The Phantom Correction: EU Interest Limitation and the Persistence of Aggregate Debt Bias

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Abstract

Corporate tax systems worldwide create a debt bias by allowing interest deductions but not equity returns. The EU's Anti-Tax Avoidance Directive (ATAD I), effective 2019, coordinated the largest reform of interest deductibility in history—capping deductions at 30% of EBITDA across 27 member states. I exploit cross-country variation in de minimis thresholds and staggered adoption by derogation countries to estimate the aggregate effect on corporate financing structure. Using Eurostat sector accounts data for 27 countries over 2012–2023, I find precisely estimated null effects: the interest-to-operating-surplus ratio, debt composition, and leverage are statistically indistinguishable from pre-ATAD trends. The design can rule out effects larger than 5 percentage points on the interest burden. The null survives wild cluster bootstrap, leave-one-out, and a derogation-country placebo. ATAD appears not to have corrected the aggregate debt bias.

JEL Codes: H25, G32, F36, H26

Keywords: interest deductibility, debt bias, ATAD, corporate taxation, difference-in-differences

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1. Introduction

Every major corporate tax system in the world subsidizes debt. Interest payments reduce taxable income; equity returns do not. This asymmetry—the "debt bias"—is among the most studied distortions in public finance, with a theoretical literature stretching from Modigliani and Miller (1963) through Myers (1977) to Desai et al. (2004). The empirical evidence is equally consistent: firms respond to interest deductibility by increasing leverage (Graham, 2000; Blouin et al., 2014; Buettner et al., 2012; De Mooij and Keen, 2012), and the resulting fragility imposes real costs during financial crises (Schepens, 2016; Kalemli-Özcan et al., 2021).

Policymakers have tried to limit this distortion for decades, but always unilaterally—and multinational firms can simply shift debt to jurisdictions with generous deductions (Desai et al., 2004; Huizinga et al., 2008). In July 2016, the European Union broke this pattern. Council Directive 2016/1164, the Anti-Tax Avoidance Directive (ATAD I), required all 27 member states to cap deductible net borrowing costs at 30% of EBITDA, effective January 2019. It was the first coordinated cross-border attack on the debt bias. If limiting interest deductibility works, it should work here.

This paper asks whether it did. Specifically, I test whether ATAD shifted the aggregate financing structure of non-financial corporations—not at the firm level, where prior work concentrates, but at the level of entire economies. The distinction matters. Firm-level studies using commercial databases like Orbis (Blouin et al., 2014; Buettner et al., 2012) can identify corporate responses to tax incentives, but they miss general equilibrium effects: substitution between domestic and cross-border debt, reallocation of lending across sectors, and changes in the aggregate debt-to-equity mix that determine macroeconomic fragility.

I exploit two sources of variation within ATAD's coordinated framework. First, member states chose different de minimis thresholds—the level of net interest below which the cap does not apply—ranging from zero (€0) in Italy, Latvia, and Slovakia to €5 million in Sweden. Lower thresholds mean more firms face binding constraints, creating dose variation in treatment intensity. Second, six countries (France, Greece, Ireland, Slovakia, Slovenia, and Spain) received derogations allowing them to delay adoption until 2022–2024, providing a staggered-adoption control group.

Using Eurostat Annual Sector Accounts data for 27 EU countries over 2012–2023, I estimate dose-response difference-in-differences models with country and year fixed effects. The primary outcome is the ratio of interest paid to gross operating surplus (a proxy for the EBITDA-based constraint), with debt composition and leverage as secondary outcomes. Standard errors are clustered at the country level.

The central finding is a well-powered null. The dose-response coefficient on the interest-to-operating-surplus ratio is -0.005 (SE $= 0.018$), economically small and statistically insignificant. The binary adoption indicator yields a similarly precise zero: -0.010 (SE $=$ 0.010). Debt securities' share of total liabilities and the leverage ratio are equally unresponsive. An event study using staggered adoption timing shows clean pre-trends and flat post-treatment trajectories. The derogation-country placebo correctly finds no spurious 2019 effect. Wild cluster bootstrap with 9,999 Webb weight iterations confirms the null ($p = 0.46$). Leave-one-out analysis shows no single country drives the result, and excluding 2020 does not change the estimate.

The minimum detectable effect at 80% power is 5.1 percentage points of the interest-to-operating-surplus ratio, or roughly half of its pre-treatment standard deviation. This means the design can rule out large aggregate effects—a halving of the interest burden, for instance—but not marginal adjustments of 1–2 percentage points. This is an inherent limitation of country-level panels. The null should be read as "no large aggregate correction" rather than "no effect at all."

This paper contributes to three literatures. First, it adds to the empirical study of interest deductibility and corporate capital structure (Graham, 2000; Blouin et al., 2014; Buettner et al., 2012; De Mooij and Keen, 2012; Schepens, 2016). The existing evidence overwhelmingly uses firm-level data requiring commercial access (Orbis, Amadeus); to my knowledge, this is the first paper to test whether aggregate national financing structure responds to coordinated deductibility reform. Second, it contributes to the evaluation of the ATAD itself, joining recent firm-level work by Clifford (2021) and Gündert and Overesch (2023) with an aggregate perspective that captures economy-wide substitution patterns those studies cannot observe. Third, it speaks to the broader debate about whether tax coordination "works" at the macro level (Keen and King, 2006; Devereux and Griffith, 2008), providing evidence that even the most comprehensive reform to date may leave the aggregate debt bias unchanged.

The null is important. If ATAD—27 countries, simultaneously, with enforcement—cannot move the aggregate needle, the implication is stark: the debt bias may be more deeply entrenched than firm-level responses suggest. Firms restructure within the rules—through intra-group lending, cross-border substitution, or exploiting the generous de minimis thresholds—leaving the economy-wide debt-equity mix unchanged. The "phantom correction" is a policy that changes firm behavior without changing the macroeconomic outcome it was designed to fix.

The remainder of the paper proceeds as follows. Section 2 describes the ATAD institutional setting and implementation variation. Section 3 presents the data. Section 4 details the empirical strategy. Section 5 reports results. Section 6 discusses implications.

2. Institutional Background

The debt bias problem. Corporate income tax systems allow firms to deduct interest payments from taxable income but provide no equivalent deduction for the cost of equity capital. This asymmetry creates a tax incentive to finance investment with debt rather than equity—the "debt bias." The theoretical implications are well understood: holding all else equal, the corporate tax rate creates a wedge that favors debt financing by τ_c per euro of interest paid, where τ_c is the statutory corporate tax rate (Modigliani and Miller, 1963; Myers, 1977). In the EU, with average statutory corporate tax rates around 22% in 2018, this amounts to a substantial subsidy.

Prior unilateral reforms. Several countries attempted to address the debt bias unilaterally before ATAD. Germany introduced a 30% EBITDA-based interest barrier (*Zinsschranke*) in 2008. Italy adopted thin-capitalization rules in 2004, later replaced by an EBITDA-based cap. The Netherlands, Belgium, and others implemented various earnings-stripping or thin-cap rules (Buettner et al., 2012; De Mooij and Keen, 2012). However, unilateral action is vulnerable to profit shifting: multinationals can locate debt in high-deduction jurisdictions while booking equity in low-deduction ones (Desai et al., 2004; Huizinga et al., 2008).

ATAD I: coordinated reform. In July 2016, the EU Council adopted Directive 2016/1164, requiring all member states to limit deductible net borrowing costs to 30% of EBITDA. The key innovation was coordination: by harmonizing the cap across 27 countries simultaneously, ATAD aimed to close the profit-shifting channel that undermined unilateral efforts.

However, the directive granted member states discretion over two critical parameters. First, the *de minimis threshold*: countries could exempt firms whose net borrowing costs fell below a chosen floor. In practice, 18 countries set this at €3 million (the directive's safe harbor), five countries set it at €1 million or below (Italy, Latvia, Slovakia at zero; the Netherlands and Portugal at €1 million; Romania and Slovenia at €1 million), and Sweden set it at approximately €5 million. Second, three countries (Finland, the Netherlands, and Slovakia) chose stricter EBITDA caps of 20–25% rather than the standard 30%.

Staggered adoption. Most member states transposed ATAD by January 2019. Six countries received derogations: France, Greece, Slovakia, Slovenia, and Spain delayed until January 2024, and Ireland until January 2022. These derogation countries provide a natural placebo: they should show no ATAD effect in 2019–2021.

3. Data

I use three Eurostat datasets covering the non-financial corporate sector (institutional sector S11) across all 27 EU member states from 2012 to 2023.

Financial balance sheets. The Annual Sector Accounts financial balance sheet dataset (`nasa_10_f_bs`) provides end-of-year stocks of debt securities (F3), loans (F4), and equity (F5) as liabilities, in millions of national currency. These distinguish between bond-market and bank financing and allow construction of leverage ratios.

Non-financial transactions. The sector accounts transaction dataset (`nasa_10_nf_tr`) provides flows: interest paid (D41, "uses" side), interest received (D41, "resources" side), and gross operating surplus including mixed income (B2A3G). The ratio of gross interest paid to gross operating surplus is the primary outcome, serving as a macro-level proxy for the firm-level interest-to-EBITDA ratio. Since ATAD constrains *net* borrowing costs (interest paid minus interest received), I also construct a net interest-to-operating-surplus ratio as a robustness outcome.

Macroeconomic controls. I supplement the sector accounts with real GDP growth (chain-linked volumes, percentage change from `nama_10_gdp`) and HICP inflation (annual average rate of change from `prc_hicp_aind`).

ATAD implementation details. Treatment coding is based on the directive text (Council Directive 2016/1164) and implementation surveys from KPMG and EY. I code three treatment dimensions: de minimis threshold (€0 to €5M), EBITDA cap percentage (20–30%), and year of effective adoption (2019, 2022, or 2024).

The final panel contains 647 country-year observations (27 countries $\times$ 12 years, with one missing interest observation). The panel is strongly balanced.

Table 1 reports summary statistics. The average interest-to-operating-surplus ratio was 11.0% in the pre-ATAD period (2012–2018), declining to 8.9% post-ATAD (2019–2023). This raw decline partly reflects the low-interest-rate environment of 2019–2021 and is absorbed by year fixed effects in the regression analysis. The debt securities share averaged 7.5% of total debt, with a cross-country standard deviation of 5.3 percentage points, reflecting substantial heterogeneity between bond-market-oriented economies (e.g., France, the Netherlands) and bank-dependent ones (e.g., the Baltics, Central Europe).

Table 1: Summary Statistics: Non-Financial Corporations (S11), 2012–2023

	Pre-ATAD (2012–2018)			Post-ATAD (2019–2023)		
	Mean	SD	N	Mean	SD	N
Panel A: Key Ratios						
Interest/GOS ratio	10.95	10.61	378	8.92	8.63	268
Debt securities share (%)	7.47	5.33	378	7.51	4.62	269
Leverage ratio	0.75	0.25	378	0.64	0.30	269
Panel B: Levels (€ millions, national currency)						
Interest paid	43,024	136,988	378	66,914	264,247	268
Gross operating surplus	504,471	1,566,146	378	756,303	2,472,305	268
Panel C: Macroeconomic Controls						
Real GDP growth (%)	2.32	3.13	378	2.19	4.62	269
HICP inflation (%)	1.16	1.29	378	4.56	4.43	269

Notes: Data from Eurostat Annual Sector Accounts for non-financial corporations (S11). Interest/GOS ratio is interest paid (D41) divided by gross operating surplus and mixed income (B2A3G). Debt securities share is F3 liabilities as a fraction of total debt (F3+F4). Leverage is total debt (F3+F4) over equity (F5). All financial data in millions of national currency. 27 EU member states, balanced panel. Pre-ATAD period: 2012–2018. Post-ATAD period: 2019–2023.

4. Empirical Strategy

4.1 Identification

I exploit two sources of within-ATAD variation. The primary specification uses a dose-response design based on de minimis thresholds. Countries with lower thresholds expose more firms to the binding constraint, generating cross-sectional variation in treatment intensity. I define dose as $(5 - d_c)/5$, where d_c is the de minimis threshold in millions of euros, so that dose ranges from 0 (Sweden, €5M) to 1 (Italy, Latvia, Slovakia, €0). The secondary specification exploits staggered adoption: 21 countries adopted in 2019, Ireland in 2022, and five derogation countries in 2024.

4.2 Estimation

The primary estimating equation is:

$$Y_{ct} = \alpha_c + \gamma_t + \beta \cdot (\text{Adopted}_{ct} \times \text{Dose}_c) + \varepsilon_{ct} \tag{1}$$

where Y_{ct} is the outcome for country c in year t, α_c and γ_t are country and year fixed effects, Adopted_{ct} is an indicator equal to one after country c's ATAD adoption, Dose_c is the

time-invariant treatment intensity, and ε_{ct} is the error term. Standard errors are clustered at the country level (27 clusters).

The coefficient β captures the differential effect of ATAD adoption per unit of dose intensity. Under the identifying assumption that trends in corporate financing ratios would have evolved similarly across dose groups absent ATAD, β estimates the causal effect of more stringent interest limitation rules.

4.3 Threats to validity

The main concern is differential trends correlated with de minimis thresholds. Countries choosing stricter thresholds may have had different pre-existing trends in corporate indebtedness. I address this with an event study that tests for pre-trends and with a derogation-country placebo that directly tests whether the "wrong" countries show effects at the "wrong" time.

With 27 clusters, standard asymptotic cluster-robust inference may over-reject. I supplement standard clustered standard errors with wild cluster bootstrap using 9,999 Webb weight iterations (Cameron et al., 2008; Webb, 2014).

5. Results

5.1 Main Results

Table 2 presents the main estimates. Column 1 reports the simple binary adoption effect on the interest-to-operating-surplus ratio: -0.0102 (SE $= 0.0104$), indicating a statistically insignificant 1 percentage point decline. Column 2 introduces the dose-response interaction: the coefficient is -0.0050 (SE $= 0.0180$), smaller in magnitude and further from significance. Adding GDP growth and inflation controls in Column 3 yields -0.0078 (SE $= 0.0166$), essentially unchanged.

Columns 4 and 5 examine alternative financing outcomes. The debt securities share shows a small positive but insignificant coefficient (0.0093, SE $= 0.0119$), and the leverage ratio shows a negative but imprecise estimate (-0.0415, SE $= 0.1040$). Neither outcome exhibits a statistically detectable response to ATAD adoption.

To contextualize the magnitudes: the point estimate in Column 2 implies that moving from the weakest dose (Sweden, €5M de minimis) to the strongest (Italy, zero de minimis) reduces the interest-to-operating-surplus ratio by 0.5 percentage points. With a pre-treatment mean of 11%, this represents a 4.5% relative decline—economically small even if it were statistically significant.

Table 2: Effect of ATAD Interest Limitation on Corporate Financing

	(1) Interest/ GOS	(2) Interest/ GOS	(3) Interest/ GOS	(4) Debt Sec. Share	(5) Leverage Ratio
Adopted	-0.0102				
	(0.0104)				
Adopted × Dose		-0.0050	-0.0078	0.0093	-0.0416
		(0.0180)	(0.0166)	(0.0119)	(0.1040)
Macro controls	No	No	Yes	No	No
Country FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	646	646	646	647	647
Within R^2	0.004	0.001	0.034	0.006	0.002

Notes: Each column reports a separate regression of the outcome on ATAD adoption, with country and year fixed effects. Column 1 uses a binary indicator for post-adoption. Columns 2–5 interact adoption with dose intensity, defined as (5 − de minimis threshold)/5, where higher values indicate more firms are constrained. Column 3 adds GDP growth and HICP inflation as controls. Standard errors clustered by country in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

5.2 Event Study

Table 3 reports the event-study estimates, with coefficients representing dose-weighted interactions at each event-time lag and lead, normalized to the year before adoption ($t - 1$). For the interest-to-operating-surplus ratio, pre-treatment coefficients at $t - 5$ through $t - 2$ range from -0.012 to $+0.014$, none statistically significant, confirming parallel pre-trends. Post-treatment coefficients at t through $t + 4$ show no systematic departure from zero, consistent with the null DiD result. The debt securities share event study is equally flat both before and after treatment.

5.3 Derogation Placebo

The derogation countries (France, Greece, Ireland, Slovakia, Slovenia, Spain) did not adopt ATAD until 2022–2024. If the research design is valid, these countries should show no spurious effect in 2019–2021, when only the early adopters were treated. Table 4, Panel B confirms this: the placebo coefficient on the interest-to-operating-surplus ratio is 0.0050 (SE = 0.0120), and on the debt securities share is 0.0115 (SE = 0.0101)—both small and insignificant. The design correctly identifies "no treatment" when there is none.

Table 3: Event Study: Dynamic Effects of ATAD Adoption

	Interest/GOS		Debt Securities Share	
Event time	Coeff.	(SE)	Coeff.	(SE)
$t-5$	-0.0121	(0.0229)	0.0004	(0.0164)
$t-4$	0.0052	(0.0195)	-0.0049	(0.0067)
$t-3$	0.0138	(0.0173)	-0.0066	(0.0072)
$t-2$	0.0136	(0.0152)	-0.0023	(0.0038)
$t+0$	0.0123	(0.0152)	0.0073	(0.0127)
$t+1$	0.0100	(0.0262)	0.0035	(0.0071)
$t+2$	0.0217	(0.0224)	-0.0061	(0.0162)
$t+3$	0.0101	(0.0213)	0.0057	(0.0189)
$t+4$	-0.0342	(0.0278)	0.0193	(0.0201)
Reference: $t-1$			—	
Observations	646		647	
Country FE			Yes	
Year FE			Yes	

Notes: Event-study regressions using the full panel of 27 EU countries with staggered ATAD adoption. Event time is relative to each country's adoption year (2019 for 21 early adopters; 2022 for Ireland; 2024 for France, Greece, Slovakia, Slovenia, Spain). Coefficients are interactions of event-time dummies with dose intensity. Reference period is $t-1$ (one year before adoption). Standard errors clustered by country. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

5.4 Robustness

Table 4 consolidates the robustness analysis. Panel A shows the main result is robust to wild cluster bootstrap inference ($p = 0.463$), exclusion of 2020 (coefficient: -0.009, SE $=$ 0.018), and leave-one-out analysis (coefficient range: $[-0.018, 0.005]$ across 27 drops). Only removing Portugal flips the sign of the coefficient, and even then the estimate remains far from significance.

Panel C reports the minimum detectable effect at 80% power and 5% significance: 5.1 percentage points of the interest-to-operating-surplus ratio, or 49% of its pre-treatment standard deviation. The design is well-powered to detect moderate effects but cannot rule out small ones. This is an inherent limitation of country-level panels with 27 units, but it means the null is substantive: ATAD did not produce even a moderate aggregate shift in corporate financing.

6. Discussion

The finding that the largest coordinated reform of interest deductibility in history left no detectable mark on aggregate corporate financing invites three interpretations.

Table 4: Robustness Checks

Specification	Coefficient	SE	p-value
Panel A: Interest/GOS Ratio			
Baseline (Adopted × Dose)	-0.0050	0.0180	0.782
Wild cluster bootstrap	-0.0050	—	0.463
Excluding 2020	-0.0089	0.0181	0.628
Leave-one-out range	[-0.0176, 0.0047]	—	—
Panel B: Derogation Country Placebo (2019–2021)			
Interest/GOS ratio	0.0050	0.0120	0.681
Debt securities share	0.0115	0.0101	0.264
Panel C: Minimum Detectable Effect (80% power)			
MDE (Int/GOS)	0.0505	—	—
MDE as % of pre-treatment SD	48.6%	—	—

Notes: Panel A reports the main dose-response coefficient under alternative specifications. Wild cluster bootstrap uses 9,999 Webb weight iterations. Leave-one-out reports the range of coefficients when each country is sequentially dropped. Panel B tests whether derogation countries (France, Greece, Slovakia, Slovenia, Spain, Ireland) experienced spurious effects in 2019–2021, before their ATAD adoption. Panel C reports the minimum detectable effect at 80% power and 5% significance.

Thresholds, pre-existing rules, and the 3M anomaly. The heterogeneity analysis reveals a pattern worth noting. The 18 countries with the standard €3 million de minimis threshold show a marginally significant decline of 2.5 percentage points ($p < 0.10$)—a 22% reduction relative to the pre-treatment mean. If taken at face value, this suggests ATAD may be working in the modal EU country. Meanwhile, the zero-threshold group (Italy, Latvia, Slovakia) shows a smaller and insignificant effect, likely because these countries had pre-existing strict interest limitation rules that ATAD merely codified (Fuest et al., 2017). The dose-response specification averages across these heterogeneous responses, and the linear dose assumption—that moving from €5M to €0 should produce monotonically larger effects—may be incorrect if the binding margin differs from the regulatory margin. With 18 of 27 countries at the same €3M threshold, the dose variable provides limited cross-sectional variation among most of the sample, potentially attenuating the aggregate estimate.

Restructuring within the rules. ATAD constrains *net* borrowing costs, not gross interest. Firms can restructure to exploit the EBITDA carry-forward provisions, shift debt to intra-group lending arrangements not captured by aggregate statistics, or substitute between domestic and foreign-source borrowing. These responses would show up in firm-level data as compliance-induced restructuring but would leave aggregate debt stocks and interest flows

largely unchanged—a "phantom correction" that satisfies the letter of the directive without reducing macroeconomic fragility.

Insufficient time. The post-treatment window extends only to 2023, providing at most four post-adoption years for most countries. Corporate capital structure adjusts slowly (Leary and Roberts, 2005), and firms may wait to restructure until existing debt matures. The 2020–2021 COVID period further complicates identification, as emergency fiscal measures and ECB interventions dwarfed ATAD's incentive effects. A longer post-treatment horizon may eventually reveal aggregate effects that are not yet visible.

Implications for policy. The null result does not mean ATAD was poorly designed—it may be succeeding at the firm level while failing to register in aggregate statistics because the affected margin is too narrow. But it does challenge the assumption that tax coordination alone can solve the debt bias problem. Proposals for an allowance for corporate equity (ACE), which directly subsidizes equity financing rather than penalizing debt, may be more effective at the aggregate level (De Mooij and Keen, 2012; Hebous and Ruf, 2020). Belgium's experience with ACE provides suggestive evidence that leveling up (subsidizing equity) may work better than leveling down (limiting debt deductions) when the goal is macroeconomic stability.

7. Conclusion

The EU Anti-Tax Avoidance Directive was the most ambitious attempt in history to coordinate the limitation of interest deductibility. Using aggregate national accounts data for 27 EU countries, I find that ATAD did not detectably shift the economy-wide debt-equity financing mix. The null is not an artifact of low power: the design rules out aggregate effects larger than half a standard deviation.

This finding reframes the policy debate. If interest limitation cannot move the macro needle even when implemented simultaneously across 27 countries, the debt bias may require a fundamentally different instrument—one that makes equity cheaper rather than making debt more expensive. The phantom correction is a warning: changing the rules is not the same as changing the outcome.

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A. Data Appendix

Eurostat datasets. The primary data come from three Eurostat datasets accessed via the `eurostat` R package (v4.0.0) in March 2026:

- `nasa_10_f_bs`: Annual sector accounts—financial balance sheets. Provides end-of-year stocks of financial instruments by institutional sector. I extract non-consolidated (NCO) liabilities for non-financial corporations (S11) in millions of national currency (MIO_NAC) for debt securities (F3), loans (F4), and equity/investment fund shares (F5).
- `nasa_10_nf_tr`: Annual sector accounts—non-financial transactions. Provides annual flows. I extract interest paid (D41, "PAID" direction) and gross operating surplus/mixed income (B2A3G) for S11, in millions of national currency.
- `nama_10_gdp`: GDP and main aggregates. I extract real GDP growth (chain-linked volumes, percentage change on previous year, B1GQ).
- `prc_hicp_aind`: HICP annual average rate of change. I extract the all-items index (CP00, RCH_A_AVG).

ATAD treatment coding. Treatment variables are coded from the directive text (Council Directive 2016/1164, OJ L 193), the KPMG ATAD Implementation Overview (2019), and EY Global Tax Alert: EU Anti-Tax Avoidance Directive Tracker (2020). De minimis thresholds, EBITDA cap percentages, and adoption years are cross-validated across these sources.

Variable construction. All ratios are constructed from national-currency values to avoid exchange-rate noise. The interest-to-operating-surplus ratio is winsorized at the 1st and 99th percentiles to limit the influence of small-economy outliers (e.g., Cyprus, Luxembourg). The dose variable is $(5 - d)/5$ where d is the de minimis threshold in EUR millions, so Italy (d=0) has dose 1 and Sweden (d=5) has dose 0.

B. Robustness Appendix

Wild cluster bootstrap. With 27 country-level clusters, asymptotic cluster-robust inference may over-reject. I implement the wild cluster bootstrap with Webb (6-point) weights (Webb, 2014) using the `fwildclusterboot` R package (Fischer and Roodman, 2021), with 9,999 iterations.

Leave-one-out. I re-estimate the main dose-response specification 27 times, each time dropping one country. The coefficient ranges from -0.018 (dropping Portugal) to $+0.005$, with a mean of -0.005. Only Portugal's removal flips the sign, and no single drop yields statistical significance.

Alternative treatment definition. I also test an alternative treatment based on the EBITDA cap strictness (below 30%): Finland (25%), the Netherlands (20%), and Slovakia (25%). The coefficient on this "strict cap" indicator is positive (0.021, SE = 0.011, $p < 0.1$), likely reflecting pre-existing differences in these countries' corporate sectors rather than ATAD effects.

C. Standardized Effect Sizes

Table 5: Standardized Effect Sizes

Outcome	$\hat{\beta}$	SE	SD(Y)	SDE	SE(SDE)	Classification
Panel A: Pooled (Dose-Response)						
Interest/GOS ratio	-0.0050	0.0180	0.1061	-0.0116	0.0416	Small negative
Debt securities share	0.0093	0.0119	0.0533	0.0428	0.0546	Small positive
Leverage ratio	-0.0416	0.1040	0.2517	-0.0404	0.1011	Small negative
Panel B: Heterogeneous (by de minimis threshold)						
Int/GOS: Standard (€3M)	-0.0245	0.0121	0.1140	-0.2147	0.1063	Large negative
Int/GOS: Binary adopted	-0.0102	0.0104	0.1061	-0.0961	0.0981	Moderate negative

Notes: **Country:** European Union (27 member states). **Research question:** Does coordinated limitation of interest deductibility under the EU Anti-Tax Avoidance Directive shift aggregate corporate financing from debt toward equity? **Policy mechanism:** ATAD I caps tax-deductible net borrowing costs at 30% of EBITDA for non-financial corporations, with member states setting de minimis thresholds below which the rule does not apply, aiming to reduce the tax-induced incentive to finance with debt over equity. **Outcome definition:** Panel A: Interest-to-GOS ratio (D41 PAID / B2A3G), debt securities share (F3 / [F3 + F4]), leverage ratio ([F3 + F4] / F5) from Eurostat Annual Sector Accounts. Panel B: Interest-to-GOS ratio for subsamples by de minimis threshold group. **Treatment:** Continuous dose intensity for Panel A, defined as $(5 - \text{de minimis in EUR million})/5$; binary post-adoption indicator for Panel B subsamples. **Data:** Eurostat Annual Sector Accounts (nasa_10_f_bs, nasa_10_nf_tr) for non-financial corporations (S11), 2012–2023, country-year observations ($N = 647$). **Method:** Two-way fixed effects (country + year) difference-in-differences exploiting cross-country variation in de minimis thresholds and staggered adoption timing; standard errors clustered by country. **Sample:** All 27 EU member states; 21 early adopters (January 2019) and 6 derogation countries (2022–2024). $\text{SDE} = \hat{\beta} \times \text{SD}(X)/\text{SD}(Y)$ for continuous treatment (Panel A) and $\text{SDE} = \hat{\beta}/\text{SD}(Y)$ for binary treatment (Panel B), where SD(Y) is the pre-treatment standard deviation. Classification refers to magnitude, not statistical significance: Large ($|\text{SDE}| > 0.15$), Moderate (0.05–0.15), Small (0.005–0.05), Null (< 0.005).