The COVID-19 Auction Premium

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A premise: Flash Crashes

- In recent years, an increasing number of incidents known as "flash crashes" has roiled financial markets.
- The most infamous event is probably the equity market flash crash on May 6, 2010 ("The Flash Crash").

Flash crash: (Bank of England, 2019)

A large and rapid change in the price of an asset that does not coincide with or in some cases substantially overshoots changes in economic fundamentals, before typically retracing those moves shortly afterwards

Date	Year	Market
Sep. 17	2012	Commodities (oil)
Apr. 23	2013	Twitter flash crash
Oct. 15	2014	US Treasury bonds
Mar. 18	2015	US Dollar FX rates
Oct. 7	2016	British Pound
Jan. 3	2019	Japanese Yen
March 12	2020	Italian Government Bonds

- Open debate: Is this a problem for financial stability?

Contributions of this paper

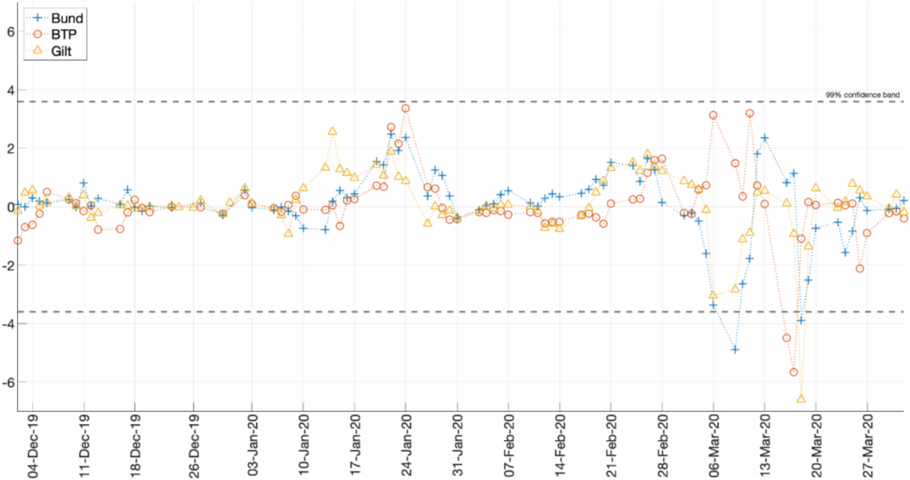
We contribute to this literature in different directions:

1. By arguing that a market inefficiency of flash-crash type (a V-shape) is signaled by a sudden change in the sign of the price drift, we uncover an additional channel by which a pandemic is costly for taxpayers
2. We analyze data from the secondary Italian bond market, and we show that the auction premium spiked anomalously on Thursday 12 March 2020
3. We quantify the Treasury issuance cost at 136 bps of the auction size
4. Our results also indicate that subsequent monetary policy measures effectively reduced the size of the premium during the second wave of the pandemic

Outreach

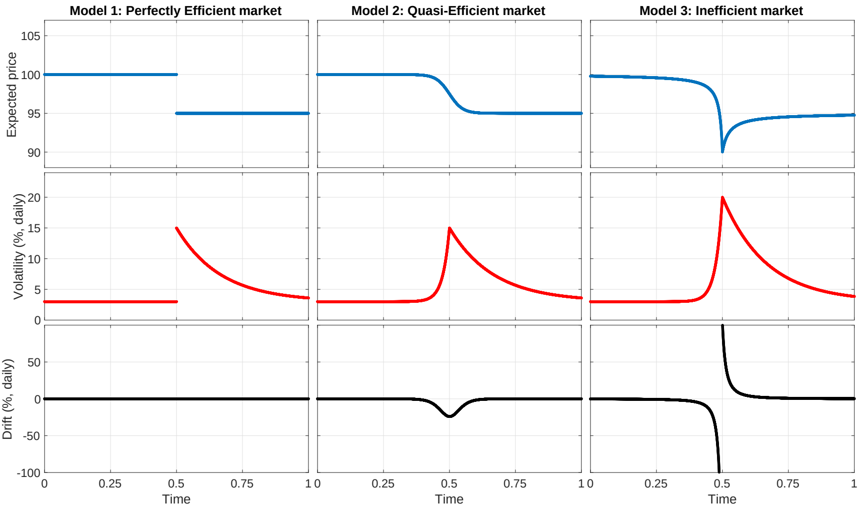
- Il Sole 24 Ore Econopoly blog – *Dal coronavirus una sfida per il futuro: disegnare mercati meno fragili* link
- Bank Underground blog post – *Market fragility in the pandemic era* – Our post has received some good traction so far, helped in part by being a recommended reading of the Financial Times link
- The V-statistic was used in the Financial Stability Report of the Bank of England (August 2020) to assess the presence of market distress link

An example: Market distress during March 2020



Source: Market fragility in the pandemic era, Bank Underground post, 2020 link

How does price react to news?



Source: V-shapes, Maria Flora and Roberto Renò, working paper, 2020 ▸ link

Data

- Our main dataset mainly consists of all transactions in the Monte Titoli (MOT) up to 31 October 2020 of the 10-year fixed-rate bond which was incepted on 30 August 2019. This bond was auctioned in 7 additional ordinary tranches on:
  - 27 September 2019
  - 30 October 2019
  - 28 November 2019
  - 30 December 2019
  - 30 January 2020
  - 12 March 2020
  - 31 March 2020
- The daily COVID-19 data for Italy come from the website of the European Centre for Disease Protection and Control (ECDC).

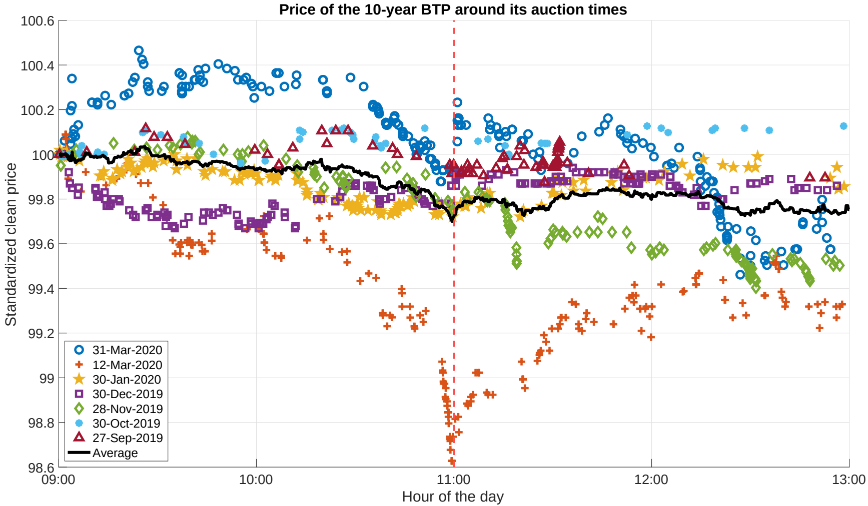


Figure : Intraday prices of the 10-year BTP in the MOT market for various days in which it was auctioned. The dashed-red line is at 11:00 (auction time).

Relevant literature: a selective review

- Flora and Renò (2020) show how to capture movements of the price away from fundamentals
- Duffie (2020), to improve financial stability, advocates the introduction of a broad central clearing mandate
- Menkveld and Yueshen (2019) show that cross-arbitrage may break during a severe liquidity shock, and point at fragmented markets (like the Italian secondary market for Treasury bonds) as a potential source of flash crashes
- Schrimpf, Shin, and Sushko (2020) point at hedge funds as a major amplifier of the events in the U.S. Treasury market
- Colliard (2017) shows that flash crashes can be exacerbated by the presence of traders with superior information on liquidity, instead of fundamentals
- Lou, Yan, and Zhang (2013) show that the average auction premium on the US bond market is between 9.07 and 18.43 bps.

The model

Assume that the log-price process X, observed in the interval $[0, 1]$, is driven by

$$\mathrm{d}X_t = \mathrm{d}t \left(\mu_t + \frac{c^-_{1,t}}{(\tau_{\mathrm{db}} - t)^\alpha} \mathbb{1}_{\{t<\tau_{\mathrm{db}}\}} + \frac{c^+_{1,t}}{(t - \tau_{\mathrm{db}})^\alpha} \mathbb{1}_{\{t>\tau_{\mathrm{db}}\}} \right) + \mathrm{d}W_t \left(\sigma_t + \frac{c_{2,t}}{|\tau_{\mathrm{db}} - t|^\beta} \right) + \mathrm{d}J_t \, , \tag{1}$$

- μ_t is locally bounded and predictable;
- σ_t is locally bounded, adapted, càdlàg and positive;
- J_t is a pure jump process;
- τ_{db} is the explosion time;
- $0 \leq \alpha < 1$ and $0 \leq \beta < \frac{1}{2}$

The V-statistic (Flora and Renò, 2020)

The V-statistic

$$\mathcal{V}_{\tau,n} = \sqrt{h_n} \cdot T^{+}_{\tau,n} \cdot T^{-}_{\tau,n}$$

Similarly to Christensen, Oomen, and Renò (2021), the test can be formally expressed at time-point τ as follows

$$T^{-}_{\tau,n} = \sqrt{\frac{h_n}{K_2^{-}}} \frac{\hat{\mu}^{-}_{\tau,n}}{\hat{\sigma}^{-}_{\tau,n}} ,$$

where

$$\hat{\mu}^{-}_{\tau,n} = \frac{1}{h_n} \sum_{i=1}^{n} K^{-} \left(\frac{t_{i-1} - \tau}{h_n} \right) (X_i - X_{i-1}) , \quad \text{for } \tau \in (0, 1] ,$$

and

$$\hat{\sigma}^{-}_{\tau,n} = \left(\frac{1}{h_n} \sum_{i=1}^{n} K^{-} \left(\frac{t_{i-1} - \tau}{h_n} \right) (X_i - X_{i-1})^2 \right)^{\frac{1}{2}} , \quad \text{for } \tau \in (0, 1] .$$

What happened on Thursday 12 March 2020?

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A dangerous slip-up from Lagarde

The European Central Bank really is there to close spreads.

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Claire Jones MARCH 12 2020

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Market Extra

Lagarde in damage-control mode after saying ECB ‘not here to close spreads’ amid Italy bond selloff

Published: March 12, 2020 at 12:58 p.m. ET

By William Watts

2

Investors call ECB response underwhelming

Results on Italian bonds

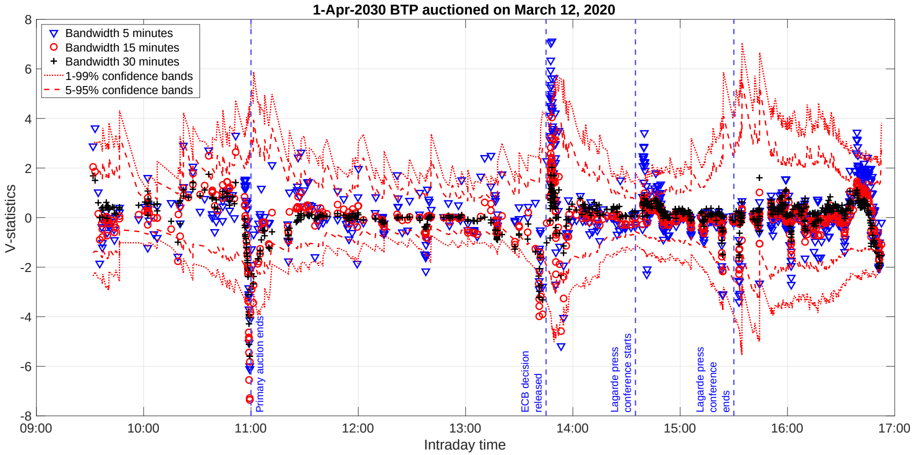

Figure : The $\mathcal{V}_{\tau,n}$ computed on the intraday clean prices at each transaction time using a bandwidth $h_n = 5$, $h_n = 15$, and $h_n = 30$ minutes. Confidence bands are reported for the 15-minute bandwidth only with a parametric bootstrap technique.

Comparison

	Time at minimum	V-statistics minimum	p-value
31-Mar-2020	10 : 55 : 53	−3.53	0.10
12-Mar-2020	10 : 59 : 19	−7.35	0.00
30-Jan-2020	10 : 55 : 11	−0.55	0.80
30-Dec-2019	11 : 00 : 56	−0.96	0.61
28-Nov-2019	10 : 59 : 48	−0.03	0.93
30-Oct-2019	11 : 07 : 17	−0.00	0.63
27-Sep-2019	11 : 04 : 29	−0.69	0.53

Table : Shows the minimum of the $\mathcal{V}_{\tau,n}$, the time at which it was attained and its p-value in the seven days in which the 10-year BTP was auctioned by using a bandwidths of 15 minutes.

Estimated cost for taxpayers: I

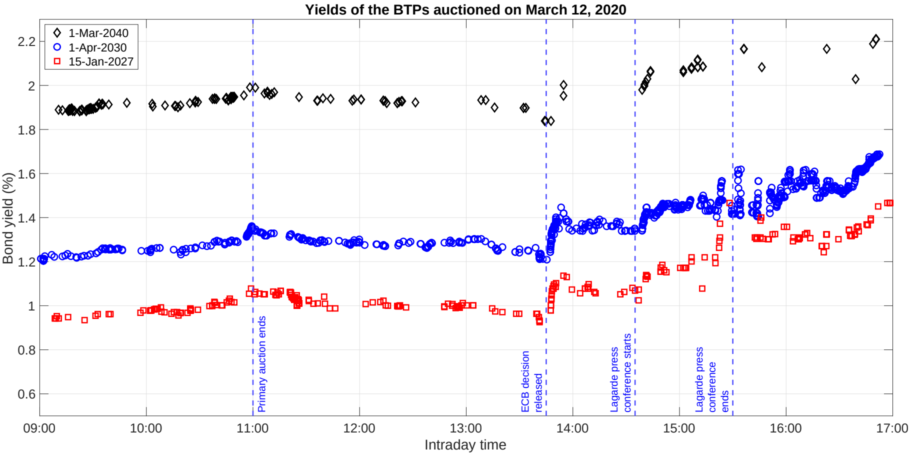

Figure : Yields of the three bonds auctioned on 12 March 2020 in the secondary market (MOT). Each point represents a transaction in the MOT.

Estimated cost for taxpayers: II

- The auction of 12 March 2020 offered four different bonds, all fixed-rate BTPs with maturity 3 (€3.5 bln), 7 (€0.795 bln), 10 (€1.205 bln) and 20 (€1.5 bln) years.
- The cost for taxpayers is estimated to be -0.90%, -1.39% and -1.57% for the 7, 10 and 30 year BTP respectively. The corresponding loss amounts to 47.55 million euros, 1.36% of the amount offered (€3.5 bln).

Note: This estimated total auction premium has to be considered a lower bound, since the computation ignores the 3.5 billion euros auction on the first tranche of a 3-year BTP for which a secondary market was still not available.

Volatility and size of the auction cycle: I

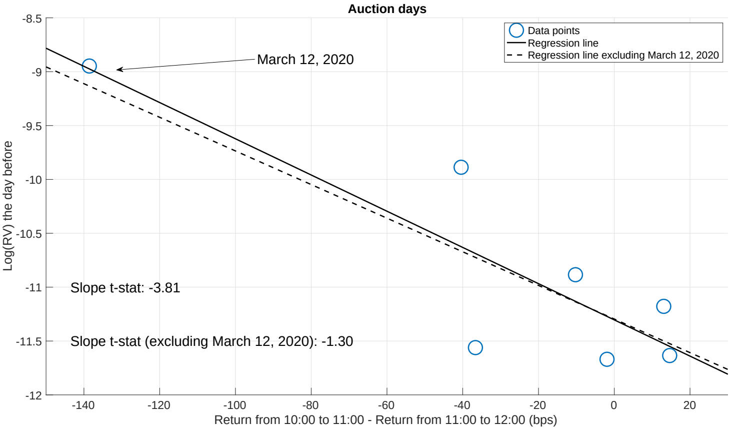

Figure : The difference between hourly returns before and after the auction versus the logarithm of 5-minute realized variance computed in the previous day.

Volatility and size of the auction cycle: II

Lou, Yan, and Zhang (2013) explain the transient price decrease by the limited risk-bearing capacity of primary dealers. Their theory has two ingredients.

- Primary dealers hedge the supply shock by selling substitute bonds in the secondary market before the auctions, which creates a temporary downward pressure in prices.
- Harsher liquidity conditions and higher volatility should magnify the effect because of the risk aversion of the primary dealers.

Covid and bond markets

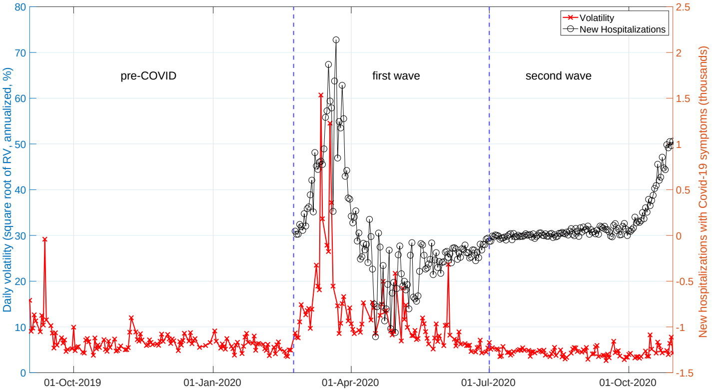

Figure : Volatility of the 10-year BTP under auction, measured as the square root of 5-minute realized volatility, and number of new hospitalizations with Covid-19 symptoms.

Testing methodology

We test the impact of COVID-19 on the BTP volatility using a modification of the additive cascade model of volatility components defined over different time periods in Corsi (2009), as follows

$$\sqrt{RV}_t = \alpha + \beta_d \sqrt{RV}_{t-1} + \beta_w \sqrt{RV}_{t-1:t-5} + \beta_m \sqrt{RV}_{t-1:t-22} + \gamma \mathrm{COVID}_{t-1} + \\ + \delta \mathrm{ECB}_t + \varepsilon_t.$$

Note: The first three explanatory variables ($\sqrt{RV}_{t-1}$, $\sqrt{RV}_{t-1:t-5}$ and $\sqrt{RV}_{t-1:t-22}$) are meant to model the "normal" volatility dynamics and its long-term persistence.

Results of the testing methodology

	Pre-Covid		First wave		Second wave	
Parameter	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
Constant	2.07^{***}	2.86	5.42^{***}	3.44	2.59^{***}	3.11
$\sqrt{RV}_{t-1}$	0.16	1.60	0.43^{***}	5.13	0.16	1.31
$\sqrt{RV}_{t-1:t-5}$	0.39^{**}	2.23	0.09	0.62	-0.31	-1.14
$\sqrt{RV}_{t-1:t-22}$	0.09	0.58	-0.05	-0.43	0.51^{**}	2.52
ECB decisions	6.15^{***}	5.64	25.63^{***}	10.95	1.05^{*}	1.83
COVID_{t-1}	–	–	2.73^{**}	2.44	1.42^{***}	2.66
Observations	119		88		89	
R^2	40.55		76.83		16.27	

Note:

- First wave -> 2 Sep 2019-22 Feb 2020
- Second wave -> 23 Feb 2020-30 Jun 2020
- Third wave -> 1 Jul 2020-31 Oct 2020

Pandemic emergency purchase programme (PEPP): I

The Governing Council decided to increase the initial €750 bln amount releases on 18 March 2020 by €600 bln on 4 June 2020 and by €500 bln on 10 December, for a new total of €1,850 billion.

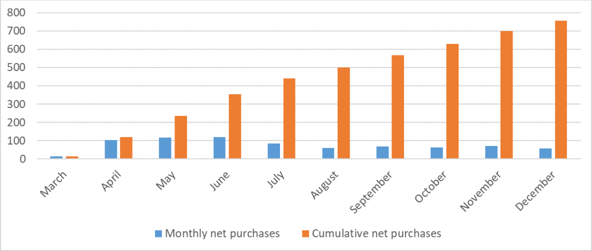

Figure : Cumulative figures represent the difference between the acquisition cost of all purchase operations and the redeemed nominal amounts. Source: ECB data

Note: The monthly purchase volumes are reported on a settlement basis and net of redemptions.

Pandemic emergency purchase programme (PEPP): II

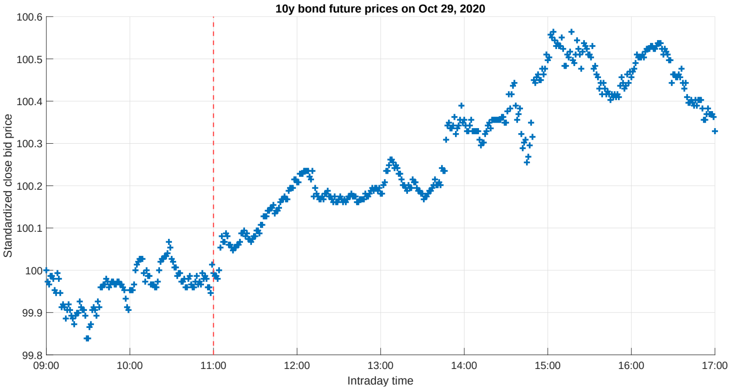

Figure : 1-minute closing price bids of the 10-year BTP futures on 29 October 2020. The dashed red line represents the auction time.

Conclusions

- V-shapes indicate market dysfunctions, and we should use local drift to detect distress.
- We uncover an additional channel by which a pandemic is costly for taxpayers.
- What should be on our agenda?
  - Understand reasons that may cause abnormal price movement and improve monitoring of financial markets.
  - Can we avoid market dysfunctions? We show the effectiveness of the ECB interventions.
- Thanks for your attention!

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