



# Systematic cojumps, market component portfolios and scheduled macroeconomic announcements



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## ABSTRACT

This study provides evidence of common bivariate jumps (i.e., systematic cojumps) between the market index and style-sorted portfolios. Systematic cojumps are prevalent in book-to-market portfolios and hence, their risk cannot easily be diversified away by investing in growth or value stocks. Nonetheless, large-cap firms have less exposure to systematic cojumps than small-cap firms. Probit regression reveals that systematic cojump occurrences are significantly associated with worse-than-expected scheduled macroeconomic announcements, especially those pertaining to the Federal Funds target rate. Tobit regression shows that Federal Funds news surprises are also significantly related to the magnitude of systematic cojumps.

## 1. Introduction

Empirical asset pricing literature typically characterizes the log price process as a combination of continuous and discontinuous sample paths; see, for example, Andersen et al. (2007), Beber and Brandt (2010), Rangel (2011). Related to these studies, Das and Uppal (2004) define cojumps as infrequent discontinuous sample paths that occur simultaneously across multiple assets (see also Dungey et al., 2009; Lahaye et al., 2011; Dungey and Hvozydk, 2012). It is important to consider cojumps – in addition to individual jumps – in order to properly diversify portfolios. Das and Uppal (2004) find that cojumps reduce the benefits of portfolio diversification and can expose highly levered portfolios to large losses. Similarly, Cont and Kan (2011) show that cojump is a key determinant in modelling default contagion. In contrast, Pukthuanthong and Roll (2015) find that individual jumps identified across various countries are only weakly correlated, which the authors interpret as suggesting that cross-border diversification could provide reasonable protection against idiosyncratic jumps.

The present study characterizes systematic cojumps, which we define as common bivariate jumps in prices between the market index and its component portfolios sorted based on market capitalization (size) and book-to-market (B/M) price ratio. Similarly, Gilder et al. (2014) define simultaneous jumps in the market index and cojumps among the underlying stocks as systematic cojumps. Fundamental portfolio theory suggests that systematic cojumps are non-diversifiable, because common jumps observed across the market portfolio's underlying components are likely due to market-wide news and this news produces jumps in the market portfolio (Bollerslev et al., 2008, p.234; Gilder et al., 2014, p.443). The present study examines whether this really happens by scrutinizing the effect of regularly scheduled macroeconomic announcements on systematic cojumps. In linking cojumps to macroeconomic

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announcements, this study extends the research by [Gilder et al. \(2014\)](#), who show that systematic cojumps are related to the timing of macroeconomic announcements and [Dungey et al. \(2009\)](#), [Evans \(2011\)](#), [Lahaye et al. \(2011\)](#) and [Dungey and Hvozdyk \(2012\)](#), who provide similar findings for cojumps identified separately across individual assets or market indices. Nevertheless, our study differs from previous work in three major respects.

First, we draw on recent advances in nonparametric multivariate jump-diffusion modelling to extract systematic cojumps rather than by identifying jumps from individual assets and then aggregating them to form cojumps ([Gilder et al., 2014](#)). [Gnabo et al. \(2014\)](#) show that abnormally large comovements identified across different asset classes cannot be detected otherwise using the univariate jump-diffusion approach and therefore they develop a cojump test. This motivates the present study to identify systematic cojumps using a nonparametric multivariate econometric model; this alleviates the type II cojump error specified by [Gnabo et al. \(2014\)](#).<sup>1</sup>

Second, the present study investigates how scheduled macroeconomic announcements affect systematic bivariate cojumps between the market index and its style-sorted component portfolios. [Maio \(2014\)](#) argues that small and value stocks are more vulnerable to monetary shocks than large and growth stocks; see also [Gertler and Gilchrist \(1994\)](#). This is because small and value firms with low equity-valuation are typically financially constrained, hence making them more susceptible to lending shocks ([Maio, 2014, p.323](#)). [Maio \(2014\)](#) finds that the returns of small and value stocks respond more to monthly changes in the Federal Funds target rate than the returns of large and growth stocks. However, he does not consider other scheduled macroeconomic announcements. In a related study, [Cenesizoglu \(2011\)](#) investigates the daily return reactions of style-sorted portfolios to various macroeconomic announcements. He finds that large and growth stocks tend to react significantly and negatively to ‘good’ employment news, but no evidence of a significant reaction in small and value stocks. Both [Cenesizoglu \(2011\)](#) and [Maio \(2014\)](#) only consider the reactions of the first moment of returns. The present study extends their work by considering higher moment in the form of systematic cojumps.

Third, [Gilder et al. \(2014\)](#) analyze the association between systematic cojumps and announcement indicator variables. In contrast, we analyze both cojump intensity and cojump magnitude and relate these attributes to the first two moments of announcement expectations. The efficient markets paradigm implies that systematic cojumps react to the first conditional moment of announcements, namely announcement surprises or realized less expected news. That is, we hypothesize that asset prices react swiftly to new information – the unanticipated component of macroeconomic announcements – rather than the mere existence of scheduled releases.<sup>2</sup> We also conjecture that systematic cojumps react to the second moment of news – i.e., the dispersion of market expectations – which reflects the disagreement of agents’ beliefs ([Wongswan, 2006](#)). Accounting for dispersion of expectations is crucial because resolution of heterogeneity in market expectations may affect systematic cojumps even if announcement surprises do not.

We presage our empirical findings as follows. There is evidence of systematic cojumps in the style-sorted portfolios. Systematic cojumps are ubiquitous in portfolios sorted on B/M price ratio. This is bad news for investors and asset managers interested in style rotation strategies, because our finding implies that they cannot simply avoid systematic cojump risk by investing in growth or value stocks (see also [Bollerslev et al., 2008](#); [Gilder et al., 2014](#)). Recently, [Pukthuanthong and Roll \(2015\)](#) show that individual jumps identified across international stock markets are weakly correlated and not driven by shocks to global factors. Taken together, the findings in [Pukthuanthong and Roll \(2015\)](#) and our study suggest that investors should diversify their investments overseas, rather than pursuing a ‘growth-value’ style rotation strategy in the domestic market. At the same time, however, we also show that large-cap firms exhibit fewer systematic cojumps than small-cap firms, which suggests that the former mitigates cojump risk better than the latter.

We then use probit and Tobit regressions to show that macroeconomic announcement surprises are associated with cojump intensity and amplitude. [Inoue and Kilian \(2004\)](#) show that data mining can result in spurious rejection of no-reaction hypothesis more often than it should. To circumvent this problem, we closely follow the recommendation of [Kilian and Vega \(2011\)](#) and perform an extensive Monte-Carlo simulation exercise to assess the statistical significances of the regression parameter estimates.

The empirical findings reveal heterogeneous reactions to macroeconomic news. In particular, unanticipated Federal Funds rate news is strongly associated with systematic cojump occurrence and size in all the style-sorted portfolios. This is good news for investors and portfolio managers who were searching for factors to explain systematic cojumps; Federal Funds target news does so. At the same time, however, our finding also implies that even the most risk-averse investors cannot completely avoid macroeconomic risk emanating from the Federal Funds because it consistently affects systematic cojumps. Unanticipated information related to other macroeconomic variables (such as labor statistics) have much less effect.

We expect greater dispersion of announcement expectations (i.e., the cross-sectional variation of analysts’ expectations) to raise systematic cojumps because heterogeneity in agents’ beliefs reflects greater uncertainty prior to the release of news. Very few studies on macroeconomic announcements have used the dispersion of news forecasts as a measure of information uncertainty. [Wongswan \(2006\)](#) finds a significant positive relationship between the dispersion of expectations and trading volume of international equity markets. [Huang \(2015\)](#) shows that the dispersion of expectations significantly influences both volatilities and jumps in U.S. bond futures. We extend this literature by showing that the dispersion of analysts’ expectations is generally not a significant factor affecting systematic cojumps. However, dispersion of expectations pertaining to nonfarm payroll statistics and Institute of Supply

<sup>1</sup> Alternatively, we could have considered the multivariate cojump test of [Bollerslev et al. \(2008\)](#) to analyze systematic cojumps. However, since this test only detects whether two or more series cojump within a specified interval period (which is quarterly in the current context, as discussed in [Section 4.1](#)), it is not particularly helpful to our study which requires the identification of systematic cojumps on a daily basis.

<sup>2</sup> [Maheu and McCurdy \(2004\)](#) find that unusual news events contribute considerably to jumps in price variation of individual stocks.

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