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Business cycle variation in the risk-return trade-off

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ABSTRACT

In the United States and other Organisation for Economic Co-operation and Development (OECD) countries, the expected returns on stocks, adjusted for volatility, are much higher in recessions than in expansions. We consider feasible trading strategies that buy or sell shortly after business cycle turning points that are identifiable in real time and involve holding periods of up to 1 year. The observed business cycle changes in expected returns are not spuriously driven by changes in expected near-term dividend growth. Our findings imply that value-maximizing managers face much higher risk-adjusted costs of capital in their investment decisions during recessions than expansions.

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1. Introduction

The risk-adjusted cost of capital is a key input in any financial decision of rational managers. Its level affects the net present value of payoffs from any corporate investment project, from hiring decisions to capital expenditures, investment in inventories, advertising, and research and development. The risk-adjusted cost of capital of any firm depends on the firm's quantity of risk and its aggregate price. This paper focuses on the time-variation in the aggregate price of risk. We document regular shifts in the risk return trade-off over the course of 100 years of U.S. data and a half century of OECD data.

This paper provides new historical evidence from U.S. and foreign securities markets documenting large increases in the market price of aggregate risk during recessions. A U.S. equity investor, who buys securities 1–5 quarters into a recession or expansion – as defined by the National Bureau of Economic Research (NBER) – and holds them for 1 year, earns an average excess return of 11.3% in recessions, compared to only 5.3% in expansions, in the post-war sample examined (1945.1–2009.12). Sharpe ratios, which correspond to average excess returns divided by their standard deviations and thus represent a market compensation per unit of risk, are counter-cyclical: the post-war realized Sharpe ratio is on average 0.66 in recessions compared to 0.38 in expansions. In addition, the variation in the realized excess returns and Sharpe ratios during recessions (expansions) is equally substantial. Sharpe ratios reach a maximum of 0.82 four quarters into a recession and a minimum of 0.14 three quarters into an expansion.

The findings imply that, even in the absence of any other frictions in internal or external capital markets, unconstrained firms that maximize shareholder value have to use much higher risk-adjusted costs of capital when choosing investment projects during recessions, compared to expansions, if these projects are exposed to some aggregate risk. For a 1-year project with the same aggregate risk exposure as the U.S. stock market, the risk-adjusted cost of capital in the middle of an expansion would be at least nine percentage points lower than in the middle of a recession. As a result, financially

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unconstrained firms may reject lots of seemingly “good” projects in recessions to avoid destroying shareholder value. Conversely, in expansions, firms may accept lots of seemingly “bad” projects.

The findings are robust to different frequencies, different sub-samples, and different countries. Samples start either in 1854, 1925, or 1945, and end either in 1944 or 2009; estimates use either quarterly returns and quarterly recession dates, or monthly returns and monthly dates; and business cycles are dated thanks to the NBER or OECD economic turning points. In all time frames examined, equity Sharpe ratios increase during recessions and decrease during expansions. The findings pertain to a very limited number of observations: the NBER has identified only 32 cycles since 1854 in the USA. However, foreign countries offer additional observations. Using the OECD turning points to date peaks and troughs, similar business cycle variations in the conditional Sharpe ratio on equity appear in all G7 countries (Canada, France, Germany, Italy, Japan, UK, and USA). Again, the conditional equity Sharpe ratio increases during recessions and decreases during expansions.

In contrast to previous studies, financial variables are not used to predict asset returns. Instead, returns are only conditioned on the stage of the business cycle, determined exclusively by non-financial variables. Thus, the investment strategy described so far is not implementable because investors do not know NBER recession dates in real time. Hence, the question remains whether the variation in returns truly measures variation in expected returns, or whether it is a variation in expected cash flows mislabeled as discount rate variation. To answer this key question, four additional experiments are conducted.

First, evidence from newspaper articles and Internet searches shows that investors seem to learn about changes in the aggregate state of the U.S. economy rather quickly. The occurrence of the word “recession” in *The New York Times* and *The Washington Post* since 1980 is informative: it takes only 2 months for such an index to increase by one standard deviation above its expansion-implied mean. The number of Google Insight searches of the word “recession” is available on a shorter sample, but it shows a clear increase at the end of 2007, well before the NBER announcement of the start of the Great Recession.

Second, two different quasi real-time measures of business cycles lead to similar equity returns: the Chauvet and Piger’s (2008) real-time recession probabilities and the Chicago Fed National Activity Index (CFNAI). Investment strategies built on these quasi-real-time recession dates deliver substantial differences in average excess returns between recessions and expansions. In all cases, the average excess returns and the Sharpe ratios in the midst of recessions are larger than those measured in the midst of expansions.

Third, changes in expected returns during business cycle expansions and contractions are not related to changes in expected near-term dividend growth. The variance decomposition of the dividend yield offers a useful tool to assess cash flow predictability because the dividend yield is driven exclusively by news about either future returns or dividend growth. In the data, dividend-yield variation is more informative about returns in the subsequent year during recessions than during normal times: a 1% increase in the dividend yield raises the expected return by 56 basis points (bps) in recessions, compared to only 17 bps in expansions. This finding is consistent with a decrease in the persistence of risk premia during recessions. The dividend yield, however, is not more informative about future dividend growth during recessions. We find no empirical evidence that the simple investment strategy based on business cycle dates is really capturing cash flow variation.

Fourth, a set of simulations from a simple toy model shows that the investment strategy based on business cycle dates does not mechanically drive the results.[1] If excess returns and output or consumption growth are perfectly correlated and the NBER defines a peak as a period followed by low growth, then the methodology would suffer from a severe look-ahead bias: the simple investment strategy would automatically deliver low excess returns at the start of recessions. Excess returns, however, exhibit a low correlation with consumption growth. In this case, simulations show that the look-ahead bias is limited, even if consumption growth is persistent.

We show that expected returns to stocks, adjusted for volatilities, are higher in recessions than in expansions in the USA and other OECD countries under feasible trading strategies that start shortly after turning points and involve holding periods of up to 1 year. Such changes in expected returns during business cycle expansions and contractions are not explained away by changes in near-term dividend growth rates.

The rest of the paper is organized as follows. Section 2 presents some evidence that agents in the economy can detect changes in the business cycle environment rather quickly and defines “real-time” recession dates. Section 3 shows that realized and expected excess returns are higher on average during recessions than expansions. Section 4 focuses on the dynamics of excess returns and Sharpe ratios during recessions and expansions. Section 5 disentangles the cash flow and risk premium effects. Section 6 reviews the literature. Section 7 concludes. A detailed Appendix is available online on the Science Direct website.

2. How to identify recessions?

Recessions and expansions are commonly defined in the USA and other OECD countries using the NBER and OECD methodologies.

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[1] A detailed description of the simulations is available in a separate Online Appendix, along with the published paper on Science Direct.

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