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New return anomalies and new-Keynesian ICAPM☆,☆☆

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ABSTRACT

I propose a new multi-factor asset pricing model with new-Keynesian factors to explain stock return anomalies from 1972Q1 to 2009Q2. This new model explains the average returns across testing portfolios formed on financial distress, momentum, and standardized unexpected earnings with misspecification-robust statistics. Test portfolios formed on net stock issues and total accruals are also partly explained by new-Keynesian factors. Two monetary policy factors play an important role in explaining these new anomalies. The credit aspect of these new anomalies suggests an economic rationale for the model through capital market imperfections and the credit channel of monetary policy mechanism.

1. Introduction

Fama and French (1996) demonstrate that their three-factor model with the market excess return (RMRF) and two mimicking portfolios based on market capitalization (SMB) and book-to-market (HML) can explain the average return variations across portfolios formed on many different characteristics. They interpret their two mimicking portfolios as risk factors capturing risk premia for the relative distress of firms in the context of the ICAPM.

However, there are patterns in average stock returns that are considered new anomalies because they are not explained by the Fama–French three-factor model. Fama and French (2008) find that the anomalous returns associated with net stock issues, accruals, and momentum are pervasive in all size groups in cross-section regressions. Furthermore, Campbell, Hilscher, and Szilagyi (2008) report that more distressed firms have lower average returns despite their high loadings on HML than less distressed firms. They conclude that their results indicate a significant challenge to the Fama–French model. Finally, the post-earnings-announcement drift anomaly or earnings momentum exists, first documented by Ball and Brown (1968), which describes the outperformance of good-news firms with high standardized-unexpected earnings (SUE) relative to bad-news (low-SUE) firms.

Recently, several papers propose commonalities in these asset pricing anomalies. For example, Avramov, Chordia, Jostova, and Philipov (2012) find that strategies based on price momentum, earnings momentum, credit risk, and other anomalies derive their profitability from taking short positions in high credit risk firms during the deteriorating credit conditions. While Avramov et al. (2012) do not find risk-based explanations for the commonalities, other researchers find connections between these anomalies and aggregate risk factors. For example, Mahajan, Petkevich, and Petkova (2012) claim that momentum is a compensation for the systemic default risk because momentum profits are concentrated in periods of high default shocks. Liu and Zhang (2008) find that the growth rate of industrial production is a priced risk factor for the momentum. Finally, Chen, Novy-Marx, and Zhang (2010) demonstrate that neoclassical factors based on the q-theory can explain these return anomalies. These results suggest that an asset pricing model with macroeconomic factors is a good candidate to describing these return anomalies. Particularly asset pricing models with neoclassical factors have a clear interpretation because the motivation of the selected factors is from equilibrium macroeconomic models.

In this paper, I add a new dimension to this literature. I argue that an Intertemporal CAPM with new-Keynesian factors motivated from new-Keynesian dynamic stochastic general equilibrium models (DSGE) is important to understand these anomalies. Like the neoclassical

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approach, new-Keynesian macroeconomic analysis has micro-foundations with rational expectations. However, new-Keynesian analysis assumes a variety of market failures and emphasizes the importance of monetary policy actions. Surprisingly, these factors have not received deserved attention in explaining the cross-sectional asset pricing puzzles. For example, it is well known that the stock market investors continuously watches and forms expectations about the Federal Reserve Board (Fed) decisions. It seems natural to investigate the role of these monetary factors because the actions of the Fed seem to have a considerable impact on stock market returns.

However, I do not impose tight restrictions of the new-Keynesian DSGE in driving the asset pricing model with new-Keynesian factors. This reduced-form approach would induce misspecification biases naturally. To ensure robust and valid inference under the potential misspecification, I use misspecification-robust standard errors in the second pass cross-sectional regression for estimates of the risk premia or the prices of covariance risk proposed by Kan, Robotti, and Shanken (in press). They demonstrate that the statistical inference in asset pricing models particularly with macroeconomic factors should be conducted allowing for the possibility of potential misspecification to avoid spurious results. For the better comparison with the literature, I also report the standard errors based on Fama and MacBeth (1973), Shanken (1992), and Jagannathan and Wang (1998) under correctly specified models. As expected, the use of misspecification-robust standard errors often makes a qualitative difference in determining whether estimates of the risk premia or the prices of covariance risk are statistically significant, confirming the usefulness of this robust statistics. Finally, I also report standard errors of adjusted R^2 following Kan et al. (in press).

The results with these robust statistical tools show that the new-Keynesian ICAPM explains the average returns of portfolios formed on financial distress, price and earnings momentums with statistically significant adjusted R^2. Furthermore, I find that other anomalies can be at least partially explained by these new-Keynesian factors. Particularly, I find that the temporary monetary policy factor explains the distress and momentum premia, and the permanent monetary policy factor captures the anomalous returns on portfolios formed on SUE and total accruals. These two monetary factors also have theoretically-consistent negative risk prices because higher interest rates from monetary tightening forecast negative changes in investment opportunities.[1] Other factors have limited success in explaining the anomalies with misspecification-robust standard errors. While the proposed new multi-factor model has a limited success in driving out some of the anomalies, the results with new-Keynesian factors look sufficiently encouraging to warrant further empirical investigation. At a minimum, the evidence shows that the new-Keynesian factor model is possible to shed new light on understanding the puzzling risk premia in stock markets.

One economic interpretation of the results is the capital market imperfections story. Bernanke and Gertler (1989) and Kiyotaki and Moore (1997) predict that changing credit market conditions can have very different effects on firms' risks and expected returns. Interestingly, Avramov et al. (2012) show that return anomalies such as momentum profits are restricted to high credit risk firms and are nonexistent for firms of high credit quality. Mahajan et al. (2012) claim that this credit risk is a systematic risk factor. The credit channel mechanism of monetary policy describes the theory that a central bank's policy changes affect the amount of credit that banks issue to firms and consumers for purchases, which in turn affects the real economy and return-risk characteristics of firms. Particularly, during a flight-to-quality episode (deteriorating credit conditions) external financing becomes harder for lower quality borrowers. Investors or banks faced with tightened balance sheet and uncertainty aversion shift their portfolio only towards high quality borrowers. During this uncertain period, however, easier monetary policy (arguably temporary monetary policy shock) can generate much needed liquidity within the financial system, correspondingly changing the credit conditions.

The rest of the paper is organized as follows. Section 2 presents briefly the structural new-Keynesian model employed in this study. Section 3 outlines the empirical methods. Section 4 presents the data and discusses the cross-sectional results of the new-Keynesian factor models for portfolios formed on various anomalies. Section 5 summarizes the main findings and concludes.

2. Empirical asset pricing models

This section motivates the new-Keynesian ICAPM; the first subsection briefly discusses a multi-factor asset pricing model implied by new-Keynesian equilibrium models and the second subsection explains the Keynesian DSGE model employed to identify new-Keynesian factors.

2.1. The pricing kernel of the new-Keynesian models

Without imposing any theoretical structure, the fundamental existence theorem of Harrison and Kreps (1979) states that, in the absence of arbitrage, there exists a positive stochastic discount factor, or pricing kernel, M_{t+1}, such that, for any traded asset with a gross return at time t of $R_{i,t+1}$, the following equation holds:

$$1 = E_t\left[M_{t+1}\left(R_{i,t+1}\right)\right] \tag{2.1}$$

where E_t denotes the expectation operator conditional on information available at time t.

Standard new-Keynesian macro models employ the following external habit specification in utility function built on Fuhrer (2000).[2]

$$E_t\sum_{s=t}^{\infty}\psi^{s-t}U(C_s;F_s) = E_t\sum_{s=t}^{\infty}\psi^{s-t}\left[\frac{F_sC_s^{1-\sigma}-1}{1-\sigma}\right]$$

where C_s is the composite index of consumption, F_s represents an aggregate demand shifting factor and usually denotes as H_sG_s where H_s is an external habit level and G_s is a preference shock; ψ denotes the subject discount factor and σ is the inverse of the intertemporal elasticity of consumption.

Bekaert, Cho, and Moreno (2005) derive the pricing kernel implied by Fuhrer (2000) assuming standard log-normality and simple three-equation new-Keynesian model:

$$m_{t+1} = \ln\psi-\sigma y_{t+1}+(\sigma+\eta)y_t-(g_{t+1}-g_t)-\pi_{t+1} \tag{2.2}$$

where $m_{t+1} = \ln(M_{t+1})$, y_{t+1} is detrended log output, $g_{t+1} = \ln(G_{t+1})$ and π_{t+1} is the inflation rate.

They express Eq. (2.2) in terms of the structural shocks in the economy.

$$m_{t+1} = -i_t-\frac{1}{2}\Lambda'D\Lambda-\Lambda'\varepsilon_{t+1} \tag{2.3}$$

where Λ' is a vector of prices of risks entirely restricted by the structural parameters of new-Keynesian models and D is the covariance matrix of structural shocks.

The pricing kernel (2.3) is a linear combination of structural shocks to the overall economy. In this way, any new-Keynesian model can be expressed as an asset pricing model. However, strictly speaking, this

[1] As described carefully by Maio and Santa-Clara (2012), any ICAPM should produce theoretically consistent risk prices.

[2] I closely follow the representation given in Bekaert et al. (2005). Refer to the first nine chapters in Woodford (2003) for more detailed explanations.