

Global liquidity as EWI for asset price booms: G5 versus broader measures

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Plan of the presentation

- Short introduction to EWI: Nts and LDV approach
- Literature review: liquidity as EWI
- RHS variables: liquidity measures, global liquidity (G5 vs. broader coverage)
- LHS variables: asset price booms, pre-boom episodes
- EWI model
- Baseline results
- Robustness checks
- Conclusions

Abstract

We test the performance of various global liquidity measures as early warning indicators for **booms in house and equity prices in 20 OECD countries between 1970 and 2010**. We use a **panel probit approach** to link global liquidity measures with asset price booms. We test the relative performance of global liquidity measures based on two aggregation schemes: the traditional measures, based on G5 data, and broader measures, based on **data for up to 26 countries/currency areas**. Our results show that in the last decade **global liquidity measures more often outperformed domestic measures** as early warning indicators than otherwise. Between the two global liquidity measures, G5 aggregates outperformed broader global liquidity measures. The search for the best early warning indicators shows that the **G5 real narrow money gap** performs best for booms in house prices, while **the global real private credit growth gap** performs best for booms in equity prices, either when aggregated over G5 or over a broader sample of countries. Given the rising importance of the emerging market economies and the declining share of G5 in global liquidity, the current superior performance of G5 measures may not warrant their superior performance in the future. Therefore, given the importance of global liquidity measures in detecting asset price booms, **the need for constructing broader global liquidity measures remains warranted**.

Short introduction to EWI

- Early Warning Indicator
- Indicator = a variable
- Warning = that (correctly) signals a (bad) event
- Early = in advance (as far as possible)

EWI: NtS approach

- A statistical approach
- Binary event/binary signal (issued by the indicator, discrete threshold)

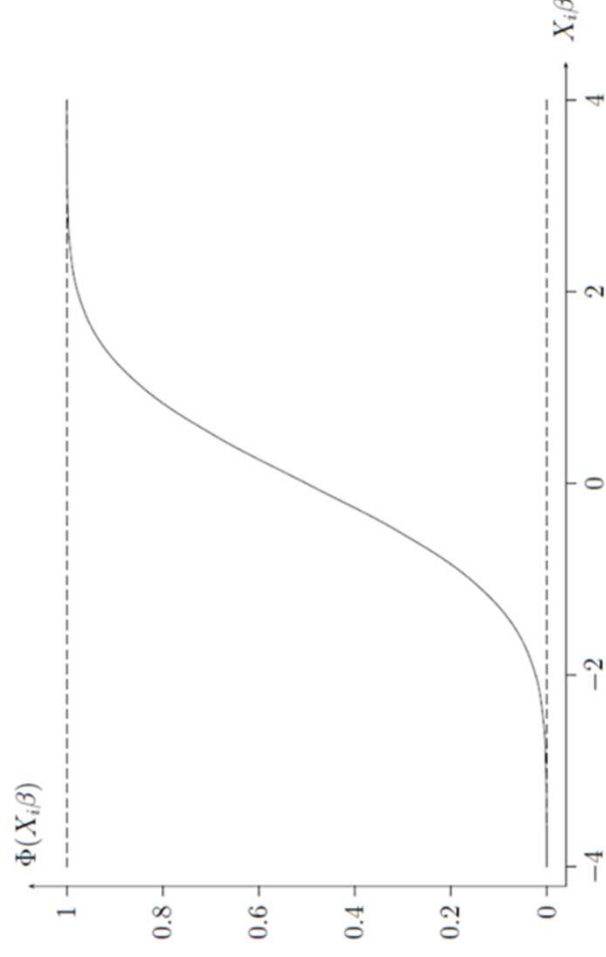
Signal/Event	Event=1	Event=0
Signal=1	A	B
Signal=0	C	D

- Type 1 error: no signal is issued when event occurs (C);
Type 2 error: a signal is issued but no event occurs (B).
- Select indicator and threshold that minimizes

$$\text{NtS ratio} = [B/(B+D)]/[A/(A+C)]$$

EWI: LDV approach

- An econometric approach
- Binary event/continuous indicator, linked by a CDF
$$\mathbf{P}(Y=1) = \mathbf{P}(Y^* > 0) = \mathbf{CDF}(b_0 + b_1 X_1 + b_2 X_2)$$
- Probit model: CDF of a standard normal distribution
- Select indicator that is statistically significant, yields the best model fit, etc.



EWI: LDV approach

- Allows for testing the statistical significance of individual indicators and the constancy of coefficients over time
- Allows for a more satisfactory aggregation of the indicators into one composite indicator, taking into account correlations among different variables
- etc.
- Nts approach can be incorporated in LDV framework (Berg and Pattillo (1999))

Liquidity as EWI

- Baks and Kramer (1999): G7 excess broad / narrow money growth
-> real stock market returns, long- and short-term interest rates
- Agnello and Schuknecht (2009): panel probit model: global liquidity, measured as a weighted average of broad money growth for all sample countries, minus the corresponding domestic aggregate -> house price booms in 18 industrialized countries
- Gerdesmeier et al. (2010): panel probit model: domestic credit aggregates -> among the best EWIs of asset price busts in 18 main industrial countries
- Alessi and Detken (2011): global private credit gap and global M1 gap (defined as detrended ratios to GDP) -> the best EWIs for asset price booms in 18 OECD countries
- EWIs for financial/banking crises (Borio et al., domestic credit gap)

No papers comparing performance of global liquidity measures depending on country coverage

Measuring (global) liquidity

- CGFS Ad-hoc Group to investigate the measurement, drivers and policy implications of global liquidity
- Ease of financing
- Global private credit + complementary indicators

	Quantities	Prices
Monetary liquidity	Base money and broader monetary aggregates Foreign exchange reserves	Policy and money market interest rates Monetary conditions indices
Funding liquidity	Bank liquidity ratios Maturity mismatch measures CP market volumes	Libor-OIS spreads FX swap basis Bond-CDS basis Qualitative surveys of funding conditions
Market liquidity	Transaction volumes	Bid-ask spreads on selected global assets Qualitative fund manager surveys
Risk-taking and valuation	Bank leverage ratios	VIX index and other risk appetite measures Sharpe and carry-to-risk ratios Financial asset prices and spreads Property prices Price/earnings ratios

Measuring (global) liquidity

- Real broad money
- Real narrow money
- Real bank credit to the private sector
- Real short-term interest rate
- Real long-term interest rate
- Term spread

-> 30 transformations/indicators

Global liquidity: G5 vs broader coverage

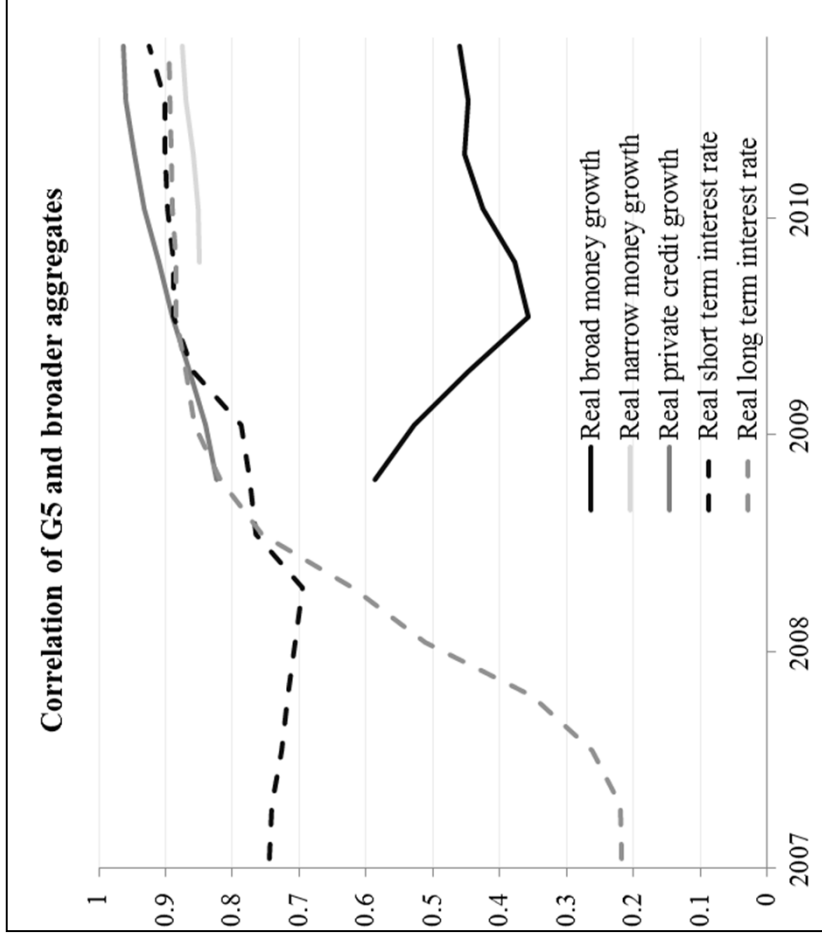
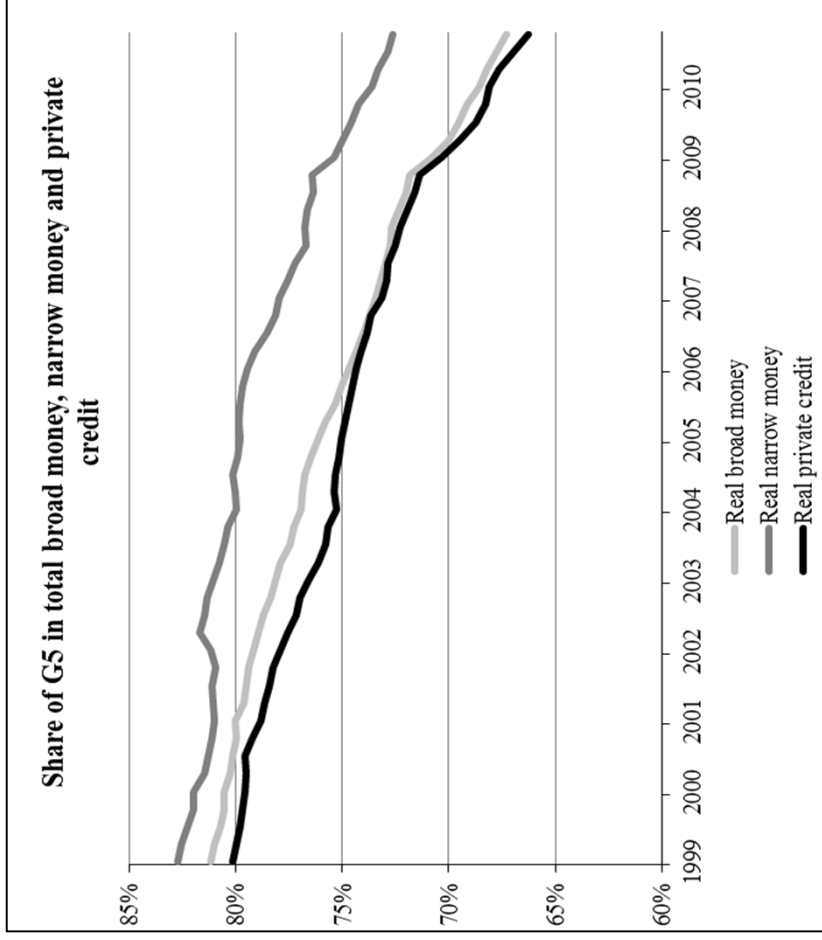
- G5: United States, euro area, United Kingdom, Japan and Canada
- Broader: G5 + Australia, Brazil, Chile, China, Czech Republic, Denmark, Hungary, India, Iceland, Indonesia, Israel, Mexico, New Zealand, Norway, Poland, Russian Federation, South Africa, South Korea, Sweden, Switzerland, Turkey
- Aggregation: GDP-weighted averages, using PPP-based GDP weights (from IMF WEO). The weights are constant (averaged over 1995-2010).

Global liquidity: G5 vs broader coverage

- G5 aggregates easier to construct, based on more reliable data and available with a much longer history.
- Share of G5 in broader aggregates steadily decreased, from about 81% in the late 1990s to about 69% at the end of 2010.
- G5 and broader liquidity measures display similar behavior over time: the overall correlation between the two aggregations – for real growth or interest rates - is between 0.47 and 0.86, with an upward trend in correlation over time.

=> opposite conclusions regarding the need for and the usefulness of broader aggregates

G5 vs broader aggregation



Asset price booms

- Periods of large swings in asset prices historically associated with periods of financial instability (Borio and Lowe (2002), Detken et al. (2010), Drehmann et al. (2011))
- 40% of house price booms historically followed by busts, leading to output losses of about 8% of GDP. 25% of equity price booms followed by busts, with losses of about 4% of GDP (Helbling and Terrones (2003))
- Recessions aligned with financial crises tended to be about 1/3 more costly than normal ones (Jordá, Schularick and Taylor (2010))

Defining asset price booms

- An unusually swift and persistent asset price increase compared to trend (Adalid and Detken (2007), Alessi and Detken (2011))
- > Identification of a boom/bust?
- Real house prices and real equity prices
- 20 OECD countries: Australia, Canada, Switzerland, Denmark, United Kingdom, Japan, Norway, New Zealand, Sweden, Korea, United States, Germany, France, Italy, Spain, Greece, Ireland, Finland, Belgium and Netherlands; Q1 1970 to Q4 2010
- EWI: length of the pre-boom horizon?

Asset price booms/pre-boom periods

	Asset	Boom definition	Pre-boom period (quarters)
Borio and Lowe (2002)	Ratio of credit/asset prices to GDP	A period when ratio deviates from its recursive trend more than the threshold (in terms of percentage (points))	4/8/12
Borio and Drehmann (2009)			
Detken and Smets (2004)	Aggregate real asset price index	A period when index is more than 10% above its recursive HP trend	8
Borio and Lowe (2004)	Ratio of credit/inflation adjusted asset prices to GDP	A period when ratio deviates from its very slowly adjusting recursive HP trend more than the threshold (in terms of percentage (points))	12 to 20
Adalid and Detken (2007)	Aggregate real asset price index	A period of at least 4 consecutive quarters when index is more than 10% above its very slowly adjusting recursive HP trend	4
Gerdesmeier et al. (2010)	Composite asset market indicator	Bust definition: A period when indicator is below its mean plus 1.5 times the standard deviation	8
Agnello and Schuknecht (2009)	Real house prices	Dating approach	4
Alessi and Detken (2011)	Aggregate real asset price index	A period of at least 3 consecutive quarters when index exceeds its very slowly adjusting recursive trend plus 1.75 times its recursive standard deviation	6

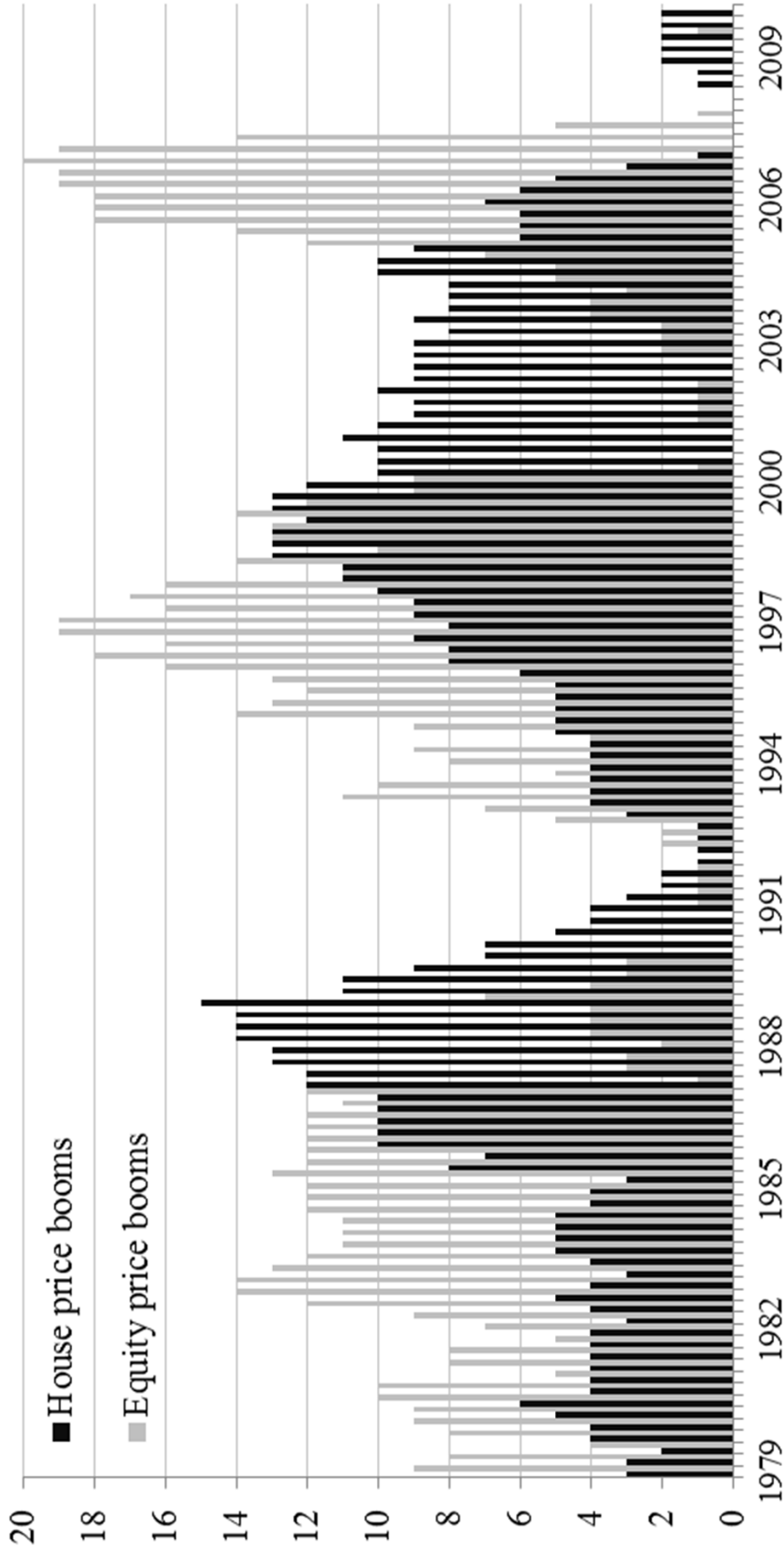
Asset price booms/pre-boom periods

	Asset	Start significant response (quarter)	impulse	Maximum impulse response (quarter)
Rüffer and Stracca (2006)	Composite real asset price index	8		12
Goodhart and Hofmann (2001)	House price index	2 to 7		2 to 12
Goodhart and Hofmann (2001)	Equity price index	1		2
Neri (2004)	Equity price index	1		3
Belke and Orth (2007)	House price index	3		12
Assenmacher-Wesche and Gerlach (2008)	House price index	4		10
Assenmacher-Wesche and Gerlach (2008)	Equity price index	1		7
Goodhart and Hofmann (2008)	House prices	1		40

Asset price booms/pre-boom periods

- Booms: asset price index exceeds the recursive trend plus 0.5 times the recursive STD. Trend calculated over a moving window of 40 quarters (quasi real-time approach), with a very slowly adjusting HP filter ($\lambda=100000$).
- Cross-checked with Helbling and Terrones (2003), Bracke (2011), Claessens et al. (2011) and Alessi and Detken (2011)
- Two pre-boom horizons: 2-6 and 6-10 quarters for real house prices, 1-5 and 5-9 quarters for real equity prices
- Focus on detecting general build-up of vulnerabilities rather than predicting the exact timing of a boom (Drehmann et al. (2011))
- Borio et al.: performance of EWIs for financial/banking crises improves considerably as time horizon is longer

Asset price booms



EWI model

- Baseline model: panel random effects probit
- 20 OECD countries
- Two pre-boom horizons
- Bootstrapped errors
- Four estimations samples:
- When broader liquidity measures are available or from a fixed point in time (shorter samples)
- Whole sample or when G5 aggregates are available (longer samples)

Results: 1999-2010

	Real house prices 1	Real house prices 2	Real equity prices 1	Real equity prices 2
Broad money	No	No	Yes	Yes
Broader outperforms G5	No	No	Yes	Yes
Broader outperforms domestic	Yes	No	No	No
G5 outperforms domestic	Yes	Yes	No	No
Narrow money	No	No	X	No
Broader outperforms G5	No	No	X	No
Broader outperforms domestic	No	Yes	X	No
G5 outperforms domestic	Yes	Yes	X	No
Private credit	Yes	Yes	No	Yes
Broader outperforms G5	Yes	Yes	No	Yes
Broader outperforms domestic	Yes	Yes	Yes	Yes
G5 outperforms domestic	No	Yes	Yes	Yes
Short term rate	No	No	Yes	No
Broader outperforms G5	No	No	Yes	No
Broader outperforms domestic	Yes	No	No	Yes
G5 outperforms domestic	Yes	No	No	Yes
Long term rate	No	No	No	No
Broader outperforms G5	No	No	No	No
Broader outperforms domestic	No	No	Yes	Yes
G5 outperforms domestic	No	No	Yes	Yes
Term spread	Yes	Yes	No	No
Broader outperforms G5	Yes	Yes	No	No
Broader outperforms domestic	No	Yes	No	Yes
G5 outperforms domestic	No	Yes	Yes	Yes

Results: 1970-2010

	Real house prices 1	Real house prices 2	Real equity prices 1	Real equity prices 2
Broad money	No	No	Yes	Yes
Narrow money	Yes	Yes	No	No
Private credit	No	No	Yes	Yes
Short term rate	No	No	No	No
Long term rate	No	No	No	No
Term spread	Yes	No	Yes	X

Results: summary

- In 16 out of 24 cases global liquidity measures outperform domestic variables (broader measures 12 times, G5 aggregates 14 times).
- In 8 out of 24 cases broader liquidity outperforms G5 aggregates.
- The winners:
 - Real G5 narrow money gap (deviations from trend, real house prices 1,2)
 - Real G5 private credit growth gap (real equity prices 1, real house prices 1)
 - Real broader private credit growth gap (real equity prices 2)

Robustness checks

1. Estimations for G5 countries only
2. Panel fixed effects probit model
3. Rolling estimations
4. Out-of-sample forecasting (latest booms)

Results robustness check 1: 1999-2010

		Real house prices 1	Real house prices 2	Real equity prices 1	Real equity prices 2
Broad money	Broader outperforms G5				
	Full sample (20)	No	No	Yes	Yes
	G5 countries (13)	X	No	Yes	Yes
Narrow money	Broader outperforms G5				
	Full sample (20)	No	No	X	No
	G5 countries (13)	Yes	X	X	X
Private credit	Broader outperforms G5				
	Full sample (20)	Yes	Yes	No	Yes
	G5 countries (13)	Yes	Yes	No	Yes
Short term rate	Broader outperforms G5				
	Full sample (20)	No	No	Yes	No
	G5 countries (13)	No	Yes	Yes	Yes
Long term rate	Broader outperforms G5				
	Full sample (20)	No	No	No	No
	G5 countries (13)	No	No	No	No
Term spread	Broader outperforms G5				
	Full sample (20)	Yes	Yes	No	No
	G5 countries (13)	Yes	Yes	No	No

Results robustness check 2: 1999-2010

	Real house prices 1	Fixed effects	Real house prices 2	Fixed effects	Real equity prices 1	Fixed effects	Real equity prices 2	Fixed effects
Broad money	Broader outperforms G5	No	No	No	Yes	Yes	Yes	Yes
	Broader outperforms domestic	Yes	No	No	No	No	No	No
	G5 outperforms domestic	Yes	Yes	Yes	No	No	No	No
Narrow money	Broader outperforms G5	No	No	No	X	X	No	No
	Broader outperforms domestic	No	Yes	Yes	X	X	No	No
	G5 outperforms domestic	Yes	Yes	Yes	X	X	No	No
Private credit	Broader outperforms G5	Yes	Yes	Yes	No	No	Yes	Yes
	Broader outperforms domestic	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	G5 outperforms domestic	No	Yes	Yes	Yes	Yes	Yes	Yes
Short term rate	Broader outperforms G5	No	No	No	Yes	Yes	No	No
	Broader outperforms domestic	Yes	Yes	No	No	No	Yes	Yes
	G5 outperforms domestic	Yes	Yes	No	No	No	Yes	Yes
Long term rate	Broader outperforms G5	No	No	No	No	No	No	No
	Broader outperforms domestic	No	No	No	Yes	Yes	Yes	Yes
	G5 outperforms domestic	No	No	No	Yes	Yes	Yes	Yes
Term spread	Broader outperforms G5	Yes	Yes	Yes	No	No	No	No
	Broader outperforms domestic	No	Yes	Yes	No	No	Yes	Yes
	G5 outperforms domestic	No	Yes	Yes	Yes	Yes	Yes	Yes

Results robustness check 2: 1970-2010

	Real house prices 1	Fixed effects	Real house prices 2	Fixed effects	Real equity prices 1	Fixed effects	Real equity prices 2	Fixed effects
Broad money	No	No	No	No	Yes	Yes	Yes	Yes
Narrow money	Yes	Yes	Yes	Yes	No	No	No	No
Private credit	No	No	No	No	Yes	Yes	Yes	No
Short term rate	No	No	No	No	No	No	No	No
Long term rate	No	No	No	No	No	No	No	No
Term spread	Yes	Yes	No	No	Yes	Yes	X	X

Robustness checks: summary

- For G5 countries, broader liquidity measures outperform G5 aggregates more often. Superior performance of broader measures in the full sample of 20 OECD countries not due to a better correspondence between RHS and LHS variables.
- Fixed effects probit estimations largely confirm baseline results.

Conclusions

- Our findings broadly confirm results by Alessi and Detken (2011).
- However, global private credit performs best as deviations of the annual growth rate from trend (also different from Borio et al.).
- Our results clearly illustrate the impact of financial liberalization and globalization: the performance of global (G5) liquidity measures worse in the longer sample than in the last decade.
- G5 aggregates perform better relatively to broader measures. However, the rising importance of the emerging market economies and the declining share of G5 in global liquidity -> the current performance of G5 measures may not warrant their superior performance in the future. The need for constructing broader liquidity measures remains warranted.

Thank you