

High-Frequency Financial Econometrics: Project 4

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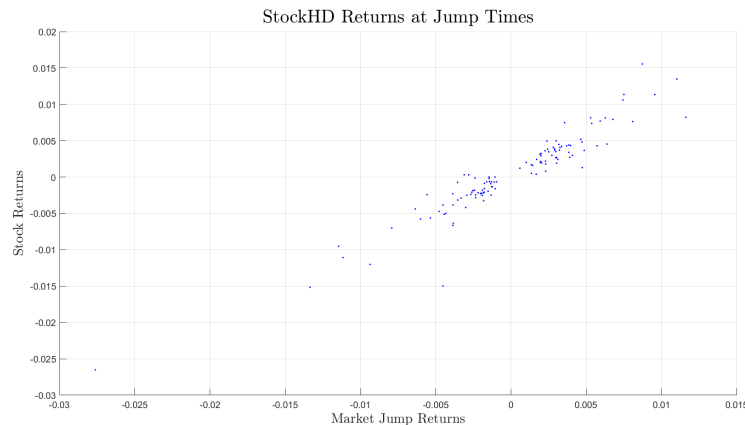
0.1 Exercise 1

0.1.1 A

The market index SPY had 11 jumps in 2007, 5 jumps in 2008, 7 jumps in 2009, 8 jumps in 2010, 4 jumps in 2011, 17 jumps in 2012, 9 jumps in 2013, 14 jumps in 2014, 8 jumps in 2015, 18 jumps in 2016 and 15 jumps in 2017. Average magnitude of the jumps in one year are: 0.0047 (2007), 0.0095 (2008), 0.0063 (2009), 0.0051 (2010), 0.0067 (2011), 0.0034 (2012), 0.0045 (2013), 0.0024 (2014), 0.0040 (2015), 0.0027 (2016), 0.0019 (2017).

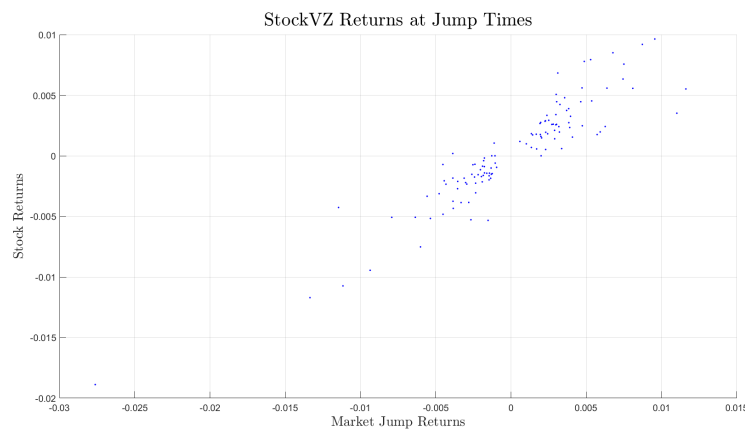
0.1.2 B

This is HD returns at jump times.



From the plot, it seems quite plausible to assume a linear relationship between HD returns at jump times and market jump returns.

This is VZ returns at jump times.



From the plot, it seems quite plausible to assume a linear relationship between VZ returns at jump times and market jump returns.

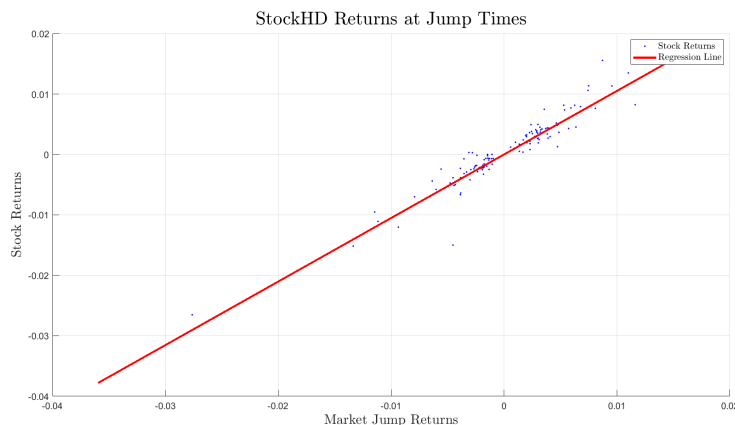
0.1.3 C

The OLS jump beta for stock HD is 1.0511, which means when market jump return is 1 percent, the HD returns are expected to be 1.0511 percent. The OLS jump beta for stock VZ is 0.7640, which means when

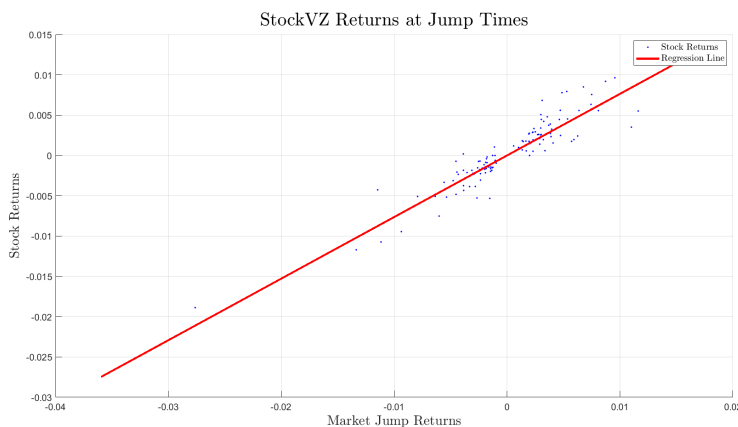
market jump return is 1 percent, the HD returns are expected to be 0.7640 percent.

0.1.4 D

This is HD returns at jump times and the regression line.



This is VZ returns at jump times and the regression line.



0.1.5 E

The $\sqrt{\Delta_n \hat{V}_\beta}$ of Stock HD is 0.0415. The $\sqrt{\Delta_n \hat{V}_\beta}$ of Stock VZ is 0.0455.

0.1.6 F

The 95% confidence interval for jump beta of HD is [0.9698, 1.1325]. The 95% confidence interval for jump beta of VZ is [0.6747, 0.8533].

0.1.7 G

I can hedge my position by shortselling market index futures (SPY futures). If I am holding \$100 million worth of HD stock, I will want to short sell SPY futures at the range from \$96.98 million to \$113.25 million. If I am holding \$100 million worth of VZ stock, I will want to short sell SPY futures at the range from \$67.47 million to \$85.33 million.

0.1.8 H

The jump beta of HD for the period 1: 2007-2011 is 1.0310 and $\hat{V}_{\beta 1}$ is 0.0035. The jump beta of HD for the period 2: 2012-2017 is 1.0946 and $\hat{V}_{\beta 2}$ is 0.00075. The jump beta of VZ for the period 1: 2007-2011 is 0.7102 and $\hat{V}_{\beta 1}$ is 0.0046. The jump beta of VZ for the period 2: 2012-2017 is 0.8802 and $\hat{V}_{\beta 2}$ is 0.00092.

0.1.9 I

The 95% confidence interval for the difference of the jump betas of HD is [-0.0781, -0.0490]. It doesn't contain the number 0, which means the jump betas of HD for two periods are not equal at the probability of 95%. We can reject the assumption that we have same beta for these 11 years at significance level of 5%. The 95% confidence interval for the difference of the jump betas of VZ is [-0.1865, -0.1535]. It doesn't contain the number 0, which means the jump betas of VZ for two periods are not equal at the probability of 95%. We can reject the assumption that we have same beta for these 11 years at significance level of 5%.