

Supplemental material for

Asset Pricing and Excess Returns over the Market Return

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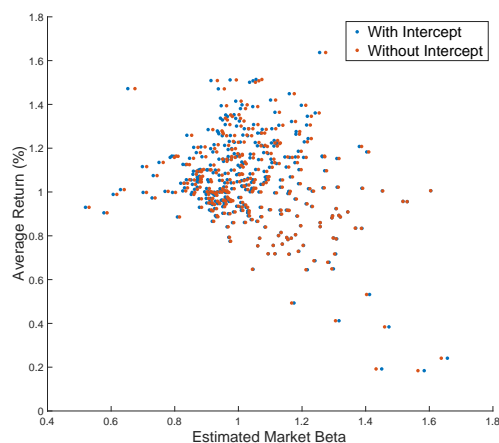
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This documents contains an additional figure and five tables whose results are discussed in the paper but are not part of it.

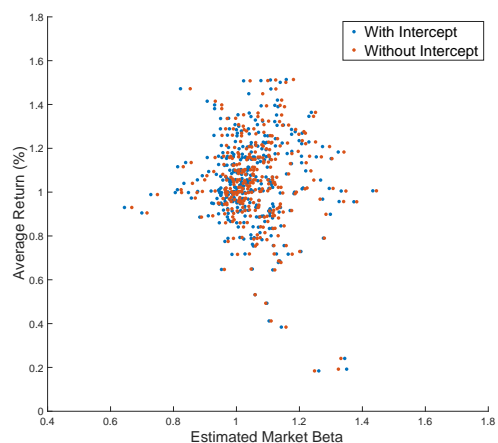
Alternative Figure 3: Distributions of Estimated Market Betas from Regressions With and Without Intercept

The market betas are estimated using 330 portfolio returns over the one-month treasury bill rate (RF-excess returns) from January 1970 to December 2013. The value-weighted portfolio returns, the one-month treasury bill rate, the five factors of Fama and French (2015), and the 330 test portfolio returns are from Kenneth French’s webpage. The 330 portfolios are 25 Size and Book to Market, 25 Size and Investment, 25 Size and Operating Profitability, 25 Book to Market and Investment, 25 Book to Market and Operating Profitability, 25 Investment and Operating Profitability, 30 Industry, 10 Residual Variance, 10 Variance, 10 Net Share Issues, 10 Market Beta, 10 Accruals, 10 Long-term Reversal, 10 Short-term Reversal, 10 Momentum, 10 Dividend Yield, 10 Cash Flow to Price, 10 Earnings to Price, 10 Size, 10 Book to Market, 10 Investment, and 10 Operating Profitability. The five VW-PC factors are obtained from the VW-excess returns on these 330 portfolios. The market betas (the betas of the RF-excess return on the VW portfolio “With Intercept” and the raw return on the VW portfolio “Without Intercept”) are estimated by three different factor models: the basic CAPM (which uses the MKT factor only), the five-factor model of Fama and French (2015), and the CAPM augmented with the five VW-PC factors.

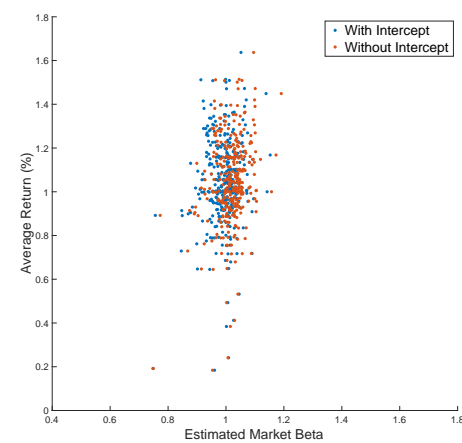
(a) CAPM



(b) Fama-French Five-Factor model



(c) CAPM Augmented with five VW-PCs



Alternative Table 2: Summary Statistics from Estimated Market Betas using Raw Returns and No-Intercept

The market betas (the betas of the MKT factor) are estimated from three different models without intercept: the CAPM (one factor model with the MKT factor), the five-factor model of Fama and French (2015, FF5), and the CAPM augmented with the five VW-PC factors (CAPM plus VW-PC5). The data used for this table are the same as those used for Table 2 in the main body of the paper. For each model, the response variables are raw returns on individual stocks or the 180 tests portfolios. The five VW-PC factors are extracted from the 150 base portfolios as in Table 2 in the main body of the paper. Four different sample periods are considered. Panel (a) reports the rejection frequencies of the hypothesis that the market beta equals one ($\beta_{vw,i} = 1$) for an individual asset i at a 5% significance level. The t-statistics are computed with the White heteroskedasticity robust OLS standard errors. Panels (b) and (c) report the magnitude of the dispersions (cross-sectional standard deviations) of the estimated market betas and the root mean square errors that are computed by $\sqrt{N^{-1}\sum_{i=1}^N(\hat{\beta}_{vw,i} - \bar{b}_{vw})^2}$ and $\sqrt{N^{-1}\sum_{i=1}^N(\hat{\beta}_{vw,i} - 1)^2}$, respectively, where $\bar{b}_{vw} = N^{-1}\sum_{i=1}^N\hat{\beta}_{vw,i}$.

	N	T	CAPM	FF5	CAPM plus VW-PC5
Panel (a) Rejection frequency of the hypothesis that market beta equal 1 (at 5% level)					
Individual Stock Returns 1970-1980	1224	132	37%	24%	22%
Individual Stock Returns 1981-1991	1856	132	35%	28%	18%
Individual Stock Returns 1992-2002	1877	132	50%	27%	21%
Individual Stock Returns 2003-2013	2062	132	42%	31%	22%
Test Portfolio Returns 1970-1980	180	132	49%	31%	25%
Test Portfolio Returns 1981-1991	180	132	58%	54%	39%
Test Portfolio Returns 1992-2002	180	132	69%	37%	23%
Test Portfolio Returns 2003-2013	180	132	67%	48%	25%
Panel (b) Dispersion (standard deviation) of the estimated market betas					
Individual Stock Returns 1970-1980	1224	132	0.39	0.32	0.31
Individual Stock Returns 1981-1991	1856	132	0.38	0.37	0.37
Individual Stock Returns 1992-2002	1877	132	0.58	0.53	0.47
Individual Stock Returns 2003-2013	2062	132	0.56	0.52	0.47
Test Portfolio Returns 1970-1980	180	132	0.18	0.11	0.09
Test Portfolio Returns 1981-1991	180	132	0.14	0.10	0.08
Test Portfolio Returns 1992-2002	180	132	0.29	0.16	0.11
Test Portfolio Returns 2003-2013	180	132	0.25	0.18	0.12
Panel (c) Root Mean Square Error					
Individual Stock Returns 1970-1980	1224	132	0.45	0.33	0.31
Individual Stock Returns 1981-1991	1856	132	0.38	0.37	0.37
Individual Stock Returns 1992-2002	1877	132	0.62	0.53	0.47
Individual Stock Returns 2003-2013	2062	132	0.61	0.52	0.47
Test Portfolio Returns 1970-1980	180	132	0.19	0.12	0.09
Test Portfolio Returns 1981-1991	180	132	0.15	0.12	0.09
Test Portfolio Returns 1992-2002	180	132	0.30	0.17	0.11
Test Portfolio Returns 2003-2013	180	132	0.27	0.20	0.12

Alternative Table 3 using EW-excess returns: Frequencies of Significant Pricing Errors (at a 5% Significance Level)

This table reports the rejection frequencies of the hypothesis of no pricing error ($\alpha_i = 0$) for an individual asset i at a 5% significance level. The pricing errors of individual assets are estimated for five different models: the CAPM, the five-factor model of Fama and French (FF5), the model of one single EW-PC factor (EW-PC1), the model of five EW-PC factors (EW-PC5), and, finally, the CAPM augmented with the five EW-PC factors (CAPM plus EW-PC5). Each model is estimated using the EW-excess returns as response variables. The standard errors of the estimated pricing errors are obtained using the White heteroskedasticity robust OLS variance matrices. The hypothesis of no pricing error was tested for each asset by the usual t -statistic. All of the results are obtained using the same data that are used for Table 1.

	N	T	CAPM	FF5	EW-PC1	EW-PC5	CAPM plus EW-PC5
Individual Stocks Returns 1970-1980	1224	132	4.7%	13.5%	8.8%	11.8%	11.3%
Individual Stocks Returns 1981-1991	1856	132	22.7%	17.6%	12.1%	11.2%	10.3%
Individual Stocks Returns 1992-2002	1877	132	5.9%	11.6%	6.6%	14.1%	10.3%
Individual Stocks Returns 2003-2013	2062	132	6.8%	9.3%	7.7%	8.0%	9.3%
Test Portfolios Returns 1970-1980	180	132	32.8%	15.0%	17.2%	20.6%	20.6%
Test Portfolios Returns 1981-1991	180	132	28.3%	19.4%	16.1%	22.8%	20.0%
Test Portfolios Returns 1992-2002	180	132	12.8%	15.6%	21.7%	32.2%	22.2%
Test Portfolios Returns 2003-2013	180	132	15.0%	30.6%	8.3%	8.3%	15.0%

Alternative Table 4 using EW-excess returns: Annualized Average Absolute Pricing Errors

This table reports the estimated annualized average absolute pricing error of each of the five different models considered in Table 4. All of the results are obtained using the same data that are used for Table 1.

	N	T	CAPM	FF5	EW-PC1	EW-PC5	CAPM plus EW-PC5
Individual Stocks Returns 1970-1980	1224	132	0.072	0.089	0.074	0.080	0.079
Individual Stocks Returns 1981-1991	1856	132	0.104	0.113	0.090	0.093	0.094
Individual Stocks Returns 1992-2002	1877	132	0.098	0.119	0.099	0.117	0.112
Individual Stocks Returns 2003-2013	2062	132	0.085	0.096	0.088	0.089	0.092
Test Portfolios Returns 1970-1980	180	132	0.052	0.023	0.025	0.021	0.020
Test Portfolios Returns 1981-1991	180	132	0.045	0.029	0.023	0.021	0.021
Test Portfolios Returns 1992-2002	180	132	0.036	0.045	0.033	0.032	0.028
Test Portfolios Returns 2003-2013	180	132	0.028	0.035	0.017	0.014	0.018

Alternative Table 5 using EW-excess returns: Correlations between Average and Predicted Expected Returns I

This table reports the correlations between (*ex post*) average returns and predicted expected returns on individual assets. The expected returns are predicted by the same models that are used for Table 4. For each model, the predicted expected return on asset i is obtained by $\hat{\mu}_i = \bar{r}_{EW} + \hat{\beta}'_i \bar{f}$, where \bar{r}_{EW} is the mean return on the EW portfolio, \bar{f} is the vector of mean factors, and $\hat{\beta}_i$ is the estimated factor beta for asset i . All of the results are obtained using the same data that are used for Table 1.

	N	T	CAPM	FF5	EW-PC1	EW-PC5	CAPM plus EW-PC5
Individual Stocks Returns 1970-1980	1224	132	0.271	-0.104	0.095	-0.023	0.039
Individual Stocks Returns 1981-1991	1856	132	0.103	0.094	0.259	0.259	0.296
Individual Stocks Returns 1992-2002	1877	132	0.400	-0.027	0.314	-0.34	-0.055
Individual Stocks Returns 2003-2013	2062	132	0.323	0.177	0.336	0.216	0.323
Test Portfolios Returns 1970-1980	180	132	0.093	0.312	0.109	0.417	0.484
Test Portfolios Returns 1981-1991	180	132	-0.325	0.498	0.630	0.642	0.649
Test Portfolios Returns 1992-2002	180	132	-0.253	0.285	-0.209	0.332	0.392
Test Portfolios Returns 2003-2013	180	132	0.357	0.340	0.443	0.619	0.528

Alternative Table 6 using EW-excess returns: Correlations between Average and Predicted Expected Returns II

This table reports the correlations between average (*ex post*) returns and predicted expected returns on individual assets. The expected returns are predicted by the same five models that are used for Table 4. For each model, the predicted expected return on asset i is $\tilde{\mu}_i = \bar{r}_{EW} + \hat{\beta}'_i \hat{\gamma}_f$, where \bar{r}_{EW} is the mean return on the EW portfolio, $\hat{\beta}_i$ is the estimated factor beta, and $\hat{\gamma}_f$ is the estimated risk premium vector by the Fama-MacBeth (1973) cross-sectional regression. All of the results are obtained using the same data that are used for Table 1.

	N	T	CAPM	FF5	EW-PC1	EW-PC5	CAPM plus EW-PC5
Individual Stocks Returns 1970-1980	1224	132	0.271	0.424	0.095	0.489	0.495
Individual Stocks Returns 1981-1991	1856	132	0.103	0.324	0.259	0.411	0.425
Individual Stocks Returns 1992-2002	1877	132	0.400	0.416	0.314	0.409	0.414
Individual Stocks Returns 2003-2013	2062	132	0.323	0.433	0.336	0.411	0.442
Test Portfolios Returns 1970-1980	180	132	0.093	0.498	0.109	0.592	0.635
Test Portfolios Returns 1981-1991	180	132	0.325	0.675	0.630	0.744	0.746
Test Portfolios Returns 1992-2002	180	132	0.253	0.343	0.209	0.395	0.506
Test Portfolios Returns 2003-2013	180	132	0.357	0.585	0.443	0.637	0.639