firms towards compliance.

The observed market outcome resonates with behavioral economics. The resistance to brand

manipulation is drastically reduced owing to blind reliability on known physicians. Therefore, a psychological anchor helps companies sustain premium prices. This is a common practice even in the presence of cheaper alternatives as such alternatives are never prescribed. Therefore, the law must intervene to harmonize the choice architecture at pharmacies with prescription by physicians. Furthermore, the erosion of innovation overtime along with current pricing distortion is due to the dynamic inefficiency created by monopolistic and oligopolistic practices. Rather than true R& D driven product differentiation, when dominant firms rely on exclusive distribution, patent evergreen and bundling the sector experiences Schumpeterian stagnation. Both allocative and productive efficiency is compromised, limiting long-term societal gains from pharmaceutical innovations.

To address these multidimensional failures, a hybrid regulatory model is needed one that leverages incentive compatibility mechanism alongside strict deterrents. Regulatory sandboxing, outcome-based regulations and AI driven surveillance can complement traditional legal enforcement. Integration of real time market intelligence with legal decision making will also enhance deterrence. Ultimately, a law and economic synthesis enable a shift from reactive, fragmented enforcement to proactive system-based regulation. By internalizing rationality into legal design, Indian pharmaceutical Governance can move closer to achieving Kaldor- Hicks efficient outcomes where gain to consumers and social welfare outweigh transitional industry cost

8. FINDINGS

There is a persistent disconnect between the aims of regulatory framework and the economic realities of India's pharmaceutical market as per the findings of the study. The presence of price fixing, supply in manipulation and brand favoritism-uncovered through both qualitative and quantitative data-demand critical synthesis of legal norms with economic theory to identify reform pathways and force accountability. Some of the major findings are:

1. At the heart of competition lies the objective of promoting consumer welfare and ensuring market efficiency from a law and economics perspective these anti-competitive behaviors lead to potential gains from trade or loss due to distorted pricing and restricted output result in significant dead weight loss. The empirical data supports this: over 53.3% of pharmacy respondents existing laws were only partially effective when 66.7% admitted to facing pressure from distributors to push specific brands. These coercive arrangements shift market power, upstream, and away from consumer interest violating the spirit of the

competition act 2002 and undermining the Drug Price Control Order (DPCO)'s regulatory ambitions.

2. The anti-competitive practices documented here have performed and measurable economic effects:

    a) *Reduced consumer welfare:* unaffordable condition for low-income families is created by the bundling and monopolistic pricing of medicines, particularly life-saving drugs.

    b) *Barriers to entry:* market concentration as seen in electronic city and Neeladri, has pushed smaller retailers to the brink, deterring new entrants and consolidating Oligopoly.

    c) *Distorted resort location:* markups driven by brand collusion divert public and private expenditure from the broader healthcare services toward inflated pharmaceutical costs. The resulting efficiencies are not merely market distortions- they are public health crisis in economic disguise.

3. The enforcement appears both fragmented and reactive, despite the presence of legal instruments like DPCO and regulatory body, such as the CCI and NPPA. The structural issues are:

    a) *Narrow Coverage of essential drugs:* The shrinking of essential medicine list (EMI) leaves many vital treatments unregulated. liberalization has diluted statutory price control, reducing their scope.

    b) *In efficient supply chain oversight:* regulatory blind spot, allow distributors and wholesaler to engage in practices like exclusive supply arrangements, which restrict downstream competition.

    c) *Weak Institutional accountability:* a significant proportion of respondents believe agencies, lack both teeth and transparency. This regulatory capture limits deterrence and often leads to Kaldor-Hicks inefficient outcomes, where the social cost outweighs private gains.

    The survey responses from consumers- 35% of whom have deferred essential medicine purchase due to price-underscore the inequity of outcome in an uncompetitive market.

9. CONCLUSION

The pervasive nature of anti-competitive practices in the pharmaceutical industry is highlighted in the responses from electronic city. The hypothesis that anti-competitive practices in the pharmaceutical sector significantly impact market dynamics, and healthcare affordability is confirmed by the findings of the study. Empirical evidence from the surveyed pharmacies highlights how market concentration, restrictive supply agreements, price fixing and brand favoritism undermine fair competition. This inflates drugs prices and limits consumer choice. These practices create significant barriers for small businesses, reducing market diversity.

From a legal perspective, such anti-competitive behaviors violate principles established under competition law, consumer protection, statutes, and pharmaceutical regulatory frameworks. Furthermore, the findings underscore the need for stronger regulatory interventions, including more rigorous enforcement of existing competition law.

To promote affair in sustainable pharmaceutical market, policy makers must consider legal reforms that prevent monopolistic dominance. Strengthening legal accountability mechanisms, enhancing consumer awareness and fostering market entry for new competitors are essential steps in ensuring that pharmaceutical markets function in a manner that prioritize public health overfit maximization.

A multi-faceted approach involving regulatory agencies, judicial oversight, industry, stakeholders, and consumer advocacy groups is required to achieve a balance between pharmaceutical innovation, economic, incentives and public health objectives requires. Only through a well-regulated, competitive and environment can enable access to essential medication ensured, protecting both consumer rights and long-term sustainability of healthcare sector.

10. POLICY RECOMMENDATIONS

The following policy interventions are recommended:

1. Strengthen the CCIs pharmaceutical enforcement wing- empower the competition commission of India with a dedicated unit for pharmaceuticals and expand its *suo motu* powers to proactively investigate anti-competitive conduct in the sector.

2. Expand the jurisdiction of NPPA- amend the mandate of the National Pharmaceutical Pricing Authority (NPPA) to regulate not only direct pricing, but also bundling practices, hidden commissions, and vertical distortion within the supply chain.

3. Create national medicine, price transparency portal- establish a real time, public portal that discloses retail and wholesale prices of essential medicines across region to empower consumer choice and detect pricing anomalies.

4. Strengthen the *Jan Aushadhi* scheme- scale of the Pradhan Mantri Bhartiya Janaushadhi Pariyojana (PMBJP) by ensuring consistent supply of high demand generics, expanding outlets to underserved areas and removing procedural bottle necks for new entrants.

5. Mandate, generic substitution and rational prescription- legislate, mandatory generic substitution where appropriate and require prescribers to justify non-generic prescriptions, subject to audit by regulatory authorities.

6. Implement whistleblower protection mechanism in Pharma markets- encourage reporting of collusive or monopolistic conduct through confidential channels with legal protections and incentives for insiders.

7. Enhance supply chain oversight- introduced statutory audit mechanism for pharmaceutical, distributors and large retailers to detect preferential dealings and ensure equitable access across retailers.

8. Reinstate and expand Essential Medical List (EMI)- periodically revise and expand the EML with expert consultations to ensure broader coverage of life-saving drugs under price regulation.

9. Launch Public awareness campaigns- invest in educational programs to inform consumers about their rights, the benefits of generic, and how to report pricing abuse.

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More Ecology or More Economy in International Conventions on Biodiversity?

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ABSTRACT

International biodiversity governance has progressively evolved from a predominantly ecological and conservation-oriented approach toward a more integrated framework that incorporates economic reasoning. This article argues that such an evolution is not merely terminological, but reflects a deeper transformation in the way biodiversity is conceptualized and governed at the international level. The study examines whether, and to what extent, international biodiversity conventions and related policy initiatives have incorporated economic considerations alongside traditional conservation objectives. Using a text analysis methodology, the article analyzes the language of key international conventions adopted since the 1970s, distinguishing between early conservation agreements, state-based conventions, and instruments developed within the framework of the Convention on Biological Diversity. This analysis is complemented by an examination of the conceptual frameworks adopted by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services and the European Union Biodiversity Strategy. The findings show a growing emphasis on ecosystems, ecosystem services, and human well-being, which emerges progressively across the examined instruments and culminates in the Kunming-Montreal Global Biodiversity Framework. From a

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law-and-economics perspective, this study argues that economic instruments—such as taxes, subsidies, tradable permits, and payments for ecosystem services—play a crucial role in translating biodiversity commitments into effective and actionable policy measures. The article concludes that future biodiversity governance is likely to rely increasingly on economic approaches to complement legal obligations and enhance their practical effectiveness.

Keywords*: Biodiversity, Law and economics, Ecosystem services, Economic instruments, International environmental law.*

1. INTRODUCTION

There is growing evidence of a worldwide decline in biodiversity. Research has demonstrated that biodiversity is closely tied to the proper functioning of ecosystems.[3] Consequently, reductions in biodiversity are likely to undermine ecosystem productivity and stability. For this reason, preserving biodiversity is crucial and can be achieved, for instance, by strengthening natural mechanisms such as resource partitioning through human initiatives like establishing biodiversity hotspots and parks - or by reducing human-driven activities that cause significant biodiversity loss, including land-use change, invasive species introductions, and climate change (Lenzi et al., 2023).

The concept of biodiversity has evolved significantly since its inception, reflecting advancements in scientific understanding, ecological awareness, and societal values. From the initial affirmation of the importance of the aspect of "species richness and variety" and their simple counts (Tangley, 1985) to the more sophisticated definition of the "ecological dimension" (Díaz & Malhi, 2022). Moreover, other aspects have been considered, such as the "genetic dimension" (Jörger & Schrödl, 2013) and the "cultural dimension" (Hill et al., 2011). Against this background, this article adopts a law-and-economics perspective to examine how international biodiversity governance has progressively incorporated economic reasoning and incentive-based instruments alongside traditional conservation approaches.

Over the past decade, there has been a notable shift in focus towards ecosystem services and human well-being. The Convention on Biological Diversity (CBD) at Art. 2 defines biological diversity as "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems". Notably, this definition explicitly includes ecosystems, whereas many other definitions exclude them - likely because ecosystems comprise both living and nonliving components (such as water, minerals, and other physical factors) that do not fall under taxonomic biodiversity (Petersson & Stoett, 2022).

"Biological diversity, or biodiversity for short, means the diversity of life in all its forms. It is not uncommon though to regard biodiversity to be the number of species of organisms that inhabit Earth". This definition of biodiversity is provided in "Economics of Biodiversity", an

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[3] Researchers have conducted controlled laboratory experiments to examine whether alterations in specific components of biodiversity, such as species richness, influence key aspects of ecosystem functioning. Their findings indicate that ecosystem stability is determined by species richness, community composition, and genetic diversity. Naeem, S. et al. (2009).

independent, global review that Her Majesty's Treasury (UK) commissioned to Sir Partha Dasgupta, an economist and Professor Emeritus at Cambridge University (Dasgupta, 2021). This document establishes the increasingly frequent use of the economic approach to the definition of global biodiversity governance that will be investigated in this article (Schumacher, 2022).

Particularly, we explore the increasing affirmation of the concept of biodiversity in environmental conventions and other international initiatives since the 70s through the analysis of their text and conceptual framework. For this purpose, we apply a text analysis methodology to detect the most frequent words in three groups of conventions (Conventions in the 70s; Conventions by Nations; Conventions on Biological Diversity). In the following, we consider the conceptual framework of a different type of initiatives (The Global Assessment of Biodiversity and Ecosystem Services and The Biodiversity EU Strategy). In this last group we analyze their conceptual framework and we observe the increasing role of the economic approach. Finally, we consider the relationship between ecology and economy in the Kunming-Montreal Global Biodiversity Framework that determines the use of positive economic incentives for the conservation and sustainable use of biodiversity. As a conclusion, the analysis of the relationship between ecology and economy in the definition of biodiversity helps to find a more practical approach to the conservation and protection of biodiversity through real actions. Together with growing attention from international institutions, the economic approach will likely play an essential role in the future conservation of "biodiversity".

2. LITERATURE REVIEW

a. *Biodiversity and International Environmental Law*

The concept of biodiversity has progressively evolved within international environmental law from a narrow ecological focus on species conservation toward a broader and more integrated understanding that encompasses ecosystems, genetic resources, and human well-being. Early international conventions adopted in the 1970s—such as the Ramsar Convention on Wetlands and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)—were primarily oriented toward the protection of specific natural resources or species categories. These instruments reflected an ecological preservation approach, largely detached from economic considerations and focused on regulatory restrictions rather than incentive-based mechanisms.

The adoption of the Convention on Biological Diversity (CBD) in 1992 marked a turning point in global biodiversity governance. The CBD introduced a comprehensive definition of

biological diversity, explicitly including ecosystems and recognizing the interdependence between conservation, sustainable use, and the fair and equitable sharing of benefits arising from genetic resources. Scholars have emphasized that the CBD represents a shift from sectoral conservation efforts toward an integrated governance framework capable of addressing biodiversity loss at multiple levels (Petersson & Stoett, 2022).

Subsequent protocols adopted under the CBD framework, such as the Cartagena Protocol on Biosafety and the Nagoya Protocol on Access and Benefit-Sharing, further expanded the legal architecture of biodiversity governance. These instruments refined the regulatory treatment of biotechnology risks and benefit-sharing mechanisms, respectively, reflecting the growing complexity of biodiversity-related challenges in a globalized economy.

Despite these advances, the literature highlights persistent gaps in the effectiveness of international biodiversity law, particularly in terms of implementation and compliance. Legal scholars note that binding commitments alone have often proven insufficient to halt biodiversity loss, especially in the absence of adequate economic incentives and institutional capacity (Kok & Ludwig, 2022).

b. Ecosystem Services, Human Well-Being, and Valuation

Parallel to developments in international environmental law, from an ecological and economic perspective, the role of ecosystem services in supporting human well-being has been increasingly emphasized. The Millennium Ecosystem Assessment (MEA, 2005) played a foundational role in framing biodiversity not merely as an intrinsic ecological value but as a provider of essential services such as food production, climate regulation, water purification, and cultural benefits. Subsequent studies have deepened this perspective by empirically demonstrating the link between biodiversity loss and declines in ecosystem functioning and resilience (Cardinale et al., 2012; Loreau et al., 2021). This body of literature underscores that biodiversity loss entails not only ecological risks but also significant economic and social costs. Economic valuation of ecosystem services has therefore become a central theme in biodiversity-related research (Helm & Hepburn, 2012). While scholars acknowledge methodological challenges and ethical concerns associated with monetizing nature, valuation approaches are widely recognized as instrumental in informing policy decisions and integrating biodiversity considerations into economic planning (de Groot et al., 2010; Dasgupta, 2021).

c. Law and Economics Approaches to Biodiversity Governance

The law and economics literature provides a complementary analytical lens by focusing on incentives, behavior, and institutional design. From this perspective, biodiversity loss is

understood as a consequence of market failures, including negative externalities, public goods characteristics, and information asymmetries.

Traditional command-and-control regulation has been criticized for its limited flexibility and high enforcement costs. In contrast, economic instruments—such as taxes, subsidies, tradable permits, and payments for ecosystem services—are designed to internalize environmental externalities by altering price signals faced by economic actors (Porrini, 2019).

Recent contributions emphasizes that incentive-based instruments can achieve biodiversity conservation objectives more cost-effectively, particularly when combined with robust legal frameworks and governance structures (Deutz et al., 2020; Reyes-García et al., 2025). The growing integration of economic tools within international biodiversity governance reflects this analytical shift (OECD, 2025).

While this strand of literature has significantly advanced the understanding of biodiversity governance from an economic perspective, it remains limited in explaining how economic reasoning is concretely embedded within the language and structure of international legal instruments. This article addresses this gap by linking economic analysis to a systematic textual examination of biodiversity-related conventions.

d. Research Gap and Contribution of the Present Study

While existing literature has extensively examined biodiversity governance from legal, ecological, and economic perspectives, fewer studies systematically analyze how the language and conceptual framing of international biodiversity instruments reflect a gradual transition from an ecological to an economic approach. Moreover, limited attention has been paid to the role of conceptual frameworks—such as those developed by IPBES and the European Union— in operationalizing the link between biodiversity conservation and economic incentives.

This article contributes to the literature by combining textual analysis of international biodiversity conventions with a law-and-economics interpretation of emerging conceptual frameworks. By doing so, it sheds light on the increasing prominence of economic reasoning in global biodiversity governance and its implications for future conservation strategies.

3. CONCEPTUAL FRAMEWORK: A LAW AND ECONOMICS PERSPECTIVE ON BIODIVERSITY

This study adopts a law and economics conceptual framework to analyze the evolving role of biodiversity within international environmental governance. The framework is grounded in the assumption that legal instruments influence environmental outcomes primarily by shaping economic incentives and behavioral responses (Faure & Skogh, 2003; Porrini, 2017). In this direction, the conceptual framework adopted in this paper does not aim to develop a formal

economic model. Rather, it serves as an analytical tool to interpret how legal instruments shape economic incentives and behavioral responses in the context of biodiversity governance.

At the core of the framework lies the interaction between legal rules, economic incentives, and behavioral outcomes. International conventions and policy initiatives—such as the CBD, the Kunming-Montreal Global Biodiversity Framework, and regional strategies—establish legal obligations, standards, and policy objectives. These legal instruments, however, do not operate in isolation. Their effectiveness depends on how they translate into incentives that affect the decisions of states, firms, and individuals.

From an economic perspective, biodiversity loss is driven by externalities, where the social costs of environmental degradation are not fully borne by those who cause it (Giglio et al., 2024). Incentive-based instruments aim to correct these market failures by internalizing environmental costs or rewarding conservation-friendly behavior. Taxes, fees, subsidies, tradable permits, and payments for ecosystem services represent mechanisms through which legal frameworks can influence economic behavior (Ring et al., 2010).

The framework also incorporates institutional and governance variables, including enforcement capacity, compliance mechanisms, and stakeholder participation. These factors mediate the relationship between legal norms and actual outcomes. Weak institutions or inadequate enforcement may undermine even well-designed incentive schemes, whereas strong governance structures can enhance their effectiveness (Clement et al., 2015).

Finally, the framework links behavioral responses to biodiversity and welfare outcomes. Changes in land use, resource exploitation, and investment decisions affect ecosystem integrity and the provision of ecosystem services, which in turn influence human well-being and economic sustainability. By explicitly mapping these relationships, the conceptual framework provides an analytical foundation for understanding the growing integration of economic approaches within international biodiversity governance.

4. ANALYSIS OF THE CONTENT OF BIODIVERSITY INTERNATIONAL CONVENTIONS

The objective of this section is to analyze the lexical content of the international conventions that have been issued on the subject of biodiversity. First of all, we will try to highlight what these conventions focus on through the analysis of the words and expressions that are used most frequently.

To implement the right text mining methodology, a three steps research procedure has been followed:

1. The identification of the goal of the analysis: the goal of the analysis has been identified as considering the frequency of specific words or expressions in convention texts;

2. The choice of the method to be used to meet this goal: a "word counting" program has been chosen;

3. The selection of a sampling set that accurately represents the research object: a sampling set composed by selected conventions have been identified on the base of the ones generally indicated in the literature about "biodiversity".

a. Methodology

To detect the frequency of words and expressions in the selected international conventions we implemented in its most basic form a text analysis, essentially "counting the words" and calculating their frequency in the text.

We used https://wordcounter.net/ which is a simple user interface that features a prominent word and character count, even large text areas, with various controls and a sidebar that promises detailed text analysis. So, the text analysis consists in specifying individual lexical items (words, phrases) under investigation and observing patterns.

In detail, we analyzed the most common single word and expression with two words. We then detected the context in which the word has been used (just a mention, definition, explicit use of the concept). The analysis was limited only to nouns (excluding for example expressions like "any" or "shall").

b. The sample

The sample is composed by selected documents that are international conventions, with the exception of only one document only (The Environment Protection and Biodiversity Conservation Act – EPBC) that is a national act. We decided to include this last documents to consider the contribution of a very important geographical area (Australia).

We grouped the selected documents as follows:

The first group, named "Conventions in the 70s", includes:

1. the Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat (RCW);

2. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES);

3. Convention on the Conservation of Migratory Species of Wild Animals (CMS).

The second group, named "Conventions by Nations", includes:

4. The United Nations Convention on the Law of the Sea (UNCLOS);

5. The African Convention on the Conservation of Nature and Natural Resources (ALGIERS);

6. The Environment Protection and Biodiversity Conservation Act (EPBC)2

The third group, named "Conventions on Biological Diversity", includes:

7. The Convention on Biological Diversity (CBD);

8. Cartagena Protocol on Biosafety;

9. Nagoya Protocol on Access and Benefit-sharing.

By selecting this type of documents we are aware of reducing the analysis to multilateral international agreements only and excluding non-state and subnational initiatives that has recently became very relevant (Kok and Ludwig, 2022).

c. The analysis

First group: Conventions in the 70s

As a first group of Conventions, we considered the ones issued in the 70s.

The Ramsar **Convention on Wetlands of International Importance especially as Waterfowl Habitat** (RCW) aims to conserve wetlands and their biodiversity. It promotes the sustainable use of wetland resources and recognizes the ecological importance of these areas. The Contracting Parties to the RCW are now 172 (https://www.ramsar.org/).

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was established to regulate global trade in wild animals and plants, ensuring that such activities do not endanger their survival. The initiative originated from a resolution adopted in 1963 during a meeting of the International Union for Conservation of Nature (IUCN). After negotiations, the Convention was formally agreed upon by representatives of 80 nations in Washington, D.C., on 3 March 1973, and it came into effect on 1 July 1975. Today, CITES counts 184 member states (https://www.cites.org/).

Few years later, in 1979, the **Convention on the Conservation of Migratory Species of Wild Animals** (CMS) aims to conserve migratory species and their habitats, promoting international cooperation to protect species that migrate across borders. The Contracting Parties are now 133 (https://www.cms.int/).

Convention	Text Length	Most frequent and significant words	Most frequent expressions (2 words)
Ramsar Convention on Wetlands of International	2232	Contracting 54 (6%) Parties 41 (4%)	Contracting Parties 39 (8%) Flora Fauna 6 (1%)

Importance especially as Waterfowl Habitat (RCW) – 1971		Westland 35 (4%) Convention 29 (3%)	Westland Flora 5 (1%)
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) – 1973	6982	Convention 85 (3%) Species 81 (3%) State 74 (3%)	Present Convention 53 (4%) Management Authority 47 (3%) Species Included 38 (3%)
Convention on the Conservation of Migratory Species of Wild Animals (CMS) – 1979	4660	Species 101 (6%) Parties 87 (5%) Migratory 75 (4%)	Migratory Species 75 (9%) Conference Parties 39 (5%) Conservation Status 15 (2%)

Table 1: Text analysis of the first group of conventions

Source: Authors' elaboration on the text of the conventions

From the text analysis, in terms of the length, these Conventions were originally not very long: they mainly contain general statements to define specifically fields in terms of natural resources. The lexical choice is characterized by the use of words that outline the specificity of the conventions (Contracting, Parties, State) and the object of the Conventions (Westland Species, Migratory, Westland Flora).

We can derive that these conventions are characterized by the aim to promote the conservations of some kinds of natural resources and in this sense they are more ecological oriented. Even if these conventions do not explicitly talk about biodiversity, they present a well-defined target in terms of protection of a certain kind of natural resources for which it is considered necessary to preserve.

- **Second group of Conventions by Nations**

We considered then another group of documents characterized by an agreement between specific groups of countries.

Adopted in 1982, the **United Nations Convention on the Law of the Sea** (UNCLOS) is an international treaty under the United Nations that establishes a comprehensive legal framework for all marine and maritime activities. It sets out a regime of law and order for the world's oceans and seas, defining rules for their use and the exploitation of their resources. The Convention also serves as the foundation for the further development of specific areas of

maritime law. As of October 2024, 169 sovereign states and the European Union are parties to UNCLOS (https://www.unclos.org/).

The African Convention on the Conservation of Nature and Natural Resources, also referred to as the Algiers Convention, represents a comprehensive regional framework for safeguarding biodiversity and natural resources across Africa. Initially adopted in 1968, it was considered the most progressive regional agreement of its time, exerting a major influence on the evolution of environmental law on the continent. Nevertheless, the rapid advancements in international environmental law over the following twenty-five years highlighted the need to revise and expand the treaty's provisions. This revision, conducted under the authority of the African Union, was officially endorsed by the Heads of State and Government in July 2003 at the Maputo summit (https://au.int/en/treaties/african-convention-conservation-nature-and-natural-resources).

Enacted in 1999, the **Environment Protection and Biodiversity Conservation Act** (EPBC Act) is Australia's primary environmental law. It establishes a legal framework for protecting and managing certain plants, animals, habitats, and places- including heritage sites, marine areas, and unique wetlands. Together with its regulations, the EPBC Act serves as Australia's central national environmental legislation, providing mechanisms to safeguard and manage both nationally and internationally significant biodiversity and ecosystems (https://www.dcceew.gov.au/environment/epbc).

Convention	Text Length	Most frequent and significant words	Most frequent expressions (2 words)
United Nations Convention on the Law of the Sea (UNCLOS) – 1982	73963	States 633 (3%) State 587 (3%) Authority 370 (2%)	Coastal States 187(3%) States Parties 141 (2%) Territorial Sea 118 (2%)
African Convention on the Conservation of Nature and Natural Resources (ALGIERS) – 1968/2003	8924	Convention 138 (5%) Parties 117 (4%) Resources 97 (3%) Natural 97 (3%) African 57 (2%)	Natural Resources 68 (6%) Conservation Nature 41 (4%) African Convention 40 (4%)
Environment Protection and	162726	Conservation 1332 (3%)	Environmental Protection 613 (3%)

| Biodiversity Conservation Act (EPBC) – 1999 | | Heritage 1173 (2%) Commonwealth 1039 (2%) | Conservation Act 603 (3%) Protection Biodiversity 601 (3%) |

Table 2: Text analysis of the second group of conventions

Source: Authors' elaboration on the text of the conventions

From the analysis of the text length, it is evident that the documents of this group are longer than the previous ones, and they are very much oriented towards defining a regime of biodiversity protection in specific geographical areas. In fact, the most frequent words are: States, Parties, Authority, Coastal States Territorial Sea. In the text of EPBC the expression "Protection Biodiversity" is one of the most relevant.

In efforts to halt and reverse biodiversity loss, such conventions play a crucial role in conservation, each designed to address the specific ecological and socio-economic challenges of its region. By fostering cooperation among countries to conserve natural resources, these conventions are generally more elaborate and complex, representing an advancement compared to those of the previous group.

- **The Convention on Biological Diversity**

The **Convention on Biological Diversity (CBD)** was adopted in 1992 at the Earth Summit in Rio de Janeiro with the aim to conserve biodiversity, promote sustainable use of its components and ensure fair sharing of benefits arising from genetic resources (https://www.cbd.int/).

The **Cartagena Protocol on Biosafety** is a supplementary agreement to the CBD, adopted in 2000, it focuses on the safe transfer, handling, and use of living modified organisms to protect biodiversity from potential risks associated with biotechnology.

The **Nagoya Protocol on Access and Benefit-sharing** was adopted in 2010 with the aim to share the benefits arising from the utilization of genetic resources in a fair and equitable way. It provides a framework for access to genetic resources and traditional knowledge.

Convention	Text Length	Most frequent and significant words	Most frequent expressions (2 words)
Convention on Biological Diversity (CBD) - 1992	9962	Convention 140 (4%) Parties 139 (4%) Biological 131 (4%) Diversity 119 (3%)	Biological Diversity 117 (8%) Convention Biological 45 (3%) Conservation Sustainable 28 (2%) Conservation Biological 25 (2%)

Cartagena Protocol on Biosafety - 2000	9631	Protocol 165 (4%)	Living Modified 106 (6%)
		Parties 124 (3%)	Modified Organism 54 (3%)
		Living 108 (3%)	Biological Diversity 41 (2%)
		Modified 107 (3%)	Protocol, Biosafety 40 (2%)
Nagoya Protocol on Access and Benefit-sharing – 2010	8184	Resources 123 (4%)	Genetic Resources 105 (6%)
		Parties 123 (4%)	Benefit Sharing 77 (4%)
		Genetic 110 (3%)	Biological Diversity 33 (2%)
		Access 107 (3%)	Indigenous Local 33 (2%)

Table 3: Text analysis of the third group of conventions

Source: Authors' elaboration on the text of the conventions

From the analysis of the text, it is evident that this Group of Conventions is homogenous in terms of length and content within the CBD framework. They are very much oriented than the previous ones in defining in technical terms the specific biological characteristics (Biological Diversity, Modified Organism) but also defining targets (Conservation Sustainable, Benefit Sharing).

By the lexical analysis, we can say that the work carried out within the CBD framework in the first twenty years of activity (1990-2010) is mostly oriented towards the scientific definition of biodiversity from a biological point of view.

In the following years, however, there was a profound change and broadening of the perspective which went from being scientific to becoming multidisciplinary. This is clearly evident in sentences like the following: "The Convention recognizes that biological diversity is about more than plants, animals and microorganisms and their ecosystems – it is about people and our need for food security, medicines, fresh air and water, shelter, and a clean and healthy environment in which to live" (Secretariat of the Convention on Biological Diversity, "How the Convention on Biological Diversity promotes nature and human well-being," 2020).

Subsequently, The Kunming-Montreal Global Biodiversity Framework (GBF) was adopted during the fifteenth Conference of the Parties (COP 15), after four years of consultations and negotiations. Building on the Convention's earlier Strategic Plans and aligned with the Sustainable Development Goals, this landmark framework provides a comprehensive roadmap to achieve the long-term vision of living in harmony with nature by 2050, which will be further examined in section 4.

5. BEYOND THE BIODIVERSITY CONVENTIONS: THE IBPES PLATFORM AND THE BIODIVERSITY EU STRATEGY

In this section we are going to analyze two initiatives that are peculiar in the use of a different kind of environmental agreements rather than conventions. These two are not formally conventions, but they are the expression of a different kind of initiatives in terms of biodiversity as we will see in the following.

a. IPBES

The first one is the so called IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services). IPBES is an intergovernmental organization established in Panama City, on 21 April 2012 by 94 Governments to improve the interface between science and policy on issues of biodiversity and ecosystem services. It is intended to serve a similar role to the Intergovernmental Panel on Climate Change, but with a specific focus on nature and its contributions to people.

The primary objective of IPBES is to provide governments, the private sector, and civil society with scientifically credible, independent, and up-to-date assessments of existing knowledge to inform evidence-based policy and action at local, national, regional, and global levels. Central to IPBES's work is its conceptual framework on biodiversity and ecosystem services, which supports analytical activities, guides the development and evolution of its work program, and aims to catalyze transformative change in addressing the drivers of biodiversity loss and ecosystem degradation.

This conceptual framework identifies six interlinked elements of a social-ecological system that function across multiple scales in time and space: 1) Nature; 2) Nature's contributions to people; 3) Anthropogenic assets; 4) Institutions, governance systems, and other indirect drivers of change; 5) Direct drivers of change; 6) Good quality of life.

These components and their interrelations are detailed in the framework adopted by IPBES and further elaborated in a scientific publication (Díaz et al., 2015). As illustrated in Figure 1, the framework provides a simplified model of the complex interactions between natural systems and human societies. By identifying the most relevant elements and their interconnections, the framework offers a foundation for assessments, knowledge generation, and capacity-building efforts that support the platform's overarching goal.
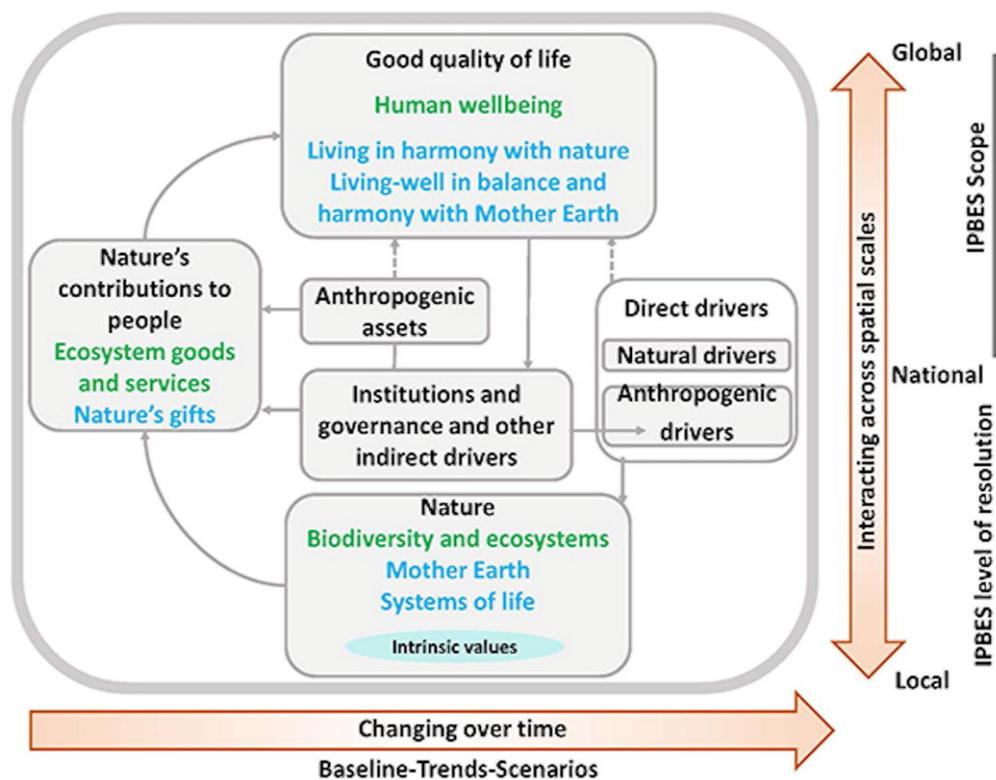
Figure 1 - The IPBES Conceptual Framework
Source: Diaz et al. 2015

Within the IPBES Conceptual Framework, the central panel uses boxes and arrows to represent the key elements of nature and society that form the core focus of the Platform. Each box includes black headlines that identify broad, inclusive categories intended to be meaningful for all stakeholders. The labels incorporate scientific categories (shown in green) as well as analogous or equivalent categories from other knowledge systems (shown in blue).

Human-centered (anthropocentric) values of nature are reflected in the boxes labeled "nature", "nature's contributions to people", and "good quality of life", as well as in the arrows linking them. In contrast, "nature's intrinsic values", illustrated by a blue oval at the base of the nature box, are considered independent of human experience and therefore are not included in these connections. The thick colored arrows along the bottom and right edges of the panel highlight that interactions among these elements evolve over time (horizontal arrow) and take place across different spatial scales (vertical arrow). The vertical lines adjacent to the spatial scale arrow indicate that while IPBES assessments primarily address supranational to global scales, they also draw upon processes and relationships occurring at national and subnational levels.

A defining innovation of the framework is its transparent, participatory development process, which explicitly integrates a wide range of scientific disciplines, stakeholders, and knowledge systems, including indigenous and local knowledge. In this way, the framework serves as a

shared foundation—broad, inclusive, and general—that enables collaboration among diverse actors and supports collective efforts toward achieving the Platform's overarching goals.

IPBES has also introduced a renewed definition of biodiversity for the intergovernmental arena, drawing substantially from the CBD's formulation. It defines biodiversity as: "The variability among living organisms from all sources, including terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are a part. This includes variation in genetic, phenotypic, phylogenetic, and functional traits, as well as changes in abundance and distribution over time and space, within and among species, biological communities, and ecosystems". This definition underscores the focus on living components, aiming to uphold the intent of the CBD's original definition while aligning more closely with contemporary ecological theory.

i.   The EU Biodiversity Strategy

In 2011, the European Commission adopted the EU Biodiversity Strategy, aimed at implementing a set of measures to halt the loss of biodiversity and ecosystem services within the Union by 2020. This strategy reflects the commitments undertaken by EU member states under the framework of the Convention on Biological Diversity (CBD) in 2010.

The originality of this European initiative consists in the formulation of a document based on a series of specific strategies to achieve six well-defined targets:

1. Protecting Species and Habitats: By 2020, the conservation status of species and habitats protected under EU nature legislation should show significant progress, with 50% more species and twice as many habitats achieving secure or improved status.

2. Maintaining and Restoring Ecosystems: Ecosystems and the services they provide must be safeguarded and improved by creating green infrastructure and restoring at least 15% of degraded ecosystems.

3. Promoting Sustainable Agriculture and Forestry: By 2020, measurable improvements must be achieved in the conservation of species and habitats that depend on or are affected by agricultural and forestry practices, along with an enhancement of related ecosystem services.

4. Ensuring Sustainable Fishing and Healthier Seas: By 2015, fishing activities should become sustainable, and by 2020, fish stocks must be healthy, European seas must show improved conditions, and fishing practices should no longer cause significant harm to species or ecosystems.

5. Combating Invasive Alien Species: By 2020, invasive alien species must be identified, priority species controlled or eradicated, and measures implemented to prevent the introduction of new species that pose a threat to European biodiversity.

6. Halting Global Biodiversity Loss: The EU should strengthen its efforts to contribute to halting biodiversity loss on a global scale by 2020.

The overarching objective of the strategy is to reverse biodiversity loss and accelerate the EU's transition toward a resource-efficient and green economy. This will be achieved by protecting and restoring biodiversity and ecosystem services, enhancing the positive impacts of agriculture, forestry, and fisheries, reducing the main pressures on EU biodiversity, and stepping up the EU's global efforts to conserve biodiversity.[4]

As we can see in Figure 2, also for the EU Biodiversity Strategy a conceptual framework has been developed in the literature (Maes et al., 2016).
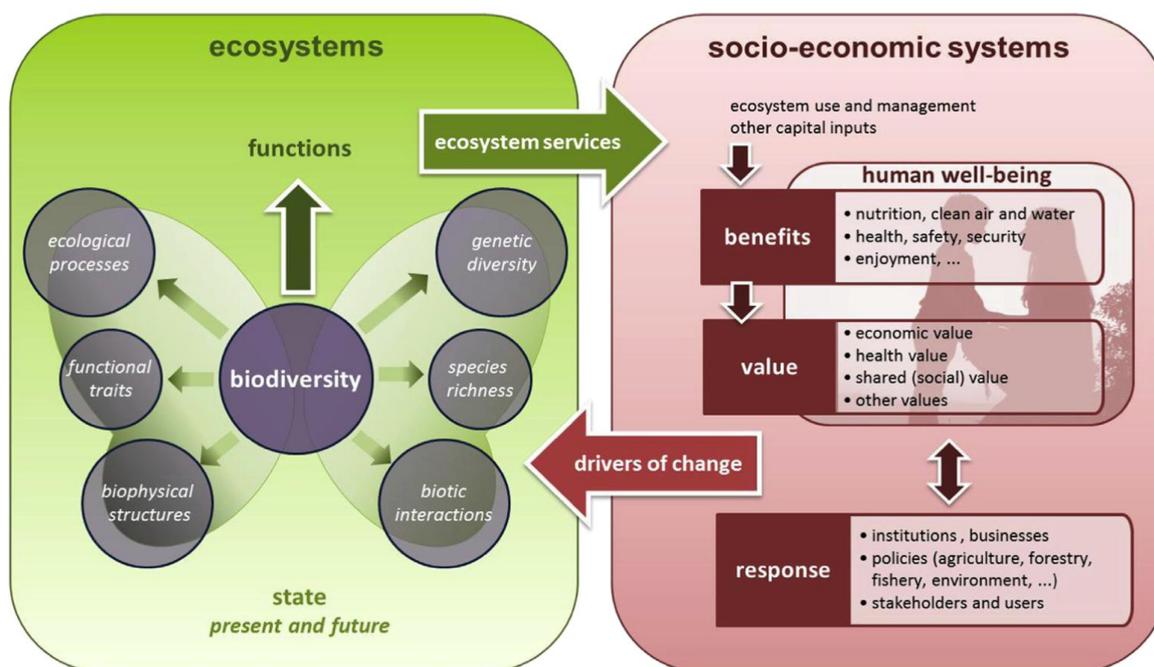
Figure 2 - The Conceptual Framework for EU Biodiversity Strategy to 2020

Source: Maes et al. 2016

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[4] In 2015, a mid-term evaluation of the EU Biodiversity Strategy 2020 was carried out. The resulting report highlights areas requiring increased efforts to achieve the EU's biodiversity targets by 2020. It emphasizes that concrete action on the ground, supported by sufficient financial resources, can effectively safeguard and restore nature while preserving the benefits it delivers. The report firmly opposes any revision of the existing Directives and instead advocates for strengthening their implementation, with consideration for economic, social, and cultural needs. Furthermore, it underscores the necessity of expanding financial tools dedicated to biodiversity protection and enhancing the connection between existing funding sources.
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In this simplified version, the conceptual framework connects socio-economic systems with ecosystems through the flow of ecosystem services, as well as through drivers of change. These drivers place pressure on ecosystems and their biodiversity, either as a direct result of using these services or as indirect impacts of human activities more broadly (MEA, 2005).

The EU Biodiversity Strategy aims to protect the status of all species and habitats under EU nature legislation and to achieve measurable and significant improvements in their conservation. To support this goal, assessments of habitats and species will be enhanced. Additionally, ecosystems and their services will be safeguarded and improved through the establishment of green infrastructure and the restoration of degraded ecosystems.

Integration across key sectors such as agriculture, forestry, and fisheries will be prioritized, with specific targets and actions to promote their positive contributions to biodiversity conservation and sustainable use. Ecosystem-based approaches will also be incorporated into climate change mitigation and adaptation strategies. These approaches provide cost-effective alternatives to technological solutions and deliver multiple benefits beyond biodiversity protection. Furthermore, pathways of invasive alien species will be identified to prevent their introduction and spread.

The EU Biodiversity Strategy emphasizes the ecosystem concept, which highlights the interactions between communities of living organisms and their environments. Biodiversity plays a fundamental role in supporting ecosystem functions (Cardinale et al., 2012; Mace et al., 2012). This concept establishes a connection between the habitats and species safeguarded by the EU Habitats Directive (European Union, 1992) and the spatial provision of ecosystem services, assigning specific roles to service providers according to their respective contributions. This is especially pertinent for protected habitats, which cover nearly half of the EU's terrestrial area. Ecosystem functions refer to the inherent capacity of ecosystems to generate services (de Groot et al., 2010). In this framework, ecosystem services represent the actual flow of benefits that meet societal demands, including goods derived from ecosystems. As Loreau et al. (2021) observe "Biodiversity can buffer ecosystem functioning against the disruptive effects of environmental fluctuations".

The governance of coupled socio-economic–ecological systems is a core element of the framework. Institutions, stakeholders, and users of ecosystem services influence ecosystems through both direct and indirect drivers of change (Kenward et al., 2011). Natural resource management policies (e.g., agriculture) seek to steer these drivers to achieve desired ecosystem outcomes. At the same time, many other policies—such as those on energy or territorial

cohesion—also shape these drivers, and thus affect ecosystems even if biodiversity is not their explicit focus.

After a few years an even more ambitious initiative was launched by the European Union, the EU Biodiversity Strategy for 2030, a long-term plan to protect nature and reverse the degradation of ecosystems. It aims to restore Europe's biodiversity by 2030 and contributes to the post-2020 global biodiversity goals. The new Strategy seeks to designate protected areas covering at least 30% of both terrestrial and marine environments in Europe. It also aims to restore degraded ecosystems across the continent by promoting sustainable agricultural practices, reversing the decline of pollinator populations, and rehabilitating a minimum of 25,000 km of EU rivers to a free-flowing state.

As outlined in Hermoso et al. (2022), this document is characterized by the idea to correct the limit of the previous version of the EU strategy by: 1) coordinating the EU Member States; 2) integrating biodiversity conservation into socio-economic sectors, iii) finding adequate and sufficient funds, and iv) improving governance and stakeholder participation.

In this new European initiative, it is widely acknowledged that future biodiversity conservation will depend on the expansion and improved management of protected area networks, the mobilization of additional funding sources—including private sector contributions—and the development of more effective co-governance models. Nonetheless, identifying sustainable solutions to reconcile conservation with competing socio-economic objectives, as well as addressing inconsistencies among sectoral policies, will be essential.

6. THE RISING OF THE ECONOMIC APPROACH TO "BIODIVERSITY"

The Kunming-Montreal Global Biodiversity Framework (KMGBF), adopted within the CBD framework in December 2022, sets out four long-term goals to 2050 and 23 action-orientated targets that are intended to achieve the mission of the Framework, which is to halt and reverse biodiversity loss and put nature on a path to recovery by 2030.

Target 18 of the Kunming-Montreal Global Biodiversity Framework calls for governments to scale up positive incentives for the conservation and sustainable use of biodiversity.[5] The novelty is the official mention to the use of economic incentives that plays a crucial role in the achievement of the Target.

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[5] Target 18. "Reduce Harmful Incentives by at Least $500 Billion per Year, and Scale Up Positive Incentives for Biodiversity Identify by 2025, and eliminate, phase out or reform incentives, including subsidies, harmful for biodiversity, in a proportionate, just, fair, effective and equitable way, while substantially and progressively reducing them by at least 500 billion United States dollars per year by 2030, starting with the most harmful incentives, and scale up positive incentives for the conservation and sustainable use of biodiversity".

Positive incentives for biodiversity encompass the so called "incentive-based" instruments that provide economic incentives to conserve and sustainably use biodiversity: they include taxes, fees, environmentally-motivated subsidies, tradable permit schemes, payments for ecosystem services, and biodiversity offsets (De Masi & Porrini, 2021). The peculiarity of these instruments is to provide price signals to both producers and consumers to behave in a more environmentally-sustainable way. Compared to more traditional regulatory, such as command-and-control instruments, economic instruments provide continuous incentives to help achieve a given environmental objective in a more cost-effective way (Porrini, 2019).

Positive incentives are essential for integrating biodiversity considerations across various sectors, including changes in land and sea use, overexploitation of natural resources, and pollution. By promoting the recognition of the real value of biodiversity and ecosystem services in economic choices, these incentives can help mobilize private funding and investment in support of biodiversity. Moreover, these incentives are able to generate revenue from biodiversity-relevant taxes and fees that is, in cases, also earmarked to help finance biodiversity conservation and sustainable use. Looking for example at biodiversity-positive taxes, they provide economic incentives to promote the conservation and sustainable use of biodiversity, including taxes on pesticides, fertilizers, forest products, and timber harvests. These taxes are grounded in the polluter-pays principle, imposing additional costs on the use of natural resources or the emission of pollutants to account for the negative environmental externalities they generate. This economic approach encourages producers and consumers to adopt more environmentally sustainable practices (Deutz et al., 2020).

The OECD Environmental Policy Committee gathers both quantitative and qualitative data on environmental policy instruments through its Policy Instruments for the Environment (PINE) database, with data currently spanning 146 countries worldwide. This 2024 update of Tracking Economic Instruments and Finance for Biodiversity presents data on the biodiversity-relevant economic instruments on currently available data in PINE, as shown in Figure 3.

According to the OECD PINE database, 70 countries currently apply biodiversity-positive taxes. While the number of such taxes grew steadily from 1980, their adoption has slowed since around 2015. As of 2024, these countries have implemented a total of 227 biodiversity-positive taxes.
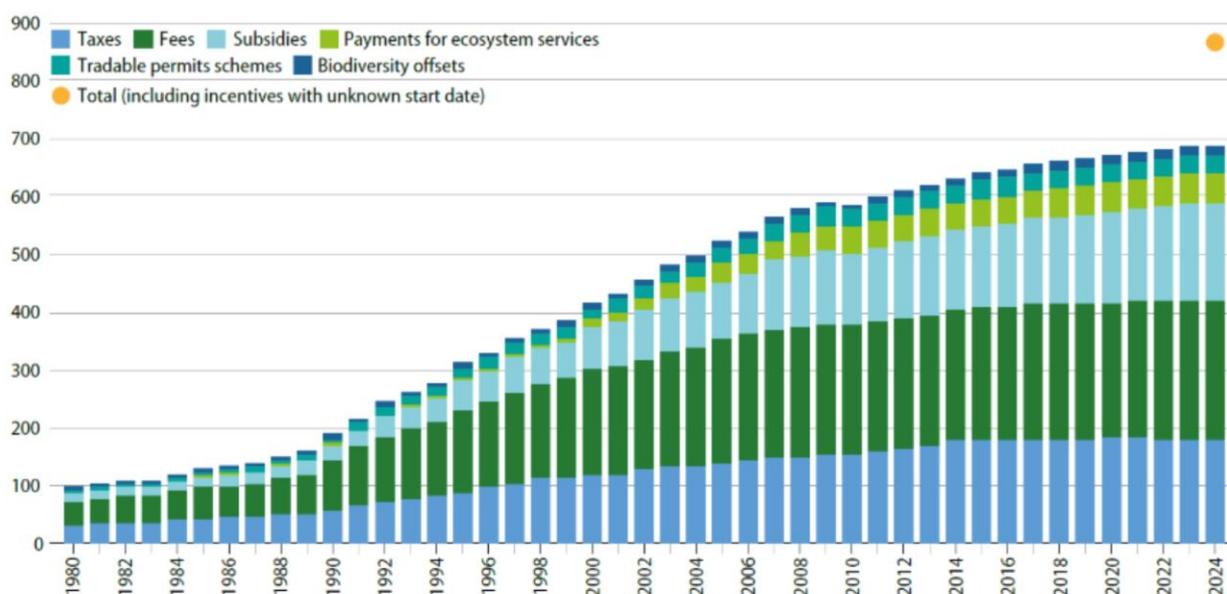
Figure 3 - Number of Active Biodiversity-Positive Incentives 1980-2024

Source: OECD PINE database, accessed November 2024

Biodiversity-positive fees (or charges) function in a similar way. Examples include entrance fees for national parks, hunting and fishing license fees, charges for land-based sewage discharges or groundwater abstraction, and fines for biodiversity-related non-compliance. Currently, 75 countries have biodiversity-positive fees in place depicts the trend in the number of countries with biodiversity-positive fees over 1980-2024. The number of active biodiversity-positive fees is 301 and the trend is increasing, as shown in Figure 3.

Tradable permits relevant to biodiversity include instruments such as individual transferable quotas (ITQs) for fisheries, tradable development rights, and tradable hunting rights. These tools establish a total cap on the exploitation of a natural resource and then distribute individual permits to users, which can be exchanged. Permit allocation can occur through grandfathering—assigning permits free of charge to current resource users, often indefinitely - or through auctions. When auctioned, tradable permits can also provide a source of revenue.

Currently, 25 countries have biodiversity-positive tradable permits, with a total of 34 schemes. According to the PINE data, in 2024, ITQs for fisheries are the main type of biodiversity-positive tradable permit schemes.

Biodiversity offsets are defined as quantifiable conservation results achieved through actions aimed at compensating for significant remaining negative impacts on biodiversity caused by project development, once suitable prevention and mitigation measures have been implemented. They are applicable to a wide range of sectors (e.g. mining, wind power, property development) and can be used to compensate for impacts on a variety of ecosystems.

Biodiversity offset schemes operate with an overall objective of no net loss of biodiversity, with some schemes adopting a more ambitious objective of a net gain in biodiversity. By imposing additional costs on developers whose activities have adverse impacts on biodiversity, biodiversity offsets are thus in line with the polluter pays approach.

Since 2022, the PINE database also allows for the reporting of information on biodiversity offset schemes, thereby providing a platform where data on biodiversity offset schemes can be collected in a structured and harmonized way across countries. While comprehensive data on biodiversity offsets is not yet available, the PINE database contains 9 countries with biodiversity offsets programs in 2024, covering a total of 17 active biodiversity offset schemes. While recent data on finance mobilized by biodiversity offsets is not yet available, previous studies have estimated that the finance mobilized by biodiversity offset schemes was in the order of USD 6.3-9.2 billion per year (Deutz et al., 2020).

Biodiversity-positive subsidies can be defined as environmentally beneficial if it reduces directly or indirectly the use of something that has a proven, specific negative impact on the environment. Biodiversity-positive subsidies include, for example, grants or loans to help finance sustainable forest management and reforestation, organic or pesticide-free agriculture, and land conservation.

There are currently 34 countries that have biodiversity- positive subsidies with a total of 240 biodiversity-positive subsidies, as reported in the PINE database.

Payments for ecosystem services (PES) are described as: (1) voluntary agreements, (2) between those who benefit from ecosystem services and (3) those who manage or provide them, (4) contingent on compliance with agreed-upon natural resource management practices, (5) aimed at producing benefits beyond the site of service provision (Wunder, 2015). PES operate on the principle that the user or beneficiary bears the cost.

Since 2022, the PINE database also allows for the collection of information on PES programs, thereby providing a platform where data on PES schemes can be collected in a structured and harmonized way across countries. While comprehensive data on PES programs is not yet available, the PINE database contains 28 countries with active PES programs in 2024, covering a total of 51 PES programs.

7. CONCLUSION

By combining a textual analysis of international biodiversity conventions with a law-and-economics interpretation of emerging policy frameworks, this study highlights the gradual development of global initiatives and frameworks aimed at conserving biodiversity and

ecosystem services. Early conventions from the 1970s primarily focused on safeguarding specific natural resources with an ecological orientation but did not explicitly address biodiversity as a concept. Over time, these agreements evolved into more comprehensive instruments, particularly with the introduction of the Convention on Biological Diversity (CBD) and subsequent frameworks like the Kunming-Montreal Global Biodiversity Framework (KMGBF).

The CBD has progressively broadened its focus, moving beyond scientific definitions of biodiversity to embrace a multidisciplinary approach that includes social, economic, and cultural dimensions. The KMGBF, adopted in 2022, outlines strategies to halt and reverse biodiversity loss by 2030, emphasizing economic incentives and the integration of biodiversity considerations into wider economic sectors. This evolution reflects an increasing awareness of the intricate connections between natural systems and human well-being. Economic tools such as biodiversity-positive taxes, subsidies, and payments for ecosystem services (PES) have become pivotal in advancing conservation efforts. These mechanisms not only promote sustainable practices but also generate essential financial resources to combat environmental degradation. Their role is vital in driving sustainability and engaging the private sector in biodiversity objectives.

In parallel, initiatives like the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) have strengthened the link between ecology and economy. IPBES provides governments and stakeholders with critical insights to inform decision-making, emphasizing the interplay between socio-economic systems and ecosystems. Its conceptual framework advocates for integrated, cross-disciplinary approaches to biodiversity management. Achieving global biodiversity goals requires ongoing commitment, innovation, and collaboration across all sectors. Recognizing biodiversity's value, not only for ecological purposes but also for its economic value, offers hope for the future. By aligning policies, scientific research, and financial strategies, it is possible to halt biodiversity loss, restore ecosystems, and secure a sustainable future.

In summary, the evolution of biodiversity governance, exemplified by the CBD, the Kunming-Montreal Framework, and regional initiatives like the EU Biodiversity Strategy, demonstrates a significant transition from a solely scientific focus to a holistic, multidisciplinary approach. Understanding the interconnectedness of biodiversity, ecosystem services, and human well-being is central to shaping sustainable environmental policies.

The increased reliance on economic mechanisms, such as incentives, taxes, and ecosystem service payments, provides innovative and cost-effective means of mainstreaming conservation

efforts across diverse sectors. These tools align financial and policy frameworks to effectively preserve biodiversity and promote ecosystem restoration.

Looking forward, the success of these frameworks will depend on robust international cooperation, effective governance, and expanded implementation of positive incentives. The collaboration between science, policy, and finance will be crucial in reversing biodiversity loss and fostering a future where nature and humanity thrive together.

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ABBREVIATIONS

ALGIERS	African Convention on the Conservation of Nature and Natural Resources
CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on the Conservation of Migratory Species of Wild Animals
EPBC	Environment Protection and Biodiversity Conservation Act
GBF	Kunming-Montreal Global Biodiversity Framework
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
ITQs	Individual Transferable Quotas
IUCN	The International Union of Conservation of Nature
PINE	Policy Instruments for the Environment
RCW	Ramsar Convention on Wetlands
UNCLOS	United Nations Convention on the Law of the Sea

REGULATING THE INDIAN THRIFT MARKET: AN ECONOMIC ANALYSIS OF THE TRADEMARKS ACT, 1999

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ABSTRACT

'Thrifting' in layman's language, is the practice of purchasing commodities that have not been sold to the primary consumers, or have been used by them and are up for sale again. Naturally, the idea of thrifting clothes is to lengthen the cycle of the apparel and delay its ultimate disposal. A typical thrift market for apparel in India is a street market with vendors selling clothing items that have been discarded by their producers due to defaults as minor as a wrong stitch. These items are available in bulk and are sold at a price much below than what the brand would sell in their outlets otherwise. The growth of social media platforms has also given an opportunity to resellers, especially small businesses, to capitalise on the wide reach. The creation of secondary markets has become a bone of contention between original producers and resellers in mature jurisdictions such as those of the European Union for example, where the intellectual property rights of the former have been demanded for. The Indian legal regime for trademark protection, however, does not provide solace to brands that aim to protect their exclusivity and reputation in the domestic thrift market. This article uses statistical tools to assess consumer responses to analyse whether resellers are posed as competitors to brand manufacturers. Further, a model has been proposed to impose product liability on resellers to protect the interests of consumers and brands alike.

Keywords: *Thrifting, Trademark, Product Liability, Income, Environment*

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1. INTRODUCTION

Exclusivity to a brand is of prime importance to the producer since it is the first step to creating an image in the minds of consumers. A company can achieve this distinctiveness through using the tool of trademarks. Essentially, trademarks are the means through which consumers relate to a brand's quality. These intellectual property tools reduce the search costs for a consumer who wish to purchase a commodity with certain qualities. On the supply side, it also creates an incentive for the manufacturers to supply goods of great quality (Cooter and Ulen, 2016).

On this note, thrifting culture includes the secondary market of brand surplus or preowned clothes which are sold to buyers at cheaper rates (Panda, 2022). This challenges the relevance of a brand's identity. The situation becomes more alarming for luxury brands for whom the maintenance of rarity is the key to stay relevant in the market. A notable American case in this regard is that of the renowned French luxury brand Chanel, which filed a trademark infringement suit against a luxury secondhand retailer, The RealReal. (*Chanel, Inc. v. The RealReal, Inc.*, 2021). The allegations include false endorsement and advertisement, apart from unfair competition under the American Trademark Act (Lanham Act, 1946). The elementary dispute in the case is whether the retailer has the requisite authentication process to qualify products manufactured by Chanel that deceived the consumers into falsely believing that it obtained the necessary approval from the brand to resell its apparel. The proliferation of thrift stores presents itself as an avenue to companies for pursuing opportunities to extend their trademark protection rights into the resale transactions (Robertson, 2023). However, the case has not been concluded as of now, but it could provide a concrete precedent for determining the extent to which brands in general have an authority over the reselling of their products in the second-hand market.

Conversely, in the case of Tiffany v. eBay (*Tiffany (NJ) Inc. v. eBay Inc.*, 2010), it was alleged by the brand that eBay, a popular second-hand merchandise seller was selling counterfeit Tiffany merchandise. The American court rejected its allegations to state that eBay was itself not selling counterfeit items (contrary to the case of RealReal where the retailer had a verification process to check such counterfeiting) as vendors had the autonomy to sell their infringed merchandise. RealReal itself controlled a second-hand market of trademarked luxury goods and therefore, can be subjected to the burden of potential liability for "selling, offering for sale, distributing, and advertising goods in the market it created." Even if costs are imposed

on RealReal for violation of the abovementioned, Chanel cannot obtain a total injunction to bar it from reselling the products by virtue of the Doctrine of First Sale (Barer and Villazon, 2024).

2. CONCEPTUAL FRAMEWORK

a. Infringement of Trademark of brand manufacturers

The fundamental idea behind intellectual property laws is to provide as much safeguard which is required for incentivising innovation, but not to make it too rigid which shall hamper free competition in the market. In this regard, intellectual property rights are distinct from the species of real property, as the legal protection in the former is strategized to tackle the tragedy of commons (Lemley, 2005). This tragedy foresees the depletion of resources when they are open to use by public without any regulations. Thrift markets, like the primary markets for apparel, permit brands to earn enough income to cover their costs, but it does not help in realising the full social value of the product. These social values impose social costs, that become externalities which remain uncompensated for. The goal of property rights would be to equate private and social costs. An efficient intellectual property law regime would, therefore, focus on internalising the costs & benefits, thereby facilitating the selling of the product to the consumer who values it more (Demsetz, 1967). This internalisation would create the problem of free riding by the competitors, where they obtain a benefit from the manufacturer's investment.

b. Creation of Monopoly

In the case of secondary markets of thrift, the extent to which the original producer can control the resale should be carefully determined. This takes us to the flipside of granting exclusive rights of reselling to the brands. Trademarks enable the brands to have a monopoly if they are permitted to infiltrate the thrift market (as was counter-alleged by RealReal against Chanel) (*Chanel, Inc. v. The RealReal, Inc.*, 2021). Naturally, consumers are driven towards the market for thrift owing to the cheap rates. In a scenario where brand manufacturers are permitted to sell their clothing in the thrift stores, they will have the scope of selling their items at a price which is similar to their outlet prices. If the brand is allowed to become an unfettered monopolist in the secondary market, it will price its products to equate its marginal costs to its marginal revenue. This is because it will not prefer to lose money by selling an additional unit if it has the option to recoup its costs. If the pricing is set at a level which is very high than the marginal cost, it will create the problem of deadweight loss. The deadweight loss is a market inefficiency where the potential consumers of thrifted clothing are drawn out of the market

since their marginal benefit from the clothing item is lower than the price at which the monopolist brand would potentially sell it. In other words, it is the loss of potential transactions that could have taken place if not for the high prices set by the monopolist.
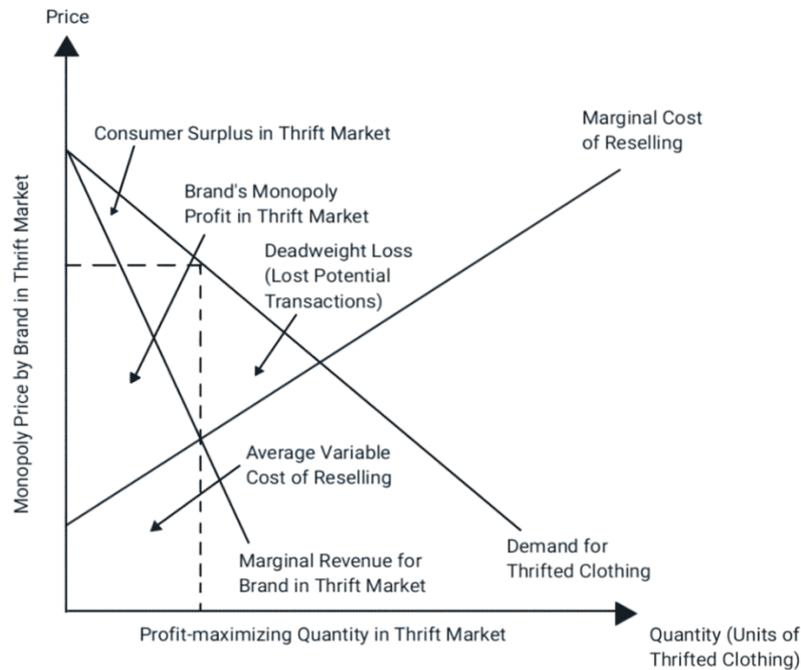

Figure 1. The Monopolist Pricing of Brand Manufacturers
Source(s): Authors' own construction

c. The Principle of Exhaustion

The Principle of Exhaustion allows lawful owners of trademarked products to freely resell it without any restriction. The origins of this principle can be found in the 'Doctrine of First Sale' that was developed in the American jurisprudence in the century old the case of Bobbs-Merrill Co. v. Straus (*Bobbs-Merrill Co. v. Straus*, 1908). The United States Supreme Court in this case did not identify the right of the original producer of the book (defendants) to restrain the booksellers (plaintiffs) from selling the book further at lower prices, despite an explicit condition in the first transaction against it. In the words of the Hon'ble bench, "*there is no privity between the future purchasers of the book with the copyright holder and hence cannot attempt to limit the sales*".

In India, the Trade Marks Act 1999 ('The Act'*)* has incorporated the principle, which has been further developed by judicial precedents (*Kapil Wadhwa & Ors. v. Samsung Electronics Co. Ltd. & Anr.*, 2012; *Philip Morris Products S.A. & Anr. v. Sameer & Ors.*, 2014). The Act states that when the goods bearing a registered trademark are lawfully acquired by a person, and he

further intends to sell that product, it shall not be an infringement of the trade mark (Trade Marks Act, 1999). Conversely, the proprietor of the trademarks has a right to oppose further dealings in these goods, if their condition has been changed or impaired after they have been presented in the market (Trade Marks Act, 1999). The Act, however, mandates that for the proprietor of the trademark to sue for infringement, the quality of the product in question should be considerably changed (*Patanjali Ayurved Limited v. Masala King Exports Trading Pvt. Ltd. & Ors.*, 2020).

So far, there is no specific precedent of trademark infringement in the Indian apparel industry with respect to resale in secondary markets. The limited mention of reselling in the Act and the requirement of 'considerable' altercation of the commodity is a loophole open for exploitation by the vendors who currently escape liability. The following article establishes how resellers infringe the trademark rights of the proprietors using the economic tools for patent protection, thereafter which presents the model for imposing product liability upon them. In the concluding sections, certain policy recommendations have been presented, that may be incorporated in the existing regime to adapt to the secondary market of thrifting.

3. RESEARCH PROBLEM AND OBJECTIVES

As described in the introductory part so the article, the advent of thrift markets in India poses a newfound challenge of protecting trademarks for brands. It is pertinent to note here that thrifting is not bad for the society. On the contrary, it is good for the environment since there shall be a reduced demand for novel clothes, which will result in lesser utilisation of resources in apparel production. However, it is important from a consumer's perspective that the identification of the brand in the thrift market is made simpler, to facilitate concrete authentication. This is currently lacking in the market for thrifting in India, which this paper addresses in the following sections. Through a statistical analysis of consumer opinions, the authors present the need of imposing product liability upon the resellers using economic tools.

The following are the objectives that the paper aims to address: -

(i) To explain the infringement of trademark owned by the proprietors in the thrift market where resellers pose a competition to them by selling the clothes at lesser prices by applying statistical analysis of consumer responses to the economic theory of trademark protection.

(ii) To present a model for incorporating liability on resellers because of dearth of information about the brand's identity amongst the consumers by applying statistical analysis of consumer responses to the economic theory of product liability.
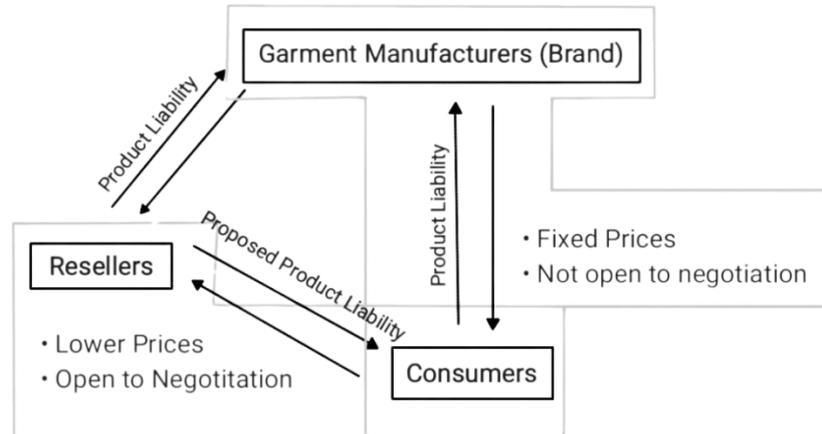

Figure 2. Proposed Product Liability Framework for Thrift Markets under Trademark Law

Source(s): Authors' own construction

This diagram encapsulates the core argument of the paper: integrating product liability into India's thrift market to protect both consumer interests and trademark integrity while balancing affordability and brand exclusivity. Currently, garment manufacturers (brands) maintain fixed, non-negotiable prices and are subject to product liability for defective goods. Resellers in thrift markets, however, offer lower, negotiable prices without assuming liability, despite competing with brands while using their goodwill and trademarks. The paper proposes extending product liability obligations to resellers, ensuring they internalize risks associated with selling potentially defective or counterfeit goods in the second-hand market. This framework aims to create an equitable balance where consumers retain affordability and choice, brands protect their trademark and reputation, and resellers ensure transparency and quality, thereby supporting a sustainable, legally robust thrift ecosystem in India.

4. RESEARCH METHODOLOGY

An empirical survey consisting of questions intended to understand the consumer behaviour towards thrifting was conducted through the dissemination of an anonymous virtual form. The questions are close ended, and are operative on the 5-point Likert Scale. The available options were Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), Strongly Agree (5). The ordinal data then obtained was statistically analysed to check the correlation and the strength of it.

A total of 59 responses are analysed, and the consumers belong to the age range of 15-25 since thrifting is an upcoming trend that is popular amongst the younger generation. The tool which has been used in this statistical analysis is convenience or purposeful sampling. The sample size is free from geographical restraints, but is limited to consumers in the Indian thrift market. The results have been derived from conducting a statistical analysis using the Jeffreys's Amazing Statistics Program ('JASP').

5. STATISTICAL FRAMEWORK AND RESEARCH FINDINGS

The vendors in a thrift market are essentially competitors to the brands as they do not have to incur the initial costs of designing and manufacturing the clothes, which enables them to sell the same product at a lesser rate. Due to a lack of a justified pricing mechanism where there are no base prices, the cost of an item is negotiable and open to bargain. However, the Act provides solace to the manufacturers when it restricts reselling of products in the primary market, allowing the brand manufacturer to recoup its initial costs of designing without the threat of being undersold. A statistical analysis of the consumer responses for the propensity to thrift amongst the sample and its correlation with the feature of low prices in the thrift market is presented as follows:

1. **Null hypothesis (H0):** That there is no correlation between the propensity to thrift amongst consumers and the feature of low prices for thrifted items

2. **Alternative hypothesis (H1):** That there is a correlation between the propensity to thrift amongst consumers and the feature of low prices for thrifted items

	Propensity to thrift	Attractiveness of low prices
Valid	59	59
Missing	0	0
Mean	3.172	3.508
Std. Deviation	0.966	0.954
Shapiro Wilk	0.885	0.878
P-Value of Shapiro-Wilk	<.001	<.001
Minimum	1.000	1.000
Maximum	5.000	5.000

Table 1. Descriptive Statistics

Source(s): Author's construction

Propensity to thrift	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Disagree	1	1.695	1.695	1.695
Disagree	5	8.475	8.475	10.169
Neutral	17	28.814	28.814	38.983
Agree	23	38.983	38.983	77.966
Strongly Agree	13	22.034	22.034	100.000
Missing	0	0.000	-	-
Total	59	100.000	-	-

Table 2. Frequency Table for Propensity to Thrift

Source(s): Author's construction

Attractiveness of low prices	Frequency	Percent	Valid Percent	Cumulative percent
Strongly disagree	1	1.695	1.695	1.695
Disagree	9	15.254	15.254	16.949
Neutral	15	25.424	25.424	42.373
Agree	27	45.763	45.763	88.136
Strongly Agree	7	11.864	11.864	100.000
Missing	0	0.000	-	-
Total	59	100.000	-	-

Table 3. Frequency Table for Attractiveness of Low Prices

Source(s): Author's construction

Variable		Propensity to Thrift	Attractiveness of Low Prices
Propensity to Thrift	Spearman's Rho	-	-
	P-Value	-	-
Attractiveness of low prices	Spearman's Rho	0.353	-
	P-Value	0.006	-

Table 4. Correlation

Source(s): Author's construction

Since the p-value (0.006) is less than the significance level (0.05) we can reject the null hypothesis (H0) to state that there is a statistically significant monotonic correlation between the propensity to thrift amongst consumers and the feature of low prices for the thrifted item. The Spearman's rank correlation coefficient of 0.353 indicates that there exists a moderate monotonic relationship between the propensity of the consumers to thrift and the fact that cheap rates of the clothes is what attracts them to the thrift market. This finding suggests that the vendors of the secondary market present themselves as competitors to the brands.

6. PRODUCT LIABILITY MODEL

Product liability refers to the legal responsibility imposed upon manufacturers and sellers when consumers suffer harm due to a defective product (Ottley et al., 2013). This legal framework primarily addresses products with observable utility but hidden risks, where the appeal of these items lies in their observable utility despite the potential for injuries due to undisclosed risks (Hylton, 2012). This unique combination of features often leads to market failure, as consumers may lack sufficient information to make informed choices, and producers may not have incentives to prioritize safety in their designs. In contrast, products with openly apparent risks are more effectively regulated by the market.

In cases where safer alternatives offering similar utility are available, consumers tend to opt for these alternatives, leading to the exclusion of riskier products from the market (Landes and Posner, 1985) However, the regulatory reach of product liability law is extensive, covering a wide range of products, making it challenging for government regulatory agencies to entirely replace the role of courts. Even without issues like regulatory capture or sluggish government incentives, courts applying liability rules have an advantage over regulators as they respond directly to actual injuries rather than mere breaches of regulatory mandates, which may not always result in significant harm (Huber, 1995). Product liability law plays a crucial role in correcting market failures and ensuring consumer safety.

The landmark case of Henningsen v. Bloomfield Motors, Inc. (*Henningsen v. Bloomfield Motors, Inc*., 1960) marked a pivotal moment in the evolution of American product liability law, as it deliberated on the transition from implied warranty to strict liability as the prevailing theory. Over time, it has become apparent that the principles governing liability for sellers of new products are equally applicable to sellers of used goods such as second hand clothing in the present case (Metzger, 1977). Notable cases such as Turner v. International Harvester Co. *(Turner v. International Harvester Co.,* 1975) and Peterson v. Lou Bachrodt Chevrolet Co. (*Peterson v. Lou Bachrodt Chevrolet Co*., 1974) have affirmed the legitimacy of applying strict liability to the sale of used goods, citing familiar policy arguments often used to justify strict liability for new product sellers. Despite sellers of used products not being the creators of risk in the same sense as manufacturers or retailers, courts have recognized that they still contribute to the flow of commerce and thus should be held to similar standards (Metzger, 1977). Moreover, the concept of a minimal level of quality has been extensively discussed in cases like Overland Bond & Investment Corp. v. Howard (*Overland Bond & Investment Corp. v. Howard*, 1972), where the court emphasized the lack of justifiable reasons for distinguishing

between new and used goods in terms of liability. Despite the beneficial aspects of product liability, such as incentivizing firms to enhance product safety, ensuring prices reflect associated risks, and compensating injured consumers, criticisms persist regarding the potential for heavy litigation and associated costs to outweigh these benefits (Shavell and Polinsky, 2010).

The implementation of strict product liability laws in the second-hand clothing market aims to ensure quality assurance, transparency in product information, and fair return and refund policies for both sellers as well as purchasers (Metzger, 1977). These laws require sellers to internalize the costs associated with potential product defects, prompting a comprehensive assessment of the product's benefits versus risks before offering it for sale. In situations where neither party is negligent, it is preferable for sellers to assume these costs, as they are better equipped to manage them and can adjust pricing accordingly to mitigate risks, effectively serving as insurers against defective clothing

Furthermore, such product liability laws will help in addressing the information asymmetry between sellers and purchasers, which is particularly evident in the second-hand clothing market where purchasers may lack knowledge about the item's history and authenticity. Sellers, possessing more information on the product's condition and potential risks, are responsible for identifying, addressing, and communicating any concerns to purchasers. An overall evaluation, considering both benefits and trade-offs, occurs when individuals seek information and weigh options to achieve the perceived value of goods. This assessment encompasses various factors including price, risk, and convenience, as depicted in the provided figure, viewed through the lens of mental accounting theory (Boedecker and Morgan, 1993).
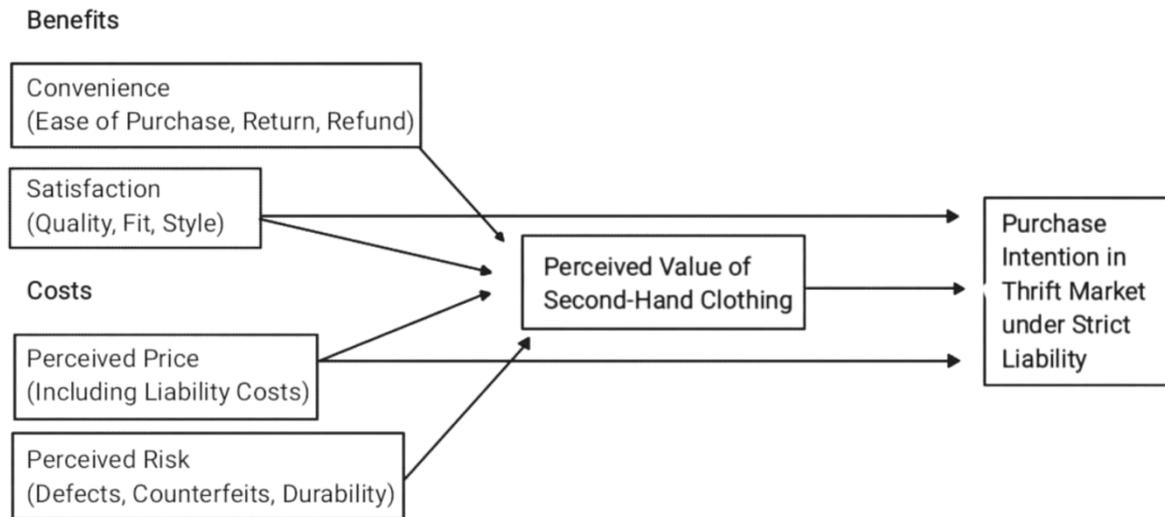
Figure 3. Mental Accounting Theory Model for Strict Liability in Thrift Markets
Source(s): Authors' own construction. Also refer to Gupta, S., and Kim, H. (2009).

Enforcing product liability laws in the second-hand clothing market ensures consumer safety, transparency, and financial security by holding sellers responsible for product quality. This promotes fairness and efficiency in the marketplace for both sellers and buyers. The following are the scenarios where product liability is imposed upon resellers via measures like quality and durability assurance.

a. Scenario 1: Increased search costs vis a vis low prices of items

Consumers are attracted to the low prices set by resellers, regardless of its quality. Thrift stores do not operate on brand identity, and as a result, consumers are not offered the information about the quality of the product. Thus, there is an increase in time, effort and money spent by consumers i.e. the search costs, in comparing the thrifted garment pieces within a shop and amongst different shops. Thus, if search costs are fixed for consumers in a thrift market, resellers will compete against one other to lower the prices of the garment itself. This results in excessive consumption of risky items and suboptimal societal welfare. Imposing product liability upon resellers which factors measures of quality and durability assurance, disclosure of product information, and return and refund policies will result in shifting of injury costs to the reseller.

b. Scenario 2: Enforcement of product liability will result in increased costs for resellers

To enforce product liability on resellers, they will be required to undertake inspection and quality-check measures for the items which they sell. They may also be required to offer refund schemes. This mechanism may exploit the ecological cycle, where items which are found unfit for resale are discarded. For consumers, this may lead to a negative trickle-down effect where they will bear the increase in costs. Thus, these markets will witness reduced consumer purchases and promote safer consumption choices which enhances the overall societal welfare. In a situation where consumers purchase multiple items, if the fixed costs for taking regulatory measures is same for all resellers, consumers will compare the total purchase price of all items that they wish to thrift and not their individual prices. Resellers will thus, compete against one another to capture the larger market share by offering incentives in the form of discounts and schemes to promote consumers to purchase items in bulk. With low shifting costs, consumers will not hesitate to purchase items at the next best alternative price for same items.

c. Scenario 3: Informed Consumers Behaviour

With full awareness of product risks and liability in place, consumer behaviour adapts accordingly. Resellers can take advantage of advertisements and promotion schemes to educate consumers about the durability of the item. This increase in advertisement costs, in addition to the increase in injury costs, will incentivise resellers to allocate their resources efficiently to drive their profits. While appealing features (like the uniqueness of an item) may still drive demand for riskier items, consumer awareness about associated risks will moderate this demand. This will result in a new equilibrium where prices and quantities optimize consumer welfare, balancing product appeal with risk factors. Compensation payments can further optimize the equilibrium quantity, ensuring a socially optimal level of consumption.

7. POLICY RECOMMENDATIONS

With insufficient oversight, second-hand apparel platforms risk becoming breeding grounds for counterfeiters, where pre-owned counterfeits are offered alongside genuine items or new counterfeits disguised as pre-owned goods (Elias et al., 2023). This dual threat of brand authentication and counterfeit detection is further complicated by the difficulty of distinguishing lightly worn genuine pieces from expertly crafted fakes. A recent Bengaluru police raid seized approximately INR 30 lakh worth of counterfeit branded apparel featuring imitations of Levi's, Nike, Puma, Ralph Lauren, and Polo operating through informal second-

hand channels (Times of India, 2025b), highlighting the real-world prevalence of this challenge.

a. Enforcement Under the Trade Marks Act, 1999

Under the Trade Marks Act, brand owners have recourse to Section 103 (Trade Marks Act, 1999), which imposes criminal penalties for the application and sale of goods and services under false trademarks. However, the practical enforcement of these provisions within the complex online second-hand apparel ecosystem is limited, often requiring proactive efforts from brands to monitor marketplaces, collect evidence, and initiate complaints. As the second-hand fashion sector continues to expand, brand owners are urged to adjust their strategies, acknowledging the potential advantages of engaging with this market rather than simply resisting its growth.

b. Brand-Led Strategies to Navigate the Second-Hand Market

Embracing the second-hand market represents a significant stride toward bolstering the sustainability of the fashion industry. Numerous brands have already commenced exploration of this sector by establishing online platforms for selling vintage items or permitting consumers to list their pre-owned goods, akin to The RealReal. Alternatively, brands could establish temporary or permanent stores exclusively dedicated to marketing pre-owned goods, empowering them to retain oversight of quality while upholding their esteemed luxury image. This approach allows brands to secure a share of the second-hand market revenue they might otherwise overlook while enabling them to connect with fresh audiences, thereby showcasing adaptability to evolving consumer preferences. Additionally, brands can leverage insights gleaned from second-hand buyers to pinpoint new target demographics.

c. Collaborations with Second-Hand Platforms

Forging partnerships with second-hand retailers and online platforms such as Vestiaire, Depop, and Vinted can yield mutual benefits for both brand owners and online platforms. Through collaboration, brand owners can offload logistical responsibilities such as shipping and authentication while accessing a broader customer base and strengthening credibility. Conversely, online platforms stand to enhance their credibility, popularity, and customer base by associating with reputable brand owners. This collaborative approach enables brands to capitalize on the logistical infrastructure of online platforms without incurring additional expenses.

d. The Need for Regulatory Strengthening Under E-Commerce Rules

Currently, the Consumer Protection (E-Commerce) Rules, 2020, particularly Rule 4(3) (Consumer Protection (E-Commerce) Rules, 2020) requiring platforms to display seller details and Rule 5(3)(b) (Consumer Protection (E-Commerce) Rules, 2020) on disclosing product information, are designed to enhance transparency, but primarily protect consumers and fall short in assisting brand owners to trace and act against counterfeiters in India's booming second-hand e-commerce market. The lack of mandatory seller KYC disclosures to brand owners, inadequate requirements for platforms to verify the authenticity of goods before listing, and the absence of clear takedown timelines for counterfeit complaints leave brands exposed to reputational harm and revenue loss. To address these gaps, it is recommended that the E-Commerce Rules be amended to mandate seller identity verification with disclosures to brand owners upon request, establish pre-listing authentication for branded second-hand goods, and require prompt takedowns upon evidence of trademark infringement. This regulatory strengthening would align the consumer protection focus of the Rules with trademark enforcement needs in the second-hand market, ensuring that the sustainability goals of thrifting do not come at the cost of weakened brand protection.

Fundamentally, brand owners and online platforms must collaborate closely to combat the proliferation of counterfeit products. Transparency and comprehensive training from brands are critical for quickly identifying and removing counterfeit items. Platforms should adopt robust seller authentication processes and enforce penalties for violations. A recent coordinated raid in Meerut, conducted by anti-counterfeit firm Brand Protectors India alongside Uttar Pradesh Police, led to the seizure of fake SG cricket gear worth around INR 4 lakhs (Times of India, 2025a) demonstrating the effectiveness of joint operations involving brand partners, platforms, and law enforcement.

8. CONCLUSION

The interface between trademark law and second-hand clothing retailing sheds light on the intricate dynamics of intellectual property rights and market accessibility within the context of thrift shopping. While trademarks grant exclusive rights to original clothing brands, allowing them to recoup costs through pricing strategies, thrift shops sell branded items at lower prices due to the absence of such costs. Despite trademarks, the doctrine of exhaustion permits lawful resale of products, benefiting thrift retailers. However, challenges may arise if thrift retailers exceed the scope of exhaustion, such as reproducing patented designs without authorization.

Moreover, product liability laws play a crucial role in ensuring consumer safety and fairness within the second-hand clothing market. These laws hold manufacturers and sellers accountable for defective products, promoting transparency and quality assurance. Enforcing product liability mechanisms in the second-hand clothing market enhances consumer welfare by shifting injury costs to retailers and incentivizing safer consumption choices. However, while enforcing such measures may be easier for online platforms, the asymmetric physical markets where activities are not regularised may pose a challenge for authorities to impose liability on resellers.

The efficacy of the Act in regulating the secondary market of thrifting in India requires a comprehensive understanding of trademark protection, patent rights, and product liability. Policymakers must consider measures to enhance trademark protection, regulate thrift clothing retailing, and promote consumer awareness to ensure a fair and sustainable marketplace. By addressing these complexities, policymakers can uphold intellectual property rights while promoting economic efficiency and consumer welfare in the fashion industry.

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ECONOMIC ANALYSIS OF ALGORITHMIC COLLUSION AND SELF-PREFERENCING IN DIGITAL MARKETS: COMPETITION CHALLENGES AND REGULATORY RESPONSES

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ABSTRACT

The global digital markets are stimulating traditional market competition frameworks. This is with respect to the algorithmic systems empowering innovative methods of coordination and exclusion in the digital markets. The present research is an attempt to inspects the economic aspect underlying the same. Numerous studies reveals that algorithmic pricing system are self-reliant in achieving coordinated results. Evidences from global enforcement cases have shown the use of self-preferencing practices through game-theory. The current Google Shopping decision, RealPage investigation, by the U.S. Department of Justice's and the Competition Commission of India's ongoing Amazon-Flipkart investigation reveals self-preferencing practices as a threat to consumer surplus. This paper attempts to throws light on the trials faced by the old-school competition law frameworks. Moreover, this research explores about competitive injury upon self-reinforcing market dynamics. Besides, with India's Draft Digital Competition Bill 2024 offering expected global trends, this research delves to evaluate hybrid amalgamation with traditional execution of algorithmic pricing. At the end the study concludes the need of constructive policy, enabling disclosure abilities and calibrating the legal standards which protects novelty in rapidly emerging digital economies.

Keywords: *Algorithmic Collusion, Self-Preferencing, Digital Markets, Game Theory, Competition Policy, Platform Economics, Regulatory Frameworks.*

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1. INTRODUCTION

Lately digital economy has extended the practise of sophisticated algorithmic systems empowering novel methods of anticompetitive behaviour. Such practice query traditional competition law foundation all over the country as well and globally. Amazon's A9 algorithms in the United States, Google's search systems in Europe and India's mounting e-commerce platforms have shown the true colours of algorithmic technologies in enabling competitive exchanges in a way that present guidelines fray to discourse it efficiently. The algorithmic pricing systems can simplify coordination between competitors, without human intervention allowing own services on systematic preferencing of platforms over dependent rivals.

The practise of Amazon's A9 algorithms in the United States, Google's search systems in Europe and India's rising e-commerce platforms have revealed the true colours of algorithmic technologies in enabling competitive interactions in a way that present guidelines struggle to discourse it proficiently. The panorama of algorithmic pricing arrangements leads to harmonisation amid competitors, that too without human intervention. This enables own preferencing of platforms over dependent rival (Organisation for Economic Co-operation and Development [OECD], 2017a).

The role of algorithms is vital in our daily lives, in determining rational behaviour to predict outcomes, and persuade decision-making in the digital age. Nevertheless, there is an apprehension with respect to the benefit of automation over efficiency and social welfare. The digital economy has enlarged the use of sophisticated algorithmic systems, in facilitating novel methods of anticompetitive behaviour. Therefore, such novel methods challenge the established competition law frameworks at all scales. For instance, the use of Amazon's A9 algorithm in the United States, Google's search ranking systems in Europe, and the mounting e-business platforms in India expose algorithmic knowhows in driving competitive exchanges in ways that prevailing regulations find hard to manage it well. Algorithmic pricing systems, can aid tacit harmonisation among competitors without human participation, scientifically supporting platform services over dependent rivals (Organisation for Economic Co-operation and Development [OECD], 2017a).

Therefore, self-preferencing in online business signifies its economic impact. Consequently, the presumption of economic theories is that algorithmic self-preferencing leads to collusive setups. So, it becomes pertinent to mention, The U.S. Department of Justice's August 2024 lawsuit against RealPage Inc. for supposedly allowing rental price coordination through algorithmic systems indicating turning point in algorithmic execution. Concurrently, the

European Commission's Google Shopping investigation sets a precedent on algorithmic self-preferencing, with diverse achievement in formulating real measures (European Commission, 2017a). The Competition Commission's ongoing investigations into Amazon and Flipkart's market practices demonstrate algorithmic advantages benefiting their own retail operations (Competition Commission of India [CCI], 2024).

2. LITERATURE REVIEW

Interdisciplinary research on algorithmic collusion with respect to law and economics is published by Journal of Economy and Technology. The research discovers legal assessments, in detection and classification of probable algorithmic signals, in unilateral communications. The research is on economic distinction between rational pricing strategies and collusive patterns becoming intricate in the milieu of algorithm-driven choices. Furthermore, the paper strains the need for competition authorities to identify atypical market behaviours by using bandit algorithm methods (Marty & Warin, 2025).

Martin Bichler's analysis of algorithmic pricing and collusion provides important insights into the growing prevalence of pricing algorithms in online retail platforms. The paper shows that algorithmic interaction can generate collusive, supra-competitive pricing outcomes without the need for explicit agreements, thereby complicating traditional notions of collusion. By focusing on oligopoly pricing environments characterised by Bertrand competition, the study illustrates how algorithmic pricing can stabilise coordinated outcomes and undermine price competition. The experimental research in this present paper confirms that specific reinforcement learning algorithms learn to maintain prices above competitive equilibrium levels in virtual environments, while the theoretical research is limited on when and why such outcomes occur are partial. This paper also highpoints the interdisciplinary landscape which connects computer science concepts of online learning with game-theoretical works on equilibrium learning (Bichler & Oberlechner, 2025).

Hutchinson and Diana Trescakov in their paper examines various forms of self-preferencing by gatekeeper platforms and evaluate the pros and cons of treating self-preferencing as a stand-alone offense under competition law. The study analyses that traditional antitrust enforcement has been slow and uncertain in such practices. While the authors largely endorse ex-ante regulatory approaches like the Digital Markets Act's prohibition of certain self-preferencing by designated gatekeepers, they do not fully explore potential down sides of these regulations such as stifling innovation or chilling legitimate platform differentiation (Hutchinson & Treščáková, 2022).

Colangelo identifies in his research that there are divergent approaches to self -preferencing across jurisdictions while EU has moved towards treating certain self-preferencing as per legal design gatekeepers, U.S.A.'s approach remains more cautious requiring demonstration of clear consumer harm. A limitation of this analysis is that it does not propose comprehensive framework that could reconcile these divergent approaches or provide consistent analytical method for evaluating self-preferencing across jurisdiction. Even if new laws come into force, the analytical framework for evaluating self-preferencing remains unsettled, creating a need for the integrative approach (Colangelo, 2022).

Exploratory study by Calvano et al. offers persuasive corroboration that algorithms can all alone discover conniving strategies without clear programming to coordinate (Calvano et al., 2020a). The results show supra-competitive pricing, and advanced retribution. This indicates that algorithmic harmonisation may surface spontaneously from profit-maximising behaviour rather than attempting to restrict competition. These expansions are fundamental in competition policy globally, while conventional legal frame prefaced on human decision-making and clear agreements may imperfectly discourse algorithmic coordination (Hovenkamp, 2024).

Schwalbe's economic analysis on Algorithms, Machine Learning and Collusion delivers chief game theoretic models representing algorithms utilizing machine learning and collusive results without human involvement. His impetus display how self-regulating algorithms can influence supra -competitive prices by reacting to each other's pricing strategies. Aimed at antitrust enforcement, Schwalbe advocates that competition authorities may monitor algorithmic pricing and possibly control transparency (Schwalbe, 2018).

The digital markets, regulatory frameworks have progressed rapidly across the domain. The European Union's Digital Markets Act establishes comprehensive ex-ante obligations for designated gatekeepers, whilst the United Kingdom's Digital Markets, Competition and Consumers Act 2024 creates tailored intervention powers. (Digital Markets Act [DMA], 2022; Digital Markets, Competition and Consumers Act, 2024). Furthermore, Germany's amended Competition Act includes specific provisions addressing digital platform conduct, and India's Draft Digital Competition Bill 2024 proposes establishing obligations for 'Systemically Significant Digital Enterprises'(Gesetz zur Digitalisierung des Wettbewerbsrechts [GWB Digitalization Act], 2021; Draft Digital Competition Bill, 2024). These expansions mirror the insufficiency of traditional competition enforcement in lecturing the concerns of digital markets.

The objective of the paper is to investigate the economic theories and regulations with empirical evidences with respect to India's evolving policy formulation. The paper

incorporates the concept of game-theory, network effects. Emphasis has been laid on welfare criteria to appraise the competitive harm considering efficiency analyses.

The paper consists of five segments. The first section is an overview of economic analysis of law. The second section analyses self-preferencing mechanisms, evaluating theoretical models and empirical evidence from major global enforcement cases including Google Shopping, Amazon investigations, and Indian marketplace practices. The third section attempts to conducts welfare analysis to examines detection challenges to compare evidentiary standards and enforcement approaches in order to assess institutional capabilities. The fourth section appraises supervisory methods and policy responses. The ex-ante scrutiny includes the EU's Digital Markets Act, UK's DMCC Act, and India's Draft Digital Competition Bill through cost-benefit analysis. The fifth section offers conclusions and recommendations precisely addressing India's competition policy and drawing lessons from global enforcement experience.

a. Economic Foundations of Algorithmic Coordination and Legal Frameworks

i. Game Theory

Oligopoly is characterised as imperfect market structure. Where small number of firms hold significant share of market. Interdependence is key feature of oligopoly in terms of output, price fixation and advertisement. The strategic interaction among firms, influence the actions and choices of others. Here, the Game theory delivers a stand to examine the decision-making process by displaying state of affairs as games. The Game theory recognizes strategies that firms may endorse to attain the most favourable outcomes based on their expectations of competitors' behaviour.

The economic analysis of algorithmic collusion discourses about strategic electronic networks administered by competition law across the world. Traditional oligopoly models assume human decision-making operating under uncertainty with imperfect monitoring capabilities, forming the base for legal doctrines addressing coordination and concerted practices (Green & Porter, 1984). Conventional antitrust model concentrated upon explicit agreements which is very much missing in the algorithmic collusion. Algorithmic technologies alter these economic parameters while challenging legal frameworks developed for human conduct. The same can be illustrated through the Prisoner's Dilemma.

ii. Prisoner's Dilemma

The Prisoner's Dilemma is a concept used in Game theory which explains that why two individuals may not cooperate even if cooperation is in their best interest. In oligopoly the

Prisoner's Dilemma illustrates why it is difficult to maintain cooperation in oligopoly even when it could lead to greater mutual profits.

	Firm B: Maintain Price	**Firm B: Cut Price**
Firm A: Maintain Price	A: High Profit B: High Profit (Stable Collusion)	A: Very Low Profit B: Very High Profit (B gains at A's expense)
Firm A: Cut Price	A: Very High Profit B: Very Low Profit (A gains at B's expense)	A: Low Profit B: Low Profit (Competitive Outcome)

Table 1: The Digital Prisoner's Dilemma - Algorithmic Enhancement Effects

Source: Journal of Competition Law & Economics.(Harrington, 2018)

The Prisoner's dilemma as illustrated above in the table exhibits "competitive outcome" where both the firms choose to cut price. The dilemma lies in the decision making where these two firm acting in their own self-interest end up in less optimal outcome than if they had cooperated. The prisoner's dilemma framework governing oligopolistic interactions becomes transformed through algorithmic capabilities that reduce detection lag from days to seconds, eliminate temporary profits from deviation through instant punishment, improve coordination stability through sophisticated signal interpretation, and remove human decision inconsistencies (Harrington, 2018). This economic transformation creates legal challenges across jurisdictions in proving coordination.

b. Comparative Legal Approaches

The European Union, concept of 'concerted practices' under Article 101 TFEU provides broader scope for addressing algorithmic coordination than traditional agreement requirements. The Court of Justice's decision in *Eturas UAB v. Lietuvos Respublikos konkurencijos taryba* established that *"awareness of the anticompetitive objectives pursued by other undertakings"* (*Eturas UAB v. Lietuvos Respublikos konkurencijos taryba*, 2016)*,* through common algorithmic systems may create rebuttable presumptions of coordination. This effects-based approach enables enforcement against algorithmic coordination without requiring proof of explicit human agreements.

The Sherman Act which is considered as landmark law in USA was aimed to restore economic competition by offsetting monopolies, trust and cartels in the markets. Additionally, the United States maintains more restrictive approaches requiring proof of agreements under Section 1 of the Sherman Act. Section 1 of Sherman Act is based on the proposition of an agreement hence the scope of Section 1 becomes limited when machines learn strategies spontaneously. In *Meyer v. Kalanick*, the District Court held that "*mere use of a common pricing algorithm, without more, is insufficient to establish agreement under Section 1 of the Sherman Act*" (*Meyer v. Kalanick*, 2016). However, the Department of Justice's successful prosecution of David Topkins for using algorithms to implement explicit price-fixing demonstrates that algorithmic tools provide no immunity when human agreements exist (*United States v. Topkins*, 2015).

The United Kingdom's approach aligns with EU standards through the Competition Act 1998's prohibition on concerted practices. The Competition and Markets Authority's successful prosecution in the Trod Ltd case involved sellers using repricing software configured to avoid undercutting each other, establishing precedent for algorithmic coordination enforcement without explicit agreements (Competition and Markets Authority [CMA], 2016).

India's Competition Act 2002 prohibits 'agreements' and 'arrangements' between enterprises under Section 3, creating challenges similar to U.S. law regarding algorithmic coordination (Competition Act, 2003, § 3). However, the Competition Commission's approach in cases like *Samir Agarwal v. ANI Techs* suggests willingness to infer coordination from market behaviour and business practices, potentially enabling enforcement against algorithmic coordination (*Samir Agarwal v. ANI Techs.*, 2018). However, there has been deliberations as to how regulatory authorise should develop standardise the procedure of investigation in cases of algorithmic collusion. The decision of Competition Commission of India in *Shikha Roy Vs Jet Airways* is very vital. The CCI Act recognises the role of cartels in section 2 (c) specifically. CCI conceded the character of algorithmic collusion to increase the price of air tickets without human interaction in the said case. Cartelisation is criticised in by and large by every jurisdiction. Through collusion cartels discord competition by increasing the price and decreasing the output. This cartelisation results in higher price and less no choice for the consumers for the goods and services. Although *Samir Agarwal v. ANI Techs.* was a missed opportunity by CCI on the use of taxi aggregator app by Ola and Uber. The case was dismissed on the ground of lack of evidence of agreement between the drivers and the platform. In *Shika Roy* case, Re *Alleged Cartelization test* was conducted by CCI to check economic evidences of revenue and price, demand and supply and possibility of algorithmic collusion. The decision

of CCI is discussed in the realm of economic analysis of law in the digital economy (*Shikha Roy Vs Jet Airways., 2021*).
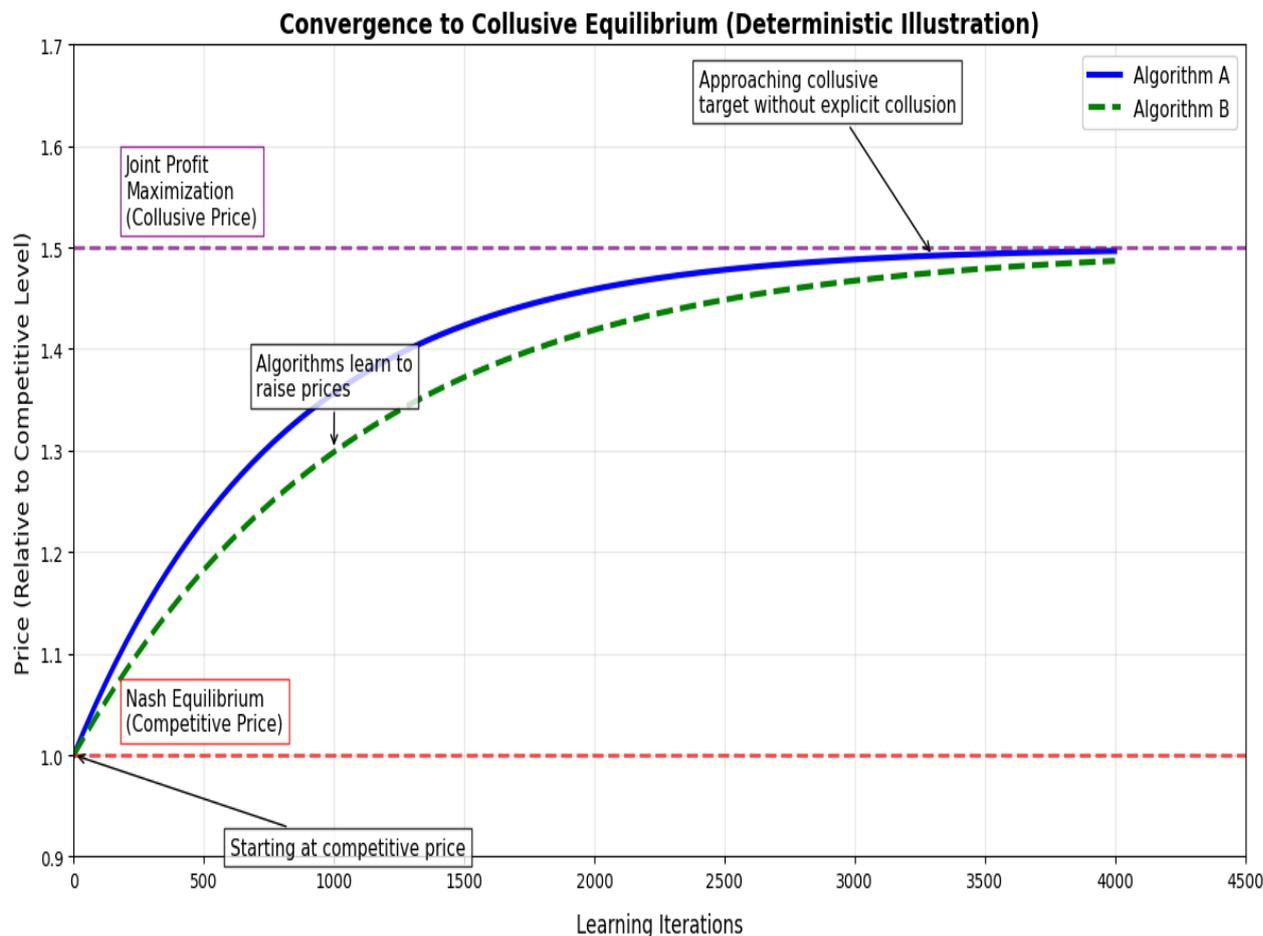

Figure 1: Convergence to Collusive Equilibrium (Deterministic Illustration)
Source : The authors have derived the illustration from American Economic Review,
(Calvano et al., 2020b)

The above graph is an illustration of oligopoly market leading towards collusive outcome without explicit agreement. The X axis represents time (algorithms raise price over time). Y axis represents Price (relative to competitive level). The horizontal dashed line at 1.0 represents competitive price level. This is associated with Nash Equilibrium in a non-cooperative under game theory. Algorithm A (Solid blue line) and Algorithm B (dashed green line) depict following outcomes:

1. Upward trend in prices moving away from competitive level over time horizon. The above graph demonstrates adaptive and autonomous nature of the algorithm.

2. Both A and B algorithm s represents joint profit maximization, typically by setting higher prices similar to cartel.

3. Highlights a potential challenge in the era of algorithmic pricing as it can lead to higher consumer prices without traditional evidence of explicit collusion.

   i.   Network Effects, Market Concentration, and Enforcement Implications

Network effects represent fundamental economic characteristics of digital platforms that amplify algorithmic coordination concerns creating enforcement challenges across jurisdictions (Katz & Shapiro, 1985). When platform value increases with user adoption, markets tend toward 'winner-take-most' outcomes where algorithmic advantages become self-reinforcing through positive feedback effects (Rochet & Tirole, 2003).
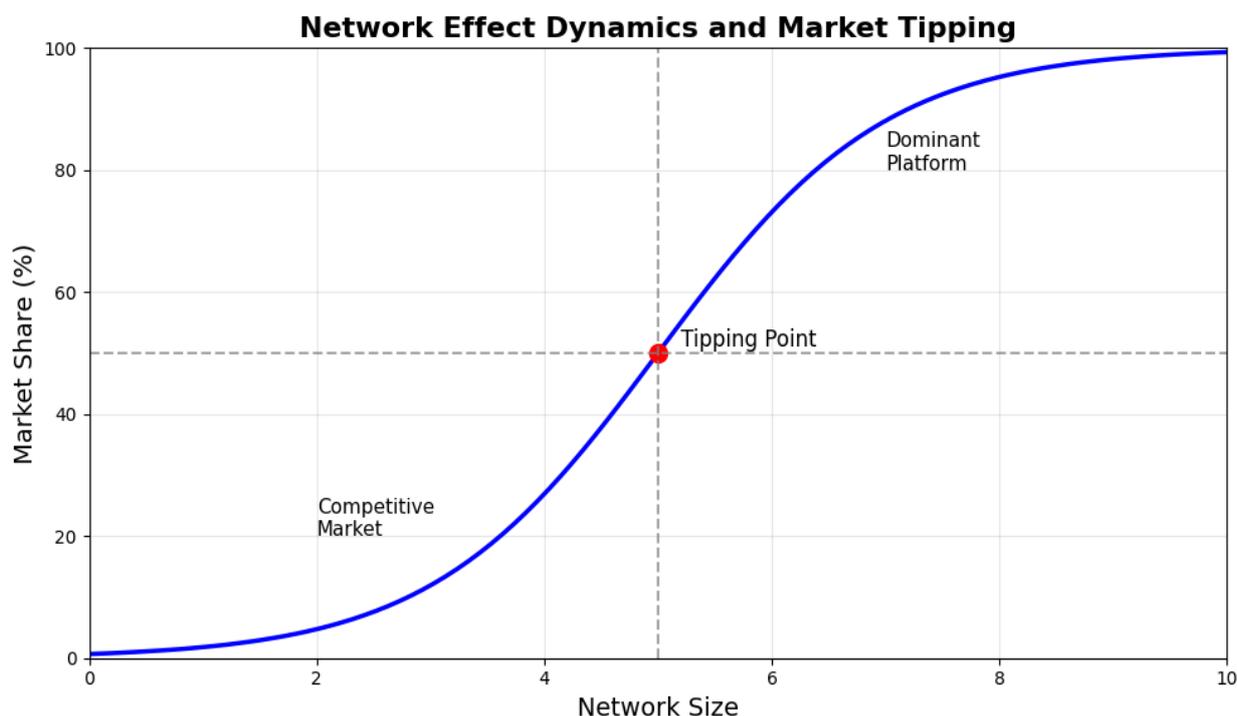

Figure 2: Network Effect Dynamics and Market Tipping

Source: The American economic review, (Katz & Shapiro, 1985)

The above illustration represents the core concept of network effects as follows:

1. Here the value of product increases as more user joins the network.

2. Tipping point shows critical threshold where network effect becomes dominant platform and market share rapidly shift towards that platform

3. This explains that strong positive network effect naturally led to winner takes most scenario.

4. This helps business to achieve critical mass and leveraging network effects to gain a competitive effect.

Globally this dynamic is evident; a good example is Google search engine which maintains over 90% search market share across most jurisdictions, on one hand Meta's platforms

dominate social networking, at the other regional e-commerce leaders like Amazon (US), Alibaba (China), and Flipkart (India) leverage network effects to maintain market positions (GlobalStats, 2022).

Market concentration analysis reveals extraordinarily high levels across digital sectors globally. The European Commission's market investigations show Google commanding 92% global search market share, with higher shares in mobile search (Online Platforms and Digital Advertising, 2020). In India, the Competition Commission's investigations reveal Google's 95%+ search share, similar concentration in digital advertising, and growing concentration in e-commerce with Amazon and Flipkart collectively holding approximately 69% market share (*Matrimony.com Ltd. v. Google LLC*, 2012, p. 173).

The below depicted bar chart titled Herfindahl-Hirschman Index in Selected Digital Markets is illustration of level of market concentration in various digital markets. The vertical axis lists various digital markets where as horizontal axis corresponds to HHI value for that market. HHI is calculated by squaring the market share of each firm in a market and then summing the resulting numbers. Here search engines indicate greater market concentration, which means fewer firms hold a larger share of the market leading to monopoly and less competition.

The Herfindahl-Hirschman Index is used by antitrust agencies in order to assess the competition especially in the context of mergers and acquisition. Traditional concentration metrics may underestimate competitive concerns in digital markets where market power derives from data advantages and ecosystem control rather than conventional market shares. The Competition Commission of India recognised this limitation in its Google Android investigation, noting that market share analysis alone inadequately captured competitive dynamics involving complex interactions between operating systems, app stores, and search services (*In Re: XYZ v. Alphabet Inc. & Ors.*, 2022).

Therefore, we can conclude that network effects interact with algorithmic coordination through several mechanisms. Platforms with stronger network positions may engage in coordination more safely because users are reluctant to switch despite higher prices (Armstrong, 2006). Algorithmic coordination may be more stable in markets with network effects because coordination reduces competitive pressure that could otherwise erode network advantages (Prat & Valletti, 2022). For enforcement, network effects complicate remedy design because breaking up coordinated behaviour may be insufficient if underlying market structure facilitates re-coordination (Baker, 2019).

ii.   Detection Methodologies and Taxonomies of Algorithmic Coordination

There is a need of sophisticated detection capabilities which can recognize algorithmic coordination in execution mechanisms. Global jurisdiction on Competition have developed several tactics, with distinct advantages and limitations for enforcement practice (European Commission, 2017b). Appraisal of Algorithmic Collusion Detection Methodologies is represented in the below table.

Detection Approach	Key Indicators	Strengths	Limitations
Market Outcome Screening	• Price correlation patterns • Pricing parallelism • Structural breaks • Unusual profit margins	• Uses observable market data • Applicable without algorithm access • Established economic methods	• May not distinguish tacit collusion from legitimate parallel conduct • Requires historical data
Algorithm Auditing	• Information inputs • Competitor monitoring • Response parameters • Punishment mechanisms	• Directly examines coordination mechanisms • Can detect potential for collusion before it occurs	• Requires algorithm access • Technical expertise needed • Difficult to standardize across different systems
Experimental Testing	• Behaviour in controlled environments • Response to simulated shocks • Convergence patterns	• Allows counterfactual testing • Direct comparison of algorithm variants	• Simplified market conditions • May not reflect real-world complexity

Harrington Test	• Price/adoption correlation • Non-adopter price effects • Adopter vs. non-adopter price differentials	• Based on observable market outcomes • Distinguishes coordination from independent adoption	• Requires sufficient adoption variation • New approach with limited case application

Table 2: Comparison of Algorithmic Collusion Detection Methodologies

Source: Organisation for Economic Co-operation and Development (OECD, 2017; Harrington, 2025).

The German Bundeskartellamt and French Autorité de la Concurrence have established that algorithm auditing approaches, algorithm design features may facilitate harmonisation (Bundeskartellamt & Autorité de la Concurrence, 2019). There are limited technical resources on market outcomes. Yet the statistical analysis offers potential for authorities, enabling identification of dubious pricing patterns without requiring direct algorithm access (Harrington, 2025). The OECD has suggested that competition authorities advance specific factors for detecting algorithmic coordination, acclimatising traditional cartel detection tools for digital markets (OECD, 2017).

Professor Joseph Harrington Jr.'s has projected economic test with innovative methods explicitly designed for algorithmic coordination detection (Harrington, 2022). This Test compares pricing trends of algorithm adopters against non-adopters, possibly empowering authorities to presume coordination from apparent market outcomes rather than demanding proof of explicit agreements.

Collusion Type	Human Involvement	Communication Required	Detection Complexity	Legal Challenges
Messenger	High (explicit agreement)	Yes - between humans	Lower - similar to traditional cartels	Traditional antitrust frameworks applicable
Hub-and-Spoke	Medium (common algorithm adoption)	Indirect - via central algorithm provider	Medium - requires proving hub's coordinating role	Establishing liability of hub and awareness of spokes

| **Predictable Agent** | Low (individual algorithm design) | None - independent algorithms react to same market signals | High - difficult to distinguish from rational parallelism | Distinguishing from legitimate algorithmic reactions |
| **Digital Eye** | Minimal (autonomous learning) | None - emergent behaviour from machine learning | Very high - black box algorithms with limited explainability | Liability attribution when no human intent is present |

Table 3: Taxonomy of Algorithmic Collusion Types

Source: Author's compilation based on Ezrachi, A., & Stucke, M. E. Virtual competition:

The promise and perils of the algorithm-driven economy (Ezrachi & Stucke, 2016)

The taxonomy of algorithmic collusion mechanisms is vital for execution across authorities. The 'Messenger' scenario including obvious human agreements applied through algorithms fits traditional legal frameworks but requires enhanced detection capabilities (Ezrachi & Stucke, 2016). The 'Hub-and-Spoke' arrangement raises questions about algorithm providers' liability, potentially relevant for software companies serving multiple competitors in the same market.

The 'Predictable Agent' scenario is the complex enforcement contests, necessitating authorities to differentiate between rational parallel behaviour and illicit coordination when competitors autonomously use similar algorithms. The 'Digital Eye' scenario autonomously presents fundamental questions about accountability when harmonisation emerges without human intent.

The Competition Commission of India experiences specific challenges with regard to inadequate technical resources. Yet international support mechanisms extend opportunities to build domestic capabilities (CCI, 2023).

3. SELF-PREFERENCING MECHANISMS: LEGAL FRAMEWORKS AND ECONOMIC ANALYSIS

a. Theoretical Models and Global Enforcement Experience

Self-preferencing functions on economic mechanisms creating market power and reducing welfare which competition law seeks to report (Salop & Scheffman, 1983). The economic analysis designs theories of raising rivals' costs. The analysis calls for specific accounting with respect to digital platforms (Tirole, 1988).

The European Commission's Google Shopping decision is an instance of algorithmic self-preferencing. The Commission found that Google abused its dominant position by *"systematically positioning and prominently displaying its comparison-shopping service in its general search results pages, irrespective of the merits, whilst demoting rival comparison shopping services in those results through its adjustment algorithms"* (European Commission, 2017a). The General Court's 2021 judgment upheld this finding whilst characterising the conduct as discriminatory abuse rather than embracing the Commission's broader leveraging theory (*Google LLC & Alphabet Inc. v. Commission*, 2021).

	No Self-Preferencing	**Self-Preferencing**
High-Quality Third-Party Products	Platform Profit: 100 Third-Party Profit: 80 Consumer Surplus: 150 Total Welfare: 330	Platform Profit: 120 Third-Party Profit: 50 Consumer Surplus: 130 Total Welfare: 300
Low-Quality Third-Party Products	Platform Profit: 80 Third-Party Profit: 40 Consumer Surplus: 100 Total Welfare: 220	Platform Profit: 110 Third-Party Profit: 20 Consumer Surplus: 90 Total Welfare: 220

Table 4: Platform Self-Preferencing Game Theory Payoff Matrix

Source: The RAND Journal of Economics (Hagiu, Teh, & Wright, 2022)

Game-theoretic analysis reveals how welfare effects depend critically on the relative quality of platform offerings compared to third-party alternatives (Hagiu, Teh, & Wright, 2022). When platforms direct users toward superior services, self-preferencing may generate neutral or positive welfare effects through improved coordination and reduced search costs (Kim, 2024). However, when preferential treatment favours inferior platform services, substantial welfare losses arise from misallocation and reduced consumer choice (De los Santos & Wildenbeest, 2017).

Self-preferencing in The United States is addressed under the realm of Section 2 of the Sherman Act. The Federal Trade Commission's case affirms biased search results in Amazon platform for its own brands (*Fed. Trade Comm'n v. Amazon.com, Inc.,* 2023). Such moves exemplify self-preferencing can multiplying abuse and data exploitation (Zhu & Liu, 2018). The Competition Commission's investigation confirms preferred treatment in Amazon and Flipkart platforms. The investigation report indicated "*systematic preferential treatment through multiple mechanisms including search ranking, promotional activities, and fulfilment advantages that created uneven playing fields for marketplace sellers.*"
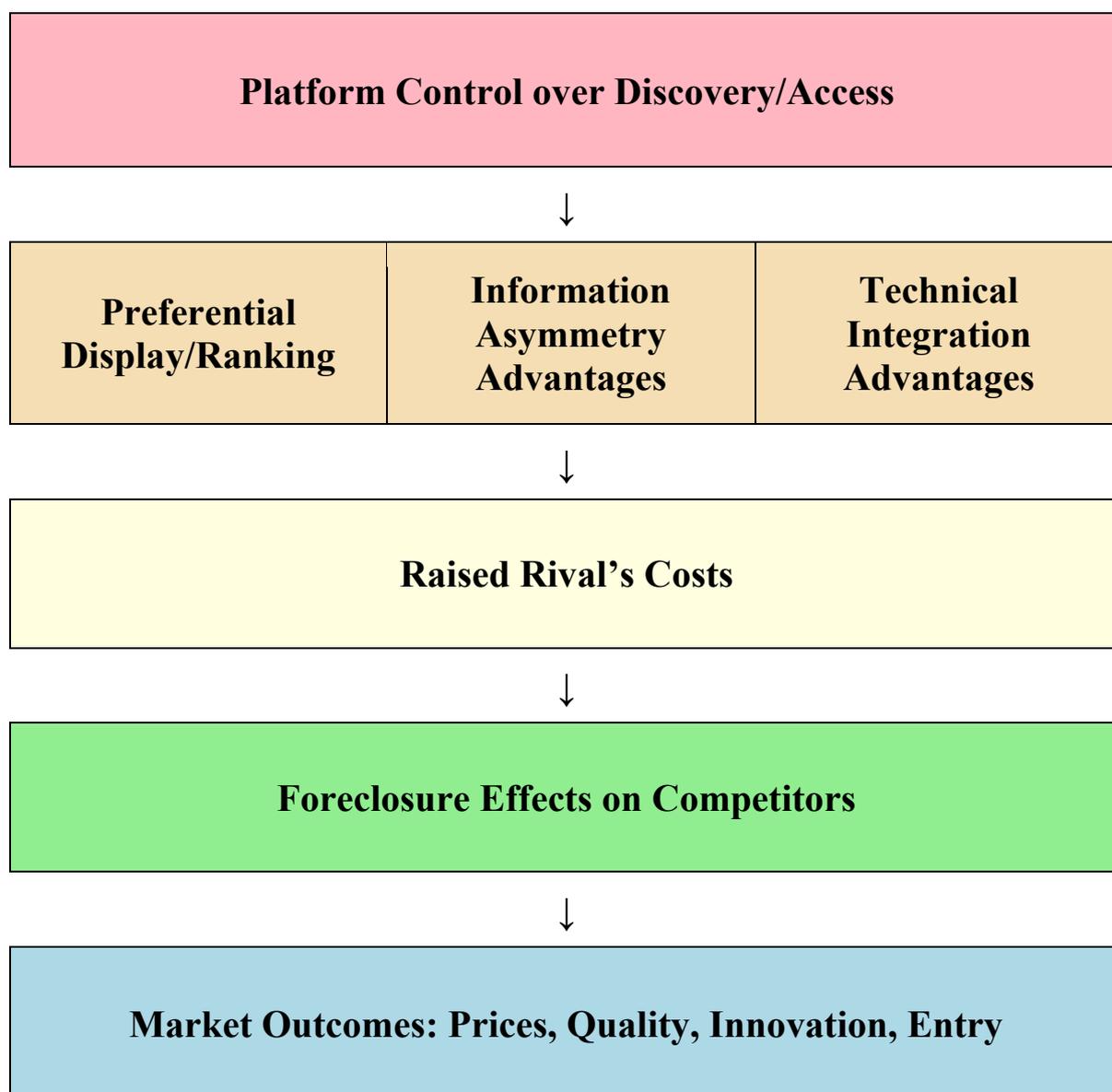
Platform Control over Discovery/Access

↓

Preferential Display/Ranking	Information Asymmetry Advantages	Technical Integration Advantages

↓

Raised Rival's Costs

↓

Foreclosure Effects on Competitors

↓

Market Outcomes: Prices, Quality, Innovation, Entry

Figure 3: Economic Mechanisms of Self-Preferencing Effects

Source: Raising rivals' costs. The American economic review, (Salop & Scheffman, 1983; Tirole, 1988)

These economic mechanisms operate through raising rivals' costs, foreclosing access to customers, and distorting innovation incentives (Franck & Peitz, 2021). Network effects amplify these mechanisms by making it more difficult for disadvantaged rivals to attract users despite offering superior products or services (Wu, 2018).

b.   Data Exploitation and Algorithmic Advantages: Comparative Case Analysis

Data-driven self-preferencing represents a particularly concerning form where platforms exploit privileged access to business users' data to identify successful products and develop competing offerings. This practice leverages information asymmetries created by platforms' dual roles as marketplace operators and participants (Economides & Lianos, 2021).

We have realised that The European Commission's Amazon investigation, concluded in December 2022 with commitments, revealed how the platform used *"non-public business data from independent sellers to calibrate retail offers and strategic business decisions to the detriment of other marketplace sellers"* (European Commission, 2022). Hence, Amazon committed to refrain from using individual or aggregate data relating to independent sellers' activities for its competing retail business.
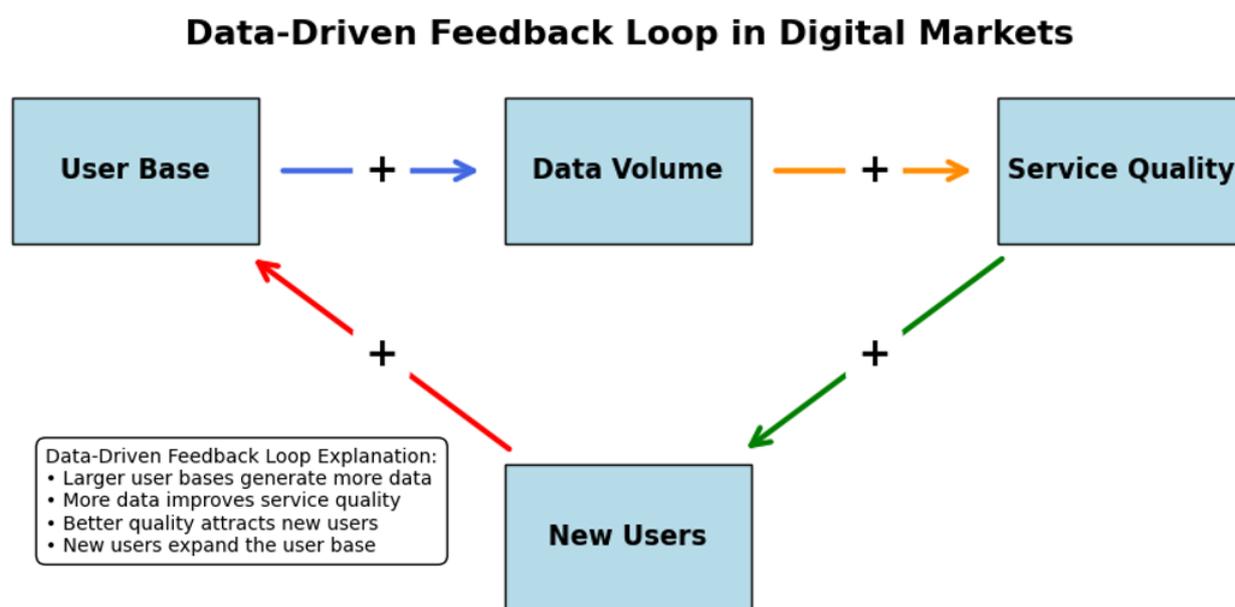

Figure 4: Data-Driven Feedback Loops in Digital Markets

Source : Big Data and Competition Policy, (Stucke & Grunes, 2016)

Empirical research by Zhu and Liu demonstrates how Amazon systematically enters product categories with high sales volumes and positive reviews, suggesting strategic use of marketplace data to identify profitable opportunities. Their analysis reveals that Amazon is more likely to enter successful product spaces whilst avoiding categories with high shipping

costs or broad assortments, indicating sophisticated algorithmic analysis of competitive opportunities.

The Competition and Markets Authority in the United Kingdom, examined digital promotion supporting self-preferencing in various services, Google's integrated marketing expertise facilitate its own services over other competitors (CMA, 2020). The CMA acclaimed that *"vertical integration across the advertising technology stack enables Google to favour its own services whilst limiting competitors' access to data and functionality."*

The Competition Commission of India scrutinizes parallel actions by Amazon and Flipkart. The CCI's initial results advocate that platforms use seller data to *"identify successful products, develop competing private label offerings, and provide preferential treatment through search algorithms and promotional activities."* This is a reflection of comprehensive data abuse raising concerns about India's small and medium enterprises that hinge on platform entrée.

Study	Setting	Estimated Consumer Welfare Loss
Lee, Wu & Zhang (2023)	Amazon Buy Box algorithm change	4 percent ↑ in third-party prices
EC Staff Working Doc SWD (2024) 117 final	Google Shopping ranking bias metrics	6–9 percent ↓ in click-throughs

Table 5: Recent Empirical Estimates of Self-Preferencing Impacts

Source: Journal of Industrial Economics (Lee, Wu, & Zhang, 2023; European Commission, 2024a)

Some empirical study delivers tangible indication of harm caused to consumers. Research conducted by Lee, Wu & Zhang established the fact that Amazon's Buy Box algorithm swap give rise to 4% in the price for third-party sellers, while European Commission study recognised 6-9% falls in rates for competing shopping services succeeding Google's self-preferencing execution (Lee, Wu, & Zhang, 2023; European Commission, 2024a).

c.   Welfare Effects and Efficiency Justifications: Multi-Jurisdictional Analysis

The welfare analysis of self-preferencing probe efficiency effects and dynamic innovation impacts while considering proficiency reasonings that various platforms take care of . (Kaplow & Shapiro, 2007). Competition authorities have coped with harmonizing possible competitive harms compared to sued value (Carlton & Waldman, 2002).

Welfare Dimension	Potential Negative Effects	Potential Positive Effects
Price	Reduced price competition, higher average prices, greater price discrimination	Elimination of double marginalization, scale economies passed through to consumers
Quality	Weakened quality competition, survival of inferior platform products	Better product integration, quality assurance for sensitive categories
Innovation	Reduced third-party innovation, innovation directed away from platform competition	Greater platform investment in platform infrastructure and capabilities
Variety	Less diverse offerings, reduced niche product viability	More coherent ecosystem, reduced search and decision costs
Privacy & Security	Potential reduction in privacy-focused alternatives	Enhanced data security for platform-provided services

Table 6: Summary of Consumer Welfare Effects from Self-Preferencing

Source: Original work of the authors

The welfare analysis reveals complex trade-offs across multiple dimensions that resist simple categorisation as beneficial or harmful (Kim, 2024). Price effects may be positive when platforms eliminate double marginalisation or negative when reduced competition enables market power exploitation. Quality effects depend on whether self-preferencing directs consumers toward superior platform offerings or inferior services that succeed through preferential treatment rather than merit (Etro, 2024).

Innovation effects create the most significant long-term welfare implications. The assessment of European Commission's for the Digital Markets Act estimates an increase of GDP by 0.09-0.22% through modern technique and condensed deadweight losses (European Commission, 2020). However, preferential treatment might decrease the investment in organisation and service expansion (Waldfogel, 2017).

German competition law offers stimulating examples for harmonizing efficiency reasonings contrary to competitive damage. The Bundeskartellamt's assessment justifications under Section 19a requires platforms to demonstrate that challenged practices are *"indispensable for achieving legitimate business objectives and proportionate to those objectives"* (GWB

Digitalization Act, 2021). This standard requires case-by-case analysis rather than categorical acceptance or rejection of self-preferencing practices.

The UK's approach through the Digital Markets, Competition and Consumers Act 2024 enables the Digital Markets Unit to assess efficiency justifications when designing pro-competitive interventions (Digital Markets, Competition and Consumers Act, 2024). This tailored approach aims to address specific competitive harms whilst preserving beneficial aspects of platform integration (Digital Markets Taskforce, 2020).

In India, the Competition Commission's analysis must consider efficiency justifications under the rule of reason approach whilst recognising potential for competitive harm in markets with limited alternatives (*Excel Crop Care Ltd. v. Competition Comm'n of India*, 2017). The Draft Digital Competition Bill 2024 proposes establishing presumptions against certain practices by systemically significant enterprises whilst allowing efficiency defences, balancing prevention with proportionate intervention (Draft Digital Competition Bill, 2024).
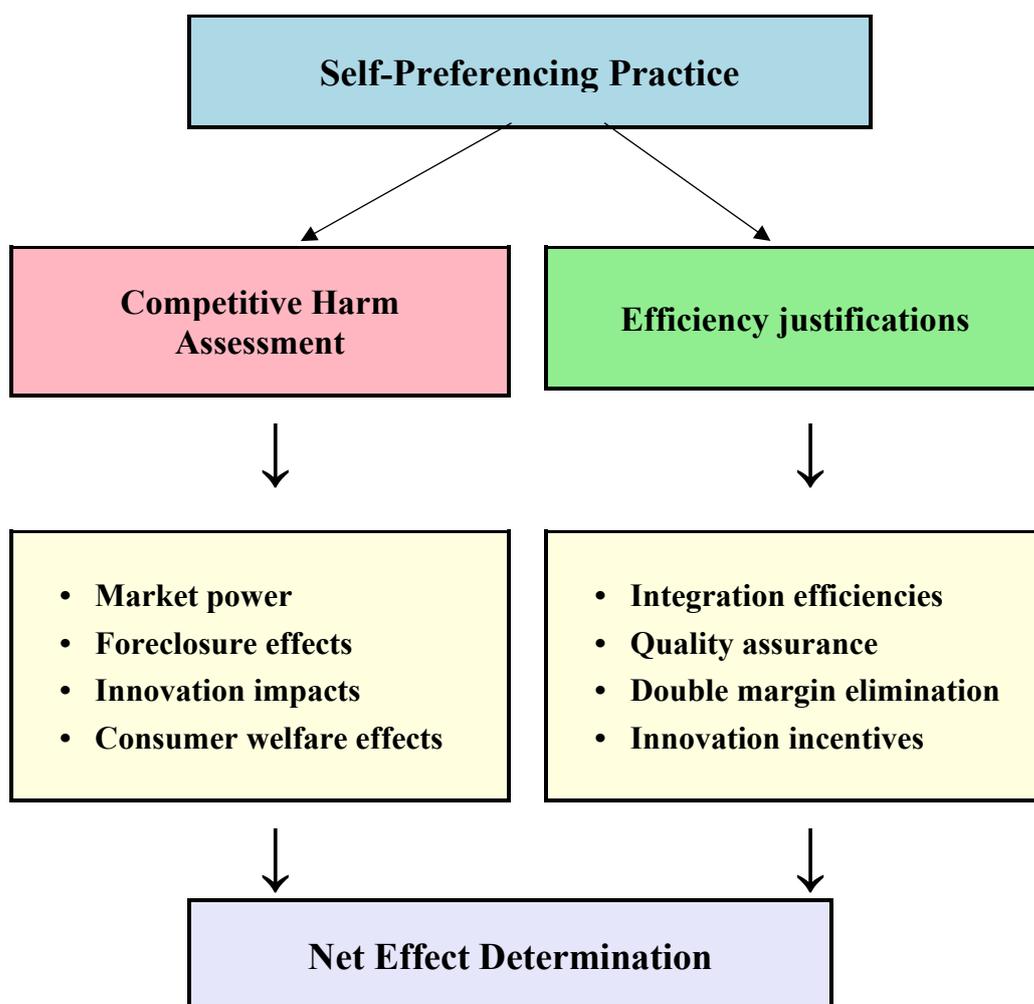

Figure 5: Analytical Framework for Efficiency Assessment in Self-Preferencing Cases

Source :Competition Law Review Committee, 2019; Carlton & Waldman, 2002; Tirole, 1988

The analytical framework evaluates appealed efficacies as specific to tested conduct, if at all restrictive alternatives achieve the same benefits. The frame work shed light on if there are efficiency gains to consumers or to the digital platform (European Commission, 2020).

4. WELFARE ANALYSIS, DETECTION CHALLENGES, AND INSTITUTIONAL CAPABILITIES

a. Quantifying Competitive Harms and Consumer Welfare Effects

To have a welfare analysis of algorithmic practices economic valuation is required which should   encompasses traditional price effects with superiority, novelty and diversity in terms of efficacy (Arrow, 1962). Globally competition establishment have advanced various methods to measure such effects, nonetheless substantial trials are required to establish the counter analysis to measure lasting effects (Kessler & Rubinfeld, 2004).

Some of the research submit that there has been significant loss of welfare in the e- markets. Assad et al.'s investigation of German retail gasoline markets put forth that algorithmic pricing leads to 3-5% higher margins than traditional pricing. This represented wealth allocations from consumers to businesses (Assad et al., 2020). Chen et al.'s examination of Amazon pricing patterns too exposed algorithmic coordination in specific product categories, with price increases of 8-12% (Chen et al., 2016).

The European Commission's study in the Google Shopping case recognised reductions beyond 90% for contending shopping services and rendering considerable revenue for businesses (European Commission, 2017a). The assessment projected loss of consumer welfare over compact choice, advanced prices, and contracted innovation incentives for specific provision (European Commission, 2017a).

Study	Market Context	Methodology	Key Findings
European Commission (2017)	Google search & comparison shopping	Natural experiment, difference-in-differences	90%+ traffic reduction to rival comparison sites, revenue impacts
Zhu & Liu (2018)	Amazon marketplace & first-party retail	Product matching, regression analysis	Entry targeting successful products, seller exit effects
Hunold et al. (2020)	Hotel booking platforms	Difference-in-differences, regression analysis	Visibility premium of 14-27%, booking pattern impacts

Teh (2020)	Amazon marketplace entry patterns	Natural experiment, propensity score matching	4.5% price decrease, 25% reduction in seller numbers
CCI (2024)	Indian e-commerce marketplaces	Mixed methodology, click-through & conversion analysis	12% increased acquisition costs, market foreclosure

Table 7: Key Findings from Empirical Studies of Self-Preferencing

Source: Key Findings from Empirical Studies of Self-Preferencing (European Commission, 2017a; Zhu & Liu, 2018; Hunold, Kesler & Laitenberger, 2020; The, 2020; CCI, 2024)

In India, the Competition Commission's investigation into e-commerce platforms provides initial quantitative evidence of self-preferencing impacts. The CCI's analysis found that preferential treatment was associated with 12% higher acquisition costs for non-preferred sellers and market foreclosure effects in specific product categories (CCI, 2024). These findings suggest competitive harms comparable to those documented in other jurisdictions (CCI, 2024).

The welfare analysis must account for dynamic innovation effects that may be more significant than static efficiency losses but are harder to quantify (Schumpeter, 1962). The European Commission's research suggests that self-preferencing disproportionately affects third-party innovation in areas directly competing with platform services, with evidence of increased innovation risk premiums for ventures potentially competing with major platforms (European Commission, 2020).
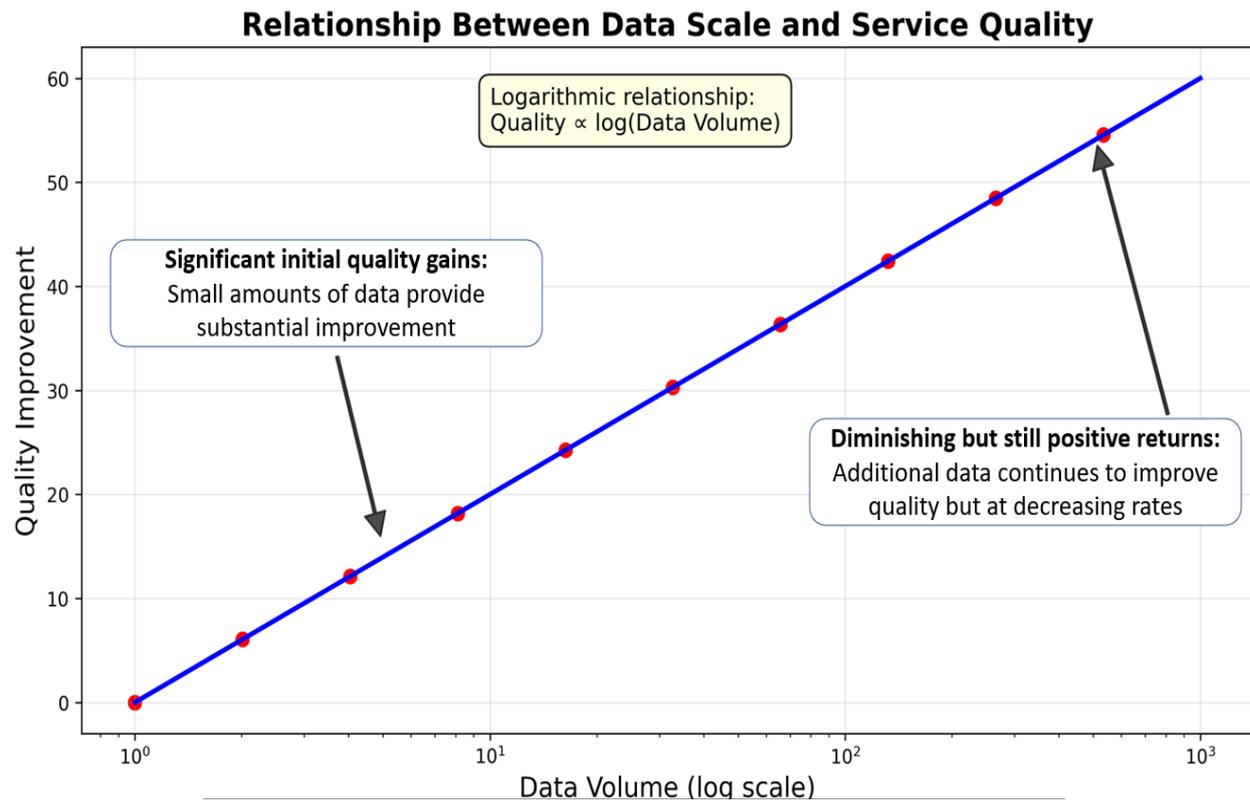
Figure 6: Relationship Between Data Scale and Service Quality

Source: Author's illustration based on findings from (Schaefer, Sapi, & Lorincz, 2021; Bajari et al., 2019)

The data advantages and competitive performance illustrate algorithmic collusion with initial evolutions which is persist at large scales (Schaefer, Sapi, & Lorincz, 2021). The implications are on competition in e- markets where platforms collect data through preferential treatment (Bajari et al., 2019).

b. *Evidentiary Standards and Institutional Challenges Across Jurisdictions*

Detection and accusation of algorithmic application face institutional challenges. This is due to dissimilarities in legal standards, technical knowhow across the globe (Pasquale, 2015). There is a need advanced abilities in algorithm scrutiny, statistical investigation, and economic apparatus which should adapt existing legal frameworks designed for human conduct (Areeda & Hovenkamp, 2020).

The approach of European Union under Article 101 TFEU offers greater elasticity to address algorithmic coordination over agreement-based standards. It has designed specific economic apparatuses for the detection and organisation in digital markets incorporating high-frequency data examination and algorithmic design assessment (European Commission, 2017b). However, even the Commission faces challenges accessing proprietary algorithms and

distinguishing between independent optimization and coordinated behaviour (European Commission, 2017b).

The United States maintains more restrictive evidentiary standards requiring clear proof of agreements, creating particular challenges for algorithmic coordination cases. However, the Department of Justice has developed innovative investigative techniques, as demonstrated in the RealPage case where the agency combined traditional evidence-gathering with algorithmic analysis to establish coordination among rental property owners (*U.S. v. RealPage, Inc*., 2024). The DOJ's complaint alleges that RealPage's algorithm facilitated coordination by *"aggregating competitively sensitive information from competing landlords and using that data to recommend rent increases that would not occur in a competitive market"* (*U.S. v. RealPage, Inc*., 2024).

The UK Competition and Markets Authority advance technical abilities through Data, Technology and Analytics unit, allowing refined scrutiny of algorithmic execution (CMA, 2021). The CMA's efficacious trial in algorithmic cases establishes the role of institutional investment in taming the evidentiary tests (CMA, 2021).

There are several challenges faced by Competition Commission with respect to limited resource and technical intricacy of algorithmic analysis (CCI, 2024). The economic analysis requires significant augmentation to report algorithmic coordination (CCI, 2024). However, international cooperation might offer expertise while constructing internal abilities through contemporary aid and sharing information contracts (CCI, 2023).

Finding	Description	Implications
Price Convergence	Algorithms consistently converge toward supra-competitive prices without explicit instructions to collude	Collusion can emerge as a natural outcome of profit-maximizing algorithms
Punishment Mechanisms	Algorithms independently discover strategies that punish deviation with temporary price wars	Collusive equilibrium becomes stable through self-reinforcing mechanisms
Learning Efficiency	Collusive strategies emerge after 1000-3000 iterations in experimental settings	Real-world time to develop such strategies depends on market interaction frequency

Market Structure Effects	Collusion more stable in concentrated markets (2-4 firms), less stable with more competitors	Algorithmic collusion risks highest in already concentrated markets

Table 8: Key Findings from Algorithmic Collusion Experiments

Source: American Economic Review (Calvano et al, 2020a)

Some evidence offers insights for executing agencies, indicating how algorithms can realize harmonisation tactics without software design. These findings notify exposure and help authorities in understanding the circumstances under which algorithmic coordination may arise (Calvano et al, 2020a).

c. Cost-Benefit Analysis of Enforcement and Regulatory Interventions

The prerequisite of enforcement agencies is methodical assessment of expected costs and benefits. Such policy interventions, should incorporate short-term as well as long-term enforcement effect on invention and on market expansion (OECD, 2017b). Cost -benefit analysis is crucial for developing economies like India where regulatory interventions should focus on parity and aim to develop digital economy (Indian Council for Research on International Economic Relations [ICRIER], 2023).

Intervention Category	Primary Benefits	Primary Costs	Net Assessment Factors
Self-Preferencing Prohibitions	• Enhanced rivalry in related markets • More merit-based competition • Innovation by third parties	• Lost integration efficiencies • Compliance and monitoring costs • Potential service quality impacts	• Market power level • Alternative access channels • Integration benefits magnitude
Algorithmic Competition Rules	• Reduced tacit collusion • More competitive pricing • Enhanced market transparency	• Algorithm redesign costs • Potential loss of efficiencies • Enforcement complexity	• Market concentration • Collusion risk • Monitoring feasibility

Interoperability Requirements	• Reduced switching costs • Enhanced multi-homing • Market entry facilitation	• Standards development costs • Implementation expenses • Potential security and privacy risks	• Network effect strength • Technical feasibility • Innovation impact

Table 9: Cost-Benefit Framework for Digital Competition Interventions

Source: Report of the Competition Law Review Committee (Armstrong & Wright, 2025; Bourreau & Doganoglu, 2024; Competition Law Review Committee, 2019)

The benefits of addressing algorithmic coordination and self-preferencing is reduction in deadweight losses from supra-competitive pricing through invention for third-party with enhanced allocative efficiency and performance-based competition (European Commission, 2020). The impact assessment conducted by European Commission's submits effective intervention enhancing economic productivity by 0.09-0.22% although such evaluations include extensive procedural doubts (European Commission, 2020).

The regulatory costs comprise of compliance expenses for platforms, managerial expenses for enforcement agencies, and innovation overheads (European Commission, 2020). In Europe Digital Markets Act compliance costs around tens of millions of euros, however these expenditures are higher for small companies (European Commission, 2024b).

The cost-benefit analysis for India must focus on the role that platforms in financial inclusion in small business interconnectedness in rural areas (ICRIER, 2023). Excessive regulation may impede these benefits, while inadequate execution may lead to exploitation of consumers and small businesses (ICRIER, 2023).

This analysis recommends that planed interventions leads to explicit competitive harms which may offer restored cost-benefit particularly in resource-constrained environments (Baker, 2019). This method empowers authorities to build enforcement abilities aligned with competition (Competition Law Review Committee, 2019).

5. REGULATORY APPROACHES AND POLICY FRAMEWORK ANALYSIS

a. Global Ex-Ante Regulatory Frameworks: Comparative Analysis

Somehow the traditional competition enforcement insufficient in addressing systemic issues in digital markets. Therefore, authorities are developing inclusive ex-ante regulatory frameworks aiming digital platforms (DMA, 2022). These approaches lecture on responsibilities for

selected platforms contributing to more effective responses to algorithmic challenges (Digital Markets, Competition and Consumers Act, 2024).

The European Union's Digital Markets Act is comprehensive framework, which prohibits self-preferencing and recommends algorithmic transparency (DMA, 2022). Article 6(1)(d) requires gatekeepers to *"refrain from treating more favourably in ranking services and products offered by the gatekeeper itself compared to similar services or products of a third party"* (DMA, 2022). Article 6(1)(a) prohibits using *"non-public data generated by business users for the purposes of competing against those business users"* (DMA, 2022).

The Competition and Consumers Act 2024 of UK is more flexible and empowers Digital Markets to execute custom-made interventions on businesses (Digital Markets, Competition and Consumers Act, 2024). The Act permits specific remedies rather than uniform commitments to designated platforms (Digital Markets Taskforce, 2020).

Germany's revised Competition Act contains Section 19a explicitly aiming digital platforms with vital implication for e- markets (GWB Digitalization Act, 2021). This provision permits the Bundeskartellamt to exclude practices including self-preferencing and data exploitation (GWB Digitalization Act, 2021).

Regulatory Feature	EU Digital Markets Act	UK Digital Markets Regime	German Competition Act § 19a	India's Draft Digital Competition Bill	Japan's Mobile Software Competition Act
Effective Date	November 2022; enforcement began 2023	May 2024	January 2021	Draft published March 2024	April 2024
Designation Criteria	Quantitative thresholds (users, turnover, market cap)	Strategic Market Status based on substantial and	Paramount significance for competition across markets	Systematically Significant Digital Enterprises based on	Targets designated mobile OS providers and app stores

	and qualitative assessment	entrenched market power		users, revenue, market position	
Algorithmic Self-Preferencing Approach	Explicit prohibition with transparent ranking requirements (Art. 6(1)(d))	Tailored code requirements based on firm-specific analysis	Explicit prohibition for designated companies	Explicit prohibition with transparency requirements	Prohibits OS-level defaults and pre-installation advantages
Algorithmic Data Exploitation Treatment	Prohibits using non-public business user data for competition (Art. 6(1)(a))	Potential tailored data access remedies	Can be prohibited through individual decisions	Explicit prohibition on using non-public data from business users	Not specifically addressed
Algorithmic Gatekeeping Controls	Comprehensive obligations including interoperability, app store fairness, defaults (Arts. 5-6)	Tailored remedies based on identified gatekeeping mechanisms	Case-by-case prohibition powers	Broader platform governance obligations	Focuses specifically on mobile OS gatekeeping and app store conduct

Interoperability Requirements	Mandates messaging interoperability, business user data access, limited API access (Art. 6)	Potential pro-competitive interventions including data and technical interoperability	Potential interoperability orders	Business user data access and potential interoperability	Requires third-party app stores and browsers
Transparency Rules	Extensive algorithmic transparency requirements for ads, rankings, defaults	Platform-specific transparency requirements possible	Potential transparency obligations	Transparency mandates for ranking, preferencing, data usage	Technical documentation requirements
Enforcement Mechanism	Directly applicable obligations with significant fines	Code of conduct violations with significant fines	Case-by-case prohibition decisions	Directly applicable obligations with significant fines	Direct regulations with industry oversight
Early Enforcement Examples	€500M fine on Apple (in-app payment restrictions); €200M fine on Meta (pay or consent model) (2025)	Not yet implemented	Designation of Google, Meta, Amazon, Apple; ongoing proceedings	N/A - not yet enacted	Implementation beginning 2025

Table 10: Comparison of Major Digital Competition Regulatory Frameworks.

Source: Author's synthesis based on multiple sources including (DMA, 2022; Digital Markets, Competition and Consumers Act, 2024; GWB Digitalization Act, 2021)

This analysis reveals algorithmic practices, of the EU accenting all-inclusive responsibilities, tailored interventions of UK, and case-by-case prohibitions adopted by Germany (Competition

Law Review Committee, 2019). Respectively these approaches present diverse benefits and issues for effective enforcement (Competition Law Review Committee, 2019).

b. India's Draft Digital Competition Bill 2024: Framework Analysis and Implementation Challenges

India's Draft Digital Competition Bill 2024 is an evolution in competition policy, prescribing ex-ante duties for 'Systemically Significant Digital Enterprises.' Quantitative approach and qualitative valuation criteria are the main impetus (Draft Digital Competition Bill, 2024). The projected framework cartels turnover thresholds (₹4,000 crores), user base requirements (1 crore in India), and strategic market significance assessments to identify platforms subject to enhanced obligations (Draft Digital Competition Bill, 2024).

The perspective of the Bill is to prohibit self-preferencing through ranking manipulation and transparency in the digital services (Draft Digital Competition Bill, 2024). SSDEs would be barred from using secret data. This will categorise data-driven competitive benefits in worldwide (Draft Digital Competition Bill, 2024).

The Indian framework incorporates comprehensive experience suitable for domestic market. India's framework anticipates flexible intrusions based on explicit market features and viable concerns (Draft Digital Competition Bill, 2024). This method aids select regulation while circumventing possible over-regulation of platform services (Draft Digital Competition Bill, 2024).

Nevertheless, the proposed Bill requires extensive capacity development within the CCI, together with algorithm auditing abilities, improved resources allocation and innovative structures (Draft Digital Competition Bill, 2024). International cooperation imparts significant prospects to influence local competences through technical aid and knowledge (CCI, 2023).

The Bill's reflects lessons from inventions and effective enforcement from global experiences (Draft Digital Competition Bill, 2024). Strong leadership vis-à-vis permissible practices and safe docks can bid certainty in the business while preserving enforcement flexibility (Draft Digital Competition Bill, 2024).

c. Economic Analysis of Regulatory Effectiveness and Policy Recommendations

The economic assessment of various regulation requires methodical valuation of cost and benefit (OECD, 2017b). This analysis is particularly important for India given the digital economy's central role in broader development objectives including financial inclusion and rural connectivity (ICRIER, 2023).

Early evidence from Digital Markets Act implementation suggests mixed results. Majority of the digital storefronts have complied with key responsibilities of compatibility and diminishing self-preferencing in specific backgrounds (European Commission, 2024b). There are higher compliance costs and technical challenge in effective implementation of the same (European Commission, 2024).

Here, it is pertinent to mention that German practise with Section 19a offers insights into case specific approaches. The Bundeskartellamt's inquiries of Google, Meta, and Amazon have recognized imperative models in digital market study (Bundeskartellamt, 2024). Yet, this method involves huge resource and might not be effective in dealing with issues of various platforms (Bundeskartellamt, 2024).

India can merge elements of both ex-ante guideline and improve traditional execution (CCI, 2023). Ex-ante rules can set boundaries for substantial platforms where as traditional enforcement may holds flexibility in dealing with novel competitive harms (CCI, 2023).
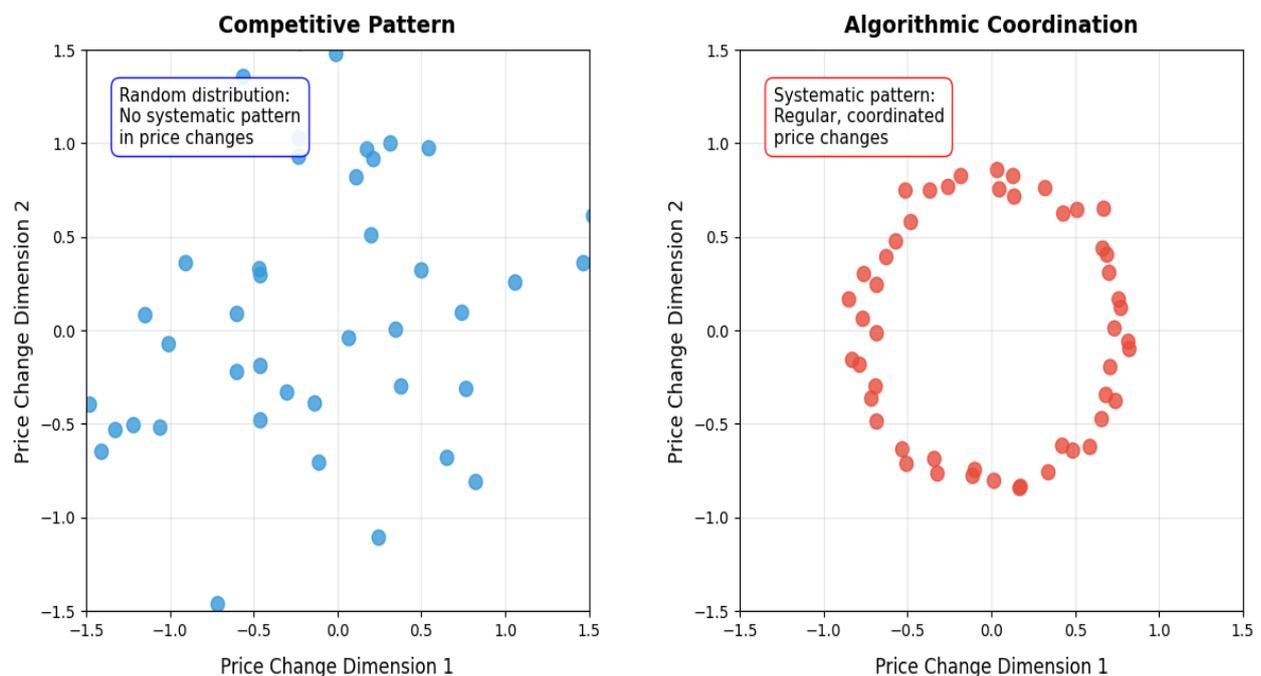

Figure 7: Detection of Algorithmic Coordination through Price Change Analysis

Source: Author's illustration based on methodologies described in Organisation for Economic Co-operation and Development. (OECD, 2017a)

Detection capabilities remain crucial for effective enforcement under any regulatory framework. Venturing statistical tools, auditing capabilities, and international collaboration is indispensable for refined algorithmic application (CCI, 2024).

India can gradually implement ex-ante duties with cases of competitive harm. This requires investment in technical expertise and expansion of clear guidance. The practice should

incorporate efficient suitable practices and global proficiency with an edifice to domestic abilities (CCI, 2023).

Indian approach should aim to balance effective implementation aligned with innovation and regulatory interferences. The resolution should meet inclusive growth and development in the era of digital economy (ICRIER, 2023).

6. CONCLUSIONS AND RECOMMENDATIONS

The comprehensive study acme some noteworthy challenges that algorithmic collusion and self-preferencing constitute. Subsequently, creating demand for refined policy initiative harmonising enforcement effectiveness with reform. Inclusive enforcement experiences bow to real-world competitive impairment and the complexity in formulating appropriate regulations deprived of unnecessary restriction to valuable platform services.

 International inferences are very much relevant for India's nascent competition policy plan. Algorithmic pricing systems reach coherent outcomes without human agreements. Consequently, this results in upgraded submission and reprimand mechanisms, with supra-competitive pricing. Prevalent implementation in the European Commission's Google Shopping inquiry, the U.S. Department of Justice's RealPage case, and India's current Amazon-Flipkart examination authenticate self-preferencing negatively effecting the welfare on consumer surplus which is estimated to be 4-15% in the online business.

The end result of algorithmic practices is self-reinforcing in market congregation because of network effects and data advantages. This tactic is missing in traditional settings therefore face significant confines because of human behaviour and their intent to have an agreement. The study exposes that ex-ante frameworks are proficient in balancing the traditional enforcement. EU's Digital Markets Act, UK's DMCC Act, and Germany's amended Competition Act render various methods to hand out the algorithmic practices. Nevertheless, the effective implementation needs institutional capacity building programme in harmony with valued innovation.

 CCI should learn from global practises to enhance the conditions of institution in the local market. The Competition Commission of India should catalogue modern detection aptitudes for algorithmic coordination. Hence it requires statistical tools and algorithm auditing mechanism which can challenge patterns without evidence of explicit agreements. Furthermore, endeavour in technology and indicative skills will be pivotal in multifaceted algorithmic markets.

The Draft Digital Competition Bill 2024 characterises algorithmic competition through pre-existing guideline. Yet, the nature of the framework should be flexible to build in proportional liabilities without imposing unwarranted compliances. Additionally, representation should launch clear precedents through significant enforcement cases from different countries.

The role of international cooperation mechanisms should bind domestic analytical capabilities. The CCI's involvement in international supervision and information sharing pacts can offer rational practices which are cost effective for developing countries.

The regulation must distinguish between degrees of algorithmic practices, with safe harbours. Insignificant forms of algorithmic optimisation should be treated in a different way from systematic coordination which harm competition.

 Digital platforms play significant part in economic development, financial inclusion, and rural connectivity in India. In future the policy should balance competition along with continued innovation. Digital ecosystem should be preserved in order to attain higher growth development. The outline should be inclusive of primary, tertiary and service sector. Current competition policy should aid public interest and not the market power which is disadvantageous for consumers and small businesses.

The particulars of algorithmic competition should partnership trade and commerce regulators, technology and academic researchers to protect assistances while maintaining the competition in the market. The regulatory measures ought to address competitive harms and venture innovation in India's rapidly growing digital economy.

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