Internet Appendix A112: Volatility Linkages
A112.1 Illustrative Reverse Engineered Pitch Template Example

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(A) Working Title	Mi, L., Benson, K. and Faff, R. (2016b, Working Paper). Information and Volatility Linkages between the Real Estate Market and Major Financial Markets: The Broad Impact of REVIX.				
(B) Basic Research Question	Are information linkages across the real estate, stock, bond and money markets shown in the correlations between the volatilities in these markets, rather than the correlations between the returns?				
(C) Key paper(s)	1. Fleming, J., Kirby, C., & Ostdiek, B. (1998). Information and volatility linkages in the stock, bond, and money markets. Journal of Financial Economics, 49(1), 111-137. 2. Kodres, L. E., & Pritsker, M. (2002). A rational expectations model of financial contagion. Journal of Finance, 57(2), 769-799. 3. Wang, K. (2009). Volatility linkages of the equity, bond and money markets: An implied volatility approach. Accounting and Finance, 49(1), 207-219.				
(D) Motivation/Puzzle	The major financial markets, for example, the stock and money markets are affected largely by the same information. However, the correlation of returns between the stock and money markets is close to zero because their returns move in potentially offsetting ways. In contrast, since these two markets share a significant amount of common information, their volatility correlation is expected to be fairly high. Moreover, the 2007-2008 Global Financial Crisis triggered further thinking of the information linkages between these markets. Is the benefit of risk management through diversification based on low return correlations overestimated? Should volatility correlations be considered as well?				
THREE	**Three** core aspects of any empirical research project i.e. the "**ID**io**T**s" guide				
(E) Idea?	The authors manage to answer the above questions by exploring another application of REVIX, which is an implied volatility index developed in Mi, Benson and Faff (2016a, Working Paper). REVIX is a forward looking index that represents investors' sentiment in the real estate market and thus the correlations between REVIX and other market volatility indexes should reflect the information flows across the markets. In light of this idea and the theory that the volatility of prices reflects the rate at which information flows to the market (Kyle, 1985; Ross, 1989; Fleming, Kirby and Ostdiek, 1998), the authors then test the hypothesis that information linkages across the financial markets are shown in the volatilities correlations instead of the return correlations.				
(F) Data?	The daily returns on the S&P 500 Index for the stock market are sourced from CRSP, while the daily returns on the S&P US REIT Index for real estate market, Ten-year T-note Futures for bond market and Eurodollar Futures for money market are obtained from Datastream. The implied volatilities for the corresponding indexes are: REVIX created from Mi, Benson and Faff (2016a, Working Paper); VIX and TYVIX sourced from the CBOE website; and Euroimpvol calculated by the authors as the average of the one month implied volatilities of one call and one put on Eurodollar futures. The sample period is from 2 January 2003 to 30 August 2012.				
(G) Tools?	The authors implement two approaches to test the hypothesis. The simple correlation approach compares the pair-wise return correlations with implied volatility correlations. The second approach is an application of the GMM estimation of FKO's speculative trading model which incorporates information flows into volatility and tests information linkages via volatility correlations. The model is underpinned by the rational expectations framework.				

TWO	**Two** key questions
(H) What's New?	The focus of the previous studies on information linkages (FKO, 1998 and Wang, 2009) is on the stock, bond and money markets. However, this research sheds a new light into the information linkages between the real estate and other major financial markets and the strength of information linkages is revealed by the volatility correlations instead of return correlations. What is different from the extant literature is that prior studies use historical volatility data, whereas the implied volatilities such as REVIX are used in this research.
(I) So What?	The primary benefit from using implied volatility indexes is that they are more informative and thus have stronger predictive power. The other merit is that the implied volatility correlation approach carries practical simplicity. The two alternative approaches that achieve the similar results also enhance research persuasiveness.
ONE	**One** bottom line
(J) Contribution?	This paper contributes to the real estate literature by uncovering the information linkages between the real estate and major financial markets. The findings will enable market participants to make more informed decisions for asset allocation, cross-market pricing, risk management and policy making. In addition, by employing implied volatility measures into examination of the linkages between real estate and other financial markets, another application of REVIX is explored.
(K) 3 Key Findings	1. REVIX developed in Mi, Benson and Faff (2016a, Working Paper) has a broad impact beyond the real estate market. 2. Information linkages across the real estate, stock, bond and money markets are shown in the correlations between the volatilities in these markets, rather than the correlations between the returns. 3. The information flows between the real estate market and the other financial markets (i.e. stock, bond and money markets) are highly correlated.