Price Elasticity of Demand and Risk-bearing Capacity in Sovereign Bond Auctions

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Motivation

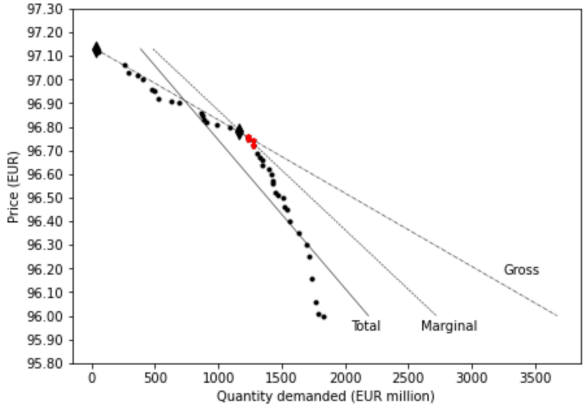
Big Picture:

- What are the macro-financial effects of quantity-driven shocks in asset markets?
- How do these effects depend on the risk-bearing capacity of financial intermediaries?

This Paper:

- Utilizes bid-level data at Portuguese Treasury auctions to construct demand curves and elasticities
- The paper then argues these elasticities are good proxies for risk bearing capacity (and not captured by existing measures)
- Finally, the paper provides strong evidence that when demand elasticity is low, returns are abnormally high in the days following the auction

Auction Demand Curve



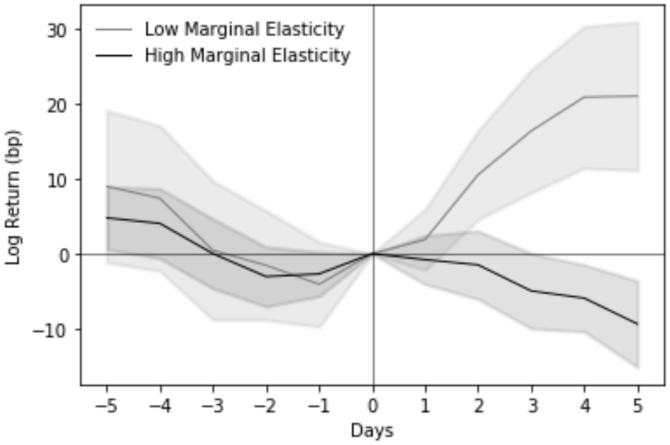
- The authors construct the entire demand schedule and demand elasticity

Demand Elasticity Determinants

	ME	ME	ME	ME
RBAS	-0.039	-0.100	-0.188**	-0.294*
	(-0.447)	(-0.779)	(-2.143)	(-1.804)
DRIFT	-0.082	-0.023	0.009	0.042
	(-0.880)	(-0.234)	(0.092)	(0.407)
SIZE	-0.014	-0.061	-0.048	0.006
	(-0.175)	(-0.617)	(-0.576)	(0.060)
SPREAD	0.081	0.036	0.093	0.253
	(0.804)	(0.172)	(0.809)	(1.179)
VOL	-0.335***	-0.421***		
	(-3.646)	(-3.695)		
SDUR	0.079	-0.119	0.256	0.151
	(0.414)	(-0.478)	(1.288)	(0.598)
Constant	5.912***		5.640***	
	(17.474)		(16.097)	
Year FE	No	Yes	No	Yes
Quarter FE	No	Yes	No	Yes
Obs.	66	66	66	66
Adj R^2	0.19	0.23	0.06	0.10

- Besides volatility in the bond market, no strong predictors of demand elasticity prior to the auction

Returns Following the Auction



- Low elasticity predicts larger abnormal returns in the days following the auction

Returns Following the Auction

	AR_5	AR_5	AR_5	AR_5	AR_5
ME			-12.68***	-9.55***	-11.37***
			(-3.23)	(-3.07)	(-3.21)
RBAS	12.79***	11.00***		10.58***	9.83***
	(3.82)	(2.84)		(3.31)	(2.71)
DRIFT	-7.50	-6.38		-7.41*	-7.62**
	(-1.63)	(-1.52)		(-1.83)	(-2.00)
SIZE		-1.87			-1.03
		(-0.40)			(-0.24)
COVER		-2.72			0.04
		(-0.51)			(0.01)
SPREAD		-6.44			-3.95
		(-1.57)			(-1.09)
VOL		8.64*			4.77
		(1.69)			(0.99)
SE		6.50*			9.49**
		(1.69)			(2.38)
Constant	-18.45***	-45.53	108.52***	62.55**	11.63
	(-3.32)	(-1.27)	(3.23)	(2.35)	(0.30)
Obs.	66	66	66	66	66
Adj R^2	0.26	0.31	0.15	0.33	0.39

- Finding holds even after controlling for various measures
- Key takeaway: quantity shocks have larger effects when risk-bearing capacity is low

Preferred Habitat Theory Predictions

- At a high level, these results are consistent with models of preferred habitat (Vayanos & Vila 2021, Droste, Gorodnichenko & Ray 2022, Gourinchas, Ray & Vayanos 2022, Greenwood et al 2022, ...)
- Arbitrageurs with mean-variance preferences

$$\max E_t(\mathrm{d}W_t) - \frac{a}{2} V_t(\mathrm{d}W_t)$$

$$\text{s.t. } \mathrm{d}W_t = W_t i_t \,\mathrm{d}t + \int_0^T X_t^{(\tau)} \left(\frac{\mathrm{d}P_t^{(\tau)}}{P_t^{(\tau)}} - i_t \,\mathrm{d}t \right) \mathrm{d}\tau$$

- Preferred habitat investors and demand/supply of bonds of maturity τ:

$$Z_t^{(\tau)} = -\alpha(\tau) \log P_t^{(\tau)} - \theta(\tau)\beta_t$$

- Under general conditions, price effects of demand/supply shocks are increasing in arbitrageur risk aversion

$$\frac{\partial}{\partial a} \left(\left| \partial P_t^{(\tau)} \Big/ \partial \beta_t \right| \right) > 0$$

Some Additional Comments

Diving in more deeply to the results, some questions:

1. Endogenous supply decisions and fiscal space
2. Strategic bidding behavior of primary dealers
3. Demand elasticity (slope) and bid-to-cover (level)

Comment 1: Supply-Side

- As explained in the paper, the Portuguese fiscal authority only sets a range of issuance before the auction
- In response to demand conditions, the authority chooses how much to issue (and sometimes even issues outside these bounds)
- Hence, even at a high frequency, these supply shocks are not fully exogenous
  - Differs from how the US conducts Treasury auctions, where issuance amount is fully fixed ex ante
- Also relevant for issues of default, which are important in the context of Portuguese debt markets

Comment 2: Primary Dealers Bidding Decisions

- Primary dealers are the only investors allowed to participate in auctions, and in fact are required to participate in order to maintain their status
- The Portuguese Treasury incentivizes their participation over a number of auctions
  - Similar to US primary dealers, except that other investors may also participate in Treasury auctions
- Hence, the bidding decisions for a given primary dealer depends not only on current conditions, but also on past bids
- Can the authors track individual dealers across time?

Comment 3: Bid-to-Cover

	ME	ME	ME	ME
RBAS	-0.085	-0.091	-0.214***	-0.242*
	(-1.041)	(-0.793)	(-2.762)	(-1.772)
DRIFT	-0.088	-0.032	-0.016	0.017
	(-0.809)	(-0.310)	(-0.144)	(0.156)
SIZE	0.079	0.053	0.068	0.142
	(0.946)	(0.532)	(0.730)	(1.446)
SPREAD	0.208*	0.134	0.240*	0.338*
	(1.700)	(0.657)	(1.784)	(1.765)
VOL	-0.281***	-0.356***		
	(-2.877)	(-3.305)		
SDUR	-0.138	-0.184	-0.032	0.010
	(-0.701)	(-0.726)	(-0.150)	(0.038)
COVER	0.278**	0.228**	0.326**	0.301**
	(2.246)	(2.045)	(2.409)	(2.570)
Constant	4.302***		3.803***	
	(4.991)		(4.219)	
Year FE	No	Yes	No	Yes
Quarter FE	No	No	Yes	Yes
Obs.	66	66	66	66
Adj R^2	0.289	0.272	0.203	0.187

- The bid-to-cover is a strong (contemporaneous) predictor

Comment 3: Bid-to-Cover

- The authors should explore the relationship between the estimated marginal elasticity and the bid-to-cover
  - Coarse measure of the overall strength of demand
  - Very strong predictor (statistically), but of course these measures are functions of the same underlying data
- One reason dealers purchase bonds is to sell to other investors, hence the bid-to-cover should be higher all else equal when investor demand is high
- Should we generally expect to find a strong relationship between demand sensitivity and the overall level of demand?

Concluding Remarks

- Utilizing great bidder-level data in Portuguese auctions, the authors convincingly show that a low demand elasticity predicts higher abnormal returns in the days following the auction
- Provides additional support to the view that the effects of supply shocks interact with risk-bearing capacity of financial intermediaries
- The findings are consistent with some theories about how demand and supply shocks are absorbed by financial markets
- But some concerns remain about how to link the estimated demand elasticities to the risk-bearing capacity of dealers (mostly from institutional details of Portuguese auctions)