

1. From the regression based on CAPM, we found out that Jensen Alpha is not significant with the p-value=0.505. Moreover, from the regression based on Fama&French, it confirms that there's no Jensen Alpha in the model with the p-value of 0.562.

regress rj rm

Source	SS	df	MS	Number of obs	=	11,959
Model	11449.5344	1	11449.5344	F(1, 11957)	=	5988.94
Residual	22859.1346	11,957	1.91177842	Prob > F	=	0.0000
				R-squared	=	0.3337
				Adj R-squared	=	0.3337
Total	34308.669	11,958	2.86909759	Root MSE	=	1.3827

rj	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
rm	.9947206	.0128536	77.39	0.000	.9695254	1.019916
_cons	.0084273	.0126552	0.67	0.505	-.0163789	.0332335

2. Based on the F-test in CAPM, we found that portfolio j has the same risk as the market (Beta(j)=1) with P-value=0.6813. Based on the F-test in Fama&French, we also found that portfolio j has the same risk as the market with P-value=0.6651.

test rm==1

(1) **rm = 1**

F(1, 11955) = **0.19**
 Prob > F = **0.6651**

3. Based on the t-test in Fama&French, we found that there is a significant size premium with t=6.07 and p-value less than 0.05.
4. Based on the t-test in Fama&French, we found that there is a significant growth premium with t=9.24 and p-value less than 0.05.

regress rj rm smb hml

Source	SS	df	MS	Number of obs	=	11,959
Model	11681.1999	3	3893.73328	F(3, 11955)	=	2057.22
Residual	22627.4691	11,955	1.89272013	Prob > F	=	0.0000
				R-squared	=	0.3405
				Adj R-squared	=	0.3403
Total	34308.669	11,958	2.86909759	Root MSE	=	1.3758

rj	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
rm	1.005554	.0128271	78.39	0.000	.9804104	1.030697
smb	.0371377	.0061189	6.07	0.000	.0251437	.0491318
hml	.0562866	.00609	9.24	0.000	.0443492	.068224
_cons	.0073088	.0125928	0.58	0.562	-.0173752	.0319928

- From the F-test, we found out that Fama&French model is more appropriate since both smb and hml are both significant. By using the CAPM model, we may face the problem of omitted variable bias.
- From the regression, we found out that the January effect is not significant with $t=1.18$ and p-value exceeds 0.05.

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regress rj rm smb hml d1
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Source	SS	df	MS	Number of obs	=	11,959
Model	11683.8263	4	2920.95657	F(4, 11954)	=	1543.31
Residual	22624.8427	11,954	1.89265875	Prob > F	=	0.0000
				R-squared	=	0.3406
				Adj R-squared	=	0.3403
Total	34308.669	11,958	2.86909759	Root MSE	=	1.3757

rj	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
rm	1.005405	.0128275	78.38	0.000	.9802607	1.030549
smb	.0369291	.0061214	6.03	0.000	.0249302	.048928
hml	.0562495	.00609	9.24	0.000	.0443121	.0681868
d1	.05393	.045781	1.18	0.239	-.0358082	.1436682
_cons	.0028773	.0131425	0.22	0.827	-.0228842	.0286388

- All coefficients have the positive correlation with the excess return on portfolio j (rj). The overall F-test confirms that the model is significant with the p-value less than 0.05. R-squared shows that 34.06% of the observations can be explained by this linear regression model. From the individual t-test, we found out that there are only two insignificant variables in the model which are the January effect variable (d1) and the constant term.
- Based on the F-test, we found that the dummy variables are all insignificant so it means both model actually share the same structure.

```
regress rj rm drm smb dsmb hml dhml d1
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Source	SS	df	MS	Number of obs	=	11,959
Model	11685.5157	7	1669.35938	F(7, 11951)	=	881.86
Residual	22623.1533	11,951	1.89299249	Prob > F	=	0.0000
				R-squared	=	0.3406
				Adj R-squared	=	0.3402
Total	34308.669	11,958	2.86909759	Root MSE	=	1.3759

rj	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
rm	1.008159	.0133675	75.42	0.000	.9819563	1.034361
drm	-.035594	.0475853	-0.75	0.454	-.1288689	.0576808
smb	.0364768	.0064084	5.69	0.000	.0239153	.0490383
dsmb	.0037628	.0217997	0.17	0.863	-.0389682	.0464937
hml	.0553364	.0063695	8.69	0.000	.0428511	.0678216
dhml	.0106311	.0218876	0.49	0.627	-.0322721	.0535344
d1	.0552912	.0461135	1.20	0.231	-.0350988	.1456811
_cons	.0027652	.0131445	0.21	0.833	-.0230002	.0285307

```
test drm dsmb dhml d1
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```
( 1)  drm = 0
( 2)  dsmb = 0
( 3)  dhml = 0
( 4)  d1 = 0

F( 4, 11951) = 0.57
Prob > F = 0.6844
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