Empirical Asset Pricing:
Predicting Swiss Aggregate Stock Returns

Bachelor's Thesis
in Financial Economics

supervised by the
Department of Banking & Finance
at the University of Zurich

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to obtain the degree of
Bachelor of Arts UZH
(in Economics and Business Administration)

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Closing date:	02/02/2012

Executive Summary

Endeavours to forecast aggregate stock returns are not just a recent phenomenon; they have a very long tradition in empirical finance. Nearly 60 years ago, Kendall (1953) insisted that stock prices should generally follow a random walk process. While he focused primarily on testing autoregressive lags of stock market returns, subsequent papers by Fama and French (1988) as well as Campbell and Shiller (1989) broadened the framework to lagged predictive variables such as the dividend yield or the price-earnings ratio. These financial indicators showed significance up to forecasting horizons of five years and above. Due to criticism during the abnormal late 1990s, novel explanatory macroeconomic variables like the consumption-wealth ratio (Lettau and Ludvigson (2001)) were applied and briefly praised. Nowadays, it is widely accepted in financial economics that stock market returns are indeed forecastable to a certain degree. While there generally was good in-sample significance in the earlier academic research, the recently emerged out-of-sample regressions have dampened the euphoria a bit.

As the purpose of this thesis is to provide both theoretical and empirical evidence for predictability, in the first half of the thesis the *dynamic Gordon growth model* (Campbell and Shiller (1989)) as well as the *consumption-wealth ratio* (Lettau and Ludvigson (2001)) are derived. For the latter I follow Nitschka (2010) and concentrate on the US consumption-wealth ratio applied to a foreign stock market, in this case Switzerland.

Since the vast prediction literature is largely dominated by surveys of US data, I deviate from that usual behaviour and assess, in the second half of the thesis, whether conventional predictive variables are significantly able to forecast Swiss aggregate stock market returns. Because of the more limited data availability for the Swiss market as well as the mainly US prediction literature, I concentrate on the following predictors: the dividend-price ratio, the price-earnings ratio, the dividend-payout ratio, the (relative) short-term rate, the term spread and the US consumption-wealth ratio. In order to get representative findings, the basic time series consist of quarterly data from 1966Q2 to 2011Q3 obtained from Global Financial Data.

To better ascertain the significance of the stock returns predictability, I apply in-

sample as well as out-of sample predictions (the latter using a recursive scheme). While for the in-sample predictions the usual methods and significance measures apply, to assess the forecasting accuracy of the out-of-sample predictions I compare the performance of predictions from the above mentioned variables with the performance of a benchmark model which uses the historical average of stock returns to forecast. Metrics of out-of-sample forecasting accuracy include an out-of-sample R^2 (Campbell and Thompson (2007)), the MSE-F statistic of McCracken (2004) and the ENC-NEW statistic of Clark and McCracken (2001). To show that predictability is not a phenomenon that appears only at certain horizons, the forecasting horizons span one, four, twelve and twenty quarters. To demonstrate that the findings are largely independent of the applied econometric methodology, I also apply a small vector autoregressive model.

After the conduction of the empirical analysis, it will become clear that, in accordance with the literature, the short-horizon predictability is in general rather weak; the most significant explanatory variables are the relative short-term rate and the term spread. As the forecasting horizon increases, the US consumption-wealth ratio gains forecasting power, culminating in a decent 34 per cent when predicting 20 quarters ahead. The later out-of-sample forecasts confirm the results from the in-sample predictions, and moreover present further findings: the traditional valuations ratios, the dividend-price ratio and the price-earnings ratio, are the worst performing explanatory variables in every aspect. Again, one could argue that the abnormal behaviour of the 1990s triggered the insignificance of these traditional variables. To test this hypothesis I use a subsample that excludes the whole 1990s; no significant improvements are observable.

As the prediction literature is voluminous both in terms of used explanatory variables and in applied econometric techniques, there is of course potential for improvement. The first point is limited by data availability, while the second is expandable, since an academic scholar could have applied more sophisticated models using Kalman filters or structural shifts. Then again, even seminal papers as such as those of Lettau and Ludvigson (2001) or Rapach and Wohar (2006) apply rather simple econometric methodologies in order to concentrate on the implications of the findings. Further research may concentrate more on statistical issues rather than on attempting to seek predictive variables that maximize the explanatory power, as there are so many both statistical as well as conceptual pitfalls. To name but a few examples, topics as overlapping data, extremely persistence and structural changes are the key challenges in modern prediction literature.