The Laffer Curve as a Theorem: How Production Complementarity Determines the Revenue-Maximizing Tax Rate

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Note

1 Introduction

The Laffer curve is one of the most influential ideas in public economics: at a zero tax rate, revenue is zero; at 100%, revenue is also zero; so a revenue-maximizing rate exists in between. The logic is compelling, but the argument is qualitative—it establishes *existence* without predicting *where* the peak falls, *why* it differs across sectors, or *how* the economy deteriorates beyond it.

This note derives the Laffer curve as a theorem from a two-parameter framework for production under information frictions smirl2026unified, adding three results the qualitative argument cannot reach: (i) the peak rate depends on a measurable property of each sector's production technology, (ii) the economy deteriorates beyond the peak in a predictable sequence, and (iii) revenue loss beyond the peak comes from displacement of activity, not suppression.

2 Setup and Derivation

Every productive sector is characterized by a **complementarity parameter** $\rho \in (-\infty, 1)$ measuring how substitutable its inputs are. Construction requires land, labor, materials, permits, and financing that cannot replace each other (ρ low). Financial trading combines highly substitutable instruments (ρ near 1). The companion papers prove that the curvature premium—the extra value from combining diverse inputs well—degrades as information friction T rises:

$$K_{\text{eff}} = K \cdot \left(1 - \frac{T}{T^*}\right)^+, \tag{1}$$

where $K = (1-\rho)(J-1)/J$ is the sector's structural curvature, $T^* \propto K$ is a critical temperature, and $(\cdot)^+$ denotes the positive part. Above T^*, allocation becomes effectively random.

Taxation is an information friction: it distorts prices, creates compliance costs, and incentivizes avoidance. A tax rate τ raises the effective temperature $T_{\text{eff}}(\tau) = T_0 + g(\tau)$, where $g(0) = 0$ and $g' > 0$. Revenue is rate times base:

$$R(\tau) = \tau \cdot Y\big(K_{\text{eff}}(\tau)\big). \tag{2}$$

Proposition 1 (The Laffer curve)**.** *$R(\tau)$ is zero at $\tau = 0$ and zero when $g(\tau) \geq T^* - T_0$ (the tax pushes the sector past its critical temperature). A revenue-maximizing rate τ^* therefore exists in $(0, \bar{\tau})$ where $g(\bar{\tau}) = T^* - T_0$.*

This is the Laffer curve, now derived from production fundamentals rather than assumed.

3 Three New Predictions

1. The peak depends on sectoral complementarity

The ceiling rate $\bar{\tau}$ satisfies $g(\bar{\tau}) = T^* - T_0$, and T^* is proportional to $K = (1-\rho)(J-1)/J$—higher for more complementary sectors.

Corollary 1 (Sector-specific peaks)**.** *Sectors with lower ρ (complementary inputs) tolerate higher tax rates before reaching the Laffer peak. Sectors with higher ρ (substitutable inputs) hit the peak at lower rates.*

This is intuitive once stated: a construction project cannot substitute away from its inputs when taxed, so taxation degrades efficiency slowly. A trading desk redirects capital to untaxed instruments almost immediately. The policy implication is direct: **there is no single Laffer peak**—every sector has its own, determined by how substitutable its inputs are. Financial services and digital goods reach their peaks at substantially lower rates than construction, manufacturing, and healthcare.

2. The decline follows a predictable sequence

The companion papers prove that three roles of curvature degrade at different rates: *diversification value* degrades quadratically (fast), while *productive complementarity* and *coordination stability* degrade linearly (slower). The Laffer decline therefore proceeds in order:

1. **Capital flight and portfolio reallocation** (fast, gentle decline). Diversification strategies fail first—investors redirect to untaxed asset classes.

2. **Productive restructuring** (medium). Firms reorganize: offshoring, entity restructuring, income reclassification. The value from combining diverse inputs is now degraded.
3. **Coordination collapse** (steep decline). The underground economy expands as strategic stability breaks down entirely.

The ordering is forced by the mathematics (quadratic degrades before linear), not by empirical generalization. The curve is therefore **not symmetric**: the decline past the peak is initially gentle, then steepens. For complementary sectors (low ρ) the curve is right-skewed; for substitutable sectors (high ρ) it is left-skewed and steep.

3. Displacement, not suppression

The framework predicts that activity beyond the Laffer peak does not vanish—it escapes to untaxed venues. The escape rate from a taxed basin is

$$k = \nu \exp(-\Delta\mathcal{F} \,/\, T_{\text{eff}}) \,, \tag{3}$$

where $\Delta\mathcal{F}$ is the barrier between taxed and untaxed states. Higher τ raises T_{eff}, *exponentially increasing* the escape rate. Revenue declines not because people stop working but because activity relocates.

A natural experiment confirms this. India imposed a 30% tax on cryptocurrency transactions in 2022. Domestic volume fell 86%—but 72% of the lost volume reappeared on offshore platforms. The tax did not suppress activity; it displaced it. The Laffer decline was almost entirely a displacement effect, exactly as predicted.

4 Conclusion

The Laffer curve is not merely a plausible conjecture—it is a theorem following from the interaction between taxation-as-friction and the complementarity structure of production. The derivation preserves the original insight while adding quantitative structure: the peak depends on a measurable parameter (ρ), the decline follows a forced sequence (diversification $\rightarrow$ production $\rightarrow$ coordination), and revenue loss comes from displacement rather than suppression.

The search for "the" Laffer peak is therefore misguided. A revenue-maximizing system would recognize that financial services and digital goods reach their peaks at lower rates than manufacturing and healthcare, and would set effective rates accordingly.

References

[Laffer(2004)] Laffer, Arthur B. 2004. "The Laffer Curve: Past, Present, and Future." Heritage Foundation Backgrounder 1765.

[Smirl(2026)] Smirl, Jon. 2026. "The (ρ, T) Framework: A Unified Dynamical Theory of Production, Cycles, and Crises from Six Economic Axioms." Working Paper.