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End-of-the-year economic growth and time-varying expected returns ☆

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ABSTRACT

We show that macroeconomic growth at the end of the year (fourth quarter or December) strongly influences expected returns on risky financial assets, whereas economic growth during the rest of the year does not. We find this pattern for many different asset classes, across different time periods, and for US and international data. We also show that movements in the surplus consumption ratio of Campbell and Cochrane (1999), a theoretically well-founded measure of time-varying risk aversion linked to macroeconomic growth, influence expected returns stronger during the fourth quarter than the other quarters of the year. Our findings suggest that expected returns, risk aversion, and economic growth are particularly related at the end of the year, when we also expect consumers' portfolio adjustments to be concentrated.

1. Introduction

Most financial economists would probably agree that economic growth should matter for expected returns. In a recession, for instance, investors are reluctant to take on risk pushing up expected returns on risky assets (Campbell and Cochrane, 1999). Empirically, however, establishing a robust link between time series movements in economic growth and expected returns has been difficult. A forecasting regression of next year's return from the US stock market in excess of the risk-free rate (R^e) on US real seasonally adjusted gross domestic product (GDP) growth (G^{GDP}) of this quarter, using quarterly observations since 1947, illustrates this:

$$R^e = \alpha - 2.59 G^{GDP} + \varepsilon, \quad t(G^{GDP}) = -1.70, \quad \overline{R}^2 = 1.65\%, \quad T = 248. \tag{1}$$

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In this regression, $t(G^{GDP})$ is the Newey and West (1987) adjusted t-statistic associated with the coefficient to GDP growth, the estimate for the constant is suppressed as it is unimportant for the point we make here, and T is the number of observations. This result — an insignificant t-statistic and a low $\overline{R}^2$ — implies that time series movements in expected excess returns have had no systematic relation to fluctuations in economic growth during the last 60+ years. Given that the continuous relation between expected returns and economic growth is a fundamental building block of many economic models, the apparent lack of a robust relation is puzzling.[1]

In this paper, we hypothesize that the relation between economic growth and expected returns is stronger at infrequent points in time. Our inspiration for this hypothesis is Duffie and Sun (1990), Lynch (1996), Gabaix and Laibson (2002), Jagannathan and Wang (2007), Bacchetta and van Wincoop (2010), and Abel, Eberly, and Panageas (2007, 2013), who argue that investors adjust their portfolio and consumption decisions at infrequent points in time. As an example, Abel, Eberly, and Panageas (2013) show that if there is a small fixed component to transaction costs, the interval between which investors make portfolio allocation decisions becomes constant. It follows that the relation between economic growth and expected returns should be stronger at such infrequent points when the Euler equation binds. We argue that the end of the year is a good candidate for a point in time when the relation between economic activity and expected returns is stronger.

We use the first part of this paper to thoroughly show that end-of-the-year macroeconomic growth rates (growth in real consumption, real GDP, industrial production, employment, capacity utilization, real labor income, etc.) contain a surprisingly large amount of information about expected excess returns over the next year from stocks and bonds, in-sample and out-of-sample, and in the US as well as internationally. As an example, when we pick out the fourth-quarter growth rates of real GDP ($G^{GDP,4}$; the growth from the third quarter to the fourth quarter) from the total sample of quarterly GDP growth rates, and use $G^{GDP,4}$ to predict next calendar year's excess return (R^e), we find

$$R^e = \alpha - 7.48 G^{GDP,4} + \varepsilon, \quad t(G^{GDP,4}) = -4.95, \quad \overline{R}^2 = 15.40\%, \quad T = 62. \tag{2}$$

In this regression, the relation between expected returns and fourth-quarter GDP growth is highly significant (t-statistic close to -5), and $G^{GDP,4}$ explains a substantial fraction of the stock return variation ($\overline{R}^2$ above 15%). Likewise, using fourth-quarter growth in industrial production or real consumption generates $\overline{R}^2$'s of 18% and 16%, respectively. These $\overline{R}^2$'s can be compared with the 11% or so that are generated by the typical variables used in the literature to capture movements in expected returns, such as the dividend–price ratio or the $\widehat{cay}$ ratio of Lettau and Ludvigson (2001). We also show, and this is the key point in the paper, that the growth rates of macroeconomic variables during the other quarters of the year are not significant predictors of excess returns. This explains why it has been difficult to uncover a robust relation between economic growth and expected returns. The strong information contained by the fourth quarter is difficult to detect from a typical time series regression of future returns on macroeconomic growth rates using all quarters as, in such a regression, the significant fourth-quarter effect gets mixed up with the noisy effects from the other quarters that do not contain systematic information about expected returns.

We show that these results extend to many settings other than the US in-sample equity return situation. For instance, we study out-of-sample predictability. Goyal and Welch (2008) show that traditional variables work poorly out-of-sample in that they generate low or negative out-of-sample R^2's. We confirm this. Fourth-quarter economic growth rates, meanwhile, are significant predictors of excess returns out-of-sample with R^2's around 10%, even when using vintage data available to the investor in real time. In addition, fourth-quarter economic growth rates predict returns on portfolios other than the aggregate US equity market portfolio, such as returns on portfolios of stocks sorted on book-to-market values and dividend yields, as well as bond returns. We study the robustness of these results through time. In general, fourth-quarter economic growth contains more information about expected returns in subsamples since the mid-1940s than commonly used information variables, such as the dividend–price ratio or the $\widehat{cay}$ ratio. We focus on quarterly observations in our paper as most macro-variables are quarterly. Using monthly observations on industrial production, we show that, within the fourth quarter, December growth rates capture a higher fraction of variation in expected returns than November and October growth rates, which makes intuitive sense. Finally, the fourth-quarter growth rate of industrial production in the Group of 7 (G7) countries is a strong predictor of excess returns on the world market portfolio as well as on regional portfolios, such as the European portfolio, the EAFE (Europe, Australia, and the Far East) portfolio, and so on, whereas economic growth during the other quarters does not predict returns globally, i.e., the fourth-quarter effect is not just a US phenomenon.

To explain our findings, we study the empirical relation between the surplus consumption ratio of Campbell and Cochrane (1999) and expected returns. Campbell and Cochrane (1999) show theoretically that low surplus consumption ratios in cyclical downturns lead to high risk aversion, which in turn lead to high expected returns, whereas high surplus consumption ratios in cyclical upswings lead to low expected returns. We show empirically that expected returns relate far more to movements in the surplus consumption ratio during the fourth quarter than during the other quarters of the year. We also show that fourth-quarter growth in consumer confidence, which

[1] The lack of a robust time series relation between economic growth and expected aggregate returns is wellknown in the literature. For instance, in their survey, Lettau and Ludvigson (2010, p. 625) write: "If such cyclical variation in the market risk premium is present, we would expect to find evidence of it from forecasting regressions of excess returns on macroeconomic variables over business cycle horizons. Yet the most widely investigated predictive variables have not been macroeconomic variables, but instead financial indicators such as equity-valuation ratios that have forecasting power concentrated over horizons longer than the typical business cycle."