Online Appendix for "Bank Funding Cost and Liquidity Supply Regimes"[1]

This online appendix provides details on the data, the methodology, and the empirical results related to our paper "Bank Funding Cost and Liquidity Supply Regimes." Section A describes the methodology. Section B describes the results associated with the estimation of a Markov-Switching model of FFS. Section C reports the full set of results relative to the ability of FFS to predict the evolution of indicators of real activity and bank lending. Finally, Section D displays the spot and forward funding spreads and the total assets of the central bank for Japan and the United Kingdom.

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A Methodology for Constructing Yield Curves

We define two types of yield curves. The discounting curve corresponds to the OIS curve with overnight rates. The forwarding curves correspond to yield curves with tenors 1 month, 3 months, 6 months, and 12 months. We denote by x the tenor of a given curve.

A.1 Notations

We define $P_x(t,T)$, $t \leq T$, the discount factor, i.e., the price of a zero-coupon bond at time t for maturity T, for underlying rate tenor x, with $P_x(t,t) = 1$ and t is reference date. The simply compounded zero-coupon rate at date t for maturity T, denoted by $Z_x(t,T)$, is defined from:

$$P_x(t,T) = \frac{1}{[1 + Z_x(t,T)]^{\tau_x(t,T)}},$$

where $\tau_x(t,T)$ is the year fraction for interval $[t,T]$ under the convention of curve x. For zero-coupon rates, the time interval is computed as $\tau_x(t,T) = (T-t)/365$.

We define the simply compounded forward rate at date t for the future time interval $[T_{k-1}, T_k]$, with tenor x, as:

$$\tilde{F}_{x,k}(t) \equiv \tilde{F}_x(t, T_{k-1}, T_k) = \frac{1}{\tau_{x,k}} \left[\frac{P_x(t,T_k)}{P_x(t,T_{k-1})} - 1 \right],$$

where $\tau_{x,k}$ is the year fraction for interval $[T_{k-1}, T_k]$ under the convention of curve x. For forward rates, the time interval is computed as $\tau_{x,k} = (T_k - T_{k-1})/360$ (actual/360). For example, $\tilde{F}_{3\text{m},6\text{m}}(t)$ denotes the forward rate with tenor 3 months between $t + 3\text{m}$ and $t + 6\text{m}$.

In the multicurve environment, the following no arbitrage relation holds:

$$P_x(t,T_k) = P_x(t,T_{k-1}) P_x(t, T_{k-1}, T_k), \quad t \leq T_{k-1} \leq T_k$$

where $P_x(t, T_{k-1}, T_k)$ is the forward discount factor at date t and corresponding to the future time interval $[T_{k-1}, T_k]$, with

$$P_x(t, T_{k-1}, T_k) = \frac{P_x(t,T_k)}{P_x(t,T_{k-1})} = \frac{1}{1 + \tilde{F}_{x,k}(t)\tau_{x,k}}.$$

We typically consider constant time intervals such as $T_k - T_{k-1} = \delta$. The yield curve of the δ-month forward rates is denoted by: $\mathcal{C}_x^{(F)} = \left\{ T \rightarrow \tilde{F}_x(t, T, T+\delta), t \geq T \right\}$.

A.2 Interbank Market Instruments

A.2.1 Overnight Index Swap (OIS)

The reference rate for overnight over-the-counter (OTC) transactions is the federal funds rate in the United States and the Eonia (European OverNight Index Average) rate in the euro area. An OIS is an interest rate agreement that involves the exchange of the overnight rate and a fixed interest rate. The floating rate is determined by the geometric average of the overnight index rate over the time interval of the contract period. The fixed leg is quoted in the market as a yield that is applied over the duration of the swap. The two counterparties of an OIS contract agree to exchange at maturity the difference between interest accrued at the agreed fixed rate and the floating rate on the notional amount of the contract. No principal is exchanged at the beginning of the contract. For maturities up to 1 year, there are no intermediate interest payments. Then the broken period is at the beginning.

The floating rate is given by the formula:

$$R_d(t, T_k) = \frac{360}{N_k}\left[\prod_{i=1}^{d_k}\left(1 + \frac{r_i n_i}{360}\right) - 1\right] \times 100$$

where r_i is the overnight rate at date i, $N_k = T_k - t$ is the total number of days, d_k is the number of working days, and n_i is the number of days with rate r_i, with $N_k = \sum_{i=1}^{d_k} n_i$.

A.2.2 Deposit

Interbank deposits are OTC zero-coupon contracts that start at reference date t and cover the period $[t, T]$ with maturities T ranging from one day to one year. The Libor rate is the reference rate in the United States and the Euribor rate is the reference rate in the euro area (IBOR, in short). They correspond to the rate at which interbank deposits are offered by a prime bank to another prime bank. Fixing rates are constructed as the trimmed average of the rates submitted by a panel of banks. The IBOR reflects the average cost of funding of banks on the interbank market for a given maturity. The deposit with duration x is selected for the construction of the curve with tenor x.

We denote by $R_x^D(t, T_k)$ the quoted rate (annual, simply compounded) associated to the deposit of maturity T_k, with tenor $x = T_k - t$ months. The implied discount factor at time t for time T_k is given by:

$$P_x(t, T_k) = \frac{1}{1 + R_x^D(t, T_k)\tau_{x,x}}, \quad t \leq T_k.$$

A.2.3 Forward Rate Agreement (FRA)

FRA contracts are forward starting deposits. They are defined for forward start dates calculated with the same convention used for the deposits. Therefore, FRAs concatenate exactly with deposits. Market FRAs on x-tenor IBOR contracts can be selected for the construction of the short-term of the yield curve with tenor x.

We denote by $\tilde{F}_{x,k}(t)$ the forward rate reset at time T_{k-1}, with tenor $x = T_k - T_{k-1}$ months. Then the implied discount factor at time T_k is given by:

$$P_x(t, T_k) = \frac{P_x(t, T_{k-1})}{1 + \tilde{F}_{x,k}(t)\tau_{x,k}}, \quad t \leq T_{k-1} \leq T_k.$$

A.2.4 Swap

Interest rate swaps are OTC contracts by which two counterparties exchange fixed against floating rate cash flows. On the U.S. market, the floating leg is usually indexed to the 3-month Libor rate payed with 3-month frequency. On the euro market, the floating leg is indexed to the 6-month Euribor rate payed with 6-month frequency. The day count convention (τ_S) is 30/360 (bond basis). Swaps on x-tenor IBOR contracts are selected for the construction of the medium and long-term of the yield curve with tenor x.

A swap is defined by two date vectors $T = \{t, T_1, \cdots, T_n\}$ and $S = \{t, S_1, \cdots, S_m\}$ with $t < T_1 < S_1 < \cdots < T_n = S_m$ and $n < m$. The fixed leg pays a fixed rate at times S_j. The floating leg pays the IBOR with tenor $x = T_k - T_{k-1}$ fixed at time T_{k-1}. We denote by $S_x(t, T, S)$ the swap rate with floating leg payment dates T and fixed leg payment dates S, with tenor $x = T_k - T_{k-1}$ months. The price of a swap with payment times T and S is given by the no arbitrage relation:

$$S_x(t, T, S) \sum_{j=1}^{n} P_d(t, S_j)\tau_j = \sum_{k=1}^{m} P_d(t, T_k)\tilde{F}_{x,k}(t)\tau_{x,k}.$$

Once the curve points at $\{t, T_1, \cdots, T_{k-1}\}$ and $\{t, S_1, \cdots, S_{j-1}\}$ are known, it is possible to bootstrap the yield curve at point $T_i = S_j$. In practice, the fixed leg frequency is annual, whereas the floating leg frequency is given by the IBOR tenor. Some points of the curve are unknown and have to be interpolated.

A.2.5 Basis swap

Basis swaps are floating versus floating swaps, admitting underlying rates with different tenors. On the U.S. market, the typical basis swaps are 1-month vs 3-month, 3-month vs 6-month, and 3-month vs 12-month. On the euro market, the typical basis swaps are 1-month vs 3-month, 3-month vs 6-month, and 6-month vs 12-month. The quotation convention is to provide the difference (in basis points) between the fixed rate of the higher frequency swap and the fixed rate of the lower frequency swap. Basis swaps are used for the construction of the yield curve with non-quoted swaps (for instance, the 6-month curve in the United States and the 3-month curve in the euro area).

We define by $BS_{x,y}(t, T_x, T_y)$ the quoted basis spread for a basis swap receiving the long y-month rate and paying the short x-month rate plus the basis spread for maturity T_{m_x}. The price of a basis swap is given by the no arbitrage relation:

$$\sum_{k=1}^{m_y} P_d(t, T_{y,k}) \tilde{F}_{y,k}(t) \tau_{y,k} = \sum_{j=1}^{m_x} P_d(t, T_{x,j}) (\tilde{F}_{x,j}(t) + BS_{x,y}(t, T_x, T_y)) \tau_{x,j}.$$

A.3 Construction of the Yield Curves

Two main approaches are usually adopted for fitting yield curves and extract implicit forward rates. Central banks often construct smoothed Treasury yield curves following Nelson and Siegel (1987) or Söderlind and Svensson (1997) methodology. This parametric approach allows us to obtain a smoothed curve when the observed yields are relatively noisy, which is often the case of Treasury curves. In the case of FRA-Swap rates, which usually display much smoother patterns, it is more common to use more direct bootstrapping techniques. In the baseline bootstrapping technique, one imposes the interpolated curve to pass through the observed sport rates. The resulting spot curve is rather smooth, but the forward curve often exhibits spikes. This is the reason why, the objective function also imposes a smoothing of the forward rates. See Flavell (2010) at textbook level.

We briefly explain below how we construct the yield curve of a given tenor and compute tenor spreads. We consider a curve with a tenor x corresponding to overnight (the discounting curve), 1 month, 3 months, 6 months, and 12 months (the forwarding curves). All the curves are constructed using instruments with the tenor of the curve. The forwarding curves also depend on the OIS curve used for discounting future cash flows. Several techniques can be used for interpolating a yield curve. Usual techniques are the linear or cubic interpolations. These techniques can be applied to the discount factor, the log of the discount factor, or the zero-coupon rate. A feature of the multicurve environment is the scarcity of the data for a given curve (except for the discounting curve). This implies that a large amount of maturities must be interpolated. The selection of the interpolation technique is therefore critical.

Ideally, all the available discount factors should be exactly given by the interpolation, yielding an arbitrage-free curve. However, it would lead to a very erratic yield curve. To cope with this problem, we allow for some arbitrage opportunity to obtain a smooth curve. We minimize a weighted sum of the squared changes in the forward rates under the arbitrage-free restrictions and the squared difference between the market and theoretical prices. The criterion is based on the 3-month forward rate. This maturity appears as a reasonable trade-off between the number of parameters to estimate and the ability to generate all the curves with similar data. For a given curve $\mathcal{C}_x^{(F)}$, we solve (imposing $T_k - T_{k-1} = 3\text{m}$ and $T_0 = t$):

$$\min_{\left\{\tilde{F}_x(t,T_{k-1},T_k)\right\}_{k=1}^{N}} \quad w\sum_{k=1}^{N-1}\left(\tilde{F}_x(t,T_k,T_{k+1}) - \tilde{F}_x(t,T_{k-1},T_k)\right)^2 + (1-w)\sum_{j=1}^{n}\left(P_x^{mkt}(t,T_j) - P_x^{theo}(t,T_j)\right)^2,$$

where w is weight of the smoothness relative to the fit of the market prices (we use $w = 0.25$); $N = 120$ is the number of 3-month forward rate over the 30 years used for the curve; n is the number of instruments used to construct curve with tenor x; $P_x^{mkt}(t,T_j)$ is the discount factor implied by the market quote, based on the pricing formula presented in Section A.2; $P_x^{theo}(t,T_j)$ is the discount factor implied by the estimated 3-month forward rates:

$$P_x^{theo}(t,T_j) = \frac{P_x^{theo}(t,T_{j-1})}{1+\tilde{F}_x(t,T_{j-1},T_j)\tau_{x,j}}, \qquad j = 1,\cdots,n,$$

with $P_x^{theo}(t,t) = 1$.

A.4 Evolution of the Forward Funding Spreads

Figure OA1 displays the time series of the forward funding spreads for the United States and the euro area for tenors of 1, 3 and 6 months. Before the start of the financial crisis in 2007, the difference between instruments with the same maturity but a different tenor was considered negligible. FFS exploded in August 2007 and remain extremely high. They almost always increase with the tenor, although not linearly so. This result is illustrated by two episodes of particular interest in the euro area: during the 2007–09 crisis, FFS was particularly high for the tenors of 3 and 6 months, with a spike above 100 bp for these spreads in January 2009. In contrast, during the sovereign debt crisis, FFS increased in a more regular way. They increased up to 50, 75, and 120 bp for the 1-, 3- and 6-month tenors, respectively, in November 2011. In the United States, the financial crisis also generated substantial differences between tenors. The FFS with a 1-month tenor increased to 140 bp in January 2009, while FFS with 3- and 6-month tenors jumped to 160 and 250 bp. Since the recent surge in spreads following the change in Federal Reserve interest rate policy (December 2015), we do not observe such large differences between tenors.

A.5 Goodness of Fit

Figure OA2 displays the evolution of the two components of the optimization criterion. In Panel A, we report the relative error (in basis points) in the construction of the 3-month and

6-month curves for the United States and the euro area, which corresponds to the second term in the optimization criterion. Panel B corresponds to the volatility of the 3-month forward rate (in basis points), which corresponds to the first term of the criterion.

For both zones, the fit of the curve is very good (Panel A). In the United States, the relative error is always below 4 bp for the 3-month curve and 2 bp for the 6-month curve. After 2009, the relative error is usually below 1 bp for both curves, with sample averages equal to 1 and 0.5 bp, respectively. For the euro area, the relative error is below 3 bp for the 3-month curve and 1 bp for the 6-month curve. After 2009, the relative error is much lower than 1 bp for both curves, with sample averages equal to 0.7 and 0.4 bp, respectively.

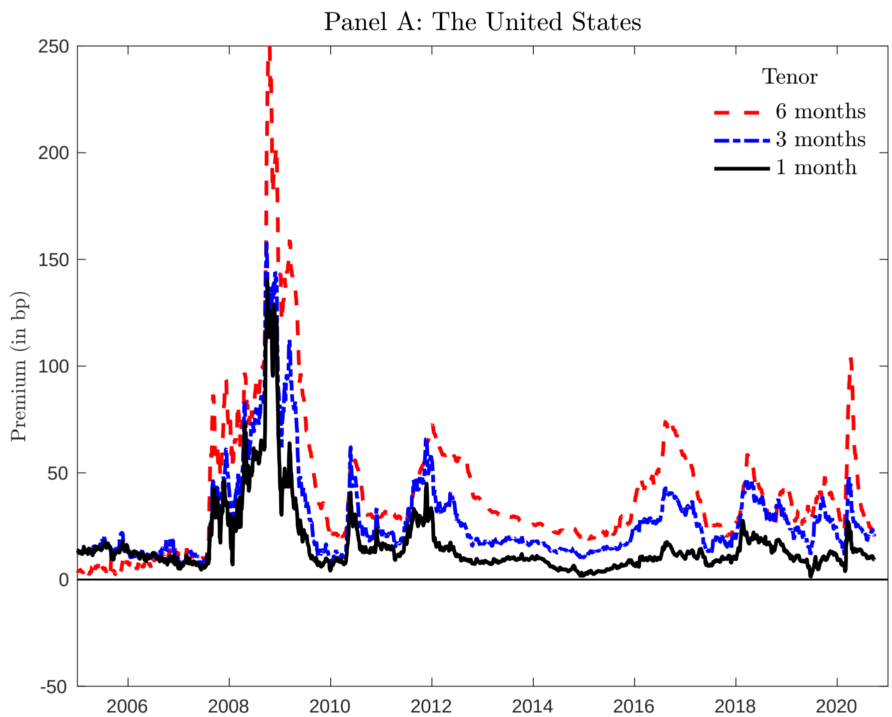
On average, the relative error is equal to 1.05 bp and 0.71 bp for the 3-month curve and 0.57 bp and 0.39 bp for the 6-month curve in the United states and the euro area, respectively.

In Panel B, we also report the volatility of the 3-month forward rate, which reflects the extend of the smoothing of the curves. As we note, the volatility is higher in the United States (up to 20 bp in 2008 and usually below 10 bp after 2009). In the euro area, the volatility rarely exceeds 10 bp.

These results suggest that the fit of the 3-month forward curve is well adjusted over our sample in both zones.

Figure OA1. Forward Funding Spreads for the United States and the Euro Area

Note: Panel A displays the 3-month forward funding spread for tenors 1 month, 3 months, and 6 months for the United States. Panel B displays the 3-month forward funding spread for tenors 1 month, 3 months, and 6 months for the euro area. The series are smoothed using a 5-day moving average. The sample periods run from January 2005 to September 2020.



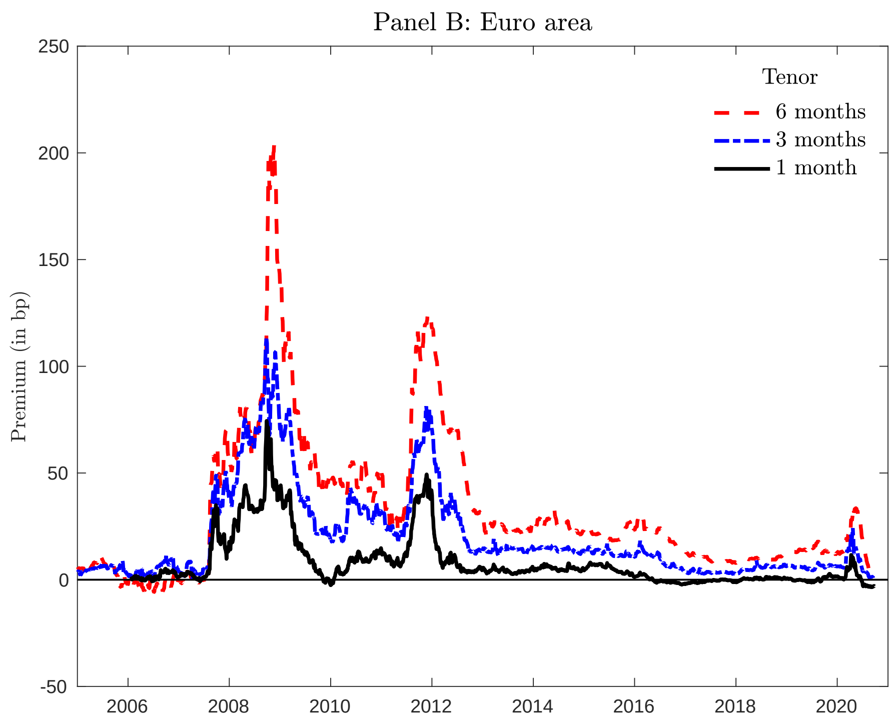
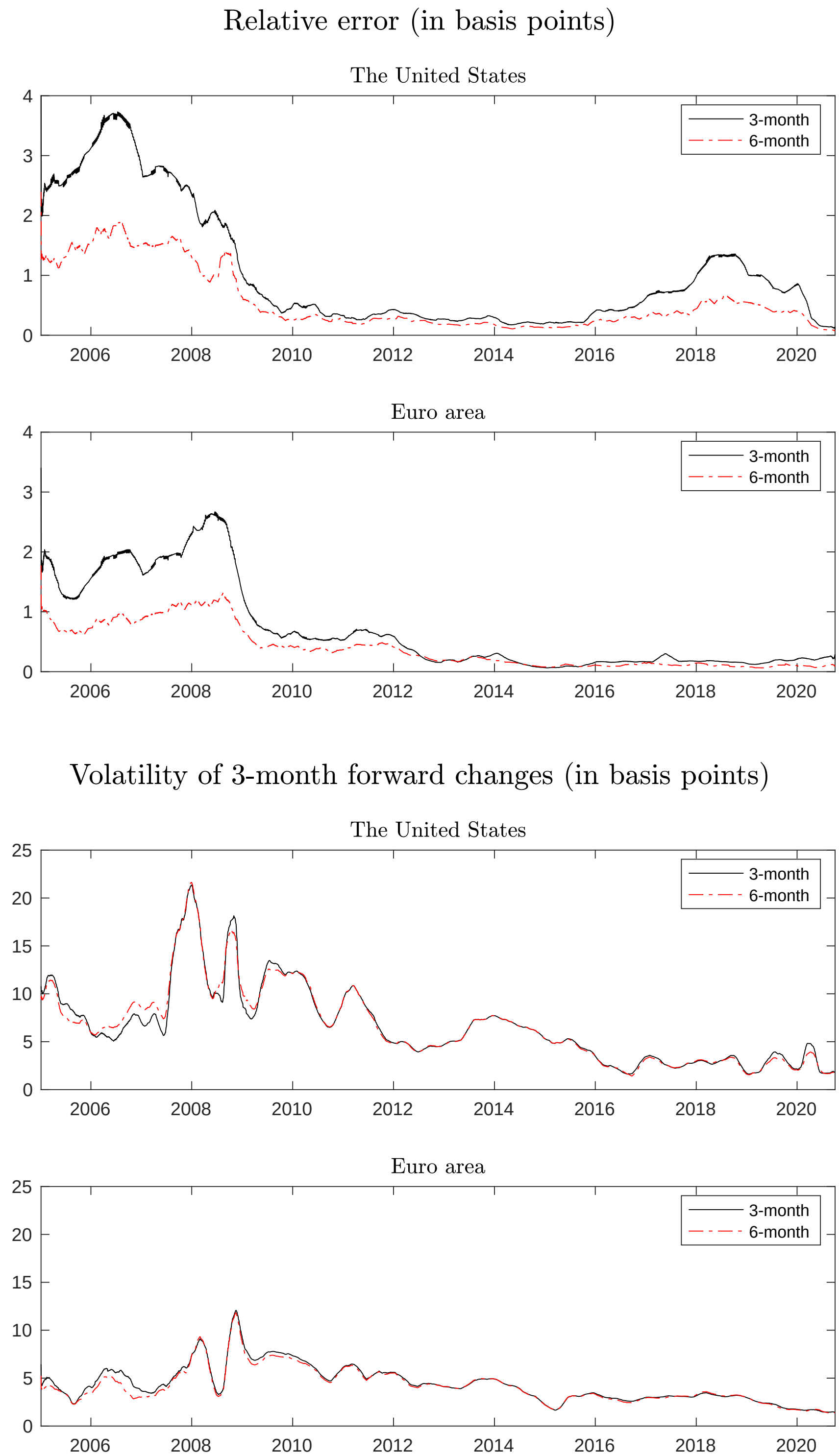


Figure OA2. Relative Error in the Fit of U.S. and Euro Area Curves

Note: Panel A displays the relative error (in basis points) in the construction of the 3-month and 6-month curves for the United States and the euro area. Panel B displays the volatility of the 3-month forward rate (in basis points) for the construction of the 3-month and 6-month curves for the United States and the euro area. The series are smoothed using a 5-day moving average. The sample periods run from January 2005 to September 2020.



B A Statistical Approach of Regimes

We complement the narrative approach with a statistical approach based on a simple Markov-Switching model. The objective is to estimate a model with regime-dependent means and volatilities and analyze whether the detected regimes do correspond to our narrative. FFS is assumed to be driven by the following process:

$$FFS_{t+1} = \mu(\mathcal{S}_{t+1}) + \varepsilon_{t+1}, \tag{A.1}$$

where $\mu(\mathcal{S}_{t+1})$ is the vector of expected returns, conditional on state $\mathcal{S}_{t+1}$. The vector of unexpected returns is defined as $\varepsilon_{t+1} = \sigma(\mathcal{S}_{t+1})z_{t+1}$, where $\sigma(\mathcal{S}_{t+1})$ denotes the volatility of unexpected returns and z_{t+1} is a sequence of iid innovations with distribution $N(0,1)$.

States are defined by the Markov chain $\{\mathcal{S}_t\}$ with k regimes and transition matrix

$$P = \begin{pmatrix} p_{11} & \cdots & p_{1k} \\ \vdots & \ddots & \vdots \\ p_{k1} & \cdots & p_{kk} \end{pmatrix},$$

where the transition probabilities are $p_{ij} = \Pr(\mathcal{S}_t = j|\mathcal{S}_{t-1} = i)$, $i, j \in \{1, ..., k\}$. We assume that expected returns $\mu(\mathcal{S}_{t+1}) = \mu_{(k)}$ and volatility $\sigma(\mathcal{S}_{t+1}) = \sigma_{(k)}$ are constant within states if $\mathcal{S}_{t+1} = k$.

We estimate a 3-state model using standard likelihood maximization over the period from January 2007 to September 2020.[2] Table OA1 reports the parameter estimates. For the United States, we observe a sequence of regime switches, from the high FFS regime ($\mu_{(3)} = 84$ bp, $\sigma_{(3)} = 7.8$) to the low FFS regime ($\mu_{(1)} = 16$ bp, $\sigma_{(1)} = 0.16$), reflecting the hectic evolution of market rates during this period. The high regime occurs from April 2008 to May 2009 (subprime crisis) and again from November to December 2011 (sovereign debt crisis). Then, there is one clear detection of the low FFS regime corresponding to period from September 2012 to December 2015, with an average FFS equal to 16 bp. From December 2015 onward, we observe that FFS is mainly in the intermediate regime ($\mu_{(2)} = 33$ bp, $\sigma_{(2)} = 0.55$), which corresponds to our moderate liquidity regime.

In the euro area, FFS varies between the high regime ($\mu_{(3)} = 68$ bp, $\sigma_{(3)} = 2.3$) and the intermediate regime ($\mu_{(2)} = 30$ bp, $\sigma_{(2)} = 0.53$) until September 2012. As for the United States, the high regime corresponds to the periods from February 2008 to May 2009 and from August 2011 to February 2012. After 2012, FFS remains in the low regime ($\mu_{(1)} = 9$ bp, $\sigma_{(1)} = 0.22$) until the end of the sample, with an exception in April 2020 during the Covid-19 pandemic.

In summary, these results confirm the correspondence between the narrative liquidity regimes and the statistical regimes based solely on the dynamic behavior of FFS.

[2] A likelihood-ratio test indicates that the two-state version is rejected under the null hypothesis.

Table OA1. Parameter Estimates of a 3-Regime Markov-Switching Model of FFS

	The United States			**Euro Area**		
	Regime 1	Regime 2	Regime 3	Regime 1	Regime 2	Regime 3
$\mu_{(k)}$	16.06	33.31	83.50	8.97	29.53	68.18
	(0.100)	(0.213)	(1.532)	(0.099)	(0.318)	(0.857)
$\sigma_{(k)}$	0.155	0.546	7.753	0.215	0.532	2.310
	(0.006)	(0.022)	(0.577)	(0.007)	(0.034)	(0.166)
Transition matrix						
$P_{1;:}$	0.995	0.007	0.000	0.999	0.003	0.000
$P_{2;:}$	0.005	0.991	0.011	0.001	0.993	0.008
$P_{3;:}$	0.000	0.003	0.989	0.000	0.005	0.992
Log-likelihood	4775.0			4897.3		

Note: Standard errors are in parentheses. The sample period runs from January 2007 to September 2020.

C Predictive Content: Full Set of Results

Table OA2. Predicting U.S. Real Activity Variables using Funding and Credit Spreads

	IBOR-OIS spread (SFS)			3-month FFS ($F^{(x)}_{3m,3m}$)			12-month FFS ($F^{(x)}_{12m,12m}$)			CDS spread	GZ spread	Goldberg var.
Tenor x	$1m$	$3m$	$6m$	$1m$	$3m$	$6m$	$1m$	$3m$	$6m$			
Panel A: Real GDP growth												
variables in $t-1$												
r	-0.002	-0.075	-0.123	-0.004	-0.103	-0.125	-0.014	-0.115	-0.168	-0.076	-0.005	-0.062
(t-stat)	(0.051)	(1.543)	(2.201)	(0.075)	(1.933)	(2.225)	(0.273)	(2.075)	(2.326)	(1.534)	(0.107)	(1.560)
$term$	-0.005	-0.053	-0.042	0.022	-0.050	-0.042	0.010	-0.055	-0.062	0.053	0.093	-0.075
(t-stat)	(0.097)	(0.897)	(0.605)	(0.396)	(0.856)	(0.626)	(0.156)	(0.835)	(0.831)	(0.740)	(1.430)	(1.724)
lag	-0.059	-0.158	-0.156	-0.148	-0.120	-0.147	-0.121	-0.079	-0.039	0.181	0.046	0.302
(t-stat)	(0.638)	(1.680)	(1.566)	(1.200)	(0.952)	(1.431)	(0.883)	(0.646)	(0.341)	(1.166)	(0.294)	(2.296)
variable	-1.751	-1.348	-1.191	-2.665	-1.964	-1.258	-3.000	-2.186	-1.610	-0.473	-0.207	-0.033
(t-stat)	(6.150)	(6.330)	(4.733)	(4.377)	(3.568)	(4.627)	(3.564)	(3.390)	(3.285)	(2.196)	(2.361)	(4.747)
variable												0.035
(t-stat)												(2.258)
Adj. R^2	0.360	0.369	0.350	0.428	0.398	0.343	0.402	0.358	0.308	0.210	0.206	0.179
variables in $t-2$												
r	-0.052	-0.180	-0.288	-0.054	-0.245	-0.294	-0.066	-0.274	-0.390	-0.196	-0.050	-0.141
(t-stat)	(0.675)	(2.025)	(2.556)	(0.628)	(2.159)	(2.629)	(0.722)	(2.218)	(2.301)	(1.878)	(0.550)	(1.472)
$term$	-0.018	-0.121	-0.121	0.011	-0.128	-0.119	-0.004	-0.137	-0.162	0.100	0.168	-0.124
(t-stat)	(0.197)	(1.163)	(0.994)	(0.122)	(1.170)	(0.995)	(0.037)	(1.076)	(1.068)	(0.919)	(1.451)	(1.230)
lag	-0.011	-0.198	-0.314	-0.205	-0.289	-0.334	-0.237	-0.241	-0.207	0.107	-0.117	0.306
(t-stat)	(0.264)	(1.820)	(1.970)	(1.660)	(1.330)	(1.971)	(1.361)	(1.130)	(1.072)	(1.000)	(0.723)	(3.645)
variable	-2.928	-2.380	-2.374	-4.907	-4.023	-2.597	-5.942	-4.531	-3.355	-0.969	-0.427	-0.071
(t-stat)	(4.828)	(5.700)	(4.508)	(4.770)	(3.451)	(4.388)	(3.785)	(3.117)	(2.914)	(2.257)	(2.167)	(3.562)
variable												0.024
(t-stat)												(0.912)
Adj. R^2	0.420	0.411	0.407	0.519	0.502	0.412	0.523	0.461	0.377	0.276	0.208	0.214
variables in $t-4$												
r	-0.323	-0.521	-0.714	-0.343	-0.622	-0.737	-0.357	-0.677	-0.905	-0.602	-0.265	-0.431
(t-stat)	(1.508)	(2.208)	(2.612)	(1.457)	(2.262)	(2.819)	(1.558)	(2.375)	(2.497)	(2.234)	(1.146)	(1.738)
$term$	-0.125	-0.312	-0.389	-0.121	-0.352	-0.395	-0.154	-0.366	-0.454	0.161	0.252	-0.218
(t-stat)	(0.700)	(1.533)	(1.729)	(0.643)	(1.500)	(1.733)	(0.766)	(1.432)	(1.472)	(0.859)	(1.917)	(1.054)
lag	-0.123	-0.276	-0.460	-0.241	-0.356	-0.515	-0.327	-0.375	-0.426	-0.240	-0.630	0.162
(t-stat)	(1.751)	(2.753)	(3.199)	(2.800)	(2.400)	(3.436)	(2.920)	(2.309)	(2.196)	(1.387)	(3.142)	(1.208)
variable	-4.398	-3.465	-3.695	-6.706	-5.760	-4.269	-8.819	-7.083	-5.694	-2.329	-1.099	-0.113
(t-stat)	(2.999)	(3.472)	(3.965)	(4.329)	(4.209)	(4.043)	(4.587)	(3.976)	(3.605)	(2.580)	(4.239)	(3.442)
variable												0.013
(t-stat)												(0.309)
Adj. R^2	0.371	0.377	0.395	0.426	0.443	0.440	0.481	0.453	0.387	0.428	0.319	0.162
Panel B: Real consumption growth												
variables in $t-1$												
r	-0.031	-0.066	-0.098	-0.032	-0.095	-0.104	-0.038	-0.107	-0.143	-0.088	-0.025	-0.055
(t-stat)	(0.956)	(2.065)	(2.969)	(0.839)	(2.149)	(3.254)	(1.008)	(2.403)	(3.051)	(2.930)	(0.628)	(1.633)
$term$	-0.029	-0.053	-0.052	-0.019	-0.065	-0.054	-0.027	-0.069	-0.071	0.033	0.039	-0.046
(t-stat)	(0.820)	(1.539)	(1.558)	(0.500)	(1.582)	(1.608)	(0.694)	(1.614)	(1.645)	(0.643)	(0.875)	(1.421)
lag	0.255	0.179	0.102	0.079	0.040	0.074	-0.012	0.038	0.079	0.138	0.237	0.476
(t-stat)	(1.799)	(1.254)	(0.765)	(0.687)	(0.291)	(0.545)	(0.094)	(0.276)	(0.594)	(1.154)	(1.631)	(3.394)

Tenor x	IBOR-OIS spread (SFS) $1m$	$3m$	$6m$	3-month FFS ($F^{(x)}_{3m,3m}$) $1m$	$3m$	$6m$	12-month FFS ($F^{(x)}_{12m,12m}$) $1m$	$3m$	$6m$	CDS spread	GZ spread	Goldberg var.
variable	-0.762	-0.629	-0.675	-1.533	-1.272	-0.767	-2.108	-1.533	-1.152	-0.475	-0.129	-0.009
(t-stat)	(2.284)	(3.181)	(4.026)	(4.237)	(4.502)	(4.309)	(4.965)	(4.534)	(4.672)	(3.119)	(3.257)	(1.102)
variable												0.023
(t-stat)												(1.534)
Adj. R^2	0.320	0.341	0.378	0.410	0.429	0.393	0.457	0.429	0.404	0.384	0.311	0.250
variables in $t-2$												
r	-0.092	-0.144	-0.193	-0.101	-0.182	-0.205	-0.110	-0.206	-0.252	-0.186	-0.099	-0.118
(t-stat)	(1.259)	(1.931)	(2.521)	(1.267)	(2.031)	(2.793)	(1.386)	(2.267)	(2.780)	(2.698)	(1.222)	(1.544)
term	-0.013	-0.054	-0.066	-0.016	-0.076	-0.074	-0.035	-0.091	-0.092	0.068	0.029	-0.024
(t-stat)	(0.157)	(0.650)	(0.835)	(0.202)	(0.898)	(0.940)	(0.439)	(1.048)	(1.087)	(0.768)	(0.279)	(0.286)
lag	0.462	0.414	0.328	0.347	0.305	0.280	0.228	0.268	0.318	0.324	0.607	0.665
(t-stat)	(4.482)	(3.223)	(2.469)	(3.524)	(2.621)	(2.142)	(2.214)	(2.363)	(2.807)	(3.177)	(3.064)	(5.466)
variable	-1.175	-0.843	-0.921	-2.010	-1.665	-1.102	-2.995	-2.153	-1.531	-0.750	-0.068	-0.021
(t-stat)	(2.369)	(2.349)	(2.730)	(3.791)	(4.010)	(3.062)	(4.573)	(4.071)	(3.941)	(3.576)	(0.605)	(1.901)
variable												0.026
(t-stat)												(1.730)
Adj. R^2	0.537	0.521	0.530	0.557	0.557	0.542	0.591	0.566	0.540	0.575	0.473	0.487
variables in $t-4$												
r	-0.305	-0.434	-0.565	-0.332	-0.519	-0.603	-0.355	-0.579	-0.733	-0.594	-0.311	-0.329
(t-stat)	(1.559)	(2.068)	(2.482)	(1.588)	(2.259)	(2.774)	(1.759)	(2.547)	(2.966)	(3.089)	(1.437)	(1.640)
term	0.038	-0.093	-0.167	0.006	-0.163	-0.205	-0.060	-0.209	-0.261	0.144	0.180	0.057
(t-stat)	(0.173)	(0.430)	(0.827)	(0.029)	(0.786)	(1.071)	(0.334)	(1.061)	(1.363)	(0.912)	(0.831)	(0.246)
lag	0.323	0.214	0.079	0.207	0.105	-0.006	0.070	0.035	0.015	-0.062	0.297	0.564
(t-stat)	(2.617)	(1.502)	(0.512)	(1.597)	(0.693)	(0.046)	(0.581)	(0.240)	(0.093)	(0.510)	(1.417)	(3.710)
variable	-2.579	-2.042	-2.211	-4.109	-3.661	-2.732	-6.077	-4.928	-3.917	-2.138	-0.337	-0.072
(t-stat)	(2.453)	(2.744)	(3.131)	(3.715)	(4.325)	(3.414)	(4.281)	(4.300)	(4.340)	(4.265)	(1.913)	(2.790)
variable												0.002
(t-stat)												(0.058)
Adj. R^2	0.478	0.478	0.487	0.503	0.517	0.523	0.557	0.547	0.511	0.613	0.394	0.402
Panel C: Real investment growth												
variables in $t-1$												
r	-0.010	-0.267	-0.432	-0.033	-0.326	-0.423	-0.066	-0.352	-0.500	-0.150	-0.021	-0.106
(t-stat)	(0.104)	(2.174)	(2.489)	(0.346)	(2.247)	(2.364)	(0.627)	(2.246)	(2.262)	(1.679)	(0.280)	(1.374)
term	0.275	0.124	0.151	0.346	0.127	0.149	0.301	0.110	0.082	0.277	0.643	0.013
(t-stat)	(2.636)	(1.098)	(1.246)	(3.061)	(0.989)	(1.204)	(2.310)	(0.761)	(0.511)	(1.900)	(3.233)	(0.107)
lag	0.367	0.227	0.196	0.317	0.294	0.223	0.327	0.332	0.350	0.618	0.279	0.643
(t-stat)	(4.735)	(1.873)	(1.228)	(2.495)	(1.834)	(1.368)	(2.103)	(2.121)	(2.514)	(4.918)	(1.437)	(7.225)
variable	-5.252	-4.151	-3.760	-7.459	-5.575	-3.832	-8.274	-6.099	-4.532	-0.774	-0.794	-0.141
(t-stat)	(9.663)	(5.256)	(3.481)	(4.360)	(3.009)	(3.189)	(3.025)	(2.646)	(2.474)	(1.645)	(2.440)	(3.674)
variable												0.023
(t-stat)												(0.840)
Adj. R^2	0.699	0.681	0.653	0.715	0.670	0.639	0.680	0.639	0.604	0.510	0.566	0.585
variables in $t-2$												
r	-0.102	-0.671	-1.093	-0.187	-0.833	-1.069	-0.253	-0.896	-1.267	-0.476	-0.207	-0.280
(t-stat)	(0.490)	(2.177)	(2.267)	(0.727)	(1.852)	(2.118)	(0.888)	(1.781)	(1.740)	(1.505)	(0.959)	(1.194)
term	0.693	0.305	0.293	0.788	0.322	0.315	0.713	0.286	0.182	0.864	1.503	0.235
(t-stat)	(2.469)	(0.889)	(0.762)	(2.448)	(0.760)	(0.786)	(1.985)	(0.607)	(0.338)	(2.458)	(2.937)	(0.654)
lag	0.264	0.107	0.010	0.191	0.121	0.032	0.180	0.157	0.152	0.439	0.000	0.526
(t-stat)	(4.523)	(0.798)	(0.044)	(1.231)	(0.525)	(0.139)	(0.909)	(0.675)	(0.630)	(2.778)	(0.000)	(5.339)
variable	-10.980	-8.317	-7.993	-15.654	-12.178	-8.245	-17.831	-13.406	-10.142	-2.343	-1.929	-0.300

	IBOR-OIS spread (SFS)			3-month FFS ($F^{(x)}_{3m,3m}$)			12-month FFS ($F^{(x)}_{12m,12m}$)			CDS spread	GZ spread	Goldberg var.
Tenor x	$1m$	$3m$	$6m$	$1m$	$3m$	$6m$	$1m$	$3m$	$6m$			
(t-stat)	(8.196)	(5.721)	(3.425)	(4.275)	(2.783)	(3.032)	(2.997)	(2.400)	(2.072)	(1.591)	(1.770)	(3.298)
variable												0.066
(t-stat)												(1.018)
Adj. R^2	0.669	0.627	0.596	0.691	0.634	0.578	0.649	0.585	0.526	0.413	0.470	0.476
variables in $t-4$												
r	-0.670	-1.559	-2.197	-0.823	-1.823	-2.195	-0.948	-1.938	-2.487	-1.353	-1.027	-0.823
(t-stat)	(1.015)	(1.894)	(2.006)	(1.018)	(1.677)	(1.964)	(1.106)	(1.639)	(1.624)	(1.464)	(1.159)	(1.236)
term	1.694	1.018	0.873	1.778	1.006	0.926	1.645	0.988	0.778	2.392	2.597	1.163
(t-stat)	(2.141)	(1.079)	(0.785)	(1.902)	(0.869)	(0.813)	(1.596)	(0.793)	(0.553)	(2.900)	(3.146)	(1.428)
lag	0.202	0.101	0.030	0.163	0.104	0.031	0.132	0.112	0.105	0.290	-0.053	0.431
(t-stat)	(2.699)	(1.018)	(0.205)	(1.443)	(0.667)	(0.202)	(0.914)	(0.658)	(0.548)	(1.603)	(0.245)	(3.377)
variable	-17.471	-12.492	-11.250	-23.489	-18.088	-12.078	-27.543	-20.566	-14.891	-5.238	-2.967	-0.563
(t-stat)	(4.631)	(5.071)	(4.048)	(4.939)	(3.551)	(3.757)	(3.650)	(2.917)	(2.332)	(1.700)	(3.135)	(5.220)
variable												0.081
(t-stat)												(0.516)
Adj. R^2	0.601	0.569	0.520	0.597	0.558	0.522	0.577	0.526	0.457	0.433	0.435	0.456
Panel D: Unemployment rate change												
variables in $t-1$												
r	0.011	0.054	0.092	0.018	0.067	0.090	0.024	0.072	0.104	0.032	0.016	0.024
(t-stat)	(0.923)	(3.934)	(5.469)	(1.210)	(3.712)	(4.676)	(1.407)	(3.406)	(3.354)	(2.426)	(0.871)	(1.725)
term	-0.010	0.021	0.024	-0.014	0.023	0.023	-0.008	0.024	0.031	-0.014	-0.091	0.014
(t-stat)	(0.661)	(1.487)	(1.608)	(0.925)	(1.208)	(1.382)	(0.412)	(1.071)	(1.181)	(0.612)	(2.049)	(0.630)
lag	0.496	0.318	0.180	0.409	0.327	0.218	0.380	0.357	0.336	0.675	0.093	0.735
(t-stat)	(5.067)	(4.281)	(2.263)	(6.508)	(3.826)	(2.601)	(4.823)	(3.732)	(3.363)	(5.394)	(0.359)	(6.882)
variable	0.766	0.657	0.690	1.104	0.908	0.696	1.314	1.020	0.829	0.109	0.192	1.120
(t-stat)	(10.245)	(10.288)	(7.800)	(7.594)	(4.172)	(5.962)	(4.486)	(3.311)	(3.109)	(1.947)	(2.637)	(0.982)
variable												-0.288
(t-stat)												(0.460)
Adj. R^2	0.763	0.774	0.775	0.760	0.735	0.756	0.745	0.715	0.698	0.592	0.701	0.593
variables in $t-2$												
r	0.031	0.129	0.217	0.050	0.164	0.210	0.064	0.178	0.253	0.093	0.062	0.046
(t-stat)	(1.235)	(4.309)	(4.524)	(1.456)	(3.041)	(3.947)	(1.644)	(2.823)	(2.551)	(2.119)	(1.421)	(1.428)
term	-0.052	0.027	0.048	-0.055	0.032	0.040	-0.038	0.038	0.061	-0.086	-0.193	-0.012
(t-stat)	(1.700)	(0.910)	(1.233)	(1.892)	(0.671)	(0.935)	(0.978)	(0.640)	(0.805)	(1.554)	(3.010)	(0.298)
lag	0.428	0.243	0.080	0.323	0.217	0.116	0.277	0.237	0.208	0.560	-0.075	0.715
(t-stat)	(6.950)	(4.412)	(0.825)	(6.319)	(1.810)	(0.997)	(3.066)	(1.681)	(1.156)	(3.525)	(0.246)	(5.431)
variable	1.735	1.396	1.440	2.531	2.083	1.474	3.033	2.369	1.879	0.382	0.417	4.244
(t-stat)	(10.718)	(11.647)	(7.185)	(7.307)	(4.187)	(5.548)	(4.539)	(3.300)	(2.727)	(1.683)	(2.790)	(2.360)
variable												-0.624
(t-stat)												(0.616)
Adj. R^2	0.806	0.798	0.781	0.821	0.787	0.764	0.800	0.751	0.703	0.574	0.670	0.612
variables in $t-4$												
r	0.155	0.354	0.525	0.197	0.424	0.516	0.235	0.464	0.628	0.320	0.259	0.168
(t-stat)	(1.727)	(3.206)	(3.489)	(1.599)	(2.575)	(3.386)	(1.778)	(2.532)	(2.535)	(1.975)	(1.764)	(1.581)
term	-0.148	0.027	0.100	-0.142	0.047	0.079	-0.094	0.063	0.137	-0.267	-0.285	-0.106
(t-stat)	(1.924)	(0.255)	(0.706)	(1.318)	(0.291)	(0.534)	(0.691)	(0.339)	(0.591)	(2.133)	(2.779)	(1.184)
lag	0.263	0.106	-0.039	0.185	0.078	-0.021	0.113	0.062	0.007	0.290	-0.141	0.547
(t-stat)	(3.980)	(2.191)	(0.454)	(3.071)	(0.716)	(0.223)	(1.209)	(0.486)	(0.048)	(1.602)	(0.800)	(3.555)
variable	3.467	2.626	2.562	4.825	3.922	2.713	5.907	4.646	3.693	1.105	0.681	9.667
(t-stat)	(5.210)	(6.303)	(6.310)	(6.801)	(5.188)	(6.051)	(5.313)	(4.244)	(3.661)	(1.816)	(4.356)	(3.472)

	IBOR-OIS spread (SFS)			3-month FFS ($F^{(x)}_{3m,3m}$)			12-month FFS ($F^{(x)}_{12m,12m}$)			CDS spread	GZ spread	Goldberg var.
Tenor x	$1m$	$3m$	$6m$	$1m$	$3m$	$6m$	$1m$	$3m$	$6m$			
variable												-2.339
(t-stat)												(0.818)
Adj. R^2	0.688	0.686	0.664	0.702	0.683	0.664	0.697	0.655	0.591	0.471	0.545	0.448

Note: This table reports predictive regressions for U.S. real activity variables. Predictive horizons are 1 quarter, 2 quarters, and 4 quarters. "Goldberg (2020) var." denotes the liquidity supply and demand variables, respectively. Presented are the parameter estimates, Newey-West adjusted t-statistics in parentheses, and adjusted R^2 values. The sample period runs from January 2005 to December 2019.

Table OA3. Predicting U.S. Bank Lending Variables using Funding and Credit Spreads

	IBOR-OIS spread (SFS)			3-month FFS ($F^{(x)}_{3m,3m}$)			12-month FFS ($F^{(x)}_{12m,12m}$)			CDS spread	GZ spread	Goldberg var.
Tenor x	$1m$	$3m$	$6m$	$1m$	$3m$	$6m$	$1m$	$3m$	$6m$			
Panel A: Bank lending growth												
variables in $t-1$												
r	0.050	0.021	-0.012	0.042	0.006	-0.015	0.046	-0.006	-0.061	0.010	0.072	0.004
(t-stat)	(0.531)	(0.222)	(0.122)	(0.446)	(0.068)	(0.147)	(0.489)	(0.067)	(0.580)	(0.102)	(0.653)	(0.039)
term	-0.281	-0.287	-0.280	-0.296	-0.317	-0.282	-0.292	-0.317	-0.319	-0.309	-0.195	-0.348
(t-stat)	(1.663)	(1.941)	(1.975)	(1.710)	(2.113)	(2.029)	(1.851)	(2.320)	(2.528)	(1.616)	(1.121)	(2.053)
lag	0.219	0.222	0.203	0.186	0.177	0.197	0.176	0.170	0.162	0.147	0.167	0.217
(t-stat)	(1.366)	(1.622)	(1.678)	(1.248)	(1.329)	(1.684)	(1.353)	(1.444)	(1.532)	(1.066)	(1.304)	(1.359)
variable	-0.794	-0.779	-0.837	-0.867	-0.885	-0.916	-1.316	-1.334	-1.348	-0.195	-0.176	-0.027
(t-stat)	(1.336)	(2.137)	(2.380)	(0.958)	(1.245)	(2.524)	(1.280)	(1.768)	(2.329)	(0.623)	(1.871)	(1.279)
variable												0.039
(t-stat)												(1.250)
Adj. R^2	0.265	0.289	0.311	0.260	0.273	0.315	0.272	0.290	0.315	0.252	0.286	0.252
variables in $t-2$												
r	0.105	0.051	-0.038	0.110	0.007	-0.043	0.117	-0.028	-0.180	-0.003	0.209	0.020
(t-stat)	(0.526)	(0.274)	(0.204)	(0.576)	(0.035)	(0.227)	(0.626)	(0.151)	(0.926)	(0.015)	(0.883)	(0.094)
term	-0.549	-0.493	-0.454	-0.524	-0.555	-0.453	-0.521	-0.578	-0.592	-0.403	-0.149	-0.736
(t-stat)	(1.342)	(1.418)	(1.405)	(1.398)	(1.753)	(1.442)	(1.536)	(1.997)	(2.257)	(1.017)	(0.353)	(1.711)
lag	0.156	0.205	0.199	0.141	0.147	0.191	0.123	0.125	0.118	0.104	0.171	0.059
(t-stat)	(0.791)	(1.208)	(1.354)	(0.813)	(0.977)	(1.386)	(0.808)	(0.932)	(0.973)	(0.646)	(1.017)	(0.260)
variable	-1.650	-2.004	-2.246	-2.623	-2.832	-2.474	-3.735	-3.775	-3.704	-1.129	-0.532	0.025
(t-stat)	(1.861)	(2.855)	(3.342)	(1.781)	(2.323)	(3.646)	(2.117)	(2.867)	(3.734)	(1.866)	(3.262)	(0.641)
variable												0.007
(t-stat)												(0.093)
Adj. R^2	0.335	0.407	0.472	0.353	0.405	0.483	0.380	0.431	0.493	0.385	0.434	0.290
variables in $t-4$												
r	0.321	0.096	-0.134	0.330	-0.016	-0.133	0.333	-0.086	-0.446	-0.008	0.504	0.059
(t-stat)	(0.981)	(0.306)	(0.495)	(1.013)	(0.052)	(0.496)	(1.043)	(0.294)	(1.838)	(0.021)	(1.329)	(0.160)
term	-0.575	-0.565	-0.448	-0.530	-0.731	-0.468	-0.590	-0.812	-0.845	-0.416	0.380	-1.157
(t-stat)	(0.959)	(1.162)	(1.069)	(1.033)	(1.648)	(1.145)	(1.228)	(1.901)	(2.440)	(0.589)	(0.609)	(1.606)
lag	0.285	0.328	0.344	0.243	0.239	0.320	0.197	0.191	0.198	0.156	0.323	0.183
(t-stat)	(1.973)	(2.992)	(3.902)	(1.977)	(2.136)	(3.620)	(1.687)	(1.773)	(2.228)	(0.947)	(2.272)	(0.944)
variable	-6.190	-5.481	-5.649	-9.237	-8.063	-6.054	-11.675	-10.089	-9.055	-2.789	-1.343	-0.071
(t-stat)	(6.004)	(7.239)	(9.255)	(6.022)	(6.749)	(9.907)	(6.028)	(7.279)	(11.004)	(2.627)	(5.803)	(0.964)
variable												0.039
(t-stat)												(0.446)
Adj. R^2	0.551	0.665	0.760	0.614	0.682	0.766	0.658	0.714	0.792	0.561	0.671	0.366
Panel B: Consumer loan growth												
variables in $t-1$												
r	-0.367	-0.207	-0.182	-0.277	-0.194	-0.182	-0.224	-0.185	-0.196	-0.187	-0.115	-0.221
(t-stat)	(2.055)	(1.282)	(1.138)	(1.769)	(1.309)	(1.129)	(1.553)	(1.196)	(1.149)	(1.151)	(0.661)	(1.181)
term	-0.797	-0.545	-0.474	-0.662	-0.522	-0.469	-0.567	-0.488	-0.455	-0.473	-0.323	-0.556
(t-stat)	(2.698)	(2.315)	(2.159)	(2.686)	(2.643)	(2.137)	(2.656)	(2.469)	(2.234)	(2.495)	(1.350)	(2.111)
lag	0.173	0.351	0.408	0.285	0.370	0.411	0.346	0.397	0.424	0.395	0.450	0.289
(t-stat)	(1.031)	(2.450)	(3.079)	(2.190)	(3.384)	(3.080)	(3.051)	(3.516)	(3.480)	(3.426)	(3.293)	(1.558)
variable	1.771	0.244	-0.112	1.303	0.222	-0.148	0.738	-0.103	-0.455	-0.073	-0.135	0.048
(t-stat)	(2.140)	(0.452)	(0.245)	(1.096)	(0.247)	(0.303)	(0.535)	(0.107)	(0.657)	(0.214)	(1.190)	(1.122)
variable												-0.052

	IBOR-OIS spread (SFS)			3-month FFS ($F^{(x)}_{3m,3m}$)			12-month FFS ($F^{(x)}_{12m,12m}$)			CDS spread	GZ spread	Goldberg var.
Tenor x	$1m$	$3m$	$6m$	$1m$	$3m$	$6m$	$1m$	$3m$	$6m$			
(t-stat)												(1.512)
Adj. R^2	0.404	0.367	0.366	0.380	0.366	0.366	0.369	0.365	0.369	0.366	0.378	0.385
variables in $t-2$												
r	-0.433	-0.146	-0.195	-0.349	-0.287	-0.211	-0.294	-0.304	-0.399	-0.387	0.120	-0.524
(t-stat)	(0.983)	(0.470)	(0.667)	(1.003)	(1.027)	(0.688)	(1.003)	(1.035)	(1.243)	(1.129)	(0.432)	(1.248)
$term$	-1.224	-0.636	-0.497	-1.079	-0.862	-0.530	-0.978	-0.840	-0.744	-0.971	-0.007	-1.354
(t-stat)	(1.515)	(1.240)	(1.283)	(1.579)	(1.813)	(1.335)	(1.769)	(1.982)	(1.936)	(1.897)	(0.021)	(2.002)
lag	0.282	0.537	0.583	0.334	0.434	0.567	0.369	0.444	0.492	0.335	0.576	0.185
(t-stat)	(1.006)	(2.931)	(4.264)	(1.419)	(2.538)	(4.080)	(1.912)	(3.039)	(3.882)	(1.941)	(4.809)	(0.800)
variable	0.169	-2.121	-2.472	-0.740	-2.055	-2.534	-1.791	-2.898	-3.342	-0.556	-0.734	0.085
(t-stat)	(0.091)	(2.679)	(4.085)	(0.284)	(1.125)	(3.592)	(0.629)	(1.590)	(2.799)	(0.839)	(4.138)	(1.270)
variable												-0.051
(t-stat)												(0.929)
Adj. R^2	0.402	0.432	0.462	0.404	0.419	0.458	0.408	0.429	0.459	0.412	0.489	0.411
variables in $t-4$												
r	-1.035	-0.719	-0.681	-0.781	-0.824	-0.747	-0.708	-0.888	-1.115	-1.058	0.173	-1.266
(t-stat)	(1.013)	(0.771)	(0.831)	(0.816)	(0.960)	(0.894)	(0.793)	(1.053)	(1.408)	(1.248)	(0.219)	(1.552)
$term$	-3.095	-2.372	-1.753	-2.629	-2.385	-1.925	-2.484	-2.395	-2.168	-2.535	-0.343	-3.323
(t-stat)	(1.793)	(1.486)	(1.365)	(1.613)	(1.690)	(1.501)	(1.705)	(1.827)	(1.886)	(2.217)	(0.321)	(2.581)
lag	0.124	0.308	0.452	0.210	0.299	0.403	0.237	0.294	0.366	0.161	0.489	0.047
(t-stat)	(0.430)	(1.132)	(1.993)	(0.802)	(1.257)	(1.806)	(0.992)	(1.318)	(1.770)	(0.821)	(2.222)	(0.210)
variable	-0.905	-3.795	-5.594	-4.821	-6.112	-5.323	-7.255	-7.683	-8.293	-1.847	-1.802	0.164
(t-stat)	(0.327)	(1.952)	(4.007)	(1.446)	(2.441)	(3.128)	(1.994)	(2.625)	(3.586)	(1.559)	(4.062)	(1.774)
variable												0.083
(t-stat)												(0.618)
Adj. R^2	0.492	0.529	0.589	0.513	0.546	0.572	0.528	0.555	0.602	0.526	0.650	0.513
Panel C: Real estate loan growth												
variables in $t-1$												
r	0.031	0.020	0.010	0.019	0.019	0.005	0.029	0.010	-0.017	0.020	0.013	0.007
(t-stat)	(0.226)	(0.156)	(0.073)	(0.138)	(0.148)	(0.040)	(0.215)	(0.074)	(0.123)	(0.148)	(0.095)	(0.051)
$term$	-0.454	-0.456	-0.452	-0.489	-0.480	-0.443	-0.462	-0.463	-0.458	-0.476	-0.511	-0.475
(t-stat)	(1.706)	(1.870)	(1.883)	(1.704)	(1.944)	(1.923)	(1.779)	(2.106)	(2.207)	(1.764)	(1.579)	(2.247)
lag	0.312	0.316	0.315	0.288	0.293	0.319	0.300	0.303	0.307	0.290	0.282	0.326
(t-stat)	(1.266)	(1.330)	(1.379)	(1.164)	(1.271)	(1.477)	(1.367)	(1.492)	(1.567)	(1.494)	(1.190)	(1.574)
variable	-0.284	-0.258	-0.267	0.053	-0.076	-0.387	-0.411	-0.582	-0.641	-0.033	0.025	-0.015
(t-stat)	(0.316)	(0.420)	(0.476)	(0.039)	(0.071)	(0.635)	(0.256)	(0.475)	(0.673)	(0.082)	(0.181)	(0.584)
variable												0.032
(t-stat)												(1.264)
Adj. R^2	0.420	0.422	0.423	0.419	0.419	0.426	0.421	0.424	0.428	0.419	0.419	0.414
variables in $t-2$												
r	-0.011	-0.016	-0.063	-0.007	-0.028	-0.070	0.016	-0.050	-0.146	-0.038	0.060	-0.014
(t-stat)	(0.046)	(0.067)	(0.270)	(0.026)	(0.120)	(0.302)	(0.066)	(0.213)	(0.595)	(0.162)	(0.237)	(0.058)
$term$	-0.762	-0.676	-0.617	-0.747	-0.702	-0.602	-0.692	-0.687	-0.668	-0.553	-0.442	-0.792
(t-stat)	(1.610)	(1.606)	(1.581)	(1.553)	(1.713)	(1.620)	(1.587)	(1.891)	(2.042)	(1.341)	(0.895)	(1.919)
lag	0.406	0.443	0.464	0.409	0.426	0.464	0.417	0.426	0.438	0.404	0.470	0.368
(t-stat)	(1.817)	(2.056)	(2.250)	(1.860)	(2.087)	(2.415)	(2.106)	(2.334)	(2.505)	(2.249)	(2.194)	(1.647)
variable	-0.068	-0.796	-1.119	-0.282	-1.066	-1.397	-1.410	-1.998	-2.208	-0.822	-0.265	0.060
(t-stat)	(0.062)	(0.886)	(1.272)	(0.147)	(0.662)	(1.511)	(0.585)	(1.090)	(1.567)	(1.604)	(1.235)	(1.812)
variable												-0.016

	IBOR-OIS spread (SFS)			3-month FFS ($F^{(x)}_{3m,3m}$)			12-month FFS ($F^{(x)}_{12m,12m}$)			CDS spread	GZ spread	Goldberg var.
Tenor x	$1m$	$3m$	$6m$	$1m$	$3m$	$6m$	$1m$	$3m$	$6m$			
(t-stat)												(0.211)
Adj. R^2	0.529	0.537	0.549	0.529	0.536	0.558	0.534	0.547	0.563	0.552	0.544	0.531
variables in $t-4$												
r	-0.345	-0.479	-0.685	-0.327	-0.520	-0.667	-0.289	-0.565	-0.891	-0.477	-0.200	-0.452
(t-stat)	(0.757)	(1.118)	(1.702)	(0.725)	(1.217)	(1.670)	(0.666)	(1.360)	(2.285)	(1.076)	(0.470)	(0.975)
$term$	-1.267	-1.155	-0.939	-1.216	-1.240	-0.970	-1.161	-1.248	-1.179	-0.966	0.015	-1.514
(t-stat)	(1.140)	(1.162)	(1.086)	(1.167)	(1.337)	(1.139)	(1.226)	(1.457)	(1.578)	(1.070)	(0.019)	(1.509)
lag	0.521	0.564	0.612	0.512	0.528	0.589	0.506	0.514	0.546	0.464	0.669	0.475
(t-stat)	(2.502)	(3.188)	(4.352)	(2.721)	(3.248)	(4.475)	(3.041)	(3.550)	(4.623)	(2.687)	(4.496)	(2.202)
variable	-2.865	-3.336	-4.178	-4.558	-4.978	-4.539	-7.143	-7.010	-7.144	-2.226	-1.186	0.065
(t-stat)	(1.770)	(2.674)	(3.437)	(1.973)	(2.605)	(3.552)	(2.411)	(3.124)	(4.246)	(2.414)	(4.567)	(0.834)
variable												0.035
(t-stat)												(0.406)
Adj. R^2	0.665	0.697	0.741	0.674	0.701	0.747	0.696	0.722	0.764	0.702	0.742	0.644
Panel D: C&I loan growth												
variables in $t-1$												
r	0.380	0.233	0.123	0.331	0.172	0.118	0.308	0.139	0.009	0.181	0.395	0.215
(t-stat)	(3.639)	(2.197)	(1.058)	(3.107)	(1.604)	(0.952)	(2.607)	(1.166)	(0.067)	(1.312)	(3.391)	(1.997)
$term$	0.357	0.237	0.198	0.297	0.148	0.190	0.241	0.118	0.069	0.238	0.530	0.096
(t-stat)	(2.712)	(1.971)	(1.597)	(1.842)	(0.932)	(1.540)	(1.475)	(0.712)	(0.402)	(1.001)	(4.438)	(0.523)
lag	0.913	0.872	0.817	0.861	0.824	0.814	0.831	0.806	0.774	0.816	0.744	0.929
(t-stat)	(11.54)	(13.94)	(15.47)	(11.03)	(12.24)	(15.06)	(11.72)	(12.28)	(12.37)	(11.51)	(15.54)	(10.05)
variable	-3.636	-2.736	-2.452	-3.955	-3.107	-2.570	-4.486	-3.749	-3.260	-0.769	-0.653	-0.125
(t-stat)	(6.406)	(7.082)	(6.559)	(3.476)	(3.569)	(5.672)	(3.088)	(3.306)	(3.629)	(1.492)	(5.957)	(2.266)
variable												0.074
(t-stat)												(0.955)
Adj. R^2	0.794	0.817	0.819	0.768	0.772	0.814	0.765	0.773	0.782	0.722	0.814	0.749
variables in $t-2$												
r	1.108	0.770	0.414	1.059	0.567	0.409	0.991	0.440	-0.013	0.552	1.282	0.624
(t-stat)	(3.328)	(2.502)	(1.372)	(3.147)	(1.779)	(1.240)	(2.697)	(1.253)	(0.036)	(1.195)	(4.343)	(1.429)
$term$	0.958	0.819	0.725	0.996	0.622	0.737	0.847	0.468	0.257	1.118	1.900	0.136
(t-stat)	(1.758)	(1.968)	(2.066)	(1.877)	(1.309)	(2.072)	(1.610)	(0.946)	(0.560)	(1.705)	(5.591)	(0.152)
lag	0.811	0.805	0.739	0.782	0.746	0.740	0.740	0.707	0.652	0.734	0.654	0.732
(t-stat)	(7.762)	(7.794)	(8.747)	(6.491)	(6.798)	(8.562)	(6.617)	(6.844)	(7.260)	(8.701)	(11.049)	(5.659)
variable	-9.077	-7.876	-7.477	-12.384	-10.483	-7.926	-14.488	-12.263	-10.590	-3.432	-2.101	-0.143
(t-stat)	(11.466)	(7.809)	(7.942)	(5.344)	(4.645)	(6.827)	(4.165)	(4.014)	(4.488)	(1.863)	(8.747)	(1.457)
variable												0.150
(t-stat)												(0.705)
Adj. R^2	0.675	0.775	0.816	0.694	0.735	0.809	0.697	0.727	0.757	0.633	0.847	0.533
variables in $t-4$												
r	2.152	1.382	0.498	2.145	0.798	0.502	1.968	0.431	-0.812	0.690	2.830	0.560
(t-stat)	(1.988)	(1.668)	(0.704)	(2.337)	(0.956)	(0.643)	(2.006)	(0.465)	(0.920)	(0.473)	(4.138)	(0.366)
$term$	0.390	0.317	0.336	0.800	-0.141	0.374	0.471	-0.572	-1.120	0.741	3.690	-2.326
(t-stat)	(0.178)	(0.228)	(0.372)	(0.502)	(0.111)	(0.402)	(0.322)	(0.431)	(1.021)	(0.336)	(4.111)	(0.741)
lag	0.390	0.427	0.390	0.387	0.357	0.386	0.335	0.293	0.234	0.290	0.337	0.191
(t-stat)	(3.323)	(4.081)	(4.295)	(3.853)	(3.383)	(4.133)	(3.616)	(3.007)	(2.573)	(2.319)	(4.093)	(0.972)
variable	-23.618	-20.181	-19.610	-34.528	-28.842	-20.605	-40.960	-33.598	-28.601	-8.539	-5.379	-0.215
(t-stat)	(7.471)	(9.828)	(11.95)	(10.63)	(7.673)	(10.07)	(7.078)	(6.256)	(7.221)	(1.809)	(15.43)	(0.931)
variable												0.438
(t-stat)												(0.984)

	IBOR-OIS spread (SFS)			3-month FFS ($F^{(x)}_{3m,3m}$)			12-month FFS ($F^{(x)}_{12m,12m}$)			CDS spread	GZ spread	Goldberg var.
Tenor x	$1m$	$3m$	$6m$	$1m$	$3m$	$6m$	$1m$	$3m$	$6m$			
Adj. R^2	0.507	0.671	0.773	0.589	0.668	0.750	0.613	0.657	0.718	0.408	0.812	0.230

Note: This table reports predictive regressions for U.S. bank lending variables. Predictive horizons are 1, 2, and 4 quarters. "Goldberg (2020) var." denotes the liquidity supply and demand variables, respectively. Presented are the parameter estimates, Newey-West adjusted t-statistics in parentheses, and adjusted R^2 values. The sample period runs from January 2005 to December 2019.

Table OA4. Predicting Euro Area Real Activity Variables using Funding and Credit Spreads

	IBOR-OIS spread (SFS)			3-month FFS ($F^{(x)}_{3m,3m}$)			12-month FFS ($F^{(x)}_{12m,12m}$)			CDS spread	GM spread
Tenor x	$1m$	$3m$	$6m$	$1m$	$3m$	$6m$	$1m$	$3m$	$6m$		
Panel A: Real GDP growth											
variables in $t-1$											
r	0.198	0.204	0.179	0.139	0.141	0.129	0.136	0.155	0.111	-0.032	-0.083
(t-stat)	(3.458)	(3.100)	(3.011)	(3.510)	(3.953)	(3.067)	(3.248)	(3.984)	(3.184)	(0.805)	(1.231)
$term$	0.131	0.188	0.270	0.130	0.196	0.268	0.178	0.269	0.358	0.182	0.257
(t-stat)	(1.973)	(2.351)	(2.553)	(2.703)	(3.151)	(2.817)	(3.326)	(3.300)	(3.095)	(1.612)	(1.761)
lag	0.185	0.116	0.126	0.183	0.188	0.063	0.034	0.177	0.188	0.583	0.372
(t-stat)	(0.885)	(0.554)	(0.691)	(1.007)	(1.184)	(0.353)	(0.153)	(1.072)	(1.223)	(3.411)	(2.281)
variable	-2.688	-1.770	-1.567	-3.806	-2.222	-1.676	-5.175	-2.860	-2.413	-0.173	-0.499
(t-stat)	(3.021)	(2.971)	(3.056)	(3.008)	(3.759)	(3.405)	(3.371)	(3.641)	(3.276)	(2.253)	(2.327)
Adj. R^2	0.597	0.630	0.655	0.596	0.615	0.683	0.663	0.619	0.632	0.385	0.462
Variables in $t-2$											
r	0.386	0.419	0.377	0.330	0.343	0.280	0.296	0.372	0.272	-0.021	-0.110
(t-stat)	(4.343)	(4.038)	(3.667)	(3.959)	(4.555)	(3.551)	(3.573)	(4.655)	(3.653)	(0.250)	(1.094)
$term$	0.348	0.428	0.580	0.320	0.471	0.563	0.401	0.636	0.815	0.525	0.613
(t-stat)	(1.569)	(2.269)	(2.636)	(2.576)	(3.793)	(2.812)	(3.093)	(4.053)	(3.543)	(1.517)	(1.714)
lag	0.211	0.058	0.066	0.033	0.004	-0.003	-0.046	0.020	0.063	0.484	0.249
(t-stat)	(1.272)	(0.379)	(0.483)	(0.183)	(0.024)	(0.022)	(0.273)	(0.126)	(0.467)	(2.390)	(1.351)
variable	-4.262	-3.222	-2.861	-8.421	-5.109	-3.042	-9.949	-6.353	-5.067	-0.414	-1.007
(t-stat)	(8.549)	(6.004)	(5.137)	(4.027)	(5.061)	(6.188)	(5.745)	(5.261)	(4.614)	(2.029)	(2.865)
Adj. R^2	0.475	0.573	0.598	0.674	0.726	0.623	0.679	0.712	0.676	0.303	0.378
Variables in $t-4$											
r	0.655	0.662	0.563	0.505	0.502	0.379	0.413	0.560	0.379	-0.233	-0.384
(t-stat)	(3.980)	(4.049)	(3.569)	(3.571)	(3.676)	(2.654)	(2.384)	(3.990)	(2.599)	(0.953)	(2.224)
$term$	0.588	0.638	0.889	0.504	0.708	0.827	0.597	1.011	1.320	1.006	1.021
(t-stat)	(1.186)	(1.637)	(2.032)	(1.944)	(2.782)	(1.990)	(2.010)	(3.346)	(3.168)	(1.217)	(1.360)
lag	0.008	-0.167	-0.162	-0.116	-0.185	-0.224	-0.180	-0.174	-0.162	0.185	-0.073
(t-stat)	(0.066)	(1.562)	(1.533)	(0.966)	(1.514)	(2.158)	(1.505)	(1.430)	(1.529)	(0.886)	(0.494)
variable	-8.087	-5.910	-5.114	-14.994	-9.084	-5.341	-16.539	-11.330	-9.125	-1.016	-2.088
(t-stat)	(4.497)	(5.605)	(5.425)	(5.721)	(7.863)	(5.526)	(5.471)	(7.664)	(6.676)	(2.069)	(4.259)
Adj. R^2	0.393	0.532	0.520	0.658	0.703	0.555	0.605	0.683	0.619	0.150	0.268
Panel B: Real consumption growth											
variables in $t-1$											
r	0.086	0.102	0.092	0.081	0.087	0.068	0.069	0.094	0.066	-0.038	-0.043
(t-stat)	(3.201)	(4.079)	(3.707)	(3.437)	(3.851)	(2.785)	(2.642)	(4.156)	(2.916)	(1.310)	(1.566)
$term$	-0.021	0.000	0.036	-0.031	0.005	0.031	-0.009	0.045	0.090	0.028	0.048
(t-stat)	(0.438)	(0.001)	(0.872)	(1.009)	(0.195)	(0.774)	(0.274)	(1.668)	(2.325)	(0.458)	(0.740)
lag	0.191	0.066	0.057	0.013	-0.032	0.035	0.035	-0.028	0.006	0.390	0.222
(t-stat)	(0.808)	(0.306)	(0.271)	(0.053)	(0.147)	(0.169)	(0.146)	(0.127)	(0.030)	(1.602)	(0.880)
variable	-1.038	-0.797	-0.711	-2.017	-1.270	-0.723	-2.139	-1.599	-1.287	-0.125	-0.265
(t-stat)	(3.295)	(4.625)	(4.674)	(3.632)	(5.269)	(4.988)	(3.975)	(5.265)	(5.246)	(2.030)	(2.720)
Adj. R^2	0.400	0.476	0.485	0.489	0.538	0.491	0.464	0.534	0.520	0.313	0.364
Variables in $t-2$											
r	0.121	0.145	0.133	0.126	0.138	0.101	0.102	0.147	0.107	-0.033	-0.012
(t-stat)	(2.767)	(3.160)	(2.931)	(2.866)	(2.843)	(2.143)	(1.993)	(3.090)	(2.308)	(0.580)	(0.189)
$term$	0.077	0.090	0.133	0.038	0.082	0.124	0.078	0.142	0.208	0.156	0.145
(t-stat)	(0.734)	(1.030)	(1.586)	(0.567)	(1.545)	(1.426)	(0.993)	(2.606)	(2.900)	(1.295)	(1.176)
lag	0.569	0.447	0.433	0.358	0.288	0.423	0.434	0.299	0.341	0.695	0.624
(t-stat)	(3.571)	(3.615)	(3.963)	(2.256)	(2.230)	(3.558)	(3.155)	(2.485)	(3.280)	(4.159)	(3.313)

Tenor x	IBOR-OIS spread (SFS) 1m	3m	6m	3-month FFS ($F^{(x)}_{3m,3m}$) 1m	3m	6m	12-month FFS ($F^{(x)}_{12m,12m}$) 1m	3m	6m	CDS spread	GM spread
variable	-1.227	-0.997	-0.901	-2.874	-1.873	-0.883	-2.633	-2.319	-1.808	-0.171	-0.239
(t-stat)	(1.934)	(3.095)	(3.604)	(4.181)	(6.972)	(3.386)	(3.418)	(6.743)	(6.389)	(1.769)	(1.768)
Adj. R^2	0.599	0.638	0.644	0.680	0.714	0.634	0.630	0.705	0.684	0.572	0.556
Variables in $t-4$											
r	0.271	0.302	0.264	0.226	0.241	0.188	0.188	0.266	0.182	-0.112	-0.101
(t-stat)	(2.106)	(2.089)	(1.907)	(1.654)	(1.632)	(1.330)	(1.206)	(1.817)	(1.347)	(0.656)	(0.636)
term	0.123	0.123	0.223	-0.009	0.073	0.186	0.097	0.215	0.365	0.340	0.288
(t-stat)	(0.389)	(0.463)	(0.883)	(0.037)	(0.370)	(0.703)	(0.377)	(1.169)	(1.822)	(0.887)	(0.741)
lag	0.320	0.172	0.159	0.103	0.028	0.125	0.177	0.043	0.062	0.497	0.322
(t-stat)	(1.563)	(0.906)	(0.858)	(0.530)	(0.146)	(0.662)	(0.887)	(0.229)	(0.331)	(1.798)	(1.074)
variable	-3.310	-2.460	-2.184	-6.633	-4.165	-2.167	-6.294	-5.186	-4.174	-0.414	-0.708
(t-stat)	(2.328)	(3.228)	(3.584)	(5.082)	(5.794)	(3.564)	(3.406)	(5.357)	(5.427)	(1.556)	(2.147)
Adj. R^2	0.418	0.479	0.483	0.545	0.586	0.464	0.458	0.576	0.542	0.313	0.311
Panel C: Real investment growth											
variables in $t-1$											
r	0.230	0.251	0.163	0.040	0.052	-0.018	-0.002	0.099	-0.065	-0.707	-0.878
(t-stat)	(1.002)	(1.234)	(0.856)	(0.176)	(0.253)	(0.095)	(0.008)	(0.494)	(0.330)	(1.970)	(2.315)
term	-0.342	-0.136	0.131	-0.346	-0.111	0.109	-0.179	0.150	0.460	-0.199	0.204
(t-stat)	(1.577)	(0.766)	(0.713)	(1.871)	(0.636)	(0.677)	(1.053)	(0.858)	(2.513)	(0.560)	(0.565)
lag	-0.527	-0.583	-0.587	-0.556	-0.571	-0.606	-0.601	-0.585	-0.583	-0.385	-0.506
(t-stat)	(3.441)	(4.111)	(4.035)	(3.802)	(3.917)	(4.272)	(4.313)	(4.016)	(3.861)	(1.631)	(2.847)
variable	-9.104	-6.023	-5.318	-13.452	-8.017	-5.422	-16.211	-10.297	-8.662	-0.850	-2.241
(t-stat)	(5.896)	(6.389)	(6.251)	(4.480)	(6.147)	(6.961)	(6.737)	(6.377)	(5.972)	(2.667)	(3.113)
Adj. R^2	0.396	0.459	0.466	0.419	0.442	0.486	0.467	0.447	0.448	0.128	0.301
Variables in $t-2$											
r	0.491	0.506	0.396	0.249	0.261	0.133	0.159	0.328	0.104	-0.601	-0.825
(t-stat)	(1.793)	(1.922)	(1.728)	(0.969)	(1.130)	(0.630)	(0.585)	(1.436)	(0.572)	(2.300)	(3.301)
term	0.166	0.320	0.685	0.059	0.364	0.622	0.240	0.745	1.201	0.665	0.885
(t-stat)	(0.329)	(0.822)	(1.675)	(0.189)	(1.467)	(1.670)	(0.799)	(2.653)	(3.208)	(0.846)	(1.173)
lag	0.111	-0.028	-0.044	-0.010	-0.068	-0.082	-0.060	-0.062	-0.051	0.325	0.138
(t-stat)	(0.651)	(0.198)	(0.346)	(0.067)	(0.537)	(0.673)	(0.451)	(0.515)	(0.495)	(1.466)	(0.857)
variable	-11.170	-8.052	-7.275	-19.083	-11.877	-7.430	-22.151	-14.830	-12.354	-1.203	-2.721
(t-stat)	(6.685)	(7.813)	(7.393)	(4.777)	(7.231)	(8.585)	(7.214)	(7.833)	(7.378)	(2.728)	(4.194)
Adj. R^2	0.419	0.521	0.548	0.533	0.592	0.561	0.547	0.575	0.569	0.190	0.315
Variables in $t-4$											
r	0.643	0.616	0.375	0.222	0.172	-0.085	-0.009	0.295	-0.128	-1.585	-1.779
(t-stat)	(1.138)	(1.192)	(0.874)	(0.455)	(0.398)	(0.204)	(0.016)	(0.705)	(0.418)	(2.854)	(4.226)
term	0.413	0.440	1.022	0.144	0.489	0.855	0.316	1.167	1.967	1.784	1.673
(t-stat)	(0.308)	(0.423)	(0.969)	(0.186)	(0.784)	(0.836)	(0.379)	(1.730)	(2.251)	(0.858)	(0.888)
lag	0.053	-0.135	-0.147	-0.069	-0.180	-0.194	-0.140	-0.191	-0.177	0.279	0.040
(t-stat)	(0.308)	(0.951)	(1.089)	(0.503)	(1.398)	(1.517)	(1.068)	(1.532)	(1.720)	(1.055)	(0.201)
variable	-19.711	-14.268	-12.593	-34.784	-21.674	-12.763	-38.535	-27.418	-22.346	-2.797	-5.046
(t-stat)	(5.046)	(6.442)	(6.340)	(6.135)	(8.900)	(6.549)	(6.376)	(9.086)	(8.293)	(2.658)	(5.113)
Adj. R^2	0.423	0.563	0.568	0.631	0.701	0.577	0.589	0.691	0.647	0.214	0.321
Panel D: Unemployment rate change											
variables in $t-1$											
r	-0.033	-0.031	-0.023	-0.015	-0.014	-0.007	-0.010	-0.018	-0.006	0.007	0.027
(t-stat)	(3.075)	(2.758)	(2.381)	(1.465)	(1.531)	(0.769)	(0.761)	(1.971)	(0.757)	(0.762)	(1.420)
term	-0.002	-0.004	-0.025	0.003	-0.010	-0.020	-0.003	-0.029	-0.052	-0.039	-0.041
(t-stat)	(0.117)	(0.305)	(1.875)	(0.194)	(0.786)	(1.523)	(0.178)	(2.252)	(3.143)	(1.220)	(1.143)

Tenor x	IBOR-OIS spread (SFS) 1m	3m	6m	3-month FFS ($F^{(x)}_{3m,3m}$) 1m	3m	6m	12-month FFS ($F^{(x)}_{12m,12m}$) 1m	3m	6m	CDS spread	GM spread
lag	0.549	0.435	0.424	0.534	0.501	0.413	0.466	0.497	0.508	0.869	0.718
(t-stat)	(6.066)	(3.671)	(3.987)	(4.850)	(4.896)	(3.928)	(3.356)	(4.643)	(5.066)	(8.093)	(8.204)
variable	0.723	0.493	0.439	0.962	0.583	0.435	1.225	0.748	0.621	0.029	0.101
(t-stat)	(6.333)	(5.005)	(4.915)	(3.673)	(4.382)	(4.738)	(4.389)	(4.277)	(3.641)	(1.824)	(1.850)
Adj. R^2	0.834	0.840	0.844	0.799	0.805	0.837	0.824	0.808	0.808	0.698	0.720
Variables in $t-2$											
r	-0.097	-0.087	-0.069	-0.055	-0.051	-0.033	-0.043	-0.061	-0.031	0.014	0.055
(t-stat)	(3.775)	(3.067)	(2.672)	(2.326)	(2.198)	(1.426)	(1.457)	(2.776)	(1.612)	(0.356)	(1.661)
$term$	-0.069	-0.058	-0.103	-0.033	-0.058	-0.093	-0.058	-0.113	-0.174	-0.169	-0.157
(t-stat)	(0.825)	(0.850)	(1.538)	(0.710)	(1.257)	(1.329)	(1.124)	(2.481)	(2.947)	(1.348)	(1.225)
lag	0.552	0.380	0.359	0.426	0.349	0.355	0.405	0.361	0.393	0.856	0.656
(t-stat)	(3.888)	(2.792)	(2.890)	(3.644)	(2.730)	(2.876)	(3.179)	(2.872)	(3.097)	(4.028)	(3.489)
variable	1.609	1.125	1.004	2.627	1.612	0.979	2.977	2.021	1.610	0.111	0.278
(t-stat)	(10.472)	(10.283)	(10.224)	(6.548)	(7.145)	(10.465)	(8.947)	(7.246)	(5.687)	(1.822)	(2.716)
Adj. R^2	0.790	0.817	0.820	0.831	0.841	0.805	0.832	0.838	0.810	0.589	0.628
Variables in $t-4$											
r	-0.185	-0.157	-0.107	-0.095	-0.071	-0.033	-0.061	-0.092	-0.017	0.166	0.222
(t-stat)	(2.553)	(1.978)	(1.425)	(1.435)	(1.028)	(0.413)	(0.726)	(1.400)	(0.260)	(1.208)	(2.359)
$term$	-0.176	-0.134	-0.213	-0.095	-0.115	-0.195	-0.145	-0.232	-0.359	-0.396	-0.337
(t-stat)	(0.605)	(0.534)	(0.851)	(0.548)	(0.680)	(0.729)	(0.698)	(1.390)	(1.705)	(0.900)	(0.781)
lag	0.404	0.203	0.169	0.268	0.136	0.165	0.244	0.129	0.145	0.629	0.394
(t-stat)	(1.697)	(0.927)	(0.758)	(1.708)	(0.788)	(0.711)	(1.295)	(0.737)	(0.711)	(1.648)	(1.169)
variable	3.636	2.475	2.169	6.168	3.724	2.109	6.622	4.694	3.726	0.390	0.753
(t-stat)	(5.281)	(7.297)	(8.186)	(10.153)	(13.622)	(8.564)	(7.612)	(11.652)	(9.580)	(2.138)	(4.422)
Adj. R^2	0.625	0.700	0.688	0.785	0.800	0.665	0.730	0.789	0.716	0.317	0.400

Note: This table reports predictive regressions for euro area real activity variables. Predictive horizons are 1, 2, and 4 quarters. Presented are the parameter estimates, Newey-West adjusted t-statistics in parentheses, and adjusted R^2 values. The sample period runs from January 2005 to December 2019.

Table OA5. Predicting Euro Area Bank Lending Variables using Funding and Credit Spreads

	IBOR-OIS spread (SFS)			3-month FFS ($F^{(x)}_{3m,3m}$)			12-month FFS ($F^{(x)}_{12m,12m}$)			CDS spread	GM spread
Tenor x	$1m$	$3m$	$6m$	$1m$	$3m$	$6m$	$1m$	$3m$	$6m$		
Panel A: Bank lending growth											
variables in $t-1$											
r	0.174	0.174	0.165	0.159	0.158	0.153	0.156	0.164	0.148	0.026	0.041
(t-stat)	(3.421)	(3.605)	(3.429)	(3.406)	(3.527)	(3.314)	(3.520)	(3.605)	(3.209)	(0.346)	(0.681)
term	0.047	0.069	0.094	0.048	0.078	0.086	0.060	0.110	0.137	0.067	0.106
(t-stat)	(0.967)	(1.343)	(1.697)	(1.069)	(1.548)	(1.640)	(1.266)	(2.109)	(2.478)	(1.208)	(2.087)
lag	0.851	0.847	0.840	0.842	0.844	0.821	0.826	0.843	0.825	0.745	0.748
(t-stat)	(16.244)	(16.546)	(15.912)	(17.177)	(17.170)	(15.928)	(16.189)	(17.286)	(16.410)	(14.465)	(14.309)
variable	-1.110	-0.682	-0.590	-1.781	-1.012	-0.626	-2.006	-1.287	-1.068	-0.239	-0.389
(t-stat)	(5.504)	(4.475)	(3.915)	(6.058)	(5.812)	(4.826)	(7.394)	(5.833)	(4.629)	(3.594)	(3.271)
Adj. R^2	0.828	0.830	0.829	0.836	0.835	0.834	0.837	0.835	0.835	0.827	0.839
Variables in $t-2$											
r	0.506	0.514	0.482	0.455	0.456	0.437	0.445	0.478	0.424	0.035	0.096
(t-stat)	(3.869)	(4.192)	(4.052)	(3.984)	(4.366)	(3.865)	(4.190)	(4.559)	(4.003)	(0.174)	(0.616)
term	0.207	0.293	0.373	0.244	0.342	0.335	0.280	0.457	0.522	0.223	0.356
(t-stat)	(1.333)	(1.695)	(1.972)	(1.874)	(2.200)	(1.843)	(1.927)	(2.792)	(2.880)	(1.410)	(1.997)
lag	0.826	0.824	0.809	0.834	0.831	0.773	0.802	0.829	0.785	0.627	0.653
(t-stat)	(10.797)	(10.925)	(10.509)	(12.438)	(12.001)	(10.349)	(11.515)	(12.348)	(11.341)	(9.008)	(9.136)
variable	-3.715	-2.332	-2.002	-6.348	-3.566	-2.045	-6.929	-4.515	-3.604	-0.755	-1.170
(t-stat)	(5.717)	(5.163)	(4.381)	(5.864)	(6.459)	(4.936)	(7.469)	(6.951)	(5.193)	(3.741)	(3.113)
Adj. R^2	0.806	0.816	0.814	0.845	0.839	0.822	0.843	0.839	0.831	0.802	0.825
Variables in $t-4$											
r	1.399	1.447	1.352	1.198	1.227	1.220	1.184	1.306	1.169	0.039	0.254
(t-stat)	(4.273)	(4.879)	(4.971)	(4.296)	(5.119)	(4.652)	(4.273)	(5.623)	(5.495)	(0.095)	(0.770)
term	0.520	0.900	1.129	0.703	1.051	0.998	0.811	1.429	1.611	0.553	0.977
(t-stat)	(1.335)	(2.017)	(2.298)	(2.193)	(2.818)	(2.169)	(2.334)	(3.653)	(3.727)	(1.600)	(2.044)
lag	0.726	0.755	0.722	0.780	0.778	0.662	0.723	0.777	0.688	0.396	0.476
(t-stat)	(5.659)	(6.700)	(6.630)	(7.902)	(8.394)	(6.455)	(7.843)	(9.223)	(8.552)	(3.015)	(4.300)
variable	-11.000	-7.362	-6.299	-19.168	-11.199	-6.268	-20.592	-14.279	-11.320	-2.244	-3.282
(t-stat)	(5.469)	(6.281)	(5.542)	(5.662)	(7.938)	(6.030)	(8.018)	(9.247)	(7.318)	(4.319)	(3.412)
Adj. R^2	0.740	0.787	0.785	0.833	0.844	0.803	0.828	0.848	0.836	0.761	0.791
Panel B: Consumer loan growth											
variables in $t-1$											
r	0.024	0.042	0.038	0.043	0.049	0.027	0.031	0.052	0.031	-0.137	-0.102
(t-stat)	(0.407)	(0.717)	(0.681)	(0.832)	(0.942)	(0.500)	(0.581)	(1.001)	(0.630)	(2.387)	(2.351)
term	-0.229	-0.209	-0.191	-0.224	-0.194	-0.197	-0.212	-0.168	-0.145	-0.185	-0.170
(t-stat)	(2.072)	(1.915)	(1.670)	(2.326)	(1.896)	(1.788)	(2.069)	(1.575)	(1.287)	(1.784)	(1.666)
lag	0.617	0.610	0.603	0.588	0.584	0.589	0.595	0.583	0.569	0.503	0.504
(t-stat)	(6.483)	(6.579)	(6.578)	(6.305)	(6.369)	(6.586)	(6.431)	(6.419)	(6.315)	(5.173)	(6.063)
variable	-0.391	-0.411	-0.388	-1.497	-0.971	-0.433	-1.400	-1.187	-0.978	-0.288	-0.397
(t-stat)	(1.070)	(1.855)	(1.893)	(3.023)	(3.825)	(2.086)	(2.649)	(3.693)	(3.187)	(2.456)	(3.053)
Adj. R^2	0.635	0.642	0.644	0.657	0.664	0.647	0.649	0.662	0.660	0.669	0.669
Variables in $t-2$											
r	0.167	0.193	0.164	0.144	0.157	0.109	0.112	0.170	0.107	-0.359	-0.287
(t-stat)	(1.120)	(1.263)	(1.144)	(1.040)	(1.113)	(0.768)	(0.771)	(1.210)	(0.801)	(2.846)	(2.653)
term	-0.512	-0.434	-0.370	-0.539	-0.436	-0.413	-0.490	-0.348	-0.275	-0.475	-0.414
(t-stat)	(1.963)	(1.676)	(1.391)	(2.288)	(1.749)	(1.573)	(1.920)	(1.362)	(1.050)	(1.712)	(1.518)
lag	0.519	0.515	0.502	0.477	0.480	0.471	0.484	0.479	0.451	0.365	0.341
(t-stat)	(3.616)	(3.651)	(3.541)	(3.333)	(3.426)	(3.327)	(3.335)	(3.410)	(3.146)	(2.941)	(2.535)

	IBOR-OIS spread (SFS)			3-month FFS ($F^{(x)}_{3m,3m}$)			12-month FFS ($F^{(x)}_{12m,12m}$)			CDS spread	GM spread
Tenor x	$1m$	$3m$	$6m$	$1m$	$3m$	$6m$	$1m$	$3m$	$6m$		
variable	-2.603	-1.848	-1.627	-5.009	-3.055	-1.692	-5.015	-3.759	-3.154	-0.746	-1.143
(t-stat)	(3.642)	(4.268)	(4.058)	(4.387)	(5.610)	(4.158)	(4.666)	(5.847)	(5.095)	(2.953)	(3.539)
Adj. R^2	0.644	0.664	0.664	0.682	0.693	0.670	0.666	0.688	0.685	0.673	0.687
Variables in $t-4$											
r	0.673	0.719	0.621	0.546	0.572	0.458	0.468	0.623	0.443	-0.617	-0.491
(t-stat)	(2.041)	(2.014)	(1.848)	(1.671)	(1.688)	(1.318)	(1.299)	(1.861)	(1.380)	(1.916)	(1.746)
$term$	-0.743	-0.516	-0.345	-0.877	-0.589	-0.514	-0.718	-0.311	-0.149	-0.867	-0.640
(t-stat)	(1.160)	(0.823)	(0.533)	(1.493)	(1.006)	(0.772)	(1.108)	(0.530)	(0.241)	(1.193)	(0.850)
lag	0.490	0.487	0.468	0.423	0.431	0.416	0.433	0.433	0.391	0.298	0.257
(t-stat)	(2.594)	(2.686)	(2.534)	(2.264)	(2.378)	(2.220)	(2.211)	(2.398)	(2.093)	(1.637)	(1.544)
variable	-8.406	-5.479	-4.734	-14.219	-8.388	-4.669	-14.517	-10.541	-8.533	-1.547	-2.634
(t-stat)	(6.099)	(6.900)	(6.652)	(7.496)	(9.119)	(6.394)	(7.516)	(9.884)	(8.187)	(2.884)	(4.667)
Adj. R^2	0.716	0.745	0.741	0.778	0.789	0.738	0.745	0.786	0.767	0.667	0.719
Panel C: Real estate loan growth											
variables in $t-1$											
r	0.064	0.065	0.064	0.069	0.069	0.060	0.066	0.072	0.061	-0.015	-0.002
(t-stat)	(1.545)	(1.487)	(1.458)	(1.767)	(1.670)	(1.480)	(1.686)	(1.670)	(1.490)	(0.451)	(0.052)
$term$	0.028	0.037	0.052	0.027	0.044	0.052	0.038	0.063	0.084	0.057	0.062
(t-stat)	(0.459)	(0.554)	(0.709)	(0.526)	(0.752)	(0.742)	(0.682)	(0.960)	(1.046)	(0.771)	(0.715)
lag	0.831	0.822	0.816	0.796	0.796	0.795	0.791	0.797	0.788	0.803	0.788
(t-stat)	(9.917)	(10.087)	(10.101)	(9.753)	(10.273)	(9.737)	(8.965)	(10.717)	(10.714)	(11.033)	(10.521)
variable	-0.487	-0.309	-0.293	-1.071	-0.608	-0.348	-1.215	-0.764	-0.646	-0.114	-0.168
(t-stat)	(1.915)	(1.876)	(1.771)	(2.368)	(2.532)	(2.115)	(2.804)	(2.448)	(2.045)	(1.762)	(1.312)
Adj. R^2	0.769	0.769	0.771	0.778	0.777	0.773	0.778	0.777	0.776	0.769	0.769
Variables in $t-2$											
r	0.239	0.238	0.218	0.236	0.233	0.199	0.218	0.248	0.208	-0.038	0.008
(t-stat)	(2.069)	(1.830)	(1.690)	(2.106)	(1.937)	(1.657)	(1.877)	(1.985)	(1.740)	(0.469)	(0.091)
$term$	0.168	0.194	0.235	0.158	0.211	0.225	0.189	0.279	0.334	0.237	0.261
(t-stat)	(0.844)	(0.914)	(1.007)	(0.968)	(1.144)	(1.007)	(1.058)	(1.397)	(1.400)	(1.019)	(0.997)
lag	0.756	0.738	0.734	0.710	0.705	0.706	0.703	0.703	0.689	0.706	0.688
(t-stat)	(5.912)	(5.853)	(5.854)	(6.005)	(6.023)	(5.612)	(5.427)	(6.184)	(6.017)	(5.909)	(6.021)
variable	-1.924	-1.139	-0.961	-3.644	-2.009	-1.053	-3.847	-2.586	-2.079	-0.366	-0.535
(t-stat)	(3.629)	(2.809)	(2.259)	(4.057)	(3.668)	(2.608)	(4.200)	(3.498)	(2.630)	(2.121)	(1.990)
Adj. R^2	0.708	0.706	0.703	0.732	0.726	0.706	0.724	0.727	0.719	0.696	0.696
Variables in $t-4$											
r	0.589	0.603	0.542	0.562	0.566	0.486	0.508	0.604	0.504	-0.277	-0.062
(t-stat)	(2.019)	(1.859)	(1.700)	(1.961)	(1.846)	(1.596)	(1.636)	(1.951)	(1.710)	(1.203)	(0.248)
$term$	0.622	0.697	0.794	0.606	0.734	0.758	0.659	0.910	1.047	0.798	0.883
(t-stat)	(1.262)	(1.344)	(1.420)	(1.534)	(1.671)	(1.413)	(1.485)	(1.969)	(1.964)	(1.356)	(1.416)
lag	0.675	0.645	0.633	0.629	0.611	0.598	0.612	0.607	0.578	0.541	0.548
(t-stat)	(4.537)	(4.387)	(4.292)	(4.843)	(4.668)	(4.106)	(4.223)	(4.727)	(4.415)	(4.217)	(4.190)
variable	-5.397	-3.231	-2.689	-9.978	-5.476	-2.854	-9.857	-6.946	-5.613	-1.255	-1.638
(t-stat)	(3.620)	(3.687)	(3.207)	(5.519)	(5.070)	(3.622)	(4.493)	(4.564)	(3.816)	(2.856)	(3.400)
Adj. R^2	0.652	0.650	0.640	0.713	0.697	0.648	0.677	0.696	0.679	0.651	0.641
Panel D: C&I loan growth											
variables in $t-1$											
r	0.133	0.137	0.129	0.105	0.108	0.111	0.106	0.117	0.102	-0.041	-0.048
(t-stat)	(2.627)	(3.134)	(2.805)	(1.960)	(2.129)	(2.421)	(2.116)	(2.310)	(1.932)	(0.409)	(0.627)
$term$	0.012	0.037	0.079	0.019	0.033	0.067	0.035	0.073	0.108	-0.009	0.086
(t-stat)	(0.155)	(0.457)	(0.948)	(0.209)	(0.335)	(0.831)	(0.396)	(0.715)	(1.122)	(0.087)	(1.404)

	IBOR-OIS spread (SFS)			3-month FFS ($F^{(x)}_{3m,3m}$)			12-month FFS ($F^{(x)}_{12m,12m}$)			CDS spread	GM spread
Tenor x	$1m$	$3m$	$6m$	$1m$	$3m$	$6m$	$1m$	$3m$	$6m$		
lag	0.921	0.910	0.903	0.923	0.901	0.884	0.903	0.899	0.875	0.778	0.806
(t-stat)	(16.275)	(19.200)	(21.751)	(17.473)	(18.770)	(23.450)	(18.517)	(19.061)	(21.638)	(12.246)	(15.966)
variable	-1.564	-0.963	-0.877	-2.438	-1.282	-0.925	-2.815	-1.629	-1.407	-0.302	-0.562
(t-stat)	(4.871)	(4.340)	(5.368)	(5.170)	(4.276)	(6.391)	(6.520)	(4.385)	(5.256)	(4.437)	(4.833)
Adj. R^2	0.876	0.879	0.882	0.882	0.878	0.888	0.887	0.878	0.881	0.876	0.898
Variables in $t-2$											
r	0.379	0.393	0.358	0.260	0.282	0.287	0.266	0.318	0.267	-0.147	-0.195
(t-stat)	(2.600)	(3.489)	(3.120)	(1.695)	(2.091)	(2.534)	(1.908)	(2.371)	(1.922)	(0.520)	(0.877)
$term$	0.127	0.283	0.402	0.146	0.244	0.307	0.189	0.404	0.483	-0.115	0.256
(t-stat)	(0.521)	(1.405)	(1.836)	(0.633)	(0.964)	(1.465)	(0.820)	(1.615)	(2.029)	(0.364)	(1.726)
lag	0.951	0.954	0.924	0.956	0.926	0.875	0.911	0.921	0.859	0.643	0.724
(t-stat)	(12.018)	(15.925)	(16.098)	(12.902)	(14.723)	(15.770)	(12.762)	(15.736)	(15.246)	(5.467)	(9.429)
variable	-5.979	-3.825	-3.317	-9.010	-5.019	-3.271	-10.042	-6.374	-5.187	-0.909	-1.712
(t-stat)	(8.668)	(8.557)	(9.348)	(6.533)	(7.506)	(9.637)	(9.162)	(8.339)	(8.836)	(4.155)	(4.306)
Adj. R^2	0.873	0.891	0.895	0.889	0.886	0.903	0.898	0.888	0.890	0.846	0.901
Variables in $t-4$											
r	1.097	1.080	0.954	0.683	0.723	0.762	0.706	0.849	0.707	-0.351	-0.528
(t-stat)	(2.423)	(3.351)	(3.379)	(1.452)	(1.929)	(2.794)	(1.697)	(2.345)	(2.102)	(0.537)	(1.026)
$term$	-0.104	0.850	1.283	0.244	0.824	0.982	0.434	1.376	1.677	-0.480	0.640
(t-stat)	(0.121)	(1.316)	(1.926)	(0.350)	(1.311)	(1.626)	(0.648)	(2.076)	(2.578)	(0.620)	(1.234)
lag	0.787	0.924	0.889	0.883	0.896	0.802	0.823	0.890	0.787	0.354	0.539
(t-stat)	(4.335)	(8.049)	(8.190)	(7.294)	(9.844)	(8.895)	(7.972)	(9.720)	(8.853)	(1.791)	(4.610)
variable	-16.256	-12.212	-10.679	-27.828	-16.771	-10.284	-30.724	-21.346	-17.192	-2.757	-4.833
(t-stat)	(5.720)	(8.996)	(9.594)	(5.920)	(10.505)	(10.413)	(10.118)	(11.908)	(12.015)	(4.369)	(4.466)
Adj. R^2	0.756	0.842	0.858	0.830	0.860	0.875	0.850	0.866	0.876	0.755	0.840

Note: This table reports predictive regressions for euro area bank lending variables. Predictive horizons are 1, 2, and 4 quarters. Presented are the parameter estimates, Newey-West adjusted t-statistics in parentheses, and adjusted R^2 values. The sample period runs from January 2005 to December 2019.

D Data for Japan and the United Kingdom

Figure OA3. Funding Spreads in Japan and Bank of Japan Total Assets

Note: Panel A displays the forward funding spread (FFS), the spot funding spread (SFS), and the difference between the two spreads. Panel B displays the Bank of Japan total assets (in JPY trillion). The spread series are smoothed using a 5-day moving average. The sample periods are January 2007 to September 2020.

Panel A: Funding Spreads

Panel B: Bank of Japan Total Assets

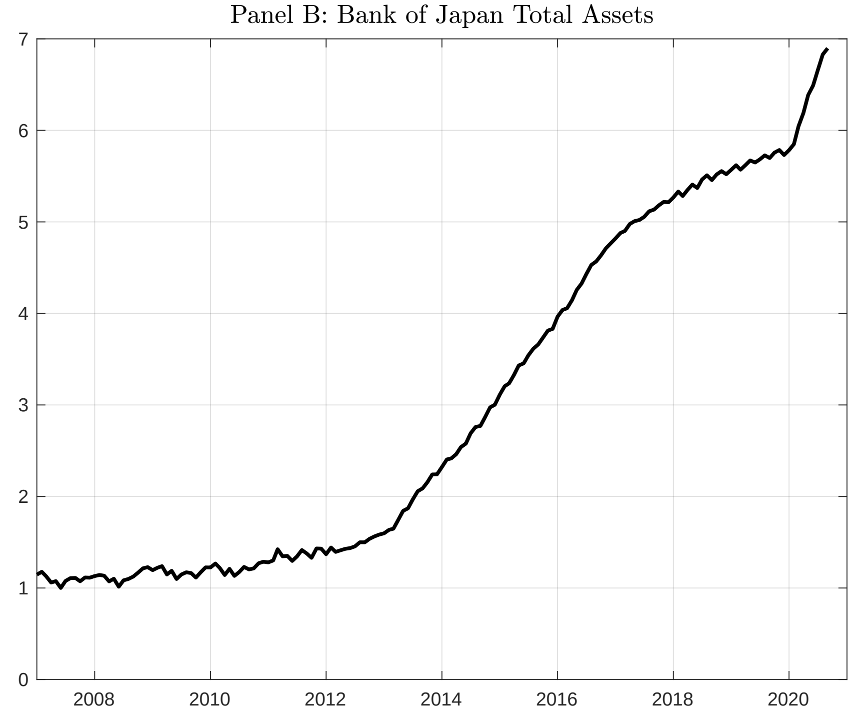
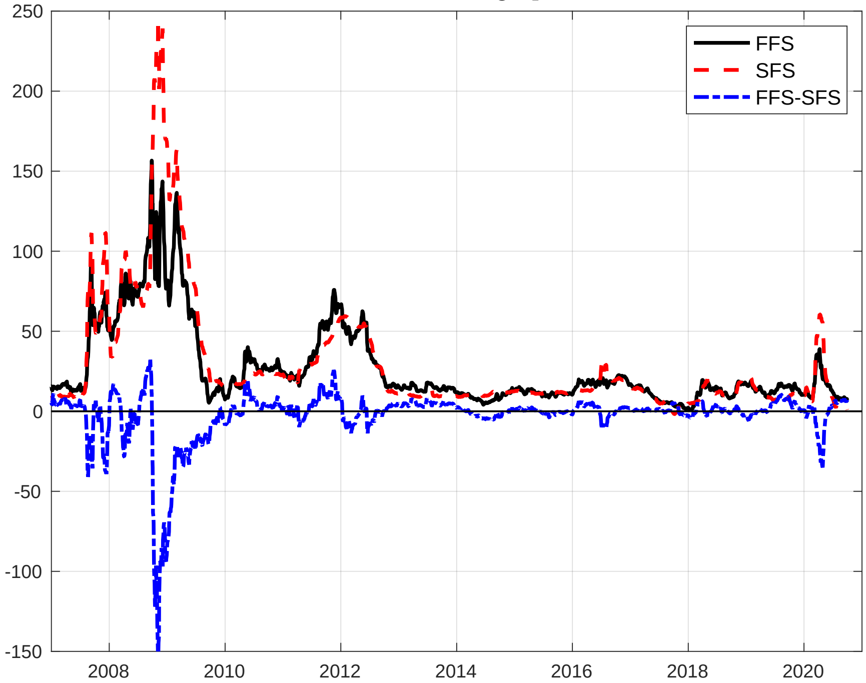


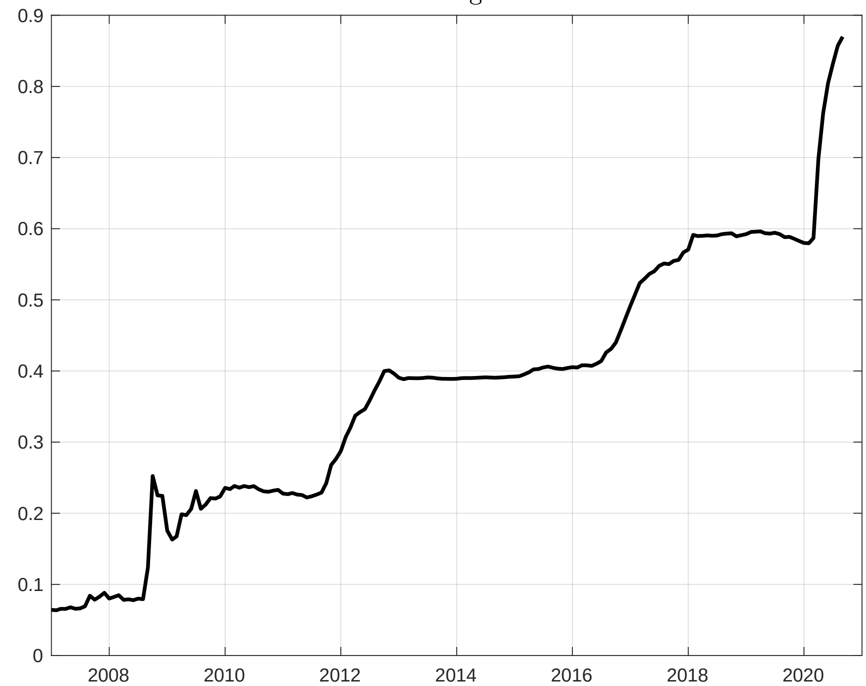
Figure OA4. Funding Spreads in the United Kingdom and Bank of England Total Assets

Note: Panel A displays the forward funding spread (FFS), the spot funding spread (SFS), and the difference between the two spreads. Panel B displays the Bank of England total assets (in GBP trillion). The spread series are smoothed using a 5-day moving average. The sample periods are January 2007 to September 2020.

Panel A: Funding Spreads



Panel B: Bank of England Total Assets



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