Quantity versus Price Rationing: An Empirical Test

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Abstract

A measure of price rationing of credit aggregates information on interest rates, and loan officer survey data quantifies quantity rationing of credit, meaning some borrowers are denied loans. The latter Granger causes real GDP but the former does not. The loan officer survey is a better leading indicator of credit market conditions that affect real activity.

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1 Introduction

In the aftermath of the crisis in 2008, the idea that credit market conditions affect real activity is undeniable, but the best measure of contemporaneous credit market conditions remains an open question. A natural measure is the cost of borrowing given by various interest rates. Recently, the Federal Reserve Bank of St. Louis has published an indicator of credit market stress that is an aggregation of interest rates and spreads.

While undoubtedly important, interest rates cannot fully explain credit market conditions, particularly during a crisis. The survey of loan officers by the Board of Governors of the Federal Reserve provides a more qualitative measure of lending standards. Whether the credit market stress indicator or the survey data on lending standards has more explanatory power for real activity is the primary goal of the present work.

Waters (2012) argues that quantity rationing of credit, when some firms are denied loans, is not fully captured by interest rate fluctuations, which measures price rationing. An extreme example occurred during the crisis when business lending virtually ceased. While corporate yields did rise, detecting a crisis from interest rates alone would be problematic. Furthermore, the DSGE model developed in Waters (2012) demonstrates that quantity rationing can have a large impact on real activity.

The fraction of loan officers who report a tightening of lending standards is a natural proxy for quantity rationing. Lown and Morgan (2006) estimate a VAR with that includes the lending standards data and shows that it has significant predictive power for real activity.

Interest rate spreads have been used to forecast the state of the economy. A commonly held belief is that a downward sloping yield curve forecasts recessions. Such relationships have been given formal support by Estrella and Mishkin (1997).

The contribution of this paper, is to estimate a properly specified VAR that can determine whether the credit market stress indicator of the survey of lending standards has greater explanatory power for real economic activity. There are a number of indicators for financial markets, surveyed in Kliesen, Owyang and Vermann (2012) who test the predictive ability of individual indicators by directly examining the forecast errors. The estimation in the present work includes both indicators simulateously. Here, the two indicators are chosen since they are ideal representatives of price and quantity rationing of credit. The stress indicator from the Federal Reserve Bank of St. Louis is a composite of interest rates, while the loan officer survey data quantifies lending decisions in aggregate.

2 Results

The primary empirical finding is that the lending standards data from the survey of loan officers is a leading indicator while the credit market stress indicator is not. The series TIGHT, the percentage of loan officers reporting a tightening (or loosening) of lending standards[1], Granger causes the log difference of real GDP (DIFFLOGRGDP) and the indicator of credit market stress (STRESS). However, STRESS does not Granger cause either variable. Further, the log difference of real GDP Granger causes the stress indicator, which brings its value for forecasting into question.

Inspection of the graphs shows the three variables to be stationary, though quite persistent, particularly during the crisis period, so care is need for the proper specification. Results for the Augmented Dickey-Fuller test on levels of the data are reported in Table 1, and shows that one can reject of unit root in all three variable at a significance level of 5% or better. The number of lags is determined by the Akaike Information Criterion.

Table 1

	lags	t - statistic	prob
DIFFLOGRGDP	1	-3.38	0.01
STRESS	1	-2.87	0.05
TIGHT	3	-3.20	0.02

Preliminary estimation of the unrestricted VAR shows considerable auto-correlation in the residuals requiring the inclusion of at least 7 lags. Since all variables are integrated of the same order, the Wald test for Granger causality has the standard χ^2 distribution. Results for this test are reported in Table 2.

Table 2

	DIFFLOGRGDP	STRESS	TIGHT
DIFFLOGRGDP		3.29	21.10
		(0.894)	(0.004)
STRESS	13.21		14.67
	(0.067)		(0.040)
TIGHT	3.92	4.31	
	(0.789)	(0.744)	

[1] See Lown and Morgan (2006) for a detailed description of the data.

As noted above, TIGHT Granger causes DIFFLOGRGDP at a high level of significance, but STRESS does not at any reasonable level of significance. Lending standards and quantity rationing of credit are much more important than lending costs for explaining fluctuations in real activity. The lending standards variable and the log difference of real GDP both Granger cause STRESS. The credit market stress indicator is correlated to the other variables, but the lending standards variable has much more explanatory power.

Graphs of the impulse response functions and variance decomposition show that there is an intuitive relationship between the three variables. Real GDP declines with an increase in the financial markets stress indicator and a tightening of lending standards. STRESS and TIGHT are positively correlated as expected. The variance decomposition graphs confirm that the loan officer survey data on standards has greater explanatory power for both real GDP and the stress indicator.

The results show evidence that quantity rationing of credit is a key determinant in the relationship between financial markets and the real economy. Price rationing, as measure by interest rates, remains closely correlated with macro variables, but the present work shows that lending standards as represented by the loan officer survey data has greater importance as a leading indicator.

References

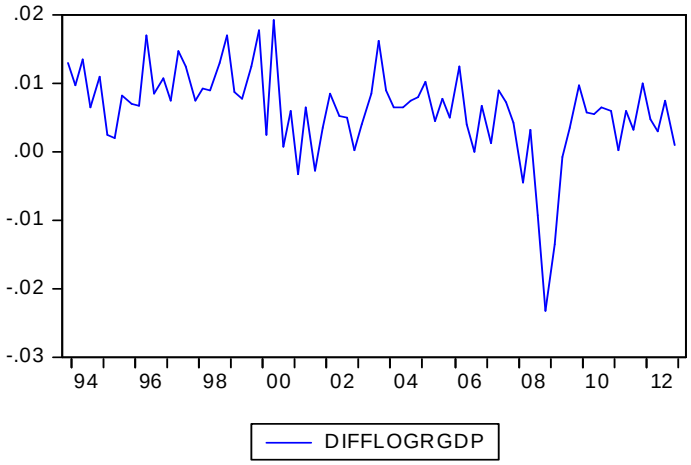
Estrella, Arturo and Frederic Mishkin (1997). "The Predictive Power of the Term Structure of Interest Rates in Europe and the United States: Implications for the European Central Bank." European Economics Review 41(7), 1375-1401.

Kliesen, Kevin, Michael Owyang and E. Katarina Vermann (2012). "Disentangling Diverse Measures: A Survey of Financial Stress Indexes." Federal Reserve Bank of St. Louis Review 94(5), 369-397.

Lown, Cara and Donald Morgan (2006). "The Credit Cycle and the Business Cycle: New Findings Using the Loan Officer Opinion Survey." Journal of Money, Credit and Banking 38(6), 1574-1597.

Waters, George (2012). "Quantity Rationing of Credit." Bank of Finland Discussion Paper 3/2012.

Figure 1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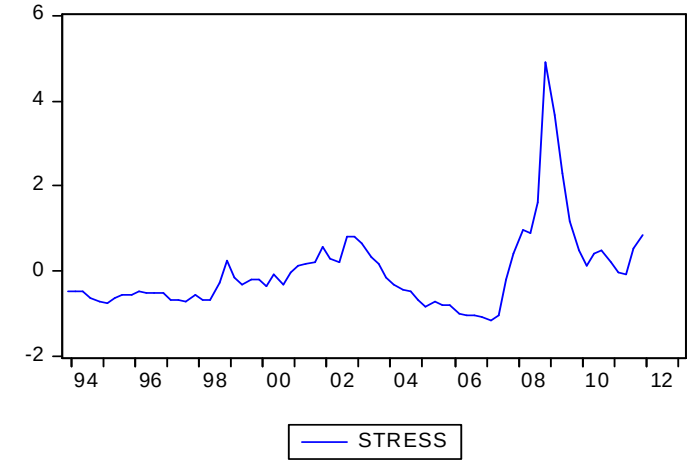
DIFFLOGRGDP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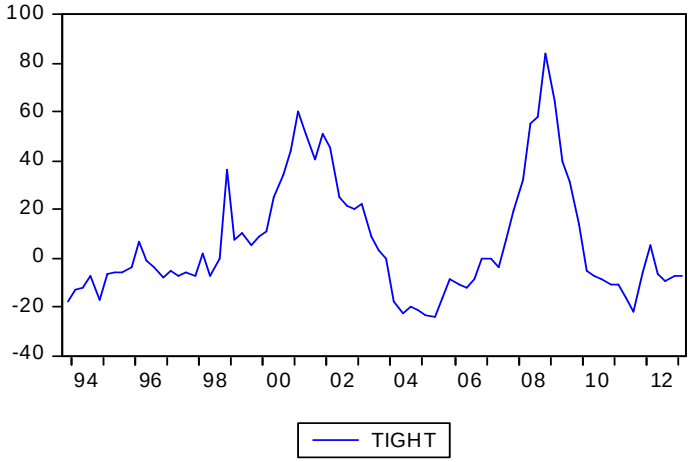
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Figure 2

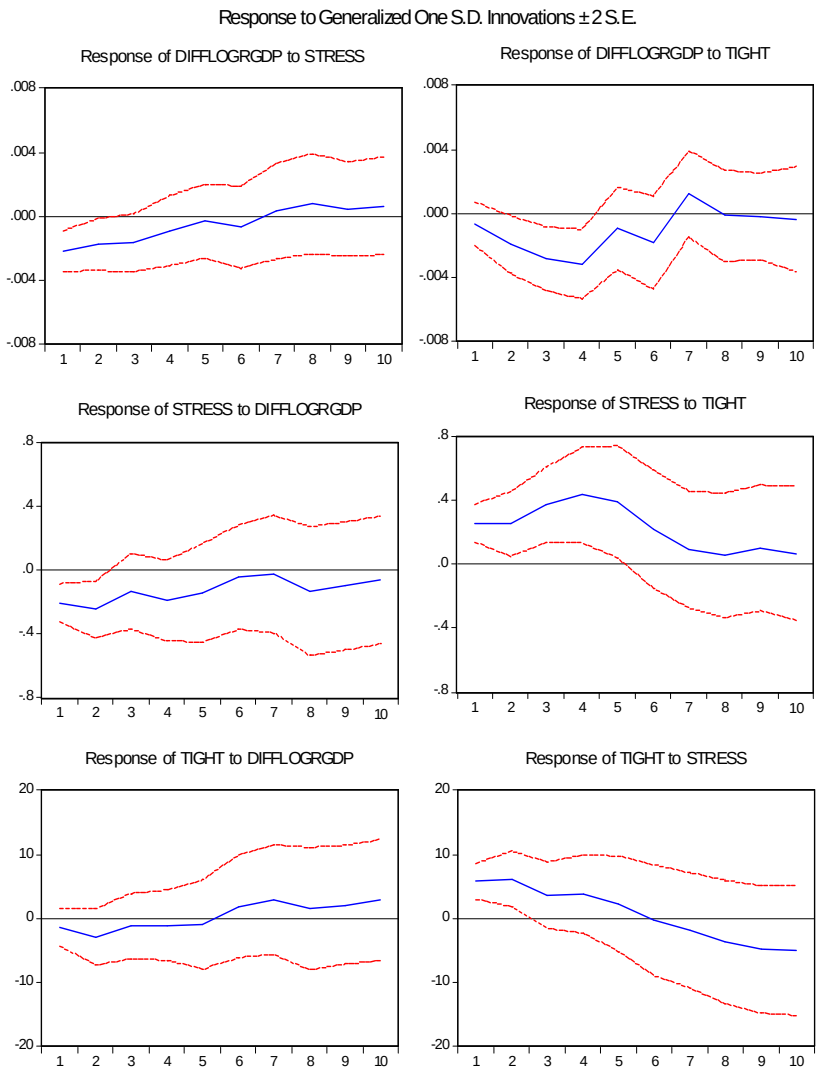
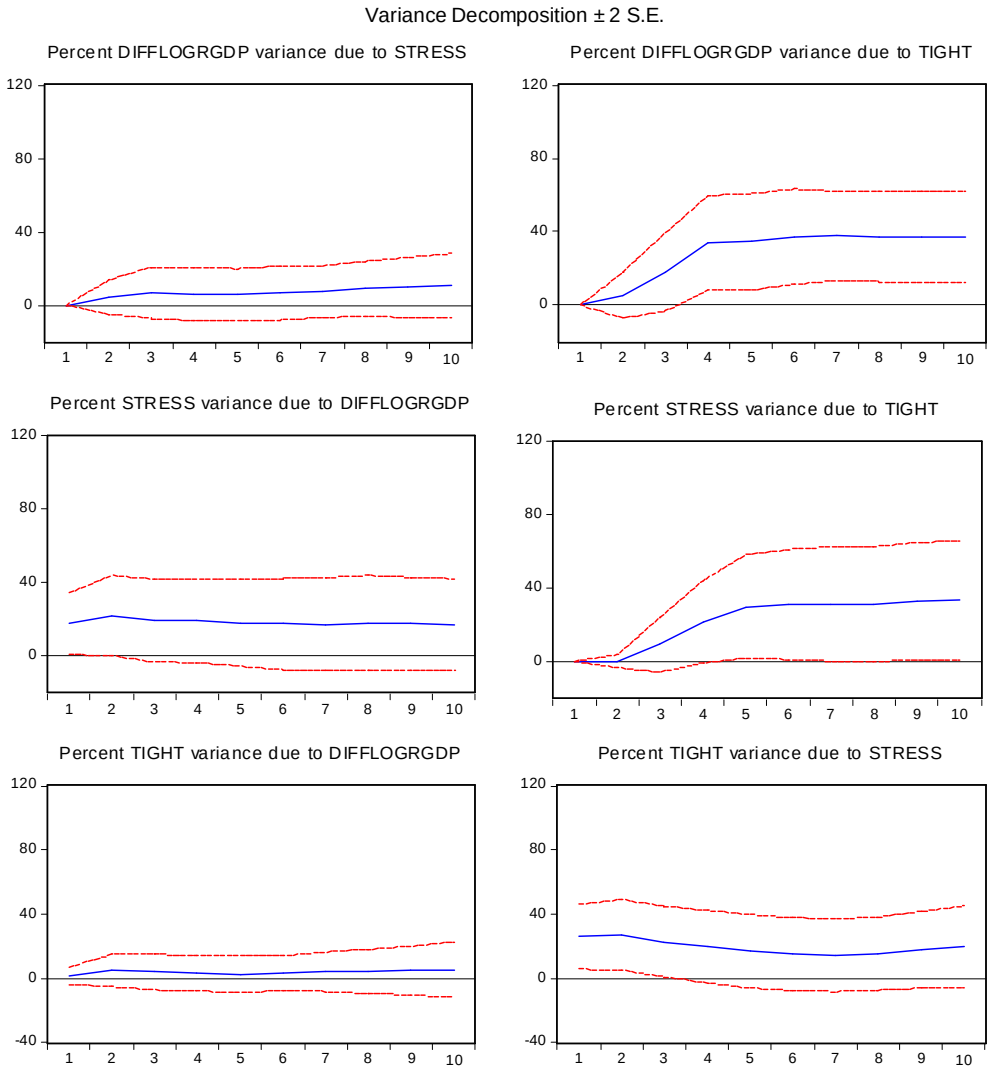

Response to Generalized One S.D. Innovations ± 2 S.E.
Response of DIFFLOGRGDP to STRESS
Response of DIFFLOGRGDP to TIGHT
Response of STRESS to DIFFLOGRGDP
Response of STRESS to TIGHT
Response of TIGHT to DIFFLOGRGDP
Response of TIGHT to STRESS

Figure 3


Variance Decomposition ± 2 S.E.
Percent DIFFLOGRGDP variance due to STRESS
Percent DIFFLOGRGDP variance due to TIGHT
Percent STRESS variance due to DIFFLOGRGDP
Percent STRESS variance due to TIGHT
Percent TIGHT variance due to DIFFLOGRGDP
Percent TIGHT variance due to STRESS