

Generativity Exploitation Propagation: A Conditional Network Model of Cascades and Buffers

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Abstract

An actor whose effective generative capability is constrained may face altered opportunities, pressures, and returns when choosing how to continue. One possible response creates a second exploitative relation; cooperation, support, exit, adaptation, and lost practical capacity can yield different outcomes. This position paper develops *generativity exploitation propagation* as a conditional causal relation between independently evaluated edges. The model requires complete global arrangements, compatible edge-level baselines, a coherent intervention on an upstream mechanism, a separately specified downstream row-satisfaction target, and a material positive total-effect screen. The source-aligned propagation label additionally requires a supported material path through the intermediate actor’s capability, viability, or response opportunities. The target remains distinct from its three-valued research audit. Under a finite response-sufficiency restriction, the paper derives a response-kernel identity for the total effect and a sign decomposition in which vulnerability, non-appropriative alternatives, practical capacity, and return can offset one another. A restricted open-cascade approximation yields an expected-generation recursion and a finite subcritical resolvent. Entrywise offspring-kernel reduction yields spectral attenuation under causally comparable regimes, while leaving policy legitimacy and burden displacement open. Countermodels separate propagation from succession, common shocks, absorbed losses, downstream harm, incompatible baselines, and unresolved edge audits. Around this construction the paper develops three further registers. A problem analysis locates the transmitting quantity in subject-level continuation: an actor sustains a trajectory across several generative domains jointly, so a contraction confined to one domain can lower its capacity to continue at all and compel a search for generative conditions elsewhere. The analysis further establishes that edge diagnoses fail to compose, since succession, common causation, and shared mechanisms remain consistent with two positive edge findings, and that the existence of a capability contraction can be accessible while its magnitude remains unidentified. A review locates the proposal among threshold, cascade, systemic-risk, interference, and structural-exploitation traditions, which divide into those modeling transmission without evaluating what is transmitted and those evaluating relations without modeling transmission. A normative argument then answers the question the model raises. Transmitted pressure leaves the intermediate actor’s agency intact; the actor’s motivating state is preservation of its own continuation rather than opportunism, which makes the conduct both more susceptible to mitigation and more tractable to institutional remedy through the availability of alternatives; and the upstream actor acquires a distinct forward-looking burden, so that responsibility neither migrates upstream nor disappears. A closed-cycle counterexample defeats the inference from reciprocal role occupancy to cancellation and establishes that distributive outcome and relational procedure are independent evaluative registers, from which it follows that stability and subcriticality are dynamical properties carrying no normative verdict. The propagation contrast is proposed as a measure of structural contribution for social-connection accounts of responsibility, which have lacked one. A political-economic register locates coordinating power through value-chain governance types, states the mismatch between the level at which the relations occur and the level at which mediating capacity resides, and argues that existing

instruments in this domain regulate observable manifestations in place of couplings, so that an instrument can be fully complied with while the transmission structure operates unchanged. Open questions are collected by register. The construction establishes neither prevalence nor inevitability, assigns no liability, recommends no institution, and classifies no observed relation. It offers a revisable framework for empirical and normative research on open exploitation cascades across AI and non-AI domains.

Keywords: generativity exploitation; causal propagation; network interference; capability; open cascades; buffering.

Document Status, Preparation, and Reuse

This unnumbered section records the manuscript’s status, research genealogy, preparation process, and reuse conditions. These statements govern the document and carry no evidential weight for its substantive position.

Status and correspondence. This paper is a revisable discussion document. Its definitions are proposals, its mathematical results are conditional on declared assumptions, and its empirical bridges remain open. Objections, counterexamples, corrections, alternative formulations, and relevant literature are welcome at huangwanhong@serendip.ngo.

Research genealogy. The author-led exploratory discussion introduced secondary exploitation, named *Generativity Exploitation Propagation*, generalized the problem beyond AI, replaced an implication of necessity with a modal claim about altered pressure and possibility, and supplied the closed-cycle robbery counterexample that defeats the inference from reciprocal role occupancy to cancellation. That counterexample is the source of Thesis 5.4. The global-arrangement construction, causal estimands, response kernel, offspring matrix, propositions, and the remaining theses are later reconstructions and arguments. Their inclusion records development of the proposal; it does not attribute these equations or arguments to the initiating notes or to the cited literature.

Generative AI use. Generative AI systems were used in the preparation of this work. Anthropic’s Claude and OpenAI systems including ChatGPT and Codex supported exploratory discussion, formal reconstruction, source discovery followed by verification, and drafting in L^AT_EX. The author determined the research questions, theoretical commitments, and epistemic status of the claims and bears sole responsibility for the manuscript, including its errors. None of these systems is an author or holds authorship credit.

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1 Introduction

An actor whose capacity to sustain its own work has been reduced must obtain what it needs from somewhere. Where the accessible routes are cooperative, restorative, or redistributive, the search ends there. Where they run through another party’s generative capability, a second relation appears that resembles the first. This paper examines whether the resemblance reflects a causal connection, and what follows if it does.

The phenomenon was proposed as *secondary exploitation* and named *generativity exploitation propagation*. Its initial statement was modal and deliberately weak: an affected actor faces increased pressure, and a downstream relation may follow. That weakness is a feature. A claim that affected actors become exploiters is refuted by any actor who absorbs the loss, exits, cooperates, or loses the practical capacity to appropriate from anyone, and all of these occur. The claim worth defending concerns a shift in a distribution of responses.

The difficulty is that two positive relations, however carefully diagnosed, do not establish a connection between them. Four situations remain consistent with every observation an edge-level diagnostic produces: the relations merely succeed one another in time; a prior institutional change independently produced both; a single mechanism reached both by separate routes while leaving the intermediate actor’s position unchanged; or the first relation genuinely altered that position and thereby raised the probability of the second. Only the last is the phenomenon. The failure to distinguish them is structural rather than evidential, since the edge diagnostic evaluates each relation against its own comparison family without relating the two comparisons.

The paper’s response is a conditional causal construction with an explicit second requirement. A propagation finding needs compatible global arrangements, a coherent intervention on an upstream mechanism, a separately specified downstream target, a material positive total effect, and a supported material path through the intermediate actor’s capability, viability, or response opportunities. The total effect alone is a necessary screen that the shared-mechanism case passes, so the path requirement carries the distinction that matters.

Four insights organize the argument. The first identifies what transmits. A participant sustains a trajectory across several generative domains jointly, so a contraction confined to one domain can lower its capacity to continue at all and compel a search for conditions elsewhere. This portfolio structure explains why an upstream relation in one domain can produce a downstream relation in another, and why the transmitting quantity is subject-level continuation rather than any single capability. The second concerns motivation. What moves the intermediate actor is preservation of its own continuation, which differs from opportunism in a way that matters: threshold-seeking terminates when the threshold is met and is indifferent among routes that meet it. This makes the conduct both more susceptible to mitigation and more tractable to institutional remedy, since a participant satisfied by a cooperative route has no stake in an appropriative one. The third concerns responsibility. Transmitted pressure leaves the intermediate actor’s agency intact, mitigates without extinguishing that actor’s burden, and generates a distinct forward-looking burden on the upstream actor, so responsibility neither migrates upstream nor disappears. A closed-cycle counterexample establishes that reciprocal role occupancy cancels no constituent wrong, from which it follows that distributive outcome and relational procedure are independent registers and that stability and subcriticality carry no verdict. The fourth concerns governance. Existing instruments in this domain regulate observable manifestations rather than couplings between relations, so an instrument can be fully complied with while the transmission structure operates unchanged.

The paper’s contribution is a framework in which a proposed cascade can be shown to lack a coherent baseline, a causal intervention, a downstream diagnosis, a path warrant, event-level descendant attribution, or a complete account of affected actors. It proposes the propagation

contrast as a measure of structural contribution for accounts of responsibility that have lacked one. It establishes no prevalence, no inevitability, and no liability, recommends no institution, and classifies no observed relation.

The argument proceeds in eleven further sections. Section 3 analyzes the transmission problem. Section 4 reviews transmission traditions. Section 5 argues the normative theses. Section 6 describes the structures in which transmitted pressure operates. Sections 7 through 10 construct the formal model. Section 11 states countermodels and an empirical protocol. Section 12 collects open questions by register, and Section 13 states limits and revision conditions.

The philosophical and formal parts are *formally independent*, since every proposition follows from declared model assumptions and no derivation cites a thesis, and *justificatorily dependent*, since a conditional causal model matters only if transmitted pressure changes how participants should be assessed. Section 5.8 records what fails if each thesis is rejected.

2 Analytical Scope and Propagation Position

This section defines the paper’s relational target, limited position, and sequence of inquiry. It begins with three motivating configurations, states the edge-to-edge possibility, distinguishes the resulting objects, and locates the proposal without claiming empirical prevalence or literature-wide novelty.

2.1 Three Transmission Configurations

This subsection presents the situations that generate the research question. Each is stated schematically, and none is classified by this paper.

Squeezed intermediary. A lead organization sets terms that contract a supplier’s effective capacity to operate on the previous basis. The supplier retains its practices and personnel. What contracts is the set of viable ways to continue: margins, scheduling latitude, and reinvestment capacity. The supplier then sets terms toward its own workforce that it would previously have declined to set.

Displaced practitioner. A practitioner’s professional capability is reorganized by an adopting organization’s deployment of a mediating system. The practitioner retains the skill and loses direction over its application. Continuing on the previous terms becomes infeasible, and the practitioner takes a position in which another participant’s capability is in turn constrained.

Foreclosed originator turned controller. A participant whose generative trajectory was foreclosed by a controller subsequently obtains control over conditions on which a third participant depends, and exercises it as the original controller did. The first relation altered which continuations were viable. The second relation is nonetheless the participant’s own.

Each configuration raises the same two questions. Did the first relation causally change the second, or did they merely occur in sequence? And if it did, what follows for how each participant should be assessed? This paper answers the first question formally and the second philosophically.

Suppose a relation benefits X through a material contraction of Y ’s effective generative capability relative to an admitted comparison. That contraction may alter Y ’s capacity to continue, the responses available to Y , and the returns attached to those responses. A later relation may then benefit Y through a contraction of Z ’s capability. The motivating sequence is therefore

$$X \leftarrow Y \quad \rightsquigarrow \quad Y \leftarrow Z,$$

where each arrow points from the affected participant toward the candidate beneficiary. The notation records a role in one relation. An actor can occupy different roles across edges, and no permanent actor type follows.

The sequence permits several continuations. Support, commons access, redistribution, cooperation, exit, internal adaptation, or redundancy may absorb the upstream change. The same change may also remove Y 's practical capacity to appropriate from another participant. Propagation is consequently a causal possibility under specified conditions, not a logical consequence of the upstream relation.

Contemporary exploitation accounts disagree about the roles of vulnerability, domination, unfair advantage, background structure, and anonymous social organization [20, 25, 22]. The present paper inherits an edge diagnostic from a companion capability framework and asks a narrower dynamic question: when does a coherent change in one diagnosed relation causally change the probability of another diagnosed relation? It leaves the correct general theory of exploitation open.

Claim 2.1 (Conditional propagation position). Positive generativity-exploitation propagation is supported, relative to a declared baseline pair and research specification, when a coherent intervention on an upstream actor-linked mechanism produces a material positive total contrast in a separately evaluated downstream generativity-exploitation target under compatible global arrangements, and a separately supported material path through the shared intermediate actor connects that intervention to the target. An open cascade additionally requires event-level descendant attribution.

Claim 2.1 separates six objects. An *edge diagnosis* evaluates one relation. A *propagation link* connects two edge positions by a positive total-effect screen and a supported path through the shared intermediate actor. *Succession* records temporal order alone. An *open cascade* joins supported links without feedback to an earlier edge. A *feedback cycle* closes such a path and requires another model. A *candidate buffer* modifies a declared propagation quantity; its normative and institutional evaluation remains separate.

Where a source is used, the text states the specific constraint it supplies and the inference it withholds. The verified corpus establishes antecedents, methodological constraints, and rivals; it establishes neither the novelty nor the empirical adequacy of the construction proposed here, and no source is cited in support of a proposition or a countermodel.

3 The Transmission Problem

This section analyzes the problem the construction addresses. Its objective is to show why edge-level diagnoses fail to compose, why the phenomenon must be stated modally, and what a replacement account must therefore supply.

3.1 Secondary Exploitation as a Phenomenon

This subsection states the phenomenon in its original form and identifies what in it requires reconstruction.

The initiating proposal was that an actor whose generativity has been exploited may face increased pressure to exploit another. The proposal contains three components worth separating. It asserts a directional relation between two relations rather than between two states. It locates

the connection in altered viability and altered available responses. And it states the connection modally: pressure increases, and the downstream relation may follow.

Each component resists a straightforward formalization. A relation between relations requires the edge diagnostic to be applied twice under a single coherent counterfactual structure, which the edge diagnostic alone does not supply. Altered viability and altered responses are intermediate states that are themselves consequences of the upstream relation, so conditioning on them naively induces post-treatment bias. And a modal claim about pressure has no natural binary rendering: it is a statement about a change in a distribution.

3.2 Subject-Level Continuation as the Transmitting Quantity

This subsection identifies what the original proposal locates between the two relations, and states why that quantity gives the phenomenon its distinctive character.

The proposal does not claim that an exploited participant acquires an appetite for exploiting others. It claims something narrower and stranger. A participant sustains a trajectory across several generative domains at once, and its capacity to continue as a participant at all depends on that portfolio jointly. Write this subject-level continuation capacity schematically as depending on the participant's effective capability across domains together with its available conditions. A contraction confined to one domain can lower the participant's capacity to continue in general, because the domains are not independently sustaining.

The participant then faces a constraint rather than a temptation: to continue at all, it must obtain generative conditions, resources, or relations from somewhere. That search is the transmitting quantity. Where the accessible routes are cooperative, redistributive, or restorative, the search terminates without a second exploitative relation. Where the accessible routes run through another participant's generative capability, the search produces one.

Two features of this structure matter for everything that follows. The motivating state is self-continuation, so a model that represents the intermediate actor as opportunistic misdescribes the mechanism. And the transmission runs through a portfolio effect, so an upstream relation confined to one domain can produce a downstream relation in an entirely different domain. The framework accordingly indexes edges by domain and requires no domain match between an upstream and a downstream relation.

Section 5 argues that the self-continuation structure has normative consequences that neither an opportunism model nor a pure-victim model captures.

3.3 Existence and Magnitude as Separate Problems

This subsection records an asymmetry that constrains the empirical program and recurs in the open questions.

Generativity is latent, observed trajectories are samples, and the economically relevant loss frequently lies in counterfactual trajectories that never occurred. This makes the magnitude of a capability contraction difficult to establish even where its existence is comparatively accessible: structural changes in conditions, permissions, and opportunity sets can support an existence finding while leaving valuation open.

The asymmetry propagates into the present model and worsens there. A propagation contrast is a difference between downstream probabilities under two arms, so it inherits the identification burden of both edge diagnoses plus the burden of the intervention and path conditions. The framework therefore treats an unresolved magnitude as an unresolved magnitude rather than converting it into a null finding, and Section 12 records the resulting research obligations.

3.4 Failure of Composition Across Edge Diagnoses

This subsection establishes that two positive edge diagnoses do not compose into a transmission finding.

Suppose the upstream relation $X \leftarrow Y$ and the downstream relation $Y \leftarrow Z$ each receive a positive edge diagnosis. Four distinct situations remain consistent with those two findings.

1. **Succession.** The relations occur in temporal order with no causal dependence between them.
2. **Common cause.** A prior institutional change independently produces both, so intervening on the first leaves the second unchanged.
3. **Shared mechanism without transmission.** A single coherent exposure reaches both relations by separate branches, changing both probabilities while leaving the intermediate actor's capability, viability, and response opportunities unchanged.
4. **Genuine transmission.** The first relation changes the intermediate actor's position, and that change raises the probability of the second.

Only the fourth is the phenomenon. The first three are compatible with every observation that the edge diagnostic produces, because the edge diagnostic evaluates each relation against its own comparison family without relating the two comparisons. Composition therefore fails, and the failure is structural rather than evidential: no accumulation of edge-level evidence resolves it.

Two consequences follow for the construction. The comparison arrangements of the two edges must be jointly realizable, since local comparisons chosen independently may require the same indivisible resource in incompatible positions. And the transmission claim requires an intervention on the upstream mechanism together with a path condition through the intermediate actor, because a total effect alone leaves case three standing.

3.5 The Modal Gap Between Pressure and Necessitation

This subsection states the gap that the paper's formal and philosophical parts each address.

The initiating proposal says that pressure increases, and it explicitly declines to say that the downstream relation follows. The distinction is not a hedge. It marks the difference between two claims with different truth conditions and different normative consequences.

A necessitation claim would hold that an actor in the upstream-affected position performs the downstream relation. It is refuted by a single actor who does not, and the configurations of Section 2 all admit participants who absorb the upstream change, exit, cooperate, or lose the practical capacity to appropriate from anyone.

A pressure claim holds that the distribution over responses shifts. It is compatible with wide individual divergence, and it is not refuted by any particular actor's conduct. This is what the formal model represents: the total contrast of Definition 8.3 is a difference of expectations, and the response decomposition of Proposition 9.2 makes it a difference of response distributions.

The gap has a normative counterpart that the formal model does not address. If pressure falls short of necessitation, the intermediate actor retains agency, and the question of what the upstream relation does to the intermediate actor's responsibility remains open. Section 5 argues for a specific answer.

3.6 Requirements on a Propagation Account

This subsection converts the analysis into the obligations discharged by the formal construction.

The analysis yields five requirements. The account needs jointly realizable comparison arrangements across both edges. It needs an intervention on an interpretable upstream mechanism in place of an intervention on a diagnostic label. It needs a downstream target whose meaning is stable across arms. It needs a path condition through the intermediate actor, since a total effect admits the shared-mechanism case. And it needs a reporting rule that preserves negative and unresolved outcomes, since a modal claim about distributions will frequently be unidentified.

Sections 7 through 10 discharge these in order.

4 Transmission Traditions and Rival Models

This section locates the proposal among established models of transmission through networks. Its objective is bounded positioning: each tradition supplies a formal or methodological constraint, none supplies an exploitation diagnosis, and the combination remains a repository-specific construction.

4.1 Threshold, Cascade, and Complex Contagion

This subsection identifies the formal ancestors of the cascade vocabulary.

Granovetter’s threshold models show that aggregate outcomes of collective behavior depend sensitively on the distribution of individual thresholds, so that populations with similar average dispositions can produce entirely different aggregate results [12]. Watts extends the analysis to random networks and identifies conditions under which global cascades occur [21]. Centola and Macy distinguish simple from complex contagion and show that behaviors requiring social reinforcement propagate differently from information [7], and Centola’s online experiment establishes a topology effect in one health-behavior setting [6].

These works supply the discipline that heterogeneous response rules and topology jointly determine aggregate paths, and they justify the paper’s refusal to infer a cascade from edge density. They supply no relational diagnosis: a threshold model describes adoption of a behavior, and the present object requires each adopted relation to be independently evaluated.

4.2 Systemic Risk and the Ambiguity of Connectivity

This subsection identifies the tradition that blocks a simple reading of buffering.

Elliott, Golub, and Jackson analyze financial contagion through cross-holdings and show that integration and diversification have non-monotone effects on cascade extent [8]. Acemoglu, Ozdaglar, and Tahbaz-Salehi show that the same network can be stabilizing for small shocks and destabilizing for large ones [1]. Katz and Shapiro’s account of network effects establishes separately that connection alters incentives and adoption [15].

The constraint these impose is directly relevant to Section 10. A structural change that lowers transmission under one shock regime may raise it under another, so a buffer result must be stated relative to declared comparable regimes. The paper accepts this constraint and states the attenuation result entrywise and regime-relative.

4.3 Causal Inference Under Interference

This subsection identifies the methodological constraints on any transmission estimand.

Hudgens and Halloran develop causal inference under interference and partial interference structures [13]; Ogburn and VanderWeele supply causal diagrams for interference [16]; and Aronow and Samii estimate average causal effects under general interference through declared exposure mappings [4]. Imai, Keele, and Tingley separate the definition of a mediation effect from its identification, estimation, and sensitivity analysis [14].

Two further results constrain observational work directly. Aral, Muchnik, and Sundararajan distinguish influence-based contagion from homophily-driven diffusion and find that naive estimates substantially overstate contagion [3]. Shalizi and Thomas prove that homophily and contagion are generically confounded in observational network studies [19].

These supply the paper’s identification obligations and its insistence that a positive association is not a propagation finding. They identify no estimand in any dataset relevant to this paper.

4.4 Structural and Anonymous Exploitation

This subsection identifies the normative tradition closest to the paper’s subject and the specific gap it leaves.

Vrousalis analyzes exploitation as self-enriching instrumentalization of vulnerability within a domination relation [20]. Zwolinski argues against strong inferences from background injustice to the classification of a discrete transaction [25]. Wollner analyzes anonymous exploitation that is non-individual, non-agential, and structural [22], which is the closest verified treatment of exploitation obtaining without an identifiable exploiting agent.

The gap is specific. These accounts address whether a relation is exploitative and whether structure suffices for that classification. None addresses the dynamic question of whether one diagnosed relation causally changes the probability of another, and none supplies a measure of that change. Wollner’s anonymous structural relations and Young’s structural processes, discussed in Section 5, describe the setting in which propagation would operate without characterizing the propagation relation itself.

4.5 Comparative Summary of Traditions

This subsection consolidates the review. Table 1 records what each tradition transmits, what it treats the transmitted item as, and the constraint it imposes on the present construction.

The traditions divide into those that model transmission without evaluating what is transmitted, and those that evaluate relations without modeling transmission between them. The present construction attempts to join the two, and the attempt’s value depends on the arguments of Section 5.

Table 1: Transmission Traditions and the Constraints They Impose. Each tradition supplies a formal, methodological, or normative constraint. None supplies a relational diagnosis or an exploitation propagation result.

Tradition	Transmitted object	Constraint imposed on the present construction
Threshold and cascade models [12, 21]	Adoption of a behavior under heterogeneous thresholds	Aggregate paths depend on response-rule distribution and topology; density supports no cascade inference
Complex contagion [7, 6]	Behavior requiring social reinforcement	Reinforcement and bridge structure change diffusion; a single transmission parameter is inadequate
Systemic risk [8, 1]	Financial loss through cross-holdings	Connectivity effects are non-monotone in shock size; buffer results require declared comparable regimes
Network effects [15]	Value from adoption by others	Connection alters incentives without producing the capability relation at issue
Interference methodology [13, 16, 4]	Treatment effects across units	Exposure mappings, interference scope, and estimand definition must be declared before estimation
Confounding results [3, 19]	Apparent influence in observational data	Homophily and contagion are generically confounded; association supports no transmission claim
Mediation methodology [14]	Effect through an intermediate variable	Definition, identification, estimation, and sensitivity remain separate obligations
Structural exploitation [20, 25, 22]	Wrongful advantage within a structure	Structural location supports no automatic diagnosis; the dynamic relation between edges remains uncharacterized

5 Agency, Constraint, and Responsibility Under Transmission

This section argues for the five theses on which the framework’s significance depends. Its objective is to answer the question the formal model raises and cannot settle: if upstream exploitation raises the probability that an intermediate actor enters a downstream exploitative relation, what follows for how each participant should be assessed?

The question is unavoidable. A model that quantifies transmitted pressure invites two opposite misreadings. On one, the intermediate actor becomes a mere conduit whose conduct is fully explained by upstream constraint, so that responsibility migrates upstream. On the other, the intermediate actor’s agency renders the upstream relation irrelevant to the downstream one, so that transmission carries no normative weight at all. Both are mistaken, and the section argues for the position between them.

Each subsection states a thesis, argues for it, states the strongest objection known to the author, and replies.

5.1 Pressure Without Necessitation

This subsection argues that the model’s central quantity leaves the intermediate actor’s agency intact.

Thesis 5.1 (Pressure without necessitation). A positive propagation contrast is compatible with the full agency of the intermediate actor. The quantity is a difference between response distributions, and it entails nothing about any individual response.

The argument is available directly from the formal construction. By Proposition 9.2, the total contrast satisfies $\tau = \sum_r d(r)[\pi_1(r) - \pi_0(r)]$. This is a difference between two distributions over a common response set. It is consistent with $\tau > 0$ that a majority of actors in the exposed arm select responses outside $\mathcal{R}_Y^E$, and consistent that any particular actor selects the same response in both arms. The model contains no individual-level determination and supplies none.

The point generalizes beyond the formalism. Fischer and Ravizza analyze moral responsibility through the reasons-responsiveness of the mechanism on which an agent acts, in place of the availability of alternative possibilities [10]. On such an account, altering the incentives an agent faces leaves the agent responsible provided the mechanism remains appropriately responsive to reasons. Upstream exploitation that changes viability, alternatives, and returns changes the reasons in play. It does not, in the ordinary range, replace a reasons-responsive mechanism with a non-responsive one.

The strongest objection is that this holds only in the ordinary range, and that sufficiently severe constraint does eliminate meaningful choice: when N_Y contains no accessible non-appropriative path, describing the resulting conduct as the actor’s own is a fiction. The reply concedes the case and treats it as a feature. The intermediate state of Definition 8.1 contains N_Y and C_Y^E as explicit coordinates precisely so that the limiting case can be represented and identified. A framework in which the elimination of alternatives was inexpressible would be worse. Thesis 5.1 claims compatibility with agency in the range where alternatives remain, and the framework marks where that range ends.

5.2 Self-Continuation as the Motivating State

This subsection argues that the mechanism’s distinctive normative character follows from what moves the intermediate actor.

Two familiar models of a participant who exploits after being exploited are both available and both wrong for this mechanism. On an opportunism model, the participant’s constraint supplies occasion and cover for conduct it was already disposed toward. On a pure-victim model, the participant’s constraint is total, and its conduct is the upstream actor’s conduct at one remove.

Thesis 5.2 (Continuation without opportunism). The intermediate actor’s motivating state is the preservation of its own capacity to continue as a participant. This distinguishes the mechanism from opportunism, and it makes the resulting conduct more rather than less susceptible to institutional remedy.

The argument is that the mechanism’s structure fixes the motivating state. Section 3 located transmission in a portfolio effect: a contraction in one domain lowers the participant’s capacity to continue in general, and the participant must obtain generative conditions from somewhere. What the participant seeks is the restoration of a threshold, and this differs from advantage-seeking in a respect that matters. Advantage-seeking is unbounded and scales with opportunity. Threshold-seeking terminates when the threshold is met, and it is indifferent among routes that meet it.

Two consequences follow. Normatively, threshold-seeking under constraint is the paradigm case for mitigation, since the reasonable cost of refusal is exactly what a justification would weigh, and here refusal may cost the participant its continuation. Institutionally, indifference among routes is the mechanism’s weak point: a participant that would be equally satisfied by a cooperative, redistributive, or restorative route has no stake in the exploitative one. This is the structural reason a buffer can work at all, and it explains why buffers in this model act on the availability of alternatives rather than on the participant’s dispositions.

The strongest objection is that the thesis is empirically optimistic and politically convenient: real participants under constraint do sometimes acquire dispositions, build capabilities around the exploitative route, and continue past the point where the threshold is met, so that the threshold model describes an initial episode rather than a settled pattern. The reply concedes this entirely and marks the boundary. Thesis 5.2 characterizes the mechanism the model represents, which is a single transmission step under a declared lag. Persistence, habituation, and the conversion of a constrained response into a stable practice are feedback phenomena that the open-cascade restriction of Section 10 explicitly excludes, and Section 12 records them as unresolved. Where they obtain, the mitigation available under Thesis 5.3 correspondingly weakens.

5.3 Constraint, Mitigation, and the Non-Transfer of Wrongfulness

This subsection argues for the paper’s central normative claim about transmission.

Thesis 5.3 (Non-transfer with graded mitigation). Upstream exploitation does not transfer the downstream relation’s normative character to the upstream actor. It can mitigate the intermediate actor’s culpability without extinguishing it, and it generates a distinct upstream responsibility for the structural effect produced.

The argument distinguishes two normative facts that a transmission finding establishes together and that are frequently conflated.

The first concerns the intermediate actor. If the downstream relation satisfies the edge diagnostic, then by the companion framework’s account a justificatory burden falls on the party whose advantage runs through the affected position. That party is the intermediate actor. Upstream constraint bears on how easily the burden is discharged, since the availability of alternatives, the reasonable cost of refusal, and the actor’s own position are exactly the considerations a justification would cite. Constraint therefore mitigates, and the degree of mitigation varies with N_Y and C_Y^E .

The second concerns the upstream actor. A supported propagation link establishes that intervening on the upstream mechanism changes the downstream target through the intermediate actor’s position. The upstream actor thereby produced a structural effect on relations to which it is not a party. That is a distinct object of assessment, and it generates its own burden.

Neither fact cancels the other, and this is the substance of the thesis. Transmission adds a burden upstream while reducing, without eliminating, the burden downstream.

The strongest objection is that this double-counts: one downstream relation generates two burdens, so the account inflates the total normative charge. The reply is that the burdens have different objects and different bearers. The intermediate actor’s burden concerns the relation it entered. The upstream actor’s burden concerns a change it produced in the conditions under which others act. An account that recognized only the first would leave upstream actors free to reshape the conditions of others’ conduct without answering for it; an account that recognized only the second would treat the intermediate actor as an instrument. No quantity is counted twice, because no single quantity is at issue.

5.4 The Circulation Argument and Its Defeat

This subsection defends the premise that the preceding thesis requires, using a counterexample that arose in the source discussion.

Thesis 5.3 denies that wrongfulness transfers. A natural opposing view holds that when a participant is both affected and beneficiary across a set of relations, the reciprocal occupancy of roles neutralizes the constituent relations, so that a closed system of mutual appropriation is normatively unobjectionable.

Thesis 5.4 (Circulation without cancellation). Reciprocal occupancy of affected and beneficiary positions across a set of relations leaves the normative character of each constituent relation unchanged. Closure and distributive neutrality cancel no constituent wrong.

The argument is a counterexample due to the source discussion rather than to this reconstruction. Consider a closed set of participants in which each robs and is robbed of equal value. The aggregate distribution is unchanged, every participant occupies both roles, and no participant ends worse off in holdings. Every constituent robbery remains wrongful. Cancellation therefore fails, and it fails for a locatable reason: the wrongfulness of each relation lies in how it was transacted, and a distributive fact about the aggregate does not reach that property. Procedural and relational legitimacy form a register that distributive outcomes do not settle.

The consequence for this paper is direct. Being upstream-affected is a fact about a participant's position in one relation. It does not enter the evaluation of a different relation as a cancelling term. Section 5's mitigation claim survives because mitigation operates through the availability of alternatives at the time of the second relation, which is a different route from cancellation by role reciprocity.

The strongest objection is that robbery is a poor analogue, since it involves a discrete wrongful act with a clear victim, whereas exploitation on the present account is a structural relation that may be entered without intention. The reply is that the counterexample is directed at a specific inference and needs no closer analogy to defeat it. The inference under test moves from role reciprocity and distributive neutrality to cancellation. Any case in which those premises hold and cancellation fails refutes it. The full evaluation of closed cycles, including stability, distribution, and procedural standing, requires the companion cycle project and is not attempted here.

5.5 Separation of Outcome and Procedural Registers

This subsection states the general distinction that the circulation counterexample establishes, and applies it to the dynamic results.

The robbery case refutes cancellation because it separates two registers that a purely distributive evaluation collapses. One register asks whether participants' generative capability ultimately remained stable or increased. The other asks how each participant's capability was used, constrained, or appropriated along the way. The robbery cycle scores neutrally on the first and badly on the second, which is possible only if the registers are independent.

Thesis 5.5 (Register independence). Distributive outcome and relational procedure are independent evaluative registers for a transmission structure. Neither determines the other, and a complete assessment reports both.

The argument for independence in one direction is the robbery cycle. The argument in the other direction is equally available: an arrangement can be procedurally impeccable, with full consent, disclosure, and recourse at every step, while producing a distribution in which one participant's generative capability is progressively exhausted. Neither register is redundant.

This thesis has direct consequences for the dynamic results, and stating it prevents a systematic misreading of them. Stability is a dynamical property and belongs to neither register: a structure that reproduces itself period after period may be stable because participants are satisfied or stable because they have no exit. Slave systems, monopolies, and predator-prey systems are all stable. Nothing follows from stability alone about either outcome or procedure.

The same holds for the spectral quantities of Section 10. A subcritical offspring kernel reports that expected cascade totals are finite. It reports nothing about how the residual is distributed and

nothing about how each constituent relation was transacted. Thesis 5.7 draws the consequence for buffer evaluation; Thesis 5.5 states the general principle from which it follows.

5.6 Forward-Looking Upstream Responsibility

This subsection identifies the kind of responsibility the upstream burden is, and states the paper’s contribution to an existing account.

Thesis 5.6 (Structural responsibility with a measure). The upstream burden established by a propagation finding is forward-looking responsibility for structural processes rather than backward-looking liability for a specific downstream act. The propagation contrast supplies a measure of structural contribution that such accounts have lacked.

Young distinguishes a liability model of responsibility, which isolates a perpetrator and traces a causal line to a discrete wrong, from a social connection model, on which all who contribute through their actions to structural processes producing injustice bear responsibility to work to remedy it [23, 24]. The social connection model is forward-looking, shared, and discharged through collective action in place of blame.

The upstream burden fits this description precisely. The upstream actor did not perform the downstream relation and may have neither foreseen nor intended it. What the actor did was alter conditions under which others act, in a way that raised the probability of relations satisfying the diagnostic. That is participation in a structural process, and the appropriate response is alteration of the mechanism in place of compensation for a particular downstream event.

The paper’s contribution runs in the other direction. A recurring difficulty for social-connection accounts is that participation in structural processes admits of no natural measure, so the resulting responsibility resists differentiation among participants. The propagation contrast supplies a candidate measure: the change in the downstream target attributable to a coherent intervention on a specific actor’s mechanism, through a specified path. Where it is identified or bounded, it distinguishes participants by structural contribution in place of treating all connection as equivalent. This is a proposal about what such a measure could be, and it inherits every identification limit stated in Section 11.

The strongest objection is that Young’s model deliberately avoids assigning differentiated blame, and that supplying a measure reintroduces the liability model she rejects. The reply distinguishes the measure’s use. Differentiating forward-looking obligation by structural contribution is not the same as assigning backward-looking blame for a discrete wrong: the former asks who is positioned to alter the process and how much their alteration would matter, and the propagation contrast answers exactly that question. Nothing in the measure supports a claim that the upstream actor performed the downstream relation.

5.7 Attenuation Without Justice

This subsection argues that the paper’s dynamic buffer result carries no normative endorsement, and converts a disclaimer into an argued position.

Thesis 5.7 (Attenuation without justice). A regime that reduces expected cascade totals may be less just than the regime it replaces. Dynamic attenuation and normative improvement are independent properties.

The argument proceeds from what Proposition 10.5 establishes and what it omits. The proposition states that entrywise domination of offspring kernels implies spectral domination, so a buffered

regime has a weakly smaller expected cascade. The premise $K_B \leq K_0$ constrains expected counts of attributed child edges by type. It says nothing about three further matters.

It says nothing about incidence: the residual cascade may fall entirely on participants who bore little of it before, so a lower total can accompany a more concentrated burden. It says nothing about omitted edge types: a buffer that prevents transmission along modeled types while creating an unmodeled type reduces the measured kernel and not the phenomenon. And it says nothing about the buffer’s own relational character: a buffer supplied by an actor who thereby acquires control over the recipient’s realization conditions may itself satisfy the edge diagnostic, so that attenuation is purchased with a new exploitative relation.

The third case deserves emphasis, since it is the one the framework is uniquely positioned to detect. Support, lending, stewardship, and infrastructure provision all reduce downstream pressure and all create dependence. The edge diagnostic applies to the buffering relation exactly as it applies to any other, and a complete evaluation must run it.

The strongest objection is that this makes the buffer result useless for policy, since any candidate intervention can be met with the observation that it might be unjust. The reply is that the thesis specifies what a complete buffer evaluation contains: the attenuation contrast, an incidence report, an omitted-type audit, and an edge diagnosis of the buffering relation itself. That is a demanding standard and a satisfiable one, and it is more useful than a spectral comparison presented as an endorsement.

5.8 Dependence of the Framework on the Theses

This subsection records what fails if each thesis is rejected, so that a reader can locate a disagreement precisely.

Rejecting Thesis 5.1 converts the model into a claim about individual determination that its own mathematics does not support, and the honest response would be to restate the paper as a study of aggregate rates with no implication for any actor. Rejecting Thesis 5.2 returns the mechanism to an opportunism model, which removes the basis for mitigation and removes the reason buffers act on alternatives in place of dispositions. Rejecting Thesis 5.3 collapses the two burdens into one: either responsibility migrates entirely upstream, in which case the intermediate actor’s downstream relation requires no justification, or it remains entirely downstream, in which case a propagation finding has no normative consequence and the paper’s motivation fails. Rejecting Thesis 5.4 reopens the cancellation inference and, with it, the view that upstream victimization neutralizes downstream conduct. Rejecting Thesis 5.5 permits distributive outcome to settle the assessment, which the circulation counterexample contradicts, and licenses reading stability and subcriticality as normative results. Rejecting Thesis 5.6 leaves the upstream burden uncharacterized, and the paper would retain its formal results while losing its account of what they are for. Rejecting Thesis 5.7 permits the spectral result to be read as a policy endorsement, which the paper’s own countermodels contradict. Rejecting Thesis 6.1 would establish that existing instruments already reach the couplings the model describes, which would narrow the paper’s political-economic contribution to a restatement.

Theses 5.3 and 5.6 are load-bearing and are the most vulnerable. The first carries the paper’s normative content, and the second carries its claim to contribute something to an existing account of structural responsibility. Thesis 5.2 is the most empirically exposed, since it characterizes a motivating state that observation may not bear out. Direct challenge to any of the three is welcome.

Every proposition in Sections 7 through 11 survives the rejection of all seven theses. What fails is the reason to have constructed the model.

6 Political Economy of Transmitted Pressure

This section describes the structures in which transmitted pressure operates. Its objective is to identify the arrangements that make the formal construction worth applying, and to state why buffer placement is a distributive decision in place of a technical one.

6.1 Squeeze Structures in Production Chains

This subsection identifies the paradigm empirical structure of transmitted pressure and the verified evidence for it.

Anner analyzes the purchasing practices of lead firms in garment supply chains and finds that price pressure and compressed lead times imposed on suppliers are associated with deteriorating conditions and rights for workers in supplier factories [2]. The structure is the paper’s squeezed-intermediary configuration in an observed setting: a lead firm alters the terms on which a supplier can viably operate, and the supplier alters the terms on which its workforce operates.

The case is instructive for what it supplies and what it leaves open. It supplies evidence that pressure imposed at one point in a chain is associated with degraded relations at the next, which is the empirical pattern the model represents. It leaves open every question the model requires: whether the association survives a coherent intervention on lead-firm practice, whether the supplier’s conduct satisfies an independently constructed edge diagnostic, whether the comparison arrangements at the two points are jointly realizable, and whether the path runs through the supplier’s altered viability or through a direct route. The paper cites the work for the structure and claims no propagation finding in that setting.

6.2 The Provider, Adopter, and Practitioner Configuration

This subsection applies the actor separation to the configuration that motivated the research program.

A mediating system is supplied by a provider that controls its access terms, deployed by an adopting organization that reorganizes work around it, and encountered by practitioners whose capability is reconfigured. Transmission in this configuration can run along several distinct routes, and conflating them produces the shared-mechanism error of Section 3.

The provider may alter the adopter’s viable operating basis, and the adopter may then alter the practitioner’s position: this is transmission through the intermediate actor. Alternatively, the provider’s single decision may reach both the adopter’s terms and the practitioner’s position by separate routes: this is a shared mechanism, and it passes the total-effect screen while failing the path condition. The two are empirically similar and normatively different. Under transmission, the adopter bears a mitigated but real burden for its own relation, and the provider bears a structural burden. Under a shared mechanism, the adopter’s burden is unmitigated by any upstream effect on its position, since its position did not change.

The distinction is the practical payoff of requiring E_i in addition to E_τ .

6.3 Chain Governance and the Location of Coordinating Power

This subsection identifies where the capacity to alter a transmission structure resides, using a verified account of how production chains are coordinated.

Gereffi, Humphrey, and Sturgeon distinguish governance forms in global value chains along the complexity of transactions, the codifiability of information, and supplier capability, yielding market, modular, relational, captive, and hierarchical types [11]. The typology matters here for a reason

independent of its original purpose. Each governance type distributes coordinating power differently, and coordinating power is what an upstream mechanism intervention requires.

In captive and hierarchical configurations, a lead actor sets terms that propagate downward, and a coherent intervention on the upstream mechanism is well defined because there is an identifiable party whose practice constitutes it. In market configurations, terms emerge from many uncoordinated exchanges, and an intervention on a single actor’s mechanism may be neither available nor consequential. The propagation model’s central estimand therefore presupposes a governance form in which the upstream mechanism is a locus of decision, and Section 12 records the diffuse case as unresolved.

6.4 The Five-Position System and the Intervention Question

This subsection states the question the political-economic register is organized around and identifies the actors among whom it must be answered.

The research program that generated this paper identified five economic positions in a mediated configuration: the system itself, users and historical contributors, workers and professional practices, organizations adopting the system, and providers controlling it. Capital and mediating institutions were subsequently distinguished as further positions. The intervention question is whether the coupling between one position’s gain and another’s capability contraction can be broken without destroying the generativity at issue.

That last qualification does the work. Foreclosing the mechanism by foreclosing the practice would satisfy the propagation model trivially and defeat the purpose. An adequate intervention must reduce the transmission quantity while preserving, or expanding, the generative capability of the participants involved. The formal result of Section 10 supplies only the first half of that criterion, which is the substance of Thesis 5.7.

6.5 Level Mismatch Between Relations and Mediation Capacity

This subsection states the paper’s political-economic insight and supports it with a verified regulatory example.

The relations the model describes occur among firms, workers, users, providers, and adopting organizations. The capacity to alter the background conditions under which all of them interact is concentrated at the state and supranational level, because those institutions can change permissions, obligations, and liabilities across an entire configuration at once. There is accordingly a mismatch between the level at which the relations occur and the level at which coordinating capacity resides.

Ostrom’s analysis of polycentric governance is the relevant structural response. She argues that complex economic systems are frequently governed by multiple overlapping centers of decision at different scales, and that neither pure market nor pure central-state models capture how such systems are actually organized [17]. On that view the mismatch is not an anomaly to be resolved by relocating all authority upward; it is the normal condition, and the question becomes which decision center is positioned to alter which coupling.

A verified example indicates both the availability and the current limits of supranational mediation. The European Union’s AI regulation entered into force on 1 August 2024 and became applicable on 2 August 2026, with prohibited-practice rules applying from 2 February 2025, governance and general-purpose model obligations from 2 August 2025, and obligations for systems used in employment and other listed high-risk areas from 2 December 2027 [9]. The instrument distinguishes providers from deployers, which is the actor separation this paper requires, and it operates at the level where coordinating capacity resides.

Its targets, however, are observable manifestations: prohibited practices, risk management, transparency, oversight, and the classification of listed high-risk uses. Capability contraction as such is not among them, and neither is the transmission of pressure from one relation to another. This yields the paper’s political-economic observation.

Thesis 6.1 (Manifestation targeting and the transmission gap). Existing governance instruments in this domain regulate observable manifestations of a configuration in place of the couplings between relations. An instrument can therefore be fully complied with while the transmission structure the model describes operates unchanged.

The argument is that manifestation targeting and coupling targeting have different extensions. A transparency obligation is satisfied by disclosure and leaves terms unaltered. A risk-classification regime attaches duties to a system’s use in a listed area and is silent about what a compliant deployment does to a supplier’s viability three relations away. Compliance is assessed relation by relation, and the transmission quantity is a property of a pair of relations under a counterfactual, which no relation-local audit evaluates.

The strongest objection is that this demands the impossible: couplings are counterfactual quantities, frequently unidentified, and no workable regulatory instrument can be built on an estimand the paper itself concedes is often unresolved. The reply concedes the difficulty and denies that it settles the matter. Thesis 6.1 is a diagnosis rather than a proposal, and it is compatible with the conclusion that coupling targeting is infeasible. What it excludes is the inference from compliance to absence of transmission. Reporting obligations that record terms imposed on counterparties, and their effects on counterparty viability, would be a weaker instrument sensitive to the structure without requiring identification of a causal contrast, and Section 12 lists the design question as open.

6.6 Buffer Placement as a Distributive Decision

This subsection states why the location of a candidate buffer is a political question.

Thesis 5.7 establishes that attenuation does not entail improvement. The political-economic form of that result concerns placement. A buffer can be placed at the upstream mechanism, at the intermediate actor’s viability, at the intermediate actor’s alternatives, or at the downstream participant’s protection. These placements produce different incidence, different dependence relations, and different beneficiaries, and they may produce similar spectral attenuation.

A buffer placed at the intermediate actor’s viability relieves pressure while leaving the upstream mechanism intact, and it positions the buffer’s supplier as a controller of the intermediate actor’s realization conditions. A buffer placed at the upstream mechanism alters the conditions that generated the pressure and concentrates the cost on the upstream actor. A buffer placed at the downstream participant protects that participant without addressing either prior relation. A buffer placed at the intermediate actor’s alternatives acts on the quantity Thesis 5.2 identifies as decisive, since a participant seeking a threshold is indifferent among routes that meet it.

These are distributive choices, and the formal result ranks none of them. The paper therefore treats buffer evaluation as requiring the four-part standard of Thesis 5.7, and it makes no institutional recommendation.

7 Diagnostic Edge States and Global Arrangements

This section establishes the paper’s edge-level dependency and global comparison domain. Its objective is to preserve baseline sensitivity, three-valued uncertainty, and joint feasibility before any

Table 2: Analytical Objects and Evidence Requirements. Each row identifies a distinct inferential object; movement downward requires the preceding objects and the additional evidence shown. The table organizes claims and supplies no evidence.

Object	Primitive record	Additional warrant	Admissible status
Edge row	Complete arrangement, admitted baseline, standing, mechanism, capability comparison, benefit-through witness	P005-compatible diagnostic construction	1, 0, ?
Total downstream screen	Upstream row, downstream target, baseline pair	Coherent mechanism intervention, global compatibility, material total causal contrast	supported, rejected, unresolved
Propagation link	Positive total-effect screen and typed intermediate state	Coherent stochastic mediator intervention, time order, material path identification or bounds	supported, rejected, unresolved
Realized open cascade	Time-ordered edge and link records	Independent validation of every constituent and declared descendant attribution	supported, defeated, indeterminate
Expected cascade	Finite type system and offspring kernel	First-moment model, open horizon, controlled interference, kernel estimation	Conditional mathematical consequence
Candidate buffer	Comparable buffered and reference regimes	Causal modifier contrast, complete edge vocabulary, displacement audit	Attenuating, null, amplifying, unresolved

causal link or network path is constructed.

Table 2 prevents a common compression: an observed network, an audited edge, a causal link, and an expected cascade are different research objects. Threshold and cascade models demonstrate that aggregate paths can depend sensitively on heterogeneous response rules and topology [12, 21]. Models of complex contagion further show that reinforcement and bridge structure can change diffusion [7]; an online experiment establishes a topology effect for one health-behavior setting [6]. These works discipline the cascade vocabulary. They provide no exploitation diagnosis for the present model.

Definition 7.1 (Dynamic edge position). An oriented edge position

$$u = (X \leftarrow Y, d_u, t, \omega_u)$$

specifies a candidate beneficiary X , an affected participant Y , a generative domain d_u , time t , and a complete edge-diagnostic specification ω_u . A downstream position $v = (Y \leftarrow Z, d_v, t + 2, \omega_v)$ shares Y in a different role. Temporal placement alone does not make v a causal descendant of u .

The inherited edge diagnostic evaluates a focal complete arrangement relative to independently admitted comparison arrangements. For one resolved row, its binary substantive targets are baseline admissibility Λ^* , participant standing S^* , an actor-linked mechanism M^* , material capability disadvantage D^* , and a typed benefit-through witness W^* . The superscript distinguishes these

model-relative targets from the three-valued research statuses used to assess them. The current paper uses the components without reopening their normative sufficiency.

Definition 7.2 (Global arrangement compatibility). Fix a pre-intervention history $H_{t-} = h$, a finite horizon $0:T$, and a family $\Omega_{0:T}(h)$ of complete dynamic arrangements. Each arrangement specifies actors, institutions, resources, transition laws, interference, constitutive rules, and benefit maps. For every edge e and stage s , let

$$\pi_{e,s} : \Omega_{0:T}(h) \longrightarrow \mathfrak{R}_{e,s}$$

be a restriction to its edge-local arrangement. An admitted baseline pair (b_u, b_v) has the binary model-relative compatibility target

$$\text{Comp}_{u,v,t}^*(b_u, b_v) = 1 \iff \exists \omega \in \Omega_{0:T}(h) : \pi_{u,t}(\omega) = b_u, \pi_{v,t+2}(\omega) = b_v.$$

Its distinct research audit is

$$\widehat{\text{Comp}}_{u,v,t}(b_u, b_v) \in \mathbb{V}_3.$$

The audit equals 1 when an adequate construction supports or exhibits a joint witness, 0 when an adequate argument establishes joint infeasibility, and ? when the existential target remains unresolved.

Separate technical feasibility of b_u and b_v therefore leaves joint compatibility open. The same indivisible resource, institutional power, or actor position cannot silently occupy inconsistent locations in a path-level comparison.

Definition 7.3 (Substantive row target and research audit). For a fully specified downstream arrangement r_v and admitted row b_v , define the model-relative substantive target

$$D_{v,b_v}^*(r_v) = \mathbf{1}\{\Lambda_{v,b_v}^* = S_{v,b_v}^* = M_{v,b_v}^* = D_{v,b_v}^* = W_{v,b_v}^* = 1\} \in \{0, 1\}.$$

Its research audit is

$$\widehat{g}_{v,b_v}(r_v) \in \mathbb{V}_3 := \{1, 0, ?\},$$

where ? records unresolved standing, mechanism, capability comparison, witness, admission, measurement, or identification. An unresolved audit does not assign $D^* = 0$.

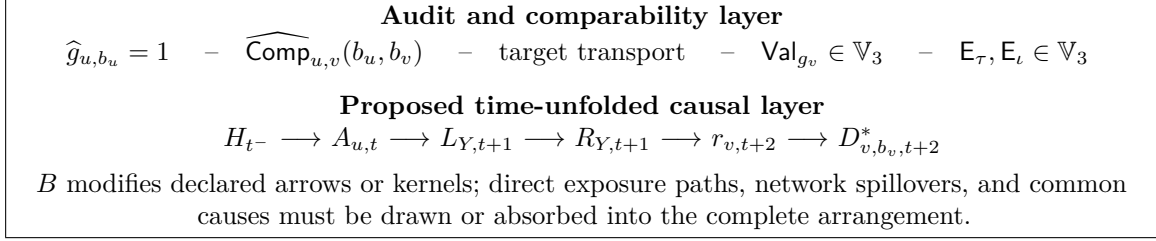
The distinction in Definition 7.3 separates ontic variation within the declared model from evidence about that variation. A family of targets may be required when evaluative disagreement is constitutively plural. The binary target is then one specification-relative member rather than a privileged hidden truth.

8 Staged Causal Structure and Intermediate States

This section constructs the causal object that connects two edge positions. It defines the intervention, temporal stages, intermediate state, necessary total-effect screen, and required intermediate-actor path, with audit and causal dependencies kept distinct.

Figure 1 makes the intervention target explicit. The exposure is an actor-linked mechanism, rule, policy, access condition, or complete arrangement arm. It is never an intervention on the audit label or on the evaluative conjunction itself.

Figure 1: Time-Unfolded Propagation and Audit Structure. Solid arrows display the proposed causal sequence; the upper row lists research conditions rather than physical causes. B denotes a candidate regime modifier. The diagram is an agent-added analytical construction and contains no empirical result.



Definition 8.1 (Staged propagation system). Let $A_{u,t} \in \{1, 0\}$ select the focal upstream mechanism and a predeclared feasible replacement within two complete global arrangements. The focal arm has a supported upstream row. Define the potential intermediate state

$$L_{Y,t+1}(a) = \left(K_Y(a), \Sigma_Y(a), \mathcal{R}_Y^{\text{feas}}(a), N_Y(a), C_Y^E(a), Q_Y(a) \right),$$

where K_Y is enriched effective generative capability, Σ_Y is an optional declared viability coordinate, $\mathcal{R}_Y^{\text{feas}}$ is a feasible-response correspondence, N_Y records accessible cooperative, supportive, adaptive, or exit paths, C_Y^E records capacity and opportunity for candidate appropriative responses, and Q_Y records their attainable typed return. A response $R_{Y,t+1}(a)$ is selected through a declared kernel conditional on $L_{Y,t+1}(a)$ and pre-treatment history h .

The scalar Σ_Y describes a restricted survival-mediated subtype only after its domain, order, and threshold are defended. Capability, bargaining position, alternatives, opportunity, and return can change without crossing a single viability threshold.

Assumption 8.2 (Causal coherence and diagnostic transport). The two exposure arms are coherent complete arrangements; the baseline pair is compatible; pre-treatment history excludes descendants of $A_{u,t}$; the downstream domain, carrier, horizon, admissibility rule, capability order, materiality schedule, and benefit types are fixed or connected by a defended transport map; and the exposure mapping, affected neighborhood, anticipation, spillovers, and descendant-attribution rule are declared. Identification uses consistency, positivity and exchangeability, a justified alternative, or explicit bounds.

These requirements follow causal-inference work on interference, contagion paths, and exposure mappings [13, 16, 4]. They also respond to the generic confounding of influence, homophily, and covariate effects in observational networks [3, 19]. The references discipline the research design; they do not identify the present estimand in any dataset.

Definition 8.3 (Baseline-pair total downstream contrast). For a compatible admitted pair (b_u, b_v) , define

$$\tau_{u \rightsquigarrow v}^{b_u, b_v}(h) = \mathbb{E} \left[D_{v,b_v,t+2}^*(1) - D_{v,b_v,t+2}^*(0) \mid H_{t-} = h \right].$$

Given a predeclared materiality threshold $\eta_P \geq 0$, let $E_\tau \in \mathbb{V}_3$ equal 1 when adequate evidence or a valid bound supports $\tau_{u \rightsquigarrow v}^{b_u, b_v}(h) > \eta_P$, equal 0 when it supports the complementary inequality, and equal ? when intervention, target, common support, identification, or materiality remains unresolved. Let $\text{Val}_{g_v} \in \mathbb{V}_3$ record whether the downstream P005 construction and measurement connect evidence in both arms to one stable substantive target. This validity field does not require the downstream target to equal 1 in both arms.

Let the strong conjunction $\wedge_3$ on $\mathbb{V}_3$ return 1 when all inputs are 1, 0 when at least one prerequisite is adequately rejected, and ? otherwise. The baseline-pair total-effect screen is

$$\hat{t}_{u \rightsquigarrow v}^{b_u, b_v} = \hat{g}_{u, b_u} \wedge_3 \widehat{\text{Comp}}_{u, v} \wedge_3 \text{App}_{A_u} \wedge_3 \text{App}_{D_v^*} \wedge_3 \text{Val}_{g_v} \wedge_3 \text{E}_\tau.$$

Writing $\hat{\mathbf{g}}_v = (\hat{g}_{v, b_v}(1), \hat{g}_{v, b_v}(0))$, retain the full total-effect profile

$$\Pi_{u \rightsquigarrow v}^T(h) = \left\langle b_u, b_v, \widehat{\text{Comp}}, \hat{g}_u, \text{App}_{A_u}, \text{App}_{D_v^*}, \text{Val}_{g_v}, \hat{\mathbf{g}}_v, \text{E}_\tau, \hat{t}, \mathcal{E}, \mathcal{U} \right\rangle_{(b_u, b_v)},$$

where $\mathcal{E}$ and $\mathcal{U}$ record evidence and uncertainty. A positive total-effect screen remains insufficient for the propagation label.

Definition 8.4 (Stochastic interventional path contrast). Let $D_{v, b_v}^*(a, l)$ denote the downstream target under exposure a and a coherent intervention setting the intermediate state to l . Draw $\tilde{L}_Y(a)$ from the declared conditional distribution of $L_{Y, t+1}(a)$ given h . The proposed path contrast is

$$\iota_{u \rightsquigarrow v}^{L; b_u, b_v}(h) = \mathbb{E} \left[D_{v, b_v}^* \left(1, \tilde{L}_Y(1) \right) - D_{v, b_v}^* \left(1, \tilde{L}_Y(0) \right) \mid H_{t-} = h \right].$$

Causal-mediation methodology separates the definition of an effect from its identification, estimation, and sensitivity analysis [14]. That general discipline is the relevant antecedent here. Definition 8.4 is an agent-added stochastic interventional proposal and is not a formula attributed to that source.

A positive total contrast in Definition 8.3 does not identify Definition 8.4. The path contrast requires coherent intervention semantics for the relevant component, temporal priority, mediator–outcome confounding control or bounds, and an adequate interference model.

Definition 8.5 (Baseline-pair propagation audit). Fix a predeclared path-materiality threshold $\eta_L \geq 0$. Let $\text{E}_\iota \in \mathbb{V}_3$ equal 1 when adequate evidence or a valid bound supports $\iota_{u \rightsquigarrow v}^{L; b_u, b_v}(h) > \eta_L$, equal 0 when it supports the complementary inequality, and equal ? when the mediator intervention, path identification, or materiality remains unresolved. The final baseline-pair propagation audit and profile are

$$\hat{p}_{u \rightsquigarrow v}^{b_u, b_v}(h) = \hat{t}_{u \rightsquigarrow v}^{b_u, b_v}(h) \wedge_3 \text{E}_\iota, \tag{1}$$

$$\Pi_{u \rightsquigarrow v}^P(h) = \left\langle \Pi_{u \rightsquigarrow v}^T(h), \text{E}_\iota, \hat{p} \right\rangle_{(b_u, b_v)}. \tag{2}$$

Every admitted baseline pair remains in the report; an unreported aggregation rule cannot create an unqualified verdict.

The total-effect screen and the intermediate-actor path perform different work. A common mechanism can directly cause both edge rows, producing $\tau > \eta_P$, while leaving $L_Y(1) = L_Y(0)$ and hence $\iota = 0$. Such a case passes the total-effect screen and fails the proposed propagation audit. A survival-mediated subtype additionally requires a predeclared material contrast such as

$$\Sigma_Y(1) < \underline{\Sigma}_Y \leq \Sigma_Y(0).$$

That inequality neither defines general propagation nor establishes a positive downstream effect.

9 Response-Kernel Decomposition and Sign Conditions

This section derives a finite special case that locates the total-effect sign in changes to response probabilities. The derivation proceeds from a common response support and invariant downstream map to an illustrative selection model, with every restriction stated before interpretation.

Assumption 9.1 (Finite invariant response representation). The response set $\mathcal{R}_Y = \{r_1, \dots, r_q\}$ is finite and has common support under both exposure arms. For each arm a and response r , define the potential-outcome conditional kernel

$$d_{a;v,b_v}(r) = \Pr\left(D_{v,b_v,t+2}^*(a) = 1 \mid R_{Y,t+1}(a) = r, H_{t-} = h\right)$$

and assume response sufficiency: $d_{a;v,b_v}(r) = d_{v,b_v}(r)$ for both arms. Thus every downstream-relevant direct exposure path is absorbed into the response type; any remaining direct path invalidates the identity below or requires an arm-indexed kernel. An interventional reading

$$d_{v,b_v}(r) = \Pr\left(D_{v,b_v,t+2}^* = 1 \mid \text{do}(R_{Y,t+1} = r), H_{t-} = h\right)$$

requires further composition and identification assumptions for the mediator. Let $\pi_a(r) = \Pr(R_{Y,t+1}(a) = r \mid h)$.

Proposition 9.2 (Finite response-kernel identity). *Under Assumption 9.1, the arm-specific downstream probability and total downstream contrast satisfy*

$$p_a = \Pr(D_{v,b_v,t+2}^*(a) = 1 \mid h) = \sum_{r \in \mathcal{R}_Y} d_{v,b_v}(r) \pi_a(r), \quad (3)$$

$$\tau_{u \rightsquigarrow v}^{b_u, b_v}(h) = \sum_{r \in \mathcal{R}_Y} d_{v,b_v}(r) [\pi_1(r) - \pi_0(r)]. \quad (4)$$

Proof. Partition the downstream probability under each arm by the finite response set. The law of total probability gives $p_a = \sum_r d_{a;v,b_v}(r) \pi_a(r)$; response sufficiency replaces the arm-indexed kernel with $d_{v,b_v}(r)$, yielding Equation (3). Subtract the $a = 0$ expression from the $a = 1$ expression to obtain Equation (4). The proof is algebraic. Interpreting d as an intervention on response requires the additional assumptions stated in Assumption 9.1. $\square$

Corollary 9.3 (Resolved binary response partition). *Suppose $\mathcal{R}_Y = \mathcal{R}_Y^E \dot{\cup} \mathcal{R}_Y^{\bar{E}}$, with $d(r) = 1$ on $\mathcal{R}_Y^E$ and $d(r) = 0$ on $\mathcal{R}_Y^{\bar{E}}$. Then*

$$\tau_{u \rightsquigarrow v}^{b_u, b_v}(h) = \pi_1(\mathcal{R}_Y^E) - \pi_0(\mathcal{R}_Y^E).$$

Membership in $\mathcal{R}_Y^E$ still requires an independently resolved downstream row. Responses outside that set may be harmful, dominating, or otherwise objectionable while failing the declared generativity-exploitation target. Proposition 9.2 and Corollary 9.3 decompose the necessary total-effect screen only; neither result supplies the path evidence required by Definition 8.5.

Proposition 9.4 (Conditional response-sign decomposition). *Consider the illustrative two-class selection model*

$$p_a = \ell\left(\alpha + \beta v_Y(a) - \eta n_Y(a) + \kappa c_Y^E(a) + \zeta q_Y(a)\right),$$

where $\ell : \mathbb{R} \rightarrow (0, 1)$ is strictly increasing; v_Y is a declared vulnerability or viability deficit; n_Y is accessible non-appropriative response availability; c_Y^E is practical capacity and opportunity for candidate appropriative responses; q_Y is attainable typed return; and $\beta, \eta, \kappa, \zeta > 0$. With $\Delta x = x(1) - x(0)$,

$$\text{sgn}(p_1 - p_0) = \text{sgn}\left(\beta \Delta v_Y - \eta \Delta n_Y + \kappa \Delta c_Y^E + \zeta \Delta q_Y\right).$$

Proof. Subtract the two linear indices. Strict monotonicity of ℓ preserves their order, which yields the stated sign equality. $\square$

Proposition 9.4 formalizes a limited implication of the initiating idea. Greater vulnerability and fewer alternatives can increase the modeled downstream probability. Changes in capacity, opportunity, and return can offset or reverse that pressure. For example, with $\beta = 1$, $\kappa = 3$, $\Delta v_Y = 1$, $\Delta c_Y^E = -1$, and the remaining changes equal to zero, the index change is (-2). An upstream loss can increase need while removing the practical means of producing the downstream target.

The coefficient signs, variables, and link are empirical hypotheses within a restricted model. Network effects can alter incentives and adoption without producing the capability relation at issue [15]. Financial-network models also show that connectivity can be stabilizing or destabilizing depending on integration and shock magnitude [8, 1]. These comparison models reinforce the conditional sign; they supply no parameter values for Proposition 9.4.

10 Open Cascades and Candidate Buffers

This section lifts one supported link into a restricted open-cascade approximation. It defines realized and expected objects separately, derives the first-moment recursion and subcritical resolvent, and states a limited comparison between candidate buffer regimes.

Definition 10.1 (Realized open cascade). A realized open cascade is a finite time-ordered path or branching family in which every edge event occurs, every adjacent propagation audit is independently supported under compatible global arrangements, and every downstream event has event-level causal-descendant attribution under a predeclared scheme. Observed events combined only with positive average link effects form an *evidentially supported probabilistic cascade*; they do not establish that the realized downstream events were caused by their proposed parents. One resolved zero defeats the claimed path; one unresolved required constituent makes it indeterminate. Causal feedback to an earlier edge changes the object to a feedback cycle and lies outside this definition.

Definition 10.1 is stricter than observing many edges in a dense network. Threshold and contagion models offer useful formal ancestors for heterogeneous transition and reinforcement [12, 21, 7]; the present cascade also requires independent relational diagnoses and causal links. The event-level attribution condition is an additional, explicitly scheme-relative burden beyond a positive population-average contrast.

Assumption 10.2 (Finite open-cascade approximation). Let $\mathcal{U} = \{1, \dots, p\}$ be a fixed finite set of resolved edge types and let $\mathbf{Z}_n$ be a row vector counting causally attributed edges by type in generation n . The horizon precedes material feedback closure; baselines are jointly compatible; collisions, multiple-parent causation, and interference have a declared attribution rule; conditional first moments are finite; and a fixed nonnegative kernel K satisfies

$$\mathbb{E}[\mathbf{Z}_{n+1} \mid \mathbf{Z}_n] = \mathbf{Z}_n K.$$

An entry K_{uv} is an expected number of type- v child edges causally attributed to one type- u parent within this approximation. It is neither an adjacency weight nor an observed transition frequency.

Proposition 10.3 (Expected-generation recursion). *Under Assumption 10.2, for deterministic $\mathbf{Z}_0$,*

$$\mathbb{E}[\mathbf{Z}_n] = \mathbf{Z}_0 K^n.$$

Proof. Iterated expectation gives $\mathbb{E}[\mathbf{Z}_{n+1}] = \mathbb{E}[\mathbf{Z}_n]K$. Induction from $\mathbf{Z}_0$ yields the result. $\square$

Proposition 10.4 (Subcritical expected cascade). *Under Assumption 10.2, if the spectral radius satisfies $\rho(K) < 1$, then $K^n \rightarrow 0$ and*

$$\mathbb{E}\left[\sum_{n=0}^{\infty} \mathbf{Z}_n\right] = \mathbf{Z}_0 \sum_{n=0}^{\infty} K^n = \mathbf{Z}_0(I - K)^{-1}.$$

Proof. For a finite matrix with $\rho(K) < 1$, the Neumann series converges to $(I - K)^{-1}$ and $K^n \rightarrow 0$. Substitute Proposition 10.3 and exchange expectation with the nonnegative partial sums; monotone convergence yields the identity. $\square$

The matrix lineage is standard nonnegative-matrix theory [18]. Multitype branching theory supplies a broader stochastic ancestor [5]. Proposition 10.4 concerns expected counts within the declared first-moment model. Almost-sure extinction, survival probability, tail risk, and realized cascade size require a fully specified offspring process and additional assumptions. When $\rho(K) > 1$, expected growth is possible only from types reaching a Perron class with growth above one; this condition supplies no empirical prevalence claim.

At the link level, a candidate buffer $B \in \{1, 0\}$ has separate total and intermediate-path attenuation contrasts

$$\Delta_{\tau, u \rightsquigarrow v}^{\text{buf}} = \tau_{u \rightsquigarrow v}(B = 0) - \tau_{u \rightsquigarrow v}(B = 1), \quad (5)$$

$$\Delta_{\iota, u \rightsquigarrow v}^{\text{buf}} = \iota_{u \rightsquigarrow v}^L(B = 0) - \iota_{u \rightsquigarrow v}^L(B = 1). \quad (6)$$

A positive first value supports total-effect attenuation; a positive second value supports attenuation of the declared intermediate path. Termination of the paper's propagation status requires adequate support that the buffered total contrast is at or below η_P , the buffered path contrast is at or below η_L , or another required audit field is resolved as zero.

Proposition 10.5 (Restricted offspring-kernel attenuation). *Let K_B and K_0 describe causally comparable buffered and reference regimes with identical edge types, target definitions, baseline maps, horizon, and descendant attribution. If*

$$0 \leq K_B \leq K_0 \quad \text{entrywise,}$$

then $\rho(K_B) \leq \rho(K_0)$. If additionally $\rho(K_B) < 1$, the buffered regime has a finite expected cascade total under Proposition 10.4.

Proof. Spectral-radius monotonicity for finite nonnegative matrices gives the first inequality. The second statement follows from Proposition 10.4 applied to K_B . $\square$

The condition $K_B \leq K_0$ is a causal assumption or empirical result rather than a definition of support, public provision, commons access, redistribution, portability, or exit. A local reduction can shift burdens to omitted actors, create a new edge type, or reduce the affected participant's capability. The proposition therefore supplies a conditional dynamic comparison and no policy endorsement.

Table 3: Propagation Countermodels and Diagnostic Outcomes. The cases are formal or hypothetical structures, not empirical classifications. A downstream harm counts as generativity exploitation only after an independent edge diagnosis.

Structure	Apparent pattern	Missing or contrary condition	Admissible result
Complete absorption	Positive upstream row followed by an unchanged downstream relation	Redundancy, reserves, or support gives $L_Y(1) = L_Y(0)$ on relevant coordinates, with no retained direct exposure path	$\tau = 0$; positive propagation rejected for the row pair
Common shock	Upstream and downstream rows occur in sequence	A prior institutional shock causes both; intervention on the upstream mechanism leaves the target unchanged	Observational association with $\tau = 0$
Shared mechanism without transmission	The coherent exposure changes both edge-row probabilities	Direct branches reach the two rows while $L_Y(1) = L_Y(0)$, so $\tau > \eta_P$ and $\iota = 0$	Positive total-effect screen; propagation rejected
Expanded alternatives	Upstream loss and timely cooperative support occur	N_Y expands enough to reduce the downstream target probability	Null or negative contrast
Lost response capacity	Vulnerability rises while practical capacity for the candidate response falls	The capacity term offsets the vulnerability term	Negative contrast is possible
Harm without benefit-through	Y 's response harms Z	Y 's specified benefit is independent of Z 's affected capability state	Causal harm transmission; downstream GEX target $D^* = 0$
Incompatible baselines	Both local comparisons appear favorable	The same indivisible resource is required in incompatible positions	$\widehat{\text{Comp}}^* = 0$, $\widehat{\text{Comp}} = 0$; no coherent path comparison
Unresolved downstream row	A plausible downstream mechanism is observed	Standing, materiality, or benefit-through remains unresolved	Propagation audit ?
Dense simultaneous network	Many related edges appear together	Temporal order and descendant attribution are absent	Network occurrence without an open cascade

11 Countermodels and Empirical Identification

This section subjects the construction to negative and indeterminate cases and then translates its dependencies into a bounded empirical protocol. The countermodels expose which apparent cascades fail the causal, diagnostic, compatibility, or scope requirements.

Table 3 shows why two positive-looking relations cannot by themselves establish propagation. The common-shock case is especially important because homophily, selection, and shared causes can mimic influence in network data [3, 19]. The capacity case also protects agency: similarly constrained actors can choose different paths, and an average contrast supplies no deterministic prediction of an individual response.

An empirical study should proceed in dependency order:

1. select a restricted domain with observable actor roles, mechanisms, timing, response opportunities, and downstream relations;
2. construct upstream and downstream baseline-relative edge profiles before examining the desired propagation result;

3. embed local comparisons in compatible global arrangements and defend any diagnostic-transport map;
4. define the upstream mechanism intervention, treatment versions, and a network exposure mapping;
5. measure or bound capability, optional viability, alternative availability, response capacity, and attainable return at the declared lag;
6. specify the downstream substantive target and its research audit separately, and validate that both arms remain connected to that target;
7. address anticipation, selection, time-varying confounding, missingness, interference, and changing topology;
8. estimate or bound the necessary total-effect screen, then identify or bound the required intermediate-actor path under its stronger assumptions;
9. evaluate absorbed, common-shock, shared-mechanism, harmful, and incompatible-baseline negative cases; and
10. report every admitted baseline pair, uncertainty reason, and displaced third-party edge.

Randomized exposure mappings can support causal estimands under declared interference structures [4]; partial-interference and contagion-path frameworks provide additional designs [13, 16]. Evolving roles and institutional relations may defeat these designs. Historical comparison, partial identification, simulation, or explicit indeterminacy can then be more honest than a point estimate.

12 Open Questions Across Registers

This section collects the questions the paper leaves unresolved, organized by the register in which each would be answered. Its objective is to separate questions that further formal work could settle from questions requiring empirical evidence, normative argument, or institutional design, and to mark which of them the paper’s own theses have made pressing.

The four formal open problems stated in Section 13 concern compatible global comparison families, interference-aware path identification, branching exit conditions, and buffer completeness. The questions below are of a different kind and are not reducible to them.

12.1 Conceptual and Formal Questions

This subsection lists questions about the construction’s objects.

Open Problem 12.1 (Portfolio structure of continuation). Section 3 locates transmission in a portfolio effect, whereby a contraction confined to one generative domain lowers a participant’s capacity to continue in general. Which aggregation structures over domains produce this behavior, which permit substitution between domains, and what evidence would distinguish them for a given participant?

Open Problem 12.2 (Threshold and persistence). Thesis 5.2 characterizes the intermediate actor as seeking a continuation threshold. Under what conditions does a constrained response persist beyond the point at which the threshold is met, converting a transmission step into a stable practice? A persistence result would bound the mitigation available under Thesis 5.3.

Open Problem 12.3 (Existence without magnitude). Section 3 records that the existence of a capability contraction may be accessible while its magnitude remains unidentified. Which propagation conclusions survive on existence evidence alone, and can a useful ordinal propagation statement be defined without a cardinal contrast?

12.2 Normative Questions

This subsection lists questions the paper’s theses raise and do not settle.

Open Problem 12.4 (Calibration of mitigation). Thesis 5.3 establishes that constraint mitigates without extinguishing the intermediate actor’s burden, and leaves the function unspecified. What relation should hold between the availability of non-appropriative alternatives and the degree of mitigation, and does complete elimination of alternatives extinguish the burden or merely minimize it?

Open Problem 12.5 (Aggregation of structural contribution). Thesis 5.6 proposes the propagation contrast as a measure of structural contribution. When several upstream actors contribute to the same downstream relation, how should their contrasts be combined, and does the resulting apportionment behave acceptably under overdetermination, where each contribution would suffice alone?

Open Problem 12.6 (Standing of the downstream participant). The downstream participant is affected by a structure it did not enter and cannot alter. Does a propagation finding generate any claim held by that participant against the upstream actor, given that the two stand in no direct relation, and does the answer depend on the mediating actor’s culpability?

Open Problem 12.7 (Register weighting). Thesis 5.5 establishes that distributive outcome and relational procedure are independent and that a complete assessment reports both. It supplies no rule for cases in which they conflict, and whether a general rule exists remains open.

12.3 Political-Economic and Institutional Questions

This subsection lists questions about intervention and governance.

Open Problem 12.8 (Coupling-sensitive instruments). Thesis 6.1 holds that existing instruments target manifestations in place of couplings, while conceding that couplings are counterfactual and frequently unidentified. Can a reporting or liability instrument be designed that is sensitive to transmission structure without requiring identification of a causal contrast, and what would it require parties to record?

Open Problem 12.9 (Decision-center assignment). Under polycentric governance, which decision center is positioned to alter which coupling, and what determines whether an intervention at one level displaces pressure to a level outside its jurisdiction?

Open Problem 12.10 (Diffuse upstream mechanisms). The propagation estimand presupposes a governance form in which the upstream mechanism is a locus of decision. What replaces it where terms emerge from many uncoordinated exchanges and no single actor’s practice constitutes the mechanism?

Open Problem 12.11 (Intervention without capability destruction). The intervention question asks whether the coupling between one position’s gain and another’s capability contraction can be broken while preserving the generativity at issue. No candidate intervention in this paper has been shown to satisfy both halves of that criterion.

12.4 Empirical Questions

This subsection lists what evidence would be needed and what currently exists.

No empirical case validates the proposed path, the sign of any response parameter, the offspring kernel, or any candidate buffer. The verified evidence in Section 6 establishes an association between lead-firm practices and supplier-level conditions in one sector; it leaves the intervention, the edge diagnoses, the compatibility of arrangements, and the path condition entirely open.

The priority questions are whether a restricted domain exists in which upstream mechanisms admit credible variation; whether intermediate capability, viability, alternatives, and response capacity can be measured at a declared lag; whether the sign decomposition’s offsetting terms can be separately estimated, since the model permits an upstream contraction to reduce downstream probability by removing practical capacity; and whether negative cases can be found, since a framework that never returns a negative finding in practice would be unfalsifiable regardless of its formal capacity to do so.

13 Limits and Revisable Research Program

This section consolidates the paper’s contribution, limitations, open obligations, and defeat conditions. It closes at the level of a conditional causal framework and reserves feedback, responsibility, and institutional evaluation for separate research.

The construction has four limited contributions. First, it distinguishes an edge audit, a total-effect screen, an intermediate-actor propagation link, and an open cascade. Second, it carries complete arrangements, admitted baselines, diagnostic transport, and three-valued uncertainty into the network model. Third, it derives a finite response-kernel identity whose total-effect sign depends on pressure, alternatives, capacity, and return. Fourth, it derives first-moment open-cascade and spectral attenuation results under explicit finite-matrix assumptions.

The model retains substantial limitations. P005 edge rows remain contestable and baseline-sensitive. Global compatibility can be difficult to establish. The binary target may inadequately represent plural evaluative specifications. Social structures may permit bounds or historical comparisons while resisting a manipulable exposure. Intermediate states can be post-treatment, multidimensional, and partially observed. Network interference and adaptive topology can invalidate the finite response and branching restrictions. A scalar viability projection can erase autonomy, direction, exit, and nonfungible losses. The current corpus contains no empirical case validating the proposed path, sign model, offspring kernel, or buffer.

Open Problem 13.1 (Compatible global comparison families). Develop a constraint-sensitive method for constructing or bounding jointly feasible global arrangements from baseline-relative edge comparisons without assigning scarce resources or institutional positions inconsistently.

Open Problem 13.2 (Interference-aware path identification). Identify or bound the total and stochastic-interventional path contrasts when actor roles, network exposure, mediator–outcome confounding, and topology change over time.

Open Problem 13.3 (Branching exit conditions). Specify observable conditions marking the failure of the open-cascade approximation through path collision, repeated actors, feedback closure, strategic adaptation, saturation, or incompatible descendant attribution.

Open Problem 13.4 (Buffer completeness and distribution). Evaluate candidate buffers in a complete edge vocabulary that records newly created dependency, displaced burdens, capability effects, beneficiary change, and unequal access to the buffer.

Several questions remain deliberately separate. Feedback closure, cycle stability, distribution across a closed set of participants, and systemic traps require a cycle model; Section 5 defeats one inference about reciprocal role occupancy without supplying that model. Recovery and institutional intervention evaluation require lifecycle criteria. Legal liability, remedy, and the doctrinal treatment of duress require jurisdictional arguments that Section 5 does not attempt: its claims concern moral assessment and forward-looking obligation. AI can intensify or reveal the proposed mechanism, while the definition itself contains no AI requirement.

The paper’s normative content is confined to the five theses and their stated dependencies. It assigns no liability, recommends no institution, and classifies no observed relation.

The framework should be narrowed or abandoned if edge rows cannot be specified without circularity, upstream mechanisms admit no coherent contrast, local baselines cannot be embedded in compatible global arrangements, target meaning cannot be transported across arms, or intermediary descriptions add no discriminating content beyond a post hoc narrative. It also loses novelty if verified antecedents already perform the same integration without the new vocabulary. Current sources establish relevant traditions and constraints, not a literature-wide originality result.

The resulting position is conservative. Generativity-exploitation propagation is a coherent candidate causal relation when independently evaluated edges are connected by compatible global counterfactuals and a material positive total downstream contrast together with a supported material path through the shared intermediate actor. The same formalism preserves null, negative, and unresolved outcomes. Its practical value may lie in showing precisely where a proposed cascade lacks a coherent baseline, causal intervention, downstream diagnosis, path warrant, event-level descendant attribution, or complete account of affected actors.

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