Medicaid GME Spending and Residency Growth

Georgia Higher Education Healthcare Initiative

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1 Methods

Medicaid GME is an optional state funding mechanism, distinct from Medicare DGME, through which states choose to support residency training costs and draw federal matching funds at their standard FMAP rate. States implement these payments through either a State Plan Amendment for fee-for-service Medicaid or a State Directed Payment arrangement for managed care programs, both of which require CMS approval and operate within federal managed care rules (Centers for Medicare & Medicaid Services 2026b, 2016). There is no federal floor or formula governing spending levels, which is why variation across states is substantial. Medicaid GME is used by a large majority of states, though not by all of them (Henderson 2022).

This analysis draws on a state-level panel assembled from four editions of the AAMC *Medicaid Graduate Medical Education Payments: A 50-State Survey* and four corresponding *ACGME Data Resource Book* volumes, covering data years 2012, 2015, 2018, and 2022 (Henderson 2013, 2016, 2019, 2022; Accreditation Council for Graduate Medical Education 2013, 2016, 2019, 2023). Washington state was excluded because of non-reporting in two survey years, yielding a balanced panel of 49 states and 196 observations. Residency density is defined here as active residents per 100,000 population. Medicaid GME spending is also expressed per 100,000 population so that the variables remain comparable across states of different sizes and are measured in consistent units throughout the regression.

1.1 Why a panel design

A simple cross-sectional comparison of states would be misleading. States differ in ways that have nothing to do with GME policy, including hospital infrastructure, academic medical center density, and baseline physician supply. By tracking the same 49 states across four periods and applying state fixed effects, each state serves as its own control. In plain terms, a fixed effects model asks whether a state has more residents when its own Medicaid GME spending rises above its usual level, rather than comparing one state directly with another. The coefficient on GME spending therefore reflects only within-state variation over time, which provides a cleaner test than any cross-state comparison.

1.2 Model specifications

We estimate three core specifications. A pooled ordinary least squares model provides a baseline comparison with prior cross-sectional work. In this setting, pooled OLS treats all state-year observations as one combined sample and does not control for stable differences across states. Entity fixed effects models for the full panel and the lower Medicare-cap-density subgroup add state-level intercepts, isolating within-state variation and controlling for all time-invariant state characteristics. The preferred specification is the lagged entity fixed effects model for the full panel. It lags GME spending by one survey wave, a gap of three to four years, so that investment at time t predicts residency density at time $t + 1$. It is referred to as the main model because it provides the clearest timing-based test in the paper.

The lagged specification is preferred because it establishes temporal ordering and maps onto the residency accreditation pipeline. New residency programs require ACGME institutional sponsorship, application preparation, specialty review committee evaluation, and initial accreditation before a program can recruit its first class through the Match, a process the ACGME documents in its guidance and related materials (Accreditation Council for Graduate Medical Education 2025, 2026). A three-to-four-year survey interval therefore captures this pipeline. Critically, the lagged effect only became statistically detectable after the 2018 survey wave was added to the panel. With only the 2012, 2015, and 2022 endpoints, the lag structure lacked sufficient within-state variation to identify the effect. The 2018 midpoint provided the

intermediate observation necessary to separate the pipeline delay from the underlying trend, and its inclusion is what allows the lagged entity fixed effects model for the full panel to serve as the main model.

Two-way fixed effects models add year fixed effects to control for national shocks common to all states. This specification does not reach conventional significance, which we attribute to limited statistical power with four time periods rather than to the absence of an effect. The lagged specification, which breaks synchronization between state GME movements and national trends, remains robust.

1.3 Medicare cap classification

Medicare's DGME cap, largely frozen since 1996, limits federal reimbursement for residents trained above a hospital's historical ceiling (Centers for Medicare & Medicaid Services 2026a; U.S. Congress 1997, 2010). The cap operates at the hospital level. By 2018, 70 percent of hospitals were already training more residents than Medicare funded, which means many hospitals had exhausted their Medicare-funded ceiling and were relying on other funding sources, including Medicaid GME, to support additional training (U.S. Government Accountability Office 2021). Where Medicaid GME can translate into new residency slots therefore depends in part on whether the surrounding Medicare cap environment leaves room for growth.

To capture those structural differences, I construct a state-level measure of Medicare GME cap density using hospital-level DGME cap data from Graham et al. (2022), aggregated to the state level and expressed per 100,000 population (Robert Graham Center 2022). Medicare cap density is defined here as DGME cap positions per 100,000 population. States in the bottom two-thirds of the distribution are referred to as lower Medicare-cap-density states, while states in the top tercile are referred to as higher Medicare-cap-density states. This is a constructed measure rather than a standard state-level classification. Even so, the higher-density group maps closely onto states widely recognized as having especially dense medical education infrastructure, including New York, Massachusetts, Pennsylvania, Ohio, Illinois, Michigan, New Jersey, Connecticut, Minnesota, and Maryland. The classification therefore has reasonable face validity, even if the tercile threshold is necessarily somewhat arbitrary.

The rationale for this subgroup analysis is mechanical. In lower Medicare-cap-density states, where Medicare-funded slots are sparser relative to population, Medicaid GME investment may be more likely to support new residency positions that would not otherwise be funded. In higher Medicare-cap-density states, existing Medicare infrastructure is already denser, which may reduce the marginal role of Medicaid GME in expanding capacity. Supporting evidence for this mechanism comes from McNamara and Hussain (2025), who found that ACA-era Medicare cap increases at the hospital level produced near one-to-one increases in residency program size, confirming that funding capacity can translate directly into training slots when structural room exists (McNamara and Hussain 2025).

The GME-residency relationship is tested separately in lower Medicare-cap-density states alongside the full panel to assess whether the relationship remains present where slot growth may be more feasible. This subgroup analysis is intended as a mechanism check, not as proof that the Medicaid GME effect is larger there than elsewhere.

1.4 Limitations

Four survey time points make for a thin panel. Consistency across specifications argues against any single year or state driving the finding, but the limited number of periods should still be kept in mind. Medicare cap classifications are drawn from 2022 data and applied retrospectively, introducing some measurement error for earlier years that we do not expect to be material (Robert Graham Center 2022; U.S. Congress 1997, 2010). Broader questions about slot capacity by state, accountability timing and effectiveness, or extension to a longer panel are best treated as follow-on projects rather than resolved within this paper.

2 Results

2.1 Contemporaneous spending and residency density

Across specifications, Medicaid GME spending is positively associated with residency density. In the pooled OLS baseline, which does not control for between-state differences, the association is positive and highly significant (beta = 3.66, $p < 0.001$). However, pooled OLS conflates within-state changes with cross-sectional differences between states that spend more on GME for unrelated reasons, which likely inflates the estimate. The entity fixed effects model addresses this by identifying only within-state variation.

Table 1: Contemporaneous models for the full panel.

Model	N	Beta	95% CI	p
Pooled OLS, full panel	196	3.66	[1.77, 5.56]	<0.001
Entity fixed effects, full panel	196	2.02	[0.99, 3.05]	<0.001

Controlling for time-invariant state characteristics, the GME coefficient remains positive, statistically significant, and precisely estimated. When a state's Medicaid GME spending rises by $1 million per 100,000 population above its own historical average, its residency density increases by about 2 additional residents per 100,000 population in the same period. The reduction in magnitude from pooled OLS to entity fixed effects is expected and indicates that the fixed effects estimator is removing between-state confounding rather than amplifying it.

2.2 The lagged effect and accreditation pipeline

The main model tests whether GME spending in the prior survey period predicts residency density in the current period, a gap of three to four years. Consistent with the accreditation pipeline described in the methods section, the lagged effect is positive, significant, and stable in magnitude across both the full panel and the lower Medicare-cap-density subgroup.

Table 2: Lagged models in the full panel and lower Medicare-cap-density subgroup.

Model	N	Beta	95% CI	p
Lagged entity fixed effects, full panel	147	1.87	[1.00, 2.74]	<0.001
Lagged entity fixed effects, lower Medicare-cap-density states	96	1.59	[0.81, 2.36]	<0.001

Two features of these results are worth noting. First, the lagged beta of 1.87 is close to the contemporaneous entity fixed effects estimate of 2.02, suggesting that the relationship is not an artifact of timing but reflects a durable within-state association across both the same period and the subsequent period. Second, when contemporaneous and lagged GME are included together, both terms remain significant (beta = 1.55, $p = 0.012$ and beta = 0.87, $p = 0.034$, respectively), and this also holds in the lower Medicare-cap-density subgroup (beta = 1.05, $p = 0.024$ and beta = 0.93, $p = 0.007$). GME spending therefore predicts residency density at multiple time horizons, which is consistent with a pipeline process operating over variable accreditation timelines.

2.3 National trends and the two-way fixed effects result

Adding year fixed effects to account for shocks common to all states, such as national policy changes, macroeconomic cycles, and federal GME policy developments, reduces the estimated GME coefficient to 0.23 and eliminates statistical significance ($p = 0.426$). This should not be read as evidence that no underlying relationship exists between Medicaid GME spending and residency growth. A more plausible interpretation is that the structure of the panel leaves limited identifying variation once common national movement is absorbed.

Over 2012 to 2022, several national developments may have contributed to common upward movement in both funding and training capacity across states. These include ACA-era Medicare residency slot redistribution under Section 5503 and later federal GME expansions, including additional Medicare-supported positions created in subsequent legislation. Once year fixed effects absorb that shared movement, identification relies only on state-level deviations from the national trend. With only four time periods, that remaining variation is limited, which reduces precision in the two-way fixed effects specification. The lagged specification, however, remains statistically significant, suggesting that the underlying relationship is still

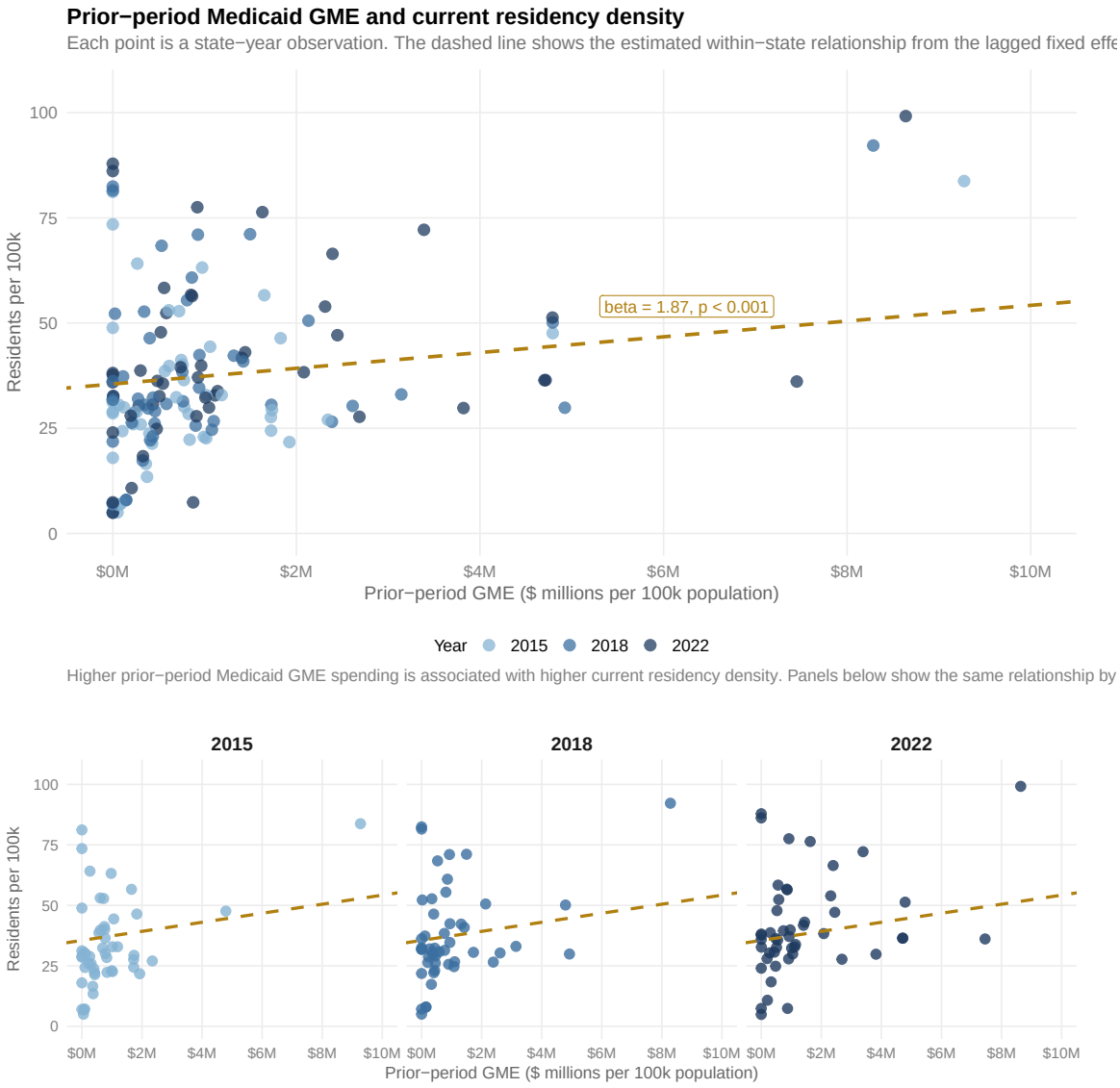

Figure 1: Prior-period Medicaid GME and current residency density. The top panel shows the full lagged relationship, and the lower panels separate the same relationship by survey year.

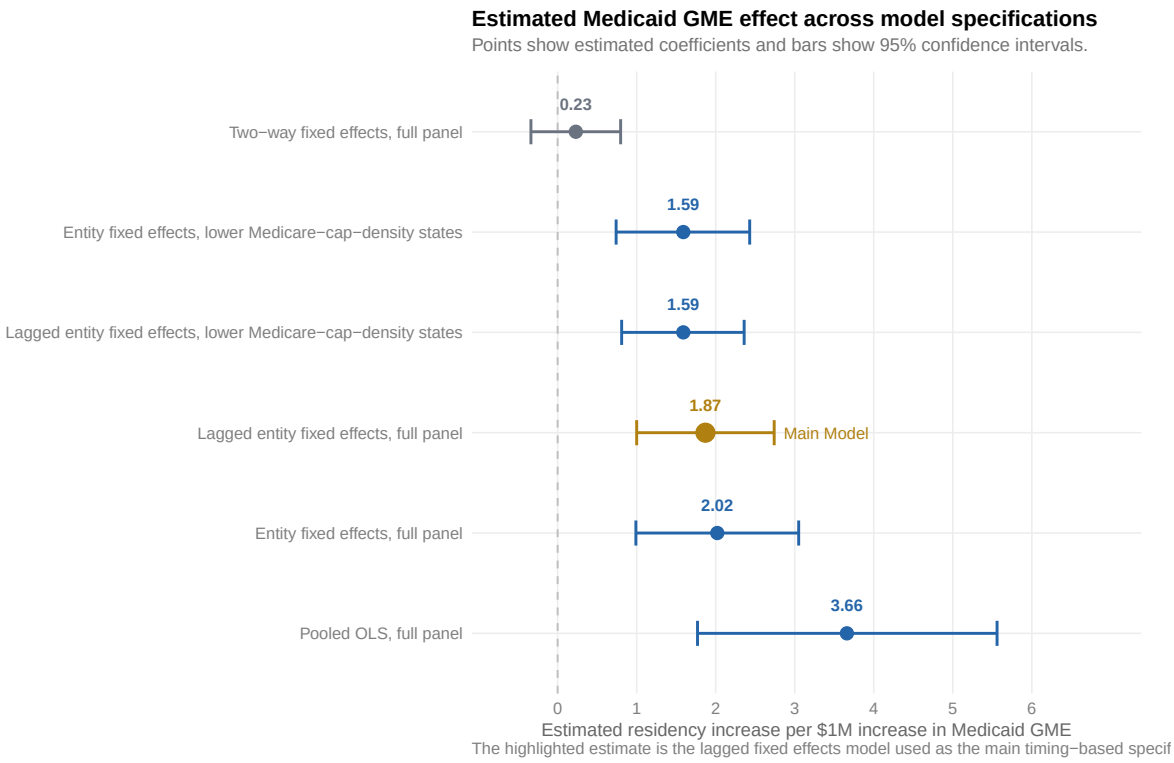

Figure 2: Estimated Medicaid GME effect across model specifications. The highlighted estimate is the lagged fixed effects model used as the main timing-based specification.

present but more difficult to isolate when common national co-movement is controlled for contemporaneously.

2.4 Mechanism check: lower Medicare-cap-density states

The final test is mechanistic. If Medicaid GME supports residency growth by helping finance additional training positions, the relationship should be observable in states with greater apparent room for expansion under the Medicare cap environment. To examine that possibility, the model is estimated separately for lower Medicare-cap-density states, defined here as those in the bottom two-thirds of Medicare cap density per population.

Table 3: Models for lower Medicare-cap-density states.

Model	N	Beta	95% CI	p
Entity fixed effects, lower Medicare-cap-density states	128	1.59	[0.74, 2.43]	<0.001
Lagged entity fixed effects, lower Medicare-cap-density states	96	1.59	[0.81, 2.36]	<0.001

In this subgroup, the Medicaid GME coefficient remains positive and statistically significant in both the contemporaneous and lagged specifications. The similarity of the estimates across the two models is notable. The relationship is essentially unchanged whether GME is measured in the same period or with a three-to-four-year lag. This pattern is consistent with a durable within-state association in the set of states where additional slot growth may be more feasible.

At the same time, these results should not be overstated. They show that the relationship is present in lower Medicare-cap-density states, but they do not by themselves establish that the effect is larger there than in higher Medicare-cap-density states. The subgroup analysis therefore functions best as a mechanism-consistency check rather than as evidence that Medicaid GME produces proportionately greater per-dollar gains in that subgroup.

3 Conclusion

Medicaid GME spending is associated with higher residency density within states that increase investment, both in the same period and in the period that follows. The relationship remains after removing between-state confounding through fixed effects and is also present in the lower Medicare-cap-density subgroup used as a mechanism check. Taken together, the results support a stable within-state association between Medicaid GME investment and residency growth.

To translate the estimates into practical terms, consider a state of approximately 10 million people, comparable in size to Georgia or North Carolina. A $100 million Medicaid GME program, with $40 million contributed by the state and $60 million matched by the federal government at the national average FMAP rate, is associated with the addition of about 187 to 202 new residents to the training pipeline. That range reflects the low and high ends of the main model's coefficient estimate.

Those residents train for an average of 4.5 years at a salary of approximately $65,557, contributing roughly $5,700 per year each in federal income tax during training. Under 2026 federal payroll tax rules, a resident earning $65,557 also generates approximately $10,030 in annual payroll tax receipts, including both employee-side and employer-side payroll taxes. Upon completing residency, physicians in this illustration earn an average salary of approximately $386,000, generating approximately $100,000 per year in federal income tax and about $35,746 in annual payroll tax receipts, again including both employee-side and employer-side payroll taxes. The income tax figures used here are author calculations, while the payroll tax figures reflect 2026 IRS payroll tax rules (Panacea Financial 2025; Medscape 2026; Internal Revenue Service 2025).

The direct federal return on investment, under conservative assumptions, is as follows:

Table 4: Illustrative direct federal fiscal return from a $100 million Medicaid GME program, including income and payroll taxes.

Phase	Detail	Direct federal tax generated
Residency (4.5 years)	195 residents × ($5,700 income tax + $10,030 payroll tax) × 4.5 years	~$13.8M
Practice (ongoing)	195 physicians × ($100,000 income tax + $35,746 payroll tax)	~$26.5M/year

Federal investment to recover: $60 million. Recovered during residency: about $13.8 million. Remaining after residency: about $46.2 million. Recovered through direct federal tax receipts associated with the cohort, including income and payroll taxes, in about 1.7 years after the cohort enters independent practice, or about 6.3 years from the original investment once residency duration is included. Physicians who complete additional fellowship training enter practice later, but subspecialist salaries are typically higher, which partially offsets the delayed recovery timeline.

Even this expanded direct federal tax estimate remains conservative. It does not include broader economic spillovers associated with physician practice. The AMA's 2018 national economic impact study, based on 2015 underlying data, estimates that each practicing physician supports about 17.1 jobs, $3.2 million in annual economic output, $1.4 million in annual wages

and benefits, and $126,129 in annual state and local tax revenue (American Medical Association 2018). Applied to the 187 to 202 additional residents associated with the illustrative $100 million Medicaid GME program in a state of 10 million people, that implies roughly 3,200 to 3,450 jobs supported, about $598 million to $646 million in annual economic output, about $262 million to $283 million in annual wages and benefits, and about $23.6 million to $25.5 million in annual state and local tax revenue once that cohort enters practice. Because the AMA figures are based on 2015 data, they are used here as a conservative reference point and likely understate the present-day nominal economic footprint associated with each practicing physician. These broader effects are not included in the direct federal payback calculation presented here. The fiscal illustration should therefore be understood as a lower-bound estimate of public return rather than a full accounting of the economic and workforce effects associated with increased physician supply.

The healthcare implications are also meaningful. Using CDC office-based visit data, the additional 187 to 202 physicians associated with the illustrative Medicaid GME investment would imply roughly 580,000 to 626,000 additional office visits annually once that cohort enters practice (Centers for Disease Control and Prevention 2026, 2022). If current national distribution patterns hold, about 11 percent of that cohort, or roughly 21 to 22 physicians, would be expected to practice in rural areas, implying about 64,000 to 69,000 additional rural office visits annually (Association of American Medical Colleges 2024). Because these figures are based on average office-based physician visits, they should be understood as illustrative care-capacity estimates rather than precise forecasts.

The results therefore suggest that financing can matter. At the same time, they raise a separate design question about whether Medicaid is the most effective federal vehicle for expanding physician training. From the state perspective, the practical appeal of Medicaid GME is often the FMAP match rather than Medicaid itself as a workforce policy tool. Medicaid offers an established mechanism through which state spending can draw additional federal dollars, which makes it fiscally attractive for states seeking to support residency training. From the federal perspective, however, that same structure raises an accountability problem. Federal matching dollars can flow with limited uniform requirements governing whether funds support net new slots, which specialties benefit, how hospitals deploy the money, or what training outcomes are produced. That means substantial public spending may occur without correspondingly strong evidence of what the spending buys.

A more disciplined federal approach would preserve support for physician training while attaching clearer conditions to public dollars. That could include stronger reporting requirements, clearer documentation of training activity, and a closer link between funding and measurable outputs such as net new positions, specialty mix, or service in shortage areas. The core finding of this paper is not that public GME financing fails. It is that financing appears capable of expanding training capacity, but the current Medicaid structure may be a weak federal instrument because it buys too little accountability per dollar.

Financing is also only part of the supply equation. Even where funding is available, accreditation and program approval processes determine how quickly new training capacity can come

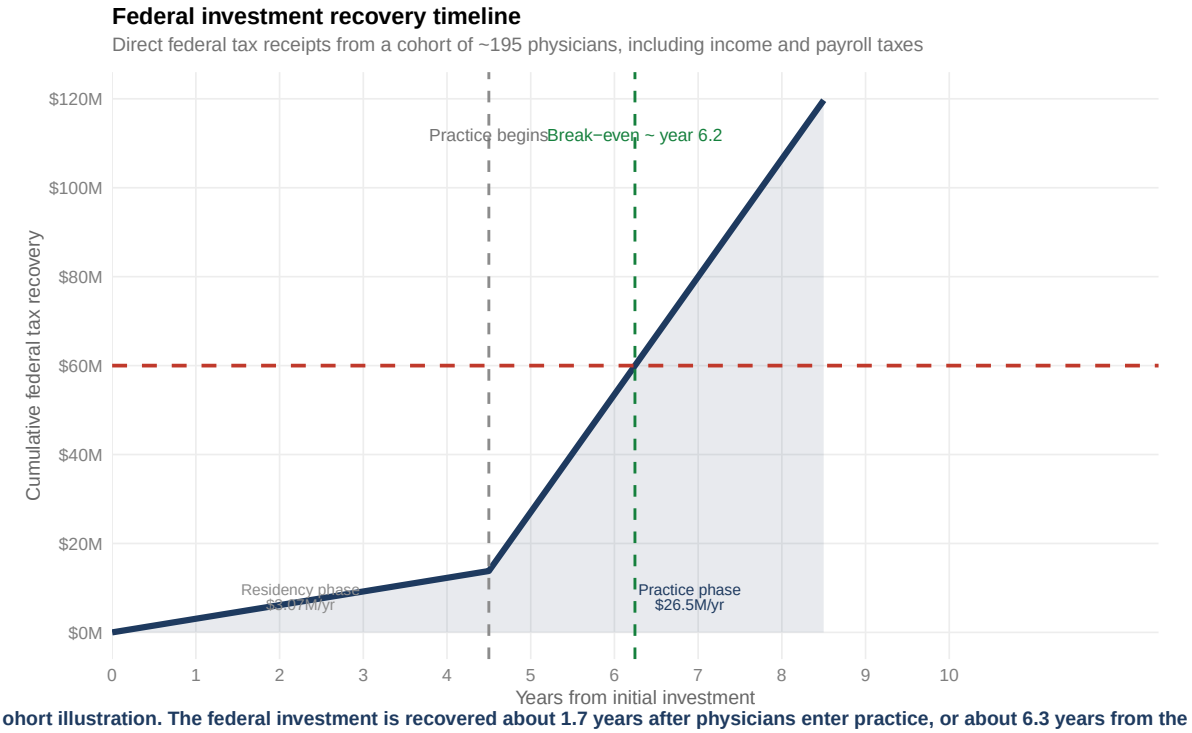

Figure 3: Illustrative federal investment recovery timeline for a single cohort. This chart includes direct federal income and payroll tax receipts associated with physician training and employment.

online. Public investment may be necessary to expand residency supply, but its effects are likely to be smaller and slower if approval pathways remain rigid or slow to respond. In that sense, financing reform and accreditation reform should be understood as complementary rather than competing strategies. A physician workforce policy that addresses funding without addressing institutional bottlenecks will leave part of the potential supply response unrealized.

One question raised by these results is whether Medicaid GME dollars are being deployed as efficiently as they could be. The funding flows to hospitals with limited federal requirements governing how it is directed, including which specialties are supported, which programs receive funding, and what outcomes are reported (Centers for Medicare & Medicaid Services 2026b, 2016). A related question, which this analysis does not test directly, is whether states that impose stronger reporting, auditing, or workforce-outcome requirements on Medicaid GME payments achieve better training outcomes per dollar spent. The available survey evidence suggests that accountability structures vary substantially across states, making this a useful question for future research. That is not a question this paper can fully answer, but it is the next one policymakers should ask.

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