Journal of Financial Economics 119 (2016) 249–283

Contents lists available at ScienceDirect

Journal of Financial Economics

journal homepage: www.elsevier.com/locate/jfec

The common factor in idiosyncratic volatility: Quantitative asset pricing implications[☆]

Bernard Herskovic[a], Bryan Kelly[b], Hanno Lustig[c], Stijn Van Nieuwerburgh[d,*]

[a] UCLA Anderson School of Management, United States
[b] University of Chicago Booth School of Business, United States
[c] Stanford Graduate School of Business, United States
[d] New York University Stern School of Business, United States

ARTICLE INFO

Article history:
Received 18 April 2014
Received in revised form
2 December 2014
Accepted 23 April 2015
Available online 21 October 2015

JEL classification:
E44
G12
G17

Keywords:
Firm volatility
Idiosyncratic risk
Cross section of stock returns

ABSTRACT

We show that firms' idiosyncratic volatility obeys a strong factor structure and that shocks to the common idiosyncratic volatility (CIV) factor are priced. Stocks in the lowest CIV-beta quintile earn average returns 5.4% per year higher than those in the highest quintile. The CIV factor helps to explain a number of asset pricing anomalies. We provide new evidence linking the CIV factor to income risk faced by households. Our findings are consistent with an incomplete markets heterogeneous agent model. In the model, CIV is a priced state variable because an increase in idiosyncratic firm volatility raises the average household's marginal utility. The calibrated model matches the high degree of co-movement in idiosyncratic volatilities, the CIV-beta return spread, and several other asset price moments.

1. Introduction

We present new empirical evidence regarding the behavior of idiosyncratic risk and consider the implications of this behavior for asset prices. First, the idiosyncratic volatilities of US firms are synchronized. Second, this common idiosyncratic volatility (CIV) is correlated with various measures of household labor income risk. Third, exposure to CIV shocks is priced in the cross section of stocks.

We then propose a heterogeneous agent model with incomplete markets that offers an economic rationale and quantitatively accounts for our findings. The key novelty in the model is that households' consumption risk inherits the same factor structure of the idiosyncratic cash flow risk of firms. Common fluctuations in firm-level risk thus enter the pricing kernel of households and, as a result, CIV is a priced state variable. Stocks that tend to appreciate when CIV rises are valuable hedges to increases in households' marginal utility and earn relatively low average returns, consistent with our empirical findings.

We start by showing an extraordinary degree of co-movement among the idiosyncratic volatilities of more than 20 thousand Center for Research in Security Prices

☆ We thank Yakov Amihud, John Campbell (discussant), John Cochrane, George Constantinides, Itamar Drechsler, Rob Engle, Stefano Giglio, John Heaton, Toby Moskowitz, Holger Mueller, Lubos Pastor, Pietro Veronesi, and conference and seminar participants at the University of Chicago Booth School of Business, McGill University, New York University, University of Washington, University of California at Los Angeles, New York Federal Reserve Bank, Chicago Federal Reserve Bank, Georgia Institute of Technology, American Finance Association, Western Finance Association, Society for Economic Dynamics in Toronto, Center for Economic and Policy Research conference in Gerzensee, Switzerland, and Stanford Institute for Theoretical Economics for helpful comments and suggestions.
* Corresponding author. Tel.: +1 212 998 0673.
E-mail address: svnieuwe@stern.nyu.edu (S. Van Nieuwerburgh).

http://dx.doi.org/10.1016/j.jfineco.2015.09.010
0304-405X/© 2015 Elsevier B.V. All rights reserved.

(CRSP) stocks over a long sample spanning 1926–2010. A single factor explains 35% of the time variation firm-level idiosyncratic risk. At first sight, a factor structure in return volatilities might not appear surprising. After all, many finance theories posit that returns are linear functions of common factors, and, if the factors themselves have time-varying volatility, then firm volatility naturally inherits this factor structure.[1] However, we emphasize that this is co-movement in idiosyncratic volatility, defined as the standard deviation of residuals from factor model regressions. Volatility co-movement does not arise from omitted factors. Even after saturating the factor regression with up to ten principal components (and showing that model residuals are virtually uncorrelated), the residual firm volatilities continue to display the same co-movement seen in raw return volatilities.

We also show that co-movement in volatilities is a feature not only of returns, but also of the volatility of firm-level cash flows. We estimate volatilities of firm fundamentals such as sales or earnings growth using quarterly Compustat data. Although these volatility estimates are noisier and less frequently observed than those for stock returns, we again find a strong factor structure among firms' idiosyncratic cash flow volatilities. The common factor in fundamental volatility follows the same low frequency patterns as the common factor in idiosyncratic return volatilities. The two have a correlation of 65%. This suggests that return volatility patterns identified in this paper are not solely attributable to shocks to investor preferences or other sources of pure discount rate variation.[2] Instead, they measure the volatility of persistent idiosyncratic cash flow growth driven by firm-level productivity and demand shocks.

Persistent, idiosyncratic cash flow shocks that hit firms are an important source of undiversifiable risk to households. We present evidence showing that the CIV factor proxies for idiosyncratic risk faced by households. Individual income data from the US Social Security Administration from Guvenen, Ozkan, and Song (2014) show that the cross-sectional dispersion in household earnings growth rises and falls with CIV measured from stock returns. They share a correlation of nearly 60% in changes. Similarly, dispersion in firm-level employment growth (from Compustat) and in sector-level employment growth of both private and publicly firms (from the Federal Reserve) are also strongly correlated with CIV. Finally, CIV shocks are positively correlated with shocks to the dispersion in wage and house price growth across metropolitan areas.

How are persistent firm-level shocks transferred to households? Perhaps the main source of transmission is through the labor income that households derive from firms that employ them. For example, when workers possess firm-specific human capital, shocks to firm value are also shocks to workers' human wealth (Becker, 1962). Other transmission channels include under-diversified equity positions in own-employer stock and the influence of firm performance on local wages and residential real estate values. And while firms provide employees with some temporary insurance against idiosyncratic productivity shocks, workers have little protection against persistent shocks, which ultimately affect compensation through either wages or layoffs.[3] Because households cannot completely insulate their consumption from persistent shocks to their labor income (Blundell, Pistaferri, and Preston, 2008), the volatility of households' consumption growth distribution inherits the same factor structure as the volatility in firm-level returns and cash flow growth.[4] As the volatility of firm-level growth rates rises, investors face more idiosyncratic risk that is not fully hedged, increasing the dispersion of their consumption growth rates. Because increases in CIV represent an increase in consumption risk for the average household, they adversely affect its marginal utility.

This effect of a change in CIV on the marginal utility of the average investor is reflected in asset price data. Differences in firms' betas on CIV shocks are strongly associated with differences in expected returns. The top CIV-beta quintile earns average returns 5.4% per annum lower than firms in the bottom quintile. We show that this fact is not due to high CIV-beta firms having high exposure to the market return, a size or value factor, or a market variance factor. Instead, incorporating CIV innovations as a new asset pricing factor can account for the CIV-beta return spread and also helps to explain the cross-sectional differences in average returns on book-to-market, size, earning-to-price, and corporate bond portfolios. Replacing CIV with a factor based on the cross-sectional dispersion in household income growth or in firm size growth recovers many of the same asset pricing facts. This provides additional evidence for the connection between household risk and CIV.

Finally, we rationalize these empirical facts regarding idiosyncratic volatility co-movement and asset prices in a heterogeneous agent incomplete markets model. In our specification, households' equilibrium idiosyncratic consumption growth process possesses the same volatility factor structure as firm-level cash flow growth. We derive equilibrium asset prices on stocks with cash flow growth that features common idiosyncratic volatility and with different exposures to CIV shocks. In the model, CIV shocks carry a negative market price of risk. Our calibration shows that the return spread on high-minus-low CIV-beta stocks observed in the data is quantitatively consistent with the model, as are the return volatilities on the CIV-beta-sorted stocks. We also match the cross-sectional dispersion of household income growth, the mean and persistence of CIV, the cross-sectional spread in CIV betas, and the equity

[1] Prominent factor models in finance include the capital asset pricing model (CAPM) (Sharpe, 1964), intertemporal CAPM (Merton, 1973), arbitrage pricing theory (APT) (Ross, 1976), and the Fama and French (1993) model.

[2] Pástor and Veronesi (2005, 2006) suggest that time variation in stochastic discount factor volatility (and hence market return volatility) can drive time variation in idiosyncratic stock return volatility.

[3] See, e.g., Berk, Stanton, and Zechner (2010), Lustig, Syverson, and Van Nieuwerburgh (2011), and Zhang (2015).

[4] Heathcote, Storesletten, and Violante (2014) estimate that over 40% of persistent labor income shocks are passed through to household consumption.