Appendix A. Online Appendix

In this appendix, we present supplementary results for our methodology in which we allow loadings of characteristics on factors to vary over time. That is, we replace equation (5) with period-by-period regressions,

$$\hat{\beta}_{p,t} - \bar{\beta}_t = \delta_{0t} + \boldsymbol{\delta}_t' \left(\mathbf{X}_{p,t} - \bar{\mathbf{x}}_t \right) + v_{p,t}.$$

The advantage to this approach is that it uses only information available at time t to estimate the relation between risk exposures and characteristics. As a result, portfolios formed on implied risk exposures do not use forward-looking information. However, this comes at the cost of time-varying relations between characteristics and risk exposures, which is difficult to reconcile with theoretical models.

Table Appendix A.1: Relation Between Portfolio Betas and Characteristics

Table **??** presents results of regressions of portfolio betas on characteristics,

$$\left(\hat{\beta}_{it} - \bar{\beta}_t\right) = d_{0t} + \mathbf{d}_t \left(\mathbf{X}_{it} - \bar{X}_t\right) + v_{it},$$

where $\hat{\beta}_{it}$ is the portfolio exposure to cumulative consumption risk estimated using data from time 0 through time t and $\mathbf{X}_{it}$ is a vector of portfolio characteristics at time t. The characteristics are those used to form portfolios; asset growth (AG), book-to-market ratio (BM), market value (MV), past 12 month return (P12), stock issuance (SI), and total accruals (TA). The table reports mean estimates $\bar{\mathbf{d}}_t$ and t-statistics calculated as in [**?**]. Data are sampled at the quarterly frequency over the period September, 1953 through December, 2012.

	AG	BM	MV	$P12$	SI	TA	$\bar{R}^2$
Mean	0.57	0.02	-0.48	1.71	-1.66	-5.97	59.47
t-stat.	9.96	1.16	-76.16	35.79	-24.14	-47.56	

Table Appendix A.2: Implied Firm-Level Betas

Table **??** depicts summary statistics for portfolios sorted on betas predicted by portfolio-level regressions of betas on characteristics. Each month t, using data available to month t, we regress cross-sectionally demeaned estimated exposures of 55 portfolios sorted on asset growth, book-to-market ratio, market value, past 12 month return, stock issuance, and total accruals onto their cross-sectionally de-meaned characteristics for the month. We utilize the portfolio level regression coefficients to construct firm-level betas, and repeat the procedure each month from September, 1983 through November, 2012. We then form portfolios on quintiles of calculated betas for monthly holding periods. Panel A presents means, *ex ante* betas, and *ex post* betas for value-weighted portfolios formed on quintiles of calculated risk exposure. The *ex post* betas are estimated via the regression

$$\prod_{j=0}^{3} R_{p,t-j} = a_p + \beta_{\eta,p} \sum_{j=0}^{3} \eta_{t-j} + e_{p,t}.$$

In Panel B we report means, *ex ante* betas, and *ex post* betas for equally-weighted portfolios formed on quintiles of calculated risk exposures. Data cover the period June, 1984 through December 2012. Mean returns are nominal and calculated using monthly returns; risk exposures are calculated using quarterly returns and deflated to real using the PCE deflator from the BEA.

Panel A: Value-Weighted Portfolios

Quintile	Mean	Ex ante β_η	Ex post β_η
1	0.925	1.155	4.079
2	1.080	2.494	4.373
3	1.212	3.219	5.748
4	1.444	3.936	7.581
5	1.318	5.130	6.686

Panel B: Equally-Weighted Portfolios

Quintile	Mean	Ex ante β_η	Ex post β_η
1	0.867	1.268	1.112
2	1.058	2.566	1.731
3	1.193	3.269	2.734
4	1.350	3.993	3.159
5	1.777	5.296	5.003

Table Appendix A.3: Implied Firm-Level Market Betas

Table **??** depicts summary statistics for portfolios sorted on betas predicted by portfolio-level regressions of market betas on characteristics. Each month t, using data available to month t, we regress cross-sectionally demeaned estimated exposures of 55 portfolios sorted on asset growth, book-to-market ratio, market value, past 12 month return, stock issuance, and total accruals onto their cross-sectionally de-meaned characteristics for the month. We utilize the portfolio level regression coefficients to construct firm-level betas, and repeat the procedure each month from September, 1983 through November, 2012. We then form portfolios on quintiles of calculated betas for monthly holding periods. Panel A presents means, *ex ante* betas, and *ex post* betas for value-weighted portfolios formed on quintiles of calculated risk exposure. The *ex post* betas are estimated via the regression

$$R_{p,t} = a_p + \beta_{m,p} R_{m,t} + e_{p,t},$$

where $R_{m,t}$ is the excess return on the value-weighted market portfolio. In Panel B we report means, *ex ante* betas, and *ex post* betas for equally-weighted portfolios formed on quintiles of calculated risk exposures. Data cover the period June, 1984 through December 2012.

Panel A: Value-Weighted Portfolios

Quintile	Mean	Ex ante β_m	Ex post β_m
1	0.824	0.907	0.962
2	1.046	0.989	0.910
3	1.127	1.031	0.958
4	1.100	1.072	0.971
5	1.137	1.148	1.079

Panel B: Equally-Weighted Portfolios

Quintile	Mean	Ex ante β_m	Ex post β_m
1	1.032	0.891	1.173
2	1.210	0.990	1.006
3	1.305	1.032	0.957
4	1.384	1.073	0.965
5	1.313	1.168	1.103

Table Appendix A.4: Factor Model Risk Adjustment

Table **??** presents time series regressions of returns on consumption beta-sorted quintile portfolios on factors from the [**?**] and [**?**] factor models:

$$\begin{aligned} R_{p,t+1} - R_f &= \alpha_p^{FF} + \beta_{p,MRP} R_{MRP,t+1} + \beta_{p,SMB} R_{SMB,t+1} + \beta_{p,HML} R_{HML,t+1} \\ &\quad + \beta_{p,CMA} R_{CMA,t+1} + \beta_{p,RMW} R_{RMW,t+1} + \epsilon_{p,t+1}^{FF} \\ R_{p,t+1} - R_f &= \alpha_p^{HXZ} + \beta_{p,MKT} R_{MKT,t+1} + \beta_{p,ME} R_{ME,t+1} + \beta_{p,IA} R_{IA,t+1} \\ &\quad + \beta_{p,ROE} R_{ROE,t+1} + \epsilon_{p,t+1}^{HXZ}. \end{aligned}$$

Panel A presents results for the [**?**] model and Panel B results for the [**?**] model. Data are sampled at the monthly frequency from June, 1984 through December, 2012.

Panel A: Fama-French (2014) Model

Quintile		α	β_{MRP}	β_{SMB}	β_{HML}	β_{CMA}	β_{RMW}	R^2
1	Coefficient	-0.28	1.21	-0.38	0.02	-0.07	-0.07	90.89
	t-stat	-2.38	49.42	-8.61	0.27	-0.81	-1.21	
2	Coefficient	-0.19	1.12	-0.28	-0.01	0.11	0.22	96.44
	t-stat	-3.04	85.78	-11.91	-0.35	2.28	7.22	
3	Coefficient	-0.04	1.04	-0.01	0.01	0.11	0.30	96.55
	t-stat	-0.62	84.85	-0.64	0.33	2.45	10.49	
4	Coefficient	0.15	0.97	0.21	0.03	0.16	0.21	96.01
	t-stat	2.45	73.45	8.71	0.88	3.32	6.89	
5	Coefficient	0.65	0.92	0.36	-0.04	0.25	-0.01	91.86
	t-stat	6.52	44.51	9.63	-0.80	3.36	-0.13	
5-1	Coefficient	0.93	-0.29	0.75	-0.06	0.32	0.06	34.48
	t-stat	4.77	-7.06	10.12	-0.57	2.21	0.67	

Panel B: Hou, Xue, and Zhang (2014) Model

Quintile		α	β_{MKT}	β_{ME}	β_{IA}	β_{ROE}	R^2
1	Coefficient	0.14	1.08	0.31	0.03	-0.57	82.64
	t-stat	0.88	29.08	6.13	0.37	-9.49	
2	Coefficient	0.09	1.01	0.50	0.23	-0.27	91.38
	t-stat	0.96	45.21	16.28	4.66	-7.38	
3	Coefficient	0.23	0.90	0.66	0.22	-0.21	91.21
	t-stat	2.48	41.90	22.41	4.80	-6.02	
4	Coefficient	0.47	0.81	0.76	0.21	-0.27	88.20
	t-stat	4.38	32.41	22.25	3.82	-6.68	
5	Coefficient	1.05	0.76	0.85	0.08	-0.42	81.94
	t-stat	7.15	22.32	18.26	1.09	-7.68	
5-1	Coefficient	0.91	-0.32	0.54	0.05	0.15	24.82
	t-stat	4.40	-6.74	8.22	0.49	1.92	

Table Appendix A.5: Industry Risk Exposures

Table **??** presents mean returns, betas, and standard deviations of betas for industry group portfolios. Industry groups are defined according to Global Industrial Classification Standard Codes (GICS) obtained from Compustat. Betas are computed using portfolio-level relations between risk exposures and characteristics. We also report average betas with respect to the equally-weighted CRSP index, $\bar{\beta}_m$, estimated from 60-month rolling regressions of the returns on the industry portfolio on the return on the index. Results of [**?**] regressions of returns on betas are presented in Panel B,

$$\begin{aligned} R_{p,t+1} &= \gamma_{0,\eta,t} + \gamma_{\eta,t}\beta_{p,t} + u_{p,\eta,t} \\ R_{p,t+1} &= \gamma_{0,m,t} + \gamma_{m,t}\beta_{m,t} + u_{p,m,t}, \end{aligned}$$

where we report averages of the point estimates of $\gamma_{0,k,t}$ and $\gamma_{k,t}$ and associated t-statistics for $k = \{\eta, m\}$. Data are sampled at the monthly frequency over the period June, 1984 through December, 2012.

Panel A: Summary Statistics

Industry	$\bar{R}$	β_η	σ_{β_η}	β_m	Industry	$\bar{R}$	β_η	σ_{β_η}	β_m
Energy	1.19	3.34	0.55	0.89	Household Products	1.30	3.39	0.44	0.96
Materials	1.17	3.22	0.43	0.97	Healthcare	1.30	3.32	0.47	1.11
Capital Goods	1.15	3.41	0.36	0.99	Pharmaceuticals	1.70	2.87	0.48	1.51
Commercial Services	0.96	3.55	0.43	1.00	Banks	1.16	2.94	0.70	0.59
Transportation	1.14	3.33	0.38	0.98	Diversified Financials	1.18	3.12	0.42	1.09
Automobiles and Components	0.96	3.13	0.51	1.13	Insurance	1.17	2.89	0.42	0.64
Consumer Durables	0.92	3.50	0.51	1.06	Real Estate	0.80	3.54	0.45	0.85
Consumer Services	0.95	3.61	0.40	1.02	Software	1.38	3.41	0.44	1.53
Media	1.07	3.35	0.58	1.12	Technology Hardware	1.25	3.46	0.49	1.50
Retailing	1.00	3.34	0.50	1.15	Semiconductors	1.73	3.11	0.61	1.76
Food and Staples Retail	1.06	3.11	0.38	0.75	Telecommunications	1.34	2.83	0.72	1.35
Food, Beverage, and Tobacco	1.08	3.13	0.37	0.67	Utilities	1.04	2.76	0.46	0.34

Panel B: Fama-MacBeth Regressions

	$\bar{\gamma}_0$	$\bar{\gamma}_\eta$	$\bar{\gamma}_m$
Mean	-0.190	0.456	
t-stat	-0.263	2.052	
Mean	0.976		0.235
t-stat	4.291		0.639

Table Appendix A.6: Decomposition of Industry Risk Exposures

Table **??** decomposes industry risk exposures into proportions arising from industry characteristics,

$$1 = \frac{Var\left(\bar{\beta}_t\right)}{Var\left(\beta_{p,t}\right)} + \frac{Var\left(\delta_{AG,t}AG_{p,t}\right)}{Var\left(\beta_{p,t}\right)} + \frac{Var\left(\delta_{BM,t}BM_{p,t}\right)}{Var\left(\beta_{p,t}\right)} + \frac{Var\left(\delta_{MV,t}MV_{p,t}\right)}{Var\left(\beta_{p,t}\right)} + \frac{Var\left(\delta_{P12,t}P12_{p,t}\right)}{Var\left(\beta_{p,t}\right)} + \frac{Var\left(\delta_{SI,t}SI_{p,t}\right)}{Var\left(\beta_{p,t}\right)} + \frac{Var\left(\delta_{TA,t}TA_{p,t}\right)}{Var\left(\beta_{p,t}\right)} + \frac{P_{p,t}}{Var\left(\beta_{p,t}\right)},$$

where $AG_{p,t}$, $BM_{p,t}$, $MV_{p,t}$, $P12_{p,t}$, $SI_{p,t}$, and $TA_{p,t}$ are the demeaned average portfolio asset growth, book-to-market ratio, market value, past 12-month return, stock issuance, and total accruals, respectively, $\bar{\beta}_t$ is the cross-sectional mean risk exposure at time t and $P_{p,t}$ represent covariance terms. Data are sampled for 24 industry groups over the period June, 1984 through December, 2012.

Industry	$\bar{\beta}$	AG	BM	MV	P12	SI	TA	Corr.
Energy	0.496	0.038	0.009	0.190	0.481	0.096	0.053	-0.363
Materials	0.793	0.010	0.017	0.044	0.180	0.017	0.015	-0.077
Capital Goods	1.164	0.011	0.012	0.025	0.104	0.028	0.038	-0.383
Commercial Services	0.804	0.003	0.008	0.037	0.073	0.035	0.015	0.025
Transportation	1.031	0.006	0.028	0.026	0.125	0.052	0.060	-0.328
Automobiles and Components	0.573	0.008	0.015	0.065	0.308	0.040	0.066	-0.075
Consumer Durables	0.587	0.005	0.023	0.022	0.159	0.022	0.045	0.138
Consumer Services	0.918	0.010	0.006	0.049	0.177	0.038	0.048	-0.245
Media	0.443	0.016	0.014	0.039	0.141	0.032	0.038	0.278
Retailing	0.605	0.002	0.007	0.082	0.142	0.026	0.052	0.085
Food and Staples Retail	1.025	0.009	0.006	0.157	0.287	0.099	0.055	-0.637
Food, Beverage, and Tobacco	1.106	0.005	0.004	0.182	0.216	0.072	0.018	-0.604
Household Products	0.757	0.013	0.018	0.086	0.204	0.051	0.029	-0.158
Healthcare	0.677	0.076	0.025	0.059	0.105	0.040	0.019	0.000
Pharmaceuticals	0.642	0.034	0.142	0.106	0.353	0.210	0.044	-0.531
Banks	0.306	0.004	0.022	0.117	0.172	0.044	0.020	0.316
Diversified Financials	0.848	0.011	0.005	0.102	0.079	0.039	0.070	-0.154
Insurance	0.846	0.013	0.060	0.043	0.183	0.072	0.052	-0.269
Real Estate	0.743	0.016	0.036	0.062	0.287	0.090	0.058	-0.293
Software	0.770	0.020	0.059	0.071	0.349	0.033	0.053	-0.355
Technology Hardware	0.618	0.010	0.007	0.046	0.198	0.011	0.053	0.058
Semiconductors	0.397	0.023	0.023	0.117	0.412	0.014	0.048	-0.033
Telecommunications	0.290	0.010	0.007	0.121	0.191	0.088	0.055	0.239
Utilities	0.722	0.008	0.035	0.219	0.294	0.049	0.017	-0.345

Table Appendix A.7: Summary Statistics of Industry Risk Premia

Table **??** presents means and standard deviations of industry risk premia utilizing risk premia calculated using a time varying price of consumption risk and consumption risk exposures. The price of consumption risk is estimated from an expanding window regression of characteristics portfolio returns on risk exposures. Ex ante betas are computed using the relation between characteristics and characteristic portfolio-level betas. Data are sampled at the quarterly frequency over the period July, 1984 through December, 2012.

Industry	Mean	Std.	Industry	Mean	Std.
Energy	6.93	0.79	Household Products	7.01	0.64
Materials	6.66	0.70	Healthcare	6.86	0.67
Capital Goods	7.06	0.61	Pharmaceuticals	5.94	0.66
Commercial Services	7.34	0.68	Banks	6.11	0.92
Transportation	6.90	0.64	Diversified Financials	6.45	0.64
Autos and Components	6.48	0.75	Insurance	5.98	0.63
Consumer Durables	7.26	0.79	Real Estate	7.33	0.69
Consumer Services	7.46	0.66	Software	7.04	0.66
Media	6.94	0.84	Technology Hardware	7.15	0.72
Retailing	6.92	0.76	Semiconductors	6.44	0.78
Food and Staples Retail	6.42	0.61	Telecommunications	5.90	0.96
Food, Bev, and Tobacco	6.48	0.60	Utilities	5.72	0.67

Table Appendix A.8: Firm-Level Fama-MacBeth Regressions

We estimate [**?**] regressions for individual firms. The regression is specified as

$$\begin{aligned} R_{i,t+1} = \quad & \gamma_{0,t} + \gamma_{\eta,t}\beta_{\eta,t} + \gamma_{MRP,t}\beta_{MRP,t} + \gamma_{SMB,t}\beta_{SMB,t} + \gamma_{HML,t}\beta_{HML,t} + \gamma_{RMW,t}\beta_{RMW,t}, \\ & + \gamma_{CMA,t}\beta_{CMA,t} + u_{i,t+1}, \end{aligned}$$

where $\beta_{\eta,t}$ is the consumption growth level risk exposure estimated using the procedure described in this paper, and β_k, $k = \{MRP, SMB, HML, RMW, CMA\}$ are coefficients of multiple regressions of returns on the five [**?**] risk factors. The risk factors are the difference in the return on the market and a risk free asset, MRP_t, the difference in the return on a portfolio of small stocks and large stocks, SMB_t, the difference in the return on a portfolio of high book-to-market and low-book-to-market stocks, HML_t, the difference in the return on a portfolio of highly profitable firms minus the return on a portfolio of firms with low profitability, RMW_t, and the return on a portfolio of firms with low asset growth in excess of the return on a portfolio of firms with high asset growth, CMA_t. We report average coefficients and associated t-statistics following [**?**]. Data are sampled at the monthly frequency over the period June, 1984 through December, 2012.

	γ_η	γ_{MRP}	γ_{SMB}	γ_{HML}	γ_{RMW}	γ_{CMA}
Coeff.	0.207					
t-stat	3.519					
Coeff.		0.070				
t-stat		0.403				
Coeff.		0.099	0.016	0.149	-0.035	0.033
t-stat		0.674	0.209	1.456	-0.458	0.530
Coeff.	0.231	0.104				
t-stat	4.866	0.618				
Coeff.	0.238	0.151	-0.015	0.135	-0.023	0.018
t-stat	6.261	1.084	-0.198	1.355	-0.300	0.301

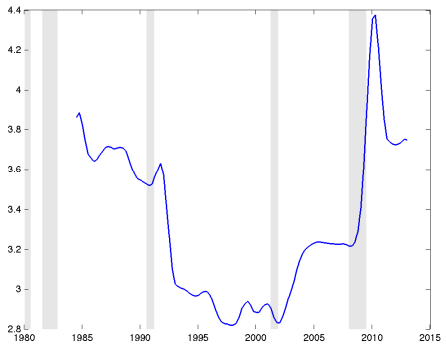
Table Appendix A.9: Risk Exposures and Risk Premia for Dow 30 Stocks

Table **??** presents summary statistics for risk exposures and risk premia for 30 stocks in the Dow Jones Industrial Average as of December, 2012. Risk exposures, β_η, are computed using firm-level characteristics and the procedure discussed in the paper. Risk premia, $\beta_\eta\gamma_\eta$ are computed using these betas multiplied by prices of risk estimated using the expanding window procedure described in Section 4. We report means of risk measure, β_η, their standard deviation, σ_{β_η}, average risk premia, $\overline{\beta_\eta\gamma_\eta}$, their standard deviation, $\sigma_{\beta_\eta\gamma_\eta}$, and the correlation of risk exposures with aggreate prices of risk, $\rho_{\beta_\eta,\gamma_\eta}$. Data are sampled at the monthly frequency from June, 1984 through December, 2012.

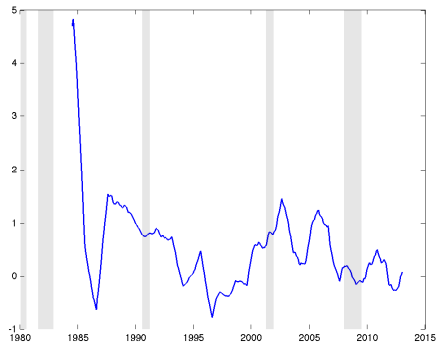
Ticker	$\bar{\beta}_\eta$	σ_{β_η}	$\overline{\beta_\eta\gamma_\eta}$	$\sigma_{\beta_\eta\gamma_\eta}$	$\rho_{\beta_\eta,\gamma_\eta}$
AA	3.81	0.54	7.63	1.65	0.33
AXP	3.33	0.72	6.83	2.05	0.37
BA	3.48	0.62	6.56	2.05	0.20
BAC	2.64	1.02	4.90	2.26	0.13
CAT	3.72	0.57	7.51	1.78	0.48
CSCO	3.07	0.72	6.41	1.71	0.21
CVX	3.30	0.56	6.76	1.64	0.40
DD	3.42	0.61	7.10	1.78	0.37
DIS	3.59	0.66	6.91	1.75	0.40
GE	2.65	0.88	5.42	2.17	0.34
HD	3.47	0.83	6.87	1.99	0.16
HPQ	3.05	0.71	6.05	1.57	-0.11
IBM	2.94	0.52	6.44	1.49	0.13
INTC	3.57	0.63	7.11	1.68	0.23
JNJ	3.15	0.42	6.21	1.15	0.21
JPM	2.67	0.93	5.12	2.06	0.19
KO	3.10	0.57	6.15	1.47	0.27
MCD	3.64	0.48	7.26	1.42	0.32
MMM	3.51	0.40	7.20	1.28	0.27
MRK	3.18	0.70	6.32	1.87	0.42
MSFT	3.07	0.65	6.22	1.26	-0.28
PFE	3.09	0.72	6.23	1.79	0.18
PG	3.16	0.42	6.36	1.22	0.28
T	3.30	0.63	6.71	1.78	0.45
TRV	3.70	0.95	7.24	2.07	-0.07
UNH	4.27	0.80	8.48	1.87	0.06
UTX	3.61	0.33	7.42	1.08	-0.01
VZ	3.36	0.76	6.85	2.04	0.39
WMT	2.98	0.62	5.98	1.55	0.21
XOM	2.89	0.55	5.84	1.52	0.39

Figure Appendix A.1: Loadings of Betas on Characteristics

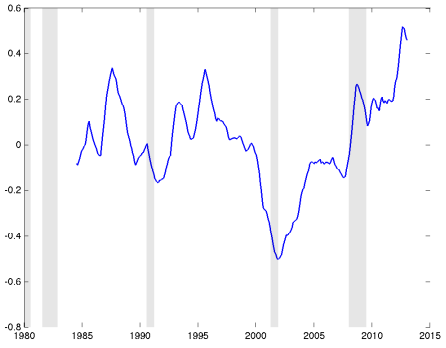
Figure **??** depicts the loadings of cross-sectionally demeaned estimated betas on cross-sectionally demeaned characteristics over time. Betas are estimated by regressing cumulative returns over four quarters on cumulated consumption growth over four quarters using an expanding window starting with the time period September, 1953 through June, 1983. We depict the mean beta over time in subfigure (a). Time series of loadings are depicted for (b) asset growth, (c) book-to-market ratio, (d) market value, (e) past 12-month return, (f) stock issuance, and (g) total accruals. NBER recessions are depicted as grey bars. Coefficients are smoothed over the past 12 months by averaging.



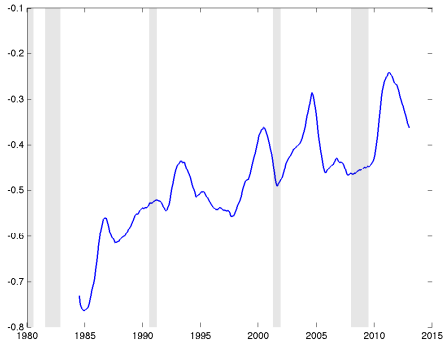
(a) Mean



(b) Asset Growth



(c) Book-to-Market



(d) Market Value

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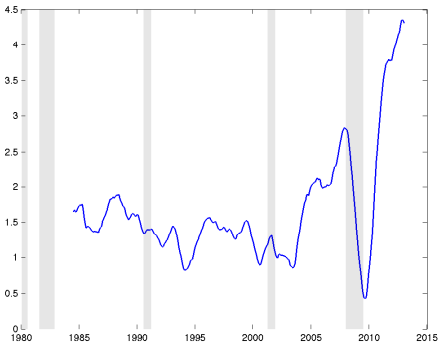
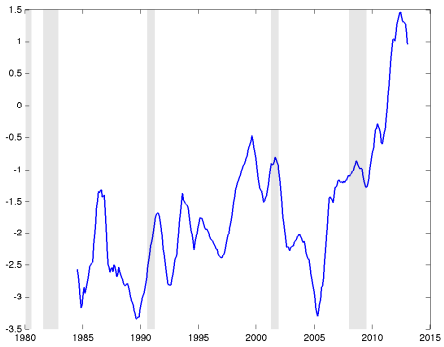
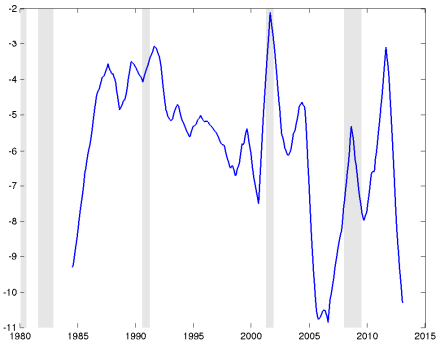


(e) Past 12 Month Return



(f) Stock Issuance



(g) Total Accruals

Figure Appendix A.2: Time Series of ex ante Betas

Figure **??** presents the time series of ex ante betas for portfolios of firms formed on the basis of these betas. Portfolios are formed by first calculating betas using firm-level characteristics and coefficients from regressions of portfolio-level betas on portfolio-level characteristics. Each month, firms are sorted into quintiles on the basis of the calculated beta and held in a portfolio for the subsequent month. The figure presents the time series of betas for the bottom and top quintile equally-weighted portfolios over the period June, 1984 through December, 2012.

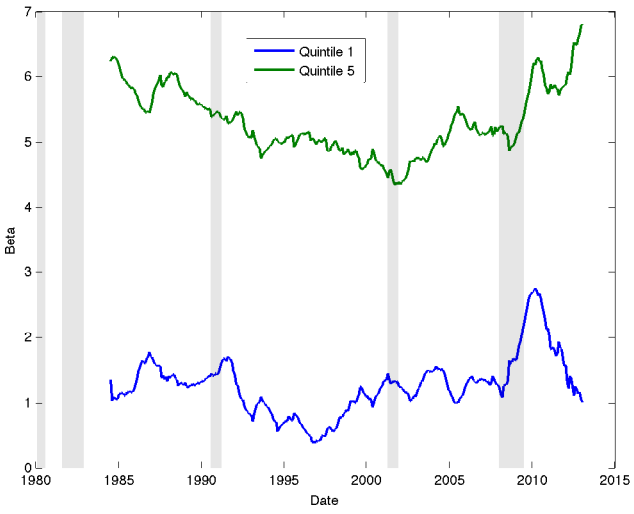


Figure Appendix A.3: Price of Consumption Risk

Figure **??** presents the time series of the price of consumption risk implied by cross-sectional regressions of average returns onto consumption betas,

$$\bar{R}_{i,t} - R_{f,t} = \gamma_{0t} + \gamma_{\eta,t}\beta_{i,\eta,t} + u_{i,t}.$$

Consumption betas are calculated by regressing cumulative real returns on cumulative growth in real per capita consumption of nondurables and services,

$$\prod_{j=0}^{3} R_{i,t-j} \quad = \quad a_i + \beta_{i,\eta} \sum_{j=0}^{3} \hat{\eta}_{t-j} + e_{i,t}.$$

Prices of risk, $\gamma_{\eta,t}$ and risk exposures, $\beta_{i,\eta,t}$ are estimated using expanding window regressions, beginning with a window from September, 1953 through July, 1983, and culminating with a window from September, 1953 through December, 2012. We utilize 55 portfolios formed on asset growth, book-to-market ratio, market capitalization, past 12-month return, stock issuance, and total accruals.

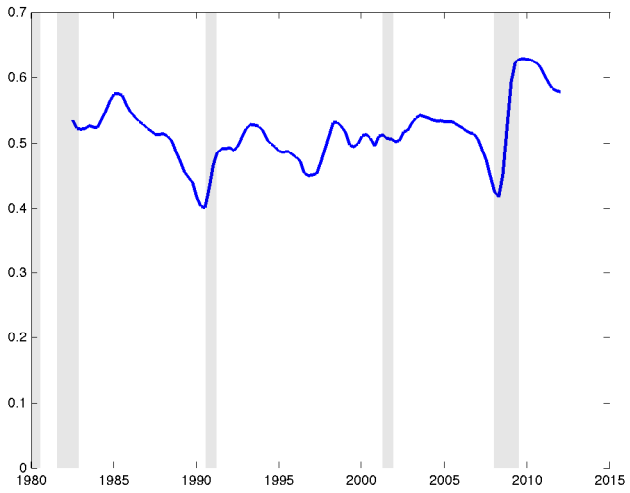
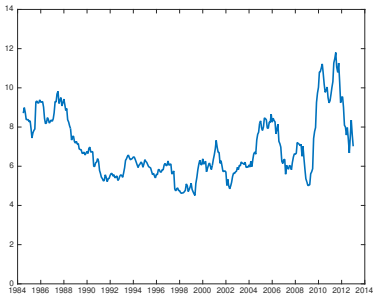
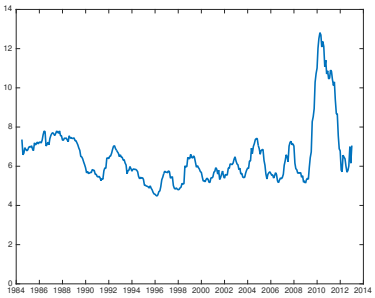


Figure Appendix A.4: Industry Risk Premia

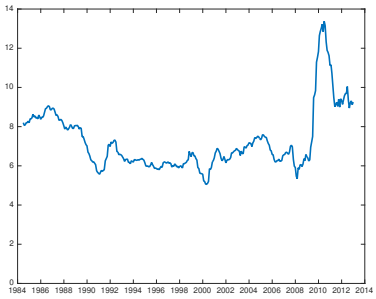
Figure **??** presents the time series of ex ante risk premia for portfolios of firms formed on the basis of GICS industry groups. Risk premia are calculated by first calculating betas using firm-level characteristics and coefficients from regressions of portfolio-level betas on portfolio-level characteristics. The resulting betas are multiplied by annualized prices of consumption risk from expanding window regressions. Each month, firms are sorted into quintiles on the basis of GICS industry group from Compustat. The figure presents the time series of betas for six equally-weighted portfolios over the period June, 1984 through December, 2012.



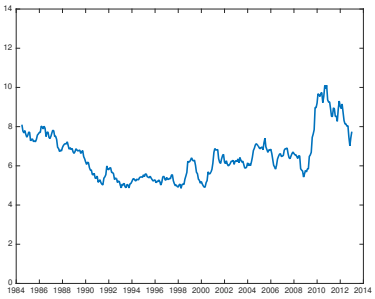
(a) Energy



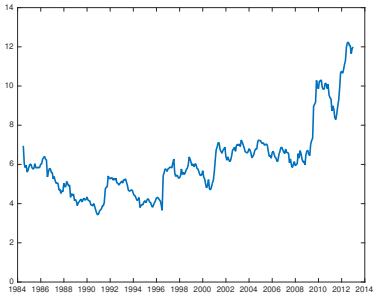
(b) Autos



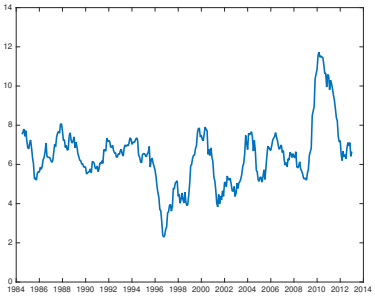
(c) Consumer Durables



(d) Food, Beverage, and Tobacco



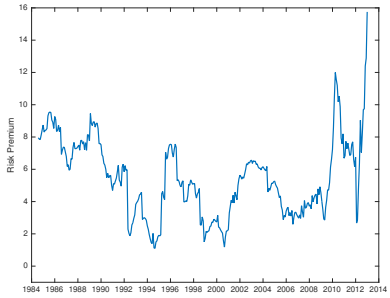
(e) Banks



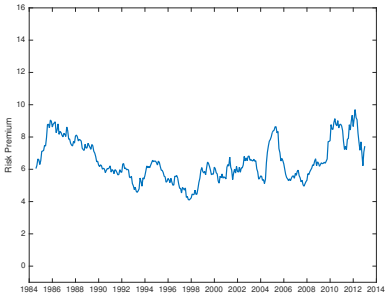
(f) Semiconductors

Figure Appendix A.5: Dow 30 Risk Premia

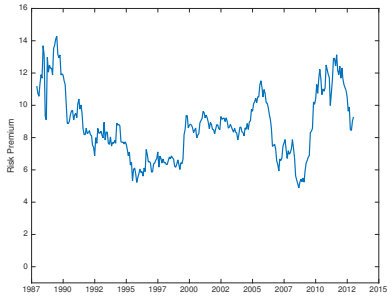
Figure **??** plots time series of risk premia for select constituents of the Dow Jones Industrial Average as of December, 2012. Ex ante betas are calculated by imputing betas from firm characteristics and portfolio-level coefficients of regressions of portfolio betas on portfolio characteristics. The characteristics utilized are asset growth, book-to-market ratio, market capitalization, past 12-month return, stock issuance, and total accruals. Risk premia are calculated by multiplying the firm's beta by the point estimate of the price of consumption risk implied by expanding window regressions of portfolio average returns on portfolio betas. Betas are plotted in blue on the left y-axis scale; risk premia are plotted in red on the right y-axis scale. Data are plotted for Bank of America Corporation (BAC), Johnson & Johnson (JNJ), United Health Group (UNH), Exxon-Mobil (XOM), Microsoft (MSFT), and Caterpillar (CAT). Data cover the period June, 1984 through December, 2012.



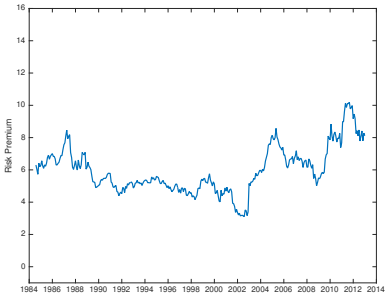
(a) BAC



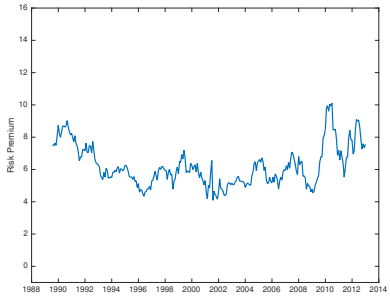
(b) JNJ



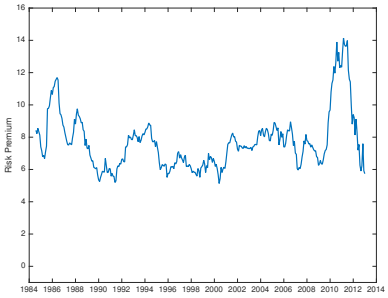
(c) UNH



(d) XOM



(e) MSFT



(f) CAT