Commercial Paper Rates and Stock Market Excess Returns

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Abstract

This study investigates how commercial paper rates respond to the innovations in stock market risk premiums.   The unrestricted vector autoregression (VAR) analysis of monthly data from 1997:1 to 2012:M6 shows that the changes in the one-, two-, and three-month non-financial and financial commercial paper rates positively respond to the innovations in the excess returns on the CRSP value weighted index. The response is especially strong during the first few months following shocks to stock market risk premiums. The Granger-causality test results show the changes in commercial paper rates can be predicted by the excess returns on the CRSP value weighted index.   The findings from this study provide evidence that there is a link between equity market and commercial paper market.

1   Introduction

There has been a growing interest to investigate the cross-market linkage and transmission because returns on equity and other debt instruments can be explained by many common factors. Fama and French (1993) provide empirical evidence of the linkage between equity and bond markets by showing that the market factor, size factor (SMB), growth factor (HML), and maturity, default risks and dividend yields are prime candidates in explaining excess return variability of government bond returns. In addition, both stock and bond prices are affected by discount rate and expected inflation (Campbell & Ammer, 1993). Evidence of the linkage between stock and bond markets is also

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empirically documented in studies conducted by Sum (2012a and 2012b) which show that stock and bond returns can be predicted by business and consumer confidence.   Another study by Wilson and Jones (1990) shows that January effect is observed in the returns on commercial paper and bond.   Kairys (1993) finds a persistent relationship between stock returns and commercial paper rates.

Although there are many factors explaining price and return behavior in the equity and debt markets, the overall financial market factor is one of the most common factors included in various asset pricing models including the single-index model (Sharpe, 1966), three-factor model (Fama & French, 1992) and four-factor model (Carhart, 1997). Consequently, it is the problem of this study to investigate how commercial paper rates respond to the innovations in stock market risk premiums.   This study is unique because it applies the vector autoregression analysis to examine the impulse response functions of commercial paper rates to excess returns on the stock market. The vector autoregression analysis also allows the causality link between stock market excess returns and commercial paper rates to be established.   This study is necessary because it furthers the understanding the common factor explaining returns on the equity and commercial paper market.   In addition, the results of this study provide useful information for asset and risk management.

2   Method and Data

Monthly data of stock market excess returns and changes in the one-, two-, and three-month non-financial and financial commercial paper rates from 1997:1 to 2012:M6 are obtained from the CRSP database and Federal Reserve Bank provided by the University of Pennsylvania's Wharton Research Data Services (WRDS). This study employs the unrestricted vector autoregression (VAR) analysis to investigate if changes in the one-, two-, and three-month non-financial and financial commercial paper rates respond to the innovation in the stock market risk premiums.   This study is also set up to test if stock market excess returns cause the changes in the one-, two-, and three-month non-financial and financial commercial paper rates.

$$R_{mt} - R_{ft} = \alpha + \sum_{i=1}^{p} \lambda_i (R_{mt-i} - R_{ft-i}) + \sum_{i=1}^{p} \varphi_i \Delta CP_{t-i} + \varepsilon_t \qquad (1)$$

$$\Delta CP_t = \alpha + \sum_{i=1}^{p} \lambda_i (R_{mt-i} - R_{ft-i}) + \sum_{i=1}^{p} \varphi_i \Delta CP_{t-i} + \varepsilon_t \qquad (2)$$

where:

R_{mt} = Return on CRSP value-weighted index (%) in time t
R_{mt-i} = Return on the CRSP value-weighted index (%) in time t-i
R_{ft} = One-Month Treasury bill rate (%) in time t
R_{ft-i} = One-Month Treasury bill rate (%) in time t-i
ΔCP_t = change in commercial paper rates in month t
ΔCP_{t-i} = change in commercial paper rates in month t-i

3 Results

Before performing the vector autoregression analysis, Schwarz's Bayesian information criterion (SBIC), the Akaike's information criterion (AIC), and the Hannan and Quinn information criterion (HQIC) tests are performed to determine the appropriate length of lags to be included in the model. Two lags are recommended by the tests for the one-, two-, and three-month non-financial commercial papers and one-month financial commercial paper rates. Three lags are suggested for the two-, and three-month financial commercial paper rates. The results show that the changes in the one-, two-, and three-month non-financial and financial commercial paper rates positively respond to the innovations in the excess returns on the CRSP value weighted index. The response is especially strong during the first few months following shocks to stock market risk premiums. The Granger-causality test results show the changes in commercial paper rates can be predicted by the excess returns on the CRSP value weighted index.
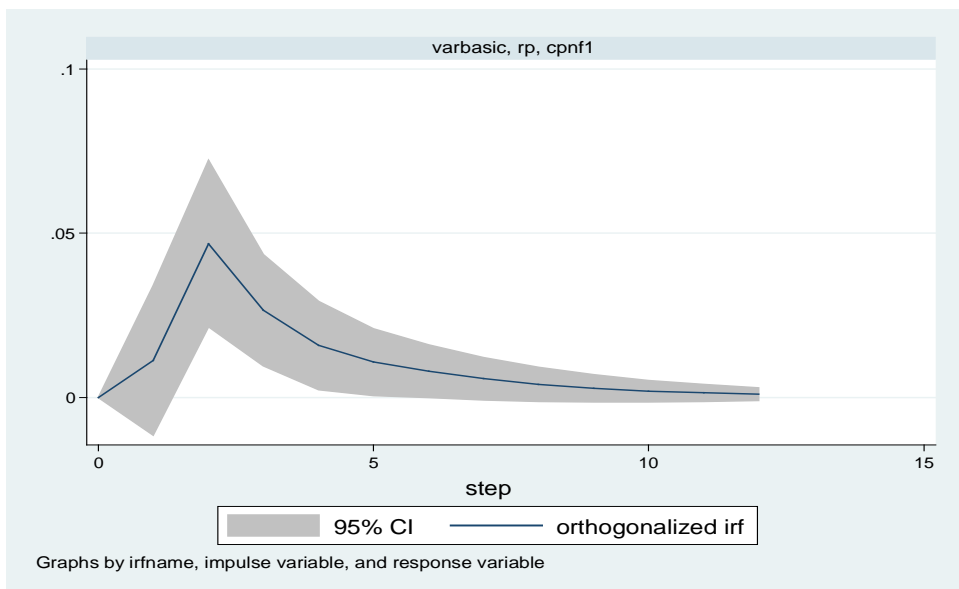

Figure 1: The Orthogonal Impulse Response Functions (OIRF) of the Changes in the One-Month Non-Financial Commercial Paper Rates to CSRP Value-Weighted Excess Returns

Table 1: Granger Causality Walt Tests

Equation	Excluded	chi2	df	Prob > chi2
$R_m - R_f$	ΔCP	1.47	2	0.478
$R_m - R_f$	All	1.47	2	0.478
ΔCP	$R_m - R_f$	13.84	2	0.001
ΔCP	All	13.84	2	0.001

Null Hypothesis: CRSP value-weighted excess returns do not Granger-cause the changes in one-month non-financial commercial paper rates.
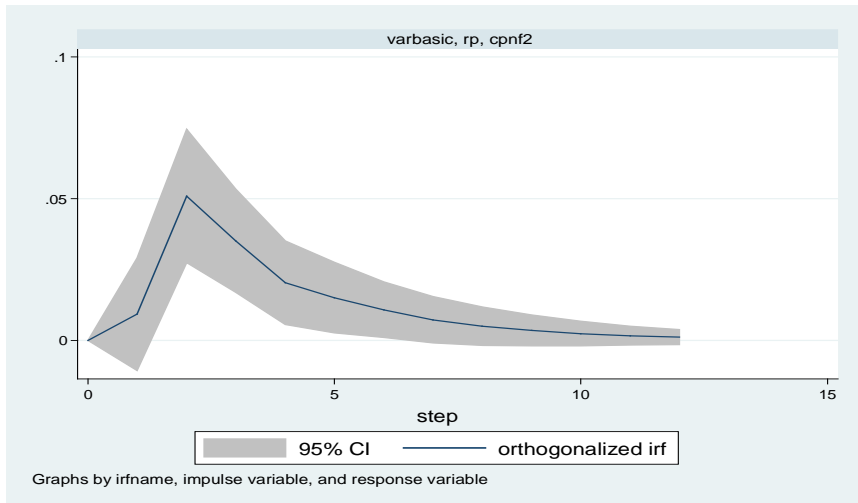
Figure 2: The Orthogonal Impulse Response Functions (OIRF) of the Changes in the
Two-Month Non-Financial Commercial Paper Rates to CSRP Value-Weighted Excess
Returns

Table 2: Granger Causality Walt Tests

Equation	Excluded	chi2	df	Prob > chi2
$R_m - R_f$	ΔCP	5.32	2	0.070
$R_m - R_f$	All	5.32	2	0.070
ΔCP	$R_m - R_f$	21.22	2	0.000
ΔCP	All	21.22	2	0.000

*Null Hypothesis: CRSP value-weighted excess returns do not Granger-cause the changes
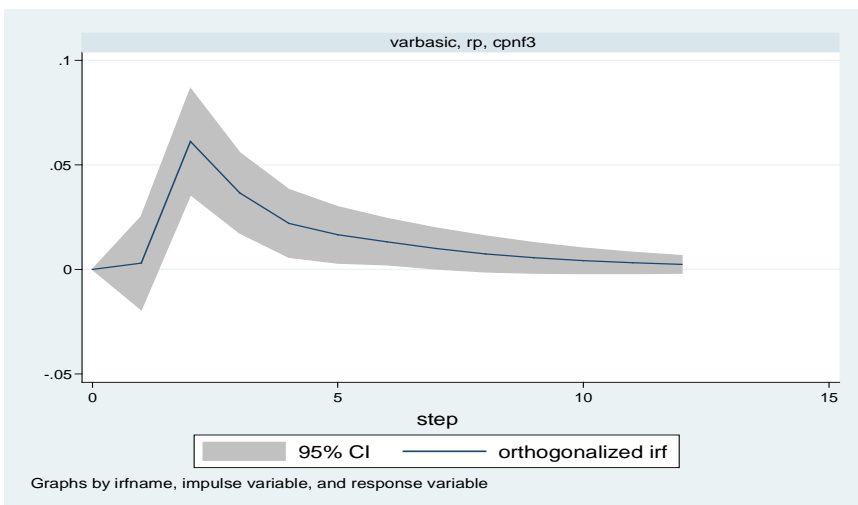in two-month non-financial commercial paper rates.*

Figure 3: The Orthogonal Impulse Response Functions (OIRF) of the Changes in the
Three-Month Non-Financial Commercial Paper Rates to CSRP Value-Weighted Excess
Returns

Table 3: Granger Causality Walt Tests

Equation	Excluded	chi2	df	Prob > chi2
$R_m - R_f$	ΔCP	3.17	2	0.205
$R_m - R_f$	All	3.17	2	0.205
ΔCP	$R_m - R_f$	28.00	2	0.000
ΔCP	All	28.00	2	0.000

Null Hypothesis: CRSP value-weighted excess returns do not Granger-cause the changes in three-month non-financial commercial paper rates.
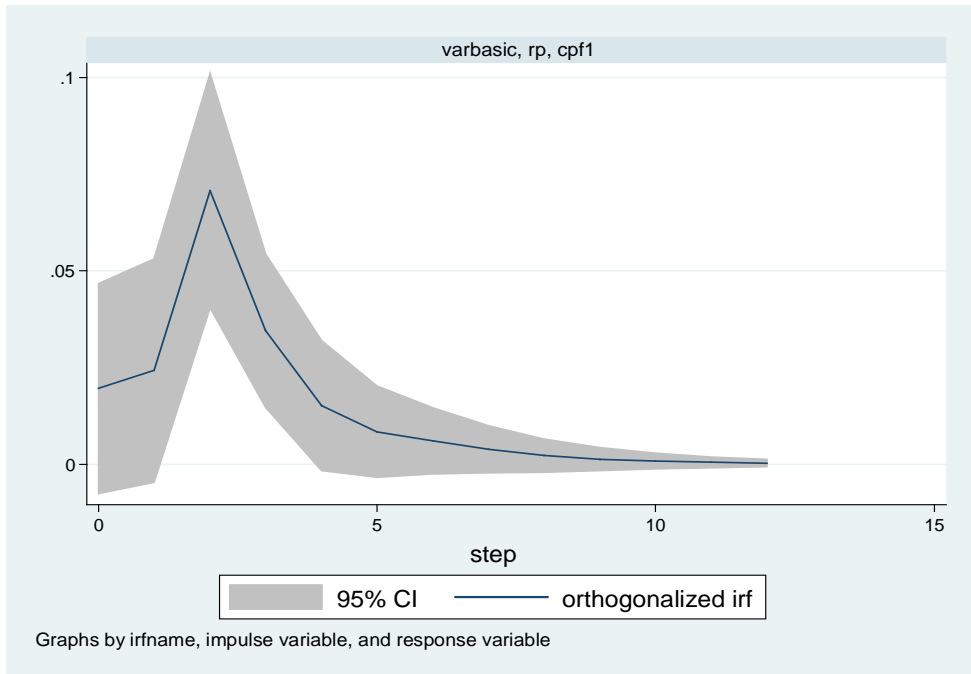

Figure 4: The Orthogonal Impulse Response Functions (OIRF) of the Changes in the One-Month Financial Commercial Paper Rates to CSRP Value-Weighted Excess Returns

Table 4: Granger Causality Walt Tests

Equation	Excluded	chi2	df	Prob > chi2
$R_m - R_f$	ΔCP	1.12	2	0.570
$R_m - R_f$	All	1.12	2	0.570
ΔCP	$R_m - R_f$	20.25	2	0.000
ΔCP	All	20.25	2	0.000

Null Hypothesis: CRSP value-weighted excess returns do not Granger-cause the changes in one-month financial commercial paper rates.
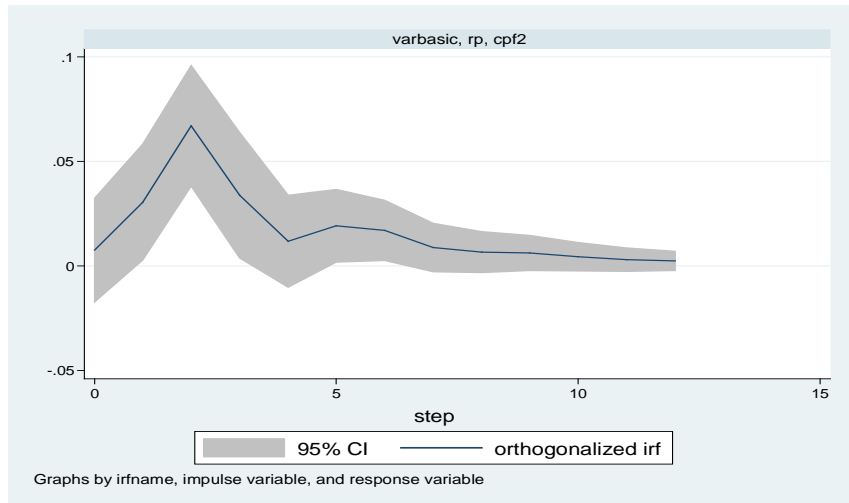
Figure 5: The Orthogonal Impulse Response Functions (OIRF) of the Changes in the
Two-Month Financial Commercial Paper Rates
to CSRP Value-Weighted Excess Returns

Table 5: Granger Causality Walt Tests

Equation	Excluded	chi2	df	Prob > chi2
$R_m - R_f$	ΔCP	0.74	3	0.862
$R_m - R_f$	All	0.74	3	0.862
ΔCP	$R_m - R_f$	21.78	3	0.000
ΔCP	All	21.78	3	0.000

*Null Hypothesis: CRSP value-weighted excess returns do not Granger-cause the changes
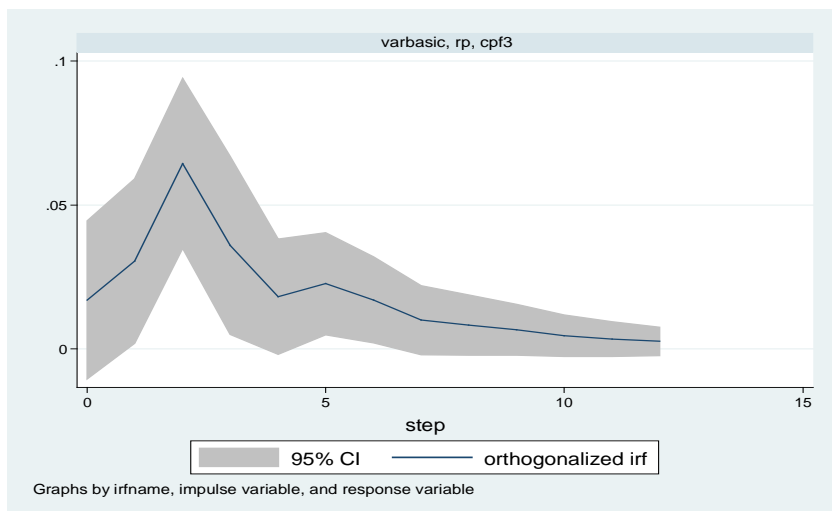in two-month financial commercial paper rates.*

Figure 6: The Orthogonal Impulse Response Functions (OIRF) of the Changes in the
Three-Month Financial Commercial Paper Rates to CSRP Value-Weighted Excess
Returns

Table 6: Granger Causality Walt Tests

Equation	Excluded	chi2	df	Prob > chi2
$R_m - R_f$	ΔCP	2.08	3	0.555
$R_m - R_f$	All	2.08	3	0.555
ΔCP	$R_m - R_f$	19.08	3	0.000
ΔCP	All	21.08	3	0.000

Null Hypothesis: CRSP value-weighted excess returns do not Granger-cause the changes in three-month financial commercial paper rates.

4 Conclusion

This study investigates how commercial paper rates respond to the innovations in stock market risk premiums. The unrestricted vector autoregression (VAR) analysis of monthly data from 1997:1 to 2012:M6 shows that the changes in the one-, two-, and three-month non-financial and financial commercial paper rates positively respond to the innovations in the excess returns on the CRSP value weighted index. The response is especially strong during the first few months following shocks to stock market risk premiums. The Granger-causality test results show the changes in commercial paper rates can be predicted by the excess returns on the CRSP value weighted index. The findings from this study provide evidence that there is a link between equity market and commercial paper market. Finally, the findings provide useful information for asset and risk management.

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