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Macroeconomic Shocks and Risk Premia

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This paper integrates models of empirical asset pricing with structural vector autoregressions (VAR) to explore the macroeconomic forces behind the cross-sectional and time-series variation in expected asset returns. To that end, I propose novel orthogonalisation techniques in a VAR, which rely exclusively on asset price information and not on macroeconomic assumptions.

First, I use an unconditional asset pricing framework to find an orthogonal shock in a macroeconomic VAR that best explains the *cross-sectional variation* in expected returns. The obtained "λ-shock" does not explain the recent US recessions, and closely resembles identified monetary policy surprises. This result highlights the overlap between linear pricing models of the cross-section of average returns (Fama-French, 1993) and structural shocks identified by the macroeconometric literature (Sims, 1980).

The (cross-sectional) method to construct the λ -shock connects two simple ideas: (i) a basic fact of the empirical finance literature (Cochrane, 2005) is that β -pricing models of the cross-section of asset prices imply a linear model of the stochastic discount factor (SDF); (ii) a basic fact of the macroeconometrics literature (Sims, 1980) is that orthogonalised shocks in a VAR model are linear combinations of the reduced-form innovations. These two facts imply that, given the space spanned by the innovations of a linear VAR and the space spanned by the cross-section of asset returns, one can construct orthogonal shocks in the VAR that are best linear approximations of the SDF (with all other orthogonalised shocks in the VAR demanding zero average risk premia).

Second, I integrate return-forecasting methods to construct a second shock in the VAR, which best explains *time-variation* in expected returns. The obtained "γ-shock" turns out to be virtually orthogonal to the λ-shock, resembles demand-type financial shocks identified by macroeconomists (Christiano-Motto-Rostagno, 2014), and explains most US recessions.

The (time-series) method to construct the γ-shock builds on the asset pricing literature which found empirical evidence on the predictability of excess returns by financial and macroeconomic variables, implying that expected excess returns vary with the business cycle (Cochrane, 2011). This literature typically employed univariate time-series techniques to regress realised excess returns on lagged values of valuation ratios or macroeconomic variables, and assessed the forecasting power of the proposed predictors based on the regression R^2 statistic. Given that most of the proposed

predictor variables are reduced-form objects, their forecasting power could in theory be decomposed to the historical contribution of primitive economic shocks that generated fluctuations in the given predictors. I take this idea to the limit, and search for a single orthogonal shock in my macroeconomic VAR with the following property: the historical contribution of this shock to predictor variables in the VAR would generate counterfactual variation in these predictors, which would have the highest possible R^2 statistic when using them in return forecasting regressions. To the extent that time-variation in expected returns is linked to economic booms and busts (Lettau-Ludvigson, 2010; Cochrane, 2011), the γ-shock can be thought of as the stochastic driver of recessions in the VAR.

While the construction of the λ-shock and the γ-shock relies exclusively on asset price information and not on macroeconomic assumptions, I find that these two shocks jointly explain up to 80% of aggregate consumption fluctuations in the US. Overall, the proposed framework and the empirical results close some of the gap between asset pricing and macroeconomics.