The Cost of Credibility: Fiscal Rules and Recession Risk During Consolidations*

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Abstract

This paper shows that fiscal rules interact with financial market conditions to substantially amplify recession risks during fiscal adjustments. Using a panel of about 100 countries from 1990 to 2022, we document that consolidations undertaken during periods of elevated sovereign spreads impose four times larger recession costs when countries operate under stringent fiscal rule frameworks (7.9 percentage points) compared to more flexible arrangements (2.0 percentage points). The amplification mechanism reflects constraints on policy composition: stringent rules force governments to rely on spending cuts and front-loaded adjustments precisely when such policies are most costly. Budget balance rules generate the strongest effects, followed by debt rules, while expenditure rules show minimal amplification. Local projections reveal these costs persist for 3-4 years rather than dissipating quickly. We rationalize these patterns with a simple framework in which stringent rules prevent governments from substituting toward less costly consolidation instruments during stress. The amplification of recession risks under higher-quality fiscal rules reflects a tension between credibility and flexibility. Traditional quality indices reward credibility-enhancing features but do not assess state-contingent flexibility, particularly in the first-generation rules that dominate our sample. For emerging economies exposed to sudden stops and volatile capital flows, these results suggest fiscal rule design should incorporate well-designed escape clauses and greater flexibility in rule type selection.

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1 Introduction

Fiscal consolidations are among the most consequential and contentious policy interventions in macroeconomics. When governments tighten fiscal policy to restore sustainability, the immediate economic costs often include slower growth, rising unemployment, and increased recession risk (Guajardo, Leigh and Pescatori, 2014; Alesina, Favero and Giavazzi, 2019). However, the long-term benefits of fiscal discipline are equally well-documented: lower borrowing costs, increased credibility with financial markets, and greater capacity to respond to future shocks (Alesina and Perotti, 1997). This tension has motivated extensive research on the design and timing of fiscal adjustments.

Recent experience illustrates the stakes involved in consolidation design. Greece, Portugal, and Spain endured severe recessions following consolidation programs during the European debt crisis of 2010-2012, while other countries adjusted with comparatively modest output costs. Emerging economies show similar variation: Argentina's 2016-2019 consolidation during rising spreads contributed to a severe recession, while Mexico's 1995 post-Tequila crisis adjustment achieved stabilization with relatively modest costs. For emerging and developing economies that face recurring pressures from sudden stops and volatile commodity prices, the determinants of fiscal consolidation outcomes matter for policy design. The COVID-19 pandemic raised similar questions globally about how and when to restore fiscal balance after unprecedented expansion.

In this paper, we examine how fiscal rules affect the macroeconomic costs of fiscal consolidation. Fiscal rules have proliferated since the 1990s, with over 100 countries now operating under some form of numerical fiscal constraint (Schaechter, Kinda, Budina and Weber, 2012; Lledó, Yoon, Fang, Mbaye and Kim, 2017). These rules provide valuable discipline during normal times by constraining deficit bias and improving fiscal outcomes (Debrun, Epstein and Symansky, 2008). However, they may also constrain policy flexibility during crises in ways that amplify output costs. We document that fiscal rules interact with financial market conditions to substantially amplify recession risks during adjustment episodes. In fact, we find that fiscal consolidations undertaken during periods of elevated sovereign spreads impose four times larger recession costs when countries operate under stringent fiscal rule frameworks compared to more flexible

arrangements. This amplification arises because rigid rules constrain governments' ability to choose the composition and timing of consolidation measures, forcing reliance on spending cuts and front-loaded adjustments when such policies are most damaging (Ardanaz, Cavallo, Izquierdo and Puig, 2021; Alesina, Barbiero, Favero, Giavazzi and Paradisi, 2017).

We begin by examining the determinants of fiscal consolidation timing using survival analysis across 107 countries from 1990 to 2022. Fiscal rules exhibit state-dependent effects on the probability of a fiscal consolidation. Specifically, during calm periods, rules have minimal influence on whether countries consolidate, but during periods of elevated financial stress, rules significantly increase the likelihood of consolidation. This pattern suggests that fiscal rules become binding constraints when financial markets apply pressure, potentially forcing adjustments that might otherwise be delayed or designed differently.

We then examine whether these rule-induced consolidations during stress periods impose larger macroeconomic costs. Using a panel framework with country and year fixed effects, we estimate how fiscal consolidations affect recession probability across different combinations of financial stress and fiscal rule stringency. The triple interaction reveals that fiscal consolidations increase the probability of recession by 2.0 percentage points during high-spread periods under weak fiscal rules but by 7.9 percentage points under stringent rules (a fourfold amplification). During low-spread periods, rule stringency has minimal effect on consolidation costs, confirming that the amplification mechanism operates specifically during financial stress. This pattern holds across multiple specifications, appears in both advanced and emerging countries (though with larger effects in the latter), and survives alternative measures of financial stress.

We disaggregate the analysis by fiscal rule type to understand which institutional features drive the amplification. Budget balance rules generate the strongest effects (9.3 percentage point increase in the probability of recession), followed by debt rules (7.4 percentage points), while expenditure rules show minimal amplification (statistically insignificant). This heterogeneity reflects differences in how rules constrain policy choice: budget balance rules mandate immediate spending cuts when revenues decline

(Debrun et al., 2008), debt rules prevent intertemporal smoothing, while expenditure rules permit greater flexibility in adjustment timing and composition (Eyraud, Debrun, Hodge, Lledó and Pattillo, 2018). Local projection estimates confirm these effects persist for 3-4 years following consolidation, indicating lasting rather than merely front-loaded costs.

We develop a simple framework to rationalize these findings. The model features a government choosing among consolidation instruments (spending cuts, revenue measures, efficiency improvements) that differ in output costs and market credibility. The framework builds on the state-dependent fiscal policy literature (Auerbach and Gorodnichenko, 2012; Ramey, 2011) and generates testable predictions that align with our empirical findings: fiscal consolidations are more costly during stress, stringent rules amplify these costs (the triple interaction), and the amplification varies by rule type (budget balance rules most binding).

The amplification of recession risks under higher-quality fiscal rules reflects a distinction between rule quality and rule optimality across states. Traditional fiscal rule quality indices reward institutional characteristics that enhance credibility during normal times (legal basis, enforcement mechanisms, comprehensive coverage) but do not assess whether rules incorporate adequate state-contingent flexibility for crisis periods (Schaechter et al., 2012; Eyraud et al., 2018). Our sample predominantly captures first-generation fiscal rules adopted before the 2008 financial crisis: only 8% of pre-2008 fiscal consolidation episodes in our data occurred in countries with escape clauses, compared to 48% after 2008. Even when escape clauses existed, governments rarely activated them. The COVID-19 pandemic illustrated this tension: numerous countries with high-quality fiscal rules found it necessary to suspend or invoke inadequate escape clauses (Davoodi, Elger, Fotiou, Garcia-Macia, Han, Lagerborn, Lam and Medas, 2022).

Our findings contribute to three types of literature. First, we expand the evidence on state-dependent fiscal policy (Auerbach and Gorodnichenko, 2012; Ramey, 2011) by showing that institutional constraints amplify the state-dependence of fiscal consolidation costs. While previous work documents that fiscal consolidations are more costly during recessions or credit crunches (Guajardo et al., 2014), we show that fiscal rules tend to magnify these effects by restricting the policy instruments governments

can deploy. Second, we contribute to the fiscal rules literature (Schaechter et al., 2012; Eyraud et al., 2018; Davoodi et al., 2022) by providing systematic evidence on how rule design affects consolidation costs during financial stress. Recent work has emphasized the importance of escape clauses and flexibility mechanisms in fiscal frameworks (Eyraud et al., 2018; Guerguil, Mandon and Tapsoba, 2017), but previous empirical work provides limited evidence on the macroeconomic costs of rigid rules. Third, we speak to debates on optimal consolidation design (Alesina et al., 2019; Ardanaz et al., 2021) by showing that institutional constraints matter as much as economic conditions to determine outcomes. The policy implication is not that fiscal rules are counterproductive (our results show they reduce consolidation costs during normal times) but that rule design must incorporate adequate state-contingent flexibility.

The rest of the paper is organized as follows: Section 2 describes our data and the identification of fiscal consolidation episodes. Section 3 presents the survival analysis on the determinants of consolidation timing. Section 4 examines how consolidations affect the probability of recession under financial stress conditions and fiscal rule stringency. Section 5 develops the simple framework. Section 6 concludes with policy implications.

2 Fiscal Consolidation Episodes

The first step in our analysis is to define and identify fiscal consolidation episodes. We consider several definitions to ensure the robustness of our findings.

In chronological order, but also as a reference in the literature, is the work of Alesina and Perotti (1997), where a fiscal consolidation is defined as the years in which the cyclically adjusted primary balance (CAPB) improves by at least 1.5 percentage points of GDP. Later, in Alesina and Ardagna (1998), it is redefined as the years in which the CAPB improves by at least 2 percentage points of GDP, or a cumulative improvement of at least 1.5 percentage points of GDP over two consecutive years. More recently, Georgantas, Kasselaki and Tagkalakis (2023) employs a filtering technique that aims to address the critique that anticipating a fiscal shock can bias the effects of fiscal policy. Jalles, Pessino and Calderon (2025) uses an Alesina and Perotti (1997)-based criterion, which identifies episodes as a CAPB change threshold of 0.5 percentage points over two consecutive years, using CAPB data derived from a Hamilton filter.

Figure 1 presents the temporal distribution of fiscal consolidation episodes from 1980 to 2022 using the Alesina and Perotti (1997) criterion. The observed temporal clustering of consolidation episodes reflects the interaction between macroeconomic shocks, institutional constraints, and evolving fiscal policy paradigms. The scarcity of episodes in the early 1980s likely stems from the predominant focus on counter-cyclical fiscal expansion during the recession-prone period, while the subsequent increase through the late 1980s and early 1990s coincides with the emergence of fiscal sustainability concerns and the influence of supranational fiscal frameworks. The pronounced consolidation waves during the mid-to late 1990s and 2000s reflect both the institutionalization of fiscal rules and the procyclical nature of fiscal policy in many emerging economies during periods of favorable external conditions. The concentration of episodes around 2010–2012 represents a coordinated global response to the fiscal deterioration following the global financial crisis, driven by market pressures and concerns over sovereign debt sustainability. The subsequent decline after 2015 suggests either the completion of necessary adjustments or a recognition of the contractionary effects of simultaneous consolidations, leading to a recalibration of the fiscal policy mix toward more accommodative stances in an environment of persistently low interest rates and subdued inflation.

Figures 3 and 4 illustrate the distribution of fiscal consolidation episodes across advanced and emerging economies. Several patterns emerge. First, consolidation activity accelerates sharply after the early 1990s in both country groups, coinciding with the proliferation of fiscal rules and increased attention to debt sustainability. Second, advanced economies (Figure 3) show concentrated consolidation waves around the European sovereign debt crisis (2010-2012), with countries like Greece, Ireland, Portugal, and Spain undertaking sustained multi-year adjustments. Emerging economies (Figure 4) display more dispersed consolidation patterns across time, reflecting heterogeneous exposure to external shocks and varying degrees of policy discretion. Third, substantial cross-country variation exists within each group: some countries experienced multiple fiscal consolidation episodes, while others consolidated infrequently or not at all. This heterogeneity motivates our focus on how institutional constraints—specifically fiscal rules—interact with financial conditions to shape fiscal consolidation costs across diverse country experiences.

Figure 2 extends this analysis by comparing the Alesina and Perotti (1997) measure with alternative identification strategies, specifically the Alesina and Ardagna (1998) methodology and the more recent approach by Georgantas et al. (2023). While all three measures capture similar broad temporal patterns, notable differences emerge in both the frequency and timing of identified episodes. The Alesina and Perotti (1997) criterion consistently identifies more episodes than the alternatives, particularly during the 1990s and 2000s, suggesting greater sensitivity to moderate fiscal adjustments. Hence, this approach offers several methodological advantages that justify its adoption as the primary identification strategy. First, its lower threshold (0.5 percentage points over two years versus 1.5–2.0 percentage points in a single year) captures a broader range of fiscal adjustment efforts, including gradual consolidations that may be politically more sustainable. Second, the two-year criterion helps distinguish systematic policy changes from temporary fiscal fluctuations, while the use of cyclically adjusted primary balance data ensures that identified episodes reflect deliberate policy choices rather than automatic responses to economic cycles. This methodological foundation provides a more comprehensive and policy-relevant identification of fiscal consolidation efforts across diverse economic and institutional contexts.

3 Survival Analysis of Fiscal Consolidation Episodes

We use survival analysis to study the determinants of the duration of fiscal consolidation episodes. The "failure" event is the beginning of the episode. We employ a Cox proportional hazards model and explore more flexible alternatives, such as the AFT model used in similar settings by Gomez-Gonzalez, Uribe and Valencia (2023) and Andrian, Rodriguez and Valencia (2025). Key covariates include macroeconomic variables and institutional quality.

Figure 5 presents survival estimates and hazard rates for fiscal consolidation episodes, revealing fundamental differences in consolidation dynamics between emerging and advanced economies. Panel (a) shows that both emerging and advanced economies exhibit remarkably similar survival probabilities throughout the consolidation process, with approximately 75% of episodes in both groups terminating within the first five years and survival rates converging to near zero by year 20. This con-

vergence suggests that the fundamental constraints governing the sustainability of fiscal adjustments operate with similar intensity across development levels, despite differences in underlying institutional frameworks and economic structures. Panel (b) shows that emerging economies experience elevated exit probabilities that peak around years 15-20, indicating a bimodal pattern where consolidations either succeed quickly or face mounting sustainability pressures over time. The smoother, more gradual hazard profile for advanced economies reflects their greater institutional capacity to sustain prolonged adjustment periods, supported by deeper financial markets, more credible fiscal frameworks, and stronger institutions that can absorb the distributional costs of consolidation. The divergence in survival patterns also suggests that the optimal design of fiscal consolidations should account for country-specific institutional characteristics, with emerging economies potentially benefiting from front-loaded adjustments that minimize exposure to external shocks, while advanced economies can pursue more gradual approaches -even back-loaded adjustments- that preserve social cohesion.

The similar survival rates mask important differences in how consolidations actually unfold across country types. Emerging economies tend to exit consolidations in concentrated periods—either succeeding quickly or hitting political or economic breaking points—while advanced economies show steadier, more gradual termination patterns reflecting evolving policy priorities and democratic pressures. This suggests that while both groups ultimately sustain fiscal consolidations for comparable durations, the underlying forces driving these decisions operate through markedly different channels, reinforcing the case for development-specific approaches to fiscal adjustment design.

The survival analysis employs two complementary estimation strategies to examine the determinants of starting a fiscal consolidation. The Cox proportional hazards model provides a semi-parametric approach that estimates hazard ratios without imposing assumptions about the underlying baseline hazard function, making it particularly suitable for identifying the relative effects of covariates on consolidation probability. The Weibull parametric model, by contrast, assumes a specific distributional form for the baseline hazard but allows for more precise coefficient interpretation and facilitates the modeling of time-varying effects. Both approaches treat the initiation of a

fiscal consolidation episode as the "failure" event, enabling us to identify the economic and institutional factors that increase the likelihood of countries undertaking fiscal adjustments.

Table 3 presents the duration analysis results for emerging economies, revealing that fiscal rules exhibit a complex relationship with consolidation initiation that depends critically on economic development levels. The positive coefficient on fiscal rules in columns (2) and (5) suggests that, on average, the presence of fiscal frameworks increases the probability of undertaking consolidations. However, the significant negative interaction term with GDP per capita indicates that this effect diminishes—and eventually reverses—as income levels rise within the emerging economy group. This pattern suggests that fiscal rules serve different functions across the development spectrum: in lower-income emerging economies, rules may act as commitment devices that facilitate necessary but politically difficult adjustments, while in more developed emerging economies with stronger institutions, rules may provide sufficient discipline to avoid the need for dramatic consolidations. The other coefficients are largely in line with theoretical expectations, with higher debt levels and weaker institutional quality increasing the likelihood of consolidation, while stronger primary balances reduce the need for adjustment. The negative coefficient on GDP per capita reflects the greater fiscal space available to more developed emerging economies, while the positive effect of inflation captures the fiscal pressure created by macroeconomic instability.

Table 4 examines the same relationships for advanced economies, where the effect of the fiscal rule might emphasize different channels. The generally smaller and less consistent coefficients on fiscal rules reflect the more sophisticated institutional environments in these countries, where multiple overlapping constraints influence fiscal decisions. The interaction effects with GDP per capita are less pronounced than in emerging economies, consistent with the narrower range of institutional quality within the advanced economy group. Notably, the coefficient patterns differ markedly from emerging economies: public debt exhibits a stronger negative relationship with the likelihood of entering a consolidation episode, suggesting that advanced economies can sustain higher debt levels without triggering immediate adjustment pressures, while the terms of trade effects are more pronounced, reflecting these countries' greater

integration into global markets. These results stress that the effectiveness of fiscal rules as determinants of consolidation timing varies systematically with both institutional capacity and economic development.

Fiscal rules do not operate in isolation. When governments face worsening fiscal conditions, it often comes under heightened scrutiny from financial markets, which are concerned about the government's ability to meet its financial obligations. In such scenarios, adherence to fiscal rules becomes crucial for maintaining credibility and stability in the eyes of investors and the public. During periods of elevated financial stress, the institutional constraints imposed by fiscal rules interact with market pressure to narrow governments' policy options, potentially forcing fiscal consolidations that might otherwise be delayed or designed differently. The results from the previous tables showed that fiscal rules influence consolidation timing, but left open whether this influence depends on the state of financial stress. We now address this question by estimating Cox proportional hazards models separately for high-spread and low-spread regimes, where high financial stress is defined as periods when spreads exceed the 75th percentile (corresponding to spreads above approximately 30 basis points).

Although fiscal rules on average appear to reduce the probability of consolidation, this relationship may vary during periods of market pressure, when their binding nature would be most evident. The distinction matters because it addresses the flexibility-credibility trade-off inherent in fiscal frameworks: rules that require adjustments during stress may provide credibility, but at the cost of procyclical policy. We explore this by estimating Cox proportional hazards models for emerging and advanced countries, separately for low-spread and high-spread regimes, where high financial stress corresponds to periods when sovereign spreads exceed the 70th percentile. Table 5 presents the results. During low-spread periods, fiscal rules show no consistent effect on consolidation timing, suggesting that when market pressure is limited, rules do not substantially constrain adjustment decisions. The picture changes during high-spread episodes. The main effect of fiscal rules becomes significantly negative, especially for emerging economies, indicating that rules initially reduce the probability of consolidation even under financial stress. The positive interaction with GDP per capita, however, reveals that this relationship reverses at higher income levels: wealthier

countries with fiscal rules become more likely to consolidate during stress. This pattern suggests that rules' influence on policy intensifies when market scrutiny is greatest, with the direction depending on institutional capacity. For more advanced emerging economies, rules appear to constrain flexibility and compel consolidations during stress.

This state-dependent pattern sets the stage for the next section, where we examine whether consolidations undertaken under these conditions (when both market pressure and institutional stringency constrain policy) impose larger macroeconomic costs. Specifically, we test whether the recession probability increases more when consolidations occur during high-spread periods under stringent fiscal rule frameworks.

4 Fiscal Consolidations and the Business Cycle

The state-dependent pattern described above suggests that fiscal consolidations should be analyzed in light of both market pressure and institutional constraints.

The recent policy debate and literature add evidence that this angle is worth exploring. The IMF's October 2024 World Economic Outlook warns that "delaying consolidation increases the risk of disorderly market-imposed adjustments, while an excessively abrupt turn toward fiscal tightening could be self-defeating and hurt economic activity" (International Monetary Fund, 2024*b*). This suggests that fiscal rules not adaptable to challenging circumstances can lead to harmful consolidation timing. Furthermore, recent IMF Fiscal Monitors have called for fiscal frameworks with "credible medium-term frameworks" that allow implementation flexibility (International Monetary Fund, 2024*a*), suggesting growing awareness that inflexible rules can be problematic.

From the academic literature, Ardanaz et al. (2021) show that fiscal rules with adaptable mechanisms effectively safeguard public investment during consolidations, while more rigid rules lead to procyclical cuts. In a similar vein, Lim (2020*b*) finds that "fiscal rules exacerbate procyclical tendencies," particularly in advanced economies, while Fritsche, Gräb and Walters (2021) argue that budgetary outcomes are procyclical when rules are less flexible.

4.1 Empirical Strategy

To study the macroeconomic costs of fiscal consolidations, we first define the probability of entering a period of macroeconomic contraction (recession). We follow Auerbach and Gorodnichenko (2012) and Georgantas et al. (2023) by using a logistic transition function to define the state of the economy. The probability of being in a recession, $F(z_{it})$, is given by:

$$F(z_{it}) = \frac{\exp(-\gamma z_{it})}{1 + \exp(-\gamma z_{it})} \tag{1}$$

where z_{it} is a standardized measure of economic activity (e.g., output gap, GDP growth) and $\gamma > 0$ governs the smoothness of the transition. With this, we define the following specification:

$$\begin{aligned} p\_recess_{it} = \alpha_i + \gamma_t + \beta_1 \cdot consol_{it} + \beta_2 \cdot spread_{it} + \beta_3 \cdot qrules_{it} \\ + \beta_4 \cdot (consol \times spread)_{it} + \beta_5 \cdot (consol \times qrules)_{it} \\ + \beta_6 \cdot (consol \times spread \times qrules)_{it} + \theta \cdot X_{it} + \epsilon_{it} \end{aligned} \tag{2}$$

where $p\_recess_{it} \in [0, 1]$ is the probability of entering a recession defined by $F(z_{it})$, $consol_{it}$ is the cumulative change of the cyclically adjusted primary balance (as a percentage of trend GDP), $spread_{it}$ is the sovereign spread of country i at time t in basis points, $qrules$ is an index of the captures the quality of the fiscal rule, X_{it} is a vector of control variables, α_i is a country fixed effect, γ_t is a time fixed effect, and ϵ_{it} is the error term.

This estimation strategy accounts for many factors. First, we choose the probability of entering a recession to closely monitor not just the realization of a contraction or expansion of the economy, but the expected business cycle, given each country's historical behavior. Second, $consol_{it}$ captures not only the existence of a fiscal consolidation but also its magnitude and duration over time. This is an important aspect, because from our previous analysis, timing seems an important element to factor in. Third, the state variable $spread_{it}$ measures the sovereign spread of each country. For most countries, this represents the difference between their interest rate on sovereign instruments and the US long-term Treasury rate. For countries in the Euro area, instead

of using the US, we use the Euro long-term rate.[1] This measure of sovereign spread captures how international financial markets perceive each country. A higher rate, implies a higher cost of credit as the country is perceived as more risky/unstable. We incorporate this measure into our analysis to capture the financial market pressure (financial stress). Fourth, the moderator variable $qrules$ is the index of quality of the fiscal rule from Andrián, Hirs-Garzon, Urrea and Valencia (2024). These authors construct a standarized index from -0.6 to 4, where lower levels denote weaker fiscal rules and higher implies the existence of a fiscal rule of the highest quality.[2]

With this specification, we can analyze how stronger/different types of fiscal rules amplify or dampen the state-dependent effects of financial conditions during fiscal consolidations. Ex-ante, we expect fiscal consolidations to increase the probability of a recession ($\beta_1 > 0$), to be more costly during financial stress ($\beta_4 > 0$), and that the strength of fiscal rules might actually amplify this effect ($\beta_6 > 0$).

A potential concern is that fiscal rule quality is endogenous to recession risk. However, several factors mitigate this concern in our setting. Our coefficient of interest is a triple interaction (how fiscal rules amplify the relationship between consolidations and recession probability during financial stress) rather than the main effect of rules on outcomes. Our identification exploits variation in how consolidations affect recession probability across different combinations of spread levels and rule strength, conditional on country and year fixed effects. This substantially reduces endogeneity concerns, as we control for all lower-order interactions.

While countries with stronger fiscal rules tend to have lower sovereign spreads, this reflects the credibility benefits of fiscal rules in normal times and does not confound our estimates. We use lagged fiscal rule quality, measured before consolidation outcomes, and fiscal rules are sticky institutional variables that change infrequently. Moreover, we find no significant correlation between lagged rule quality and pre-consolidation recession probability or GDP growth (correlations < 0.15; see Appendix Table X), suggesting rules are not systematically adopted in response to recent economic performance. Our sample focuses on consolidation episodes where countries are actively adjusting, and we examine how pre-existing institutional constraints affect the

[1] In cases where the sovereign rate is not available, we used the lending long-term rate.
[2] Three fiscal rules are monitored: expenditure rules, budget balance rules, and debt rules.

composition and costs of adjustment rather than the decision to consolidate itself.

A related concern is that consolidation size itself may be endogenous to recession expectations. However, this would bias our estimates toward zero: countries expecting recessions would implement smaller consolidations or delay them, attenuating our measured effects. Finding significant positive effects despite this downward bias strengthens our interpretation. Moreover, our sample restriction to ongoing fiscal consolidation episodes (rather than all country-years) means we examine variation in fiscal consolidation intensity conditional on countries having already decided to adjust, reducing concerns about selection into consolidation based on economic outlook.

4.2 Main Results

Table 7 presents our baseline estimates of how fiscal rule quality affects the relationship between fiscal consolidations and recession probability across financial stress conditions. Column (1) shows the parsimonious specification with the triple interaction term, while columns (2)-(4) progressively add controls for inflation, public debt, and institutional quality. The core results remain stable across specifications, indicating that the findings are not driven by omitted variable concerns.

The baseline interaction between fiscal consolidation and spreads is positive and highly significant across all specifications (estimate of 0.025), confirming that fiscal consolidations become more contractionary during periods of elevated financial stress. A one-unit increase in the cumulative cyclically-adjusted primary balance measure during high-spread episodes raises recession probability by 2.5 percentage points more than during calm periods. This state-dependent pattern aligns with prior evidence that fiscal multipliers vary with economic conditions, reflecting the fact that when credit markets are disrupted, private agents cannot offset fiscal tightening through borrowing.

The triple interaction term is positive and statistically significant, indicating that fiscal rule quality amplifies the contractionary effects of consolidations specifically during financial stress. This result raises an important interpretive question; how can higher-quality fiscal rules, which by construction reflect stronger institutional features, amplify recession risks during consolidations? The answer lies in distinguishing between rule quality and rule optimality across states. The fiscal rule quality index measures

institutional characteristics including legal basis, comprehensiveness, enforcement mechanisms, and independent monitoring (Schaechter et al., 2012). While the index includes the presence of escape clauses as one component, it does not assess whether such clauses are sufficiently broad or operationally feasible to accommodate financial stress episodes (Eyraud et al., 2018). These institutional features provide valuable discipline during normal times by constraining deficit bias and improving fiscal outcomes (Debrun et al., 2008). However, the same features that generate credibility can become binding constraints during financial stress when flexibility mechanisms are absent or inadequately designed.

Escape clauses became substantially more prevalent following the 2008 financial crisis, but the majority of consolidation episodes in our sample occurred when such flexibility mechanisms were rare. Table 2 presents the prevalence of escape clauses among the 309 fiscal consolidation episodes in our estimation sample. Only 8.0% of pre-2008 consolidation episodes occurred in country-years with escape clauses, compared to 47.7% after 2008. Since 46% of our sample episodes (143 of 309) occurred before 2008, the overall prevalence of escape clauses is 27.9%, meaning 72% of consolidation episodes in our analysis involved fiscal rules without escape clause provisions. Moreover, even when escape clauses existed, activation was non-existent before 2008 and occurred in only 31% of relevant post-2008 episodes. This predominance of first-generation rules lacking adequate state-contingent flexibility mechanisms (particularly for the pre-crisis period that comprises nearly half our sample) helps explain the substantial amplification effects we document.

Our sample period (1990-2022) predominantly captures first-generation fiscal rules, which emphasize numerical targets and enforcement over flexibility mechanisms (Lledó et al., 2017). Despite scoring high on traditional quality indices, these rules typically lack well-designed escape clauses that would permit temporary deviations during exceptional circumstances (Eyraud et al., 2018; Davoodi et al., 2022). When financial stress materializes, stringent rules constrain governments' ability to choose consolidation instruments optimally, forcing reliance on spending cuts and front-loaded adjustments that maximize output costs (Ardanaz et al., 2021; Alesina et al., 2017). In fact, evidence suggests that fiscal rules without adequate flexibility mechanisms can induce

procyclical bias precisely when countercyclical policy would be most valuable (Frankel, Vegh and Vuletin, 2013; Fatás and Mihov, 2006).[3] Interestingly, our results quantify the cost of this credibility-flexibility tradeoff. The institutional features that make rules "high quality" during calm periods (comprehensiveness, strong enforcement, limited discretion) become sources of procyclical constraint during financial stress when not paired with appropriate state-contingent provisions. This result aligns with recent evidence, such as (Eyraud et al., 2018; Guerguil et al., 2017), that suggests incorporating well-designed escape clauses and other flexibility mechanisms into fiscal rules.

To interpret the economic magnitude, we compute marginal effects at representative values of spreads and rule stringency. During low financial stress (corresponding to approximately 10 basis points), fiscal consolidations under weak rule frameworks actually reduce recession probability by 0.9 percentage points, consistent with expansionary consolidation effects when market confidence is high and policy flexibility permits credible, growth-friendly adjustments. However, under strong rules, the effect becomes slightly positive but statistically insignificant (0.2 percentage points), suggesting that rule constraints eliminate potential confidence benefits during calm periods by restricting the composition and sequencing of fiscal measures.

The picture changes during high financial stress (approximately 40 basis points). Under weak rule frameworks, a one-unit increase in fiscal consolidation, increases the probability of recession by 2.0 percentage points (a 2.9 percentage point deterioration from the low-stress effect). Under strong rule frameworks, the same consolidation increases recession probability by 7.9 percentage points (a 7.7 percentage point deterioration and a fourfold amplification relative to weak rules during high stress). This 5.9 percentage point differential represents the additional recession risk imposed by fiscal rule constraints during periods of market pressure. The amplification arises because strong rules can restrict governments' ability to choose the composition and timing of consolidation measures, forcing reliance on spending cuts and front-loaded adjustments precisely when such policies are most damaging to output.

The remaining coefficients in Table 7 align with our theoretical priors. Higher

[3]The COVID-19 pandemic illustrated this tension: numerous countries with high-quality fiscal rules found it necessary to suspend or invoke inadequate escape clauses, revealing that rule design had not incorporated sufficient crisis flexibility (Davoodi et al., 2022).

spreads directly increase the probability of recession, reflecting the adverse effects of tighter financial conditions. The direct effect of rule stringency on recession probability is positive, consistent with rules constraining countercyclical policy in ways that may exacerbate downturns. The interaction between consolidation and rule stringency is negative, indicating that stringent rules reduce the contractionary impact of fiscal adjustments during normal times—consistent with their disciplinary role in promoting credible consolidations when market pressure is absent. However, the positive triple interaction shows that this beneficial effect reverses during stress, when rule-imposed constraints force governments onto suboptimal consolidation paths.

However, not all fiscal rules generate equivalent amplification effects. Table **??** disaggregates our baseline specification by rule type (expenditure rules, budget balance rules, and debt rules). Each regression maintains the triple interaction structure but replaces the composite rule quality index with type-specific measures.

Expenditure rules show the weakest amplification effect. The triple interaction fails to reach significance. At high financial stress with strong/stringent expenditure rules, the marginal effect of fiscal consolidation on recession probability is 4.5 percentage points, insignificant and smaller than effects associated with other rule types. This relative mildness likely reflects the greater flexibility inherent in expenditure rule design: these rules typically target expenditure growth rates rather than absolute levels, allowing some accommodation of cyclical revenue fluctuations without triggering rule violations.

Budget balance rules generate the strongest amplification. The triple interaction is significant, and the marginal effect of consolidation during high stress reaches 9.3 percentage points under strong/stringent budget balance frameworks. This result suggests that budget balance rules force spending adjustments when revenues decline during downturns, precisely when such adjustments are most costly. The requirement to balance budgets annually or over short horizons eliminates the intertemporal smoothing that would otherwise allow governments to phase consolidations more gradually. In other words, when spreads spike and revenues fall simultaneously, budget balance rules tend to mandate expenditure cuts, leaving no room for the revenue-based or gradual adjustment strategies that would minimize output costs.

Although less restrictive than budget balance rules, debt rules still seem to constrain governments' ability to use countercyclical policy during stress episodes. The binding nature of debt ceilings during periods of rising spreads forces adjustment rather than allowing debt-financed stimulus or gradual consolidation paths.

These patterns reveal important variation in how fiscal rule design affects macroeconomic stability. Rules that require immediate adjustment to cyclical shocks impose the highest costs during financial stress. Rules that allow for greater flexibility in the timing and composition of adjustment generate smaller amplification effects. This heterogeneity has direct implications for optimal fiscal rule design in emerging and developing economies, where exposure to sudden stops and financial market volatility makes state-contingent flexibility especially valuable.

4.3 Sensitivity Analysis

We conduct several robustness checks to assess the generality of our main findings. We first examine whether the amplification effect operates similarly across country groups, then we test alternative specifications of financial stress, and finally explore the dynamic evolution of effects using local projections.

First, table 9 presents estimates separately for advanced and emerging countries. The triple interaction mechanism operates in both groups but with important differences. For advanced economies, under weak rules, consolidations have no significant effect on the probability of recession, while under strong rules, the same consolidation increases the probability of recession by 5.7 percentage points. The effect is even more pronounced in emerging economies, where strong rules during stress amplify recession risk to 7.4 percentage points compared to 1.7 percentage points under weak rules. During low financial stress, neither advanced nor emerging economies show significant effects regardless of rule stringency, confirming that the amplification mechanism is specific to periods of market pressure. The larger point estimates for emerging economies are consistent with these countries facing tighter financial constraints and more limited access to countercyclical financing during stress episodes, making stringent fiscal frameworks particularly costly.

Second, to ensure our results are not artifacts of the continuous spread specifi-

cation, we re-estimate the baseline model using a binary indicator of financial stress. Table 10 defines high financial stress as periods when the sovereign spread exceeds XYZ (approximately XYZ basis points), which corresponds roughly to the 75th percentile of the distribution. The pattern of results strengthens under this specification. During low financial stress, consolidations under weak rules have no significant effect (0.2 percentage points), while strong rules generate a small positive effect (1.2 percentage points). During high financial stress, the amplification becomes clearer, weak rules produce a modest increase in recession probability (0.9 percentage points), while strong rules generate a 11.8 percentage point increase. The larger magnitudes under the binary specification reflect the fact that we are now comparing extreme stress episodes to calm periods rather than marginal changes in spreads, but the qualitative pattern remains consistent with our baseline findings.

Third, to examine how the amplification effect evolves over time, we employ local projections (Jordà, 2005). This approach estimates separate regressions for each future horizon, allowing us to trace out the dynamic response of recession probability to consolidations under different combinations of financial stress and rule stringency. For each horizon $h = 0, 1, ..., 4$, we estimate:

$$\begin{aligned} p\_recess_{i,t+h} = \alpha_i^h + \gamma_t^h + \beta_1^h \cdot consol_{it} + \beta_2^h \cdot spread_{it} + \beta_3^h \cdot qrules_{it} \\ + \beta_4^h \cdot (consol \times spread)_{it} + \beta_5^h \cdot (consol \times qrules)_{it} \\ + \beta_6^h \cdot (consol \times spread \times qrules)_{it} + \theta^h X_{it} + \epsilon_{i,t+h} \end{aligned} \tag{3}$$

We use Driscoll-Kraay standard errors with 4 lags to account for cross-sectional and temporal correlation. The analysis focuses on the first 5 years after the initiation of a fiscal consolidation, as longer horizons yield imprecise estimates.

Figure 8 presents the marginal effects of consolidation on the probability of recession on each horizon under four scenarios: high versus low financial stress and weak versus strong fiscal rules. The dynamic patterns reveal several implications. First, the amplification effect is immediate and concentrated in the short run. Under high financial stress with strong rules (panel b), a one-unit consolidation increases the probability of recession by approximately 8 percentage points in the year of implementation. This effect persists at similar magnitudes throughout years 1-2 before gradually declining,

although remaining elevated (around 5-6 percentage points) throughout year 4. In contrast, under high stress with weak rules (panel a), the immediate effect is smaller (approximately 2 percentage points) and quickly becomes statistically indistinguishable from zero after the first year.

Second, during low financial stress (panels c and d), consolidations have minimal effects on the probability of recession regardless of the stringency of the rules. The point estimates remain close to zero throughout the five-year horizon, with confidence intervals that include zero at all horizons. This reinforces that the challenges from stringent fiscal rules manifests specifically during periods of market pressure.

Third, the persistence of effects under strong rules during stress suggests that the output costs are not merely front-loaded and subsequently reversed, but instead relatively persistent over time. There is no clear evidence that stronger rules provide medium-term benefits that offset short-term costs. In fact, local projections, confirm that fiscal rule constraints during financial stress tend to impose immediate and persistent costs on macroeconomic stability. Ultimately, our result is consistent with the idea of more flexible, state-contingent fiscal frameworks.

5 A Simple Framework

In this section, we propose a stylized model to rationalize the empirical findings and in particular illustrate how fiscal rule stringency amplifies the output costs of consolidation during periods of financial stress.

Consider a government that must implement a fiscal consolidation of size $\Delta > 0$ during either low financial stress (s_L, low spreads) or high financial stress (s_H, high spreads). The government chooses a consolidation mix across three instruments: spending cuts (x_1), revenue measures (x_2), and efficiency improvements (x_3). These instruments differ in their output costs $\omega_j(s)$ and in how financial markets value them for credibility purposes (ϕ_j).

Empirical evidence suggests that spending cuts have high output costs that increase sharply during financial stress, while revenue measures have moderate costs that are relatively stable across states, and efficiency improvements have low costs that

are not state-dependent (Guajardo et al., 2014; Alesina and Ardagna, 2010; Ardanaz et al., 2021). Following the state-dependent fiscal policy literature (Auerbach and Gorodnichenko, 2012; Ramey, 2011), the government minimizes total output cost $\Omega = \sum_{j=1}^{3} \omega_j(s) \cdot x_j$, subject to three constraints: achieving the required consolidation ($\sum_{j=1}^{3} x_j = \Delta$), maintaining market credibility ($\sum_{j=1}^{3} \phi_j \cdot x_j = \bar{\phi}(s)$, where $\bar{\phi}(s_H) > \bar{\phi}(s_L)$ reflects higher market scrutiny during stress), and satisfying the fiscal rule constraint ($\sum_{j=1}^{3} \theta_j(R) \cdot x_j \leq \bar{X}(R, s)$, where $R \in [0, 1]$ measures rule stringency and $\theta_j(R)$ captures how much the rule restricts instrument j).

5.1 Key Assumptions

Our framework relies on two empirically-motivated assumptions. First, spending cuts become much more costly during financial stress ($\omega_1(s_H) \gg \omega_1(s_L)$), while other instruments have relatively stable costs. This captures the empirical finding that spending-based consolidations are particularly harmful when credit markets are disrupted (Végh and Vuletin, 2015; Lim, 2020*a*).

Second, more stringent rules disproportionately restrict revenue measures and efficiency improvements, forcing greater reliance on spending cuts. Formally, $\theta_2(R)$ and $\theta_3(R)$ increase faster with R than does $\theta_1(R)$. The intuition comes from the institutional design of fiscal rules. Budget balance rules require balanced budgets within short horizons. When revenues decline during financial stress, such rules mandate immediate spending cuts to close the gap, directly restricting the government's ability to rely on revenue measures or efficiency improvements that take time to implement (Debrun et al., 2008). Similarly, debt rules impose ceilings that bind precisely when spreads rise and borrowing costs increase, forcing front-loaded spending adjustments rather than allowing gradual revenue-based consolidations that could be phased in over time. More stringent rules (those with stricter numerical targets, broader coverage, and stronger enforcement) amplify these constraints by leaving less room for compositional flexibility. In contrast, less stringent rules or those with well-designed escape clauses preserve flexibility to choose the consolidation mix optimally across states (Eyraud et al., 2018).

5.2 Results

We compare outcomes under less stringent rules (R_{low}) versus more stringent rules (R_{high}) and establish two results.

Proposition 1 (Stringent Rules Increase Output Costs)**.** $\Omega^{strong}(s) \geq \Omega^{weak}(s)$ *for all states* s*, with strict inequality when the stringency constraint binds.*

More stringent rules add an additional constraint to the government's optimization problem. By standard constrained optimization, this cannot reduce the minimized cost and increases it when the constraint binds. (Formal proof in Appendix A.1.)

Proposition 2 (State-Dependent Amplification)**.** *The additional cost from stringent rules is larger during financial stress:*

$$\left[\Omega^{strong}(s_H) - \Omega^{weak}(s_H)\right] > \left[\Omega^{strong}(s_L) - \Omega^{weak}(s_L)\right] \tag{4}$$

Under less stringent rules, governments optimally substitute away from spending cuts during financial stress (when $\omega_1(s_H)$ is very high) toward revenue measures and efficiency improvements. Stringent rules restrict this substitution, forcing greater use of the now-costly spending instrument when it imposes maximum harm. Flexibility is most valuable when adjustment is most needed: during calm periods, when consolidation instruments have similar costs, restricting instrument choice has modest consequences. During stress, when spending cuts become far more costly than alternatives, preventing this reallocation imposes substantial output losses. The additional cost from strengthening rules is therefore much larger during financial stress than during calm periods. (Formal proof in Appendix A.2.)

5.3 Mapping to Empirical Specification

Our stylized framework connects to the empirical specification (2) in Section X. Based on our simple model we can establish four predictions. First, $\beta_4 > 0$: consolidations increase recession probability more during periods of elevated spreads, reflecting that output costs $\omega_j(s)$ are state-dependent and higher during financial stress (Assumption 1). Second, $\beta_5 < 0$: during normal times, higher-quality rules reduce the contractionary impact of consolidations, consistent with the disciplinary bene-

fits that credible fiscal frameworks provide when market pressure is absent. Third, $\beta_6 > 0$: the amplification effect (Proposition 2); higher-quality rules magnify the contractionary impact of consolidations specifically during financial stress, when stringent rule constraints force governments onto suboptimal consolidation paths. Fourth, the total marginal effect of consolidation on the probability of a recession, given by $\frac{\partial p\_recess}{\partial consol} = \beta_1 + \beta_4 \cdot spread + \beta_5 \cdot qrules + \beta_6 \cdot spread \cdot qrules$, is most positive (most contractionary) when both spreads and rule quality are high, as predicted by Proposition 2.

6 Conclusion

Fiscal consolidations remain a recurring challenge for governments worldwide, particularly in emerging and developing economies that face volatile capital flows and limited fiscal space. This paper examines how the institutional frameworks designed to promote fiscal discipline affect the macroeconomic costs of consolidation. We document that fiscal rules interact with financial market conditions in ways that substantially amplify recession risks during adjustment episodes. This amplification arises because stringent rules constrain governments' ability to choose the composition and timing of consolidation measures, forcing reliance on costly instruments precisely when flexibility would be most valuable.

Our analysis proceeds in three stages. First, using survival analysis, we show that fiscal rules exhibit state-dependent effects on the probability of consolidation. During calm periods, rules have minimal influence on whether countries consolidate. During periods of elevated financial stress, however, rules significantly increase the likelihood of consolidation, suggesting they become binding constraints when financial markets apply pressure. This finding establishes the mechanism: fiscal rules force consolidations during precisely the periods when such adjustments may be most costly.

Second, we conclude that consolidations increase the probability of recession by 2.0 percentage points during high-spread periods under weak fiscal rules but by 7.9 percentage points under stringent rules. During low-spread periods, rule stringency has minimal effect on consolidation costs. This pattern holds across multiple specifications, appears in both advanced and emerging economies (with larger effects in the latter),

and survives alternative measures of financial stress. Disaggregating by rule type reveals that balance rules generate the strongest amplification effects, followed by debt rules, while expenditure rules show minimal amplification. Local projection estimates confirm these costs persist for 3-4 years following consolidation rather than dissipating quickly.

Third, we develop a simple framework that rationalizes these findings. The model features a government choosing among consolidation instruments that differ in output costs and market credibility, subject to constraints from fiscal rules that restrict instrument choice. The framework shows that stringent rules force governments away from optimal consolidation strategies during stress by preventing substitution toward less costly instruments. The implications of this framework align closely with our empirical findings.

Why do higher-quality fiscal rules amplify recession risks? The answer reflects a distinction between rule quality and rule optimality across states. Traditional fiscal rule quality indices reward institutional characteristics that enhance credibility during normal times but do not assess whether rules incorporate adequate state-contingent flexibility for crisis periods. Our sample predominantly captures first-generation fiscal rules, and even when escape clauses existed, governments rarely activated them. This predominance of inflexible rules explains the substantial amplification effects we document.

Our findings carry important implications for fiscal rule design, particularly in emerging and developing economies. The central message is not that fiscal rules are counterproductive, rather, the lesson is that rule design matters critically for macroeconomic outcomes during financial stress episodes. Fiscal rules should incorporate well-designed escape clauses that permit temporary deviations during severe financial stress, with clear activation procedures and transparent re-entry provisions. The choice of rule type also matters: budget balance rules mandate immediate spending cuts when revenues decline (maximizing output costs during stress), while expenditure rules permit greater flexibility by targeting spending growth rather than absolute levels. Countries with higher exposure to sudden stops and volatile capital flows face particularly severe costs from rigid fiscal frameworks, suggesting that institutional

arrangements optimal for advanced economies may impose larger costs in emerging market contexts. International financial institutions may want to incorporate these considerations when advising on fiscal framework design, recognizing that rules permitting compositional flexibility can protect growth-enhancing spending while maintaining aggregate discipline.

This analysis opens several avenues for future research. Latin America provides a particularly valuable setting since the region has extensive experience with fiscal rules, faces recurring pressures from commodity price volatility and sudden stops, and has implemented consolidations under varying financial stress conditions. A regional study could examine whether the amplification effects we document appear with similar or greater magnitude in Latin American contexts, and whether specific rule design features (such as Chile's structural balance rule) successfully mitigate the costs we identify. Beyond regional analysis, the mechanisms through which fiscal rules constrain consolidation composition deserve deeper investigation using detailed fiscal data on expenditure and revenue measures. The political economy of escape clause activation also merits attention, as governments rarely activate clauses even when available. Finally, the interaction between fiscal rules and monetary policy regimes also presents an interesting avenue for future research, as countries with independent monetary policy may better accommodate fiscal consolidations during stress through complementary easing.

References

Alesina, A. and Ardagna, S. (1998), 'Tales of fiscal adjustments', *Economic Policy* **13**(27), 487–545.

Alesina, A. and Ardagna, S. (2010), 'Large changes in fiscal policy: taxes versus spending', *Tax Policy and the Economy* **24**(1), 35–68.

Alesina, A., Barbiero, O., Favero, C., Giavazzi, F. and Paradisi, M. (2017), 'The effects of fiscal consolidations: Theory and evidence', *NBER Working Paper* (23385).

Alesina, A., Favero, C. and Giavazzi, F. (2019), *Austerity: When It Works and When It Doesn't*, Princeton University Press, Princeton.

Alesina, A. and Perotti, R. (1997), 'Fiscal adjustments in oecd countries: Composition and macroeconomic effects', *IMF Staff Papers* **44**(2), 210–248.

Andrián, L., Hirs-Garzon, J., Urrea, I. L. and Valencia, O. (2024), 'Fiscal rules and economic cycles: Quality (always) matters', *European Journal of Political Economy* **85**, 102591.

Andrian, L., Rodriguez, C. M. and Valencia, O. M. (2025), 'Surges in the shadows: Stock-flow adjustments and public debt spikes', *Emerging Markets Review* p. 101306.

Ardanaz, M., Cavallo, E., Izquierdo, A. and Puig, J. (2021), 'Growth-friendly fiscal rules? safeguarding public investment from budget cuts through fiscal rule design', *Journal of International Money and Finance* **111**, 102319.

Auerbach, A. J. and Gorodnichenko, Y. (2012), 'Measuring the output responses to fiscal policy', *American Economic Journal: Economic Policy* **4**(2), 1–27.

Davoodi, H. R., Elger, P., Fotiou, A., Garcia-Macia, D., Han, X., Lagerborn, A., Lam, W. R. and Medas, P. A. (2022), Fiscal rules and fiscal councils: Recent trends and performance during the covid-19 pandemic, IMF Working Paper WP/22/11, International Monetary Fund.

Debrun, X., Epstein, N. and Symansky, S. (2008), A new fiscal rule: Should israel "go swiss?", IMF Working Paper WP/08/87, International Monetary Fund.

Eyraud, L., Debrun, X., Hodge, A., Lledó, V. D. and Pattillo, C. A. (2018), Second-generation fiscal rules: Balancing simplicity, flexibility, and enforceability, Staff Discussion Notes 18/04, International Monetary Fund.

Fatás, A. and Mihov, I. (2006), 'The macroeconomic effects of fiscal rules in the us states', *Journal of Public Economics* **90**(1-2), 101–117.

Frankel, J. A., Vegh, C. A. and Vuletin, G. (2013), 'On graduation from fiscal procyclicality', *Journal of Development Economics* **100**(1), 32–47.

Fritsche, J. P., Gräb, J. and Walters, J. (2021), 'Fiscal policy in the european union: Counter-cyclical and productive public spending', *Journal of International Money and Finance* **119**, 102492.

Georgantas, G., Kasselaki, M. and Tagkalakis, A. (2023), 'The effects of fiscal consolidation in oecd countries', *Economic Modelling* **118**, 106099.

Gomez-Gonzalez, J. E., Uribe, J. M. and Valencia, O. M. (2023), 'Does economic complexity reduce the probability of a fiscal crisis?', *World Development* **168**, 106250.

Guajardo, J., Leigh, D. and Pescatori, A. (2014), 'Expansionary austerity? international evidence', *Journal of the European Economic Association* **12**(4), 949–968.

Guerguil, M., Mandon, P. and Tapsoba, R. (2017), 'Flexible fiscal rules and countercyclical fiscal policy', *Journal of Macroeconomics* **52**, 189–220.

International Monetary Fund (2024*a*), Fiscal monitor: Fiscal policy in the great election year, Technical report, International Monetary Fund, Washington, DC.

International Monetary Fund (2024*b*), World economic outlook: Policy pivot raising threats, Technical report, International Monetary Fund, Washington, DC.

Jalles, J. T., Pessino, C. and Calderon, A. C. (2025), Fiscal consolidations in latin america and the caribbean: Do inequality, corruption, and informality matter?, IDB Working Paper 1668, Inter-American Development Bank.

Jordà, Ò. (2005), 'Estimation and inference of impulse responses by local projections', *American Economic Review* **95**(1), 161–182.

Lim, J. J. (2020*a*), 'Do fiscal rules constrain political budget cycles?', *Public Choice* **184**(3), 291–319.

Lim, J. J. (2020*b*), 'The political economy of fiscal procyclicality', *European Journal of Political Economy* **65**, 101932.

Lledó, V., Yoon, S., Fang, X., Mbaye, S. and Kim, Y. (2017), Fiscal rules at a glance, Technical report, International Monetary Fund. Background paper to the 2015 vintage of the IMF Fiscal Rules Dataset.

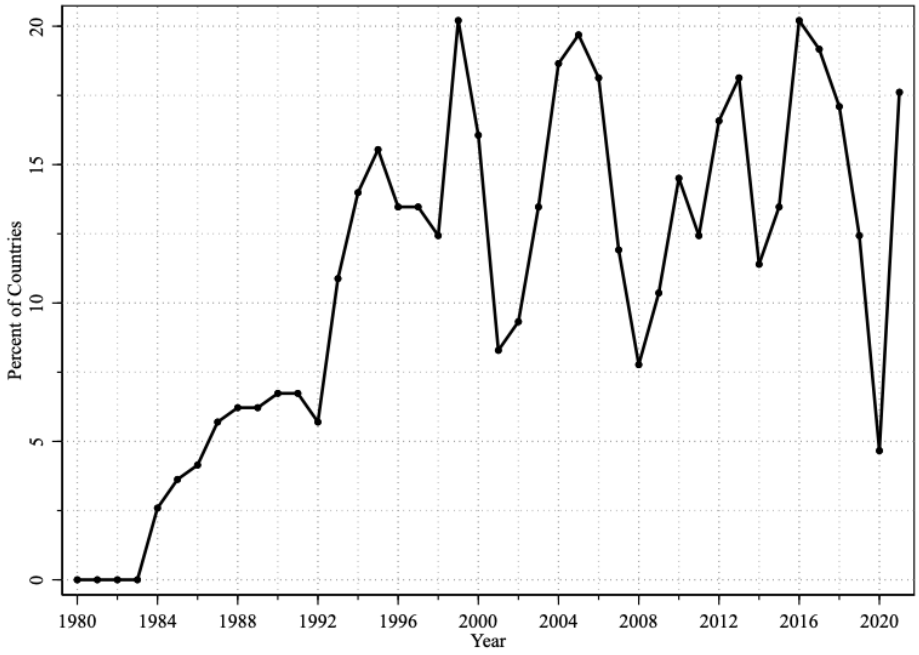
Ramey, V. A. (2011), 'Can government purchases stimulate the economy?', *Journal of Economic Literature* **49**(3), 673–685.

Schaechter, A., Kinda, T., Budina, N. and Weber, A. (2012), 'Fiscal rules in response to the crisis—toward the "next-generation" rules: A new dataset', *IMF Working Paper* (WP/12/187).

Végh, C. A. and Vuletin, G. (2015), 'How is tax policy conducted over the business cycle?', *American Economic Journal: Economic Policy* **7**(3), 327–370.

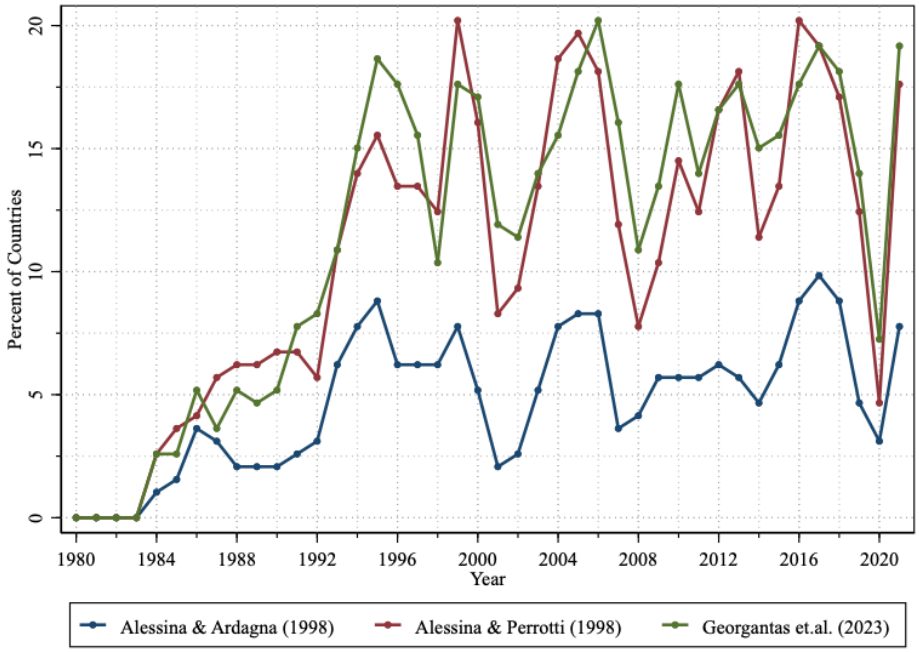
Figures

Figure 1: Fiscal Consolidation Episodes by Year



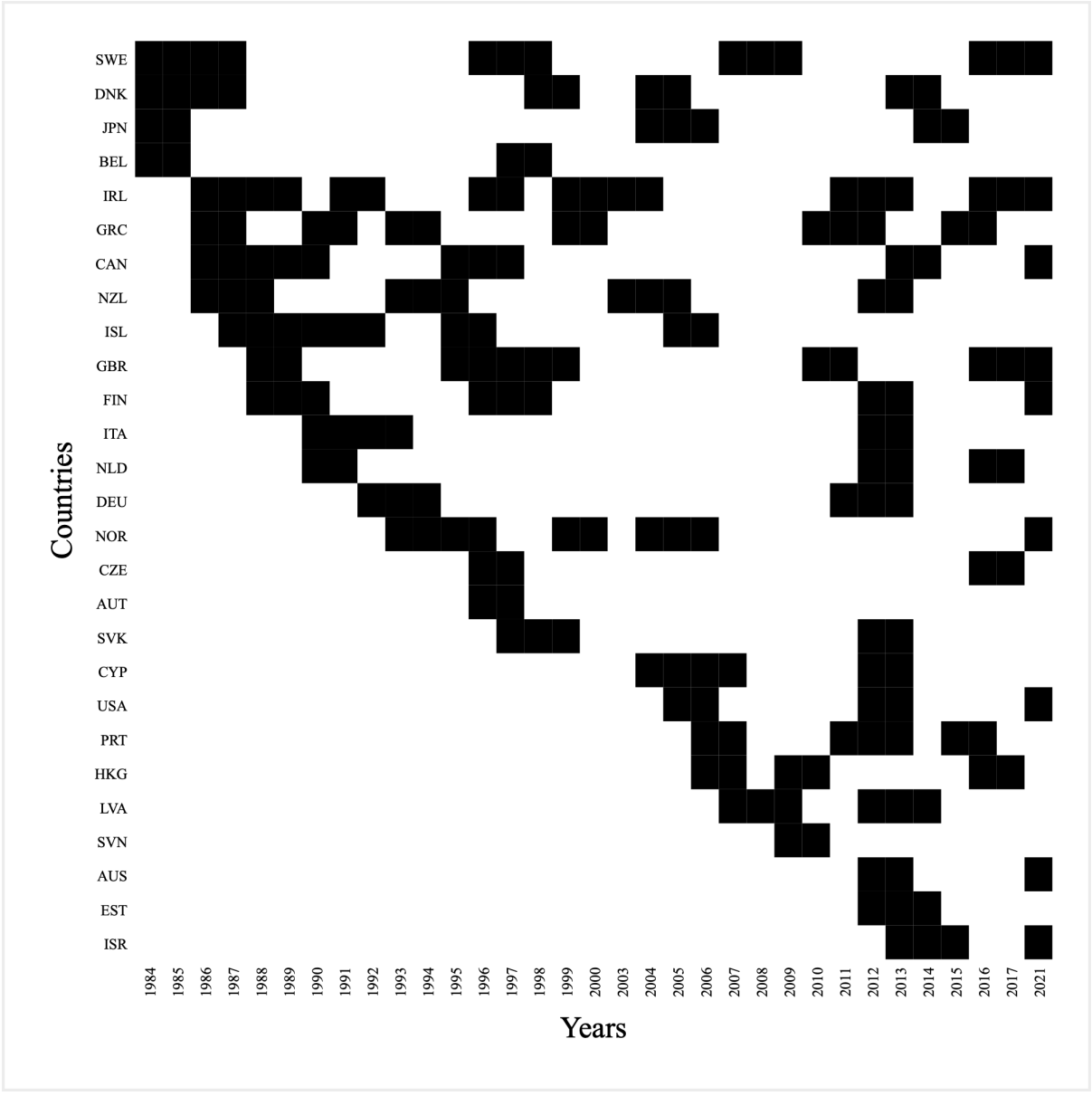
Note: CAPB improvement ≥ 0.5 percentage points over two consecutive years.

Figure 2: Fiscal Consolidation Episodes by Year (All definitions)



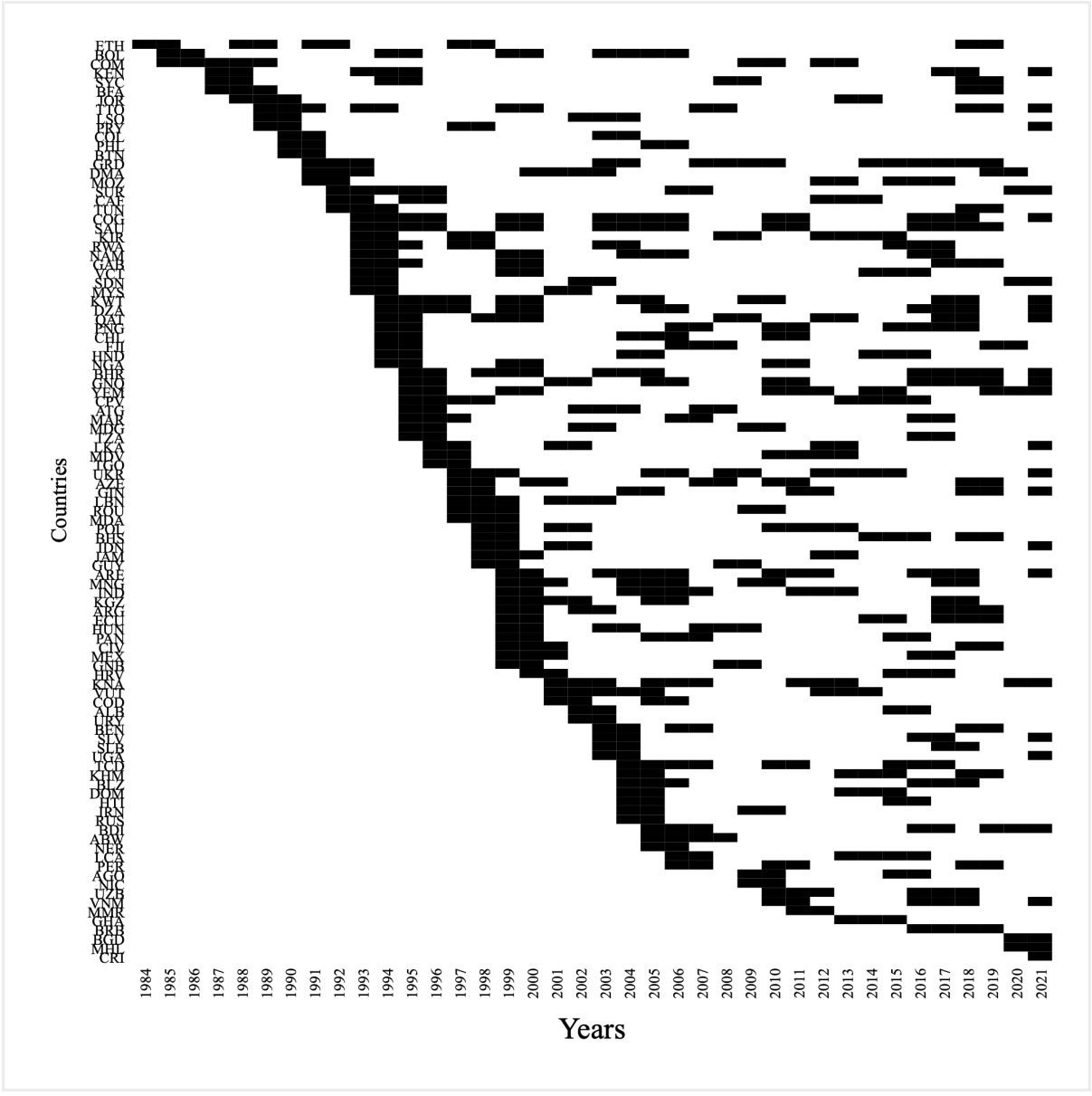
Note:

Figure 3: Fiscal Consolidation Episodes (Advanced countries)



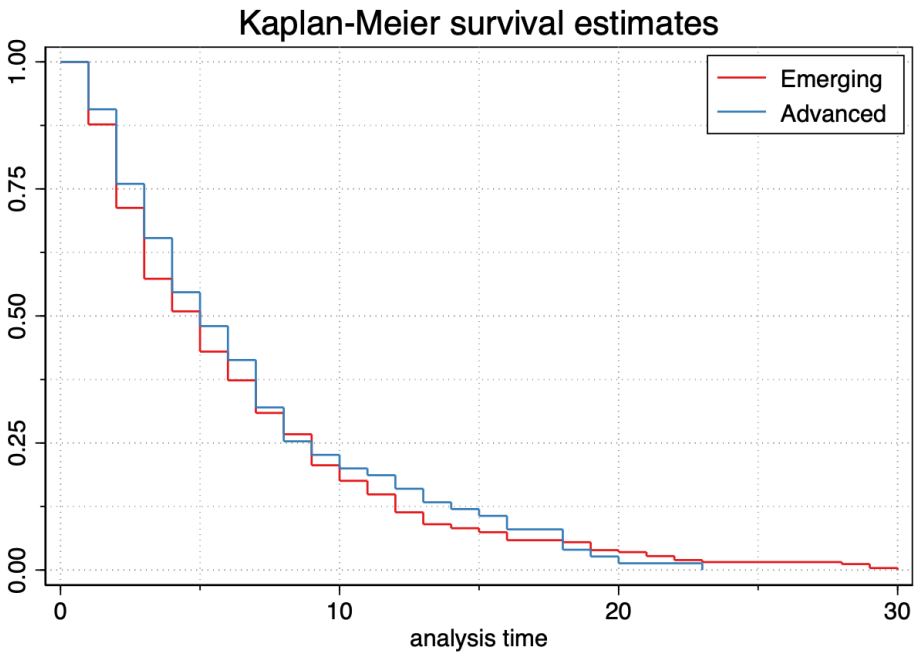
Notes:

Figure 4: Fiscal Consolidation Episodes (Emerging countries)

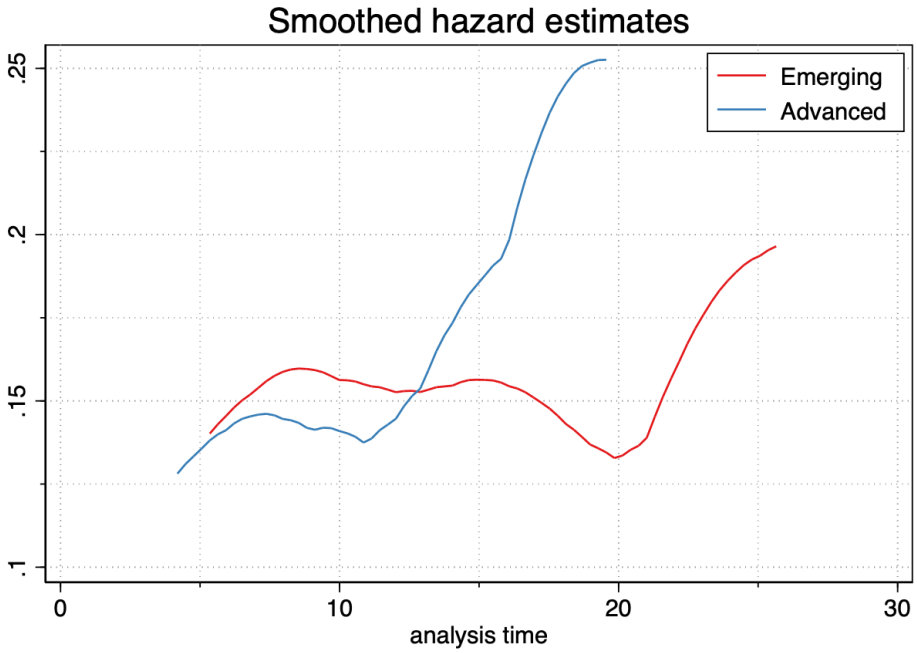


Notes:

Figure 5: Survivorship to Fiscal Consolidation Episode and Hazard Ratios



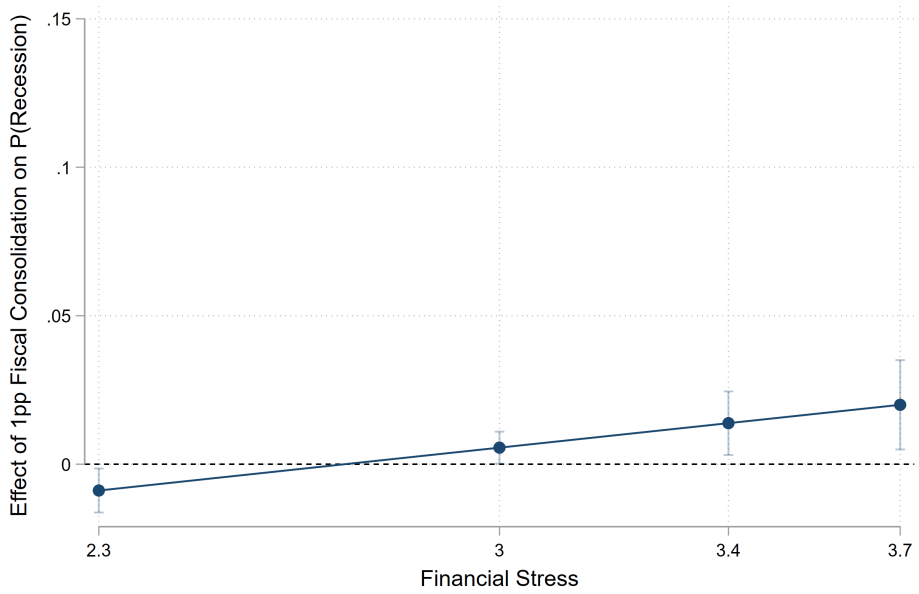
(a) Survival Estimates



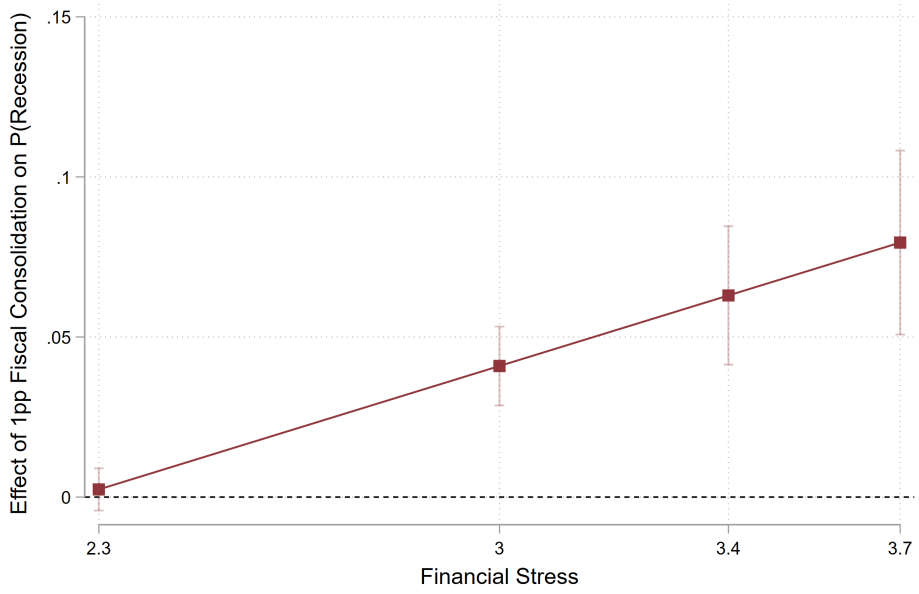
(b) Hazard rate

Note: Using Alesina and Perotti (1997) methodology.

Figure 6: Fiscal Rules Amplify Fiscal Consolidation Risk During Stress



(a) Weak Rule

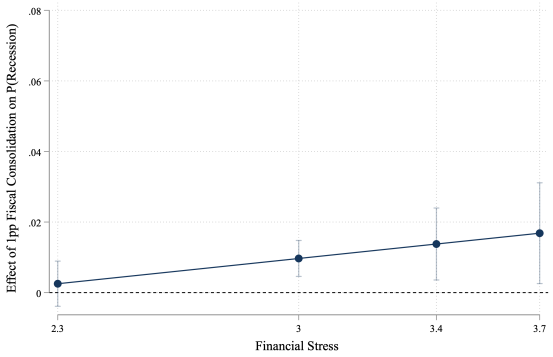


(b) Strong Rule

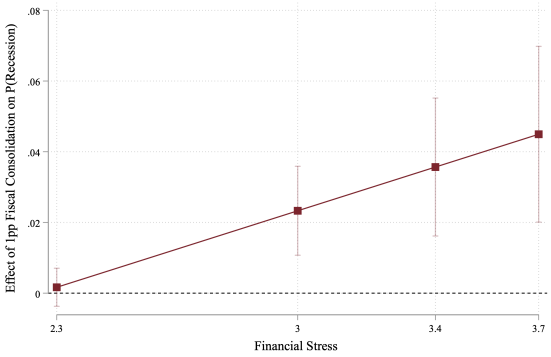
Notes:

Figure 7: Fiscal Rules Amplification of Fiscal Consolidation Risk During Stress, by Type of Rule

Expenditure

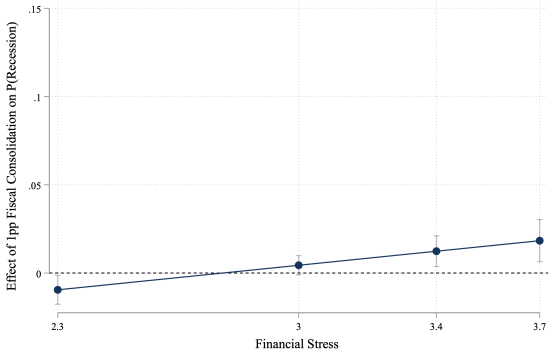


(a) Weak Rule

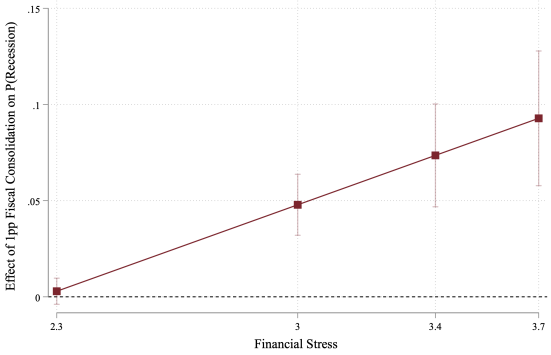


(b) Strong Rule

Budget Balance

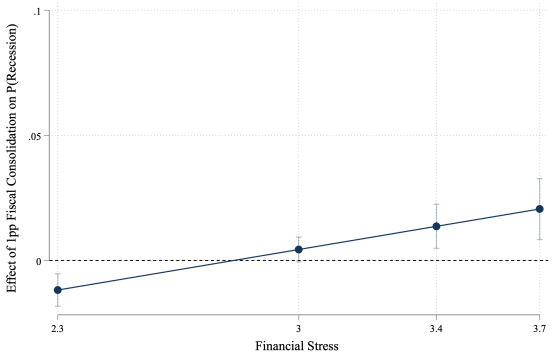


(a) Weak Rule

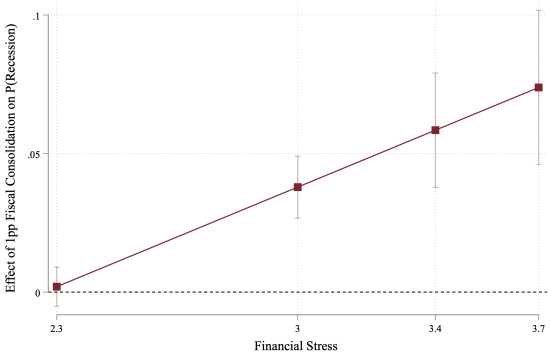


(b) Strong Rule

Debt



(a) Weak Rule

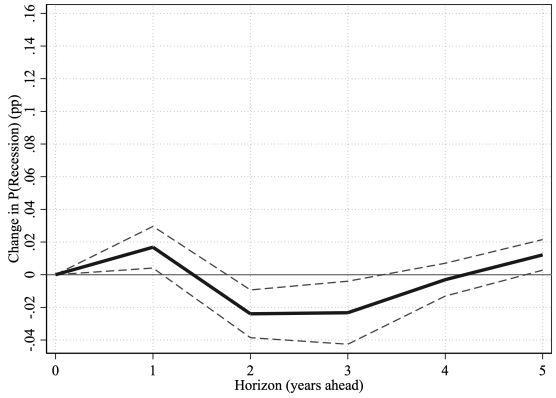


(b) Strong Rule

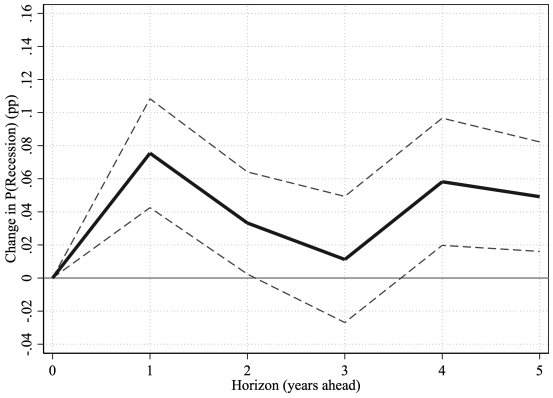
Notes:

Figure 8: Fiscal Consolidation and the Probability of Recession over Time

High Financial Stress

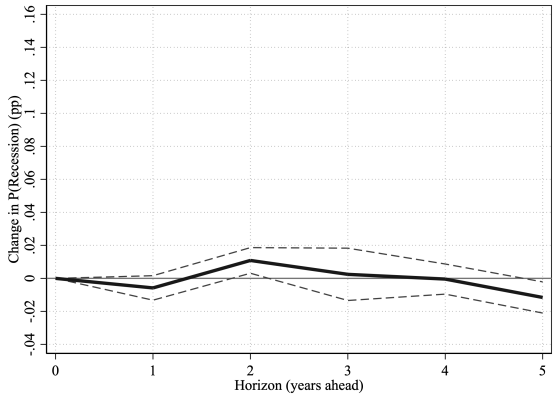


(a) Weak Rule

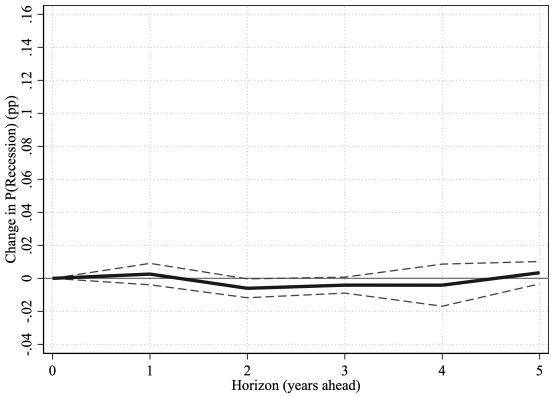


(b) Strong Rule

Low Financial Stress



(c) Weak Rule



(d) Strong Rule

Notes:

Tables

Table 1: Fiscal Consolidation Episodes. 1980-2021

	All	Emerging	Advanced
Fiscal Consolidation	331	257	74
Average Depth (in pp GDP)	7.24	7.94	4.82
Average duration (in years)	2.49	2.47	2.56
Average time to an episode (in years)	6.35	6.24	6.73

Notes: XX.

Table 2: Prevalence of Escape Clauses in Fiscal Consolidation Episodes.

	Before 2008	After 2008	Total
Has Escape Clause	8.0%	47.7%	27.9%
Escape Clause Activated	0.0%	31.0%	17.5%
Fiscal Consolidation Episodes	143	166	309

Notes: Sample includes fiscal consolidation episodes as defined in Section 2. "Has Escape Clause" indicates the country-year had at least one fiscal rule with an escape clause provision. "Escape Clause Activated" is conditional on having an escape clause and indicates the clause was invoked during that episode. The 2008 cutoff reflects the global financial crisis, after which second-generation fiscal rules with enhanced flexibility mechanisms became more common.

Table 3: Duration Analysis of Fiscal Consolidations: Emerging Economies

	Cox Proportional Hazards			Weibull Parametric		
	(1)	(2)	(3)	(4)	(5)	(6)
GDP per capita	-0.059***	-0.055***	-0.078***	0.560***	0.465***	0.465***
	(0.011)	(0.010)	(0.012)	(0.012)	(0.011)	(0.011)
Inflation	0.000***	0.000**	0.000**	-0.000*	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Public Debt	0.002	0.005	0.004	0.003	-0.128	0.074
	(0.021)	(0.020)	(0.019)	(0.168)	(0.082)	(0.087)
Trade	0.000***	0.001***	0.001***	-0.006***	-0.004***	-0.005***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Terms of Trade (growth)	0.000*	0.000*	0.000	-0.002***	-0.002***	-0.001
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
REER Growth	-0.013	-0.000	0.001	0.150	0.006	0.187
	(0.040)	(0.042)	(0.041)	(0.317)	(0.156)	(0.244)
Primary Balance	-0.002***	-0.003***	-0.003***	0.012*	0.015**	0.008**
	(0.001)	(0.001)	(0.001)	(0.007)	(0.007)	(0.004)
Inst. Quality	-0.035**	-0.041***	-0.045***	0.251	0.227***	0.299***
	(0.016)	(0.015)	(0.015)	(0.280)	(0.064)	(0.087)
Fiscal Rule		-0.078***	-0.227***		0.340***	0.954***
		(0.008)	(0.055)		(0.041)	(0.286)
Fiscal Rule X GDP per capita			0.018***			-0.089**
			(0.007)			(0.036)
Observations	1430	1430	1430	1430	1430	1430
No. of Countries	65	65	65	65	65	65
FE	Yes	Yes	Yes	Yes	Yes	Yes
AIC	3004.01	2904.53	2897.05	2550.19	2477.74	2588.81

Notes: XX.

Table 4: Duration Analysis of Fiscal Consolidations: Advanced Economies

	Cox Proportional Hazards			Weibull Parametric		
	(1)	(2)	(3)	(4)	(5)	(6)
GDP per capita	-0.254***	-0.248***	-0.302***	0.314***	0.303***	0.328***
	(0.063)	(0.062)	(0.063)	(0.011)	(0.007)	(0.015)
Inflation	0.003	0.002	0.002	-0.004	-0.005	0.000
	(0.002)	(0.002)	(0.002)	(0.004)	(0.005)	(0.008)
Public Debt	-0.101***	-0.102***	-0.106***	0.297***	0.223***	0.101
	(0.022)	(0.022)	(0.021)	(0.044)	(0.065)	(0.064)
Trade	-0.001*	-0.001*	-0.001	0.005***	0.003***	0.002
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Terms of Trade (growth)	0.001***	0.001***	0.001***	-0.003***	-0.002*	-0.005***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.002)
REER Growth	-0.053	-0.036	-0.044	0.084	-0.115	0.250
	(0.069)	(0.070)	(0.071)	(0.446)	(0.394)	(0.462)
Primary Balance	-0.003***	-0.003***	-0.003***	0.003	0.005	0.007
	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.005)
Inst. Quality	0.016	0.013	0.010	-0.059	0.116	0.163
	(0.015)	(0.015)	(0.015)	(0.106)	(0.088)	(0.102)
Fiscal Rule		-0.048**	-0.479		0.238***	2.600**
		(0.021)	(0.293)		(0.085)	(1.061)
Fiscal Rule X GDP per capita			0.041			-0.237**
			(0.028)			(0.103)
Observations	806	806	806	806	806	806
No. of Countries	30	30	30	30	30	30
FE	Yes	Yes	Yes	Yes	Yes	Yes
AIC	1556.67	1552.29	1559.55	1456.26	1455.27	1522.22

Notes: XX.

Table 5: Duration Analysis of Fiscal Consolidations and Financial Stress

	All Sample		Emerging		Advanced	
	Low	High	Low	High	Low	High
GDP per capita	-0.070***	-0.084***	-0.105***	-0.085***	-0.294***	0.003
	(0.015)	(0.014)	(0.028)	(0.015)	(0.069)	(0.066)
Inflation	0.001	0.000**	0.001	0.000*	0.002	0.010
	(0.002)	(0.000)	(0.002)	(0.000)	(0.003)	(0.007)
Public Debt	-0.038**	-0.002	-0.035	0.004	-0.096***	-0.015
	(0.015)	(0.022)	(0.049)	(0.024)	(0.022)	(0.050)
Trade	-0.000	0.001***	0.001**	0.001***	-0.000	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Terms of Trade (growth)	0.000	0.000**	-0.000	0.000**	0.001***	-0.001
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.006)
REER Growth	0.047	-0.052	0.033	-0.048	-0.015	-0.294
	(0.050)	(0.044)	(0.073)	(0.045)	(0.078)	(0.264)
Primary Balance	-0.002***	-0.002**	-0.005***	-0.002**	-0.002***	-0.006
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.006)
Inst. Quality	-0.006	-0.080***	-0.008	-0.074***	0.005	-0.013
	(0.014)	(0.020)	(0.029)	(0.022)	(0.017)	(0.069)
Fiscal Rule	-0.141	-0.297***	0.007	-0.284***	-0.586	-1.565
	(0.089)	(0.069)	(0.168)	(0.073)	(0.359)	(.)
Fiscal Rule X GDP per capita	0.008	0.029***	-0.008	0.028***	0.051	0.029
	(0.009)	(0.008)	(0.019)	(0.009)	(0.034)	(0.089)
Observations	1415	821	689	741	726	80
No. of Countries	78	66	49	58	29	8
FE	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: Standard errors for the Advanced/High specification could not be computed due to convergence failure with only 80 observations in this subsample.

Table 6: Marginal Effects: The Amplification of Fiscal Rules

	Marginal Effect of Fiscal Consolidation	
	Weak Rules	Strong Rules
Low Financial Stress	-0.009^{**}	0.002
	(0.004)	(0.004)
High Financial Stress	0.02^{**}	0.079^{***}
	(0.009)	(0.017)

Notes: XX.

Table 7: Fiscal Consolidation and Probability of Recession

	(1)	(2)	(3)	(4)
Consolidation depth	-0.065***	-0.065**	-0.066**	-0.065**
	(0.025)	(0.026)	(0.026)	(0.027)
Financial Stress	0.396***	0.396***	0.400***	0.399***
	(0.073)	(0.075)	(0.078)	(0.074)
Fiscal Rule Quality	0.244*	0.241*	0.287**	0.288*
	(0.143)	(0.140)	(0.146)	(0.147)
Consolidation depth X Financial Stress	0.025***	0.025***	0.025***	0.025***
	(0.009)	(0.009)	(0.010)	(0.010)
Consolidation depth X Fiscal Rule Quality	-0.024***	-0.024***	-0.027***	-0.027***
	(0.009)	(0.009)	(0.009)	(0.009)
Financial Stress X Fiscal Rule Quality	-0.105**	-0.104**	-0.122**	-0.122**
	(0.050)	(0.049)	(0.052)	(0.052)
Consolidation depth X Financial Stress X Fiscal Rule Quality	0.012***	0.012***	0.013***	0.013***
	(0.004)	(0.004)	(0.004)	(0.004)
Inflation		0.000	0.000	0.000
		(0.001)	(0.001)	(0.001)
Public Debt			-0.027	-0.029
			(0.116)	(0.114)
Inst. Quality				0.012
				(0.085)
Observations	309	308	307	307
No. of Countries	63	63	63	63
FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: XX.

Table 8: Fiscal Consolidation and Probability of Recession, by Type of Rule

	(1) Expenditure	(2) Budget	(3) Debt
Consolidation depth	-0.027	-0.066***	-0.071***
	(0.021)	(0.023)	(0.021)
Financial Stress	0.479***	0.355***	0.411***
	(0.091)	(0.067)	(0.072)
Fiscal Rule Quality	0.074	0.362***	0.215
	(0.117)	(0.137)	(0.160)
Consolidation depth × Financial Stress	0.013*	0.025***	0.027***
	(0.008)	(0.008)	(0.008)
Consolidation depth × Fiscal Rule Quality	-0.016	-0.030***	-0.017**
	(0.011)	(0.010)	(0.008)
Financial Stress × Fiscal Rule Quality	-0.037	-0.151***	-0.084
	(0.043)	(0.052)	(0.055)
Consolidation depth × Financial Stress × Fiscal Rule Quality	0.007	0.015***	0.010***
	(0.005)	(0.004)	(0.003)
Marginal Effect at Low Financial Stress	0.002	0.003	0.002
	(0.003)	(0.004)	(0.004)
Marginal Effect at High Financial Stress	0.045	0.093***	0.074***
	(0.015)	(0.021)	(0.017)
Observations	309	309	309
No. of Countries	63	63	63
FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: XX.

Table 9: Marginal Effects: The Amplification of Fiscal Rules by Economic Development

(a) Advanced Countries

	Marginal Effect of Fiscal Consolidation	
	Weak Rules	Strong Rules
Low Financial Stress	−0.002	−0.002
	(0.009)	(0.006)
High Financial Stress	−0.013	0.057***
	(0.055)	(0.027)

(b) Emerging Countries

	Marginal Effect of Fiscal Consolidation	
	Weak Rules	Strong Rules
Low Financial Stress	−0.009	−0.003
	(0.008)	(0.009)
High Financial Stress	0.017***	0.074***
	(0.007)	(0.037)

Notes: XX.

Table 10: Marginal Effects: The Amplification of Fiscal Rules under an Alternative Definition of Spread

	Marginal Effect of Fiscal Consolidation	
	Weak Rules	Strong Rules
Low Financial Stress	0.002	0.012***
	(0.004)	(0.003)
High Financial Stress	0.009***	0.118***
	(0.001)	(0.020)

Notes: XX.

Appendix A: Proofs

A.1 Proof of Proposition 1

Proposition 1: For any $R > 0$ and state s: $\Omega^R(s, R) \geq \Omega^*(s)$ with strict inequality when the rule constraint binds.

Proof. The unconstrained problem is:

$$\Omega^*(s) = \min_{x_1, x_2, x_3} \sum_{j=1}^{3} \omega_j(s) \cdot x_j$$

subject to:

$$\sum_{j=1}^{3} x_j = \Delta$$

$$\sum_{j=1}^{3} \phi_j \cdot x_j = \bar{\phi}(s)$$

$$x_j \geq 0 \quad \forall j$$

The rule-constrained problem adds one additional constraint:

$$\Omega^R(s, R) = \min_{x_1, x_2, x_3} \sum_{j=1}^{3} \omega_j(s) \cdot x_j$$

subject to the same constraints plus:

$$\sum_{j=1}^{3} \theta_j(R) \cdot x_j \leq \bar{X}(R, s)$$

By the principle of constrained optimization, adding a constraint to a minimization problem cannot decrease the optimal value. Therefore $\Omega^R(s, R) \geq \Omega^*(s)$.

Strict inequality holds when the rule constraint binds at the unconstrained

optimum. That is, if the unconstrained solution $\{x_j^*(s)\}$ satisfies:

$$\sum_{j=1}^{3} \theta_j(R) \cdot x_j^*(s) > \bar{X}(R, s)$$

then the rule constraint is violated, forcing the government to choose a different allocation with higher output cost, so $\Omega^R(s, R) > \Omega^*(s)$. □

A.2 Proof of Proposition 2

Proposition 2: Under assumptions (i) and (ii), $\left[\Omega^R(s_H, R) - \Omega^*(s_H)\right] > \left[\Omega^R(s_L, R) - \Omega^*(s_L)\right]$.

Proof. We establish this result by comparing the shadow prices of the rule constraint across states.

Step 1: Set up the Lagrangians

For the unconstrained problem in state s, the Lagrangian is:

$$\mathcal{L}^* = \sum_{j=1}^{3} \omega_j(s) \cdot x_j + \lambda_1 \left(\Delta - \sum_{j=1}^{3} x_j \right) + \lambda_2 \left(\bar{\phi}(s) - \sum_{j=1}^{3} \phi_j \cdot x_j \right)$$

For the rule-constrained problem, add the rule constraint with multiplier $\mu(s, R) \geq 0$:

$$\mathcal{L}^R = \sum_{j=1}^{3} \omega_j(s) \cdot x_j + \lambda_1 \left(\Delta - \sum_{j=1}^{3} x_j \right) + \lambda_2 \left(\bar{\phi}(s) - \sum_{j=1}^{3} \phi_j \cdot x_j \right) + \mu(s, R) \left(\sum_{j=1}^{3} \theta_j(R) \cdot x_j - \bar{X}(R, s) \right)$$

The first-order condition for instrument j in the rule-constrained problem is:

$$\omega_j(s) - \lambda_1 - \lambda_2 \phi_j + \mu(s, R) \theta_j(R) = 0$$

Step 2: Show that $\mu(s_H, R) > \mu(s_L, R)$

By the envelope theorem applied to parameter $\bar{X}(R, s)$:

$$\frac{\partial \Omega^R(s, R)}{\partial \bar{X}} = -\mu(s, R)$$

The shadow price $\mu(s, R)$ represents the marginal reduction in output cost from relaxing the rule constraint by one unit. This shadow price is higher when: (a) The constraint is more binding (feasible set is more restricted) (b) The marginal instruments being restricted have higher output costs

Consider state s_L (low stress): Many instruments have relatively low and similar costs $\omega_j(s_L)$. When the rule restricts some instruments, the government can substitute to other instruments without large cost increases. Therefore, the marginal value of relaxing the constraint is moderate: $\mu(s_L, R) = \mu_L$.

Consider state s_H (high stress): By Assumption (i), instrument 1 (spending cuts) now has much higher cost: $\omega_1(s_H) \gg \omega_1(s_L)$. The government would like to substitute away from this instrument. However, by Assumption (ii), the rule constraint disproportionately restricts this substitution—specifically, $\theta_j(R)$ is large for instruments $j \in \{2, 3\}$ (revenue and efficiency), meaning these preferred instruments are penalized by the rule.

The rule therefore forces greater use of instrument 1 whose cost has risen sharply. The marginal value of relaxing the constraint is much higher: $\mu(s_H, R) = \mu_H \gg \mu_L$.

More formally, for any instrument j used in positive quantity at the optimum ($x_j > 0$), the first-order condition holds with equality, yielding:

$$\mu(s, R) = \frac{\omega_j(s) - \lambda_1 - \lambda_2 \phi_j}{\theta_j(R)}$$

For instruments $j \in \{2, 3\}$ where the constraint binds: - Numerator increases significantly from s_L to s_H when these are restricted (forces use of instrument 1 with $\omega_1(s_H) \gg \omega_1(s_L)$) - Denominator $\theta_j(R)$ is large (these instruments are heavily restricted) - Therefore $\mu(s_H, R) > \mu(s_L, R)$

Step 3: Complete the argument

We have established that $\mu(s_H, R) > \mu(s_L, R)$, meaning the marginal cost of the rule constraint is higher in the high-stress state.

Consider tightening the rule constraint from a level where it doesn't bind (so $\Omega^R = \Omega^*$) to the level $\bar{X}(R, s)$. By the envelope theorem, the total additional cost from

this tightening satisfies:

$$\Omega^R(s, R) - \Omega^*(s) = \int \mu(s, R, \bar{X})\, d\bar{X}$$

where the integral is taken over the path of constraint tightening. Since $\mu(s_H, R) > \mu(s_L, R)$ along this path, we have:

$$\Omega^R(s_H, R) - \Omega^*(s_H) > \Omega^R(s_L, R) - \Omega^*(s_L)$$

This establishes the state-dependent amplification result. □

A.3 Additional Result: Monotonicity in Stringency

For completeness, we show that the amplification effect increases monotonically with rule stringency. $\frac{\partial}{\partial R}\left[\Omega^R(s_H, R) - \Omega^R(s_L, R)\right] > 0$

Proof. By the envelope theorem, the derivative of the minimized objective with respect to parameter R equals the derivative of the Lagrangian with respect to R, evaluated at the optimum:

$$\frac{\partial \Omega^R(s, R)}{\partial R} = \frac{\partial \mathcal{L}^R}{\partial R}\bigg|_{x=x^*(s,R)} = \mu(s, R) \cdot \frac{\partial}{\partial R}\left[\sum_{j=1}^{3} \theta_j(R) \cdot x_j^*(s, R) - \bar{X}(R, s)\right]$$

For simplicity, assume $\bar{X}(R, s)$ is fixed and only the weights $\theta_j(R)$ change with R. Then:

$$\frac{\partial \Omega^R(s, R)}{\partial R} = \mu(s, R) \cdot \sum_{j=1}^{3} \frac{\partial \theta_j(R)}{\partial R} \cdot x_j^*(s, R)$$

By assumption, $\frac{\partial \theta_j(R)}{\partial R} > 0$ (increasing stringency increases the penalty on instruments), with $\frac{\partial \theta_j(R)}{\partial R}$ larger for instruments $j \in \{2, 3\}$ (those with high state-dependent costs when restricted).

The state-dependent difference is:

$$\frac{\partial}{\partial R}\left[\Omega^R(s_H, R) - \Omega^R(s_L, R)\right] = \mu(s_H, R) \cdot \sum_j \frac{\partial \theta_j}{\partial R} \cdot x_j^*(s_H, R) - \mu(s_L, R) \cdot \sum_j \frac{\partial \theta_j}{\partial R} \cdot x_j^*(s_L, R)$$

This can be rewritten as:

$$= \sum_j \frac{\partial \theta_j}{\partial R}\left[\mu(s_H, R) \cdot x_j^*(s_H, R) - \mu(s_L, R) \cdot x_j^*(s_L, R)\right]$$

From Proposition 2, we know $\mu(s_H, R) > \mu(s_L, R)$. For instruments $j \in \{2, 3\}$: - $x_j^*(s_H, R)$ is constrained by the rule - $x_j^*(s_L, R)$ is also constrained but the shadow cost is lower - Therefore: $\mu(s_H, R) \cdot x_j^*(s_H, R) > \mu(s_L, R) \cdot x_j^*(s_L, R)$

Moreover, $\frac{\partial \theta_j}{\partial R}$ is largest for instruments $j \in \{2, 3\}$ (these are most affected by increasing stringency).

The summation is therefore dominated by positive terms from $j \in \{2, 3\}$, implying:

$$\frac{\partial}{\partial R}\left[\Omega^R(s_H, R) - \Omega^R(s_L, R)\right] > 0$$

This establishes that the amplification effect increases with rule stringency. □