Online Appendix

On the Timing and Pricing of Dividends: Comment

***By* Florian Schulz**

Figure A-1: **Abnormal holding period returns around ex-dividend dates (Extended sample)**

Notes: The graph shows the yearly time series of annualized average weekly *abnormal* returns around ex-dividend dates of a portfolio that consists of ex-dividend day companies only. The sample extends to include observations of all common shares. Specifically, at the end of each Wednesday, the portfolio invests in ordinary common stocks that trade ex (cash) dividend within the following seven days. Portfolio returns are value-weighted and measured according to the standard definition of holding period returns, that is, as the ratio of (nominal) dividends and price changes over previous closing price. For each year, abnormal returns are estimated as regression constants from a regression of weekly portfolio excess returns on the excess return on the market portfolio. The 95% confidence interval is constructed using Newey-West standard errors. The sample covers 2,493 trading weeks from 1964.4-2011.

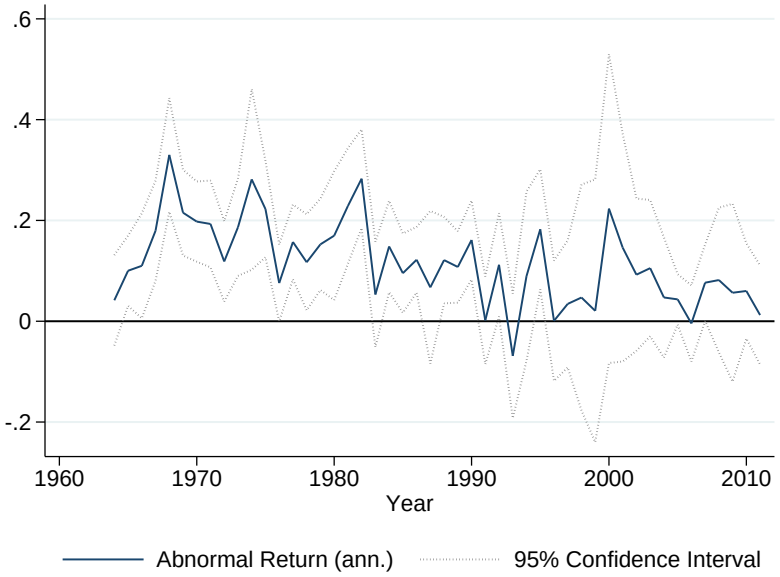
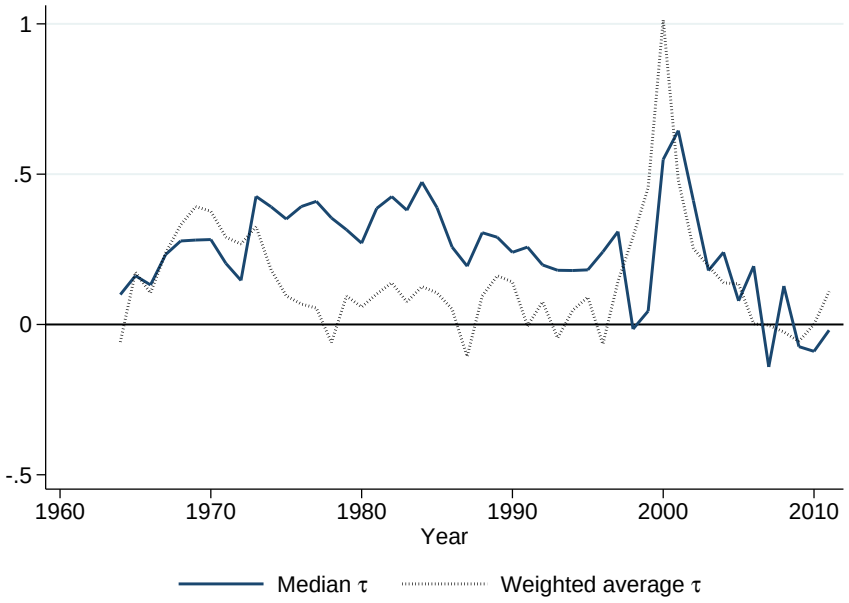


Figure A-2: **Implicit marginal tax rates over time (Extended sample)**

Notes: The following graphs show time series of median and weighted average implied marginal tax rates (τ) for the extended sample of all common shares *by year*. Implicit marginal tax rates are derived from price changes and returns on ex-dividend days (see Section IV. for detailed definitions). Panel A shows implied marginal tax rates adjusted for contemporaneous returns on the CRSP value-weighted index (incl. dividends) in order to account for market-wide movements on ex-dividend dates. In Panel B, adjustment to implied tax rates is made by controlling for industry-specific returns using the 49 value-weighted Fama-French industry portfolios. Weighted averages use the total market value of cash dividend distributions (dividend yield times market capitalization) to compute weights.

Panel A: Implicit marginal tax rate (Market-adjusted)



Panel B: Implicit marginal tax rate (Industry-adjusted)

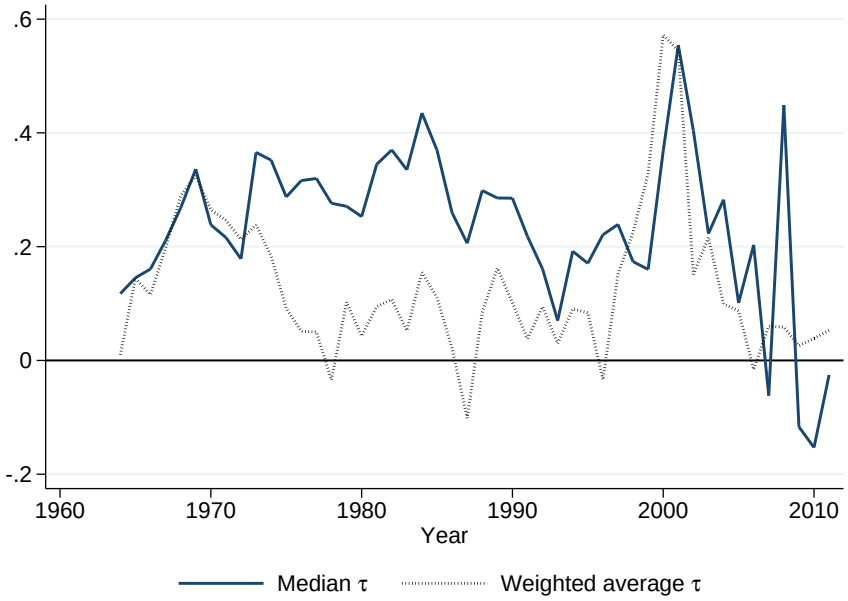
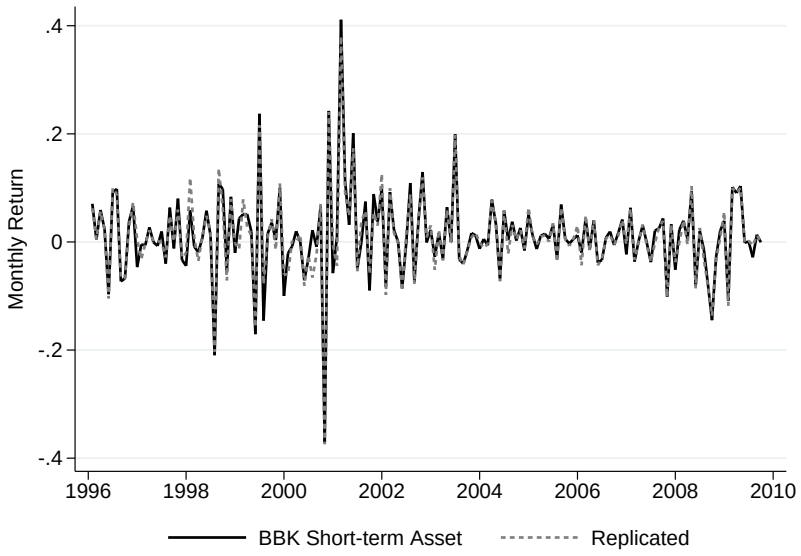


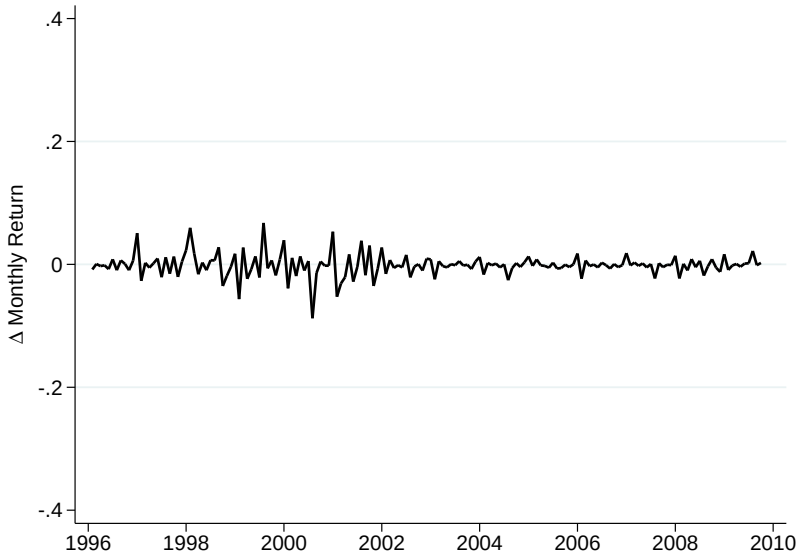
Figure A-3: **Replication of BBK Dividend Assets**

Notes: Panels A.1 and B.1 show times series of monthly returns of the BBK *short-term asset* and the BBK *steepener* along with the corresponding replicas. The correlations are 0.9719 and 0.9409, respectively. Panels A.2 and B.2 display time series of differences in monthly returns between the replicated assets and the BBK dividend assets.

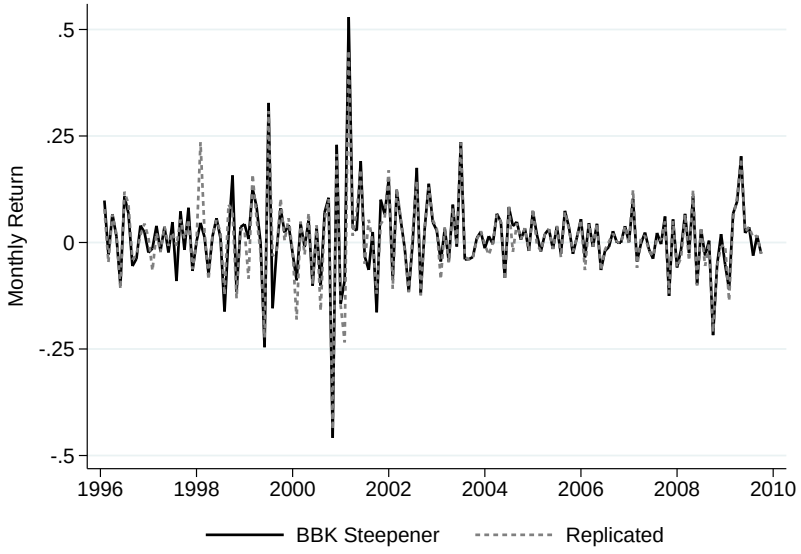
Panel A.1: Monthly returns of BBK short-term asset and replicated asset



Panel A.2: Difference in monthly returns (*short-term asset*)



Panel B.1: Monthly returns of BBK steepener and replicated asset



Panel B.2: Difference in monthly returns (*steepener*)

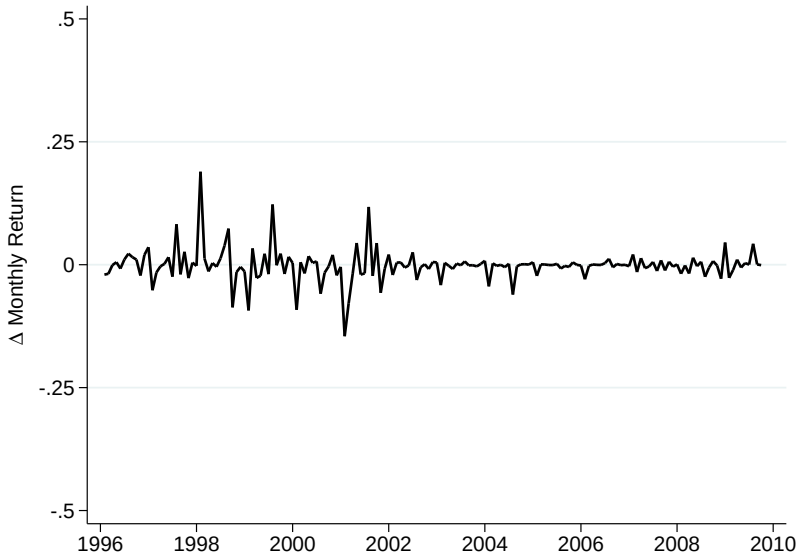


Table A-1: **Descriptive Statistics (Extended Sample)**

Notes: The Table presents descriptive statistics for observations of the extended sample of all common shares. *Declaration Date to Ex-Div Date* measures the time period, in calendar days, between the ex-dividend date and the date on which the board of directors declares a distribution (declaration date). *Ex-Div Date to Payment Date* measures the time period, in calendar days, between the date upon which dividend checks are mailed (payment date) and the ex-dividend date. *Dividend yield* measures the ex-day cash dividend as fraction of the previous day closing price of the stock. The descriptive statistics are shown for the sample period April 1964 to 2011, and for the subperiod 1996 to 2009 on which the BBK study is based. All variables are winsorized at the 1 and 99 percentiles.

			Percentiles						
	Mean	Std. Dev.	1%	5%	25%	50%	75%	95%	N(obs)
1964.4-2011									
Declaration Date to Ex-Div Date	19.22	16.62	2	5	8	13	25	55	453,366
Ex-Div Date to Payment Date	22.29	7.21	8	12	17	21	26	36	459,665
Dividend Yield	0.91%	0.64%	0.08%	0.19%	0.48%	0.74%	1.19%	2.21%	459,759
1996-2009									
Declaration Date to Ex-Div Date	20.06	17.14	3	6	9	13	26	57	148,120
Ex-Div Date to Payment Date	19.28	6.43	8	9	16	18	22	33	152,941
Dividend Yield	0.73%	0.59%	0.08%	0.14%	0.40%	0.56%	0.86%	1.95%	152,961

Table A-2: **Daily Returns around Ex-Dividend Dates (Extended Sample)**

Notes: The Table presents daily excess returns, standard deviations and abnormal returns (in basis points) of a portfolio composed of ex-dividend companies around ex-dividend dates. The sample extends to include observations of all common shares. Specifically, at the end of each day, the portfolio invests in ordinary common stocks that trade ex (cash) dividend the following day. The portfolio is rebalanced every day and, on average, consists of 38.68 companies. Panel A shows results for *value-weighted* portfolios and Panel B shows results for *prior return-weighted* portfolios following Asparouhova, Bessembinder and Kalcheva (2010, 2013). Returns are measured according to the standard definition of holding period returns, that is, as the ratio of dividends and price changes over previous closing price. *Excess returns* are defined as portfolio returns in excess of the risk-free return (one-month T-Bill). *Market model* shows the abnormal return (regression constant) from a regression of daily portfolio excess returns on the excess return of the market portfolio. *3-Factor Model* reports the abnormal return when the Fama-French three-factor model is used. Newey-West standard errors of mean estimates are shown in parentheses. The sample covers 11,884 trading days from 1964.4-2011.

Date	t(-5,-4)	t(-4,-3)	t(-3,-2)	t(-2,-1)	t(-1,0)	Ex-Div Day	t(1,2)	t(2,3)	t(3,4)	t(4,5)	t(5,6)
Panel A: Value-Weighted Portfolio											
Excess Return	7.02	7.89	7.42	8.56	12.89	14.13	0.61	0.57	0.94	1.13	1.22
s.d.	129.52	123.93	125.13	127.80	124.73	127.53	126.63	126.10	125.09	127.24	126.14
s.e. mean	(1.21)	(1.17)	(1.18)	(1.18)	(1.23)	(1.18)	(1.18)	(1.20)	(1.15)	(1.20)	(1.21)
Market Model	5.31	6.25	5.56	6.84	11.19	12.55	-1.18	-1.27	-0.87	-0.82	-0.78
	(0.84)	(0.83)	(0.82)	(0.81)	(0.84)	(0.83)	(0.82)	(0.80)	(0.80)	(0.83)	(0.83)
3-Factor Model	4.74	5.59	4.77	6.32	10.69	11.96	-1.72	-1.81	-1.39	-1.38	-1.39
	(0.84)	(0.82)	(0.81)	(0.81)	(0.84)	(0.82)	(0.83)	(0.80)	(0.80)	(0.82)	(0.82)
Panel B: Prior Return-Weighted Portfolio											
Excess Return	7.90	7.76	7.99	7.36	13.38	31.48	1.65	0.82	0.34	1.38	1.64
s.d.	96.15	96.00	95.75	94.73	94.40	98.14	100.92	95.58	94.29	93.84	94.12
s.e. mean	(1.00)	(0.98)	(0.99)	(0.96)	(0.97)	(1.00)	(1.00)	(0.97)	(0.94)	(0.96)	(0.97)
Market Model	6.66	6.52	6.60	6.11	12.13	30.34	0.26	-0.57	-1.00	-0.03	0.19
	(0.69)	(0.68)	(0.68)	(0.66)	(0.67)	(0.72)	(0.67)	(0.64)	(0.63)	(0.64)	(0.67)
3-Factor Model	5.39	5.33	5.44	4.94	11.05	29.17	-0.93	-1.70	-2.20	-1.18	-1.05
	(0.61)	(0.61)	(0.61)	(0.59)	(0.60)	(0.66)	(0.60)	(0.60)	(0.58)	(0.57)	(0.61)
N(days)	11,884	11,884	11,884	11,884	11,884	11,884	11,884	11,883	11,884	11,884	11,883
N(obs)	459,346	459,371	459,403	459,460	459,633	459,633	459,499	459,447	459,352	459,262	459,174

Table A-3: **Daily Returns around Ex-Dividend Dates (winsorized)**

Notes: The Table presents daily excess returns, standard deviations and abnormal returns (in basis points) of a portfolio composed of ex-dividend companies around ex-dividend dates. The sample only includes S&P 500 constituents. Specifically, at the end of each day, the portfolio invests in ordinary common stocks that trade ex (cash) dividend the following day. The portfolio is rebalanced every day and, on average, consists of 7.34 companies. Panel A shows results for *value-weighted* portfolios and Panel B shows results for *prior return-weighted* portfolios following Asparouhova, Bessembinder and Kalcheva (2010, 2013). Returns are measured according to the standard definition of holding period returns, that is, as the ratio of dividends and price changes over previous closing price. *Excess returns* are defined as portfolio returns in excess of the risk-free return (one-month T-Bill). *Market model* shows the abnormal return (regression constant) from a regression of daily portfolio excess returns on the excess return of the market portfolio. *3-Factor Model* reports the abnormal return when the Fama-French three-factor model is used. Newey-West standard errors of mean estimates are shown in parentheses. Returns are winsorized at the 1 and 99 percentiles. The sample covers 10,776 trading days from 1964.4-2011.

Date	t(-5,-4)	t(-4,-3)	t(-3,-2)	t(-2,-1)	t(-1,0)	Ex-Div Day	t(1,2)	t(2,3)	t(3,4)	t(4,5)	t(5,6)
Panel A: Value-Weighted Portfolio											
Excess Return	5.31	6.02	6.21	8.25	13.84	11.81	0.01	-0.77	0.93	1.51	1.12
s.d.	141.02	140.46	136.66	139.17	138.91	139.69	141.07	138.23	138.39	139.02	138.90
s.e. mean	(1.36)	(1.38)	(1.32)	(1.35)	(1.40)	(1.36)	(1.38)	(1.37)	(1.35)	(1.35)	(1.39)
Market Model	3.81	4.59	3.83	6.19	12.14	10.86	-1.96	-2.14	-1.05	0.00	-0.64
	(1.03)	(1.06)	(1.00)	(1.03)	(1.06)	(1.07)	(1.04)	(1.02)	(1.03)	(1.03)	(1.05)
3-Factor Model	3.54	4.31	3.46	6.07	12.03	10.52	-2.20	-2.36	-1.23	-0.16	-0.89
	(1.02)	(1.05)	(1.00)	(1.03)	(1.06)	(1.06)	(1.03)	(1.02)	(1.03)	(1.03)	(1.04)
Panel B: Prior Return-Weighted Portfolio											
Excess Return	5.24	5.30	5.35	7.92	13.16	14.13	0.35	-0.67	1.78	2.22	1.26
s.d.	133.35	132.24	128.66	131.31	130.83	131.73	132.73	130.72	131.41	130.66	130.96
s.e. mean	(1.31)	(1.31)	(1.27)	(1.31)	(1.33)	(1.30)	(1.32)	(1.30)	(1.30)	(1.28)	(1.32)
Market Model	3.77	3.90	3.02	5.90	11.49	13.20	-1.58	-2.02	-0.19	0.75	-0.48
	(0.96)	(0.97)	(0.91)	(0.96)	(0.98)	(0.97)	(0.97)	(0.93)	(0.96)	(0.95)	(0.95)
3-Factor Model	3.09	3.29	2.40	5.44	11.03	12.54	-2.12	-2.59	-0.71	0.26	-1.04
	(0.95)	(0.95)	(0.90)	(0.95)	(0.97)	(0.96)	(0.95)	(0.92)	(0.95)	(0.94)	(0.93)
N(days)	10,776	10,775	10,775	10,776	10,776	10,776	10,776	10,776	10,776	10,776	10,776
N(obs)	79,051	79,054	79,049	79,053	79,059	79,059	79,058	79,056	79,048	79,044	79,042

Table A-4: **Daily Returns around Ex-Dividend Dates (Extended Sample, winsorized)**

Notes: The Table presents daily excess returns, standard deviations and abnormal returns (in basis points) of a portfolio composed of ex-dividend companies around ex-dividend dates. The sample extends to include observations of all common shares. Specifically, at the end of each day, the portfolio invests in ordinary common stocks that trade ex (cash) dividend the following day. The portfolio is rebalanced every day and, on average, consists of 38.68 companies. Panel A shows results for *value-weighted* portfolios and Panel B shows results for *prior return-weighted* portfolios following Asparouhova, Bessembinder and Kalcheva (2010, 2013). Returns are measured according to the standard definition of holding period returns, that is, as the ratio of dividends and price changes over previous closing price. *Excess returns* are defined as portfolio returns in excess of the risk-free return (one-month T-Bill). *Market model* shows the abnormal return (regression constant) from a regression of daily portfolio excess returns on the excess return of the market portfolio. *3-Factor Model* reports the abnormal return when the Fama-French three-factor model is used. Newey-West standard errors of mean estimates are shown in parentheses. Returns are winsorized at the 1 and 99 percentiles. The sample covers 11,884 trading days from 1964.4-2011.

Date	t(-5,-4)	t(-4,-3)	t(-3,-2)	t(-2,-1)	t(-1,0)	Ex-Div Day	t(1,2)	t(2,3)	t(3,4)	t(4,5)	t(5,6)
Panel A: Value-Weighted Portfolio											
Excess Return	6.48	7.50	7.51	8.27	13.34	14.26	0.20	0.66	1.03	1.23	1.15
s.d.	118.26	117.15	116.42	116.79	116.51	117.22	117.25	116.26	116.50	116.39	116.60
s.e. mean	(1.13)	(1.11)	(1.11)	(1.11)	(1.15)	(1.11)	(1.11)	(1.12)	(1.10)	(1.12)	(1.13)
Market Model	4.94	5.96	5.80	6.72	11.78	12.85	-1.45	-1.03	-0.64	-0.51	-0.70
	(0.79)	(0.79)	(0.77)	(0.76)	(0.80)	(0.79)	(0.76)	(0.75)	(0.77)	(0.78)	(0.77)
3-Factor Model	4.50	5.42	5.18	6.29	11.40	12.36	-1.89	-1.46	-1.00	-0.91	-1.14
	(0.78)	(0.78)	(0.76)	(0.76)	(0.80)	(0.78)	(0.76)	(0.75)	(0.76)	(0.78)	(0.76)
Panel B: Prior Return-Weighted Portfolio											
Excess Return	6.55	6.62	7.17	6.58	12.75	30.03	0.73	0.34	-0.29	1.06	0.63
s.d.	83.77	84.12	84.03	83.21	82.55	84.58	83.72	83.38	83.01	82.48	82.84
s.e. mean	(0.88)	(0.87)	(0.88)	(0.86)	(0.87)	(0.89)	(0.86)	(0.86)	(0.85)	(0.87)	(0.87)
Market Model	5.45	5.51	5.94	5.47	11.65	29.03	-0.45	-0.87	-1.47	-0.18	-0.67
	(0.59)	(0.59)	(0.59)	(0.58)	(0.59)	(0.64)	(0.57)	(0.56)	(0.56)	(0.57)	(0.58)
3-Factor Model	4.42	4.54	4.96	4.51	10.74	28.05	-1.41	-1.77	-2.44	-1.12	-1.70
	(0.53)	(0.53)	(0.53)	(0.53)	(0.54)	(0.59)	(0.51)	(0.52)	(0.52)	(0.52)	(0.53)
N(days)	11,884	11,884	11,884	11,884	11,884	11,884	11,884	11,883	11,884	11,884	11,883
N(obs)	459,346	459,371	459,403	459,460	459,633	459,633	459,499	459,447	459,352	459,262	459,174

Table A-5: **Returns around Ex-Dividend Dates – Weekly Sorts (Extended Sample)**

Notes: The Table presents *weekly* excess returns, standard deviations and abnormal returns (in basis points) of a portfolio composed of ex-dividend companies around ex-dividend dates. The sample extends to include observations of all common shares. Specifically, at the end of each Wednesday, the portfolio invests in ordinary common stocks that trade ex (cash) dividend within the following seven days. The table also shows results for the subset of companies whose dividend announcement precedes the ex-dividend day by more than seven days. The portfolio is rebalanced every week and, on average, consists of 184.33 companies (143.79 for the restricted sample). Panel A shows results for *value-weighted* portfolios and Panel B shows results for *prior return-weighted* portfolios following Asparouhova, Bessembinder and Kalcheva (2010, 2013). Wednesday-to-Wednesday returns are measured according to the standard definition of holding period returns, that is, as the ratio of dividends and price changes over previous closing price. *Excess returns* are defined as portfolio returns in excess of the risk-free return (one-month T-Bill). *Market model* shows the abnormal return (regression constant) from a regression of weekly portfolio excess returns on the excess return of the market portfolio. *3-Factor Model* reports the abnormal return when the Fama-French three-factor model is used. Newey-West standard errors of mean estimates are shown in parentheses. The sample covers 2,493 trading weeks from 1964.4-2011.

	All Companies			***Ex day - Ann. day > 7 days***		
Date	t(-1,0)	Ex-Div Week	t(1,2)	t(-1,0)	Ex-Div Week	t(1,2)
Panel A: Value-Weighted Portfolio						
Excess Return	35.76	32.05	1.21	35.21	28.32	2.37
s.d.	225.15	218.31	223.50	227.35	222.31	225.83
s.e. mean	(4.60)	(4.44)	(4.53)	(4.66)	(4.57)	(4.55)
Market Model	26.82	23.25	-7.93	26.27	19.51	-6.75
	(2.19)	(2.03)	(1.92)	(2.24)	(2.19)	(2.02)
3-Factor Model	25.59	22.24	-9.22	25.05	18.68	-7.97
	(2.03)	(1.96)	(1.88)	(2.12)	(2.16)	(2.01)
Panel B: Prior Return-Weighted Portfolio						
Excess Return	34.04	52.22	4.67	32.42	48.30	5.43
s.d.	187.06	182.59	185.47	187.74	184.42	187.44
s.e. mean	(4.59)	(4.43)	(4.53)	(4.58)	(4.43)	(4.56)
Market Model	26.90	45.22	-2.56	25.26	41.24	-1.83
	(2.45)	(2.47)	(2.30)	(2.47)	(2.45)	(2.33)
3-Factor Model	22.08	40.55	-7.37	20.56	36.71	-6.54
	(1.87)	(1.94)	(1.74)	(1.92)	(1.98)	(1.79)
N(weeks)	2,493	2,493	2,493	2,493	2,493	2,493
N(obs)	459,529	459,529	459,474	358,469	358,469	358,435

Table A-6: **Returns around Ex-Dividend Dates – Weekly Sorts (winsorized)**

Notes: The Table presents *weekly* excess returns, standard deviations and abnormal returns (in basis points) of a portfolio composed of ex-dividend companies around ex-dividend dates. The sample only includes S&P 500 constituents. Specifically, at the end of each Wednesday, the portfolio invests in ordinary common stocks that trade ex (cash) dividend within the following seven days. The table also shows results for the subset of companies whose dividend announcement precedes the ex-dividend day by more than seven days. The portfolio is rebalanced every week and, on average, consists of 31.71 companies (24.45 for the restricted sample). Panel A shows results for *value-weighted* portfolios and Panel B shows results for *prior return-weighted* portfolios following Asparouhova, Bessembinder and Kalcheva (2010, 2013). Wednesday-to-Wednesday returns are measured according to the standard definition of holding period returns, that is, as the ratio of dividends and price changes over previous closing price. *Excess returns* are defined as portfolio returns in excess of the risk-free return (one-month T-Bill). *Market model* shows the abnormal return (regression constant) from a regression of weekly portfolio excess returns on the excess return of the market portfolio. *3-Factor Model* reports the abnormal return when the Fama-French three-factor model is used. Newey-West standard errors of mean estimates are shown in parentheses. Returns are winsorized at the 1 and 99 percentiles. The sample covers 2,493 trading weeks from 1964.4-2011.

	All Companies			***Ex day - Ann. day > 7 days***		
Date	t(-1,0)	Ex-Div Week	t(1,2)	t(-1,0)	Ex-Div Week	t(1,2)
Panel A: Value-Weighted Portfolio						
Excess Return	32.59	32.15	2.25	32.83	27.59	2.73
s.d.	232.05	226.88	228.55	236.97	232.45	233.62
s.e. mean	(4.59)	(4.49)	(4.51)	(4.70)	(4.66)	(4.54)
Market Model	23.81	23.49	-6.63	24.06	18.92	-6.15
	(2.58)	(2.48)	(2.40)	(2.71)	(2.69)	(2.55)
3-Factor Model	23.70	23.68	-6.69	23.89	19.31	-6.10
	(2.36)	(2.36)	(2.36)	(2.56)	(2.60)	(2.53)
Panel B: Prior Return-Weighted Portfolio						
Excess Return	28.15	36.16	4.26	28.23	30.67	4.18
s.d.	228.95	221.54	222.93	231.06	225.74	227.16
s.e. mean	(4.81)	(4.57)	(4.60)	(4.84)	(4.67)	(4.68)
Market Model	19.05	27.36	-4.76	19.21	21.86	-4.85
	(2.33)	(2.15)	(2.13)	(2.44)	(2.29)	(2.26)
3-Factor Model	16.09	24.81	-7.49	16.29	19.41	-7.38
	(2.06)	(2.02)	(2.03)	(2.21)	(2.21)	(2.18)
N(weeks)	2,493	2,493	2,493	2,493	2,493	2,493
N(obs)	79,063	79,063	79,063	60,957	60,957	60,957

Table A-7: **Returns around Ex-Dividend Dates – Weekly Sorts (Extended Sample, winsorized)**

Notes: The Table presents *weekly* excess returns, standard deviations and abnormal returns (in basis points) of a portfolio composed of ex-dividend companies around ex-dividend dates. The sample extends to include observations of all common shares. Specifically, at the end of each Wednesday, the portfolio invests in ordinary common stocks that trade ex (cash) dividend within the following seven days. The table also shows results for the subset of companies whose dividend announcement precedes the ex-dividend day by more than seven days. The portfolio is rebalanced every week and, on average, consists of 184.33 companies (143.79 for the restricted sample). Panel A shows results for *value-weighted* portfolios and Panel B shows results for *prior return-weighted* portfolios following Asparouhova, Bessembinder and Kalcheva (2010, 2013). Wednesday-to-Wednesday returns are measured according to the standard definition of holding period returns, that is, as the ratio of dividends and price changes over previous closing price. *Excess returns* are defined as portfolio returns in excess of the risk-free return (one-month T-Bill). *Market model* shows the abnormal return (regression constant) from a regression of weekly portfolio excess returns on the excess return of the market portfolio. *3-Factor Model* reports the abnormal return when the Fama-French three-factor model is used. Newey-West standard errors of mean estimates are shown in parentheses. Returns are winsorized at the 1 and 99 percentiles. The sample covers 2,493 trading weeks from 1964.4-2011.

	All Companies			***Ex day - Ann. day > 7 days***		
Date	t(-1,0)	Ex-Div Week	t(1,2)	t(-1,0)	Ex-Div Week	t(1,2)
Panel A: Value-Weighted Portfolio						
Excess Return	35.81	32.61	2.26	35.21	28.77	3.30
s.d.	216.40	210.81	213.86	218.47	214.55	215.97
s.e. mean	(4.40)	(4.24)	(4.30)	(4.45)	(4.38)	(4.32)
Market Model	27.24	24.17	-6.43	26.65	20.33	-5.38
	(2.14)	(2.03)	(1.96)	(2.19)	(2.18)	(2.03)
3-Factor Model	26.32	23.43	-7.32	25.74	19.75	-6.22
	(2.00)	(1.96)	(1.95)	(2.10)	(2.16)	(2.04)
Panel B: Prior Return-Weighted Portfolio						
Excess Return	31.50	49.96	2.58	29.69	45.97	3.16
s.d.	171.72	167.83	169.80	172.78	169.50	172.26
s.e. mean	(4.23)	(4.09)	(4.14)	(4.22)	(4.10)	(4.20)
Market Model	24.93	43.52	-4.05	23.08	39.48	-3.53
	(2.30)	(2.31)	(2.14)	(2.32)	(2.30)	(2.19)
3-Factor Model	20.84	39.53	-8.16	19.10	35.59	-7.58
	(1.86)	(1.91)	(1.75)	(1.91)	(1.95)	(1.79)
N(weeks)	2,493	2,493	2,493	2,493	2,493	2,493
N(obs)	459,529	459,529	459,474	358,469	358,469	358,435

Table A-8: **Replication and Analysis of alternate Term Structure Segments**

Notes: The Table presents return summary statistics of synthetic dividend assets with varying maturities (trading strategies devised to generate these returns are described in Appendix B.). Asset $s23\_6$ replicates the *short-term asset* of BBK and asset $s23\_6\_m\_11\_6$ replicates the *steepener* of BBK. The last row displays the mean number of observations (put/call pairs) that was used in determining the median price of the respective dividend claim each period.

	Short-term Assets								*Steepener*
Trading Strategy	s23_6	s17_6	s11_3	s11_6	s8_3	s5_3	s3_1	s2_1	s23_6_m_11_6
Average Maturity (years)	**1.68**	**1.18**	**0.80**	**0.68**	**0.55**	**0.30**	**0.22**	**0.14**	
Mean Dividend Yield	0.052	0.074	0.106	0.129	0.152	0.280	0.389	0.622	0
Median Dividend Yield	0.051	0.071	0.102	0.121	0.147	0.268	0.364	0.609	0
Mean Return (arithmetic)	**0.0103**	**0.0112**	**0.0120**	**0.0135**	**0.0136**	**0.0203**	**0.0390**	**0.0743**	**0.0096**
s.d.	0.0757	0.0804	0.0846	0.0834	0.0894	0.1573	0.2195	0.3054	0.0959
s.e. mean	0.0059	0.0063	0.0066	0.0065	0.0070	0.0122	0.0172	0.0239	0.0075
Excess over S&P 500 (arithm.)	0.0048	0.0057	0.0063	0.0079	0.0083	0.0147	0.0332	0.0694	0.004
Corr(BBK short-term asset)	0.97	0.90	0.82	0.72	0.62	0.39	0.31	0.16	0.86
Corr(BBK steepener)	0.91	0.75	0.59	0.45	0.33	0.12	0.07	-0.07	0.94
Mean Return (logarithmic)	**0.0074**	**0.0080**	**0.0084**	**0.0101**	**0.0097**	**0.0095**	**0.0215**	**0.0402**	**0.0049**
s.d.	0.0767	0.0809	0.0851	0.0817	0.0877	0.1435	0.1763	0.2420	0.0983
s.e. mean	0.0060	0.0063	0.0067	0.0064	0.0069	0.0112	0.0138	0.0190	0.0077
Excess over S&P 500 (logarith.)	0.0030	0.0036	0.0038	0.0056	0.0056	0.0051	0.0168	0.0363	0.0005
Number of months	165	165	162	165	163	165	163	163	165
Mean Observations/month	9504	11276	13378	15840	16438	25192	26596	33905	12672

Table A-9: **Top marginal federal tax rates 1996-2009**

Notes: This Table shows top marginal federal dividend tax rates (τ^s_{Div}) and long-term capital gains tax rates (τ^s_{CG}) for the years 1996 to 2009. The last column reflects the portion of the marginal tax rate estimates that can plausibly be reconciled with statutory tax rate differences.

Year	τ^s_{Div}	τ^s_{CG}	$\frac{\tau^s_{Div}-\tau^s_{CG}}{1-\tau^s_{CG}}$
1996	0.396	0.28	0.161
1997	0.396	0.2	0.245
1998	0.396	0.2	0.245
1999	0.396	0.2	0.245
2000	0.396	0.2	0.245
2001	0.391	0.2	0.239
2002	0.386	0.2	0.233
2003	0.15	0.15	0
2004	0.15	0.15	0
2005	0.15	0.15	0
2006	0.15	0.15	0
2007	0.15	0.15	0
2008	0.15	0.15	0
2009	0.15	0.15	0

Table A-10: **Implicit marginal tax rates & TS Slope: NBER recession months**

Notes: This Table shows averages of monthly median and monthly dividend-weighted average *implicit marginal tax rates* for S&P 500 index constituents for NBER *recession* months and *non-recession* months during February 1996 and October 2009. Implied marginal tax rates measure the tax disadvantage of dividends relative to capital gains and are estimated adjusting for market and industry movements over respective measurement periods. *Ex-day* measures the implied tax rate over one day and *t(-2,2)* measures the implied tax rate over the four days surrounding the ex-dividend date. Industry adjustment is made using returns of the 49 value-weighted Fama-French industry portfolios. Factor loading-adjusted estimates use betas that are estimated using one year of daily data. The sample only includes companies distributing cash dividends and consists of 20,600 observations (3,071 during NBER recession months). The table also reports a slope measure of the term structure of the equity premium for both periods, computed as average difference of monthly returns of the *short-term asset* and the S&P 500 index, as well as the respective dividend yields of the *short-term asset*. Dividend-weighted averages use the total market value of cash dividend distributions (dividend yield times market capitalization) to compute weights. This measure thus represents the implicit tax rate that applies to a value-weighted portfolio of dividends, such as the *short-term asset*.

		NBER RECESSION MONTHS		**NBER NON-RECESSION MONTHS**	
		Median tax rate	Div-weighted Avg.	Median tax rate	Div-weighted Avg.
S&P 500-adjusted	**Ex-day**	**0.137**	**0.156**	**0.111**	**0.208**
	t(-2,2)	0.487	0.705	0.094	0.243
Industry-adjusted	**Ex-day**	**0.176**	**0.246**	**0.117**	**0.158**
	t(-2,2)	0.409	0.414	0.080	0.160
S&P 500 + Industry	**Ex-day**	**0.086**	**0.200**	**0.137**	**0.184**
(factor loading-adjusted)	t(-2,2)	0.353	0.513	0.119	0.205
3-Factor + Industry	**Ex-day**	**0.068**	**0.221**	**0.126**	**0.172**
(factor loading-adjusted)	t(-2,2)	0.328	0.407	0.039	0.081
Term Structure Slope:					
$R_{ST,t} - R_{SP500,t}$ (arithm.)		0.0299		0.0016	
$R_{ST,t} - R_{SP500,t}$ (logarithm.)		0.0291		-0.0006	
Monthly Dividend Yield		0.056		0.051	
Number of Months		26		139	

Table A-11: **Implicit marginal tax rates 2001-2002 (*before* tax reform but *after* decimalization)**

Notes: This Table shows median (across all periods) and dividend-weighted (DW) average *implicit marginal tax rates* for S&P 500 index constituents for 2001-2002, the period after decimalization of stock prices but before the tax reform of 2003. Implied marginal tax rates measure the tax disadvantage of dividends relative to capital gains and are estimated adjusting for market and industry movements over respective measurement periods. *Ex-day* measures the implied tax rate over one day and *t(-2,2)* measures the implied tax rate over the four days surrounding the ex-dividend date. Industry adjustment is made using returns of the 49 value-weighted Fama-French industry portfolios. Factor loading-adjusted estimates use betas that are estimated using one year of daily data. The sample only includes companies distributing cash dividends and consists of 2,742 observations. Dividend-weighted averages use the total market value of cash dividend distributions (dividend yield times market capitalization) to compute weights. This measure thus represents the implicit tax rate that applies to a value-weighted portfolio of dividends, such as the *short-term asset*.

		Median tax rate	Div-weighted Avg.
S&P 500-adjusted	**Ex-day**	**0.457**	**0.337**
	t(-2,2)	0.739	0.201
Industry-adjusted	**Ex-day**	**0.295**	**0.353**
	t(-2,2)	0.330	0.123
S&P 500 + Industry	**Ex-day**	**0.307**	**0.450**
(factor loading-adjusted)	t(-2,2)	0.392	0.338
3-Factor + Industry	**Ex-day**	**0.306**	**0.488**
(factor loading-adjusted)	t(-2,2)	0.296	0.201

Table A-12: **Controlling for Pastor and Stambaugh (2003) liquidity factor**

Notes: The Tables present OLS regressions of the excess returns of trading strategies 1 (*short-term asset*, $R_{ST1,t} - R_{f,t}$) and 2 (*steepener*, $R_{ST2,t} - R_{f,t}$) on excess returns on the market factor (Panel A). Newey-West standard errors in parentheses. When an AR(1) term is included, the intercept is adjusted by dividing by one minus the AR(1) coefficient, such that the intercept is comparable to the regressions without AR(1) term. Panel B uses the three Fama and French factors. All specifications are shown with and without including the Pastor and Stambaugh (2003) liquidity factor.

Panel A: Excess returns on MKTRF and AR(1)

Dependent variable	$R_{ST1,t} - R_{f,t}$				$R_{ST2,t} - R_{f,t}$			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	**0.0074**	**0.0074**	**0.0052**	**0.0057**	**0.0070**	**0.0069**	**0.0045**	**0.0051**
	(0.0052)	(0.0058)	(0.0047)	(0.0054)	(0.0052)	(0.0062)	(0.0049)	(0.0058)
mktrf	0.4757	0.5013	0.4528	0.4779	0.4847	0.5247	0.4577	0.4981
	(0.1567)	(0.1472)	(0.1625)	(0.1522)	(0.1752)	(0.1588)	(0.1894)	(0.1740)
AR(1)		-0.2868		-0.2919		-0.3272		-0.3288
		(0.1019)		(0.1038)		(0.0801)		(0.0820)
PS Liquidity Factor			**0.2603**	**0.2742**			**0.3068**	**0.3076**
			(0.1553)	(0.1538)			(0.1956)	(0.1858)
Observations	165	164	165	164	165	164	165	164
R2	0.086	0.168	0.106	0.19	0.059	0.165	0.077	0.184

Panel B: Three Fama and French Factors

Dependent variable	$R_{ST1,t} - R_{f,t}$		$R_{ST2,t} - R_{f,t}$	
	(1)	(2)	(3)	(4)
Constant	**0.0066**	**0.0042**	**0.0054**	**0.0025**
	(0.0045)	(0.0043)	(0.0047)	(0.0046)
mktrf	0.4946	0.4756	0.5765	0.5536
	(0.1458)	(0.1521)	(0.1525)	(0.1634)
hml	0.1521	0.1807	0.3862	0.4210
	(0.1713)	(0.1694)	(0.1939)	(0.1964)
smb	0.0849	0.0947	-0.0165	-0.0046
	(0.1512)	(0.1502)	(0.1662)	(0.1648)
PS Liquidity Factor		**0.2683**		**0.3251**
		(0.1488)		(0.1607)
Observations	165	165	165	165
R2	0.091	0.112	0.08	0.101

Table A-13: **Implicit marginal tax rates for S&P 500 sample (*across all periods*)**

Notes: This Table shows median (across all periods) and dividend-weighted (DW) average *implicit marginal tax rates* for S&P 500 index constituents during February 1996 and October 2009. Implied marginal tax rates measure the tax disadvantage of dividends relative to capital gains. I report various implied tax rate estimates that are adjusted for market and industry movements over respective measurement periods (see Section IV. for detailed variable definitions). *Ex-day* measures the implied tax rate over one day, *t(-2,2)* measures the implied tax rate over the four days surrounding the ex-dividend date, and *t(-5,5)* estimates the tax rate over the ten days surrounding the ex-dividend date. Industry adjustment is made using returns of the 49 value-weighted Fama-French industry portfolios. Factor loading-adjusted estimates use betas that are estimated using one year of daily data. The sample only includes companies distributing cash dividends and consists of 20,600 observations. Dividend-weighted averages use the total market value of cash dividend distributions (dividend yield times market capitalization) to compute weights. This measure thus represents the implicit tax rate that applies to a value-weighted portfolio of dividends, such as the *short-term asset*.

		Median tax rate	Div-weighted Avg.
S&P 500-adjusted	**Ex-day**	**0.104**	**0.165**
	t(-2,2)	0.131	0.260
	t(-5,5)	0.219	0.189
Industry-adjusted	**Ex-day**	**0.103**	**0.146**
	t(-2,2)	0.055	0.153
	t(-5,5)	0.067	0.119
S&P 500 + Industry	**Ex-day**	**0.107**	**0.167**
(factor loading-adjusted)	t(-2,2)	0.120	0.222
	t(-5,5)	0.270	0.268
3-Factor + Industry	**Ex-day**	**0.103**	**0.160**
(factor loading-adjusted)	t(-2,2)	0.048	0.121
	t(-5,5)	0.017	-0.013

Table A-14: **Adjusted Returns of the Short-term Asset (*across all periods*)**

Notes: This Table reports *adjusted* monthly returns of the *short-term asset*, where the holding period return is adjusted to account for implied tax rate disadvantages of dividends. Specifically, using the unadjusted return series reported in van Binsbergen, Brandt and Koijen (2012), I decompose reported monthly returns into two parts, a capital appreciation component and a dividend component. Monthly dividend components are then adjusted using sample estimates (across all periods) of various implicit tax rate measures. Finally, a series of monthly *adjusted* holding period returns is constructed and mean return, standard deviation, and Sharpe ratio for the *short-term asset* are analyzed. The table also reports estimates of adjusted returns in excess of the S&P 500 index return, where the index dividend component is adjusted analogously (rows labeled Excess over S&P500^a; t-statistics based on bootstrapped standard errors are shown below in brackets). The table reports both adjusted *arithmetic* returns and adjusted *logarithmic* returns using the median and dividend-weighted average ex-day implied tax rate of S&P 500 index constituents estimated over the entire sample (see Table A-13). Inferred tax rates take into account market and industry movements on ex-dividend days (see Section IV. for detailed variable definitions). For comparison, I also show the unadjusted monthly mean return, standard deviation, and Sharpe ratio for the *short-term asset* reported in BBK. The average monthly return of the S&P 500 index is 0.0056 (log return of 0.0044) and the risk-free rate averages 0.0028 per month. Based on the average of those adjusted estimates, the *adjusted* arithmetic (logarithmic) return of the *short-term asset* averages 0.0046 (0.0017). The sample period spans 165 months from February 1996 to October 2009.

		ARITHMETIC ADJUSTED RETURNS		**LOGARITHMIC ADJUSTED RETURNS**	
Adjustment Method ($\hat{\tau}$)		Median	Div-weighted	Median	Div-weighted
		(1)	(2)	(3)	(4)
S&P 500-adjusted	**Mean**	**0.0062**	**0.0030**	**0.0031**	**0.0000**
tax rate	Std. Dev.	(0.0778)	(0.0777)	(0.0790)	(0.0792)
	Sharpe ratio	0.0430	0.0027	0.0037	-0.0358
	Excess over S&P500^a	**0.0008**	**-0.0023**	**-0.0012**	**-0.0042**
		[t=0.12]	[t=-0.37]	[t=-0.19]	[t=-0.69]
Industry-adjusted	**Mean**	**0.0062**	**0.0032**	**0.0032**	**0.0009**
tax rate	Std. Dev.	(0.0778)	(0.0790)	(0.0790)	(0.0792)
	Sharpe ratio	0.0441	0.0048	0.0048	-0.0235
	Excess over S&P500^a	**0.0008**	**-0.0013**	**-0.0011**	**-0.0033**
		[t=0.14]	[t=-0.22]	[t=-0.18]	[t=-0.53]
S&P 500 + Industry	**Mean**	**0.0060**	**0.0029**	**0.0030**	**-0.0002**
(factor loading-adjusted)	Std. Dev.	(0.0778)	(0.0777)	(0.0790)	(0.0793)
	Sharpe ratio	0.0412	0.0010	0.0020	-0.0375
	Excess over S&P500^a	**0.0006**	**-0.0024**	**-0.0013**	**-0.0044**
		[t=0.10]	[t=-0.39]	[t=-0.21]	[t=-0.71]
3-Factor + Industry	**Mean**	**0.0062**	**0.0033**	**0.0032**	**0.0002**
(factor loading-adjusted)	Std. Dev.	(0.0778)	(0.0777)	(0.0790)	(0.0792)
	Sharpe ratio	0.0441	0.0057	0.0048	-0.0329
	Excess over S&P500^a	**0.0008**	**-0.0021**	**-0.0011**	**-0.0040**
		[t=0.14]	[t=-0.34]	[t=-0.18]	[t=-0.65]
Unadjusted	**Mean**	**0.0116**		**0.0085**	
(as reported (BBK))	Std. Dev.	(0.0780)		(0.0787)	
	Sharpe ratio	0.1124		0.0724	
	Excess over S&P500	**0.0060**		**0.0041**	
		[t=0.98]		[t=0.67]	
Monthly D/P	*Short-term Asset*	**0.0520** (449%)			
(% of monthly return)	S&P500 Index	**0.0015** (27%)			
Relative importance of mechanisms:		26.7%	Levered noise channel (BCFS)		
(contribution to return of the *short-term asset*)		58.9%	Taxation channel		

Table A-15: **Implicit marginal tax rates and returns for subsamples (*across all periods*)**

Notes: This Table shows median (across all periods) and dividend-weighted (DW) average *implicit marginal tax rates* τ for S&P 500 index constituents as well as monthly returns of the *short-term asset* and the S&P 500 index as reported in BBK for two subsamples: 1996:2 - 2002:12 and 2003:1 - 2009:10. Implied tax rates are measured on ex-dividend days and measure the tax disadvantage of dividends relative to capital gains. In column (5), I compute a slope measure of the term structure of the equity premium as difference of average returns of the *short-term asset* and the S&P 500 index for each subsample. In column (6), I report an *adjusted* slope measure that is based on *adjusted* returns of the *short-term asset* and the index (The adjustment is based on the average of four subsample estimates of τ, median and dividend-weighted averages that are adjusted for contemporaneous S&P 500 and industry returns, respectively). T-statistics based on bootstrapped standard errors are shown below in brackets. The monthly dividend yield of the *short-term asset* is approximately 5.5% in the first half sample and 4.9% in the second half sample. For comparison, the monthly return on the risk-free asset averages 0.0036 in the first half sample and 0.002 in the second half sample.

	Median (DW avg.) implicit τ estimates		***Reported* mean returns and TS slope (BBK)**			***Adjusted* TS slope**
	S&P 500-adj.	Ind.-adj	$R_{ST,t}$	$R_{SP500,t}$	$R_{ST,t} - R_{SP500,t}$	$R^{adj}_{ST,t} - R^{adj}_{SP500,t}$
	(1)	(2)	(3)	(4)	(5)	(6)
			Arithmetic			
First half sample	0.187	0.176	0.0159	0.0065	**0.0094**	**-0.0049**
1996:2 - 2002:12	(0.401)	(0.301)			[t=0.85]	[t=-0.45]
			Logarithmic			
			0.0110	0.0052	**0.0058**	**-0.0085**
					[t=0.53]	[t=-0.77]
			Arithmetic			
Second half sample	0.038	0.053	0.0072	0.0046	**0.0027**	**0.0007**
2003:1 - 2009:10	(0.021)	(0.051)			[t=0.51]	[t=0.14]
			Logarithmic			
			0.0060	0.0036	**0.0024**	**0.0004**
					[t=0.46]	[t=0.08]

Table A-16: **Implicit marginal tax rates & TS Slope: NBER recession months (*across all periods*)**

Notes: This Table shows median (across all periods) and dividend-weighted average *implicit marginal tax rates* for S&P 500 index constituents for NBER *recession* months and *non-recession* months during February 1996 and October 2009. Implied marginal tax rates measure the tax disadvantage of dividends relative to capital gains and are estimated adjusting for market and industry movements over respective measurement periods. *Ex-day* measures the implied tax rate over one day and *t(-2,2)* measures the implied tax rate over the four days surrounding the ex-dividend date. Industry adjustment is made using returns of the 49 value-weighted Fama-French industry portfolios. Factor loading-adjusted estimates use betas that are estimated using one year of daily data. The sample only includes companies distributing cash dividends and consists of 20,600 observations (3,071 during NBER recession months). The table also reports a slope measure of the term structure of the equity premium for both periods, computed as average difference of monthly returns of the *short-term asset* and the S&P 500 index, as well as the respective dividend yields of the *short-term asset*. Dividend-weighted averages use the total market value of cash dividend distributions (dividend yield times market capitalization) to compute weights. This measure thus represents the implicit tax rate that applies to a value-weighted portfolio of dividends, such as the *short-term asset*.

		NBER RECESSION MONTHS		**NBER NON-RECESSION MONTHS**	
		Median tax rate	Div-weighted Avg.	Median tax rate	Div-weighted Avg.
S&P 500-adjusted	**Ex-day**	**0.207**	**0.102**	**0.089**	**0.179**
	t(-2,2)	0.530	0.558	0.074	0.190
Industry-adjusted	**Ex-day**	**0.152**	**0.166**	**0.098**	**0.141**
	t(-2,2)	0.249	0.265	0.028	0.127
S&P 500 + Industry	**Ex-day**	**0.084**	**0.141**	**0.113**	**0.173**
(factor loading-adjusted)	t(-2,2)	0.325	0.358	0.090	0.191
3-Factor + Industry	**Ex-day**	**0.067**	**0.145**	**0.110**	**0.164**
(factor loading-adjusted)	t(-2,2)	0.258	0.269	0.013	0.087
Term Structure Slope:					
$R_{ST,t} - R_{SP500,t}$ (arithm.)		0.0299		0.0016	
$R_{ST,t} - R_{SP500,t}$ (logarithm.)		0.0291		-0.0006	
Monthly Dividend Yield		0.056		0.051	
Number of Months		26		139	