

RESEARCH REPORT

Oregon Rural Institutional Viability Study

Education Module: School District Outcomes, Enrollment Trajectories, and the Doom Loop

Overarching Research Question

Is this community losing the population base and age balance needed to sustain schools, employers, health care, housing markets, civic institutions, and local services?

207

Oregon School Districts
Analyzed

8

Academic Years
2017–18 through 2024–25

46%

Districts
Showing full doom loop conditions

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Executive Summary

This report presents findings from the Education Module of the Oregon Rural Institutional Viability Study — a multi-sector research program examining whether Oregon's most socioeconomically at-risk communities are losing the population base and age balance needed to sustain their core civic institutions.

Three hypotheses were tested using longitudinal data from 207 Oregon school districts across eight academic years (2017–18 through 2024–25):

Hypothesis	Prediction	Verdict
H1: Fragility predicts outcomes	High-risk / fragile districts perform worse	REFUTED
H2: Spending predicts outcomes	Higher PPE districts perform better	PARTIALLY SUPPORTED
H3: The Doom Loop	Enrollment decline drives outcome deterioration which feeds further decline	SUPPORTED

The most consequential finding is not any single hypothesis result — it is the relationship between them. Rural and high-risk districts are currently outperforming urban peers on three of five outcome measures (H1 refuted). They are punching above their weight. However, 82 of 180 districts (46%) simultaneously show declining enrollment, deteriorating outcomes on two or more measures, and rising per-pupil expenditure (PPE) driven by fixed-cost spreading — the three-condition signature of an active doom loop (H3 supported). The doom loop is not a future risk; it is a present condition. In other words, you can only punch above your weight as long as you're standing...and we've got multiple rural Districts that are running out of steam.

The non-linear threshold analysis reveals an inflection point near 200 average daily membership (ADM): graduation outcomes accelerate in their deterioration for districts below this floor, and each additional point of enrollment loss causes disproportionately greater harm. Rural districts are approaching — and in some cases have crossed — this threshold.

The policy implication is clear: coordinated, place-based investment that maintains communities above their institutional viability thresholds is more effective than single-sector intervention. Schools cannot retain families if there are no jobs. Jobs cannot attract workers without housing. Housing markets fail without health care. The sectors reinforce each other in both directions — the education data documents the leading edge of a systemic process that will appear, in sequence, in health care, housing, and employment analyses to follow.

Chapter 1 Framework and Overarching Question

The Central Question

Rural and small communities across Oregon face a structural challenge that is simultaneously economic, demographic, and institutional. The central question driving this research is:

Is this community losing the population base and age balance needed to sustain schools, employers, health care, housing markets, civic institutions, and local services?

This question is not new. Rural decline has been studied, documented, and lamented for decades¹. What is less well-established is a rigorous, multi-sector, longitudinal framework that can measure not just whether decline is occurring, but at what rate, through which mechanisms, and — critically — at what point the system crosses from manageable stress into self-reinforcing collapse.

This research program is designed to provide that framework for Oregon's most at-risk communities, using the Oregon Socioeconomic Risk Index as the organizing spine across sectors. The Education Module is the first completed analysis; Housing, Health Care, and Employment modules will follow.

Institutional Carrying Capacity

The organizing concept is institutional carrying capacity — the minimum population base, age distribution, and economic activity required for a civic institution to remain self-sustaining. Every institution has such a threshold:

- Schools require enough enrolled students to justify the fixed costs of a principal, specialist staff, facilities, and extracurricular programming — the elements that make a school a functional community anchor rather than merely a building.
- Hospitals and clinics require minimum patient volumes to maintain provider staffing, accreditation, and payer negotiating leverage. Below threshold, access to care collapses faster than the population decline that caused it.
- Housing markets require minimum transaction volumes for appraisers, lenders, and title companies to operate — without which values become indeterminate, trapping existing owners and deterring in-migrants.

¹Rural population loss in individual counties and regions has been documented since at least the mid-20th century, but the first recorded *aggregate* decline of the U.S. rural population as a whole occurred during the 2010–2020 decade — a net loss of approximately 289,000 residents out of 46 million, confirmed by the 2020 U.S. Census (Johnson, 2022). Annual estimates show consecutive net losses beginning as early as 2011–2012, with six straight years of decline confirmed by USDA ERS through 2016. A methodological caveat applies: a portion of the post-2010 rural population loss is attributable to county reclassification following the 2010 Census redesignation of some rural areas as urban, which mechanically reduces the rural count independent of actual migration (Lichter & Johnson, 2019). Sources: [Johnson \(2022\)](#), [Rural Poverty Research Network](#); [USDA ERS \(2017\)](#); [Lichter & Johnson \(2019\)](#).

- Employers require labor sheds of sufficient depth and age balance to recruit. Below threshold, they either decline to locate or they leave, removing both jobs and the tax base that funds remaining services.
- Civic institutions — churches, volunteer fire departments, fraternal organizations, local media — require minimum active membership. When they close, the social infrastructure that retains residents and attracts newcomers dissolves.

These thresholds are not independent. They interact and reinforce each other in both directions: a community above its carrying capacity across multiple sectors is resilient; a community below threshold in one sector faces cascading pressure on the others. The education data presented in this report documents this dynamic in its most measurable form.

The Silo Problem

Existing policy and funding architecture operates in institutional silos. Schools report to the Oregon Department of Education and access formula funding, Small School Corrections, and federal educational grants. Hospitals report to the Oregon Health Authority and access Medicaid, rural health designations, and Critical Access Hospital status. Housing programs flow through OHCS, HUD, and USDA Rural Development on separate application cycles with incompatible eligibility criteria. Economic development flows through Business Oregon, EDA, and USDA on yet another track.

Each institution has its own planning horizon, performance metrics, professional culture, and accountability structure. None of them is designed to optimize for the cross-sector outcome that actually matters: whether the community remains viable in ten to twenty years.

The consequence is that institutions decline sequentially rather than being stabilized jointly. Each agency does its best within its mandate; none has the mandate or the data to address the underlying demographic and economic trajectory that is rendering all of them increasingly unviable. Bureaucratic silos are not a design flaw — they reflect legitimate specialization. But in communities approaching institutional carrying capacity thresholds simultaneously across multiple sectors, siloed interventions are systematically insufficient.

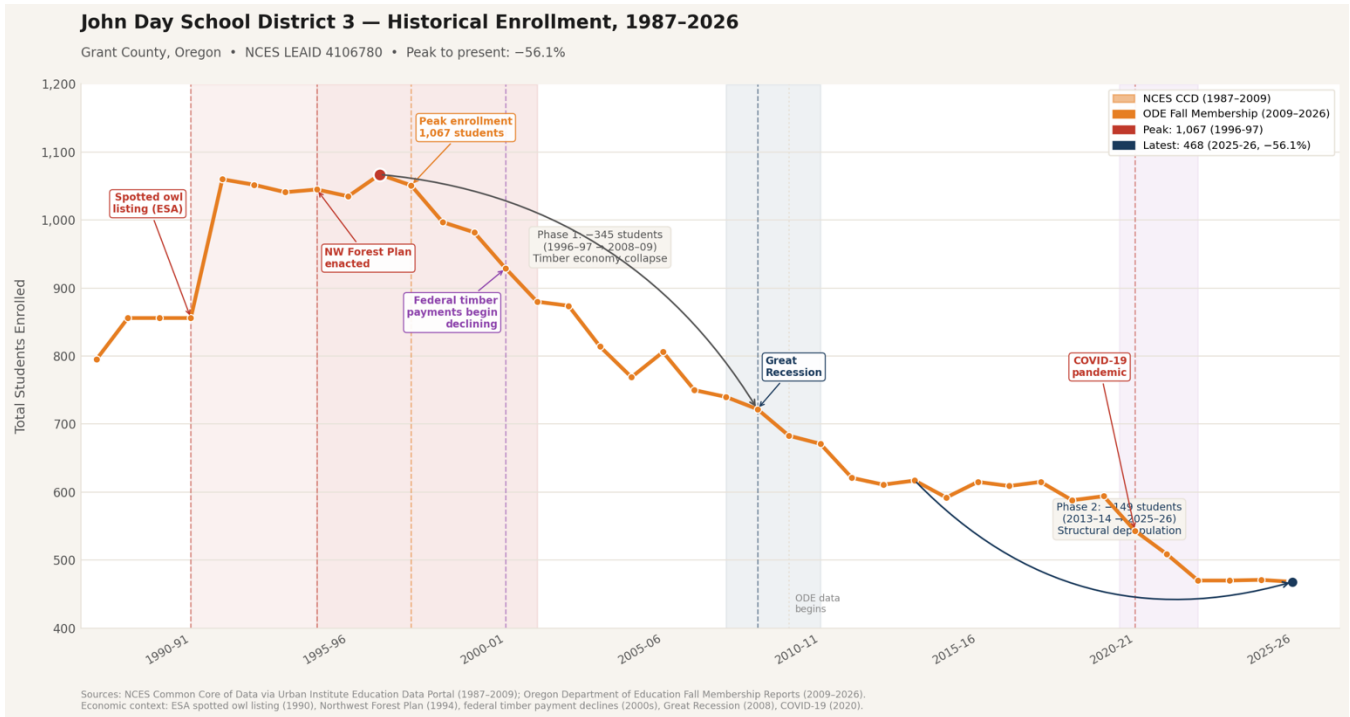
The Research Arc

This study applies the Oregon Socioeconomic Risk Index — a composite measure incorporating poverty rates, unemployment, educational attainment, housing cost burden, and demographic age structure — to rank Oregon's counties and school districts by cumulative fragility. It then tests, sector by sector, whether the index is predictive of institutional stress and whether that stress follows the non-linear dynamics predicted by carrying capacity theory.

The Education Module establishes the methodological framework and provides the first completed sector analysis. Subsequent modules will test parallel hypotheses in health care access and quality, housing market stability, and employment and wage trajectories. The synthesis across modules will enable both a unified vulnerability map and a coordinated policy recommendation framework targeting place-based investment, where it can prevent communities from crossing institutional viability thresholds — while there is still time to intervene.

Grant County as Illustrative Case

Grant County provides a thread running through each module. Grant School District 3 (John Day, Oregon) has seen an overall loss of 56% of its student enrollment over the last 30 years, with average annual declines of -4.4%/yr. It's consolidated junior/senior high school draws from a county of approximately 7,500 residents and shrinking, with every sector under simultaneous pressure. Grant County represents neither an outlier nor a worst case: it is a lead indicator and representative example of what the data show is happening across dozens of rural Oregon counties and hundreds of rural communities nationwide.



Chapter 2 Data and Methods

Data Sources

This analysis draws on three primary data sources:

- **ODE Report Card.** Oregon Department of Education Report Card Data (2017–18 through 2024–25): District-level outcomes for on-time graduation, regular attendance, on-track-to-graduate rates, Grade 3 English Language Arts proficiency, and Grade 8 Mathematics proficiency. Per-pupil expenditure data for local physical schools.
- **NCES CCD.** National Center for Education Statistics Common Core of Data (NCES CCD): District-level enrollment, average daily membership, geographic identifiers, and urbanization classification. Accessed via the Urban Institute Education Data Portal API.
- **Oregon Risk Index.** Oregon Socioeconomic Risk Index: Composite risk tier classification (Tier 1 = most fragile, Tier 3 = least fragile) for Oregon's school districts and counties, developed using the Oregon Socioeconomic Risk Analysis methodology applied to ACS 5-year estimates and OED labor market data.

Dataset

The analysis dataset comprises 1,649 district-year observations covering 207 Oregon school districts across eight academic years. Virtual host districts are excluded throughout. Districts are classified by urbanization category (Rural, Micropolitan, Metro) using NCES definitions, and by composite risk tier using the Oregon Socioeconomic Risk Index.

Dimension	Coverage
Districts	207 (excl. virtual host districts)
Academic years	2017–18 through 2024–25 (8 years)
District-year observations	1,649
PPE data availability	894 of 1,649 observations (54%)
Urbanization: Rural / Micro / Metro	35 / 56 / 116 districts
Risk Tier 1 / 2 / 3	43 / 58 / 106 districts

Hypothesis Framework

Three hypotheses were developed from the institutional carrying capacity framework and the Oregon Socioeconomic Risk literature:

- H1 (Fragility predicts worse outcomes): Districts classified as high-risk / fragile (Tier 1) will show systematically worse educational outcomes than low-risk (Tier 3) districts, after controlling for urbanization and year trend.
- H2 (Spending predicts better outcomes): Districts with higher per-pupil expenditure (PPE) will show better outcomes, both overall and within the rural subgroup.
- H3 (The Doom Loop): Declining enrollment will predict deteriorating outcome trajectories, and deteriorating outcomes will in turn predict further enrollment decline — confirming a self-reinforcing feedback loop.

Each hypothesis was operationalized to allow falsification: the goal was not to confirm a narrative but to test whether the assumed relationships hold in the data, and if so, with what strength and under what conditions.

Analytical Approach

The analysis proceeds in three stages corresponding to the three hypotheses, with diagnostics preceding each stage to verify modeling assumptions.

H1 and H2: Cross-Sectional-Longitudinal OLS

Cluster-robust ordinary least squares regression with district-level clustering was used for H1 and H2, following intraclass correlation (ICC) diagnostics that established the appropriate level of clustering. Year trend was included as a linear covariate. Urbanization category was included as a control to address the near-perfect confound between risk tier and urbanization (Tier 1 = 100% Rural, Tier 3 = 90% Metro). Cohen's *d* was computed for effect size estimation across tier comparisons.

H3: Longitudinal Slope Analysis

For H3, per-district enrollment and outcome slopes were estimated via OLS on the time series for each district individually (requiring ≥ 3 data points). Enrollment slope was expressed as an annualized percentage change relative to baseline Average Daily Membership (ADM). Outcome slopes were expressed as pp/yr. District-level slopes were then merged into a cross-sectional dataset for second-stage regression: outcome slope regressed on enrollment slope, controlling for baseline outcome level, urbanization, and $\log(\text{ADM})$.

Non-Linear Threshold Tests

Three complementary approaches were used to test whether the doom loop accelerates below enrollment floors: (1) ADM quintile stratification with within-quintile correlations; (2) threshold interaction models testing ADM cutoffs at 50, 100, 200, 300, and 500 students; and (3) polynomial regression adding a quadratic enrollment slope term to the controlled model.

A Note on the PPE Artifact

Per-pupil expenditure in rural Oregon is substantially inflated relative to urban districts — not because rural districts invest more per student, but because fixed operating costs (facilities, administration, transportation) are spread across a smaller enrollment base. The mean PPE for Rural districts in this dataset is \$40,213 vs. \$16,390 for Metro. This cost-spreading artifact suppresses the bivariate PPE-outcomes relationship and must be

accounted for in interpretation². All H2 models include urbanization controls and log(ADM) to partially address this confound.

²Oregon’s school funding formula is structured to distribute per-pupil revenue uniformly across districts, but this design produces a regressive distributional outcome: high-poverty districts receive substantially less funding than low-poverty districts — 23% less as of 2021–22, the largest such gap in the nation (Education Law Center, [Making the Grade 2024](#)). Updated 2022–23 data show the gap narrowing slightly to 18% but retaining an F grade on distribution fairness ([Willamette Week, April 2026](#); [ELC, Making the Grade 2025](#)). This context is critical for interpreting Oregon’s high rural PPE figures — rural districts are not well-funded relative to need; they are spending more per pupil because their fixed costs are spread over a smaller enrollment base.

Chapter 3 H1: Does Fragility Predict Worse Outcomes?

VERDICT: REFUTED

Tier 1 (most fragile / rural) districts outperform Tier 3 (least fragile / metro) on 3 of 5 outcomes where significant differences exist. High-risk rural districts are not lagging — they are punching above their weight.

Tier Distribution and the Urbanization Confound

Before interpreting the regression results, a critical diagnostic finding must be noted: composite risk tier is nearly perfectly confounded with urbanization. Tier 1 districts are 100% Rural; Tier 3 districts are 90% Metro. This means that a finding of "Tier 1 performs worse" would be inseparable from "Rural performs worse" — the two variables carry nearly identical information. All models, therefore, include urbanization as an explicit control.

ICC (intraclass correlation) analysis confirmed that the variance in outcomes is not concentrated at the tier level (ICC: 0–4.5%) but at the district level (37–56%). Tier explains very little of the raw variance; districts vary enormously within tiers. County-level ICC (6–15%) is moderate, confirming that geography matters but does not dominate.

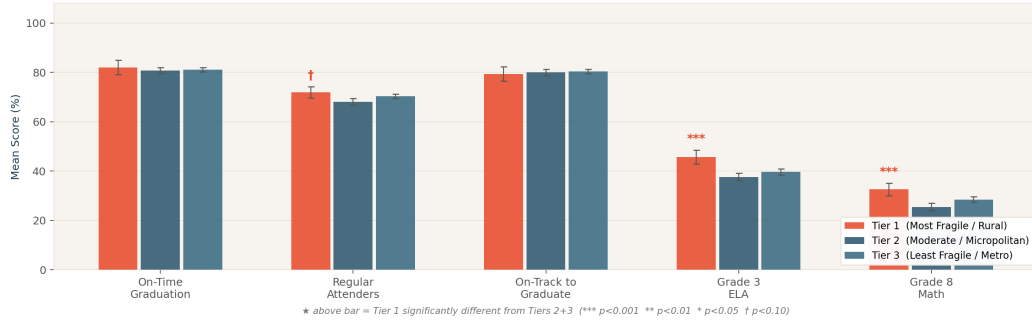
Regression Results

Cluster-robust OLS with district clustering, reference category = Tier 3, controls = urbanization + year trend:

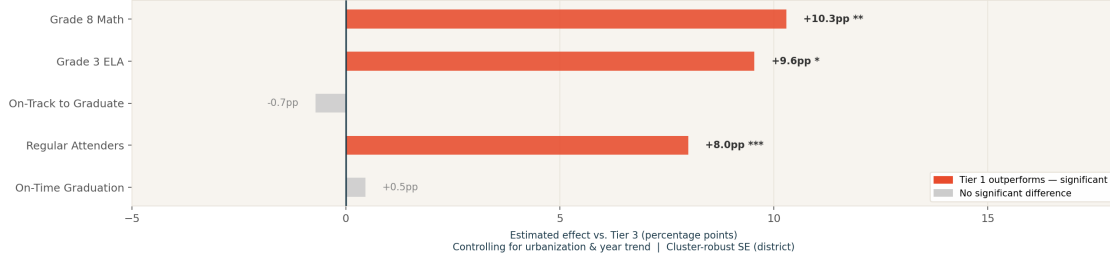
Outcome	Tier 1 vs Tier 3 (β)	p-value	Cohen's d	Verdict
On-Time Graduation	+0.46 pp	0.944 (ns)	+0.064 (ns)	No difference
Regular Attenders	+8.00 pp	< 0.001 ***	+0.176 †	Refutes H1
On-Track to Graduate	-0.70 pp	0.838 (ns)	-0.065 (ns)	No difference
Grade 3 ELA	+9.55 pp	0.044 *	+0.450 ***	Refutes H1
Grade 8 Math	+10.29 pp	0.009 **	+0.360 ***	Refutes H1

H1 — Does Fragility Predict Educational Outcomes? | Oregon School Districts, 2017-2025

A Mean Outcomes by Fragility Tier (near observations - 207 districts - 36 counties - Cluster-robust OLS, district clustering, ref = Tier 3)



B Tier 1 Effect vs. Tier 3 (controlled)



C H1 Verdict by Outcome

Outcome	Tier 1 Mean	Tiers 2+3 Mean	Direction	Cohen's d	Significance	H1 Verdict
On-Time Graduation	82.1%	81.0%	↑ Tier 1 leads	d = +0.06	ns (p=0.465)	No difference
Regular Attenders	71.9%	69.5%	↑ Tier 1 leads	d = +0.18	† (p=0.057)	REFUTES H1
On-Track to Graduate	79.4%	80.3%	↓ Tier 1 trails	d = -0.06	ns (p=0.574)	No difference
Grade 3 ELA	45.7%	39.0%	↑ Tier 1 leads	d = +0.45	*** (p=0.000)	REFUTES H1
Grade 8 Math	32.6%	27.4%	↑ Tier 1 leads	d = +0.36	*** (p=0.000)	REFUTES H1

H1 predicts: higher fragility → worse outcomes. "REFUTES H1" = most-fragile districts outperform or match less-fragile peers.

Source: ODE Report Card Data, ODE School Finance | Analysis: Catalyst Public Policy Advisors | May 2026



Figure 1. H1 Regression Results: Fragility Tier vs. Educational Outcomes (2017–18 through 2024–25)

Interpretation

Three findings from this analysis are particularly consequential for the overarching research question.

First, the year trend is significantly negative for academic outcomes: Grade 3 ELA is declining at approximately –1.2 pp/yr statewide and Grade 8 Math at –1.9 pp/yr. This is a system-wide trajectory, not a rural-specific problem. All districts, regardless of tier or urbanization, are losing ground on academic proficiency over the study period.

Second, despite this shared downward trend, rural/fragile districts are maintaining a significant performance advantage on two academic measures and on attendance. This suggests that something about rural school communities — community cohesion, shared expectations, smaller class sizes, direct accountability between families and staff — is currently compensating for the resource and demographic disadvantages the risk index documents.

Third, and most important for the carrying capacity framework: this advantage is a present-tense snapshot, not a forecast. The H3 analysis will show that the structural conditions driving deterioration are already active in the majority of rural districts. The current outperformance is real, but it reflects a system that has not yet fully crossed the institutional viability thresholds that the doom loop data identify as the critical inflection point.

Chapter 4 H2: Does Spending Predict Better Outcomes?

VERDICT: PARTIALLY SUPPORTED

Grade 8 Math shows a consistent, significant relationship between PPE and outcomes across all models. Grade 3 ELA shows a significant rural-only signal. Attendance, On-Track, and Graduation show no consistent relationship. The overall PPE-outcome correlation is weak ($r \approx 0.06\text{--}0.11$) and inflated by a cost-spreading artifact.

The Cost-Spreading Artifact

Rural districts in this dataset have a mean PPE of \$40,213 — nearly 2.5× the Metro mean of \$16,390. This is not because rural districts are better funded; it is because their fixed operating costs are divided among far fewer students. A district of 40 students requires a principal, a building, and a transportation system just as a district of 400 does. The per-student cost of those fixed elements is ten times higher in the smaller district. This makes rural districts appear to be "high spenders" in the data, even when they are operating under severe resource constraints.

This artifact suppresses the true relationship between PPE and outcomes in bivariate analysis. Models that do not control for enrollment size will understate the marginal returns to genuine increases in spending — particularly in rural contexts where the fixed-cost floor is already so high that discretionary spending on instruction is a thin layer above operating necessity.

Regression Results

Outcome	$\beta/\$1K$ (M2)	p	Rural $\beta/\$1K$	p (rural)	Key finding
On-Time Graduation	+0.122 pp	ns	+0.189 pp	ns	Log(PPE) sig: +10.3pp**
Regular Attenders	-0.039 pp	ns	-0.109 pp	ns	Flat everywhere
On-Track to Graduate	+0.063 pp	ns	+0.168 pp	ns	Flat after controls
Grade 3 ELA	+0.151 pp	ns	+0.431 pp *	p=0.023	Rural-only significant
Grade 8 Math	+0.162 pp *	p=0.011	+0.197 pp *	p=0.013	Consistent across models

Oregon K-12 Districts | 2017-18 through 2024-25 | N = 207 districts, 894 district-year observations with PPE data

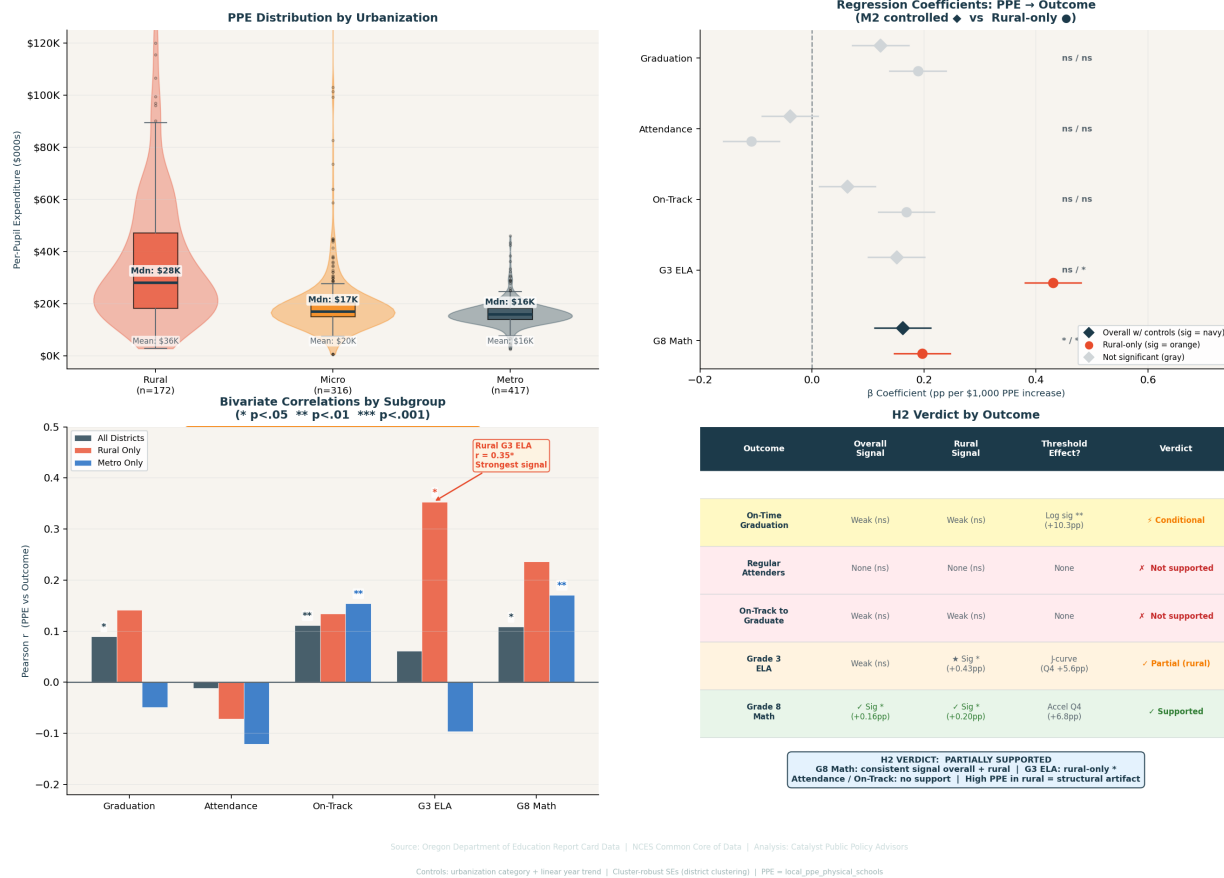


Figure 2. H2 Results: Per-Pupil Expenditure and Educational Outcomes (2017-18 through 2024-25)

Interpretation

Grade 8 Math is the most reliable indicator of a genuine spending-outcomes relationship. The coefficient is significant in both the bivariate model ($p = 0.025$) and the controlled model ($p = 0.011$), and it holds in the rural-only sample ($p = 0.013$). The quartile analysis shows an accelerating pattern: districts in the top expenditure quartile score 6.8 pp higher than Q1 districts, suggesting that the relationship intensifies at higher spending levels.

Grade 3 ELA presents the most interesting rural-specific signal: the overall correlation is negligible ($r = 0.06$, ns), but in rural districts alone it reaches $r = 0.35$ ($p = 0.012$) with $R^2 = 0.148$ in the rural-only model. This pattern is consistent with a threshold effect: once a rural district can afford a dedicated reading specialist or literacy interventionist — investments that metro districts take for granted — ELA outcomes improve measurably. Below that threshold, the marginal dollar of PPE disappears into fixed costs rather than instructional improvement.

The policy implication is not that rural districts should simply spend more. The high rural PPE is already a symptom of the doom loop — fixed costs rising per student as enrollment falls. The implication is that targeted investments in specific instructional capacity (reading support, math coaching) in rural districts appear to produce measurable returns that general formula increases do not guarantee.

Chapter 5 H3: The Doom Loop

VERDICT: SUPPORTED

Enrollment decline significantly predicts attendance deterioration ($\beta = 0.077$, $p < 0.001$) and on-track trajectory ($\beta = 0.091$, $p = 0.003$). The feedback loop closes: attendance decline predicts further enrollment loss ($\beta = 1.025$, $p = 0.001$). 82 of 180 districts (46%) simultaneously show all three doom loop conditions.

Operationalizing the Doom Loop

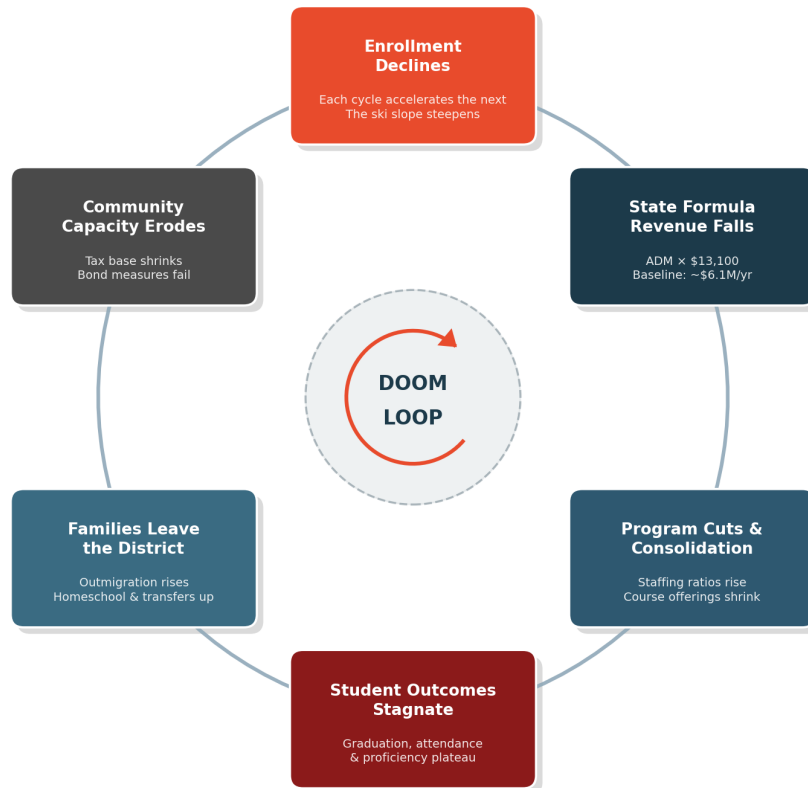
The doom loop was operationalized as three simultaneous conditions, each of which is independently measurable in the data:

- 1. Enrollment decline:** district-level enrollment slope $< -1\%/yr$ relative to baseline ADM, estimated via OLS on the annual time series (2017–18 through 2024–25).
- 2. Outcome deterioration:** two or more of the five outcome measures showing a negative annual slope over the same period.
- 3. PPE escalation:** per-pupil expenditure slope > 0 — indicating that fixed costs are spreading across a shrinking enrollment base, the structural signal of cost pressure accumulating without relief.

A district meeting all three conditions is classified as being in the "full doom loop." A district meeting conditions 1 and 2 only is classified as "partial doom." The distinction matters: PPE escalation signals that the cost pressure has already materialized; without it, declining enrollment and outcomes may reflect other dynamics.

The Enrollment Doom Loop

Oregon's ADM formula creates a self-reinforcing spiral — each lost student reduces revenue, forcing cuts that reduce program quality, which accelerates outmigration and further decline.



Oregon Rural Viability Series — Education Module | Catalyst Public Policy Advisors | 2026

Step 1: Does Enrollment Decline Drive Outcome Deterioration?

The severity gradient table confirms a monotonic relationship for graduation and on-track outcomes: severely declining districts show the worst trajectories, and growing districts show the best. The regression results refine this picture:

- Regular Attenders is the most consistent and strongest signal. $\beta = 0.077$ ($p < 0.001$) in the controlled model; $\beta = 0.140$ ($p = 0.002$) in the rural-only model with $R^2 = 0.457$. Declining enrollment is robustly associated with worsening attendance across all specifications.
- On-Track to Graduate is significant in the controlled model ($\beta = 0.091$, $p = 0.003$). The rural-only model is striking: $\beta = 0.294$, $R^2 = 0.644$ — enrollment trajectory explains 64% of the variance in on-track trends for rural districts.

- Grade 3 ELA is significant and in the expected direction ($\beta = -0.070$, $p = 0.037$): enrollment decline is associated with worse ELA trajectories, consistent with instructional capacity losses from teacher turnover and program cuts.
- Graduation shows a significant but counterintuitive result in the controlled model: declining districts show slightly improving graduation rates. This is likely a denominator artifact — as attendance-challenged students stop showing up, the remaining students graduate at higher rates. The rural-only model is flat and non-significant.

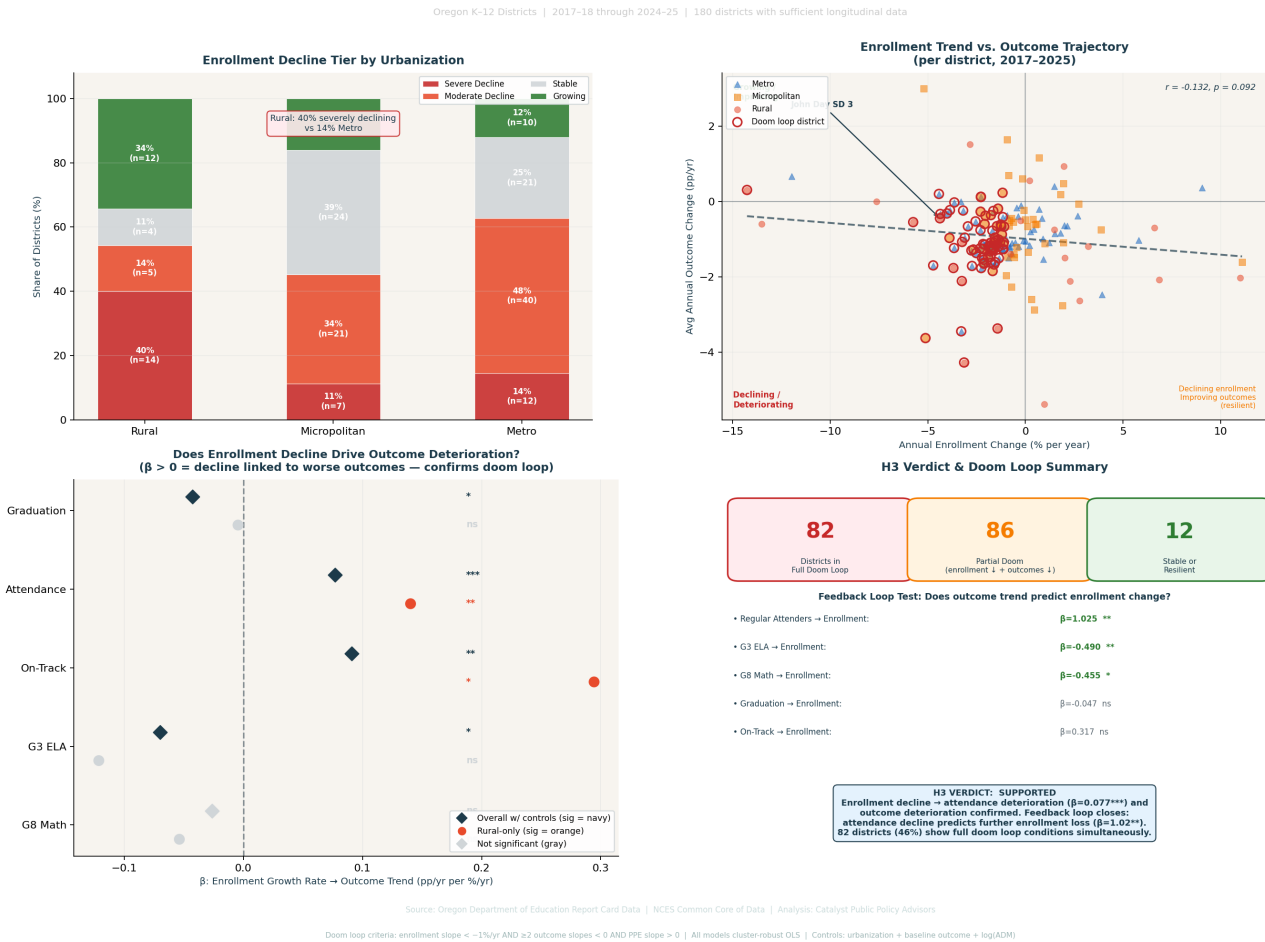


Figure 3. H3 Results: Enrollment Decline, Outcome Deterioration, and the Doom Loop (2017–18 through 2024–25)

Step 2: Does the Loop Close — Outcomes Feed Back into Enrollment?

This is the critical test for whether the relationship is a loop or merely a one-directional trend. The feedback results confirm closure:

- Attendance → Enrollment: $\beta = 1.025$ ($p = 0.001$). A district losing 1 pp/yr of regular attenders loses approximately 1%/yr of additional enrollment. Attendance decline leads to reputation effects, family exit decisions, and open enrollment transfers.

- G3 ELA → Enrollment: $\beta = -0.490$ ($p = 0.006$). Worsening elementary literacy scores predict enrollment loss — parents respond to early academic signals, particularly for elementary-age children.
- G8 Math → Enrollment: $\beta = -0.455$ ($p = 0.017$). Same direction and similar magnitude.
- Graduation and On-Track show no feedback signal — these are lagging indicators that families respond to less directly than attendance rates and test scores.

The loop is fully documented in the data: declining enrollment predicts worse attendance and academic outcomes, and worse attendance and test scores predict further declines in enrollment. This is not a theoretical model — it is a measurable dynamic already present in 82 Oregon school districts.

Threshold Analysis: Does the Loop Accelerate?

The threshold analysis tests whether the doom loop operates differently across district sizes — specifically, whether outcomes accelerate their deterioration once a district falls below a minimum enrollment floor.

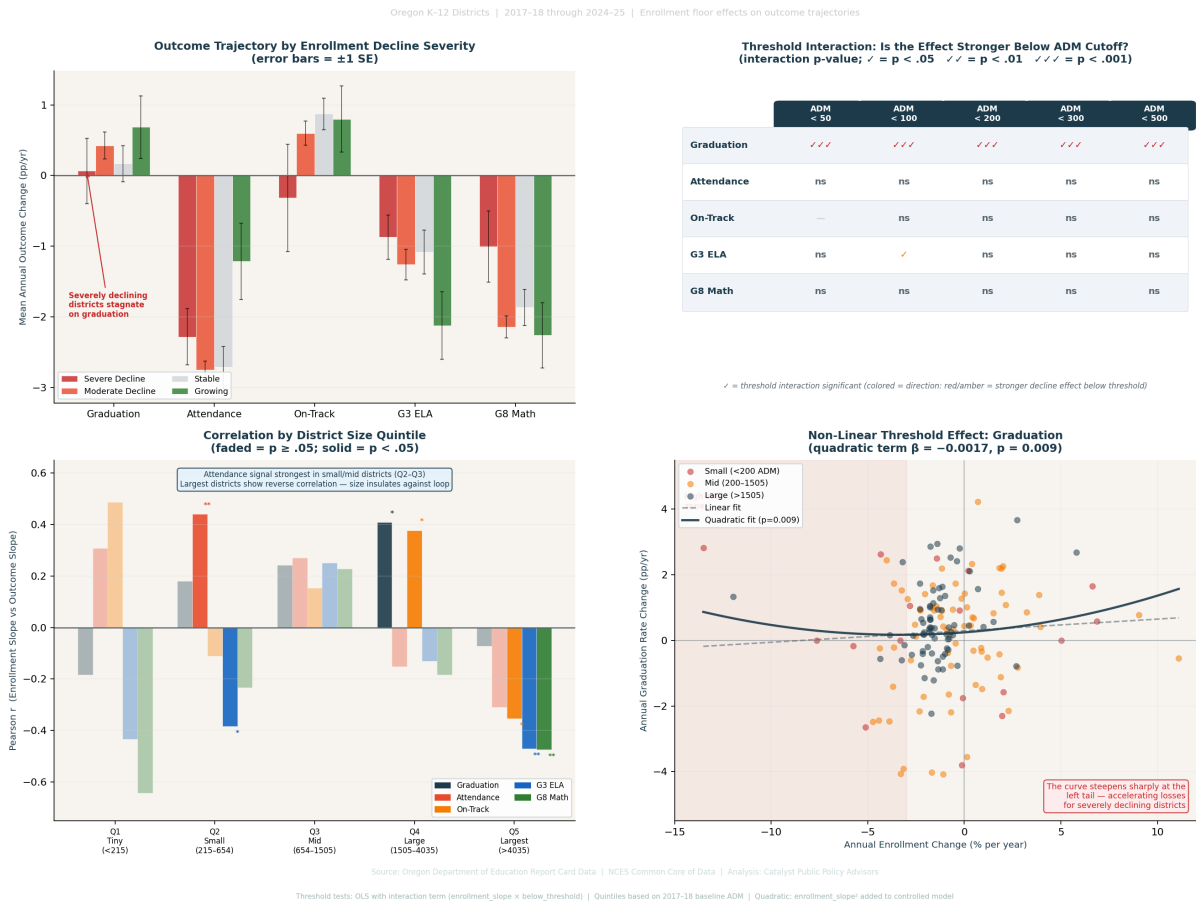


Figure 4. H3 Threshold Analysis: Non-Linear Effects and the Enrollment Floor (2017–18 through 2024–25)

The threshold interaction tests reveal a striking asymmetry. For graduation outcomes, the interaction between enrollment decline and being below an ADM cutoff is highly significant at every threshold tested ($p < 0.001$ at

ADM < 50, 100, 200, 300, and 500). The negative interaction coefficient confirms that for districts below the size floor, each additional percentage point of enrollment decline does greater damage to graduation rates than it does in larger districts.

The quadratic model confirms this non-linearity: the quadratic enrollment slope term is significant for graduation ($\beta = -0.0017$, $p = 0.009$). The scatter plot shows the characteristic "ski slope" shape — relatively flat for districts with moderate decline, then bending sharply downward as decline intensifies.

Attendance outcomes, by contrast, show no threshold effect: the doom loop hits attendance uniformly regardless of district size. There is no "safe size" below which attendance is insulated from enrollment decline. This makes attendance the most universal and reliable early warning indicator.

The Ski Slope Implication

Rural districts are not just at risk of getting worse — they are at risk of getting exponentially worse per unit of further population loss. Once an enrollment floor is crossed, the same rate of decline produces accelerating institutional damage. This non-linearity is why intervention timing matters: preventing a district from crossing the threshold is dramatically more cost-effective than attempting stabilization after the curve has steepened. At present, many of Oregon's Tier 1 rural districts are on the slope but have not yet reached its steepest section.

Chapter 6 Geographic Distribution of the Doom Loop

The geographic distribution of doom loop conditions reveals two patterns that complicate a simple "rural crisis" narrative.

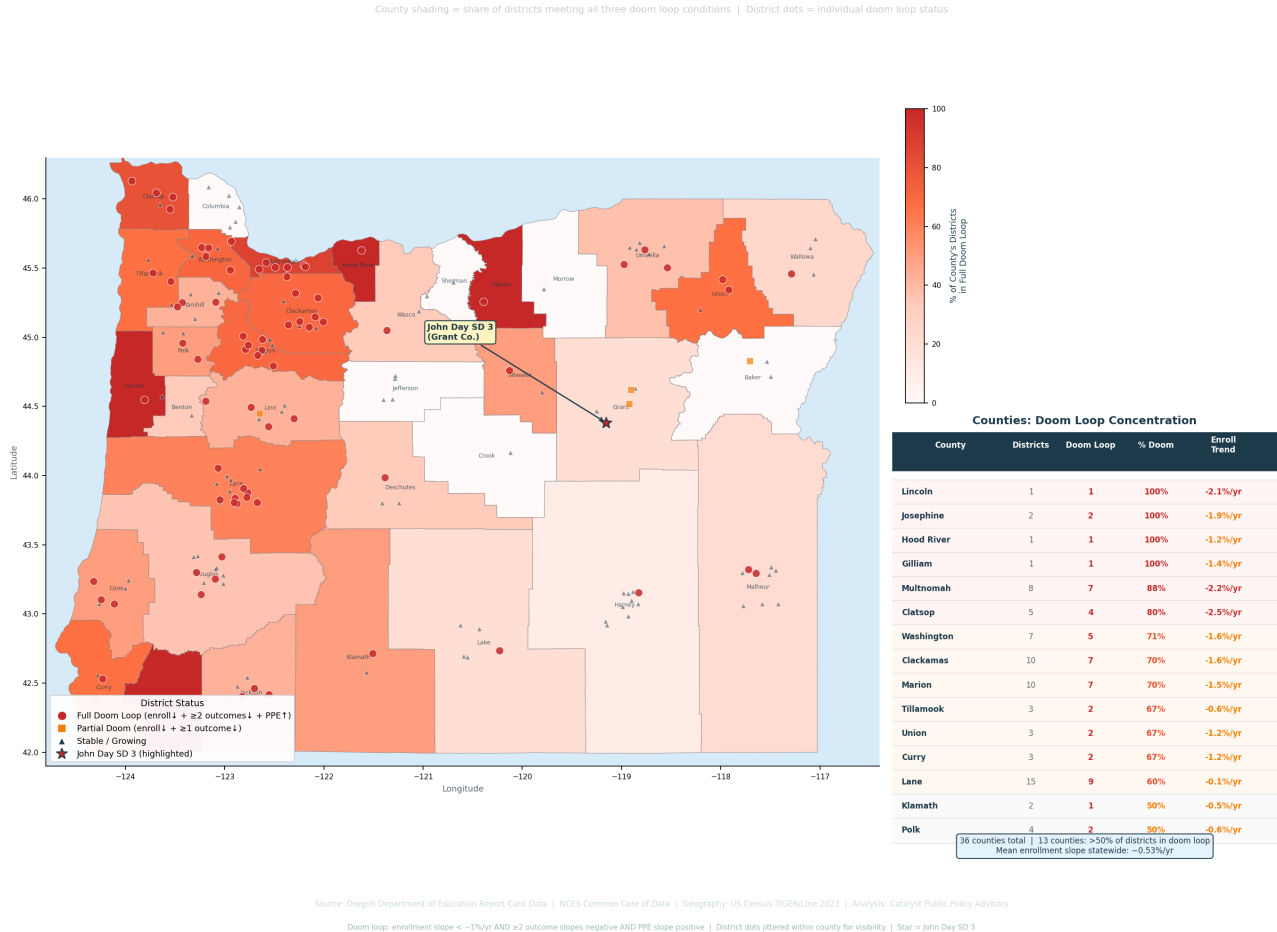


Figure 5. Geographic Distribution of Doom Loop Districts by County, Oregon (2017–18 through 2024–25)

Pattern 1: The Doom Loop Is Not Exclusively Rural

The counties with the highest concentrations of doom loop districts are Multnomah (88%), Clatsop (80%), Washington (71%), Clackamas (70%), and Marion (70%) — Oregon's largest and most urban counties. Portland, Salem, Beaverton, and the Willamette Valley suburbs are losing students at rates that, combined with deteriorating outcomes and fixed-cost pressures, meet the full doom-loop criteria for nearly three-quarters of their districts.

The mechanism in urban and suburban districts differs from that in rural districts — it is driven primarily by demographic transition (falling birth rates, out-migration of families with children, competition from charter and

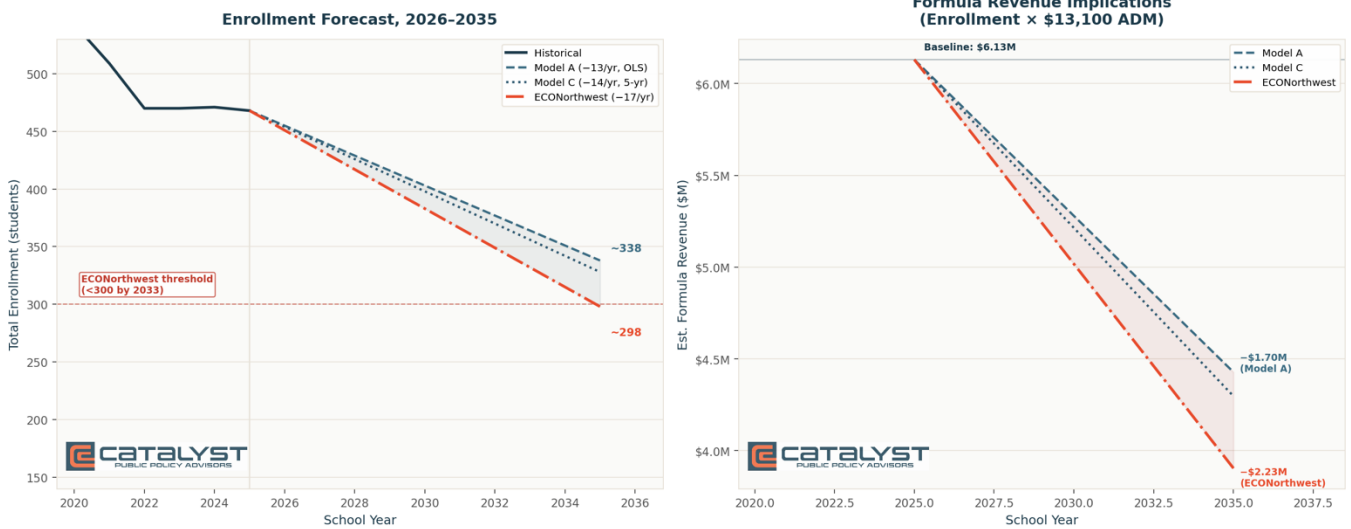
private schools) rather than by economic decline. But the structural signature in the data is the same: declining enrollment, deteriorating outcomes, rising PPE.

Pattern 2: Eastern Oregon Is Past the Cost-Spreading Phase

Grant, Harney, Lake, Malheur, and Wheeler counties have low doom loop percentages, not because their districts are doing well, but because they are so small that they no longer meet the PPE escalation criterion — they have already cut what they can cut. Their costs are not rising per student because they have eliminated the discretionary programs and staffing that would have risen. They are in a different phase of the cycle: contraction rather than cost-spreading.

Grant County has five districts, three of which are in severe enrollment decline ($>-3\%/yr$). John Day SD 3, highlighted on the map, shows an enrollment slope of $-4.4\%/yr$ and a total enrollment decline of -16.4% over the study period. Three of five outcome measures are on declining trajectories. At the current rate, the district will cross the 300-ADM threshold — where the graduation ski slope begins to steepen — by approximately 2035–36, roughly a decade from now. The district is projected to fall below 400 ADM within the next three to four years and concurrently lose between $\$1.7M$ and $\$2.3M$ in formula revenue — further reinforcing its projected decline.

Grant School District No. 3 — Enrollment Forecast & Revenue Projections



Chapter 7 Synthesis and Policy Implications

The Carrying Capacity Argument

The three hypotheses, taken together, describe a coherent and quantifiable dynamic:

- **H1 (Fragility → Outcomes, REFUTED):** Rural and high-risk districts are currently performing at or above state norms on most measures. The "rural disadvantage" narrative is not supported by current data.
- **H2 (Spending → Outcomes, PARTIALLY SUPPORTED):** Marginal spending returns are real but concentrated in rural districts at high expenditure levels — particularly for elementary literacy and math achievement. The high rural PPE is a symptom of cost-spreading, not of resource adequacy.
- **H3 (Doom Loop, SUPPORTED):** Structural deterioration is already underway in 46% of districts statewide. The feedback loop is closed and measurable. The threshold analysis shows non-linear acceleration for graduation outcomes once enrollment falls below approximately 200 ADM.

The synthesis is this: rural districts are currently outperforming because many have not yet fully crossed their institutional carrying capacity thresholds. The community cohesion, shared expectations, and direct accountability that characterize small rural schools are producing real educational advantages — but those advantages are being eroded by the structural forces the risk index documents. The current outperformance is a lagging indicator; the leading indicators point toward accelerating deterioration.

The ski slope metaphor is precise: above the inflection point, decline is manageable, and outcomes are relatively stable. Below it, the same rate of enrollment loss produces disproportionately greater harm. The policy window — the moment when intervention is most cost-effective — is before the threshold is crossed, not after.

The Coordination Imperative

Single-sector intervention is insufficient once the feedback loops are active. A school improvement grant that improves graduation rates may slow one arm of the loop, but if families are still leaving because of inadequate healthcare, unaffordable or inadequate housing, or lack of employment, enrollment continues to fall, and the improvement is transient. This is the core institutional failure that this research program is designed to document and address.

Coordinated, place-based investment — targeting communities identified as approaching multiple institutional viability thresholds simultaneously — is likely more effective per dollar than siloed sector grants. The evidence base for this claim is not yet complete; Housing, Health Care, and Employment modules will quantify the threshold dynamics in those sectors. But the education data already makes the coordination argument on its own: the doom loop's feedback closure through attendance and test scores into enrollment loss demonstrates that educational outcomes are co-produced by the broader community ecology, not just by school-specific inputs.

Actionable Recommendations

The following policy recommendations follow directly from the empirical findings:

Recommendation	Evidence Base	Priority
Establish an enrollment floor protection program for districts approaching 200 ADM, providing transition funding tied to demonstrated community viability planning across sectors.	Threshold analysis: graduation acceleration below 200 ADM; interaction term $p < 0.001$ at all cutoffs tested.	High
Target instructional capacity investments (reading specialists, math coaches) in rural districts below the median PPE, where H2 shows the highest marginal returns to spending.	Rural-only G3 ELA $r = 0.35^*$, $R^2 = 0.148$; G8 Math $\beta = 0.197^*$, rural-only.	High
Develop a cross-sector early warning system using the Oregon Risk Index tiers, tracking enrollment trends, attendance rates, and PPE alongside housing, health access, and employment indicators.	H3 feedback loop: attendance predicts enrollment loss ($\beta = 1.025^{**}$); doom loop affects 46% of districts.	High
Pilot coordinated place-based investment programs in Tier 1 counties approaching threshold simultaneously across education, health, and housing — targeting intervention before the inflection point.	Institutional carrying capacity framework; Geographic concentration of doom loop in high-risk counties.	Medium
Revisit Small School Correction formula to address the cliff-edge effect below 10 ADM, where formula revenue collapse accelerates the doom loop for the smallest rural schools.	Seneca ES case analysis: ~\$162K formula revenue vs. ~\$445K operating cost; \$320K Small School Correction nearly closes gap but creates cliff risk.	Medium

What Comes Next

The Education Module establishes the methodological framework and provides the first sector-specific evidence. Three additional modules are planned:

- **Health Care Module:** Testing whether Tier 1 counties are losing health care access (provider FTEs, hospital proximity, uninsured rates) at rates that amplify the doom loop identified in education. The hypothesis is that health care access deterioration follows the same non-linear dynamics and that its threshold effects interact with education outcomes through family retention decisions.
- **Housing Module:** Testing whether housing market thinness (transaction volume, price volatility, vacancy rates) is correlated with risk tier and enrollment decline. The hypothesis is that housing market dysfunction both responds to and drives population loss, constituting another loop arm.
- **Employment Module:** Testing whether labor market depth and wage trajectories in Tier 1 counties are declining in ways that predict both school enrollment and housing demand. The hypothesis is that employment is the anchor sector — that school quality and housing affordability ultimately track labor market conditions rather than the reverse.

The synthesis across all four modules will enable a unified vulnerability map, a quantified estimate of the cost of siloed vs. coordinated policy, and a set of evidence-based recommendations for Oregon's rural investment strategy that can inform legislative appropriations, federal grant applications, and community-level planning processes.

Appendix A: Full Regression Tables

H1: Tier Effects on Outcomes (Cluster-Robust OLS)

Reference category: Tier 3 (least fragile). Controls: urbanization category + linear year trend. Standard errors clustered at district level.

Outcome	Tier 1 β	Tier 2 β	Year trend β	p (Tier 1)	R ²	N
On-Time Graduation	+0.46 pp	(ref)	-0.01	0.944	—	659
Regular Attenders	+8.00 pp	(ref)	-0.52	< 0.001	—	484
On-Track to Graduate	-0.70 pp	(ref)	+0.10	0.838	—	545
Grade 3 ELA	+9.55 pp	(ref)	-1.20	0.044	—	447
Grade 8 Math	+10.29 pp	(ref)	-1.90	0.009	—	420

H2: PPE Effects on Outcomes (Cluster-Robust OLS)

M1 = bivariate; M2 = PPE + urbanization + year; Rural = rural districts only. Controls as noted.

Outcome	M1 β / \$K	p	M2 β / \$K	p	Rural β / \$K	p (rural)	N
Graduation	+0.088	0.232	+0.122	0.172	+0.189	0.404	659
Attendance	-0.010	0.811	-0.039	0.457	-0.109	0.293	484
On-Track	+0.226	0.157	+0.063	0.695	+0.168	0.569	545
G3 ELA	+0.143	0.450	+0.151	0.428	+0.431	0.023	447
G8 Math	+0.155	0.025	+0.162	0.011	+0.197	0.013	420

H3: Enrollment Slope → Outcome Slope (District-Level OLS)

Dependent variable = annualized outcome slope (pp/yr) per district. Independent variable = enrollment slope (%/yr). Controls: baseline outcome level + urbanization + log(ADM).

Outcome	M1 β	p	M2 β (controlled)	p	Rural β	p (rural)	N
Graduation	-0.009	0.708	-0.043	0.048	-0.004	0.957	167
Attendance	+0.081	< 0.001	+0.077	< 0.001	+0.140	0.002	166
On-Track	+0.066	0.080	+0.091	0.003	+0.294	0.013	149
G3 ELA	-0.117	0.002	-0.070	0.037	-0.121	0.204	153
G8 Math	-0.082	0.018	-0.026	0.386	-0.054	0.250	152

H3: Feedback Loop — Outcome Slope → Enrollment Slope

Dependent variable = enrollment slope (%/yr). Independent variable = outcome slope (pp/yr). Controls: urbanization + log(ADM).

Outcome Predictor	β	p-value	R ²	N	Interpretation
Regular Attenders	+1.025	0.001 **	0.150	166	Attendance loss → further enrollment loss
Grade 3 ELA	-0.490	0.006 **	0.065	153	Worse ELA → enrollment loss
Grade 8 Math	-0.455	0.017 *	0.054	152	Worse math → enrollment loss
On-Time Graduation	-0.047	0.857 (ns)	0.033	167	No feedback signal
On-Track to Graduate	+0.317	0.077 (ns)	0.051	149	No feedback signal

Appendix B: Doom Loop District Classification

Districts classified as "Full Doom Loop" meet all three criteria: enrollment slope < -1%/yr AND ≥2 outcome slopes negative AND PPE slope > 0. Sorted by enrollment slope (most severe first), top 30 shown.

District	County / Urbanization	Enroll Slope (%/yr)	Total Decline	# Declining Outcomes
Glendale SD 77	Micropolitan	-31.4%	-99.5%	2
Mitchell SD 55	Rural	-14.3%	-32.5%	3
Joseph SD 6	Rural	-5.8%	-15.1%	3
Jewell SD 8	Micropolitan	-5.1%	-28.7%	2
Colton SD 53	Metro	-4.7%	-20.7%	5
McKenzie SD 68	Metro	-4.4%	-17.9%	3
John Day SD 3 ★	Rural (Grant Co.)	-4.4%	-16.4%	3
Gladstone SD 115	Metro	-4.4%	-18.4%	3
Gervais SD 1	Metro	-4.0%	-11.1%	2
Knappa SD 4	Micropolitan	-3.9%	-15.9%	4
Newberg SD 29J	Metro	-3.9%	-16.5%	2
Paisley SD 11	Rural	-3.7%	-21.7%	4
Dayton SD 8	Metro	-3.7%	-14.0%	5
Central Linn SD 552	Metro	-3.6%	-15.5%	3
Jefferson SD 14J	Metro	-3.3%	-14.2%	5
Central Curry SD 1	Rural	-3.3%	-15.1%	4
Brookings-Harbor SD 17C	Rural	-3.2%	-15.2%	5
Phoenix-Talent SD 4	Metro	-3.2%	-13.5%	3
Harney County SD 3	Rural	-3.1%	-14.9%	5
Reynolds SD 7	Metro	-3.1%	-11.6%	4
Portland SD 1J	Metro	-2.3%	-9.5%	4
Salem-Keizer SD 24J	Metro	-1.8%	-8.0%	4
Beaverton SD 48J	Metro	-1.8%	-8.4%	3
Hillsboro SD 1J	Metro	-1.7%	-7.5%	3
Eugene SD 4J	Metro	-1.4%	-6.5%	4
Medford SD 549C	Metro	-1.8%	-8.2%	4
Bend-LaPine SD 1	Metro	-1.8%	-8.6%	3
Corvallis SD 509J	Metro	-1.8%	-8.7%	4
Greater Albany SD 8J	Metro	-1.1%	-5.5%	5
Tigard-Tualatin SD 23J	Metro	-2.1%	-9.5%	4

★ John Day SD 3 is highlighted as the illustrative case study throughout this report.

Appendix C: Methodological Notes

Cluster-Robust Standard Errors

ICC analysis prior to H1 regression confirmed that observations from the same district are substantially correlated (district-level ICC: 37–56% across outcomes), violating the independence assumption of standard OLS. Cluster-robust standard errors (HC3 estimator, clustering at the district level) were used throughout to produce valid inference. Standard errors clustered at the county or tier level would be anticonservative given the high within-district correlation.

PPE Variable Construction

The per-pupil expenditure variable (`local_ppe_physical_schools`) reflects local funds expenditure per student in physical (non-virtual) schools. Dollar signs and commas were stripped before conversion to numeric. Observations with $PPE < \$0$ or $PPE > \$150,000$ were treated as data errors and excluded. The resulting distribution is right-skewed due to small-enrollment rural districts; $\log(PPE)$ was used in the log specification (M3) for H2.

Outcome Variable Construction

Outcome variables are reported as percentages in the ODE dataset (e.g., "72.5%"). Percentage signs were stripped and values converted to float before analysis. Values of 0% and 100% were retained as valid data points. Districts with fewer than 10 students in a tested subgroup are suppressed in the ODE data and appear as missing; no imputation was performed.

Enrollment Slope Estimation

Per-district enrollment slopes were estimated via ordinary least squares regressing ADM on school year (2017–2024, integer). Districts with fewer than three non-missing ADM observations were excluded from the longitudinal analysis. The slope is expressed as a percentage of baseline ADM to facilitate cross-district comparisons. Glendale SD 77's extreme slope ($-31.4\%/yr$) reflects a near-complete enrollment collapse and was retained in the analysis as a valid data point.

Doom Loop Classification

The three-condition doom loop classification was designed to be conservative: all three conditions must be met simultaneously. Outcome slope negativity requires at least two of five outcomes showing declining trajectories; requiring all five would have produced very few qualifying districts and missed the systemic pattern. PPE slope positivity (cost escalation) was included as the third condition to distinguish active cost-spreading dynamics from districts that have already contracted and stabilized at low cost levels.

Oregon Rural Institutional Viability Study — Education Module

Catalyst Public Policy Advisors | John Day, Oregon | May 2026

Data: Oregon Department of Education | NCES Common Core of Data | US Census Bureau ACS