Discussion of:

"Davids, Goliaths, and Business Cycles"

by

Jefferson Duarte, and Nishad Kapadia

Caio Almeida

Getulio Vargas Foundation

SBFIN, July 19, 2012
An Overview of Return Predictability

- The objective is to predict the premium of aggregate stocks (market portfolio).

- Based on present value relations between prices and cash-flows, researchers have identified a number of potential predictors (Goyal and Welch, 2008).

- What is the current view on testing equity return predictability?

  i) propose a candidate predictor (based on some economic theory), ii) verify its statistical properties (i.e. persistence), iii) test for in-sample and out-of-sample ability to forecast returns, and iv) compare it to established benchmarks.

- This paper: Contributes proposing a simple, less persistent variable, economically justified by Menzly, Santos and Veronesi (2004), that presents strong in- and out-of-sample predictability. For instance, depending on the sample, an out-of-sample $R^2$ for annual returns of 5.7% or 8.3%.
Identifying good candidates to predict the equity premium

- Given an SDF $M$, from the basic conditional Euler equation for returns we obtain: $E_t(R^e_{t+1}) = -R^f_t \cdot \text{cov}_t(M_{t+1}, R^e_{t+1})$

- Or equivalently, on a beta-model notation: $E_t(R^e_{t+1}) = -R^f_t \cdot \beta^{R^e,M}_t \cdot \text{var}_t(M_{t+1})$

- Assuming small time-variation on risk exposure, we see that a good proxy for the conditional variance of the SDF will predict returns.

- More generally, factors that covary with the conditional covariance above will predict the equity premium.

- This simple structure helps to explain why the cross-sectional premium from Polk, Thompson, and Vuolteenaho (2006), the fourth-quarter consumption growth rate of Moller and Rangvid (2011), and the GVD variable (Duarte and Kapadia).

- Moreover, it can be used to suggest new predictors. For instance, if one believes that the SDF contains a market squared term $R^2_e$, than market conditional skewness might be a good predictor for the equity premium (see Harvey and Siddique for a cross-sectional analysis).
Identifying good candidates to predict the equity premium - II

- **Beta-model:** \( E_t(R^e_{t+1}) = -R^f_t \ast \beta_{R^e,t} \ast \text{var}_t(M_{t+1}) \)

- Polk, Thompson and Vuolteenaho: CAPM, \( M_{t+1} \) is linear on \( R^e_M \) and \( E_t(R^e_{t+1}) = \beta_{iR^e_M} \ast \lambda_t \).

- A cross-section regression of expected equity returns on risk exposures (betas) estimates the common equity premium \( \lambda_t \).

- Fourth-quarter consumption growth \( \frac{C_{t+1}}{C_t} \): Jagannathan and Wang (2007) show that a linearized version of the CCAPM with those particular consumption growth rates explain the cross-section of 25 FF portfolios.

- SDF is linear on \( \frac{C_{t+1}}{C_t} \). If consumption growth rate covaries with its conditional variance it will forecast equity returns.

- On a habit formation SDF model (Campbell and Cochrane (1999)) with multiple heterogeneous assets, Menzly, Santos and Veronese show that expected returns depend on the inverse of the surplus/consumption ratio (\( Y \)).

- In this paper, Duarte and Kapadia (2012) show that GVD positively covaries with \( Y \).
Comment 1: Strong Benchmarks

- Duarte and Kapadia (2012) summarize information on the cross-section of equities with their GVD variable.

- In fact, GVD measures the amount of capitalization of large firms with respect to the whole market portfolio.

- However, there are other interesting variables that can be extracted from cross-sectional data, or that explain this data and that are also quite successful:
  - Kelly and Pruitt (2011) suggest extracting information from the cross-section of book-to-market ratios of FF portfolios making use of a technique called Partial Least Squares. Their univariate measure obtains, for annual returns, out-of-sample $R^2$'s of the order of 10%!
  - Moller and Rangvid (2011) show that the fourth-quarter consumption growth rate and other macro variables produce out-of-sample $R^2$'s between 8.7% and 12.6%
Comment 2: Robust Predictability Tests

- Specially after Goyal and Welch (2008), it is a common practice for researchers on stock return predictability to report out-of-sample $R^2$'s from recursive estimation windows.

- However, recent advances on the econometrics of predictability (Hansen and Timmermann (2011) Rossi and Inoue (2011)) advocate for choices of sample split that are robust to data mining.

- As a start, they recommend plotting $R^2$'s for a sequence of different sample splits. (see Figure below)

Observing a Sequence of $R^2$’s: Annual Returns

Figure 3: Out-of-Sample $R^2$ by Sample Split Date, One Year Returns

Notes: Out-of-sample $R^2$ across sample split dates. Forecasts are based on a single PLS factor from 25 book-to-market ratios of size and value-sorted portfolios of U.S. stocks from Fama and French (1993); the aggregate price-dividend ratio; the cross-section premium (cap); the ex post consumption-wealth-income ratio (cay); and the first principal component extracted from the 25 Fama-French portfolio book-to-market ratios (pc1).
Hansen and Timmermann (2011) identify that predictability statistical power is larger when the sample split happens earlier.

They also find that when samples are split either too early or too late in time it generates size distortions (higher probability of rejecting the no-predictability hypothesis when it is true).

The picture shows that the common factor by Kelly and Pruitt (2011) extracted from the 25 FF book-to-market ratios is indeed a potentially strong competitor.

cay, the ex-post consumption-wealth-income ratio is also competitive. Difference between current paper and Kelly and Pruitt when o-o-s evaluation starts in 1975: -5.2% this paper versus 2.5% (Kelly and Pruitt).
Comment 4: Theoretical Motivation

- Menzly, Santos and Veronese (2004) propose a model with habit formation and heterogeneous assets that has theoretical implications about equity return predictability.

- Duarte and Kapadia (2012) use their model to theoretically motivate the use of GVD as a predictor.

- In their model $Y$, the inverse of the surplus/consumption ratio follows the following mean reverting process:

  \[ dY_t = k(\bar{Y} - Y_t)dt - \alpha(Y_t - \lambda)(\sigma dB_t^1) \]  

  (1)

- Duarte and Kapadia show that GVD covaries positively with $Y$.

- However, from the SDE for $Y$ and the equilibrium solution for consumption, there is no guarantee that $Y$ will be above $\lambda$ (although mentioned by Menzly, et al), so that the covariance could potentially keep switching signs.
Conclusion

- This paper proposes GVD, a simple, less persistent variable that predicts well the aggregate equity premium both in- and out-of-sample.

- GVD, the amount of capitalization of large firms, has a theoretical motivation to behave as a good predictor: On an equilibrium model with heterogeneous assets and a habit formation SDF, GVD covaries positively with a variable that drives the aggregate equity premium.

- A Stronger case will result if:
  - More appropriate benchmarks and robust techniques that avoid mining over sample split are adopted.
  - Statistical tests for comparison of predictability accuracy are adopted.

- Important message: Cross-sectional data on equity (book-to-market ratios, expected returns, capitalization shares on the market portfolio) represents powerful information to forecast aggregate equity premium.