



Market Failure Restoration: A New Blueprint for Public Policy

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Abstract

Original Research Article

Standard economic models often look perfect on a whiteboard, but real-world markets routinely fail to allocate resources efficiently. This paper looks at why that happens, connecting classic problems like pollution with institutional roadblocks, network monopolies, hidden information, and the quirky ways humans actually make decisions (bounded rationality). We look closely at the climate crisis, which isn't just one big economic problem, but a messy cluster of them: unpriced carbon emissions, severe corporate underinvestment in green research and development, and the chicken-and-egg dilemma of building clean infrastructure. By looking at the tension between market breakdowns and flawed political solutions ("government failures"), we build a practical guide for policy design. Our main takeaway is that silver-bullet solutions, like a single carbon tax, cannot fix the system on their own. Instead, fixing deep-rooted market failures requires a smart, coordinated mix of carbon pricing, clean-tech research and development subsidies, and systemic infrastructure updates.

Keywords: Market Failure, Externalities, Climate Economics, Bounded Rationality, Coase Theorem, Institutional Economics.

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1. Introduction

1.1 Pollution and Climate Change as Systemic Market Failures

Pollution is the textbook example of a negative externality: a situation where the private cost of doing business is wildly lower than the actual cost dumped on society. When a smelter refines metal, it releases localized sulfur dioxide (SO₂) and nitrogen oxides (NO_x), which eventually fall as acid rain. But these environmental spillover effects aren't just limited to heavy industry; they are woven into our daily transport networks, municipal heating systems, automated commercial lighting, and waste management setups.

These impacts fall on a broad spectrum of visibility:

- **The Easily Quantifiable:** Things we can measure precisely with sensors, like chemical spikes in a river or decibel levels next to a runway.
- **The Purely Qualitative:** Things like visual pollution or ruined landscapes, which resist easy measurement because beauty is entirely subjective.

Because total elimination is practically impossible, environmental economists focus on finding a realistic, socially acceptable level of pollution in the short term (Mukanjari & Sterner,



2022). This sweet spot happens where the marginal social benefit of an economic activity perfectly balances out its marginal social cost. Over the long haul, as green technologies mature and scale, they shift these cost curves, naturally lowering the baseline of what society is willing to tolerate (Popp et al., 2024).

When unregulated markets fail to maximize societal well-being, we hit a structural market failure. This is the primary justification for government intervention. And while public debates often treat climate change as a singular, monolithic market failure, modern economic literature treats it as an interconnected web of distinct microeconomic glitches (Stern & Stiglitz, 2023).

1.2 The Multi-Tiered Climate Distortion Matrix

The biggest glitch is the greenhouse gas (GHG) externality. Because carbon emissions mix globally into the atmosphere, the severe damages they cause are completely uncoupled from the businesses or consumers emitting them. Instead, the real bill will be paid by future generations and economically vulnerable developing nations (Carattini et al., 2021). Because the market treats these damages as someone else's problem, cutting emissions becomes an ethical choice rather than a business requirement. As a result, competitive markets systematically overproduce carbon-heavy goods.

To fix this, environmental pricing strategies try to force companies to internalize these costs, using transparent price tags on carbon to shift investor expectations and make low-carbon technologies less risky (Barrage, 2021). To make sure these costs are distributed fairly and efficiently across the economy, mainstream economic theory usually favors uniform rules, such as flat carbon taxes or cap-and-trade emissions markets (Dolphin et al., 2020). However, obsessing over carbon pricing alone ignores several other market failures that stall the green transition (Stiglitz, 2024). These include:

- **Information Asymmetries:** Homeowners and businesses frequently

lack clear, trustworthy data on decentralized energy-saving upgrades.

- **Network Externalities:** The chicken-and-egg problem of new infrastructure. Next-generation energy setups—like smart grids and EV charging networks—suffer from steep, non-linear adoption curves. Early on, private returns are incredibly low, creating a coordination trap where deployment freezes despite the long-term benefits of a mature network (Church & Ware, 2020). For example, an EV is only useful if there are plenty of chargers; but private investors won't build chargers until there are plenty of EVs on the road (Springel, 2021).
- **Innovation Underinvestment:** New ideas are essentially a public good. Once a foundational engineering concept is out in the world, competitors can copy it for free. Without strong patent protections or public R&D funding, private firms will always underinvest in clean-tech innovations because they cannot guarantee they will capture the financial rewards of their own breakthroughs (Acemoglu et al., 2023).

2. Theoretical Foundations of Market Failure

2.1 The Concept of Efficiency and Historical Origins

In formal terms, a market failure happens whenever the competitive price mechanism fails to reach a Pareto-efficient frontier. An allocation of resources is Pareto-optimal only when it is impossible to make one person better off without making someone else worse off (Arrow & Devreu, 1954). When a market fails, it means there is money, welfare, and efficiency left on the table—meaning a better configuration could improve society's net well-being.

While the modern terms were locked in during the mid-20th century (Bator, 1958), the basic idea that individual self-interest can sabotage collective welfare goes back to Henry Sidgwick's *The Principles of Political Economy*

(1883). Today, microeconomics groups these systemic deviations into a few core buckets:

Market Failure \in {Externalities, Public Goods, Market Power, Asymmetric Information, Bounded Rationality}

Pinpointing exactly where a market breaks down is usually the first analytical step toward justifying new rules, laws, or taxes by local or international regulators (Acemoglu & Robinson, 2022).

2.2 The Friction between Market and Government Failure

Any honest analysis of market failures must acknowledge that governments can fail too. Well-meaning public interventions—whether taxes, cash subsidies, corporate bailouts, price caps, or rigid command-and-control mandates—can accidentally introduce secondary distortions that waste resources, stifle production, or invite corrupt rent-seeking (Le Grand, 2021). As a result, practical public policy is rarely a choice between a flawed market and a perfect government. Usually, it is a choice between two highly imperfect states: a distorted market or an inefficient regulation (Rodrik, 2024). But even with this tension, an uncorrected market failure remains inherently inefficient.

The economic consensus agrees that well-structured rules can guide markets toward better outcomes in specific areas, like enforcing building safety codes, protecting endangered wildlife, or managing public health crises. On the flip side, heterodox perspectives, especially public choice theory, argue that political actors rarely have the real-time data or the right incentives to outsmart the decentralized sorting power of a free market (Hodgson, 2021).

2.3 Ecological Market Failures

A distinct sub-category is the ecological market failure. This happens when human economic activity burns through non-renewable resources, degrades critical ecosystem services, or simply overwhelms the planet's natural waste-

absorption limits (Dasgupta, 2021). In these cases, the standard price mechanism ignores long-term, intergenerational costs entirely. Current consumption patterns look efficient today but risk causing irreversible ecological collapse for the next generation.

3. Taxonomy of Structural Market Distortions

Mainstream microeconomics breaks market failures down into three main structural categories (Cowen & Tabarrok, 2021):

1. The build-up of unfair market power under imperfect competition.
2. The fundamental nature of the asset being traded (like public goods or shared natural resources).
3. The ripple effects of uncompensated impacts between everyday people (externalities).

3.1 The Nature of the Market: Imperfect Competition and Market Power

When a company gains too much market power, it can manipulate prices by intentionally squeezing supply, effectively blocking trades that would benefit both parties. This dynamic plays out across various real-world setups, from pure monopolies and monopsonies to monopolistic competition (Syverson, 2021). Unless a monopolist can charge every single customer a custom price, it will always restrict production below what a competitive market would naturally provide. The firm maximizes its own profit by cutting output to the point where its marginal revenue matches its private marginal cost ($MR = MC$). Because the retail price (P) sits well above marginal revenue at this point, a gap opens up between what consumers are willing to pay and the real-world resources needed to build that final unit:

$$P > MR = MC; P > MC$$

At this lower production level, the marginal social benefit (MSB) is higher than the marginal social cost (MSC). This mismatch creates a

permanent deadweight loss to society—represented visually by the unharvested economic value trapped between the demand and marginal cost curves (De Loecker et al., 2020). A massive debate in regulatory economics is whether these massive concentrations of market power naturally dissolve over time thanks to tech disruptions and scrappy new startups, or whether they harden into permanent corporate strongholds that require antitrust action (Covarrubias et al., 2020). Structural barriers to entry—like aggressive patent walls, exclusive control over raw inputs, and massive economies of scale—frequently insulate dominant players from everyday competition (Gutiérrez & Philippon, 2020).

Furthermore, strong first-mover advantages can build massive consumer switching costs. In the extreme case of a natural monopoly, the underlying technology features continuously falling long-run average costs (LRAC) across the entire scope of market demand (Joskow, 2020). In these specific instances, forcing multiple firms to compete would actually double capital infrastructure costs and ruin efficiency, leaving a single, heavily regulated firm as the most practical option.

3.2 The Nature of the Goods: Excludability and Rivalry Framework

Markets cannot function without clear, enforceable property rights. When goods drift away from the standard definition of a private good—which is both excludable (you can stop people from using it) and rivalrous (your use directly takes away from mine)—the standard price mechanism falls apart. We can classify these assets based on how they deviate from classic private property:

- **Private Goods (Rivalrous and Excludable):** These are your standard everyday market goods. The allocation system works beautifully because property rights are clear. Examples include a sandwich, a jacket, or a car.
- **Club Goods (Non-Rivalrous and Excludable):** Goods that do not wear out with use but can be locked behind a paywall. If not managed well, this creates

artificial scarcity. Examples include streaming platform subscriptions or encrypted digital software.

- **Common-Pool Resources (Rivalrous and Non-Excludable):** Resources where one person's consumption directly drains the available supply, yet blocking access is nearly impossible. Because individual users face no immediate financial penalty for taking as much as they can, they have zero economic incentive to conserve, driving the resource toward total depletion (Ostrom, 2021). In an open-access fishery, for example, every boat grabs the full cash benefit of their catch while outsourcing the long-term cost of fish stock depletion to the rest of the fleet. This race to the bottom pushes populations below replacement rates, risking a permanent collapse of the resource.
- **Public Goods (Non-Rivalrous and Non-Excludable):** Assets that anyone can enjoy without reducing the amount left for others. Because you cannot block non-payers from benefiting, you run into a massive free-rider problem that destroys private profit incentives and leads to chronic underinvestment (Bloom *et al.*, 2020). For example, once a foundational scientific concept or open-source low-carbon blueprint is published, anyone can use it for free, making it incredibly difficult for the original inventors to recover their massive up-front capital investments.

3.3 The Nature of the Exchange: Transaction Costs, Asymmetries, and Bounded Rationality

Information Asymmetries and Contractual Failures

Markets can also fail due to structural frictions within the transaction process itself, such as transaction costs, principal-agent dynamics, or informational asymmetries (Stiglitz, 2021). When one party to a transaction holds superior

information relative to their counterparty, the exchange can break down through two distinct mechanisms:

1. **Adverse Selection:** A pre-contractual informational imbalance where low-quality participants self-select into the market, risking a total collapse in trading volume (Einav *et al.*, 2023).
2. **Moral Hazard:** A post-contractual distortion where an insulated party alters their behaviour, shifting risks or costs onto the less-informed counterparty.

These information gaps are prominent in principal-agent dynamics, where a principal hires an agent to perform a task but cannot costlessly monitor their real effort or alignment of interests (Laffont and Martimort, 2022).

Bounded Rationality and Behavioural Distortions

Standard neoclassical models assume hyper-rational agents capable of instantaneous optimization. In contrast, behavioural economics demonstrates that real-world decision makers operate under bounded rationality. Agents experience distinct limits when processing information, storing data, and solving complex optimization problems.

Rather than executing comprehensive utility optimization, agents rely on cognitive heuristics to navigate complex decisions (Thaler, 2021). These shortcuts are often driven by high upfront information gathering costs or competing demands on individual attention. Under bounded rationality, choices are shaped by several systematic cognitive distortions:

- **Present Bias:** Over-indexing on immediate costs or benefits while heavily discounting long-term payoffs. This bias undercuts long-term investments in energy efficiency or retirement planning.
- **Status Quo Bias:** A disproportionate preference for current configurations, which slows the adoption of new, lower-cost technologies.

- **Loss Aversion:** Weighing potential losses significantly more than equivalent gains, which can freeze trade in highly uncertain settings.

Consequently, consumers often underinvest in energy-efficient upgrades or clean technologies even when the long-term private financial returns are clearly positive (Kahneman *et al.*, 2021).

4. Analytical Frameworks for Policy Correction

4.1 The Pigouvian Framework

The traditional approach to correcting negative externalities is the Pigouvian framework, which uses targeted fiscal policy to internalize external costs. When a production process generates a negative externality, the private market equilibrium overproduces the good because the firm's private marginal cost (PMC) sits below the true social marginal cost (SMC).

To correct this distortion, the state applies a per-unit Pigouvian tax (t) exactly equal to the marginal external damage (MED) evaluated at the socially optimal output level (Q^*):

$$t = \text{MED}(Q^*)$$

This tax shifts the private cost curve upward, aligning the producer's private incentives with social welfare. At the new equilibrium, output contracts to the socially optimal level (Q^*), and the market price rises to reflect its full socio-ecological footprint.

4.2 The Coasean Alternative and Institutional Property Rights

The Coase Theorem challenges this tax-centric approach, demonstrating that under specific conditions, private bargaining can yield efficient resource allocations without direct regulatory intervention (Libecap, 2020). The theorem requires three core conditions:

- Property rights must be clearly assigned and legally enforceable.
- Transaction costs must approach zero.

- The number of affected bargaining parties must be small.

If these conditions hold, the ultimate allocation of resources will be Pareto-efficient regardless of which party is originally assigned the property rights. For example, if a steel mill pollutes a downstream fishery, bargaining will lead to the optimal level of filtration whether the mill has the right to emit or the fishery has the right to clean water. However, real-world environmental challenges frequently involve high transaction costs, highly distributed impacts, and diffuse ownership structures that limit pure Coasean solutions.

Modern institutional economics conceptualizes markets as formal networks for exchanging bundled property rights (Eggertsson, 2021). The institutional efficiency of these exchanges depends on two foundational dimensions:

- **Excludability:** The legal authority and practical capability of an owner to control access to their asset, along with the costs incurred to enforce those boundaries.
- **Transferability:** The legal right to lease, sell, or reallocate resource control to another agent at minimal transaction cost.

If institutional frameworks fail to secure these rights at low cost, resource distributions drift toward inefficiency (Williamson & Winter, 2021). Thus, institutional design focuses on constructing legal frameworks that lower discovery, negotiation, and enforcement costs, enabling decentralized markets to coordinate effectively.

5. Strategic Recommendations for Policy Design

To prevent the compounding inefficiencies of market failure while minimizing the secondary threats of government failure, public policy design must deploy an explicit, multi-layered matrix of interventions. Isolated solutions

invariably fail when addressing interconnected systems.

5.1 Internalisation of Externalities through Tiered Fiscal Regimes

- **Dynamic Carbon and Pollution Pricing:** Governments must implement robust carbon pricing mechanisms (either through carbon taxes or cap-and-trade frameworks) indexed directly to updated assessments of Marginal External Damage (MED). To counter the threat of political manipulation and rent-seeking, these pricing mechanisms should be governed by independent statutory bodies insulated from short-term electoral cycles, mirroring the autonomy of central banks.
- **Targeted Co-Investment for Positive Externalities:** Public policy must bridge the initial capital deficits seen in networks with non-linear returns. Rather than broad corporate bailouts, states should deploy matching capital grants and public-private partnerships (PPPs) dedicated exclusively to the nascent stages of green networks (e.g., automated lighting grids, smart EV charging distribution). This directly triggers private entry by artificially elevating early-stage private returns.

5.2 Institutional Restructuring and Property Rights Allocation

- **Coasean Property Reassignment:** Where transaction costs can be structurally compressed, statutory law should prioritize clear, transferable property rights instead of direct state management. Examples include establishing Individual Transferable Quotas (ITQs) in marine ecosystems and issuing clean water credits to localized agricultural catchments.

- **Lowering Transaction and Exchange Frictions:** Institutional design must focus on digitizing registry tracking, standardizing environmental contract structures, and creating accessible legal arbitration channels. Minimizing discovery and enforcement costs allows decentralized trade to naturally rebalance resource allocations toward the Pareto frontier.

5.3 Public Overhaul of Public Goods and Innovation Deficits

- **Expanded Public Provision of Foundational Knowledge:** Because the private market cannot appropriate the long-term social returns of basic research, the state must directly finance foundational climate modeling, macroeconomic data systems, and open-source technological frameworks. This knowledge must be preserved in the public domain, bypassing restrictive patenting walls to eliminate the corporate underinvestment trap.
- **Performance-Contingent Research and Development Subsidies:** Innovation subsidies should transition away from flat inputs (e.g., generic tax credits) toward output-contingent milestone rewards. Clean-tech research grants must be tied to verified benchmarks in engineering scalability, ensuring public capital actively converts basic research into operational private infrastructure.

5.4 Remediation of Information Asymmetries and Bounded Rationality

- **Mandated Disclosures and Architectural Transparency:** To counter adverse selection and moral hazard, secondary consumer markets require statutory disclosure standards. For instance, used EV transactions should require independent, standardized battery degradation certificates, shifting

the informational equilibrium back to symmetry.

- **Deploying Choice Architecture and Behavioural Nudges:** Public agencies must adjust policy frameworks to account for present bias and status quo bias. Instead of relying solely on information campaigns, default rules should be flipped. For example, municipal building programs should implement default enrolment in energy-efficient insulation programs, utilizing choice architecture to guide boundedly rational consumers toward decisions that match their long-term private financial interests.

6. Taxonomic Classification of Failures and Responses

Negative Externalities

- **Core Economic Mechanism:** Private cost is less than social cost ($PMC < SMC$).
- **Representative Microeconomic Example:** Greenhouse gas emissions from coal-fired power generation.
- **Optimal Policy Instrument:** Pigouvian Tax ($t = MED$) or Cap-and-Trade Systems.

Positive Externalities

- **Core Economic Mechanism:** Private benefit is less than social benefit ($PMB < SMB$).
- **Representative Microeconomic Example:** Network deployment of EV charging stations.
- **Optimal Policy Instrument:** Capital Subsidies or Public Infrastructure Investment.

Public Goods

- **Core Economic Mechanism:** Non-excludable and non-rivalrous consumption leading to structural free-riding.
- **Representative Microeconomic Example:** Foundational climate modeling and basic scientific Research and Development.
- **Optimal Policy Instrument:** Direct Public Provision or Research Grants.

Common-Pool Resources

- **Core Economic Mechanism:** Non-excludable but rivalrous consumption leading to a race to extract.
- **Representative Microeconomic Example:** Open-access ocean fisheries depletion.
- **Optimal Policy Instrument:** Individual Transferable Quotas (ITQs) or Polycentric Governance frameworks.

Market Power

- **Core Economic Mechanism:** Restricted output used to push prices above marginal cost ($P > MC$), generating deadweight loss.
- **Representative Microeconomic Example:** Natural monopoly in regional electricity distribution grids.
- **Optimal Policy Instrument:** Price-Cap Regulation (RPI-X) or Antitrust Disinvestment.

Asymmetric Information

- **Core Economic Mechanism:** Pre-contractual or post-contractual information gaps (Adverse Selection / Moral Hazard).
- **Representative Microeconomic Example:** Uncertainty regarding used EV battery degradation in secondary markets.

- **Optimal Policy Instrument:** Mandated Disclosures and Standardized Certifications.

Bounded Rationality

- **Core Economic Mechanism:** Heuristic choice limits, status quo bias, and present bias over-indexing immediate transaction friction.
- **Representative Microeconomic Example:** Systemic residential underinvestment in home energy insulation.
- **Optimal Policy Instrument:** Behavioral Nudges, Default Enrollment programs, and clear Energy Efficiency Labels.

7. Conclusion

Market failure is not a singular deviation from textbook perfect competition; it is a multi-layered diagnostic reality. As demonstrated by the climate crisis, correcting deep resource misallocations requires moving beyond isolated policy tools. While carbon pricing remains an important baseline mechanism for internalizing environmental externalities, it cannot resolve parallel market frictions like network coordination traps, Research and Development underinvestment, informational barriers, or cognitive biases.

An effective response requires a coordinated policy mix: combining Pigouvian carbon pricing with targeted Research and Development subsidies, public infrastructure investments, and behavioral interventions. Ultimately, effective economic policy design requires a careful balancing act—weighing the known inefficiencies of market failures against the structural risks of government failure to chart an empirically grounded path toward sustainable, long-term social welfare.

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