Liquidity and the Business Cycle

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Topic: Equity Liquidity and the Macroeconomy

This paper:
Investigate links

- Equity Market Liquidity
- Macroeconomy — i.e. Business Cycle.

We

- Show: Strong empirical link between (aggregate) stock market liquidity and the business cycle.
- Speculate: Are expectations about business cycle (consumption, investment) leading to portfolio rebalancing of individual investors?
- Show: Portfolio rebalancing of equity portfolios consistent with such a story.

Overview of presentation

- Equity market liquidity
  - What is it?
  - How to measure it?
- Why should liquidity
  - vary?
  - be related to the macroeconomy?
- US: What is the relationship between aggregate liquidity and the business cycle?
  - In sample autoregressions
  - Out of sample analysis
- US: Possible mechanism
  - Mechanism: Rebalancing of individual investor portfolios.
  - Evidence: US – differences in crossection of stocks
    Small (bad liquidity) stocks most information
- Norway:
  - Confirming predictive power
  - Direct evidence on portfolio rebalancing.
- Conclusion

Defining liquidity

Maureen O'Hara: *"..a liquid market is one in which buyers and sellers can trade into and out of positions quickly and without having large price effects."*

Harris [2002], four interrelated liquidity dimensions:

- **depth** - the volume that can be traded
- **width** - the difference between the fundamental price and the transaction price
- **immediacy** - the speed of trade execution
- **resiliency** - how fast does the price move back to equilibrium after a large liquidity trade

Literature on liquidity

Starting point: Market Microstructure

- Implications of asymmetric information for price formation of single asset (stock)
  This literature - do not aggregate
  (Unless degree of asymmetric information varies)

Evolving microstructure literature:

- Broader implications – Asset pricing
- Common variation in (time series) of liquidity across
  - *stocks* [e.g. Chordia, Roll, and Subrahmanyam [2000], Hasbrouck and Seppi [2001], Huberman and Halka [2001]]
  - *markets* [e.g. Brockman, Chung and Pérignon (2006)]
  - *liquidity measures* [e.g. Korajczyk and Sadka [2007], Chollete, Naes, and Skjeltorp [2007, 2008]]

Time series variation in aggregate liqudity

Asset pricing implications

- commonality $\longrightarrow$ systematic (non diversifiable) risk factor
- empirical support for a liquidity risk premium [e.g. Pastor and Stambaugh [2003], Acharya and Pedersen [2005]...]

But:

Why should we observe common variation in market liquidity?

Theoretical models with endogenous market liquidity

- Eisfeldt [2004]
  - market liquidity determined as a function of productivity
  - risky assets more attractive when productivity is high
- Gallmeyer, Hollifield, and Seppi [2008]: Demand Discovery, Saar [2006]
  - uncertainty about investors preferences and portfolios
  - link time variation in liquidity to equity risk premium

Why time varying liquidity?

Alternative way of phrasing question:
Can standard (consumption based) asset pricing theory help us?
Consider intution of Merton [1973]:
Two portfolios, one used to hedge changes in investment opportunity set.
Implication: Time varying demand for assets depending on contribution to investment opportunity set.
Different stocks presumably different in contribution.
Result: Time variation in demand (for hedging purposes) of stocks.
Is contribution to investment opportunities related to liquidity?

Relevant empirics

Typical empirical question:

- Do shocks to macroeconomic variables affect liquidity of financial markets?

US: Fujimoto [2003], Goyenko/Ukhov (2004)
Scandinavia: Söderberg [2008]

- monetary shocks (federal funds rate) forecast equity market liquidity
- no effect from shocks in real variables

In this paper:

- Ask the opposite question
  – Are there effects *from* liquidity *to* macroeconomic variables?

Why should aggregate liquidity contain information about future macro?

- Rational expectations view $\Rightarrow$ current prices are set on the basis of forecasts of relevant real variables
- Asset prices aggregate investors' views about economic fundamentals
  - Fama [1990], Schwert [1990], Beaudry and Portier [2006]: Current stock returns lead production growth
- Beber et al. [2008], Kaul and Kayacetin [2009] link aggregate order-flow (portfolio shifts) to future macro
  - order-flow aggregate investors views (or dispersed information) about macro fundamentals
  - trading decisions more informative than the trading consequences (price adjustments)

Measuring liquidity

Liquidity – "Soft" concept

→ Many empirical measures, aspects of liquidity.

We use four such measures:

Transaction cost measures

- Relative spread: $RS = \frac{p_{ask} - p_{bid}}{(p_{ask} + p_{bid})/2}$
- Lesmond/Ogden/Trzcinka [1999] measure (LOT)
  - implicit cost required for a firm's price to *not* move when the market moves
  - do not require ask/bid prices for estimation
- Roll [1984] estimate of implicit spread.

Price impact

- Amihud [2002] illiquidity ratio: $\text{ILR} = |r|/VOLUME$
  - How much does one unit of trade move the price?

Market-wide liquidity

→ cross sectional averages of these liquidity measures

Describing liquidity measures, US

Liquidity measure	mean	median	no secs	no obs	Means subperiods 1947-59	1960-69	1970-79	1980-89	1990-99	2000-
RS	0.021	0.014	4248	146262	0.021	0.019		0.020	0.027	0.0
LOT	0.035	0.022	5177	340076	0.027	0.031	0.051	0.037	0.040	0.0
ILR	0.657	0.056	5178	340668	1.900	0.818	0.829	0.294	0.366	0.1
Roll	0.017	0.013	5141	174326	0.012	0.013	0.015	0.015	0.017	0.0

Correlations between liquidity measures, US

	RS	LOT	Roll
LOT	0.72		
Roll	0.40	0.62	
ILR	0.41	0.38	0.32

Macroeconomic Data

To proxy for the state of the real economy:

- real GDP (GDPR),
- unemployment rate (UE),
- real consumption (CONS)
- and real investment (INV).

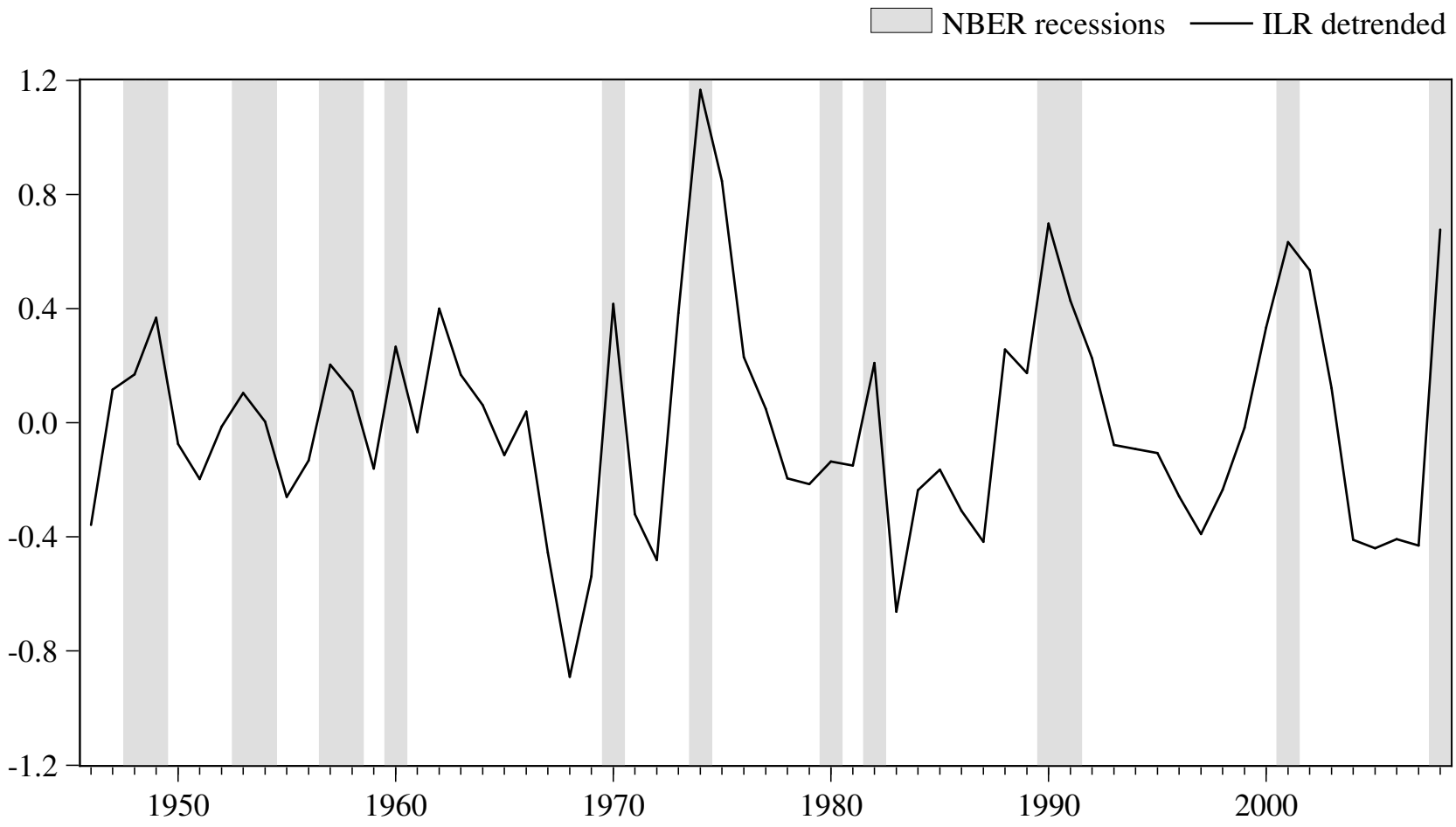
Financial variables:

- Excess equity market return (R_m)
- Equity market volatility (Vola)
- Term spread (Term)
- Credit spread (Cred)

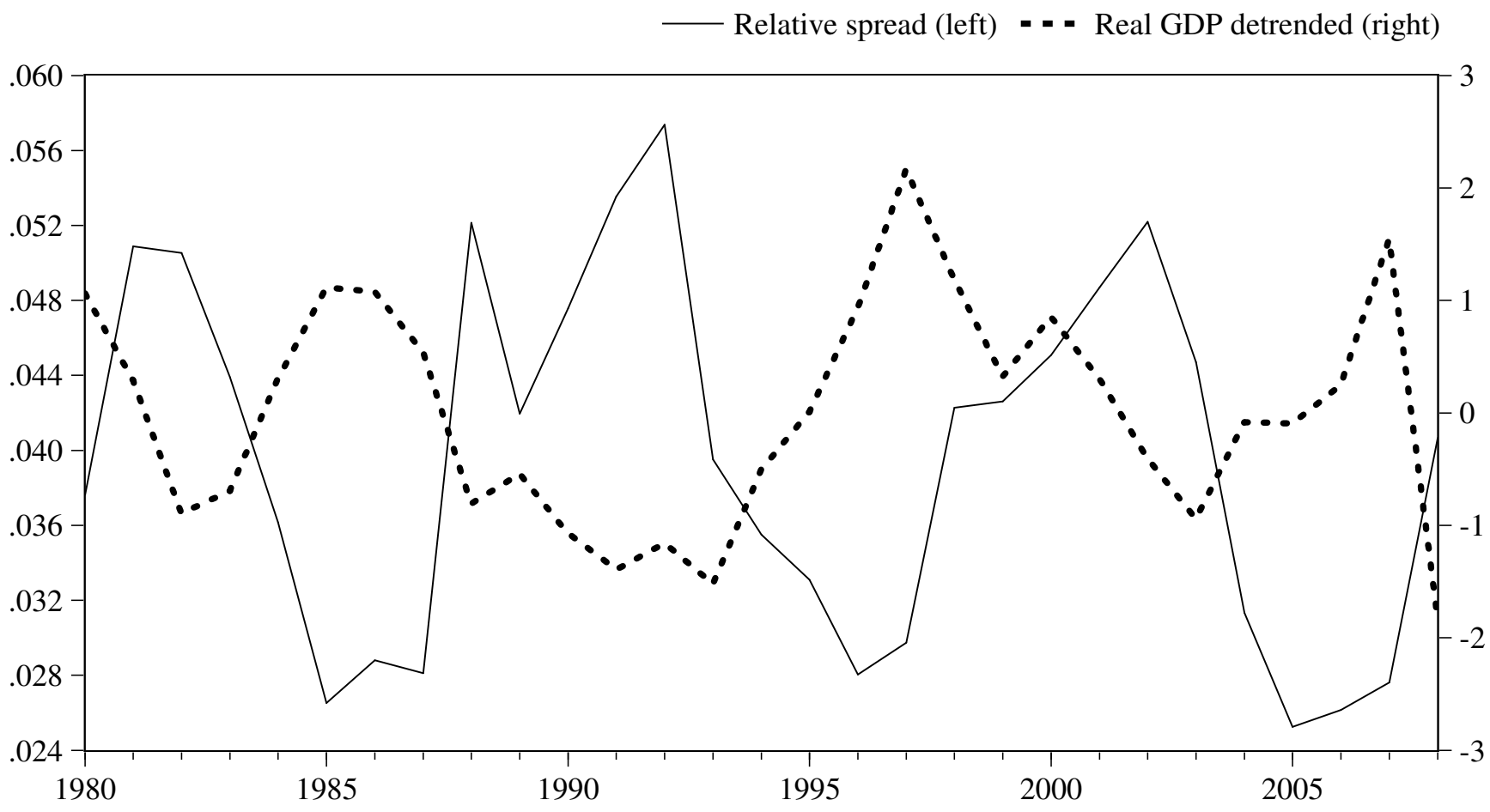
Norwegian ownership data

Data for stock market ownership for all investors at the Oslo Stock Exchange.
All ownership of stocks at the Exchange is registered in a single, government-controlled entity, the Central Securities Registry (VPS).
Monthly observations of the equity holdings of the complete stock market (anonymized).

Liquidity measure: ILR – US (1947–2008)



Liquidity measure: Spread – Norway (1980–2008)



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Predicting US real economy with market illiquidity – ILR

Models: predictive regressions

$$y_{t+1} = \alpha + \beta LIQ_t + \gamma' \mathbf{X}_t + u_{t+1} \tag{1}$$

- y_{t+1} is the growth in the macro variable over quarter t+1,
- LIQ_t is the market illiquidity measured for quarter t
- $\mathbf{X}_t$ is a set of control variables observed at t.

Predicting macro with market illiquidity – only

Dependent variable (y_{t+1})	$\hat{\alpha}$	$\hat{\beta}^{ILR}$	$\hat{\gamma}$	$\bar{R}^2$
dGDPR	0.006	-0.013	0.224	0.13
	(7.58)	(-5.37)	(3.68)	
dUE	0.003	0.074	0.300	0.13
	(0.61)	(3.68)	(5.14)	
dCONSR	0.006	-0.006	0.305	0.11
	(7.07)	(-3.33)	(4.46)	
dINV	0.006	-0.034	0.265	0.15
	(2.95)	(-6.18)	(3.97)	

Predicting macro with market liquidity controlling for non-equity variables –ILR

	$\hat{\alpha}$	$\hat{\beta}^{LIQ}$	$\hat{\gamma}^{y}$	$\hat{\gamma}^{Term}$	$\hat{\gamma}^{Cred}$	$\bar{R}^2$
dGDPR	0.005	-0.011	0.214	0.001	-0.005	0.159
	(5.02)	(-4.60)	(3.67)	(1.17)	(-2.29)	
dUE	0.015	0.057	0.303	-0.009	0.042	0.175
	(1.95)	(3.02)	(5.23)	(-2.83)	(3.19)	
dCONSR	0.004	-0.005	0.305	0.001	-0.001	0.133
	(3.86)	(-2.88)	(4.48)	(2.32)	(-0.66)	
dINV	0.001	-0.027	0.247	0.004	-0.018	0.228
	(0.45)	(-5.23)	(3.98)	(2.58)	(-3.84)	

Predicting macro with market liquidity - all control variables –ILR

	$\hat{\alpha}$	$\hat{\beta}^{LIQ}$	$\hat{\gamma}^{y}$	$\hat{\gamma}^{Term}$	$\hat{\gamma}^{Cred}$	$\hat{\gamma}^{Vola}$	$\hat{\gamma}^{Rm}$	$\bar{R}^2$
dGDPR	0.006	-0.008	0.203	0.000	-0.005	0.000	0.016	0.16
	(5.72)	(-3.90)	(3.57)	(0.92)	(-2.38)	(-0.02)	(2.01)	
dUE	0.006	0.021	0.307	-0.008	0.048	-0.033	-0.235	0.213
	(0.79)	(1.14)	(6.25)	(-2.64)	(3.56)	(-0.93)	(-4.58)	
dCONSR	0.005	-0.001	0.302	0.001	-0.001	0.002	0.026	0.171
	(4.76)	(-0.39)	(4.43)	(2.29)	(-1.04)	(0.34)	(3.38)	
dINV	0.003	-0.020	0.243	0.004	-0.019	0.007	0.048	0.238
	(1.16)	(-3.74)	(3.91)	(2.54)	(-3.95)	(0.55)	(2.14)	

Granger causality tests, US - liquidity - GDP

Which direction does links go?
Granger causality tests (in bivariate VAR)

	Whole sample	First half	Second half	20 year sub-periods				
	1947 2008	1947- 1977	1978- 2008	1950- 1970	1960- 1980	1970- 1990	1980- 2000	1990 200
N (observations)	243	119	124	84	84	84	84	76
NBER recessions	11	6	5	5	4	4	2	3
(a) ILR measure								
H0: dGDPR↛ dILR								
χ^2	4.08	1.66	3.13	3.84	3.56	3.35	2.83	2.66
p-value	(0.13)	(0.44)	(0.21)	(0.15)	(0.17)	(0.19)	(0.24)	(0.26
H0: dILR↛ dGDPR								
χ^2	31.97**	19.01**	14.50**	16.42**	8.89**	11.70**	11.64**	11.85
p-value	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00

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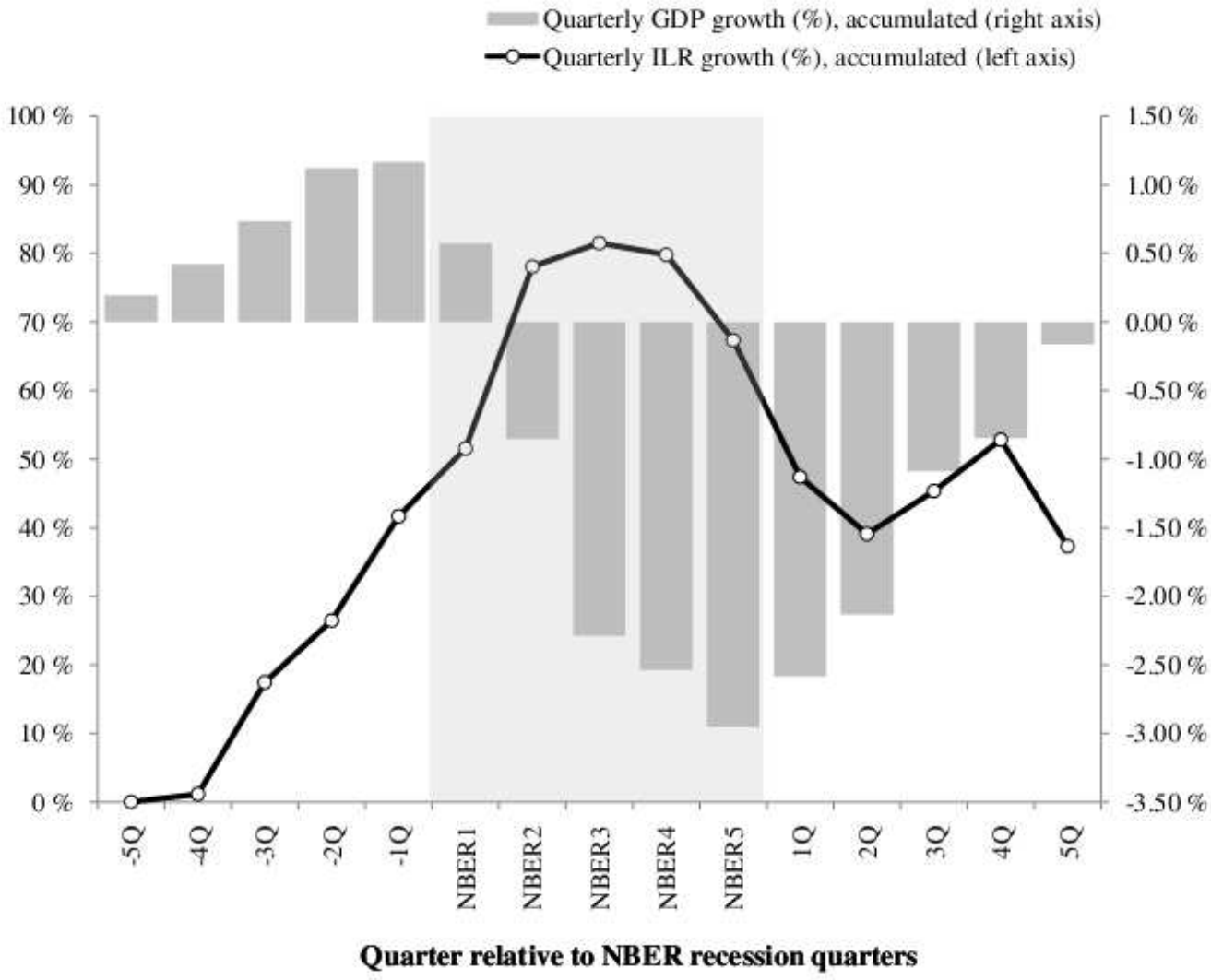
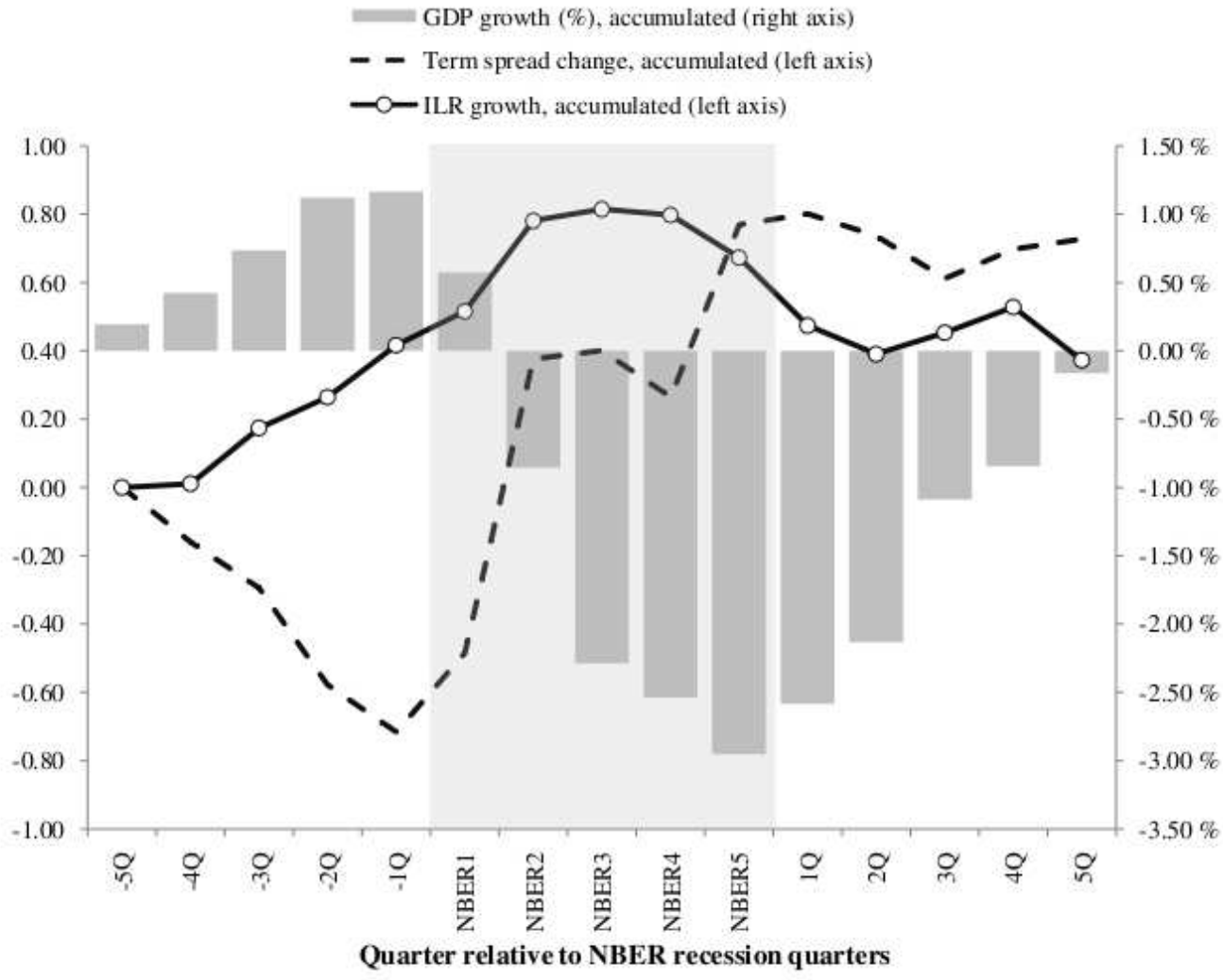
Market illiquidity around NBER recessions

Full sample period: 1947-2008



Market illiquidity and other financial variables around NBER recessions – Term spread



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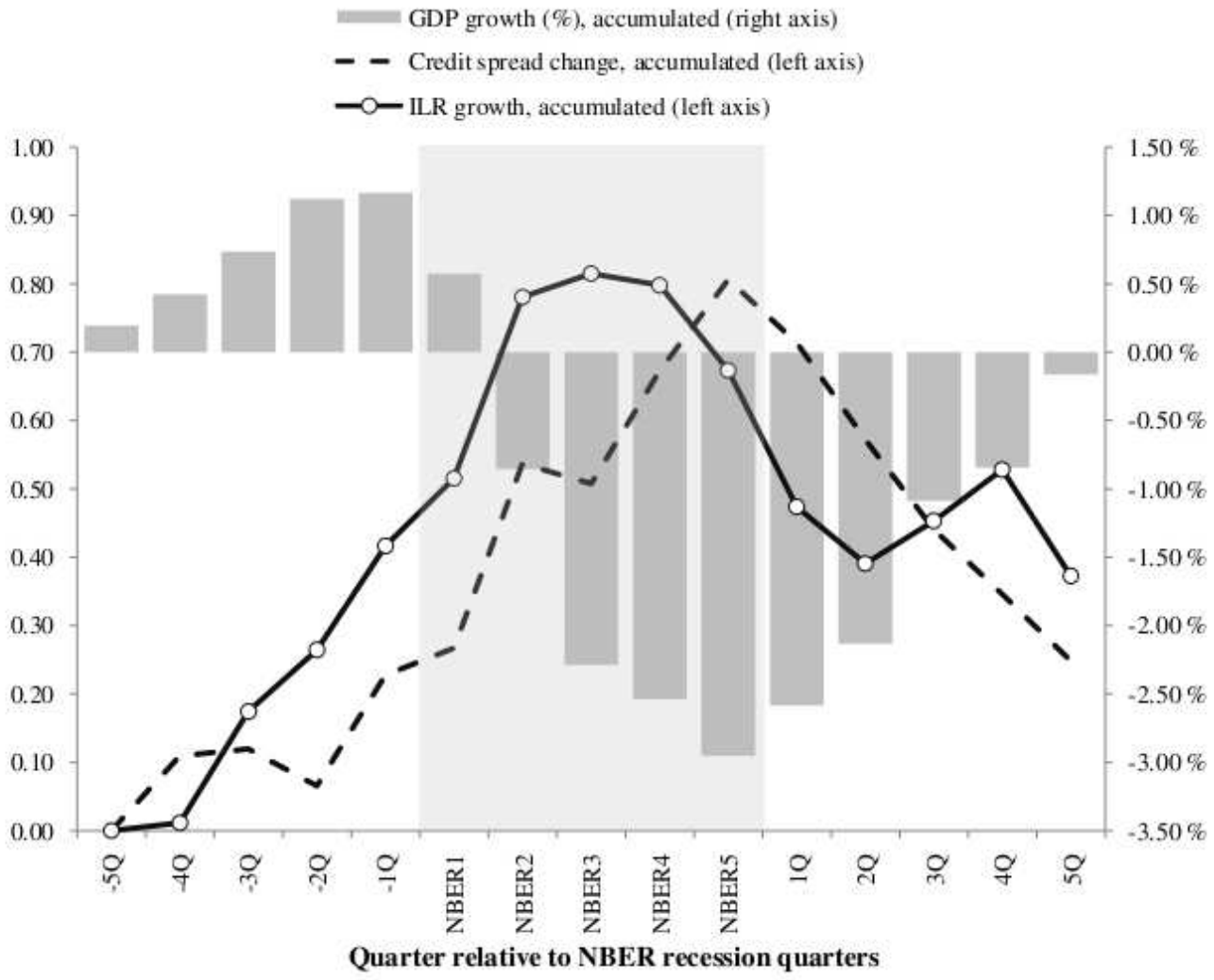
Market illiquidity and other financial variables around NBER recessions – Credit spread



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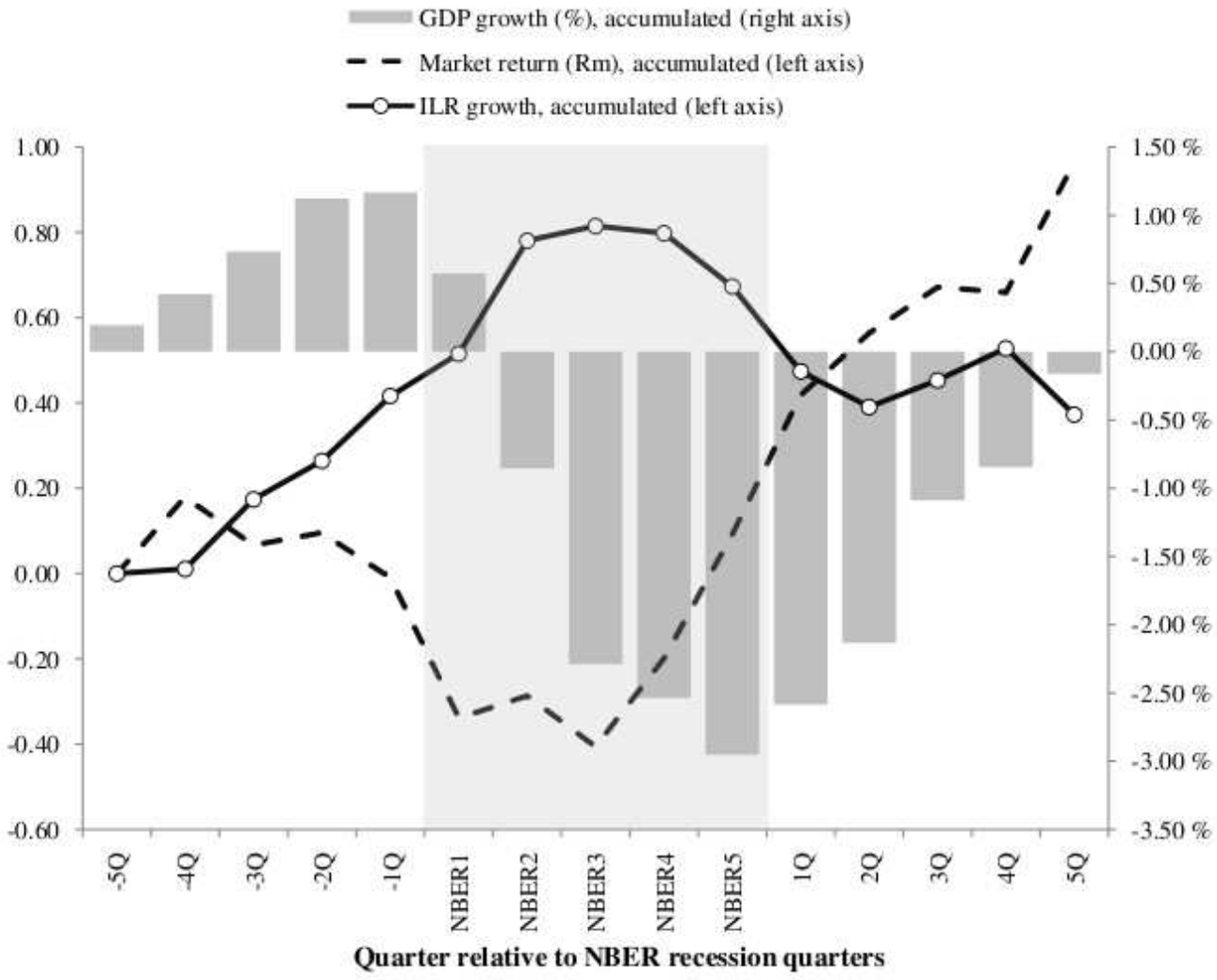
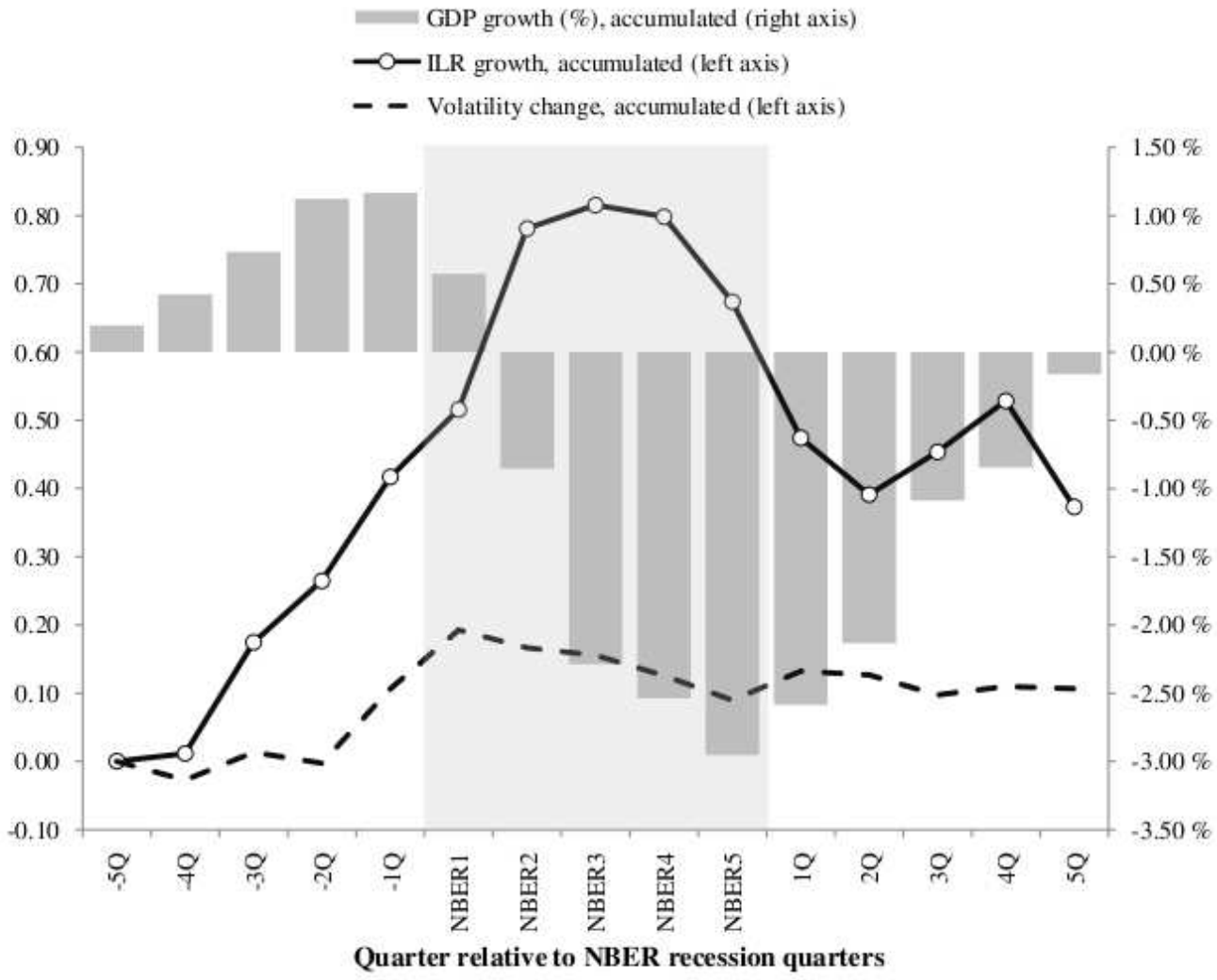
Market illiquidity and other financial variables around NBER recessions – Market return



Market illiquidity and other financial variables around NBER recessions – Volatility



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Out of sample evidence, US

Timing of information:
Liquidity – realtime observations
Macro variables – published with a lag, revised.
We predict last vintage macroeconomic variables using variables observable at time when prediction is made.

Evaluate univariate forecasts for real GDP growth.

Use liquidity as predicting variables.
Models are non-nested,
two statistics to compare out-of-sample performance:

- Mean-squared forecasting error (MSE) ratio
- Modified Diebold-Mariano (MDM) encompassing test [Harvey et al., 1998]

Comparing univariate forecasts

Out of sample tests - predicting GDP growth with different liquidity proxies

		Model 1		
Model 2	Statistic	ILR	LOT	Roll
LOT	MSE_1/MSE_2	0.89	-	
	MDM	1.74*	-	
Roll	MSE_1/MSE_2	0.82	0.91	-
	MDM	1.89*	0.47	-
	MSE ($x10^3$)	0.088	0.099	0.108

Out of sample performance of illiquidity vs alternatives

Ask: Does adding ILR to a baseline model improve the out of sample performance?
Two test statistics:

1. Encompassing test (ENC-NEW) proposed by Clark and McCracken [2001].
   The ENC-NEW test asks whether the restricted model (the model that do not include ILR), encompasses the unrestricted model that includes ILR. If the restricted model *does not* encompass the unrestricted model, that means that the additional predictor (ILR) in the larger, unrestricted, model improves forecast accuracy relative to the baseline.
2. F-type test for equal MSE between two nested models proposed by McCracken [2007] termed MSE-F.

Nested model comparisons – Forecasting real GDP growth: Illiquidity (ILR) versus other financial variables

Unrestricted model	Restricted model	1 quarter-ahead forecasts			2 quarters-ahead forecasts		
		$\frac{MSE_u}{MSE_r}$	MSE-F	ENC-NEW	$\frac{MSE_u}{MSE_r}$	MSE-F	ENC-NEW
ILR, TERM	TERM	0.917	20.95**	41.96**	0.927	18.09**	31.49**
ILR, Rm	Rm	0.976	5.69**	14.39**	1.003	-0.59	12.33**
ILR, CRED	CRED	1.000	0.02	18.73**	0.964	8.53**	22.86**
ILR, Vola	Vola	0.889	28.76**	50.91**	0.895	26.88**	35.98**

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Nested model comparisons – Forecasting real GDP growth: Financial variables versus an autoregressive model for GDP growth

Unrestricted model	Restricted model	1 quarter-ahead forecasts			2 quarters-ahead forecasts		
		$\frac{MSE_u}{MSE_r}$	MSE-F	ENC-NEW	$\frac{MSE_u}{MSE_r}$	MSE-F	ENC-NEW
ILR, dGDP	dGDP	0.849	41.16**	60.17**	0.803	56.36**	40.60**
TERM, dGDP	dGDP	0.988	2.91	34.75**	0.866	35.44**	28.99**
Rm, dGDP	dGDP	0.905	24.20**	45.54**	0.850	40.66**	30.91**
CRED, dGDP	dGDP	0.838	44.63**	51.37**	0.850	40.54**	28.77**
Vola, dGDP	dGDP	1.109	-22.77	9.92*	1.049	-10.81	1.26

Conclusion of predictability estimates

- There is information about future macro in liquidity
  - Robust to which liquidity measure
  - Both in sample and out of sample
  - Information in liquidity is not subsumed by other measures used in the literature.

The differential information content of liquidity of small and large firms

Getting to cause of result:
Add assumption: Contribution of hedging portfolio related to firm size.
Is there any difference in information content of liquidity of small vs large stocks

Comparing large and small stocks – ILR

	$\hat{\alpha}$	$\hat{\beta}_S^{LIQ}$	$\hat{\beta}_L^{LIQ}$	$\hat{\gamma}^{Term}$	$\hat{\gamma}^{Cred}$	$\hat{\gamma}^{Vola}$	$\hat{\gamma}^{Rm}$	$\bar{R}^2$
dGDPR	0.008	**-0.008**	0.003	0.000	-0.006	0.001	0.022	0.13
	(7.40)	**(-3.66)**	(1.01)	(0.74)	(-2.48)	(0.09)	(2.35)	
dUE	0.002	0.030	-0.042	-0.006	0.053	-0.029	-0.259	0.12
	(0.26)	(1.66)	(0.09)	(-1.78)	(3.61)	(-0.81)	(-4.00)	
dCONSR	0.008	-0.001	0.002	0.001	-0.002	0.000	0.028	0.08
	(8.32)	(-0.37)	(0.54)	(2.00)	(-1.19)	(0.10)	(3.17)	
dINV	0.006	**-0.019**	0.010	0.004	-0.022	0.015	0.065	0.18
	(2.10)	**(-3.45)**	(1.09)	(2.25)	(-4.03)	(1.13)	(2.51)	

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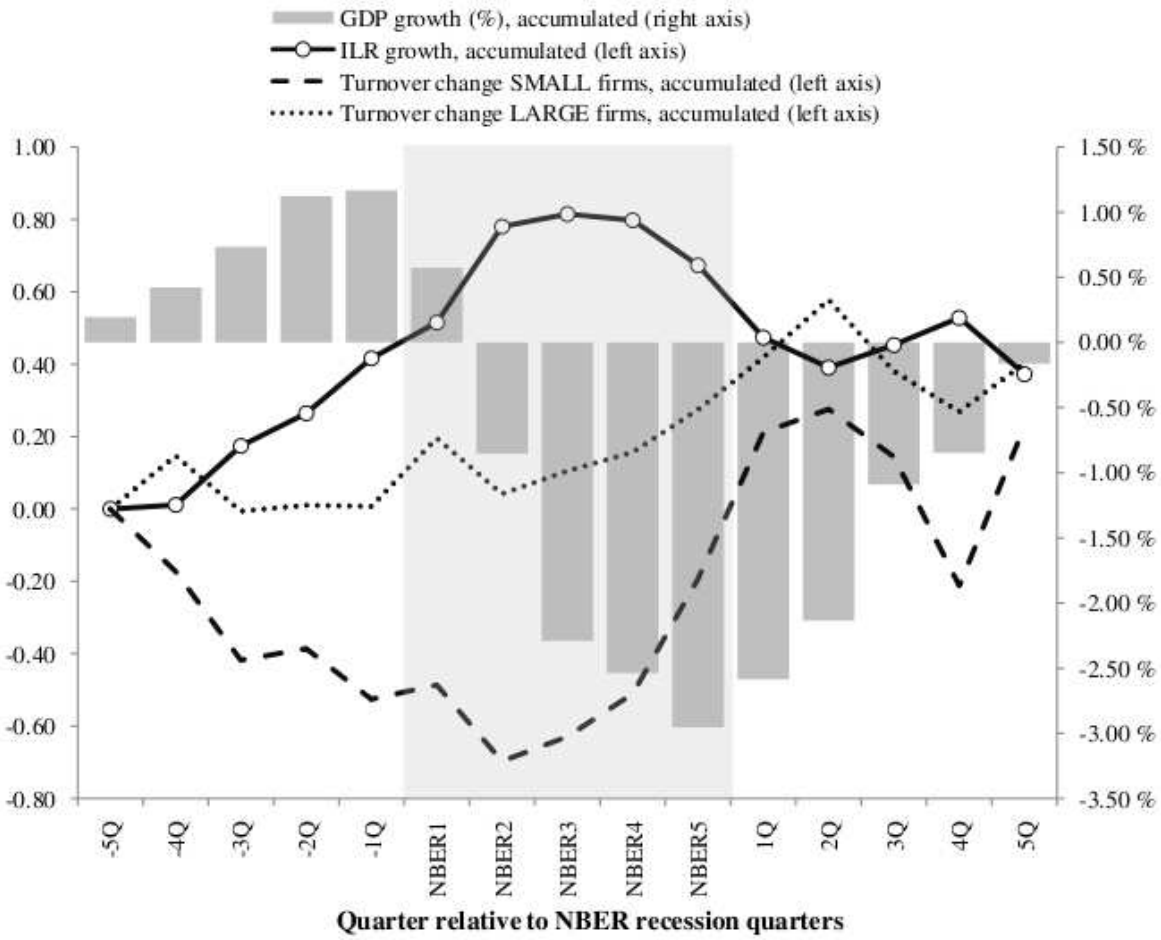
Comparing large and small stocks – Granger causality tests

Liquidity variable (LIQ)	$dGDPR \nrightarrow LIQ$		$LIQ \nrightarrow dGDPR$	
	χ^2	p-value	χ^2	p-value
ILR^S	4.34	0.23	10.33	0.02
ILR^L	6.86	0.08	1.32	0.72
$Roll^S$	0.67	0.72	6.44	0.04
$Roll^L$	0.19	0.91	5.60	0.06
LOT^S	3.19	0.07	9.84	0.00
LOT^L	0.20	0.65	0.03	0.87

Comparing large and small stocks – turnover?

Is this related to movement in and out of small stocks?

Add information about turnover.



Concluding – large vs small stocks

The predictive content of liquidity is coming from liquidity of small stocks.

Norway: Confirming the results on predictability

Dependent variable (y_{t+1})	RS				ILR			
	$\hat{\alpha}$	$\hat{\beta}^{RS}$	$\hat{\gamma}^{y}$	$\bar{R}^2$	$\hat{\alpha}$	$\hat{\beta}^{ILR}$	$\hat{\gamma}^{y}$	$\bar{R}^2$
dGDPR	0.023	-0.397	-0.243	0.12	0.012	-0.006	-0.225	0.11
	(5.28)	(-4.03)	(-4.03)		(5.99)	(-3.04)	(-3.69)	
dUE	-0.443	11.387	-0.150	0.12	-0.108	0.141	-0.080	0.06
	(-3.94)	(3.95)	(-1.56)		(-2.16)	(2.49)	(-0.82)	
dCONS	0.016	-0.216	-0.153	0.03	0.011	-0.004	-0.142	0.04
	(3.75)	(-2.43)	(-1.62)		(5.85)	(-2.72)	(-1.49)	
dINV	0.073	-1.686	-0.415	0.19	0.021	-0.018	-0.404	0.16
	(3.79)	(-4.01)	(0.19)		(2.23)	(-2.44)	(-4.94)	

Norway – prediction

Dependent variable (y_{t+1})	$\hat{\alpha}$	$\hat{\beta}^{LIQ}$	$\hat{\gamma}^{y}$	$\hat{\gamma}^{Term}$	$\hat{\gamma}^{Vola}$	$\hat{\gamma}^{Rm}$	$\bar{R}^2$
dGDPR	0.019	**-0.361**	-0.259	0.001	0.240	0.001	0.11
	(3.11)	**(-3.43)**	(-4.25)	(1.64)	(0.62)	(0.08)	
dUE	-0.358	**12.365**	-0.166	-0.007	-14.022	-0.183	0.11
	(-3.20)	**(3.05)**	(-1.39)	(-0.57)	(-1.00)	(-0.77)	
dCONS	0.018	-0.115	-0.127	0.000	-0.738	-0.010	0.03
	(2.83)	(-0.97)	(-1.33)	(0.22)	(-1.88)	(-1.20)	
dINV	0.052	**-1.325**	-0.418	0.003	0.547	0.044	0.18
	(1.56)	**(-2.66)**	(-5.03)	(0.93)	(0.24)	(0.73)	

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Causality small vs large – Norway

Liquidity variable (LIQ)	$dGDPR \not\rightarrow LIQ$ χ^2	p-value	$LIQ \not\rightarrow dGDPR$ χ^2	p-value
RS^S	0.69	0.71	**5.90**	**0.05**
RS^L	1.93	0.37	0.61	0.73
ILR^S	0.15	0.67	**4.92**	**0.03**
ILR^L	1.63	0.20	0.66	0.42

Norwegian ownership data

What can we ask with the Norwegian data?
Data: Can construct various measures of aggregate shifts in portfolio compositions.
Hypothesis: Portfolio shifts that reflects changes in expectations about macroeconomy.
What will happen:

- Some people will leave the stock market, into even more liquid assets (bank).
- Others will change their stock portfolio, shift to more liquid stocks (larger companies).

Can we detect such behavior, coinciding with changes in liquidity?

Describing annual changes in portfolio composition

Problem: How do we measure such aggregate movements?
One way: From complete portfolios of individuals:
Ask: Knowing portfolios see when one person

- leave market – participation
- leave group of stocks (small firms) – portfolio composition

Investor type	Number of investors			Fraction of investors		
	entering	leaving	net	entering	leaving	net
All	15220	11934	3286	24.1	18.5	5.6
Personal owners	13445	10087	3358	24.3	17.5	6.8
Foreign owners	862	1119	-256	33.7	35.3	-1.6
Financial owners	51	44	6	14.8	12.4	2.4
Nonfinancial owners	1013	838	175	24.4	19.6	4.8
State owners	14	11	3	20.8	15.1	5.7

Correlation liquidity and change in stock market participation

	Firm size quartiles									
	All firms		Q1 (smallest firms)		Q2		Q3		Q4 (largest firm	
All owners	-0.07	(0.32)	-0.35	(0.00)	-0.10	(0.22)	-0.20	(0.07)	-0.11	(0.2
Personal owners	-0.02	(0.45)	-0.33	(0.01)	-0.09	(0.25)	-0.18	(0.09)	-0.08	(0.2
Foreign owners	-0.18	(0.09)	-0.30	(0.01)	-0.16	(0.12)	-0.25	(0.03)	-0.23	(0.0
Financial owners	-0.06	(0.33)	-0.11	(0.21)	0.01	(0.46)	-0.09	(0.25)	-0.08	(0.2
Nonfinancial owners	-0.16	(0.12)	-0.35	(0.00)	-0.11	(0.21)	-0.21	(0.06)	-0.20	(0.0
State owners	-0.06	(0.34)	-0.20	(0.07)	0.19	(0.08)	-0.10	(0.23)	-0.06	(0.3

Correlation change in liquidity and change in ownership concentration

Concentration measure	All firms	Firm Size Quartile Q1 (smallest firms)	Q2	Q3	Q4 (largest fi
largest owner	0.07 (0.30)	0.13 (0.15)	0.13 (0.16)	0.09 (0.25)	-0.06 (0.
Herfindahl	0.09 (0.24)	0.20 (0.06)	0.10 (0.22)	0.18 (0.08)	-0.12 (0.
No owners	0.37 (0.00)	-0.09 (0.23)	-0.22 (0.04)	-0.27 (0.02)	0.37 (0.0
Herfindahl (ex 3 largest)	0.18 (0.08)	0.29 (0.01)	0.23 (0.04)	-0.07 (0.29)	-0.05 (0.

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Correlation change in liquidity and movement across owner types

Owner type	All firms	Firm Size Quartile Q1 (smallest firms)	Q2	Q3	Q4 (largest firms
Financial fraction	-0.08 (0.26)	-0.15 (0.12)	-0.06 (0.34)	-0.04 (0.38)	0.22 (0.04)
Individual fraction	-0.12 (0.18)	-0.14 (0.14)	-0.10 (0.21)	-0.06 (0.32)	0.24 (0.03)
Nonfinancial fraction	-0.06 (0.31)	-0.13 (0.16)	-0.01 (0.48)	0.04 (0.37)	-0.18 (0.08)
Foreign fraction	-0.05 (0.34)	0.10 (0.22)	0.06 (0.33)	-0.16 (0.11)	-0.17 (0.09)
State fraction	0.05 (0.34)	-0.03 (0.42)	-0.14 (0.13)	0.01 (0.48)	0.06 (0.32)

Conclude – Ownership results

- See changes in
  - stock market participation
  - stock portfolio compositions

  coinciding with changes in aggregate measures

Summary of main results

Strong relation between equity market-liquidity and economic activity

- equity market liquidity contains information about **current and future macro fundamentals**

Where is information coming from?

- Mainly from the liquidity of small firms

Variation in market liquidity related to changes in equity portfolio composition

- liquidity worsens simultaneously with investors trading/moving out of small stocks

Planned work..

- **Additional markets**
- **Forecasting/"nowcasting"**
  - Which liquidity measure has the best/most robust forecasting performance?
  - Common liquidity factor á la Chollete, Naes, and Skjeltorp [2007, 2008]

Extra Results etc

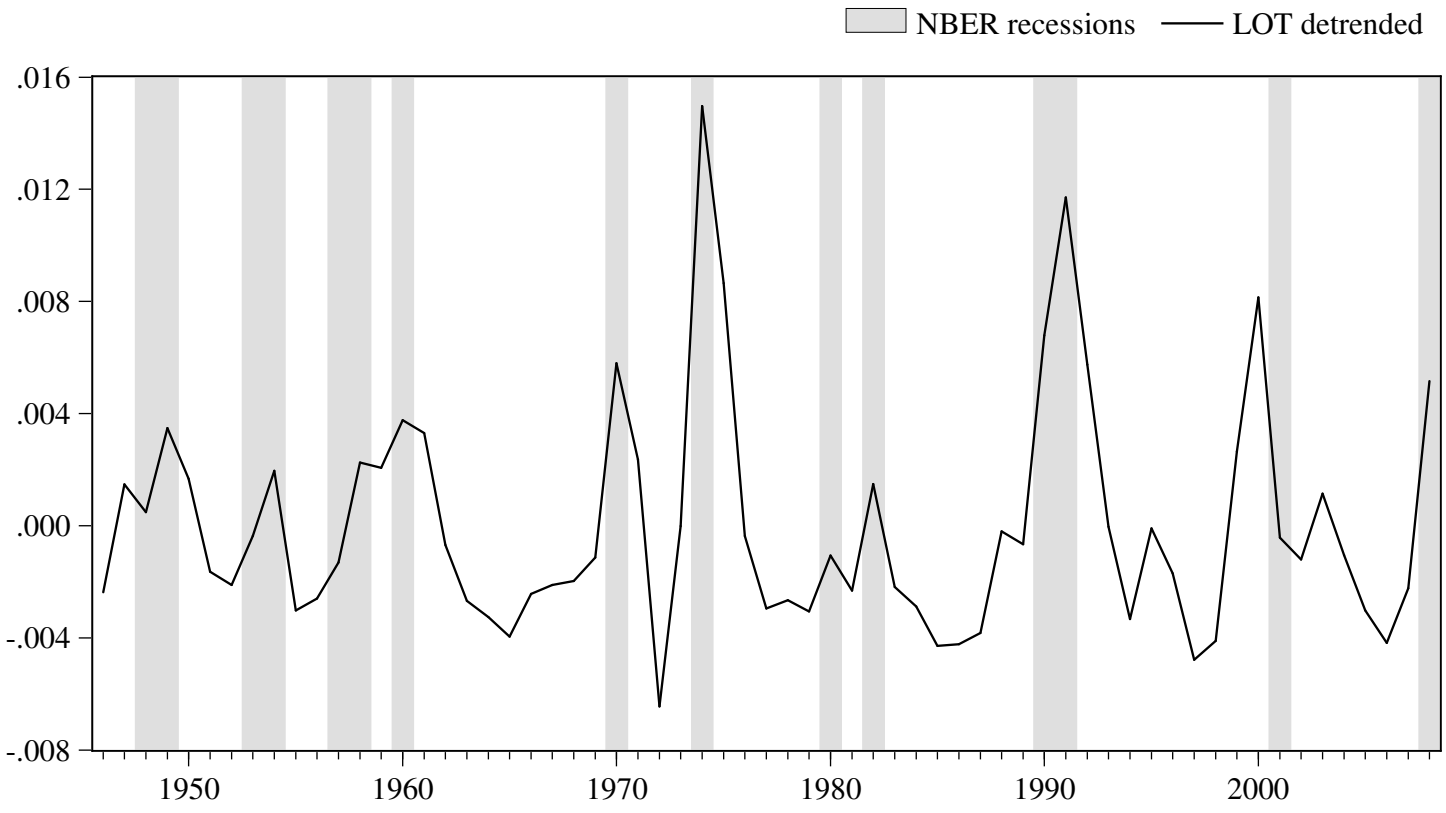
Describing liquidity measures, Norway

Liquidity measure	mean	median	no secs	no obs	Means subperiods 1980-1989	1990-1999	2000-2008
RS	0.042	0.029	788	14942	0.041	0.046	0.040
LOT	0.054	0.039	753	14852	0.055	0.064	0.049
ILR	0.772	0.205	770	15092	1.149	0.875	0.452
Roll	0.027	0.021	663	7209	0.027	0.026	0.026

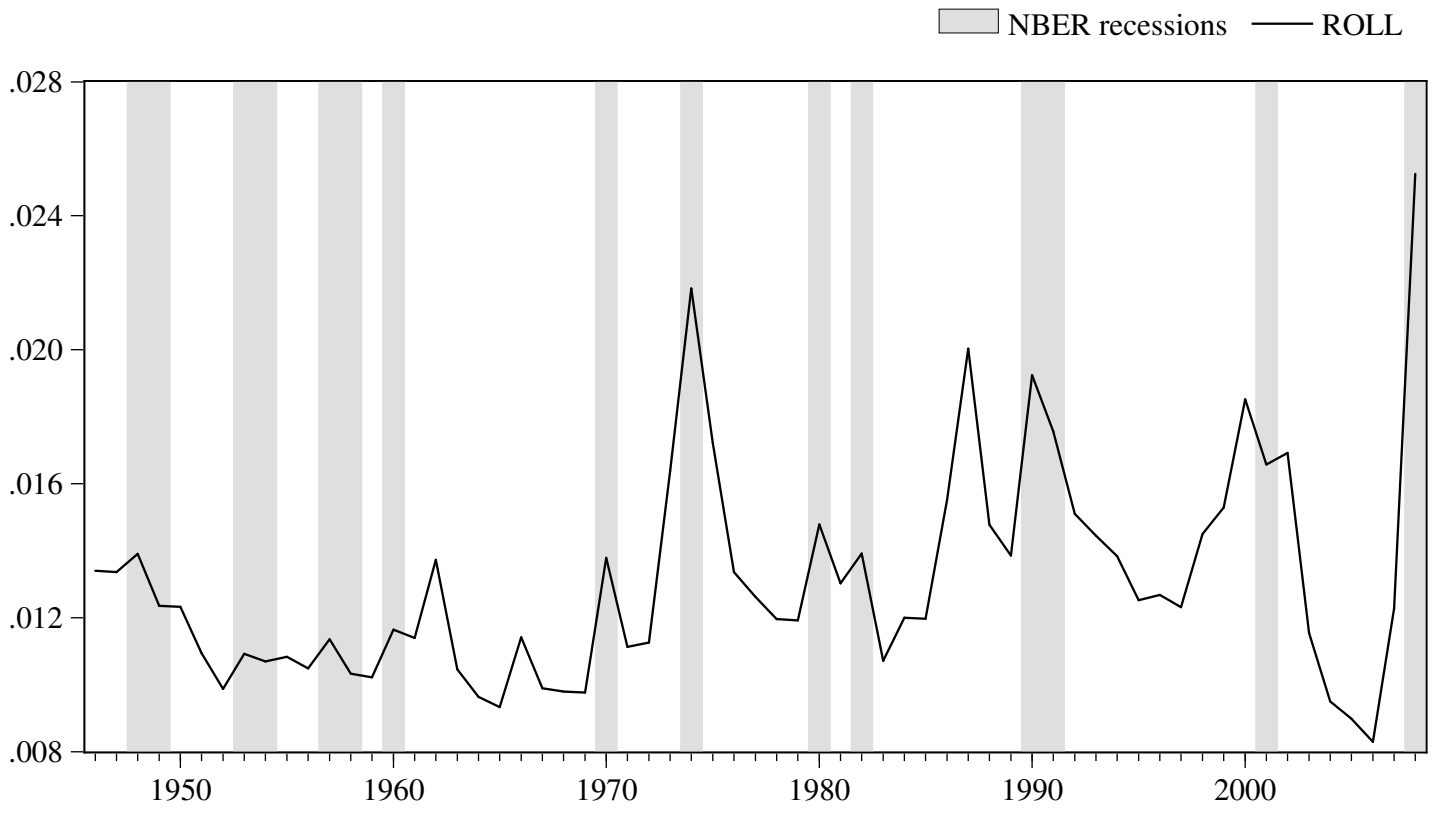
Correlations between liquidity measures, Norway

	RS	LOT	Roll
LOT	0.64		
Roll	0.65	0.51	
ILR	0.40	0.34	0.49

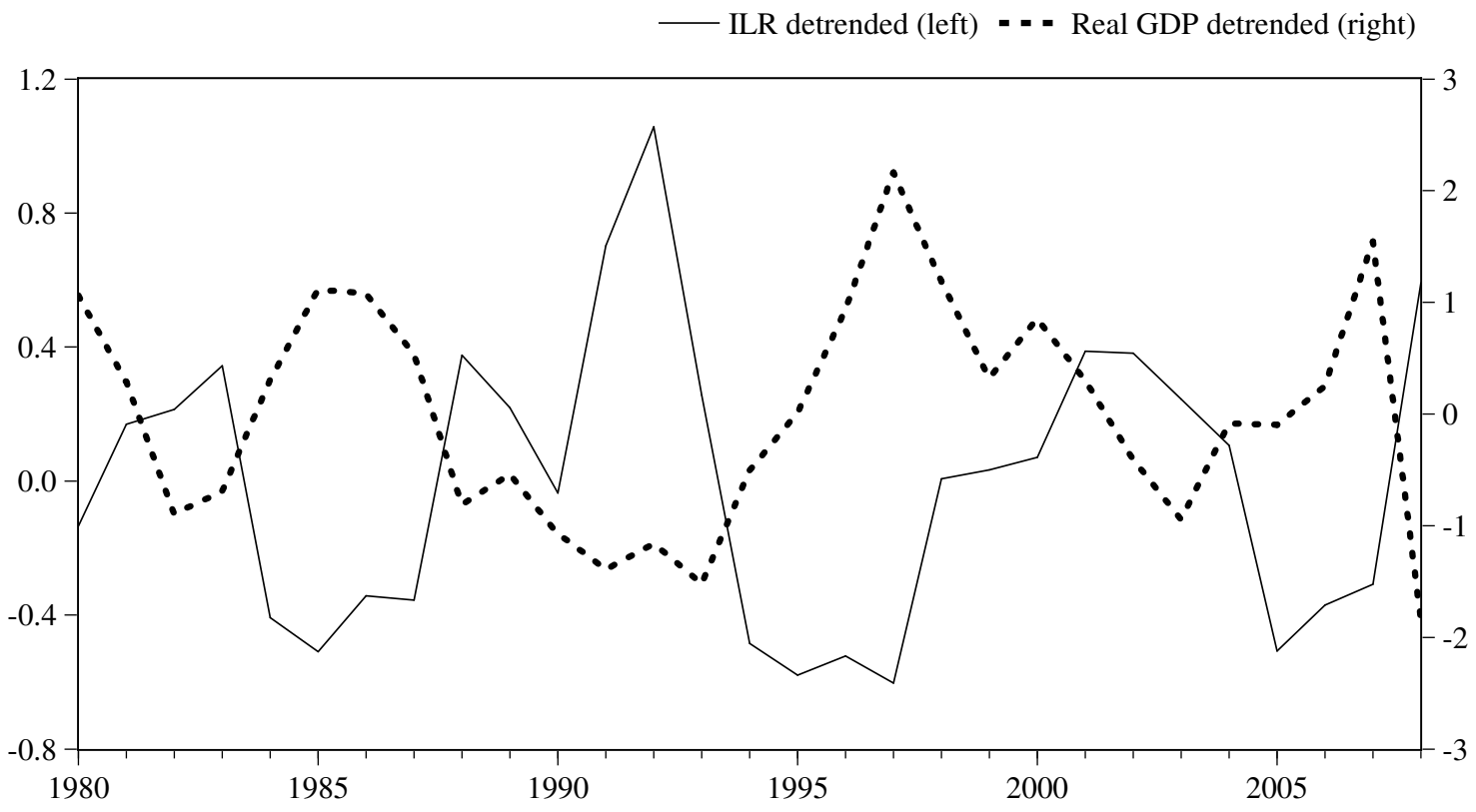
Liquidity measure: LOT – US (1947–2008)



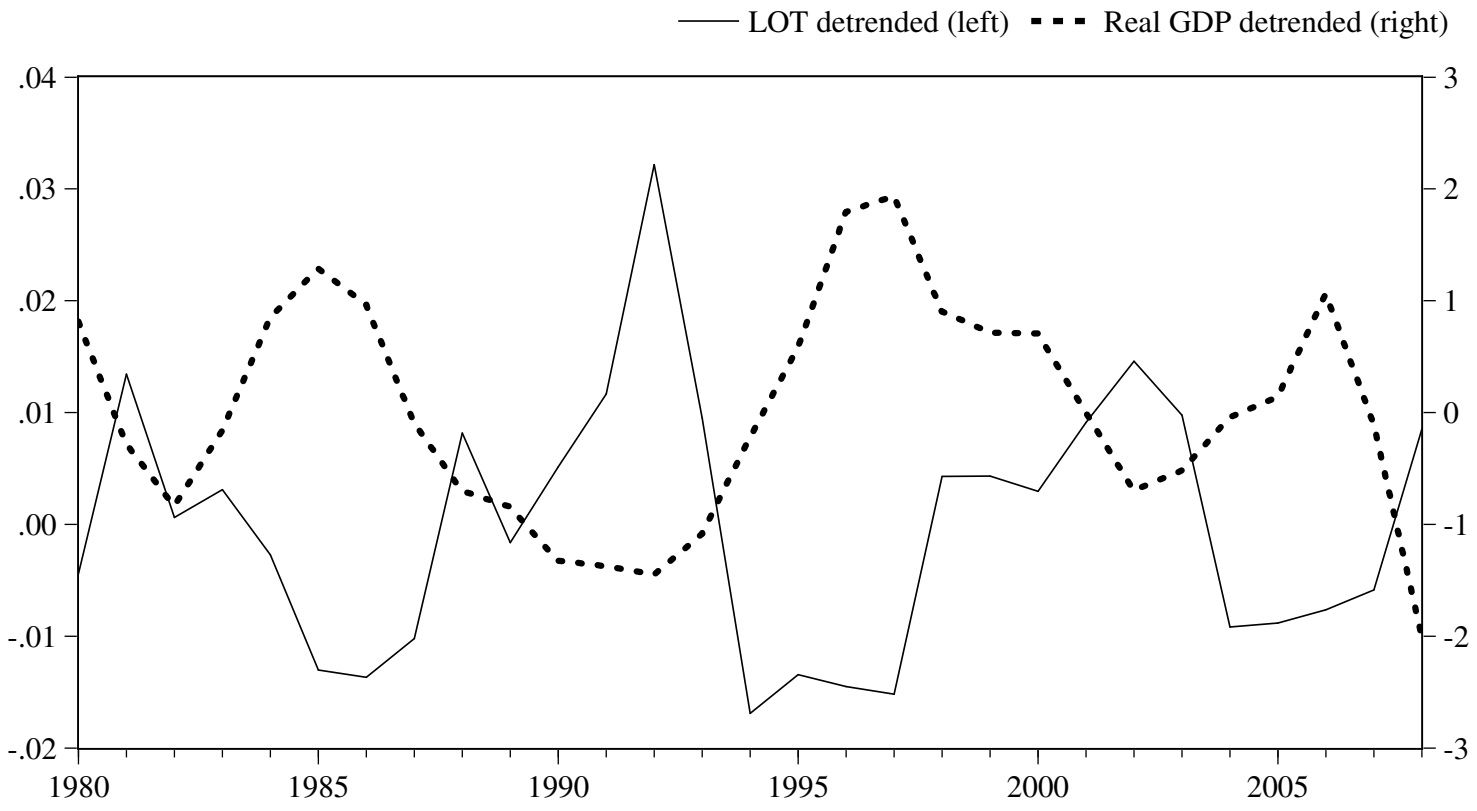
Liquidity measure: Roll – US (1947–2008)



Liquidity measure: ILR– Norway (1980–2008)



Liquidity measure: LOT– Norway (1980–2008)



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Correlations between liquidity and other variables – US

	Market variables							Macro variables		
	ILR	LOT	Roll	Term	Cred	Vola	Rm	dGDPR	dINV	dCON
Term	**-0.17**	**-0.14**	-0.04							
	(0.00)	**(0.04)**	(0.55)							
Cred	**0.32**	**0.34**	**0.42**	**-0.21**						
	(0.00)	**(0.00)**	**(0.00)**	**(0.00)**						
Vola	**0.30**	**0.57**	**0.47**	**-0.15**	**0.42**					
	(0.00)	**(0.00)**	**(0.00)**	**(0.02)**	**(0.00)**					
Rm	**-0.53**	**-0.19**	**-0.35**	**0.33**	**-0.17**	**-0.33**				
	(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.01)**	**(0.00)**				
dGDPR	**-0.16**	-0.10	**-0.31**	**0.16**	**-0.27**	0.01	0.09			
	(0.02)	(0.15)	**(0.00)**	**(0.02)**	**(0.00)**	(0.87)	(0.19)			
dINV	**-0.16**	**-0.17**	**-0.40**	0.18	**-0.26**	-0.07	0.09	**0.73**		
	(0.02)	**(0.01)**	**(0.00)**	(0.00)	**(0.00)**	(0.27)	(0.21)	**(0.00)**		
dCONSR	**-0.27**	**-0.15**	**-0.38**	**0.21**	**-0.34**	-0.08	**0.16**	**0.68**	**0.57**	
	(0.00)	**(0.02)**	**(0.00)**	**(0.00)**	**(0.00)**	(0.24)	**(0.01)**	**(0.00)**	**(0.00)**	
dUE	**0.16**	**0.15**	**0.33**	-0.10	**0.28**	0.08	-0.04	**-0.65**	**-0.62**	**-0**
	(0.01)	**(0.03)**	**(0.00)**	(0.14)	**(0.00)**	(0.21)	(0.58)	**(0.00)**	**(0.00)**	**(0.0**

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Predicting macro with market illiquidity – only – LOT

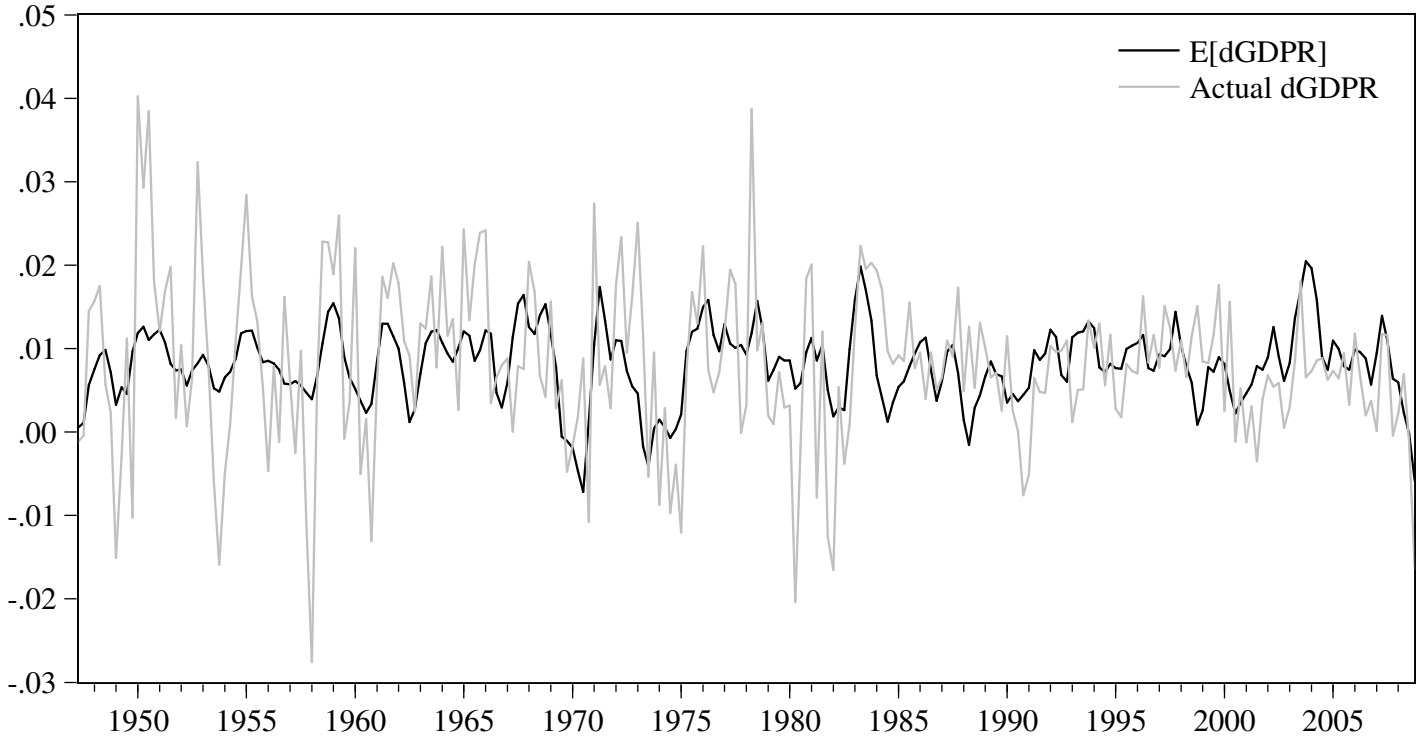
Dependent variable (y_{t+1})	$\hat{\alpha}$	$\hat{\beta}^{LOT}$	$\hat{\gamma}$	$\bar{R}^2$
dGDPR	0.007	-0.017	0.168	0.06
	(7.52)	(-2.77)	(2.58)	
dUE	0.003	0.129	0.261	0.10
	(0.47)	(3.14)	(4.42)	
dCONSR	0.006	-0.009	0.282	0.09
	(7.03)	(-1.74)	(3.85)	
dINV	0.007	-0.039	0.218	0.07
	(3.03)	(-2.56)	(3.20)	

Predicting macro with market illiquidity – only – Roll

Dependent variable (y_{t+1})	$\hat{\alpha}$	$\hat{\beta}^{Roll}$	$\hat{\gamma}$	$\bar{R}^2$
dGDPR	0.019	-0.813	0.133	0.10
	(5.96)	(-4.12)	(2.10)	
dUE	-0.074	5.206	0.236	0.12
	(-3.07)	(3.28)	(4.23)	
dCONSR	0.013	-0.437	0.264	0.11
	(4.22)	(-2.28)	(3.37)	
dINV	0.040	-2.228	0.169	0.12
	(4.29)	(-3.61)	(2.65)	

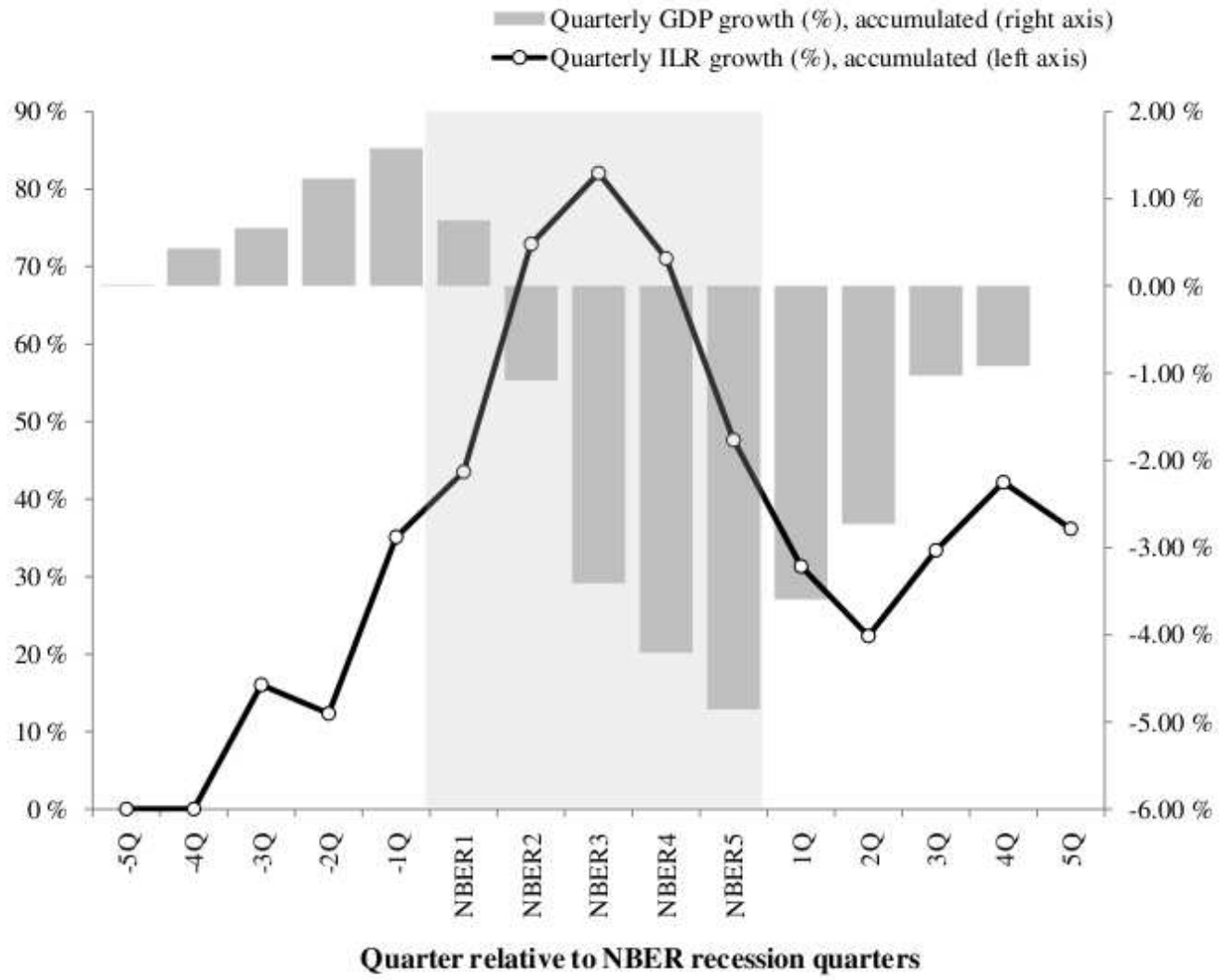
Predicted and realized macro fundamentals

GDP growth (dGDPR)



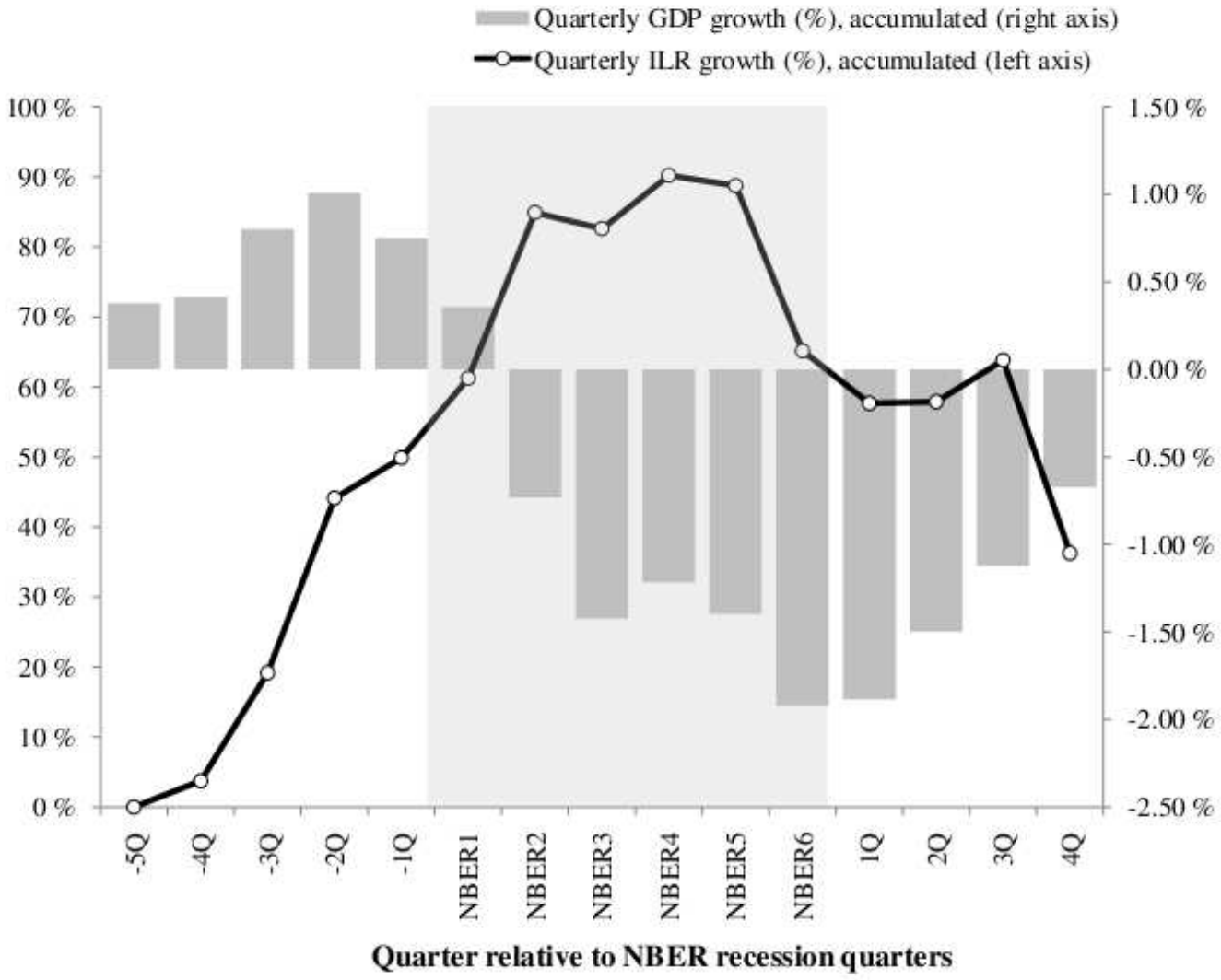
Market illiquidity around NBER recessions

First half: 1947-1977



Market illiquidity around NBER recessions

Second half:1978-2008



Comparing large and small stocks – LOT

	$\hat{\alpha}$	$\hat{\beta}_S^{LIQ}$	$\hat{\beta}_L^{LIQ}$	$\hat{\gamma}^{Term}$	$\hat{\gamma}^{Cred}$	$\hat{\gamma}^{Vola}$	$\hat{\gamma}^{Rm}$	$\bar{R}^2$
dGDPR	0.008	**-0.014**	0.000	0.000	-0.007	0.008	0.030	0.13
	(7.34)	**(-2.15)**	(0.08)	(0.62)	(-3.04)	(1.45)	(3.67)	
dUE	0.004	**0.110**	0.008	-0.006	0.052	-0.098	-0.246	0.14
	(0.43)	**(3.52)**	(0.22)	(-1.58)	(3.69)	(-2.46)	(-4.72)	
dCONSR	0.008	-0.005	-0.005	0.001	-0.002	0.005	0.026	0.09
	(8.19)	(-1.42)	(-0.96)	(1.93)	(-1.04)	(0.91)	(3.95)	
dINV	0.007	-0.017	-0.009	0.003	-0.024	0.027	0.078	0.17
	(2.20)	(-1.22)	(-0.76)	(2.15)	(-4.50)	(1.85)	(3.79)	

Comparing large and small stocks – Roll

proxy (LIQ)	$\hat{\alpha}$	$\hat{\beta}_S^{LIQ}$	$\hat{\beta}_L^{LIQ}$	$\hat{\gamma}^{Term}$	$\hat{\gamma}^{Cred}$	$\hat{\gamma}^{Vola}$	$\hat{\gamma}^{Rm}$	
dGDPR	0.017	**-0.303**	-0.272	0.001	-0.005	0.006	0.023	0.
	(5.11)	**(-2.37)**	(-0.98)	(1.59)	(-2.47)	(1.12)	(2.83)	
dUE	-0.050	**2.402**	0.859	-0.010	0.045	-0.073	-0.204	0.
	(-1.73)	**(2.70)**	(0.35)	(-2.82)	(3.22)	(-1.75)	(-3.92)	
dCONSR	0.014	**-0.300**	-0.010	0.001	-0.001	0.005	0.023	0.
	(4.71)	**(-2.51)**	(-0.03)	(3.02)	(-0.53)	(0.94)	(3.42)	
dINV	0.033	**-1.063**	-0.625	0.005	-0.020	0.034	0.059	0.
	(3.93)	**(-2.86)**	(-0.68)	(3.26)	(-4.10)	(2.68)	(2.84)	

Norway – prediction

Dependent variable (y_{t+1})	$\hat{\alpha}$	$\hat{\beta}^{LIQ}$	$\hat{\gamma}^{y}$	$\hat{\gamma}^{Term}$	$\hat{\gamma}^{Vola}$	$\hat{\gamma}^{Rm}$	$\bar{R}^2$
dGDPR	0.010	**-0.006**	-0.231	0.001	0.165	0.007	0.10
	(2.36)	**(-2.26)**	(-3.42)	(0.85)	(0.45)	(0.67)	
dUE	-0.012	**0.145**	-0.085	-0.007	-10.323	-0.335	0.05
	(-0.14)	**(2.22)**	(-0.78)	(-0.45)	(-1.01)	(-1.39)	
dCONS	0.016	-0.003	-0.128	0.000	-0.732	-0.007	0.04
	(3.71)	(-1.68)	(-1.32)	(-0.02)	(-1.85)	(-0.92)	
dINV	0.011	-0.009	-0.404	0.004	-0.071	0.057	0.16
	(0.50)	(-0.80)	(-4.96)	(1.06)	(-0.03)	(0.88)	

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