Effects of the International Regulatory Reforms over Market Liquidity of Mexican Sovereign Debt

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DISCLAIMER

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Motivation

- The 2008 Global Financial Crisis uncovered a number of risks largely attributed to an inadequate bank regulation

- Many regulatory reforms were proposed as part of the post crisis agenda: Basel 2.5, Basel III, Dodd-Frank Act, Volcker Rule and the Liquidity Coverage Ratio.

- The ultimate goal is to promote financial stability by mitigating both the probability and severity of future financial collapses.

- However, the discussion has focused on the legal implications and model calibration needed to fit the new regulation.

- The assessment of the unintended consequences of these reforms in financial markets is relatively scarce.

Roadmap

- **Introduction**

- **Data Description**

- **Econometric Model**

- **Robustness Checks**

- **Conclusions**

Introduction

- In this paper we provide empirical evidence on the effects that changes in the regulatory framework have had on the market liquidity of Mexican government debt.

- We find mixed impacts:
  - Negative effects: Basel 2.5, Basel III and Liquidity Coverage Ratio (LCR)
  - Positive effects: Dodd-Frank Act and Volcker Rule

- Some of the regulatory changes imposed additional constraints on government debt holdings, while others were designed to enhance transparency and thus reduce uncertainty as well as information asymmetries.

Introduction

- Our baseline specification explains the weekly turnover rate for government debt instruments with dummy variables that account for the regulatory changes and a number of controls.

- Our results are robust under different liquidity measures (turnover ratio, volume, volatility of yields), different sampling frequencies, different econometric specifications that account for different financial crisis controls, endogenous regime changes and endogenous break points.

- The results are significant and the methodology could be naturally applied by other countries to test for the effects of regulatory changes on market liquidity.

Literature Review

- This paper is related to a more general literature that analyzes the unintended consequences of regulatory changes on market liquidity of sovereign bonds.

- Traditionally, empirical studies have analyzed the determinants of market liquidity of fixed income instruments (Lybek and Sarr, 2002; Roll, 1984; Schestag, Schustter, and Uhrig-Homburg, 2016).

- More recent empirical evidence, a number of papers have also investigated the effects of regulatory changes on market liquidity (Trebbi and Xiao, 2016; Benos, Payne and Vasios, 2016; Aquilina and Suntheim, 2017; Adrian et al., 2017)

- To our knowledge, this paper is one of the first to provide empirical evidence of the effect of the regulatory changes over market liquidity of sovereign debt securities in emerging market economies.

Data

- We retrieve data on transaction-level sales and purchases of debt instruments from one of Banco de México's proprietary databases.

- This database contains transaction-level information of all realized debt trades among banks, brokerage houses and other institutions such as development banks from January 2006 to October 2016.

- The information contains the following:
  - Number of debt titles per trade

  - Transaction prices and related interest rates.

  - Individual level information such as security type, date of issuance, time to maturity, currency, institution type time of execution, type of transaction (e.g. purchase or sale).

Data description II – Descriptive Statistics

a) Traded securities
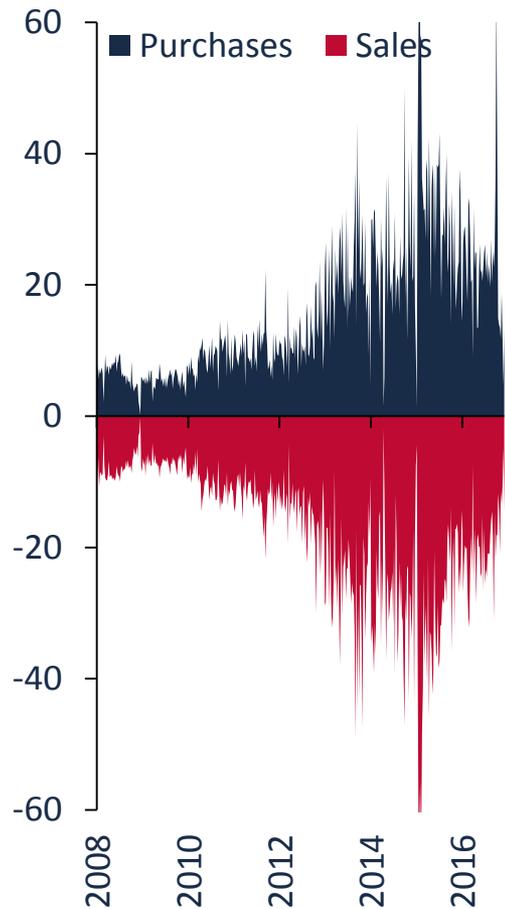
b) Traded volume
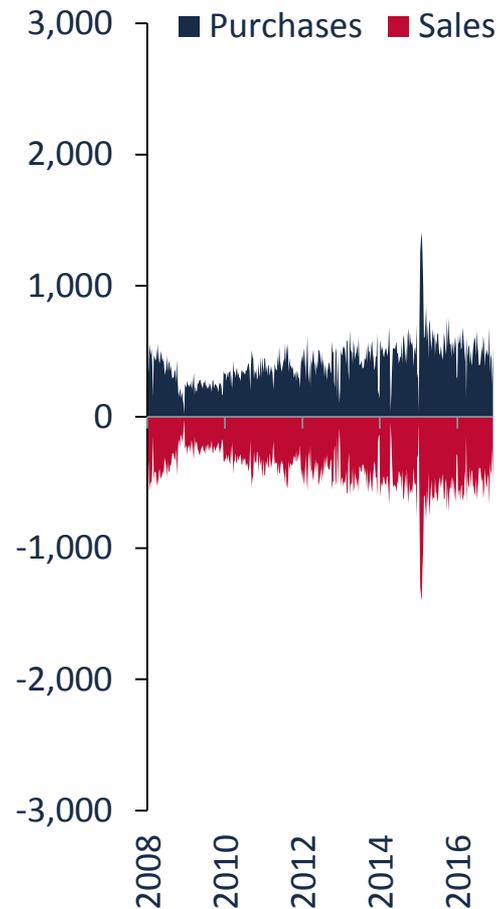
c) Average ticket size
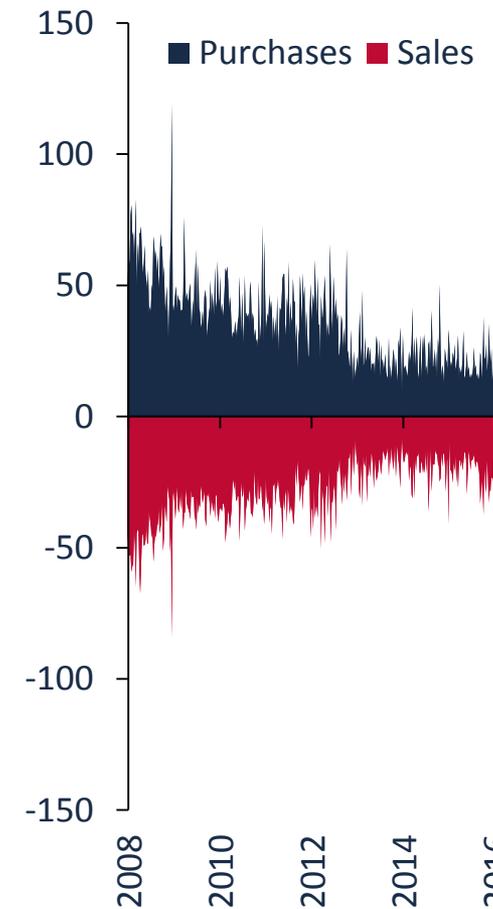
Data description III – Liquidity Measures

Weekly standardized liquidity measures for government debt instruments

a) Turnover rate
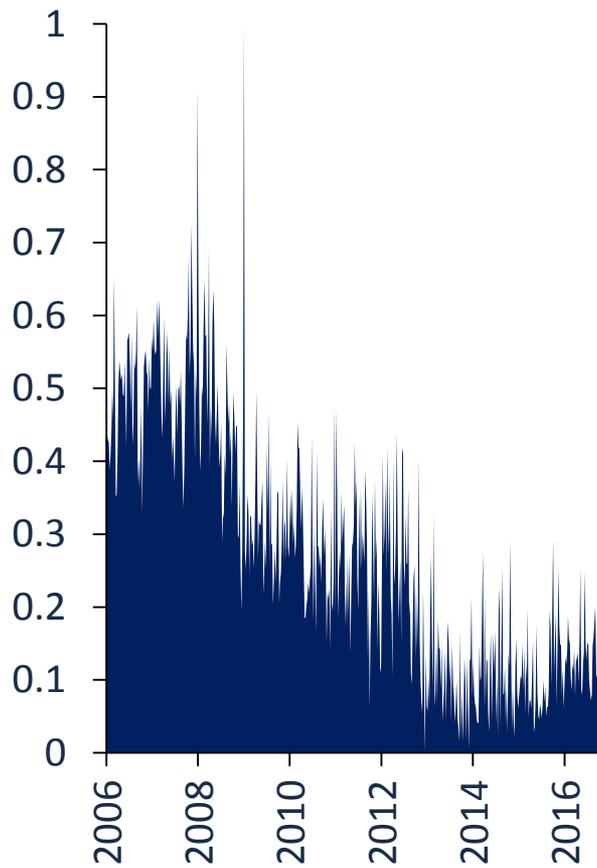
b) Intraday Volatility of interest rates
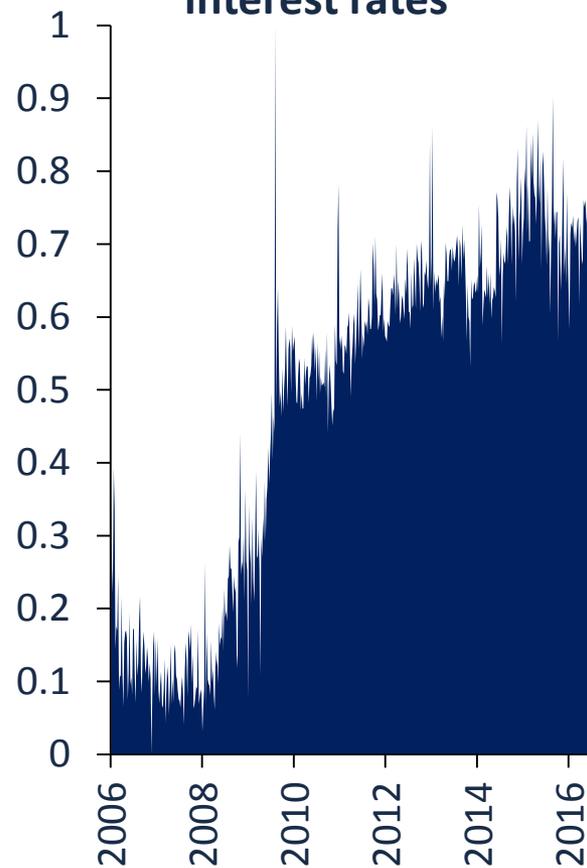
Econometric model

- We used the turnover rate as a dependent variable for the econometric model, as there is a positive relation between turnover rate and market liquidity.

- The econometric specification is as follows:

$$Turnover_t = \alpha + \sum_{i=1}^{5} \beta_i D_{it} + \sum_{j=1}^{6} \gamma_j CV_{jt} + \epsilon_t$$

$$\epsilon_t \sim N(0, {\sigma_\epsilon}^2).$$

Where D_{it} represents the dummy variables for the observed regulatory changes, CV_{jt} represents the control variables and ϵ_t represents a random noise.

Results baseline specification

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Basel 2.5	-0.0136**	-0.0131**	-0.0119**	-0.0118**	-0.0117*	0.0035	0.0193*
	(0.0057)	(0.0056)	(0.0060)	(0.0060)	(0.0060)	(0.0086)	(0.0103)
Basel III	-0.0378***	-0.0385***	-0.0383***	-0.0385***	-0.0384***	-0.0374***	-0.0371***
	(0.0103)	(0.0103)	(0.0103)	(0.0104)	(0.0104)	(0.0103)	(0.0103)
LCR	-0.0380***	-0.0426***	-0.0423***	-0.0424***	-0.0421***	-0.0391***	-0.0368***
	(0.0075)	(0.0078)	(0.0078)	(0.0078)	(0.0078)	(0.0080)	(0.0081)
DFA	0.0300***	0.0283***	0.0281***	0.0282***	0.0282***	0.0290***	0.0290***
	(0.0099)	(0.0100)	(0.0100)	(0.0100)	(0.0100)	(0.0100)	(0.0100)
VR	0.0297***	0.0308***	0.0331***	0.0328***	0.0326***	0.0315***	0.0362***
	(0.0069)	(0.0069)	(0.0088)	(0.0090)	(0.0090)	(0.0089)	(0.0092)
VIX		-0.0007***	-0.0006***	-0.0007***	-0.0007***	-0.0002	-0.0003
		(0.0002)	(0.0002)	(0.0002)	(0.0003)	(0.0003)	(0.0003)
USD/MXN			-0.0008	-0.0007	-0.0008	-0.0007	-0.0009
			(0.0017)	(0.0017)	(0.0017)	(0.0017)	(0.0017)
Return on S&P 500				-0.0343	-0.0852	-0.0445	-0.0489
				(0.0872)	(0.1334)	(0.1294)	(0.1298)
Return on MEXBOL					0.0551	0.0486	0.0542
					(0.1045)	(0.1020)	(0.1012)
FED funds rate						0.4813**	0.4383*
						(0.2176)	(0.2257)
MXN Interbank 1M Rate							0.6078
							(0.3974)
Constant	0.1822***	0.1981***	0.2064***	0.2061***	0.2064***	0.1787***	0.1374***
	(0.0034)	(0.0057)	(0.0177)	(0.0178)	(0.0178)	(0.0221)	(0.0332)
Observations	561	561	561	561	561	561	561
R-squared	0.1288	0.143	0.1434	0.1437	0.1441	0.1495	0.1522

Robust standard errors *** p<0.01, ** p<0.05, * p<0.1

Robustness tests

- **A battery of robustness tests was conducted in order to validate our results:**

  - Global Financial Crisis Controls.

  - Other liquidity measures.

  - Endogenous regime switching models

  - Structural breakpoint regression with endogenous break point specifications

  - An illiquidity measure for the US treasury bonds.

  - The implementation dates of the regulatory changes were used instead of the announcement dates.

Global Financial Crisis Controls

- **Even if the objective of using some of the local and global control variables is to capture the effect of the global financial crisis on market liquidity, we included:**

  1) A control variable that explicitly captures the impact of the global financial crises in the Mexican economy.

  2) A control variable for financial stress periods. These periods were identified via the *VIX* index.

Global Financial Crisis Controls

Variables	(1)	(2)	(3)	(4)
Basel 2.5	0.044	0.0196*	-0.0113*	0.0226**
	(0.0077)	(0.0103)	(0.0060)	(0.0105)
Basel III	-0.0378***	-0.0371***	-0.0413***	-0.0361***
	(0.0103)	(0.0104)	(0.0105)	(0.0105)
LCR	-0.0380***	-0.0367***	-0.0408***	-0.0349***
	(0.0075)	(0.0081)	(0.0078)	(0.0082)
DFA	0.0300***	0.0290***	0.0301***	0.0294***
	(0.0099)	(0.0100)	(0.0100)	(0.0100)
VR	0.0297***	0.0361***	0.0310***	0.0363***
	(0.0069)	(0.0092)	(0.0069)	(0.0092)
Dummy 2008	-0.0252***	-0.0024		
	(0.0073)	(0.0163)		
Dummy VIX			-0.0080	0.0008
			(0.0049)	(0.0059)
VIX		-0.0003		
		(0.0003)		
USD/MXN		-0.0008		-0.0013
		(0.0017)		(0.0016)
Return on S&P 500		-0.0479		-0.0167
		(0.1301)		(0.1281)
Return on MEXBOL		0.0534		0.0499
		(0.1016)		(0.1003)
FED fund rate		0.3963		0.6042***
		(0.3585)		(0.1910)
MXN Interbank 1M rate		0.6076		0.5259
		(0.3987)		(0.3750)
Constant	0.1894***	0.1390***	0.1860***	0.1355***
	(0.0039)	(0.0356)	(0.0040)	(0.0336)
Observations	561	561	561	561
R-squared	0.145	0.1522	0.1333	0.1511

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

Other liquidity measures

Variables	Δ Holdings	Avg. Ticket Size	Volatility	Spread max-min	Amihud
Basel 2.5	0.0014**	0.5415	0.3073***	2.3326***	-0.1784***
	(0.0005)	(2.0021)	(0.0392)	(0.6769)	(0.0376)
Basel III	-0.0011	-0.4714	0.1782***	1.2142**	0.0330**
	(0.0010)	(1.6623)	(0.0180)	(0.5829)	(0.0135)
LCR	-0.0020***	-12.4711***	0.0522***	0.7352	0.0626***
	(0.0005)	(1.2734)	(0.0176)	(0.5588)	(0.0184)
DFA	0.0014	-3.9723**	-0.0278	-0.7507	-0.0608***
	(0.0010)	(1.6723)	(0.0243)	(0.6463)	(0.0178)
VR	0.0008	3.8387***	0.0242	-0.4323	-0.0025
	(0.0005)	(1.2187)	(0.0210)	(0.4138)	(0.0288)
VIX	-0.0001***	-0.0467	0.0006	-0.0084	0.0016*
	(0.0000)	(0.0565)	(0.0008)	(0.0243)	(0.0009)
USD/MXN	-0.0001	-0.3203	0.0101***	-0.1087**	0.0262***
	(0.0001)	(0.2235)	(0.0033)	(0.0427)	(0.0045)
Return of S&P 500	0.0089	12.4766	-0.0664	1.4567	-0.0706
	(0.0068)	(29.1579)	(0.2924)	(7.5786)	(0.4249)
Return of MEXBOL	-0.0137**	-10.7747	0.5145*	3.1059	0.0942
	(0.0060)	(19.3510)	(0.2771)	(4.8860)	(0.3129)
FED fund rate	-0.0336**	235.2019***	-5.0301***	4.8677	0.3150
	(0.0132)	(47.7067)	(0.5489)	(10.5462)	(0.6831)
MXN Interbank 1M rate	0.0539***	255.4694***	-4.7792***	67.5072***	1.9880
	(0.0199)	(76.4142)	(1.1768)	(18.5263)	(1.3527)
Constant	0.0004	30.2565***	1.7466***	4.3473***	0.0733
	(0.0018)	(5.5196)	(0.0851)	(1.2295)	(0.1096)
Observations	561	561	561	561	561
R-squared	0.1192	0.761	0.9347	0.0452	0.4493

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

Endogenous regime switching models

- A Markov Switching Model for the weekly turnover rate was estimated in order to identify endogenously whether the turnover ratios have different regimes.

$$Turnover_t = \alpha_{s_t^*} + \varepsilon_{s_t^*}, \qquad \varepsilon_{s_t^*} \sim N\left(0, \sigma_{s_t^*}^2\right)$$

- We found empirical evidence of two regimes for the turnover rates.

Variable	$s_t^* = 1$	$s_t^* = 2$
$\alpha_{s_t^*}$	0.1446*** (0.0028)	0.2095*** (0.0062)
$\sigma_{s_t^*}^2$	0.0378*** (0.0378)	0.0532*** (0.0058)
Observations	561	561

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

Endogenous regime switching models

Weekly turnover and low turnover regime probability
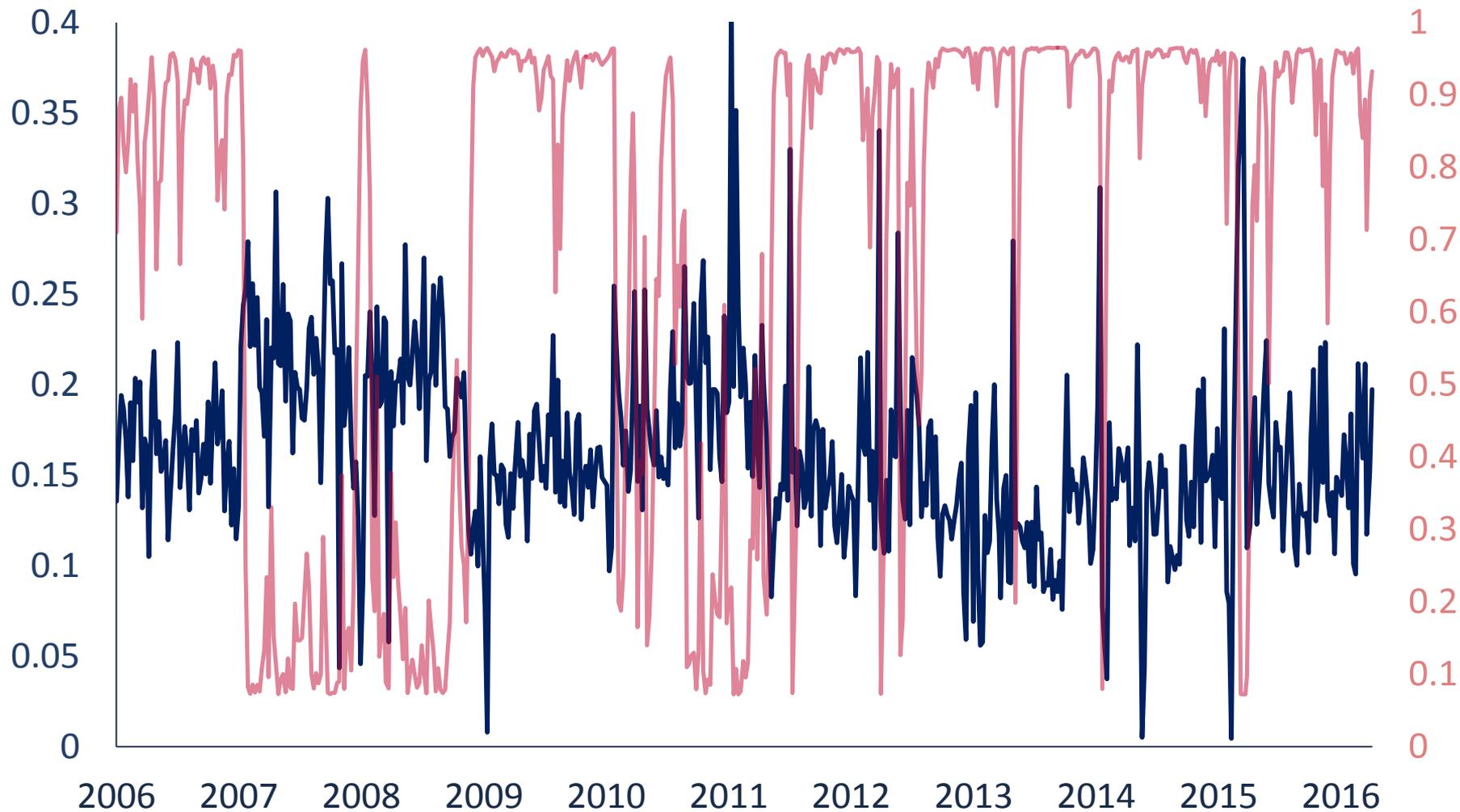
An illiquidity measure for the US

- Hu, Pan, and Wang (2013) developed an illiquidity measure for Treasury bonds which consists of price deviations from asset fundamentals ("noise").

Variables	HPW
Basel 2.5	-5.6431***
	(0.5550)
Basel III	-1.1321***
	(0.1370)
LCR	0.6241***
	(0.1363)
DFA	-0.3034**
	(0.1356)
VR	0.2993***
	(0.0703)
Dummy 2008	0.6472*
	(0.3605)
VIX	14.7606***
	(1.6774)
Return of S&P 500	8.7884***
	(3.3388)
Lagged FED funds rate	-115.2528***
	(12.2609)
Observations	467
R-squared	0.866

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

Conclusions

- In this paper, we analyze whether the recent changes in the global regulatory framework have affected market liquidity of Mexican sovereign debt.

- We find that regulatory changes that imposed additional constraints to the balance sheets of financial institutions (e.g. Basel 2.5, Basel III and LCR) have negatively affected market liquidity of Mexican sovereign debt, while those intended to increase transparency, reduce market uncertainty and information asymmetries (e.g. Dodd Frank Act and Volcker Rule) have a positive impact on market liquidity.

- Our estimates suggest that the aggregate regulatory effect has reduced the weekly turnover ratio of Mexican sovereign debt by 18 percent.

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