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CAPM:

```
. reg rj rm
```

Source	SS	df	MS	Number of obs	=	11,959
				F(1, 11957)	=	5988.94
Model	11449.5344	1	11449.5344	Prob > F	=	0.0000
Residual	22859.1346	11,957	1.91177842	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

1)

FF:

```
. reg rj rm smb hml
```

Source	SS	df	MS	Number of obs	=	11,959
				F(3, 11955)	=	2057.22
Model	11681.1999	3	3893.73328	Prob > F	=	0.0000
Residual	22627.4691	11,955	1.89272013	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

3) 4)

1)

Summary:

```
. est table capm ff, star(0.1 0.05 0.01) stat(N rss F r2 r2_a)
```

Variable	capm	ff
rm	.99472062***	1.0055536***
smb		.03713773***
hml		.05628656***
_cons	.00842732	.00730878
N	11959	11959
rss	22859.135	22627.469
F	5988.9442	2057.2156
r2	.33372132	.34047371
r2_a	.3336656	.34030821

legend: * p<.1; ** p<.05; *** p<.01

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1) There are not existing significant Jennet Alpha in both CAPM and FF. The p-value of alpha (_cons) is more than 0.05 (t=.67 & p-value=.505 and t=.58 & p-value=.562 respectively)

CAPM:

```
. test rm==1

 ( 1)  rm = 1

       F(  1, 11957) =    0.17
            Prob > F =    0.6813
```

FF Model:

```
. test rm==1

 ( 1)  rm = 1

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

2) In both model, the portfolio j has the same risk as the market (β=1) because the p-value is insignificant. In CAPM, the p-value is equal to 0.6813 (p-value>0.05). In FF, the p-value is equal to 0.6651 (p-value>0.05).
3) There is existing significant size premium in FF. The p-value is less than 0.05 (t=6.07).
4) There is existing significant growth (value) premium in FF. The p-value is less than 0.05 (t=9.24)

```
. test smb hml

 ( 1)  smb = 0
 ( 2)  hml = 0

       F(  2, 11955) =   61.20
            Prob > F =    0.0000
```

5) FF is more appropriate because both size premium and growth premium coefficient are significant. (Prob> F = 0.000) <0.05

```
. reg rj d1 rm smb hml
```

Source	SS	df	MS		
Model	11683.8263	4	2920.95657	Number of obs	= 11,959
Residual	22624.8427	11,954	1.89265875	F(4, 11954)	= 1543.31
				Prob > F	= 0.0000 (7.2)
Total	34308.669	11,958	2.86909759	R-squared	= 0.3406 (7.3)
				Adj R-squared	= 0.3403
				Root MSE	= 1.3757

rj	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
d1	(7.1) .05393	.045781	1.18	0.239 (6)	-.0358082	.1436682
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
_cons	.0028773	.0131425	0.22	0.827 (7.4)	-.0228842	.0286388

6) There are not existing significant January effects in the model. The p-value is more than 0.05 (t=1.18 & p-value=.239).

```
. est store calef

. est table calef, star(0.1 0.05 0.01) stat(N rss F r2 r2_a)
```

Variable	calef
d1	.05393001
rm	1.0054047***
smb	.03692908***
hml	.05624948***
_cons	.00287731
N	11959
rss	22624.843
F	1543.3086
r2	.34055026
r2_a	.3403296

legend: * p<.1; ** p<.05; *** p<.01

7)

a. The positive sign of the all variable (the January effect, market risk premium, size premium, growth premium) means that all variable have a positive effect on the excess return on portfolio j i.e. the excess return on portfolio j increases when each variable increases.
b. The F-test suggests that the overall test is significant (p-value=0.0000 < 0.05) Therefore, d1, rm, smb, hml are adequate to explain rj.
c. The R-square of the model (3) is equal to 0.3406. It means this model can explain 34.06% of all variation.
d. The individual test of market risk premium, size premium, and growth premium are significant (p-value<0.05) although the January effect (d1) is not significant (p-value=0.239>0.05).

```
. test d1 d1rm d1smb d1hml

 ( 1)  d1 = 0
 ( 2)  d1rm = 0
 ( 3)  d1smb = 0
 ( 4)  d1hml = 0

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

8) By using dummy variable technique, January and other month share the same structure of the FF model (F=.6844>.05)