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Do Enhanced Collective Action Clauses Affect Sovereign Borrowing Costs?

by Kay Chung and Michael G. Papaioannou

I N T E R N A T I O N A L M O N E T A R Y F U N D

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Monetary and Capital Markets Department

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Abstract

This paper analyzes the effects of including collective action clauses (CACs) and enhanced CACs in international (nondomestic law-governed) sovereign bonds on sovereigns' borrowing costs, using secondary-market bond yield spreads. Our findings indicate that inclusion of enhanced CACs, introduced in August 2014, is associated with lower borrowing costs for both noninvestment-grade and investment-grade issuers. These results suggest that market participants do not associate the use of CACs and enhanced CACs with borrowers' moral hazard, but instead consider their implied benefits of an orderly and efficient debt resolution process in case of restructuring.

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Keywords: collective action clause, sovereign bond contractual clause, governing law, sovereign debt restructuring, default, bond spreads, sovereign cost of borrowing

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I. INTRODUCTION

The experience with the Argentina and Greece sovereign debt restructurings increased the pressure to strengthen the contractual framework and decisively address collective action problems in sovereign debt restructuring. In particular, Argentina had to make steep payments in 2016 after prolonged legal battles with creditors, when the New York court rulings ordered Argentina to make ratable payments to bondholders. The New York court rulings targeting Argentina's two previous debt exchanges (2005 and 2010) and this litigation could affect other similar cases depending on interpretations of specific contractual clauses under New York law and other governing laws.^{2 3}

As similar rulings could have profound consequences for future debt resolutions and ultimately for international financial stability, relevant contractual provisions in international sovereign bond contracts needed to be amended to ensure more orderly future debt restructurings. This could especially be the case for sovereign foreign debt restructurings that involve outstanding bonds without collective action clauses (CACs). As a result, in August 2014, the International Capital Market Association (ICMA) put forward recommendations relating to model enhanced CACs and a model *pari passu* clause for sovereign debt issuers that could facilitate a more efficient and orderly restructuring process. Subsequently, the IMF Executive Board endorsed the ICMA recommendations in October 2014 (IMF 2014).

In general, CACs allow for a supermajority of creditors to impose restructuring terms on minority holdout creditors. This contributes to an efficient resolution process, which typically reduces the cost of restructuring. These *ex post* benefits need to be contrasted with possible costs incurred from a CACs inclusion. As sovereign issuers are averse to *ex ante* increases in the cost of borrowing, CACs are frequently engaged in both policy and academic debates over whether they increase or lower the cost of borrowing. Proponents of CACs focus more on how they facilitate orderly restructurings and thus benefit both investors and borrowers, while skeptics argue that CACs increase the cost of borrowing as investors may consider that these clauses make restructurings easier and in turn compromise future bond returns. This latter moral hazard argument, which is based on the presumption that allowing countries to renegotiate and lower their debt obligations reinforces their profligate behavior, may imply higher yields required by creditors.

² The extent to which these decisions will apply to future sovereign bonds is not clear. In litigation against Argentina in late 2016 and 2017 by holdout creditors, the Southern District Court of New York clarified that a sovereign's decision to pay some creditors but not others *in and of itself* did not give rise to a breach of the *pari passu* clause, and some other acts by the sovereign are necessary.

³ The Financial Markets Law Committee (FMLC), an independent body of legal experts established by the Bank of England to examine issues of legal uncertainty in financial markets, has taken the view that the interpretation of the *pari passu* clause by the New York courts is unlikely to be followed by the English courts.

Empirical analysis can help determine the bond pricing impact of CACs and enhanced CACs. Previous studies have not provided clear conclusions, with their findings often being accompanied by significant data caveats (Bardozzetti and Dottori 2013, Fang 2015, Rath and others 2016, Stolper and Dougherty 2017, Carletti and others 2018, Picarelli and others 2019, Steffen and others 2019). This paper investigates the effect on bond pricing of CACs and enhanced CACs embedded in international sovereign bond contracts by analyzing a comprehensive set of secondary-market bond yield spread data and some stylized primary-market yield observations.

Our study sheds some light on the yield behavior of bonds adopting CACs and enhanced CACs and consequently on the sovereign cost of borrowing, which is a crucial determinant of new sovereign debt issuances. Also, we examine yield developments at times of debt distress that play a crucial role in debt restructurings and relating exchanges. The main innovation of this study is the undertaking of a systematic examination of the sovereign bond pricing impact of the inclusion of the ICMA's 2014 model of enhanced CACs using a comprehensive set of secondary-market sovereign bond yield spread data. While primary-market data allow the assessment of the actual cost of sovereign borrowing at issuance, secondary-market data allow the analysis of the pricing of traded bonds, with and without enhanced CACs, at particular points in time, including times of distress.

By employing primarily emerging-market economies' bond yield spreads over a relatively long period (May 1996–March 2020), we provide a thorough understanding of the bond pricing behavior and impact of CACs. Our findings allow to better qualify the IMF Progress Reports' remarks that inclusion of enhanced CACs doesn't seem to have an observable pricing effect (IMF 2019).⁴ Using secondary-market bond yield spreads, we find that inclusion of regular CACs is associated with lower costs most of the time, while the inclusion of enhanced CACs is associated with lower spreads since the introduction of this clause in August 2014. These results suggest that market participants do not associate the use of CACs and enhanced CACs with borrowers' moral hazard, but rather take into consideration their implied benefits of an orderly and efficient process in case of restructuring.

The remainder of the paper is organized as follows: Section II provides a brief review of the literature on the cost of including CACs. An overview of the evolution of CACs and the current status of international sovereign bonds are presented in Section III. Sections IV and V discuss the findings of our empirical analysis for different historical periods. Finally, Section VI concludes by offering some insights into interpreting our findings.

⁴ Stolper and Dougherty (2017) argue along the same lines.

II. BRIEF LITERATURE REVIEW

Several studies have dealt with the cost aspects of CACs, without consistent empirical findings on the market impact of the inclusion of CACs on bond yields. Public debt managers and market participants contend that it is difficult to assess the absolute impact of specific contractual provisions, given that there are many nonlegal factors impacting bond prices. Such factors include geopolitical risks, the government's negotiating capacity, the likelihood of a bailout by international financial institutions, liquidity conditions, the structure of the investor base, investor relations, credit ratings, and haircut ratios from previous debt exchanges.

There are broadly two opposing views on the cost impact of the inclusion of CACs, namely that inclusion of CACs leads to higher yields or to lower yields of sovereign debt securities. Proponents of the view that CACs are associated with a higher cost of borrowing argue that inclusion of CACs would make it easier for sovereign debtors to restructure their debts, thus effectively decreasing creditors' returns if they come to default. Specifically, they argue that the use of CACs would encourage over-borrowing and would be an easy way out of defaults. In this context, it would promote debtors' moral hazard and, as CACs would increase the chances that investors would take losses, investors would want to be compensated *ex ante* for the added risk with a higher market yield (Eichengreen and Mody 2000, Häselser 2009, De Grauwe 2011, Carletti and others 2018, Ratha and others 2016).

The opposing view argues that inclusion of CACs in bond contracts would make restructurings more orderly and efficient, leading to fewer holdout-creditor problems and less time involvement of creditors in debt resolutions and in turn to the faster economic recovery of distressed countries through quicker international market access and higher trade (Gugiatti and Richards 2003, Bradley and Gulati 2013, Fang and others 2019). In particular, Fang and others (2019) find that CACs help reduce holdout rates, especially for high-haircut debt restructurings. Also, their simulations demonstrate that only the strongest single-limb CACs minimize holdout and litigation risks. In turn, faster economic recovery would lead to a higher expected return on investment in the long run. Therefore, CACs should in principle lower the cost of borrowing and reduce the overall long-term economic risk. Further, other recent empirical studies on the bond pricing impact of CACs inclusion have argued about no discernable CAC-related bond price effects (Stolper and Dougherty 2017) or some possible effects for the euro area (Carletti and others 2018, Picarelli and others 2019, Steffen and others 2019).

As empirical studies on the implied cost of borrowing from the inclusion of CACs in bond contracts have been inconclusive so far, this fundamental question remains practically unsettled. We present below some findings of previous studies analyzing the bond-pricing

effects of CACs for different investment-grade sovereign debt securities and for periods of debt distress for individual sovereigns.

A. Differences in Bond Pricing by Credit Rating

Several studies have looked into specific scenarios to find out how inclusion of CACs would affect the cost of borrowing for countries with different credit ratings. Becker and others (2003) examined the impact of CACs on both primary- and secondary-market bond yields for emerging market issuances on two particular time horizons, capturing the pre- and post-Russian crisis periods. In contrast to the results of Eichengreen and Mody (2004), Becker and others (2003) found no evidence that the presence of CACs had increased borrowing costs, regardless of the issuers' rating. Gugiatti and Richards (2003) found no impact of the inclusion of CACs on yields in several emerging markets (low-rated countries).

Bardozzetti and Dottori (2013), using cross-section, secondary-market yield time-series data, found that CACs have little impact on the cost of borrowing for sovereign issuers with high (AAA to BBB-) and low (B+ to the lowest) credit ratings, but generally reduce the cost for mid-rated issuers (BB+ to B+), as these countries can benefit the most from an orderly restructuring. They argue that since there is a low probability for high-rated countries to default, there would be no impact from including CACs for them. Further, since moral hazard concerns are prevalent for low-rated countries, the cost-reducing impact of CACs is at least partially offset by the higher risk premium. Different from these findings, Bradley and Gulati (2013) found that the inclusion of CACs in a sovereign bond contract was associated with a lower borrowing cost, especially for financially weak issuers, due to expectations of an orderly restructuring process and a speedier economic recovery.

B. Differences in Bond Pricing during Crises

Other studies focus on looking at how the inclusion of CACs would affect the cost of borrowing differently during a time of distress versus normalcy (Annex II, Table 2). Carletti and others (2016) studied Venezuela's secondary-market yield changes during distress. Using cross-section time series panel regressions, they found that the bonds with no CACs that required a 100 percent vote to modify the term (more difficult to restructure and cut returns) were cheaper than bonds with CACs that required a 75 percent and 85 percent vote during the distressed period of 2010–16. However, the inclusion of CACs in Venezuela's bonds was positively associated with the secondary-market yields during near-default situations (for an example of period, the probability of default was over 90 percent in June 2016). Further, Gugiatti and Richards (2003) found no observable pricing differences of sovereign borrowers who switch between the use and nonuse of CACs in their bond issuance. Their empirical evidence shows that even after the intense debate about sovereign debt

restructurings through 2002, the inclusion or absence of CACs still had no economically or statistically significant impact on yields as of early 2003.

III. AN OVERVIEW OF COLLECTIVE ACTION CLAUSES

This section presents the broad rationale and evolution of CACs in international sovereign bond contracts. CACs exist in various forms, with the main intent being to allow a qualifying majority of bondholders to agree to the restructuring terms on their bonds and to make these changes binding on dissenting creditors (holdouts). In this sense, CACs are a tool to facilitate sovereign debt restructuring and, at the same time, to make the investors (financial institutions) share the cost of financial distress of borrowers to reduce the country's taxpayers' burden. This complex nature of sovereign-bond CACs makes it difficult to analyze how the inclusion of CACs is priced in financial markets, reflecting different parties' interests.

The variety of CACs forms relates to their history (Table 1). Sovereign debt issuances prior to 2003 under New York law did not generally include such clauses, while CACs that allow collectively binding restructuring decisions have traditionally been included in sovereign bonds governed by English law. A wide use of CACs started with Mexico in February 2003, with the inclusion of CACs being the market practice for New York-law-governed bonds since then. Although a 75 percent majority of votes required is the typical form of CACs, "required votes" to change the terms varies from 18.75 to 85 percent of the outstanding bondholders (Bradley and Gulati 2013)⁵.

In October 2010, the Eurozone had initiated the inclusion of standardized "double-limb" aggregation Euro CACs in all new euro area government bonds (domestic and foreign law-governed bonds) with a maturity above one year, starting from January 1, 2013. This double-limb aggregated voting structure requires that a minimum threshold of support be achieved both (1) across all series being restructured (75 percent); and (2) in each series (66.67 percent). If an individual series does not meet the 66.67 percent requirement, it is excluded from the restructuring while others that meet the requirement are included. The key advantage of this approach, relative to the traditional series-by-series CAC, is that the minimum level of support needed from each series is lowered from (the typical) 75 percent of outstanding principle to 66.67 percent of outstanding principal, thereby making it more difficult for holdout creditors to obtain a blocking position in a particular issue. While double-limb aggregation clauses in sovereign bonds were a welcome development, they still allow holdouts to control an issue and would not address the collective action problems as effectively as single-limb aggregation.

Further, the ICMA recommended enhanced CACs in August 2014 and a new standard *pari passu* clause for inclusion in sovereign debt securities, which were endorsed by the IMF in

⁵ The 18.75 percent vote typically is applied only if an initial quorum requirement is not satisfied.

October 2014. A single-limb voting procedure enables bonds to be restructured based on a single vote across all instruments or a subset of instruments, thereby preventing a creditor or a group of creditors from holdouts in a particular series and in turn from nullifying the operation of CACs in that series. While issuances that incorporate the enhanced CACs include the key features of the ICMA proposals,⁶ the formulation of the clauses has evolved to suit specific needs and market preferences in various ways.

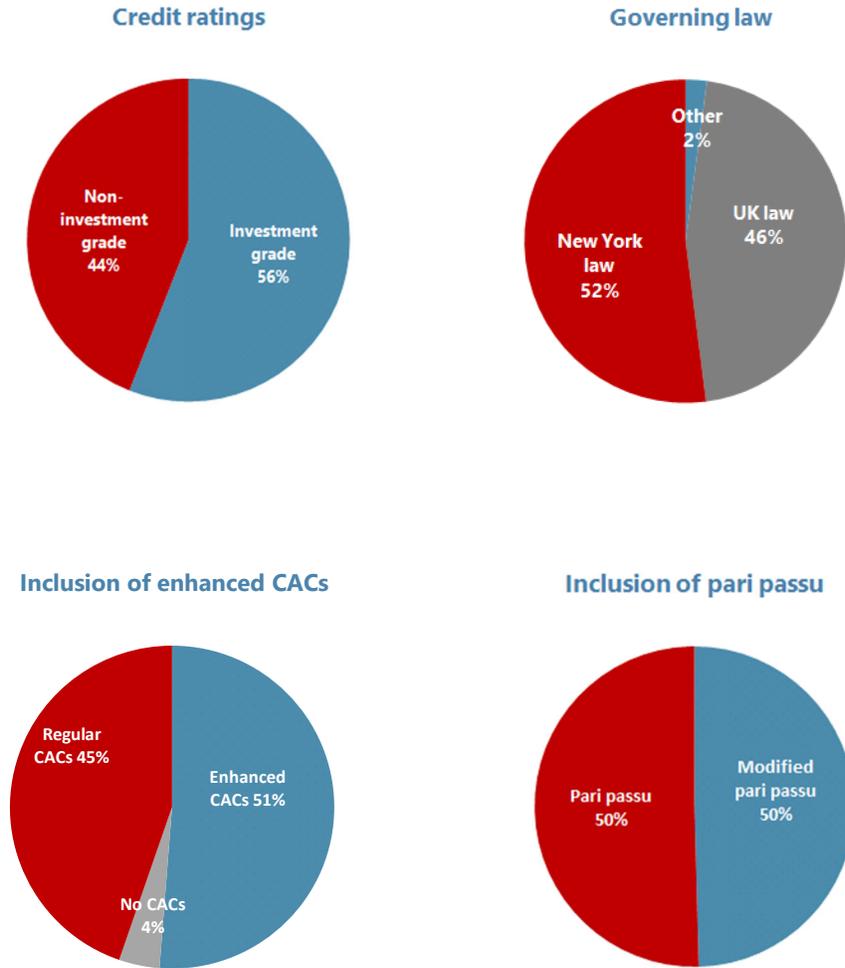
In November 2018, the Eurogroup announced broad support among euro area finance ministers to amend the European Stability Mechanism (ESM) treaty to require single-limb CACs in all euro area issuances by 2022. Currently, the ESM treaty requires the inclusion of double-limb CACs in all issuances by euro area members. The inclusion of single-limb CACs would be a significant development in harmonizing market practice around the world. At present, a substantial proportion of outstanding international sovereign bonds incorporates various forms of CACs⁷. As of March 2020, it is estimated that of the approximately \$1.3 trillion foreign law-governed sovereign bonds outstanding, approximately 46 percent is governed by English law and approximately 52 percent by New York law (Figures 1 and 2). Approximately 51 percent of the outstanding stock includes the ICMA's enhanced CACs, while 45 percent of the outstanding stock has two-limb aggregated or series-by-series CACs (old forms of CACs), and 4 percent did not include any CACs. Out of outstanding bonds without any CACs, about 44 percent is below investment-grade and more exposed to disadvantageous interpretation at the court in case of restructuring. Outstanding bonds without CACs would not mature until 2096, and 75 percent of them are under New York law. The *pari passu* clause, which states that the bond debt will be ranked equally, could be found virtually in every international sovereign debt contract, and about 50 percent of outstanding stock includes the ICMA's strengthened *pari passu* clause.⁸

⁶ The key features of the ICMA model single-limb clauses include: (1) a “uniformly applicable” requirement in a single-limb voting procedure; (2) a 75 percent aggregate voting requirement; and (3) sub-aggregation.

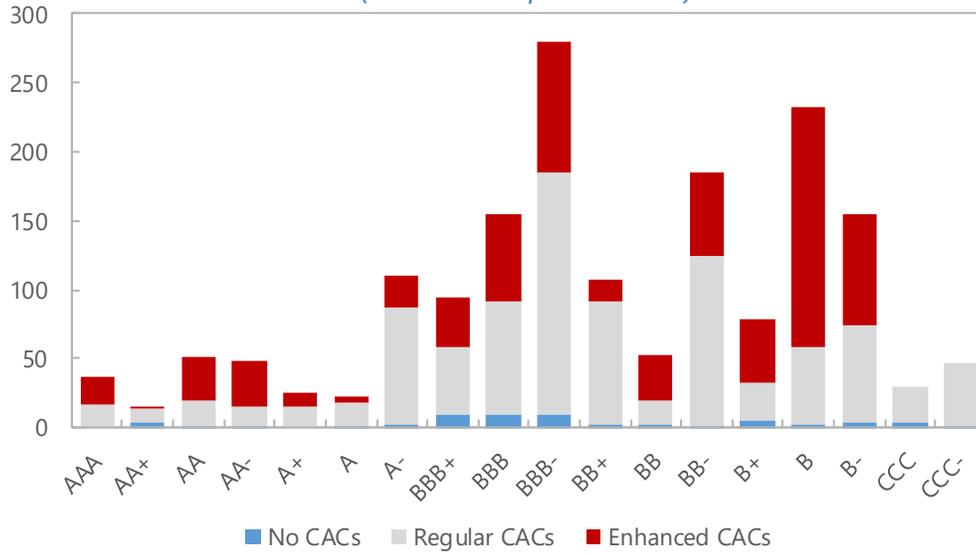
⁷ The share of outstanding stock is calculated based on the outstanding amount in US dollars as of end-March 2019. The most recent official estimate is based on data used in the IMF's Fourth Progress Report on Inclusion of Enhanced Contractual Provisions in International Sovereign Bond Contracts (2019).

⁸ This figure is based on the Bloomberg, Dealogic, Perfect Information database, and various countries' authorities. This excludes GDP warrants and China's domestic issuances under Hong Kong SAR governing law.

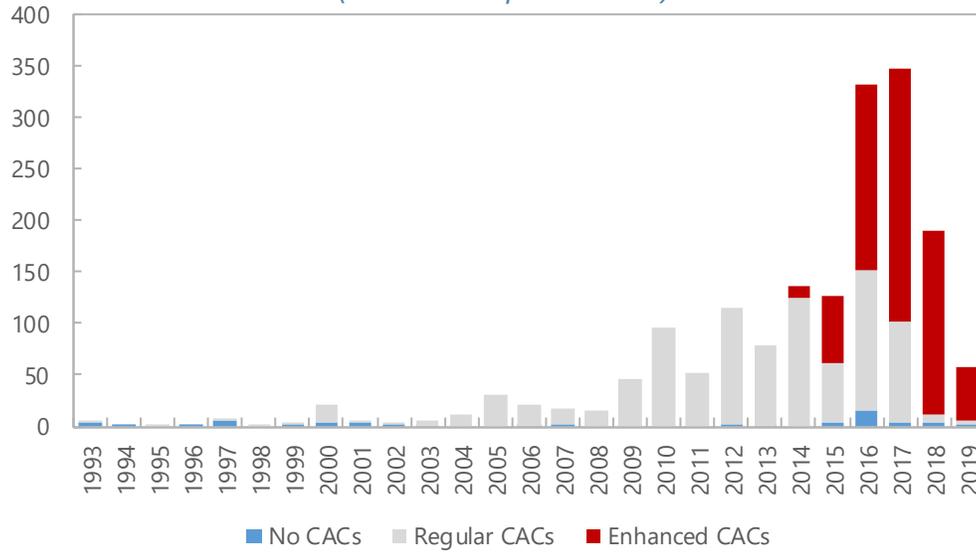
**Figure 1. Foreign Law-Governed Sovereign Bonds: Overview
(as of end-March 2020)**



Outstanding stock: By credit rating (in billions of US dollars)

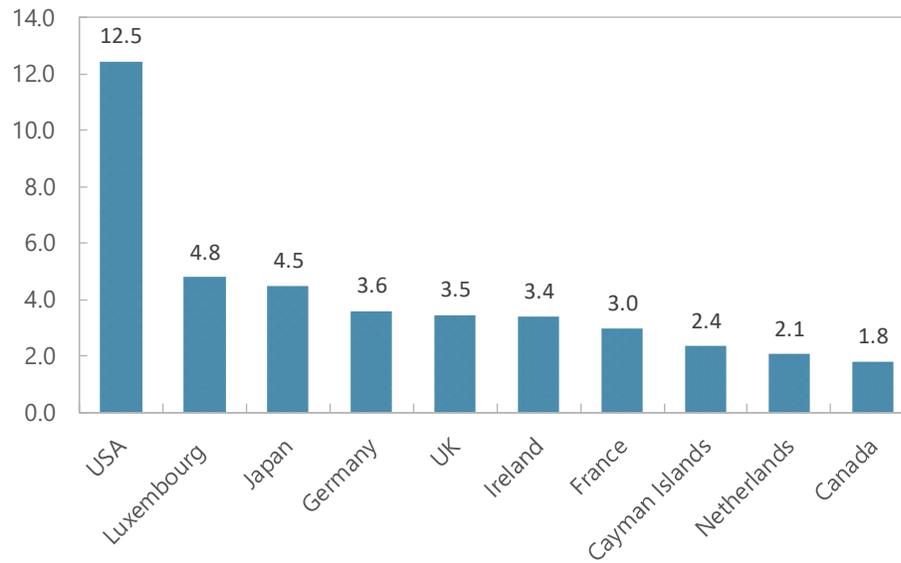


Outstanding stock: By issue year (in billions of US dollars)



Sources: Perfect Information database and IMF staff calculations.

**Figure 2. Total International Portfolio Investment Assets
(in trillions of US dollars; as of June 2019)**



Sources. Coordinated Portfolio Investment Survey and IMF.

Table 1. CACs and the Recent European Sovereign Debt Crisis

Year	Month	Region	Event
2003	Feb.	Global	U.S. Treasury initiative to include CACs in bonds issued under New York Law
2003	Apr.	Euro area	EU members decide to include CACs in the international debt issuance
	Sep.	Euro area	The EU Economic and Finance Committee agreed on a set of core CACs to be voluntarily included in the documentation accompanying the debt issuance
2007	June	USA	Subprime mortgage crisis begins; Bear Stearns falls
		USA	Lehman Brothers files for bankruptcy-court protection
2009	Oct.	Greece	New Greek government announces that earlier fiscal data had been misreported
2010	May	Greece	First economic adjustment and financial assistance program for Greece, financed by European Financial Stability Facility (EFSF) and the IMF
	Oct.	Euro area	Deauville agreement that euro-area sovereign bailouts would require losses be imposed on private creditors
	Oct.	Euro area	German government makes the first proposal to introduce CACs at European Council meeting
	Dec.	Ireland	European Financial Stabilization Mechanism (EFSM)/EFSF and the IMF economic adjustment and financial assistance program was agreed
2011	Mar.	Euro area	Eurozone countries decided at the March 24-25, 2011, European Council meeting to include two-limb CACs in all new euro-area sovereign bonds with a more-than-one year maturity, issued after July 2013
	May	Portugal	EFSM/EFSF and the IMF economic adjustment and financial assistance program was agreed
2012	Mar.	Greece	Second program was signed with the European Commission on behalf of the Eurogroup, the ECB and the IMF, with funding to be provided by EFSF and the IMF
	Mar.	Greece	Yield on Greek 10-year bonds peaks at 33.7%; restructuring of sovereign bonds held by private sector (PSI) by retrofitting CACs (83.5% participation rate; 53.5% haircut)
	Jul.	Euro area	ECB President Mario Draghi's statement of "whatever it takes to preserve the euro" leads to significantly lower bond yields of weak euro-area countries
	Sep.	Euro area	Introduction in the European Stability Mechanism Treaty (Article 12(3)) of CACs for euro-area sovereign bonds issued after January 2013 ("euro-area model CAC 2012")
	Nov.	Greece	Reduction and deferral of Greece's interest payments, extension of loan maturities and signals for additional debt relief
2013	Jan.	Portugal	Portugal returns to bond markets
	Jan.	Euro area	Two-limb CACs become mandatory for euro-area members' sovereign bond issuances
	Dec.	Ireland	Conclusion of EFSM/EFSF program
		Portugal	Portugal returns to economic growth after three years
2014	Apr.	Greece	Greece returns to bond markets, with issuance for the first time in four years
	May	Portugal	Conclusion of EFSM/EFSF program
	Aug.	World	International Capital Market Association (ICMA) introduces enhanced CACs and strengthened pari passu clauses, and IMF Executive Board endorses them
		Ireland	Ireland achieves highest GDP growth in EU
2015	Jun.	Greece	Second program funded by EFSF expires on June 30
	Jul.	Greece	EFSM provides short-term bridge loan (E7 billion) to meet immediate commitments, including loan repayments to the ECB and IMF - loan was repaid on August 15
	Aug.	Greece	Third program was approved by European Stability Mechanism (ESM) Board of Governors, with ESM making its first loan disbursement of E13 billion
	Dec.	Greece	As part of the third program, ESM provides E5.4 billions for recapitalization of the Piraeus and NBG banks
2018	Aug.	Greece	Conclusion of third program with ESM on August 20
	Dec.	Euro area	The Eurogroup announces that ESM members will pursue single-limb CACs in newly issued euro-area sovereign bonds and will introduce them by January 2022
2019	Jun.	Euro area	The Eurogroup, at its June 14 meeting, introduces single-limb CACs in the draft revised text of the ESM Treaty
	Dec.	Euro area	The Eurogroup, at its December 4 meeting, agrees in principle, subject to national procedures, on the elements related to the ESM Reform

Sources: European Financial Stability Facility, European Stability Mechanism, International Capital Market Association, and other various sites.

IV. EFFECTS OF CACs ON SECONDARY-MARKET YIELDS

Below, we provide empirical evidence on the effects of the inclusion of CACs and enhanced CACs on the yield spreads of foreign law-governed sovereign bonds traded in secondary markets. The most significant benefit of using secondary-market yield data is the ability to analyze the evolution of the same bond with enhanced CACs (or without CACs) during normal and crisis times (that is, in a sovereign debt crisis period). By controlling bond characteristics (coupon, tranche size, currency, original maturity, governing law) and time-variant financial-market variables (changes in credit ratings, remaining maturities, bid-ask spread as a liquidity indicator, the Volatility Index (VIX), credit default swap (CDS) spread, inflation, exchange rates, debt-to-GDP ratio, GDP growth rate), we try to shed light on how investors value bonds with and without CACs during times of an imminent potential debt restructuring or other immediate debt-distress concerns.

In addition to the examination of the pricing impact of regular CACs, this study systematically looks at the pricing impact of enhanced CACs since ICMA introduced them in August 2014. Market participants have frequently asserted that investors are relatively less concerned about CACs in normal times or when they buy a bond at issuance, but they start to focus on the existence of CACs and are likely to value the bond differently at times of debt distress. A way to properly identify such market changes is to examine the evolution of secondary-market yields. Some studies also argue that using secondary-market spread minimizes potential endogeneity problems and makes it easier to analyze market perceptions of bonds during specific times, for example, before Russia's distress versus after distress, and before and after the euro sovereign bond crisis.

A. Data

First, we use a sample of advanced economies and emerging markets' foreign law-governed sovereign bonds that were outstanding at the end of March 2020. Secondary-market bond yields were available for 1,025 bonds, omitting bonds with a remaining maturity of less than one year because they tend not to be actively traded and thus result in yields that are not representative of price discovery. Also, we use bonds with secondary-market bond yields for mostly conventional-type bonds with a fixed rate, bullet payment, or simple coupon payment structure, not including bonds with complex coupon payment structures, convertibles, or variable rates. Our sample of outstanding bonded debt consisted of 4 percent bonds with no CACs, 45 percent with regular CACs, and 51 percent with enhanced CACs.

For the dependent variable, we use sovereign bond yield spread (over respective benchmarks) data (in basis points) based on actual price quotes from dealers in the market.⁹

⁹ Primary pricing sources were BVAL and CBBT. If these were not available, we used generic Bloomberg pricing source BGN or others.

Mid-yields to maturity are calculated as a simple average of daily series, then spreads are calculated using as benchmarks the relevant bond yields of the respective currencies of issuance. Sovereign spreads can be interpreted as the expected loss from default and a risk premium, with the latter reflecting investors' price of the risk of unexpected losses (Remolona, 2007). For the independent variables in our analysis, we use Bloomberg data and the IMF World Economic Outlook (WEO) database for individual bond-specific characteristics (for example, coupon, maturity, tranche volume in billions of US dollars, issue currency, stock exchange, governing law, SEC registration, monetary union, and emerging-market identification), while we use other time-variant market data from Bloomberg for time series of credit ratings, GDP growth rate, debt-to-GDP ratio, the VIX, individual country CDSs, inflation, and exchange rates. Emerging markets are broadly defined, including frontier markets and low-income countries.

Information on inclusion of CACs is fine-tuned to encourage better understanding; namely, we use the binary variable for no CACs (1 or 0), CACs (1 or 0), and the new, enhanced CACs (1 or 0), as the three alternatives are mutually exclusive. As for countries' credit ratings, we use time series of S&P's long-term foreign currency sovereign bond credit ratings (complemented by Moody's and Fitch ratings data), converting into numeric values, with the "lower the grade, the larger the numbers" (in Annex II, Table 1, for example, AAA is coded 1, while C is coded 24). Regarding remaining maturities, they are calculated as the time remaining (in years) each month from the original maturities.

Further, we use the Perfect Information database for bond contract information, and Bloomberg and Dealogic for bond market data. From the Bloomberg and Dealogic databases, we obtain all bond market characteristics, including yields at issuance and market yield-to-maturity time series (monthly average series). From the Perfect Information database, we obtain all bond legal characteristics, including various forms of CACs, enhanced CACs, and pari passu and strengthened pari passu clauses. Thorough data indexing developed for each legal clause is a novelty of this study, since this level of detail has not been documented or used before. Many existing studies use the governing law (New York law-governed bonds as not including CACs versus English law-governed bonds as including CACs) as a proxy, while our study's level of CACs specification provides more accurate analysis on market pricing.

For the purpose of this study, we look at foreign law-governed sovereign bonds, with the majority issued in foreign currency. Our sample includes advanced economies' bonds (that is, Austrian, Finnish, and Swedish sovereign bonds under English law) and emerging markets' sovereign bonds, which represent over 90 percent of the sample. We treat central bank bonds issued to finance the sovereign balance sheet as equivalent to government bonds issued by the ministry of finance. We do not include state-owned enterprise bonds or

government guaranteed bonds. Further, we include sukuk (Islamic bonds) issued in international markets, using their regular daily yields.

This study expands the existing literature, not only because it uses a novel data set, but also because it provides a systematic analysis of the effects of inclusion of CACs and enhanced CACs on secondary-market bond yields. So far, studies have looked at specific bond markets (for example, emerging markets, Eurozone, Venezuela, and so on), specific time periods (at bond issuance, the Eurozone sovereign debt crisis, or the near-default situation in Venezuela), certain issuing currency (US dollars, euros), or certain governing laws (English law, New York law). Our analysis uses such a comprehensive data sample, covering 287 time-points (monthly series) of 1,025 outstanding bonds from 116 countries for all regions (advanced economies and emerging markets), issuing currencies, governing laws, stock exchanges, time-variant variables like bond market liquidity, credit ratings, and remaining maturities, and various macroeconomic indicators.

Table 2. Descriptive Statistics of Main Regression Variables

	BID	CDS	COUPON	CPI	DEBT	EMBI	EXR	ISSUE	MAT	MATURE	ORIG_MAT	Outstanding\$	RATING	SEC	VIX	YIELD	SPREAD
Mean	0.8	327.2	4.9	9.7	51.8	443	1,493.9	2014	18.6	2030	15.5	1.2	11	0.3	20.1	5.6	390.8
Median	0.5	147.3	4.8	4.6	43.0	283	19.1	2016	17.3	2026	10.3	1.0	10	-	18.4	4.6	250.4
Maximum	-	23,745	18.5	-	344.3	6847	-	2020	100.0	2119	100.1	6.8	27	1.0	62.6	-	-
Minimum	-	1.4	0.0	-25.8	0.0	0	0.0	1993	-0.1	2020	1.0	0.0	1	-	10.1	-	-
Std. Dev.	2.6	909.9	2.6	118.4	34.4	649.3	3,779.5	5.0	12.5	11.1	11.8	1.0	4	0.4	8.1	27.3	2,731.4
Skewness	16.0	12.0	0.4	78.7	1.6	6.0	3.5	-1.5	2.2	3.5	2.9	1.5	0	1.1	2.0	175.0	175.6
Kurtosis	1,007.0	212.1	3.4	6,759.2	6.8	46.3	19.1	5.2	14.7	23.7	19.2	6.8	4	2.1	9.3	36,538	36,698

Note: BID denotes bid-ask spread. Outstanding\$ denotes outstanding amount in billions of U.S. dollars.

CDS denotes five-year credit default swap spread.

Spreads denote each bond yields over 10-year US government treasury, German bund, Japanese government bond yields in bps, corresponding to each bond's issuing currency.

B. Methodology

We use a panel regression model with the sovereign bond yield spread (in basis points) as the dependent variable and the variables discussed above as independent variables. (We also ran the same model with the mid-yield to maturity as the dependent variable, but no significant difference was observed in our findings.) Our analysis uses a monthly series from May 1996 to March 2020, a monthly series of a simple average of daily sovereign bond yield spreads, partly to avoid a noise from daily-yield volatility.¹⁰ For estimating the impact of different types of CACs, we use a binary dummy variable for no CACs, regular CACs, and enhanced

¹⁰ To obtain meaningful results, we exclude spreads over 1,000 since bonds with spreads over 1,000 tend to have weak price discovery due to, e.g., limited liquidity. Bonds with remaining maturity of less than 12 month are excluded due to the limited trading activity and liquidity.

CACs (since August 2014, when the ICMA's enhanced CACs became available). Our proposed model for the empirical analysis has the following specification:

$$Y_{i,t} = \alpha + \beta_1 CAC + \beta_2 CAC_ENHANCED + \beta_3 X_{i,t} + \beta_4 \theta_i + \varepsilon_{i,t}$$

where $Y_{i,t}$ is the sovereign yield spread for bond i during month t , $X_{i,t}$ is a vector of time-variant variables, and θ_i is a bond-specific time invariant effect.

Our approach uses a rudimentary equation that fits the data well for the whole sample, and, when we break the sample, we omit any variable if we encounter a near singular matrix or an error. Notably, the model using the whole sample with the best fit could contain most of the control variables, so we didn't need to omit too many variables to get a meaningful analysis for each time period.

The vector $X_{i,t}$ includes variables common to all bonds, as well as bond-specific variables (coupon, tranche volume in billions of US dollars, tenor, governing law as binary variables, with definitions of the explanatory variables being provided in Annex I. Time-variant variables include: (1) inflation in annual percent changes; (2) sovereign five-year CDSs; (3) changes in the numeric value of credit ratings (foreign currency long-term); (4) remaining maturities at the end of each month; (5) bid-ask spreads; (6) the VIX; (7) exchange rates; (8) debt to GDP ratios; and (9) emerging markets bond index (EMBI) spreads.

We divide bonds into three CACs groups: no CACs (1, 0 otherwise); inclusion of regular CACs (1, 0 otherwise); and inclusion of enhanced CACs (1, 0 otherwise). By using two variables in an equation, regular CACs and enhanced CACs, the coefficient is interpreted as the difference of spreads (increase or decrease) compared to the absence of CACs. For example, if the regular CACs' coefficient is -40, this means the yield of bonds with the CACs is 40 basis points lower than bonds without CACs.

Given that the pricing impact of CACs could be sensitive to the prevailing sovereign financial and macroeconomic conditions, it is important to understand the different pricing impact during crises, particularly during the European sovereign debt crisis. To understand the differences in sovereigns' cost of borrowing during times of normalcy and crisis, we divide the sample into five periods, based on main events related to CACs and financial market and sovereign market crises. As for our analysis relating to credit ratings, we use two groups of investment grade (AAA to BBB-) versus noninvestment grade (below BBB-). This allows the examination of the impact of each rating group on bond prices.

C. Empirical Results

Based on our overall sample, which spans a period of over 23 years (287 months) and covers 1,025 bonds, our overall results suggest that the presence of CACs is associated with lower secondary-market sovereign bond yield spreads,¹¹ with the relationship being more pronounced for noninvestment-grade issuers. These results are in line with findings from Bradley and Gulati (2013), who examine the pricing impact of CACs on the primary-market yield of 746 bonds from 75 countries between 1990 and 2011.¹² They show that countries with weak credit ratings benefited from including CACs in their bonds, whereas the yield of high-rated issuers is not affected by the inclusion of CACs in bond contracts.

Our results indicate that most of the time, the presence of regular CACs is negatively associated with bond yield spreads (except for the European sovereign debt crisis period). This means that the presence of regular CACs is associated with lower borrowing costs, with this trend being more consistent for noninvestment-grade issues. However, for investment-grade issues, regular CACs have a positive coefficient, indicating that they are associated with higher borrowing costs, over the considered different times. This seems to be counterintuitive, as a restructuring is less likely to happen to the more creditworthy issuers and investors would not typically price bonds based on their legal clauses related to restructuring. However, our results do not detect moral hazard concerns in pricing for noninvestment-grade issuers.

The examination of the pricing impact of enhanced CACs, after ICMA introduced strengthened CACs in August 2014, is rather novel in the literature. Our results suggest that bonds that included enhanced CACs exhibit negative signs with spreads — which means that the presence of enhanced CACs is associated with lower secondary-market yield spreads, while they are found to be consistently statistically significant. This is consistent with expressed views from issuers and investors saying they do not price bonds based on their legal clauses, and it is likely that these results will persist after the current period of market distress.

C.1. Determination of bond pricing

Explanatory variables are added to enhance the understanding of the relationship between secondary-market yield spreads and each independent variable, with most coefficients generating the expected sign. In particular, we employ credit ratings, remaining maturities,

¹¹ Spreads denote the difference of each bond's yields over the corresponding bond yield of the currency of issuance, i.e., the 10-year U.S. government treasury, German bund, Japanese government bond yield in basis points.

¹² Bradley and Gulati (2013) looked at the primary markets in Europe and spread at issuance, at one point of time.

bond-specific characteristics, bid-ask spreads, and other macroeconomic and financial market determinants as the main explanatory variables:

Credit ratings (time-variant)

Looking at credit ratings during May 1996 to March 2020, our results suggest that credit ratings are strong explanatory variables in the determination of secondary-market yield spreads. The more creditworthy bonds (1–10 numeric values) are associated with lower yield spreads, and less creditworthy bonds (numeric values over 10) are associated with higher yield spreads (higher risks). This result is statistically strong over the different periods.

Remaining maturities (time-variant)

Residual maturities change based on each data point, and the results suggest that remaining maturities are strong explanatory variables and they are positively associated. The more the months to maturities means higher yield spreads, just in line with sovereign bond yield curve and term structures. The remaining maturities are statistically strong regardless of the creditworthiness of issuers.

Bond-specific characteristics

Coupon and tranche volumes are positively associated with yield spreads, while tranche volumes are important variables to determine the yields. Issue currency seems meaningful as well, suggesting issuing in euros or US dollars is associated with lower yield spreads compared to bonds issued in other currencies (Japanese yen, British pound, Scandinavian currencies, Chinese renminbi). Governing law is not a consistently significant determinant, changing signs over the various considered periods. Our results show that English governing law is associated with higher yield spreads only in the latest periods (after 2014), with this relationship being statistically significant. This result is somewhat in line with the study of Ratha and others (2016), although we do not find evidence that English law-governed bonds are consistently associated with higher yield spreads throughout the whole-time periods.

Bid-ask spreads

We use bid-ask spread changes of each bond over the time period to see the relationship between sovereign bond liquidity and secondary-market yield spreads. In comparison to the use of primary-market yield data and comparing to primary-market liquidity analysis, we obtain more consistent results using secondary-market data, namely that they are positively associated, indicating that the more liquid bonds are (lower bid-ask spread), the lower yield spreads are (lower risks). They are statistically significant during the crisis time since 2007, regardless of credit ratings groups; this association is slightly more pronounced for the noninvestment-grade issuers group. Related to liquidity, our secondary-market analysis on SEC registration shows a statistically strong negative relationship between SEC registration and yield spreads since 2010, which can be interpreted that bonds with SEC registration (more liquid market and more information documents) is associated with lower yield spreads.

Other macroeconomic and financial market variables

The consumer price index annual growth rate is positively associated with yield spreads, which indicates that when the inflation rate rises, bond yield spreads rise accordingly. The CDS spread and market VIX are positively associated as expected, meaning yield spreads increase as market risks increase. Commodity prices are not statistically significant and generate mixed signs, probably reflecting risks in different directions of bonds from commodity-exporting and -importing countries. It is also interesting to note that during the European sovereign debt crisis, monetary union members were associated with higher secondary-market bond yield spreads. The results of all the macroeconomic indicators broadly confirm that macroeconomic fundamentals play a major role in explaining governments bond yields differentials.

C.2. Impact of CACs and enhanced CACs on bond pricing

To understand the differences in the cost of sovereign capital borrowing during normal times and at times of crises, we break down the sample into the following periods:

1. Before New York law-governed sovereign bonds included CACs: May 1996–January 2003
2. Pre-global financial crisis: February 2003–May 2007
3. Global financial crisis: June 2007–December 2009
4. European sovereign debt crisis: January 2010–August 2014
5. After ICMA introduced enhanced CACs: September 2014–March 2020

When we use the entire country sample, we notice that US dollar bonds and New York law-governed bonds are associated with excessively high bond yield spreads since 2014. Further, we observe that this result is mainly due to the abnormal pricing behavior of 14 of Venezuela's sovereign bonds. As Venezuela is suffering a prolonged macroeconomic crisis and a sovereign debt default since 2017, its bonds have experienced a jittery secondary-market pricing pattern. Since this erratic price behavior was a major source of distortion of our results, we exclude Venezuela's sovereign bond pricing data from this analysis. The results for the five periods discussed below are summarized in Tables 3–7 and in Annex Table 7A.

a. Before New York law-governed sovereign bonds included CACs (pre-February 2003)

Due to the limited data available during this period, we encounter a *near singular matrix* problem, and thus we reduce the number of variables to obtain the best fit for the model. Before 2003, most English law-governed bonds included CACs, but not all of them. According to our results (Table 3), CACs are estimated to have contributed to lowering the

yield spreads by 1.3 percent (statistically significant) for the investment grade issuers, while its effect becomes insignificant for noninvestment-grade issuers.

Table 3. Regression Results: Before New York Law-Governed Bonds Adopted CACs**(pre-February 2003)**

Secondary markets: Panel regression results

Dependent variable: Spread over benchmark (in bps)

	<i>Before CACs usage became prevalent in New</i>		
	1996M5-2003M1		
	Total	Non- investment grade	Investment grade
Coupon	102.1 **	57.8 *	435.2 **
Outstanding\$	207.2 **	184.5	-282.8
Maturity	10.4 **	114.7 **	6.4 *
IG	-127.3 *		
Eur	-115.7		-115.7 *
UK law	-18.3		513.3
VIX	18.7 **		14.0 **
SEC	-53.3		-399.5 **
EM	-198.8 *		-868.6
Regular CACs	109.9	110.1	-135.8 *
C	-217.4	375.3	-155.3
R-squared	0.42	0.34	0.66
Notes: **99% significant, * 95% significant.			

b. Pre-global financial crisis (February 2003–May 2007)

Since Mexico's landmark inclusion of CACs in 2003, most New York law-governed bonds have included CACs. The benefits of including CACs in emerging-market bonds appear to be recognized by investors based on secondary-market behavior. After New York law-governed sovereign bonds prevalently included CACs, we find that spreads of bonds with CACs are lower than those of bonds without CACs in the entire sample (Table 4). In particular, there is evidence that CACs lead to a decrease in secondary-market bond yield spreads and in turn in the cost of borrowing for both noninvestment-grade and investment-grade issuers (all results are statistically significant).

Table 4. Regression Results: Pre-Crisis (February 2003–May 2007)

Secondary markets: Panel regression results

Dependent variable: Spread over benchmark (in bps)

	<i>Pre-crisis</i>		
	2003M2-2007M5		
	Total	Non- investment grade	Investment grade
Coupon	342.0 **	8.3	103.1 **
Outstanding\$	747.1 **	45.2	2.4
Maturity	-179.7 **	-18.6 **	18.7 **
USD	235.4 **	282.6 **	
NY law	-117.9	539.7 **	107.3 *
SEC	-532.2	-281.1 **	24.9
CPI(-6)	1.1		
DEBT(-6)	1.9 **	4.6 **	
EXR	11.9		
VIX	8.3 **		8.3 **
Regular CACs	-296.4 **	-263.2 **	-210.8 **
C	360.8	377.2	-380.7
R-squared	0.97	0.89	0.90

Notes: **99% significant, * 95% significant.

c. Global financial crisis (June 2007–December 2009)

During the global financial crisis, when market participants became aware of sovereigns' declining financial conditions, the price of their bonds was expected to fall, while bond yield spreads were expected to rise. These changes in the price and bond yield spreads usually reflect the *ex post* sovereign bond market behavior during crises and these secondary-market bond yield spreads are typically used as a reference rate in a debt restructuring or in an extension of the debt maturity.

Based on our results, inclusion of CACs appears to decrease the bond yield spreads for noninvestment-grade countries by 402 basis points, while it is positively associated with investment-grade issuers (both statistically significant) (Table 5). Our finding that CACs have no harmful pricing impact on the less creditworthy issuers is in line with Bradly and Gulati (2013).

**Table 5. Regression Results: Global Financial Crisis
(June 2007–December 2009)**

Secondary markets: Panel regression results

Dependent variable: Spread over benchmark (in bps)

	<i>Global Financial Crisis</i>		
	2007M6-2009M12		
	Total	Non- investment grade	Investment grade
Coupon	1.1	51.7 **	39.0 **
Outstanding\$	6.1	19.5 **	12.5 **
Maturity	-14.1	-57.1 **	4.6 **
IG	-119.7 **		
USD		925.9 **	-308.7 **
NY law	61.8 **	-235.1 *	55.3 **
SEC	-63.9	-735.8 *	38.9 *
CDS	0.0 **	0.3	0.8 **
CPI(-6)	10.6 *	35.2 **	-3.6
DEBT(-6)	-7.5	-2.3	-0.1
EXR	0.0 **	154.6 *	0.0 **
VIX	-0.6	-4.0 *	0.4 *
EMBI	0.5 **	0.9 **	
Regular CACs	83.2	-402.0 **	137.8 **
C	1526	1158	-9452
R-squared	0.87	0.91	0.76
Notes: **99% significant, * 95% significant.			

d. European sovereign debt crisis (January 2010–August 2014)

For the overall sample during this period, inclusion of CACs seems to have been associated with slightly higher borrowing costs, with a statistically significant impact (Table 6). Further, for both investment-grade issuers and noninvestment-grade issuers, inclusion of CACs is associated with higher bond yield spreads with the effect being statistically significant. It should be noted that these results are affected by the inclusion of Greece in this analysis, being in the BBB group in 2010 (S&P's credit rating deteriorated from BBB+ on December

16, 2009 to BB+ on April 27, 2010, to CC on July 27, 2011, to SD on February 27, 2012, to B- on December 18, 2012, and to B on December 12, 2014).

**Table 6. Regression Results: European Sovereign Debt Crisis
(January 2010–August 2014)**

Secondary markets: Panel regression results

Dependent variable: Spread over benchmark in bps

	<i>European Sovereign Debt Crisis</i>		
	2010M1-2014M8		
	Total	Non- investment grade	Investment grade
Coupon	16.9 **	48.7 **	44.6 **
Outstanding\$	6.0 **	30.0	2.7 *
Maturity	1.2 **	4.6	1.3 **
IG	-154.9 **		-83.3 **
Bid-ask spread	73.0 **	34.9 **	8.7
USD	-131.3 **	-176.0	-165.2 **
NY law	26.6 **	-170.0	49.9 **
SEC	-55.4 **	48.7	-55.4 **
CDS	0.0 **	-0.1 **	0.1
CPI(-6)	-3.3	-2.8	-8.5
DEBT(-6)	0.0	1.7	-1.2 *
VIX	2.1 **	-0.7	0.6 *
Exchange rate	0.0 *	0.0	0.0
EMBI	0.6 **	0.7 **	0.7 **
Regular CACs	82.2 **	129.0 *	62.8 **
C	-2376	-8938	-2653
R-squared	0.90	0.93	0.84

Notes: **99% significant, * 95% significant.

e. After ICMA introduced enhanced CACs (September 2014–March 2020)

In examining the pricing impact of the inclusion of the ICMA enhanced (single-limb) CACs after they were introduced in August 2014, we find that the presence of enhanced CACs seems to be negatively associated (statistically significant) with bond yield spreads, for both noninvestment-grade issuers and investment-grade issuers (Table 7).¹³ During this period, regular CACs appear to have a negative and statistically significant association with bond spreads for the whole sample. Such empirical results demonstrate that inclusion of enhanced CACs and regular CACs is associated with lower borrowing costs for the sovereign.

¹³ For this period, we exclude (Bloomberg) pricing data for 14 Venezuela bonds because of highly volatile secondary-market trading activity.

**Table 7. Regression Results: ICMA Enhanced CACs
(September 2014–March 2020)**

Secondary markets: Panel regression results

Dependent variable: Spread over benchmark in bps

	<i>ICMA introduced enhanced CACs</i>		
	2014M9-2020M3		
	Total	Non- investment grade	Investment grade
Coupon	39.4 **	24.2 **	29.9 **
Outstanding\$	1.2	8.1	-2.5
Maturity	2.8 **	3.1 **	2.7 **
IG	-161.5 **		
Bid-ask spread	36.8 **	26.2 **	177.9 **
USD	-101.7 **	-53.1 *	-47.5 **
NY law	23.4 **	43.9	-20.9 **
SEC	-22.9 *	-11.6	-6.4 **
EMBI	0.2 **	0.1 **	-0.1 **
VIX	1.4 **	4.3 **	1.5 **
CDS	0.0 **	0.0 **	0.1 **
Exchange rate	0.0 *	-0.2 *	0.0 **
CPI(-6)	1.9 **\	-1.0	0.4
DEBT(-6)	-0.1	0.4	1.1 **
Enhanced CACs	-17.9 **	-129.8 **	-16.6 *
Regular CACs	-31.9 **	-85.9 **	-34.5 **
C	-5603	-5983	-5580
R-squared	0.73	0.45	0.64

Notes: **99% significant, * 95% significant.

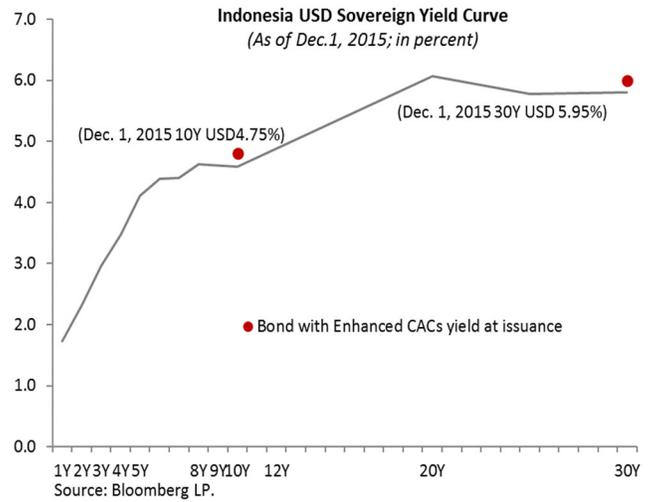
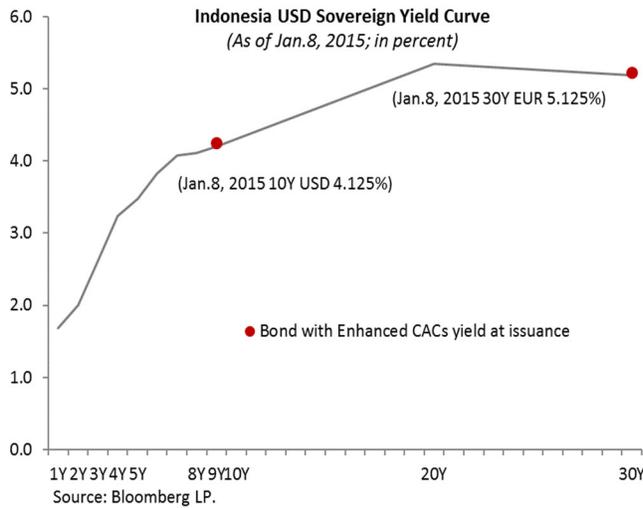
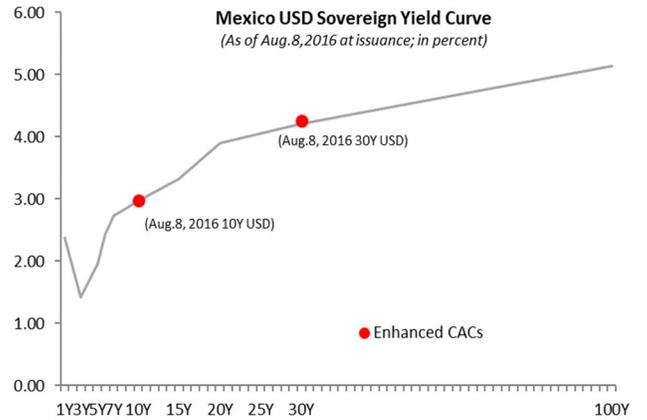
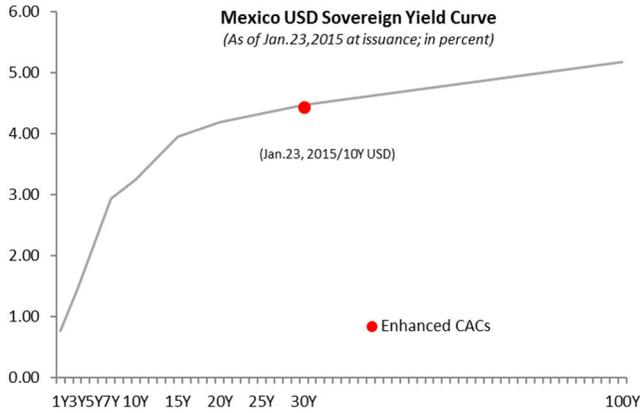
V. EFFECTS OF CACs ON PRIMARY-MARKET ISSUE YIELDS OF SELECTED COUNTRIES

In this section, we illustrate the trends of the cost of borrowing for selected countries' bonds without CACs, with regular CACs, and with enhanced CACs. For meaningful comparisons, we select countries that possess relatively similar bond characteristics (with regard to coupon rate, remaining maturity, tranche volume, currency, and ratings). Thus, we look at Mexico (New York law) and Romania (UK law) as investment-grade issuers, while we look at Indonesia (New York law) as lower-grade or noninvestment-grade issuers. This section intends to complement previous econometric results and demonstrate that idiosyncratic differences in individual countries, for example, due to varying liquidity in sovereign bond markets, investor base compositions, or geopolitical risk, may be responsible for differences in yield spread movements.

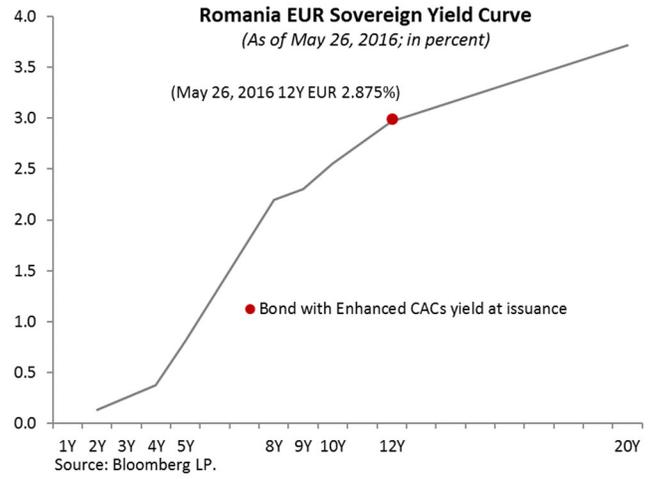
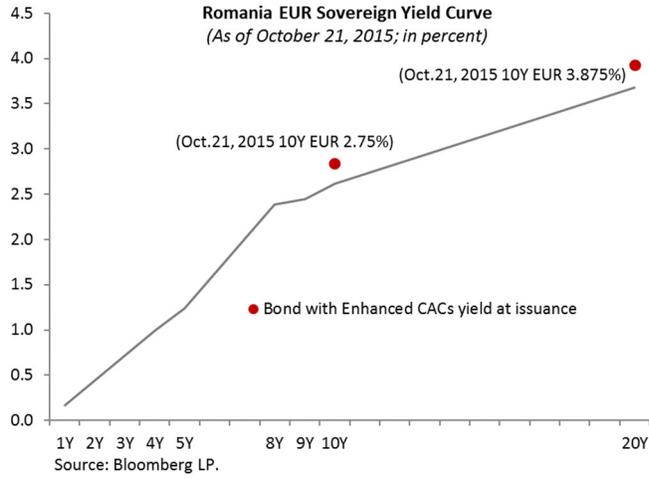
When the yields of bonds with enhanced CACs are compared with respective bond yields at the sovereign yield curve, no obvious pricing impact is observed. Further, in the secondary market, when these major issuers (Mexico, Romania, Indonesia) are examined at market lows and highs, based on the performance of their sovereign CDSs, no pricing difference for

bonds with enhanced CACs was observed, even during debt distressed periods. For example, Mexico's and Indonesia's bonds with enhanced CACs did not display materially higher yields, being consistently aligned with the respective sovereign bond yield curves. In particular, Mexico's bonds with enhanced CACs seem to have been priced based on Mexico's standing sovereign USD yield curve. Under UK-governing law, we observe a similar same pattern—the pricing of Romania's new EUR bonds with enhanced CACs is aligned with the EUR sovereign yield curve, during both normal and distressed times.

Figure 3. Enhanced CACs: Pricing at Issuance Based on Sovereign Yield Curve



**Figure 3. Enhanced CACs: Pricing at Issuance Based on Sovereign Yield Curve
(continued)**



VI. CONCLUSION

This empirical study provides novel quantitative estimates on the effect of the use of CACs and enhanced CACs on bond pricing. Using secondary-market sovereign bond yield spreads, our general findings indicate that the inclusion of regular CACs contributes to lower costs, as observed for both investment- and noninvestment-grade issuers during most of the considered periods: (1) pre-CACs inclusion in New York law-governed bonds (May 1996–January 2003); (2) pre-global financial crisis (February 2003–May 2007); (3) during the global financial crisis (June 2007–December 2009); (4) during the European sovereign debt crisis (January 2010–August 2014); and (5) after the ICMA introduced enhanced CACs (September 2014–March 2020). In particular, the bond yield spread/borrowing cost-reducing effects are more pronounced for noninvestment-grade issuers, who are traditionally more subject to moral hazard concerns. These findings are more consistent in the first two periods under examination, while they start to lose statistical significance since the global financial crisis.

In general, our findings could be interpreted as an implied acknowledgement by secondary-market investors of CACs' potential benefits to an efficient and orderly restructuring process, which especially helps the pricing of noninvestment-grade issues. Also, our results indicate that the presence of enhanced CACs exhibits a negative association (statistically significant) with spreads. However, to better grasp how the inclusion of enhanced CACs affects secondary-market bond yield spreads, a deeper understanding of what affects changes in the investor base and the international sovereign bond market liquidity is needed. Specifically, the following factors pose limitations to such analysis and warrant further investigation:

The composition of the investor base, which may change quickly as a result of emerging market developments, could influence bond prices. This could be due to differences in the pool of creditors for bonds with and without CACs, or to changes in the creditor base (for example, because of the political leaning of the government, although this assumption may be difficult to prove in an empirical analysis). Further, during debt-distressed periods, for instance, it has been reported that institutional investors are largely replaced by hedge funds,

and sometimes by official creditors. This might change market participants' behavior and in turn affects bond pricing^{14, 15}.

The observed variations of CACs, which are formulated to suit each issuer's needs and preference, may have differential bond pricing effects. This study does not make a distinction, for example, of the minimum voting requirement to modify the contractual terms, which varies (66.6 percent, 75 percent, 85 percent, and 100 percent)¹⁶; the mandatory meeting requirement; aggregation; acceleration; reverse acceleration; and collective representation (Bradley and Gulati 2013). Also, for the purpose of our study, Euro CACs with a double-limb arrangement are classified as regular CACs, while CACs with a single limb are classified as enhanced CACs.

Other contractual provisions, such as the pari passu/modified pari passu, may influence the secondary-market liquidity of bonds and their pricing. After Judge Griesa's interpretation of the Argentine pari passu clause under New York law, market participants became concerned about different interpretations of the pari passu clause under New York law and non-New York law. Also, there might be a pricing impact from the presence or absence of cross-default clauses, engagement clauses, disenfranchised clauses, and information covenant clauses. Further, the mode of meetings, frequency of meetings, and how eligibility of investors is formulated could influence bond prices are not addressed in this study.

Variations in credit ratings and their effect on bond pricing are not considered to avoid a complicated analysis. This study focuses on two groups of credit ratings, an investment-grade and a noninvestment-grade group. Although there are significant variations in ratings within the same investment-grade group, this study does not distinguish among more specific credit ratings to provide more precise information for individual countries' characteristics. In particular, for lower to medium-grade issuers (for example, BBB+/BBB/BBB-), further investigation is warranted on how markets price bonds.

Issuer structure, such as trustee or fiscal agency, and its impact on bond pricing are not addressed in this study. A common assumption is that bonds under trustee structure are in favor of creditors, while a fiscal agency structure favors sovereign issuers. However, only an

¹⁴ The IMF has quarterly series of investor base information for 24 advanced economies and 24 emerging-market countries, where relatively low level of trading in several emerging market countries precludes the collection of this type of data at a higher frequency.

¹⁵ Although central bank purchases of government bonds, such as the QE operations, can be part of the overall demand for government bonds, we have not included such purchases in our analysis, as they mainly relate to monetary policy initiatives and not to market (investor base) activities.

¹⁶ Absence of CACs is interpreted as 100 percent minimum voting requirement.

empirical analysis can indicate whether the issuer structure is important enough to influence investor behavior in the primary and secondary markets, especially during crises.

Also, investors treat restructured/exchanged bonds differently, since some feature specific payment schedules. Amortized bonds (with sinking schedule) or bonds with a near-maturity equal installment payment feature may have different bond pricing effects, which warrants further study.

Overall, using an extensive secondary-market bond spread dataset, we find that CACs lowered the cost of borrowing for most of the considered historical periods. Indicatively, we find that the inclusion of enhanced CACs is associated with lower bond yield spreads. Since regular CACs and single-limb CACs are expected to ensure an orderly and efficient debt restructuring process, the inclusion of these legal clauses is assumed to benefit both issuers and investors alike.

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ANNEX I : DESCRIPTION OF VARIABLES

This annex provides a description of variables included in the primary- and secondary-market analyses:

- Mid-yield to maturity: Monthly data are based on the simple average of daily mid-yield to maturity from May 1996 to March 2020 (time-variant).
- Sovereign bond yield spread over relevant benchmark: This variable is calculated based on the issue currency. If the issue currency is the U.S. dollar, we use US treasury 10-year generic yields to calculate the spread. For euro-denominated bonds, German 10-year bond generic yield are used as benchmark, while for Yen-denominated bonds, we use Japanese 10-year bond generic yields.
- Credit rating: S&P foreign-currency long-term sovereign credit ratings are converted to numeric values, as outlined in Annex II Table 2. This metric is also complemented by Moody's and Fitch ratings when the S&P rating is not available. A sovereign credit rating for each data point is converted to a numeric value over the months (time-variant).
- Credit rating at issuance: S&P foreign-currency long-term sovereign credit ratings at issuance are converted to numeric value, as outlined in Annex II, Table 2.
- Maturity: year of maturity.
- Remaining maturities: Years to maturity is calculated based on the last day of the month (time-variant).
- Bid-ask spread: The bid-ask spread is calculated based on bid and ask prices for each month. This monthly series is based on the average of daily series whenever there was a meaningful bid price and ask price (time-variant).
- Coupon: Each bond's coupon in percent (time-invariant).
- Outstanding \$ amount: Each bond's outstanding tranche volume, not the total deal volume. Each tranche volume is converted to billions of US dollars based on the exchange rate of the date of issuance (time- invariant).
- EUR currency: If a bond is issued in euros, the value is 1, otherwise 0 (binary value).
- USD currency: If a bond is issued in US dollars, the value is 1, otherwise 0.
- English law: If the governing law is English law, the value is 1, otherwise 0, with the significant majority of other cases being New York law. Also, we employ another governing-law category, while *English law*, *New York law*, and *other governing law* are

mutually exclusive and their value adds up to 1 for each bond. Other governing law comprises less than 2 percent of total cases (time-invariant).

- CDS spread: Monthly series of each sovereign issuer's CDS spread is used for each specific bond. Monthly series are simple averages of daily series (time-invariant).
- VIX: CBOE Volatility Index at the time of the issue date, a measure of the implied volatility of S&P 500 index options, calculated and published by the CBOE (time-variant).
- SEC: If a bond is registered in SEC at the time of issuance, the value is 1, otherwise 0.
- Consumer Price Index (CPI): Annualized consumer inflation growth rate in percent, monthly
- Exchange rate (EXR): National currency to US dollar, monthly average of daily exchange rates.
- Debt-to-GDP ratio of previous year: Debt to GDP in percent in the year $t-1$
- Commodity price index.
- Monetary union: If the issuer is a member of a monetary union at each data point, the value is 1, otherwise 0.
- No CACs: Based on the sales documents and prospectuses available from Perfect Information, Dealogic, and Bloomberg database, if a bond does not include collective action clauses, the value is 1, otherwise 0. Up to August 2014, *no CACs* and *CACs* are mutually exclusive, and they add up to 1 for each bond. For the period of September 2014 to November 2016, *no CACs*, *CACs*, and *enhanced CACs* are mutually exclusive, and they add up to 1 for each bond.
- Regular CACs: Based on the sales documents and prospectuses available from Perfect Information, Dealogic, and Bloomberg database, if a bond includes collective action clauses, the value is 1, otherwise 0 (time-invariant).
- Enhanced CACs: Based on the sales documents and prospectuses available from Perfect Information, Dealogic, and Bloomberg database, if a bond includes ICMA's enhanced version of collective action clauses, the value is 1, otherwise 0. IMF Legal Department staff verify the correct indexing of this information (time-invariant).
- Emerging markets (EM): If the issuing country is an Emerging Market and not an advanced economy, according to the IMF WEO definition, the value is 1, otherwise 0 (binary value).

ANNEX II: ALTERNATIVE REGRESSION RESULTS TO TABLE 7

To better control the impact of the inclusion of CACs on sovereign bond pricing, we limit the sample to U.S. dollar-denominated sovereign bond issuances. Also, to eliminate a potentially endogenous-variable bias, we revise the model by eliminating three of the previously employed independent variables, namely that of the time-variant sovereign credit ratings, the sovereign five-year credit default swap, and the bid-ask spread. In order to have more meaningful results, this model also excludes spreads over 1,000 basis points, where price discovery is very weak due to limited liquidity and trading activity because of a debt default or an imminent debt restructuring. Table Annex II Table 1 reports on the results of the revised model.

**Annex II. Table 1. Alternative Regression Results: ICMA Enhanced CACs
(September 2014–March 2020)**

Secondary markets: Panel regression results

Dependent variable: Spread over bench mark in bps

	ICMA introduced enhanced CACs		
	2014M9-2020M3		
	Total	Non- investment grade	Investment grade
Coupon	27.7 **	-5.9	11.8 **
Outstanding\$	-52.4	-111.2	19.9 **
Maturity	3.4 **	4.5 **	2.6 **
NY law	-41.4 **	-160.0 **	-18.7 **
SEC	-15.4 **	42.7 **	-42.0 **
EMBI	0.5 **	0.4 **	0.3 **
VIX	1.1 **	2.3 **	1.4 **
Exchange rate	0.0 **	0.0	0.0 **
CPI(-6)	0.1	-1.5	-3.3
DEBT(-6)	0.3 *	1.6 *	-1.6 *
Enhanced CACs	-29.6 *	-70.5 *	-35.4 **
Regular CACs	-59.9 **	-113.7 **	-28.9 **
C	-676.0	-869.2	-515.9
R-squared	0.66	0.48	0.69

Notes. **99% significant, * 95% significant.

Our findings from this revised model, which focuses on U.S. dollar-denominated bonds, demonstrate that inclusion of single-limb CACs is associated with lower borrowing costs for both noninvestment- and investment-grade issuers, while inclusion of regular CACs is associated with even lower borrowing costs. Noninvestment-grade issuers are benefitted more from including single-limb CACs than investment grade issuers, which agrees with the argument that investors may view inclusion of single-limb CACs more beneficial for noninvestment-grade

issuers who have a greater chance to face a debt restructuring. When we include bonds with spreads over 1,000 basis points, we get similar results but R-squared is falling drastically to 22 percent. Elimination of the potentially endogenous variables from the model does not necessarily lead to but supports the causal effects between the dependent and independent variables. These results indicate in a consistent manner that market participants do not associate the inclusion of enhanced CACs with potential future restructurings.

Annex II. Table 2. Conversion of Credit Ratings to Numeric Values

Composite credit ratings	Numeric value		
AAA	1	Prime	Investment grade
AA+	2	High Grade	
AA	3		
AA-	4		
A+	5	Upper Medium Grade	
A	6		
A-	7		
BBB+	8	Lower Medium Grade	
BBB	9		
BBB-	10		
BB+	11	Noninvestment Grade Speculative	Noninvestment grade
BB	12		
BB-	13		
B+	14	Highly Speculative	
B	15		
B-	16		
CCC+	17	Substantial Risks	
CCC	18		
CCC-	19		
CC+	20	Near Default	
CC	21		
CC-	22	In Default	
C+	23		
C	24		
C-	25		
D	26		
Not rated	27		