A Note on “Dividend Strips and the Term Structure of Equity Risk Premia: A Case Study of the Limits of Arbitrage”

by Oliver Boguth, Murray Carlson, Adlai Fisher and Mikhail Simutin

Jules H. van Binsbergen†
Northwestern Kellogg,
Stanford GSB and NBER

Ralph S.J. Koijen‡
Chicago Booth
and NBER

October 2011

Binsbergen, Brandt, and Koijen (2011) (BBK) provide empirical evidence on the returns on dividend strips for the S&P 500 index. BBK report the following main empirical results using data from January 1996 to October 2009:

1. The average risk premium on short-term dividend strips is large and positive. The average excess return (or risk premium) on an annual buy-and-hold strategy over this data period is 8.35% for dividend return strategy 1 (denoted by $R_1$), which goes long in the 1.5 year dividend claim and 5.37% for return strategy 2 (denoted by $R_2$ and called the dividend steepener). The point estimate of average (excess) returns for both dividend strategies is higher than the 2.75% average return of the S&P500 index, suggesting that the term structure of stock markets is on average downward-sloping. However, given that the sample period only spans the period January 1996-October 2009, BBK can not reject the hypothesis that the average returns of dividend strips of all maturities are equal.

2. The standard deviation of dividend strip returns is higher than those of the S&P500 index for both return strategies.

3. The CAPM beta of dividend strip returns is below 1, with a point estimate of around 0.5, using monthly returns.

4. Returns on dividend strips are predictable by the lagged price-dividend ratio of dividend strips, where the price-dividend ratio is defined as the ratio of the dividend strip price to the sum of dividends over the past year.

Boguth, Carlson, Fisher, and Simutin (2011) (BCFS) write that market micro structure noise can explain the empirical properties of dividend strips as documented in BBK. In particular, BCFS argue that synthetically replicated claims can be mismeasured if the index level is slow to adjust relative to futures and/or options markets. Further, there may be other measurement error in prices. The authors show that in this setting:

*We thank Michael Brandt, John Cochrane, Darrell Duffie, Sydney Ludvigson, Bob McDonald, Jonathan Parker, Lubos Pastor, and Stijn Van Nieuwerburgh for discussions and suggestions. All views expressed in this note are ours.

†j-vanbinsbergen@kellogg.northwestern.edu, (847) 491-3838, http://www.kellogg.northwestern.edu/
‡ralph.koijen@chicagobooth.edu, (773) 834-4199, http://faculty.chicagobooth.edu/ralph.koijen/

1The dividend steepener goes long in dividends paid out between 0.5 year and 1.5 years from now (on average), so it excludes the first few months of dividends.
1. The average monthly simple return of dividend strips has an upward bias.

2. The volatility of monthly returns has an upward bias.

3. There is spurious return predictability in monthly returns.

4. Asynchronous price adjustment leads to an downward bias in measured CAPM betas. The other type of measurement error does not introduce a bias. The authors calibrate the model to obtain a CAPM beta of 0.5 for monthly returns, as reported in BBK (2011).

5. The null hypothesis that average returns on dividend strips are equal to those of the S&P500 index can not be rejected at conventional significance levels.

BCFS then proceed by arguing that in the environment with microstructure noise they propose, one should study average annual buy-and-hold returns (which are also reported in BBK) instead of monthly returns. They use the data set by BBK to compute these returns. They argue that the moments of monthly returns can be biased, whereas the moments of annual buy-and-hold returns have a much lower bias. BCFS argue that studying these long-term buy-and-hold returns alters the conclusions on the properties of dividend strips.

We show in this note that the conclusion of BCFS is based on a misunderstanding of the available empirical evidence:

1. We argue that based on annual buy-and-hold returns on synthetically replicated dividend strips, the conclusions from BBK are the same as those for monthly returns. BBK report annualized average monthly returns as well as average annual buy-and-hold returns. The economic conclusions from BBK are the same for both measures.

2. Synthetic replication is the key assumption in the model proposed by BCFS. Due to recent market developments, we can now measure dividend strip prices without having to rely on synthetic replication. After writing BBK, we have obtained data from the dividend futures market, which we explore in Binsbergen, Hueskes, Koijen and Vrugt (2011) (BHKV). We show in this note that the empirical properties of monthly returns on dividend futures confirm the results for monthly returns on synthetically replicated claims in BBK.

3. Monthly (and annual) returns based on dividend futures for the European and Japanese markets show the same results as for the US market: high average excess returns, high volatility, and a low CAPM beta.

In summary, the results we have documented so far, all point to a large positive risk premium, excess volatility and a CAPM beta below 1. We have now confirmed these finding through data from options markets (synthetic replication of dividend strips), dividend futures markets, and across three world regions. We find no evidence to support the idea that microstructure effects related to highly-leveraged positions explain the documented empirical properties of dividend strips.

In the abstract and introduction of their paper, BCFS suggest that their empirical results are drastically different than BBK. We show in this note that the results in both papers are identical, as BCFS use the data on dividend strip returns generated by BBK. BCFS show that the estimated risk premium on short-term dividend strips using overlapping monthly data of annual returns is somewhat lower than using annualized average monthly returns. However, BBK show that even using monthly data on overlapping annual buy-and-hold returns, the
estimated risk premium is large and larger than the risk premium on the index (the equity risk premium) over the same sample period. This point is repeated and confirmed by BCFS. We thus disagree with BCFS’s conclusion that there is no economic difference between returns on short-term dividend strips and the S&P500 index, as this difference is 2.6%-5.6% per year, but we agree that statistically one can not reject the null hypothesis that these returns are equal on average. Again, the latter point was already made in BBK.

In the theory section of their paper, BCFS take a flat term structure of equity markets as the benchmark, that is, dividend strips of all maturities (and hence of the index) have the same expected return. However, the reference point is a strongly upward-sloping term structure, not a flat term structure. Several leading asset pricing models (Campbell and Cochrane (1999) and Bansal and Yaron (2004)) suggest that (1) the risk premium on the short-term dividend strips is close to zero and (2) there is little excess volatility in such assets. These theories are the point of reference in BBK, not a flat term structure.

1 Dividend Futures US: Jan 2003 - Oct 2009

Given that we now have data from dividend futures markets between October 2002 and March 2011, we can compute the average returns for both our synthetically replicated data set as well as our dividend futures data set. We compute these (excess) returns between January 2003 and October 2009, which corresponds to the second sub sample in BBK, see Table I. The full sample results (October 2002 - March 2011), which are highly comparable, are discussed in the next section and in BHKV. To keep the discussion focused on BBK, we first study the sample period January 2003 to October 2009 in this section.

Every January, we go long in the dividend futures of the next year. That is, in January 2003 we go long in the dividend futures that expires in December 2004. We hold this contract for a year and compute monthly returns during the year, and unwind the position in December of 2003. In January 2004, we then go long in the dividend futures contract that expires in December of 2005 and continue this way to the end of our data set. Even though the maturities of these claims are not exactly the same as those of the synthetically replicated claims, they are very close and should therefore lead to highly similar estimates.

Table I reports the mean, standard deviation and CAPM beta with respect to the S&P500 index for three different monthly excess return strategies. Columns 2 and 3 report the moments of the excess returns for the dividend strategies reported in BBK (2011), which use synthetic replication. That is, the long dividend strategy \((R_{1,t+1} - R_{ft})\) and the dividend steepener \((R_{2,t+1} - R_{ft})\). Column 4 reports the moments of returns when investing in dividend futures \(R_{DF,t+1}\). Because the latter strategy is based on futures prices, this return is already an excess return (in excess of bond returns of the same maturity). Column 5 reports the moments of the excess returns on the S&P500, denoted by \(R_{SP,t+1} - R_{ft}\).

The table shows that the results for the synthetically replicated strips are highly similar to the results for the dividend futures market, leading to average excess returns that are about twice as high and more volatile than those of the index over this sample period. The average monthly excess return on dividend futures is 63bp per month, which in annualized terms corresponds to 7.83%. Using overlapping monthly data on annual buy-and-hold returns, the average annual excess return is

\[ \frac{\text{Average Monthly Excess Return}}{\text{Average Annual Excess Return}} = \frac{100}{7.83} \]

The difference in maturities arises from the different issuing cycles of dividend futures vs call and put options on the S&P500 index.
excess return is 6.60%. Further, the CAPM beta based on dividend futures is 0.60. The volatility of dividend future returns is also high and comparable to those of the synthetically replicated claims.

Finally, because the dividend futures returns are in excess of bond returns of the same maturity, and not in excess of the risk free rate, the average return we report for dividend futures is a lower bound. To make the number fully comparable to the other excess returns, we should add the average monthly excess returns on bonds, which increases the number by another 5-9 basis points. Also, because average excess returns on bonds have a low beta with respect to the excess returns on the S&P500 index, correcting for the bond excess returns in our dividend future computations, lowers the estimated CAPM beta from 0.60 to 0.56. We can conclude that the results from synthetic replication are highly comparable to those of using dividend futures markets directly, suggesting that potential measurement error in our replication procedure did not lead to significant biases in our results and hence does not seem to affect the main conclusions.

2 Dividend Futures US, Europe, and Japan: Oct 2002 - March 2011

Finally, we show that the empirical results documented in BBK do not just hold for the US market (S&P 500 index). We find similar results for Europe (DJ Eurostoxx 50 index) and Japan (Nikkei 225 index). Table 2 reports the (excess) returns on the dividend futures strategy described in the previous section across these three different markets over the full sample period that we have available (October 2002 through March 2011). The estimates show that for all three markets the average monthly excess returns is high. For the US this excess return is 71 basis points per month (as argued before, to get a measure of excess return in excess of the risk free rate instead in excess of bond returns we need to add another 5 to 9bp to this 71 bp number). For Europe and Japan these average monthly excess returns are 141 and 112 basis points, respectively. The volatility of dividend futures returns over this sample period are higher than those of the market. Also, as before, the betas on the market vary between 0.5 and 0.6.

In BHKV, we decompose the movements in dividend futures prices into movements in expected returns (return predictability) and expected dividend growth rates (dividend growth predictability). Our estimates suggest that risk premia and expected dividend both vary strongly over time, consistent with the results in BBK that returns on dividend strips are predictable. We refer to BHKV for further details.

---

<table>
<thead>
<tr>
<th>Long dividends</th>
<th>Dividend steepener</th>
<th>Dividend futures</th>
<th>S&amp;P500 Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_{1,t+1} - R_{ft}$</td>
<td>$R_{2,t+1} - R_{ft}$</td>
<td>$R_{DF,t+1}$</td>
<td>$R_{SP,t+1} - R_{ft}$</td>
</tr>
<tr>
<td>mean</td>
<td>0.0052</td>
<td>0.0066</td>
<td>0.0063</td>
</tr>
<tr>
<td>standard deviation</td>
<td>0.0490</td>
<td>0.0630</td>
<td>0.0490</td>
</tr>
<tr>
<td>CAPM beta</td>
<td>0.5659</td>
<td>0.7100</td>
<td>0.6041</td>
</tr>
</tbody>
</table>

Table 1: Comparing the empirical properties of monthly dividend strip returns using either synthetic replication as done in BBK (columns 2 and 3), or through data from the dividend futures market as done in BHKV (column 4) using data between January 2003 and October 2009.

---

4The average monthly excess returns on 1-year bonds is about 5bp and the average excess returns on 2-year bonds is about 9bp over this sample period.

5Because dividend futures price levels start in October 2002, the first return observation is in November 2002.
Table 2: Comparing the empirical properties of monthly dividend strip returns in dividend futures market data as studied in BHKV using monthly data between October 2002 and March 2011 for three regions: US, Europe and Japan. For Japan our available data sample is January 2003 through March 2011.

References


