The Fed Takes on Corporate Credit Risk:
An Analysis of the Efficacy of the SMCCF

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EVALUATING THE MONETARY POLICY TOOLKIT:
LESSONS FOR THE FUTURE
Sveriges Riksbank
September 1–2, 2022

Financial Market Turmoil During Covid-19

- Severe stresses emerge in global financial markets in the early stages of pandemic:
  - **Fed's response**: cut funds rate to zero and re-introduce QE (Mar-15); re-launch CPFF & PDCF (Mar-17); and re-launch MMLF (Mar-18).
- Nevertheless, credit spreads continue to surge and liquidity dries up in the corporate bond market.
- To stabilize financial conditions and support the flow of credit to businesses and households:
  - **Mar-23**: Fed announces P/SMCCF; re-launches TALF and commits to open-ended QE.
  - **Apr-9**: Fed expands P/SMCCF and TALF; announces PPPLF, MSLF, and MLF.

Sources of Corporate Bond Market Distress

- Structure of the market has changed significantly since the GFC:
  - Holdings of corporate bond mutual funds have risen substantially. (Liang [2020])
  - Inherent "liquidity mismatch" made this funds especially vulnerable to runs. (Falato, Goldstein & Hortascu [2020]; Ma, Xiao & Zeng [2020])
    - Large redemptions as investors seek cash during the crisis
    - Sell most liquid (i.e., shorter maturity, high-quality) bonds first.
- Since the GFC, intermediation in the market has remained concentrated among a dozen or so bank-affiliated broker-dealers:
  - Post-GFC regulations and rapid growth of the U.S. Treasury market in the years before the pandemic limit their intermediation capacity. (Duffie [2020])
  - When Covid-19 shock hits, primary dealers refuse to take on more corporate bonds, while secondary dealers actively sell. (O'Hara & Zhou [2020])
  - Spillovers between U.S. Treasury and corporate bond markets. (Schrimpf, Shin & Sushko [2020]; He, Nagel & Song [2020])

This Paper

- Evaluate the efficacy of the SMCCF and analyze the mechanism(s) through which it affected the corporate bond market.
- Challenging to identify and isolate the direct effects of SMCCF:
  - SMCCF announced simultaneously with other emergency measures.
  - In early March 2020, the credit curve inverted, with the long-short credit spread dropping deep into negative territory.
- Contribution:
  - Using a DiD identification strategy that controls for the pandemic-induced rotation of the credit curve quantify announcement effects of SMCCF on credit and bid-ask spreads.
  - Using intraday transactions data quantify purchase effects of SMCCF on credit and bid-ask spreads.
  - Synthesize our empirical findings through the lens of the preferred-habitat framework. (Vayanos & Vila [2021])

Key Takeaways

- Empirical analysis:
  - Mar-23 and Apr-9 announcements significantly narrowed investment-grade credit and bid-ask spreads across the maturity spectrum.
  - Narrowing of credit spreads was due almost entirely to a reduction in credit risk premia as opposed to a reduction in default risk.
  - Announcements significantly rotated the investment-grade credit curve, restoring the normal upward-sloping term structure of credit spreads.
- Quantitative analysis of a calibrated preferred-habitat model:
  - Credit curve inversion is explained by a negative demand shock for short-term high-quality investment-grade paper (i.e., dash for cash) and a jump in the arbitrageurs' risk aversion.
  - Mar-23 and Apr-9 announcements reduce the degree of arbitrageurs' risk aversion, restoring the credit curve to its pre-pandemic shape and level.

Data Sources and Methods

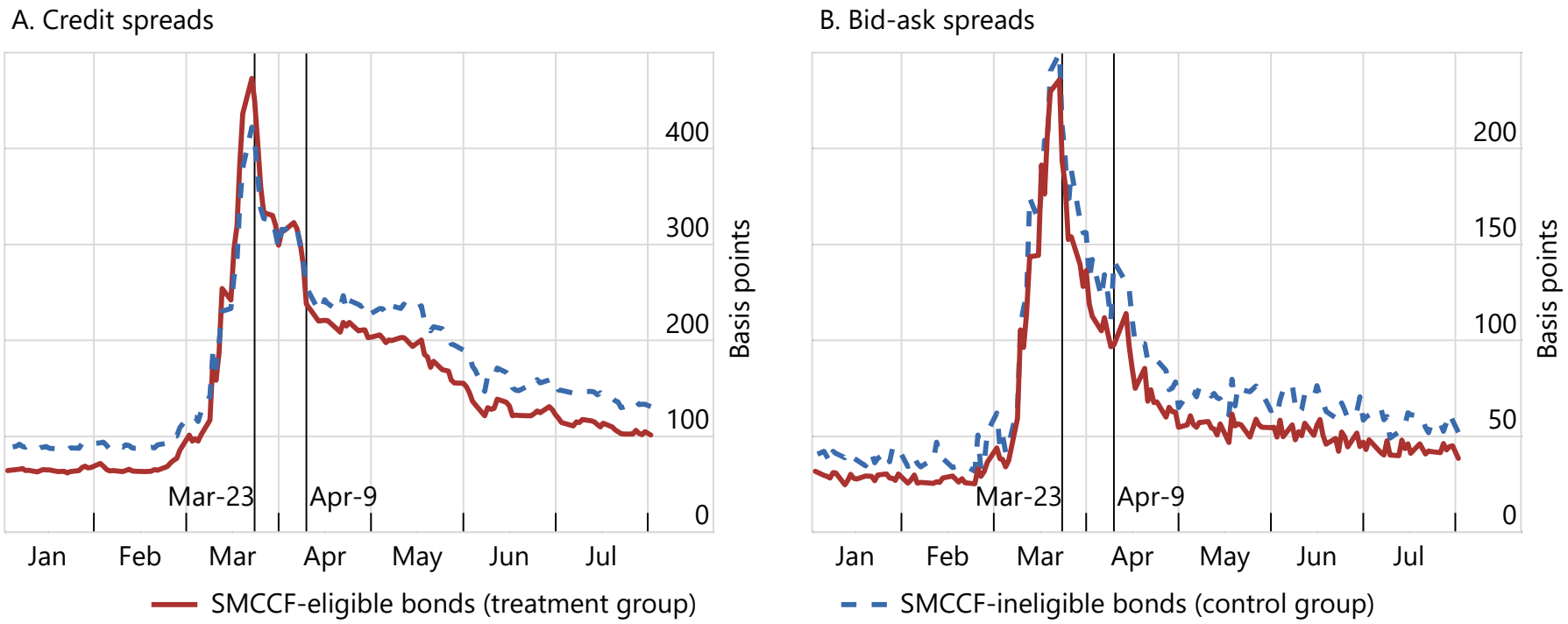
- The (Enhanced) Trade Reporting and Compliance Engine (TRACE):
  - FINRA-developed vehicle for mandatory reporting of OTC secondary market transactions in publicly traded TRACE-eligible securities.
  - Represents all OTC activity in these securities.
  - Enhanced TRACE includes certain transaction-level information (e.g., trade volume).
  - Apply standard filters. (Dick-Nielsen & Poulsen [2019])
- Fixed Income Securities Database (FISD) for bond-level characteristics (e.g., coupon, coupon frequency, payment schedule, credit ratings, etc.).
- Credit spreads measured relative to synthetic U.S. Treasuries that exactly replicate cash-flows of corporate debt instruments. (Gilchrist & Zakrajšek [2012])
- Use information about the type of counterparties involved in each transaction to construct a proxy for bid-ask spreads.

Diff-in-Diff Approach

Program-eligibility as a treatment effect

- Construct a narrow matched sample:
  - Find all bonds for each issuer with an IG rating as of Mar-22.
  - Select the pair of bonds with remaining maturities closest to 5 years:
    - One SMCCF eligible bond ($TTM \leq 5$) $\Rightarrow$ narrow "treatment" group
    - One SMCCF ineligible bond ($TTM > 5$) $\Rightarrow$ narrow "control" group
- Narrow matched sample:
  - 3,225 pairs of bonds, issued by 545 unique U.S. companies.
  - The mean (median) difference in TTM is 2.7 (2.3) years.
- Also construct a broad matched sample:
  - Treatment group: all bonds with $1 \leq TTM \leq 5$
  - Control group: all bonds with $5 < TTM \leq 12$

SMCCF Eligible vs. Ineligible Bonds



SOURCE: Authors' calculations using TRACE data.

Econometric Methodology

- Bond-level DiD specification:

$$Y_{i,j,t} = \beta_1 \mathbb{1}[t \geq t^*] + \beta_2 \mathbb{1}[j = E] + \beta_3 \left(\mathbb{1}[t \geq t^*] \times \mathbb{1}[j = E]\right) + \theta' \mathbf{X}_{i,j,t} + \eta_i + \epsilon_{i,j,t}$$

  - $Y_{i,j,t}$ = outcome variable (i.e., credit spread or log of bid-ask spread)
  - $\mathbb{1}[t \geq t^*]$ = 0/1-indicator that equals 1 if $t \geq t^*$ (i.e., Mar-23 or Apr-9)
  - $\mathbb{1}[j = E]$ = 0/1-indicator that equals one if bond j (a liability of firm i) was eligible (as of Mar-22) to be purchased by the SMCCF
  - $\mathbf{X}_{i,j,t}$ = vector of pre-determined bond-specific control variables

- Estimated by OLS using 2-, 5-, and 10-day windows bracketing t^*.

- Implicit identifying assumption: treatment effect $\mathbb{1}[j = E]$ is uniform across maturities.

Mar-23 Announcement – Credit Spreads

Narrow matched sample

	Event Window		
Explanatory variables	2-day	5-day	10-day
$\mathbb{1}[t \geq t^*]$	-0.31^{***}	0.05	0.55^{***}
	(0.04)	(0.03)	(0.04)
$\mathbb{1}[t \geq t^*] \times \mathbb{1}[j = E]$	-0.26^{***}	-0.23^{***}	-0.08^{**}
	(0.07)	(0.04)	(0.03)
R^2	0.76	0.70	0.65
No. of firms	487	523	544
No. of bonds	1,395	1,812	2,181
Observations	3,934	8,656	16,466

NOTE: Issuer-clustered standard errors in parentheses: * $p < .10$; ** $p < .05$; and *** $p < .01$.

Apr-9 Announcement – Credit Spreads

Narrow matched sample

	Event Window		
Explanatory variables	2-day	5-day	10-day
$\mathbb{1}[t \geq t^*]$	-0.52^{***}	-0.69^{***}	-0.72^{***}
	(0.02)	(0.02)	(0.02)
$\mathbb{1}[t \geq t^*] \times \mathbb{1}[j = E]$	-0.11^{***}	-0.17^{***}	-0.24^{***}
	(0.03)	(0.03)	(0.03)
R^2	0.91	0.90	0.89
No. of firms	513	537	552
No. of bonds	1,477	1,813	2,146
Observations	4,174	9,106	17,316

NOTE: Issuer-clustered standard errors in parentheses: * $p < .10$; ** $p < .05$; and *** $p < .01$.

Credit Spread Decomposition

Gilchrist & Zakrajšek [2012]

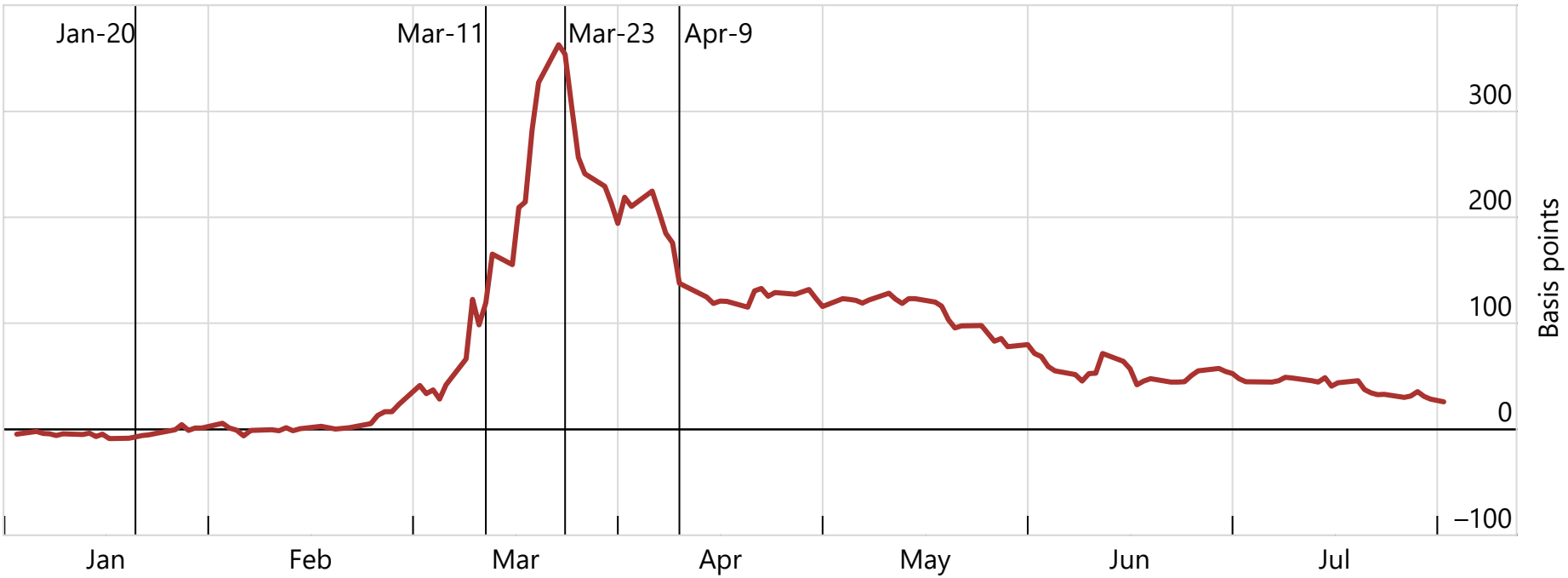
- Compute daily firm-level distance-to-default based on the Merton model.
- Calculate bond-specific DDs based on time-to-maturity τ:

$$\text{DD}(\tau) = \frac{\ln\left(\frac{V}{D}\right) + \left(\mu_A - \frac{\sigma_A^2}{2}\right)\tau}{\sigma_A\sqrt{\tau}}$$

- Regress IG bond spreads on $\text{DD}(\tau)$ and other bond characteristics to obtain the expected default component.
  - Panel regression estimated between Jul2002 and Dec2019 to avoid look-ahead bias.
- Decompose credit spreads: $\text{CS}_{i,j,t} = \widehat{\text{CS}}^{df}_{i,j,t} + \text{CRP}_{i,j,t}$

Investment-Grade Excess Bond Premium (EBP)

Daily data (January – July, 2020)



NOTE: Jan-20 = Chinese officials acknowledge that Covid-19 might be transmissible between humans; Mar-11 = WHO declares Covid-19 a pandemic.
SOURCE: Authors' calculations using data from TRACE, CRSP, and S&P's Compustat.

Mar-23 Announcement – Credit Risk Premia

Broad matched sample

	Event Window		
Explanatory variables	2-day	5-day	10-day
$\mathbb{1}[t \geq t^*]$	-0.30^{***}	0.02	0.46^{***}
	(0.03)	(0.04)	(0.05)
$\mathbb{1}[t \geq t^*] \times \mathbb{1}[j = E]$	-0.47^{***}	-0.42^{***}	-0.28^{***}
	(0.04)	(0.04)	(0.05)
R^2	0.66	0.59	0.55
No. of firms	496	543	565
No. of bonds	2,555	2,785	2,926
Observations	9,889	21,473	40,452

NOTE: Issuer-clustered standard errors in parentheses: * $p < .10$; ** $p < .05$; and *** $p < .01$.

Apr-9 Announcement – Credit Risk Premia

Broad matched sample

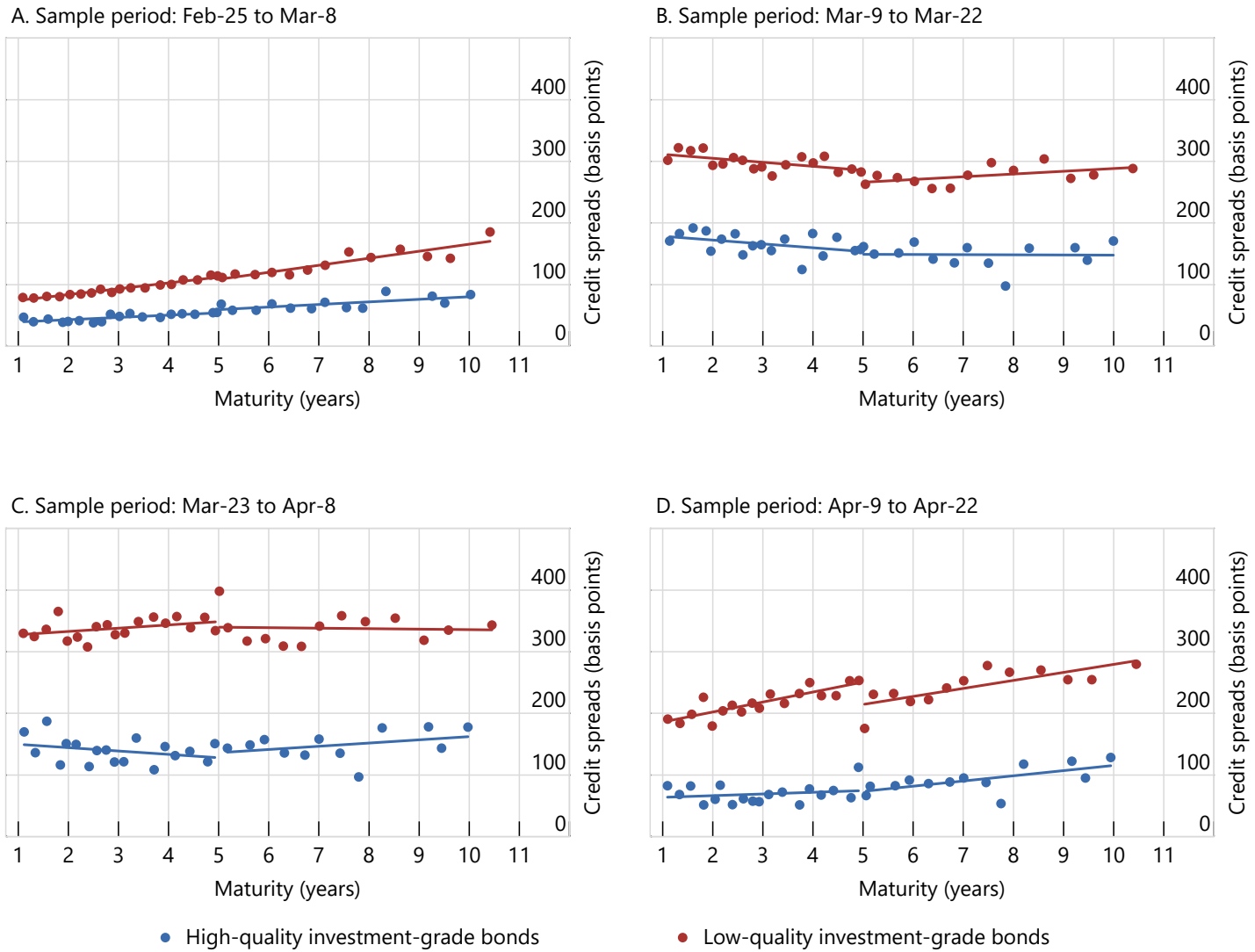
	Event Window		
Explanatory variables	2-day	5-day	10-day
$\mathbb{1}[t \geq t^*]$	-0.48^{***}	-0.63^{***}	-0.67^{***}
	(0.02)	(0.02)	(0.03)
$\mathbb{1}[t \geq t^*] \times \mathbb{1}[j = E]$	-0.05^{*}	-0.15^{***}	-0.24^{***}
	(0.02)	(0.03)	(0.03)
R^2	0.88	0.87	0.85
No. of firms	516	555	569
No. of bonds	2,596	2,781	2,942
Observations	10,037	22,181	42,469

NOTE: Issuer-clustered standard errors in parentheses: * $p < .10$; ** $p < .05$; and *** $p < .01$.

Term Structure of Credit Risk

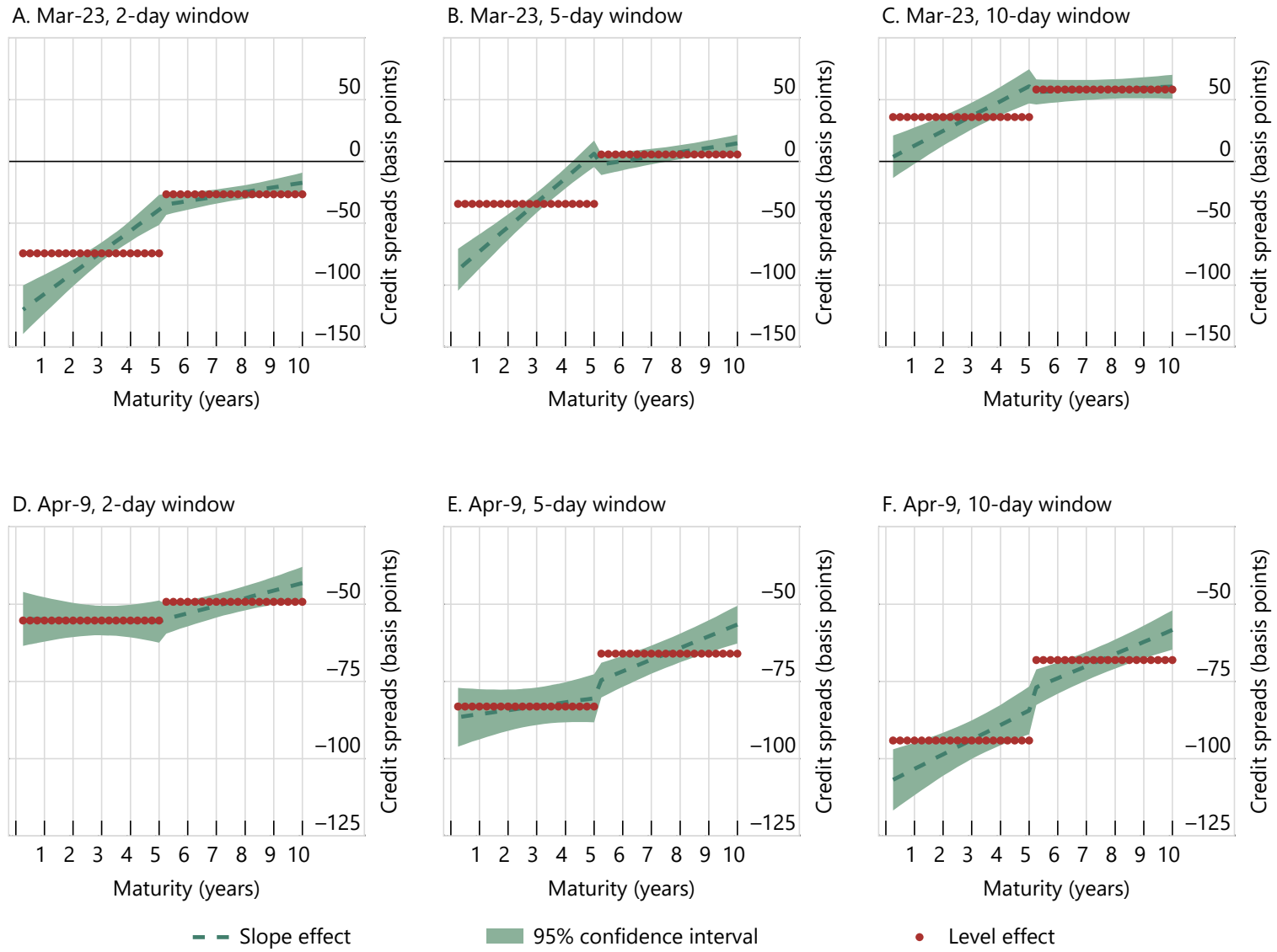
- Standard DiD analysis emphasizes the differential impact of the two SMCCF announcements on the average level of credit spreads between program-eligible and program-ineligible bonds.
- **Question**: How did the two announcements affected the slope of the term structure of investment-grade credit spreads?
- Why this matters?
  - If significant differential effect on the credit spreads of program-eligible bonds persists, even after controlling for the announcement-induced shifts in the credit curve, then in designing such programs, eligibility criteria matter.
  - If announcements—through their impact on the slope of the entire investment-grade credit curve—led to a narrowing of credit spreads of both eligible and ineligible securities, then a broader mechanism is at work.

Investment-Grade Credit Curve During the Pandemic



SOURCE: Authors' calculations using TRACE data.

Announcement-Induced Shifts in the Credit Curve



SOURCE: Authors' calculations using TRACE data.

A Preferred-Habitat Framework

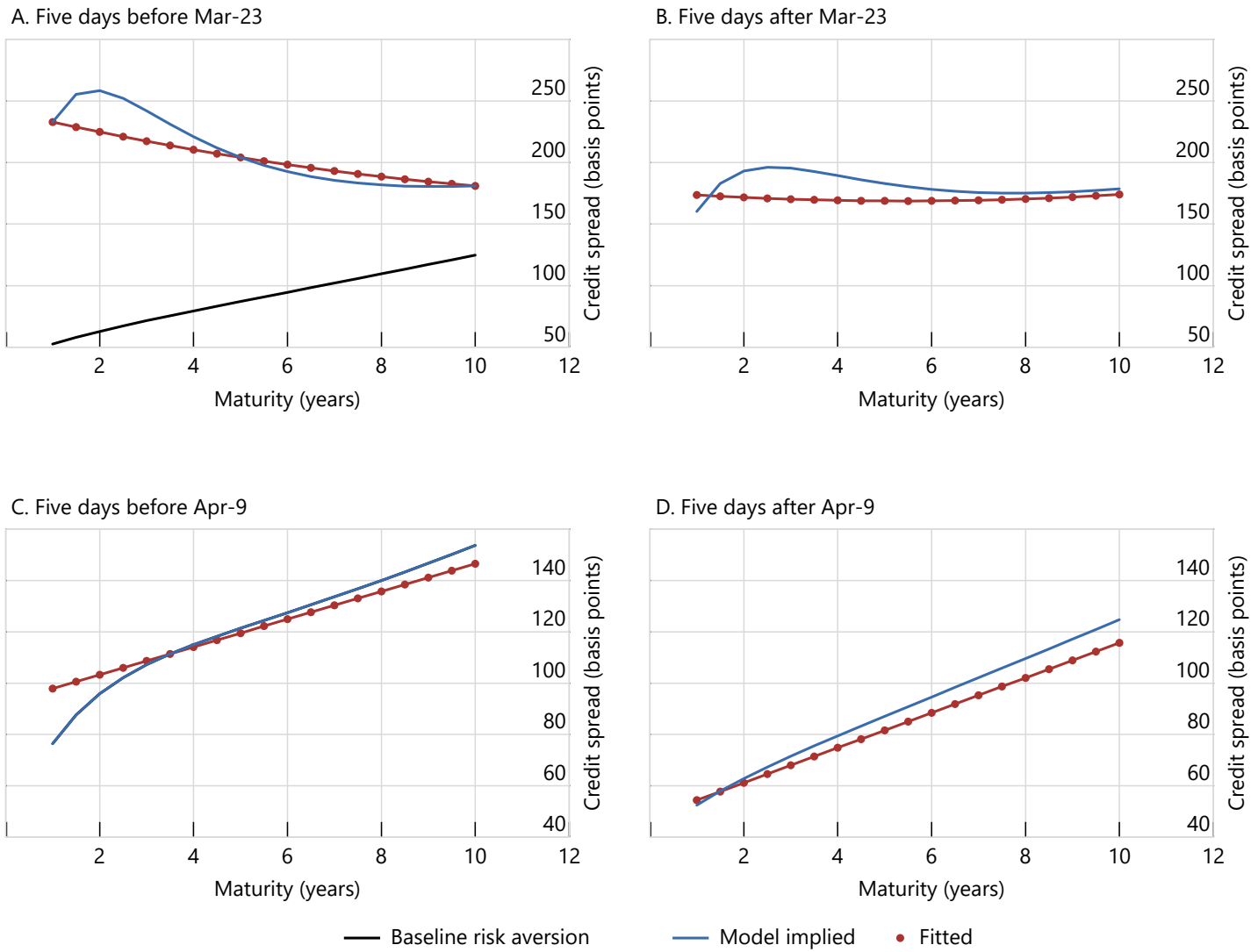
Vayanos and Vila [2021]

- Standard preferred-habitat model augmented with a parallel market for high-quality investment-grade corporate debt.
  - Abstract from credit risk.
  - Differences in demand across Treasury and corporate bond markets are motivated by differences in investors' liquidity preferences.
- Agents:
  - **Arbitrageurs**: Can invest in the short rate and corporate bonds and do so to maximize a mean-variance objective over changes in their wealth.
  - **Preferred-habitat investors**: Demand only corporate bonds in a certain maturity sector.
- Credit spreads are determined by the differential exposure of corporate and comparable-maturity Treasury bonds to exogenous fluctuations in the short rate and by the idiosyncratic demand shocks in the two markets.

Quantitative Analysis

- What configuration of shocks can explain the pandemic-induced shifts in the high-quality investment-grade credit curve?
  - **Shock 1**: An unanticipated drop in the preferred-habitat investors' demand for short-term corporate debt.
  - **Shock 2**: Arbitrageurs' risk aversion jumps by a factor of 330 from its baseline value (i.e., $3.3 \rightarrow 1000$).
- Fed's announcements "calm" the market by reducing arbitrageurs' risk aversion:
  - **Mar-23 announcement**: reverses more about 70% of the pandemic-induced jump in arbitrageurs' risk aversion.
  - **Apr-9 announcement**: reduces arbitrageurs' risk aversion by an additional 20%.

Model-Implied vs. Actual Credit Curve



Summary

- Mar-23 and Apr-9 announcements:
  - Significantly reduced investment-grade credit and bid-ask spreads across the maturity spectrum.
  - Rotated the credit curve and restored the normal upward-sloping term structure of credit spreads.
  - Apr-9 announcement induced a steepening of the entire investment-grade credit curve, irrespective of the SMCCF's maturity-eligibility criterion.
  - Announcement-induced narrowing of credit spreads is due almost entirely to a decline in credit risk premia.
- Empirical findings can be rationalized within the preferred-habitat framework.
- **Bottom line**: The primary effect of the Fed's announcements was to restore investor confidence and improve market sentiment, in the process making it substantially easier for companies to borrow in the corporate bond and other debt markets.