Business groups, investment, and firm value

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Chapter 5

Group affiliation and risk

5.1 Introduction

In many emerging economies, most private companies are affiliated to a business group. Claessens et al. (2002), for instance, show that for nine Asian countries, on average 70 percent of all firms are affiliated to a group. Hence, whether group affiliates perform better than their stand-alone peers is an important economic issue. It is therefore not surprising that the performance of group companies has been the subject of debate for quite some time. Some authors argue that business groups are efficient organizational responses to the institutional environment. They stress that, in the face of market imperfections, group affiliation may help to solve agency problems and liquidity constraints.[1] Business groups are associated with a greater use of internal factor markets and financial markets (Khanna and Rivkin, 2001). Access to these internal markets may be beneficial in countries with poorly developed markets. More specifically, a group's internal capital market may enable the affiliated companies to fund profitable investment projects that external capital markets are not willing to finance because of information asymmetries.[2]

Others claim that business groups mainly exist to the benefit of the typically small number of investors that controls a group. The complicated

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This chapter is based on Van der Molen and Lensink (2005).

[1] See e.g. Hoshi et al. (1991) and Khanna and Palepu (2000).

[2] See Stein (2003) for an excellent survey of the literature on internal capital markets.

ownership structures of business groups may lead to large deviations from one-share-one-vote, inducing the expropriation of minority shareholders. For example, Johnson et al. (2000) argue that controlling shareholders have an incentive to tunnel assets from group companies where they have low cash-flow rights to firms where they have high cash-flow rights. In general, the complicated ownership structures of business groups may lead to more severe agency problems, negatively affecting firm performance and firm value.

The usual empirical strategy in determining the valuation effect of group affiliation is to regress some measure of firm value (typically a modified version of Tobin's q) on a dummy variable, indicating whether or not a firm is affiliated to a business group, together with a number of control variables. Examples of this methodology can be found in Khanna and Palepu (2000) and Claessens et al. (2002).[3] This approach is useful to determine the overall effect of group affiliation on firm value. However, a weakness of this approach is that it does not give any insights into the underlying determinants of group affiliation's effect on firm value. In general, firm value is determined by the size, timing and riskiness of expected future cash flows. This implies that a change in firm value can be the result of a change in the magnitude, timing or riskiness of cash flows, or a combination of the three. To improve our understanding of exactly how group affiliation affects firm value, the effects on the three determinants of firm value should be disentangled. This chapter makes a first attempt to do so by focusing exclusively on the relationship between group affiliation and the riskiness of a company.[4]

We have several reasons to believe that group affiliation may have a substantial effect on the riskiness of a company. Many authors have argued that business groups may play an important role in risk-sharing, because they enable smoothing of income flows and the reallocation of funds between different affiliates. Especially in emerging markets, risk-sharing within a business group can be valuable. If the financial sector is poorly developed, access to the group's internal capital market may diminish the value-destroying effect of credit constraints or bankruptcy. Moreover, with capital markets underdeveloped and minority shareholder rights poorly protected, markets

[3] Chapter 2 of this thesis provides another example of this methodology.

[4] This is not to say that risk is ignored in the traditional approach. A company's Tobin's q is of course partly determined by its riskiness.

for risk-sharing are likely to fail (see e.g. LaPorta et al., 2002). Since establishing a stock market has a public good character, coordination problems may prevent the stock market to take off (Pagano, 1993). The cost of forming bilateral links between a number of companies (i.e., a business group) are likely to be lower.[5] In this situation, a group structure permits wealthy individuals to diversify their holdings. In general, the reallocation of funds through a group's internal capital market may lead to income smoothing between the affiliated companies. At the company level, this will result in more stable profits, but at a lower level, *ceteris paribus.* Empirical tests have found evidence consistent with this prediction. For example, Nakatani (1984) finds that group companies have lower variance of profits and of growth rates than stand-alone companies in Japan. Other evidence of risk-sharing in Japanese groups is given by Caves and Uekusa (1976) and Lincoln et al. (1996). Moreover, Khanna and Rivkin (2001) find lower variation in ROA for group firms in a number of other countries. However, Khanna and Yafeh (2005) show that the extent of risk-sharing in business groups differs from one country to another. Risk-sharing in business groups will also affect the probability of a group company going into bankruptcy. Claessens et al. (2001) indeed find that, during the financial crises in East Asia in 1997-98, group-affiliated companies were less likely to file for bankruptcy than their stand-alone peers.[6]

Instead of looking at the volatility of profits, we estimate an asset pricing model to analyze the effect of group affiliation on the riskiness of a company. According to finance theory, the volatility of cash flows does not tell us anything about their riskiness. The only volatility that matters from a finance perspective is the volatility that investors cannot eliminate by creating a diversified portfolio. In other words, if we want to investigate the impact of group affiliation on the riskiness of a company, we have to distinguish between idiosyncratic and systematic risk. More specifically, we estimate an asset pricing model to explain the cost of equity for firms that are and are not affiliated to business groups. In doing so, we are able to distinguish

[5] See Kali (2003) for a formal model of business groups along these lines.

[6] Until now, we have only mentioned the negative relationship between group affiliation and risk. Yet, Khanna and Yafeh (2004) also note that group affiliation might increase risk in cases where there are shocks to the political system and groups are closely connected to the political apparatus. This possibility only makes the issue of group affiliation's effect on risk more interesting.

between differences in stock returns which are due to differences in (factor) risk and abnormal returns. In our analysis, abnormal returns are defined as returns in excess of what could have been achieved by passive investments in the risk factors (Jensen's alpha). In line with Fama and French (1993, 1995, 1996) we use a three-factor model to explain differences in risk premia for stocks of group firms and stand-alone firms. We use the Fama-French model because of its empirical success in explaining the returns on (portfolios of) stocks. Its success has made the Fama-French model one of the most popular multifactor models that currently dominate empirical research in asset pricing. Moreover, the Fama-French model explicitly takes into account a size factor, which may be important when comparing returns on group companies and stand-alone firms, because the latter typically are the smaller ones. The Fama-French model controls for market, size and book-to-market factors. We also examine whether group companies share common variation in stock returns by adding a group factor to the standard Fama-French three-factor model. Thus, we examine whether group firms share common variation in their stock returns, which is not captured by the traditional Fama-French factors.

We show that the three-factor Fama-French model does a reasonable job in explaining stock returns of group firms. Yet, the analysis also suggests that the difference in average returns between group firms and stand-alone firms cannot be easily explained by the Fama-French three factor model only. The explanatory power of the standard Fama-French model is not very large. Moreover, the constant (alpha) is highly significant and negative, suggesting that stocks of stand-alone firms systematically outperform stocks of group firms, even if the model allows for risk differences implied by the Fama-French factors. When we add a group, this extended Fama-French model does a better job in that the explanatory power of the model improves, confirming the relevance of our approach. If the efficient market theory holds and the group factor mimics an underlying risk factor, the analysis clearly suggests that stocks of stand-alone firms are cheaper than stocks of group firms partly because investors think that stand-alone stocks are more risky. Most importantly, the results show that there is common variation in stock returns of firms that are affiliated to business groups which is not captured by the standard Fama-French factors. We hypothesize that the significance of the group factor, and the implied lower risk premium for stocks of group firms, mainly stem from group members being better able than stand-alone firms to diversify risk. We provide evidence for this by showing that loadings on the group factor are higher for highly diversified groups than for groups that are only slightly diversified.

This chapter proceeds as follows. In section 5.2 we provide a descriptive analysis of the data. Section 5.3 makes a first step in analyzing the relationship between group affiliation and risk by presenting estimates of a standard Fama-French three-factor model for portfolios of group firms and stand-alone firms. In section 5.4 we continue the analysis by adding a group factor to the Fama-French model. In section 5.5 we construct portfolios based on the degree of diversification and show that the group factor has a higher loading on the portfolios containing the most diversified groups. Section 5.6 concludes and describes some avenues for further research.

5.2 Data

Share prices as well as financial data are obtained from the Prowess dataset from the Center for Monitoring the Indian Economy (CMIE). This dataset is used extensively by both professionals and researchers. The dataset contains information on more than 8,000 Indian companies, both private and public. We use information on stock returns, market capitalization and the book-to-market ratio. Prowess also identifies whether a firm is affiliated to a business group. We use the yield on 91-day Government of India Treasury Bills, as reported by the Reserve Bank of India, as the risk-free rate.

The sample period is restricted by the availability of share price data. The first year for which Prowess contains share price information is 1996. We therefore use monthly returns from June 1996 to July 2004. The sample size is further restricted by the illiquidity of a large number of shares. Since prices of illiquid shares are less likely to reflect the underlying fundamental values, we remove these shares from our sample. All stocks listed on the Bombay Stock Exchange (over 3,500) are classified into one of four categories (A, B1, B2, and Z). We only use shares that are in the A and B1 categories.[7] These

[7]Prowess only reports a share's category at the latest date available. This means that we ignore possible shifts in the categorization of stocks. The shares in the A-group are

two categories contain the most frequently traded stocks on the Bombay Stock Exchange. The exclusion of the illiquid stocks implies that our sample size is reduced from over 3,500 to 965 stocks.

For the construction of portfolios and factors, we follow the same procedure as in Fama and French (1993). We classify each firm into one of three size categories (small-, mid-, and large-caps, with cut-off points at 30 and 70 percent of the distribution of market capitalization), one of three book-to-market equity categories (high (H), medium (M), and low (L), with cut-off points at 30 and 70 percent of the distribution of book-to-market equity) and one of two group-affiliation categories (group (G) and stand-alone (S) companies). So, firms in size category *Small-cap* are in the lowest thirty percent of the distribution of market capitalization, firms in *Mid-cap* are in the middle forty percent of the distribution, etcetera. The classification of firms in size and book-to-market equity categories is renewed in June of each year t, and held fixed for one year. This implies that a firm can be in a different category from one year to the next. We then construct 18 portfolios based on the intersections of the size, book-to-market, and group affiliation categories. The returns on the portfolios are calculated as the unweighted average monthly returns on all shares in a given portfolio.[8] In doing so, we follow Lakonishok et al. (1994).

Table 5.1 reports some descriptive statistics. In general, within each size category, average returns are decreasing in a portfolio's book-to-market equity. The relationship between market capitalization and average returns is less clear-cut. Small-caps have the highest returns, on average, but average returns are not linearly decreasing in firm size. Moreover, stand-alone companies' shares yield higher average returns than group companies' for low book-to-market equity firms. For high book-to-market equity firms, the relationship appears to be the other way around.[9] Note the small number of

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also known as specified shares, and many of them are blue chips. These shares have the highest liquidity. The shares in the B1-group are smaller than the A-group shares, in general. Their liquidity is not as high as the A-group shares, but they still have a reasonable trading interest. The B2-group of shares is a very large group with shares that are traded very infrequently. The Z-group contains firms that would otherwise have been delisted, and investors are even advised to avoid investing in these shares.

[8] The monthly returns on a share are the cumulative daily returns for a company during that month. Daily returns are adjusted for dividends, rights issues, bonus issues, etc..

[9] Except for the large-cap firms, where the average returns are based on a relatively

Table 5.1. Portfolio characteristics and returns
The number of firms in a portfolio is the average number of firms in the portfolio over time. The average return on a portfolio is defined as the time-average of the return on the portfolio, which in turn is defined as the simple average of the returns on all stocks in the portfolio. Returns on individual stocks are calculated as the monthly average of the daily percentage change in the market value of the stock, correcting for events such as stock splits, rights issues, and dividend payments.

		# of firms	Average return
Small-cap firms			
Low B/M	Group companies	14	3.88
	Stand-alones	12	5.56
Medium B/M	Group companies	39	1.25
	Stand-alones	48	1.26
High B/M	Group companies	70	0.56
	Stand-alones	71	-0.02
Mid-cap firms			
Low B/M	Group companies	40	2.03
	Stand-alones	48	2.55
Medium B/M	Group companies	103	0.77
	Stand-alones	52	0.76
High B/M	Group companies	50	0.58
	Stand-alones	40	0.49
Large-cap firms			
Low B/M	Group companies	80	2.21
	Stand-alones	57	3.55
Medium B/M	Group companies	70	0.97
	Stand-alones	20	2.04
High B/M	Group companies	12	-0.44
	Stand-alones	8	1.07

firms in the small-cap, low B/M portfolios and in the large-cap, high B/M portfolios. This implies that there are relatively few firms which combine a small market capitalization and a low book-to-market equity or a large

small number of firms.

Table 5.2. Differences in stock returns
GRMINSA and GMS both capture the differences in returns between group companies and stand-alones. GRMINSA is constructed as the difference between the average return on all group companies and the average return on all stand-alones. For GMS, we calculate the difference between the average return on the nine group company portfolios and the nine stand-alone portfolios. t-statistics (mean) and z-statistics (median) are in parenthesis. Statistical significance at the ten-, five-, and one-percent level is indicated by †, *, and **, respectively.

	GRMINSA	GMS
mean	-0.472†	-0.639†
	(-1.73)	(-1.85)
median	-0.620*	-0.581†
	(2.27)	(1.93)

market capitalization and a high book-to-market equity.

To compare the returns on group affiliates and stand-alone companies, we first calculate the difference between the unweighted average monthly returns for the two types of shares at each point in time. The result is a time series of differences in returns. Basically, this can be seen as the return on holding a long position in group company shares and a short position in stand-alone company shares. In table 5.2, this portfolio is denoted as GRMINSA. GRMINSA is less than zero, on average, and the difference is significant at the 10 percent (mean) and the 5 percent (median) level. So, the returns on group firms are lower than that of stand-alone firms, on average. Our second measure of the difference between group companies' and stand-alone companies' returns is based on the 18 portfolios that we constructed. We calculate the difference between group firms and stand-alones as the difference between the average return on the nine portfolios consisting of group firms and the average return on the stand-alones portfolios. Because the portfolios are based on independent sorts, differences in size and book-to-market equity, which may be related to returns, are to some extent controlled for. Again, we have a time-series of differences in returns, which is denoted by GMS. Table 5.2 shows that the returns on the GMS portfolio is significantly negative, confirming that group companies have lower returns on equity than stand-alone companies.

5.3 Fama-French Estimates

Of course, differences in returns are not very interesting *per se*. They may simply be the result of differences in riskiness or 'style' of the two types of firms. Hence, we continue by examining whether the difference in average stock returns between group firms and stand-alone firms can be explained by an asset pricing model. Are there differences in the equity characteristics of group affiliates and stand-alone firms that can justify the differences in realized returns between the two types of companies? For example, we know that stand-alone companies are typically smaller than group companies. Hence, since smaller companies are known to have higher stock returns (see Banz, 1981, and Fama and French, 1993), the difference in realized returns may be partly due to this size effect. We analyze this problem by using the Fama-French three-factor model (Fama and French, 1993, 1996).[10]

The Fama-French three-factor model is based on the observation that equity returns are related to firm size and book-to-market equity, and that this relationship cannot be explained by differences in covariance with the return on the market portfolio. In other words, realized returns demonstrate common variation not just with a market factor, as the CAPM would predict, but also with a size factor and a book-to-market factor. The Fama-French three-factor model typically does a much better job than the CAPM in explaining the cross-section of equity returns. The model is estimated for each portfolio by

$$R_t = \alpha + \beta_1 * \text{RMRF}_t + \beta_2 * \text{SMB}_t + \beta_3 * \text{HML}_t + \epsilon_t, \tag{5.1}$$

where R_t is the excess return on a portfolio in month t, RMRF_t is the month t value-weighted market return minus the risk-free rate in month t, SMB_t (small minus big) is the month t portfolio that mimics the size effect, and HML_t (high minus low) is the month t portfolio that mimics the book-to-market effect.[11]

[10] We also estimated a CAPM, i.e., using the market factor as the single explanatroy variable. Because the explanatory power of the model is weak (the average adjusted R^2 is 0.53) and because it does not give additional insights, we do not present the results here.

[11] The market return is calculated as the value-weighted average of all firms in the sample. SMB_t is the month t difference between the simple averages of the six small companies portfolios and the six large companies portfolios. HML_t is the month t difference between the simple averages of the six high book-to-market portfolios and the six low book-to-market portfolios.

Despite its empirical success, the Fama-French three-factor model is not undisputed. One of the problems of the model is that a theoretical basis is lacking. More specifically, it is not clear what is the macroeconomic, nondiversifiable risk that is captured in the size and book-to-market factors. Fama and French (1995) have argued that the book-to-market factor captures aggregate financial distress, but other authors have tried to explain the (size and) value premium from under- and overreaction by investors (see Lakonishok et al., 1994 and Chan et al., 2003). It is certainly not our intention to downgrade this debate. However, we take a rather functional point of view. At the minimum, the Fama-French model is very successful in explaining average returns. Even if the economic interpretation of the model is not clear, the model is still useful for our purposes.[12] From our perspective, it does not make much difference whether one considers the Fama-French model as an APT or as a macroeconomic factor model. First and foremost, our aim is to find out which factors are priced by Indian investors, and whether these factors can explain the difference between the returns on the shares of group companies and stand-alones. Put differently, we want to test whether the difference between the two types of companies' returns is above or below the return that could have been earned by passive investments in the factors. This would be the case if the estimated intercept in a time-series model (Jensen's alpha) is different from zero (see Gompers et al. (2003) for a similar interpretation). Since the Fama-French model is one of the most popular multifactor models in empirical research, we use this model as our benchmark.

The results from estimating equation (5.1) for all 18 portfolios are presented in table 5.3. We find that the market factor is significant in all cases and that the estimated coefficients (the market beta's) are all relatively close to unity. The size factor is significant in 9 out of 18 models, and the book-to-market factor is significant in 10 out of 18 cases. Moreover, if we compare group companies portfolios and stand-alone companies portfolios in the same size and book-to-market category, we find that the intercept is lower for group companies in all but one regression. This means that, after controlling for factors that are commonly understood to be priced by

[12]Cochrane (2001) gives a summary of the discussion about the economics behind the Fama-French factors.

Table 5.3. Fama-French regressions
Dependent variable in each model is the average return on a portfolio consisting of either group companies or stand-alone companies that are in the intersection of the respective size and book-to-market categories. $\bar{R}^2$ denotes adjusted R^2. Statistical significance at the ten-, five-, and one-percent level is indicated by †, *, and **, respectively.

	Constant	RMRF	SMB	HML	$\bar{R}^2$
		GROUP COMPANIES			
Small-cap firms					
Low B/M	0.301	1.189**	0.528*	0.418†	0.48
	(0.274)	(9.001)	(2.194)	(1.790)	
Medium B/M	-0.91†	1.012**	0.309*	0.017	0.70
	(-1.674)	(12.032)	(2.548)	(-0.204)	
High B/M	-0.594†	0.884**	0.124†	-0.083**	0.84
	(-1.710)	(17.554)	(1.920)	(-3.189)	
Mid-cap firms					
Low B/M	-0.549	0.899**	0.427**	0.179	0.67
	(-0.947)	(10.624)	(3.448)	(1.434)	
Medium B/M	-0.79†	0.845**	0.183	0.240*	0.62
	(-1.654)	(11.917)	(1.461)	(2.164)	
High B/M	-0.428	1.040**	-0.027	0.246**	0.70
	(-0.796)	(15.455)	(-0.257)	(3.416)	
Large-cap firms					
Low B/M	-0.552	0.896**	0.442**	0.358*	0.61
	(-0.896)	(10.442)	(2.908)	(2.392)	
Medium B/M	-0.971†	0.959**	0.211	0.368*	0.65
	(-1.846)	(12.882)	(1.605)	(2.746)	
High B/M	-1.758*	1.166**	-0.028	0.409**	0.57
	(-1.981)	(11.927)	(-0.192)	(3.384)	
		STAND-ALONE COMPANIES			
Small-cap firms					
Low B/M	0.702	1.228**	0.953**	-0.253	0.52

Table 5.3. (continued)

	(0.561)	(6.929)	(3.038)	(-1.047)	
Medium B/M	-0.637	0.974**	0.270*	-0.051	0.72
	(-1.239)	(14.343)	(2.373)	(-0.732)	
High B/M	-0.328	0.866**	-0.11	0.079†	0.72
	(-0.718)	(15.138)	(-1.337)	(1.864)	
Mid-cap firms					
Low B/M	-0.011	0.833**	0.460**	0.105	0.68
	(-0.018)	(10.878)	(4.226)	(0.868)	
Medium B/M	-1.02*	0.899**	0.23†	0.174*	0.65
	(-1.970)	(11.821)	(1.860)	(2.000)	
High B/M	0.030	0.974**	-0.145	0.274**	0.73
	(0.069)	(17.204)	(-1.620)	(3.786)	
Large-cap firms					
Low B/M	0.310	0.967**	0.562**	0.208	0.68
	(0.490)	(11.591)	(4.010)	(1.283)	
Medium B/M	0.202	1.064**	0.146	0.372**	0.65
	(0.279)	(12.846)	(1.242)	(2.945)	
High B/M	1.340	1.198**	-0.389**	0.565**	0.64
	(1.601)	(11.235)	(-3.643)	(5.482)	

investors, group company shares still have lower realized returns than stand-alone shares. After controlling for differences in covariance with the market, the size factor, and the book-to-market factor, the monthly returns to group company shares are on average 0.76 lower than the returns on stand-alone company shares.[13] Note that this difference is larger than the differences we found before controlling for riskiness or style, as reported in table 5.2. So, known sources of common variation cannot explain why group companies and stand-alones have different returns. After controlling for the riks captured by the Fama-French factors, the differences in returns are even larger.

Our analysis can also be seen as an out of sample test of the Fama-French model. Our results indicate that size and value premia are also present in

[13] The difference between the average regression constant for all group company portfolios (-0.695) and the average regression constant for all stand-alone portfolios (0.065) is 0.76.

Indian stock returns. The explanatory power of the Fama-French model for Indian stocks is not as high as it is for US stocks. On average, the Fama-French three-factor model explains about 65 percent of the variation in realized returns. Other papers also find that the explanatory power of the Fama-French three-factor model is lower for Indian stocks than for US stocks (Connor and Sehgal, 2001, and Muneesh and Sehgal, 2000).

5.4 Is there a group affiliation factor?

In the previous section, we found that the Fama-French three-factor model leaves 35 percent of the variation in Indian equity returns unexplained. This warrants the question whether we can find a factor model that does a better job than the Fama-French three-factor model. Moreover, we found that the returns to group company shares are substantially lower than the returns to stand-alone companies. This raises the more specific question of whether there is an additional factor, related to group affiliation and not accounted for by the Fama-French factors, that is priced by Indian investors. Put differently, we test whether there is common variation in the returns on group company portfolios other than the common variation due to the market, size, and book-to-market factors.

A natural way to do this is to construct a group affiliation factor, for which GMS is a good candidate. Just as SMB and HML, it can be regarded as a factor-mimicking portfolio, because GMS is constructed as the difference between the returns on group companies and stand-alone companies. In addition, because it is based on independent sorts on size and book-to-market equity, GMS is likely to capture the difference in return due to group affiliation. Moreover, as table 5.4 shows, the correlation between the Fama-French factors and GMS is low, suggesting that GMS may contain new information. As an additional test of the new information captured by GMS, we estimate equation (5.1), with the monthly return difference between group company shares and stand-alone company shares as the dependent variable. If the Fama-French model is indeed a good asset-pricing model, it should also be able to explain a large part of the monthly return differences, because GMS can be thought of as just another investment portfolio. For completeness, we also estimate equation 5.1 using GRMINSA as the dependent variable. The

Table 5.4. Correlation matrix of factors
The table denotes pairwise correlations of the factors. The factors in the lower part of the table are adjusted versions of the group affiliation factor (GMS). Their definitions can be found in equation 5.3.

	RMRF	SMB	HML	GMS
SMB	0.21			
HML	-0.22	-0.01		
GMS	-0.08	0.05	0.28	
$GMS_{S,L}$	0.03	0.26	0.01	0.82
$GMS_{S,M}$	-0.09	0.04	0.27	0.98
$GMS_{S,H}$	-0.12	-0.03	0.34	0.99
$GMS_{M,L}$	-0.1	0.06	0.27	0.99
$GMS_{M,M}$	-0.06	0.08	0.26	0.99
$GMS_{M,H}$	-0.12	0.01	0.32	0.99
$GMS_{B,L}$	-0.04	0.1	0.23	0.99
$GMS_{B,M}$	-0.06	0.04	0.31	0.97
$GMS_{B,H}$	-0.13	-0.07	0.39	0.93

results are reported in table 5.5. As expected, we find a significantly negative constant. This means that the Fama-French factors do not price the monthly return differences, GMS, because this model would predict a zero intercept. Furthermore, we find that the market factor and the size factor have no significant effect on both GMS and GRMINSA. Only the book-to-market factor explains a significant part of the variation in the monthly return differences. Moreover, the explained variation, as measured by the adjusted R^2, is very low, implying that the explanatory power of the Fama-French model is poor. Hence, adding GMS as a group affiliation factor might increase the explanatory power of the model by adding information that is not captured by the market, size and book-to-market factors.

To test whether the group affiliation factor GMS is indeed an independent source of return variation, we estimate the following model:

$$R_t = \alpha + \beta_1 * \text{RMRF}_t + \beta_2 * \text{SMB}_t + \beta_3 * \text{HML}_t + \beta_3 * \text{GMS}_t + \epsilon_t, \qquad (5.2)$$

where, as before, GMS (group minus stand-alone) is the average return on the group companies portfolios minus the average return on the stand-alone companies portfolios. However, using all portfolios to construct GMS would

Table 5.5. Group affiliation factor and Fama-French factors
Dependent variable is the difference between the return on group companies and the return on stand-alone companies, measured as GMS and GRMINSA, respectively. Statistical significance at the ten-, five-, and one-percent level is indicated by †, *, and **, respectively.

Variable	**Coefficient** (Std. Err.)	
	GMS	GRMINSA
constant	-0.76*	-0.632*
	(-2.46)	(-2.89)
RMRF	-0.013	-0.006
	(-0.34)	(-0.21)
SMB	0.021	0.028
	(0.47)	(0.92)
HML	0.076*	0.075**
	(2.41)	(3.20)
adjusted R^2	0.05	0.10

imply that the same portfolio is both on the right-hand side and on the left-hand side in equation (5.2). To avoid spurious regressions, we construct the group affiliation factor such that the dependent variable is excluded from GMS. In general, if we let $P \equiv \{S, M, B\} \times \{L, M, H\}$, the set of all combinations of size and book-to-market categories, and G and S denote group companies and stand-alones, respectively, we define the adjusted group affiliation factor as

$$GMS_{jt} = \frac{\sum_{P\setminus\{j\}\times G} R(i)_t - \sum_{P\setminus\{j\}\times S} R(i)_t}{8} \;\forall j \in P \qquad (5.3)$$

where $i \in \{P\} \times \{G, S\}$, and $R(i)$ denotes the return on the portfolio which consists of the intersection of the sets in i. For instance, for small, low book-to-market companies, both group affiliates and stand-alones, we construct $\text{GMS}_{S,L}$ as the average of all group companies portfolios except the small, low book-to-market portfolio minus the average of all stand-alone companies except the small, low book-to-market one. The correlation of the adjusted group affiliation factors with the unadjusted group affiliation factor and with the Fama-French factors are reported in the lower part table 5.4. Note that the correlations with GMS are very high. This indicates that the adjusted group affiliation factors are likely to capture the effect of group affiliation on equity returns.

Table 5.6 reports the results from estimating equation (5.2) for all 18 portfolios, using the appropriate adjusted group affiliation factor. We find that the group affiliation factor is significant in 13 out of 18 cases. Moreover, in comparison to the Fama-French three-factor model, the fit of the model improves in 14 out of 18 cases. The average adjusted R^2 increases from 0.65 to 0.69. This suggests that our four-factor model does a better job explaining the cross-section of returns. Another measure of the explanatory power is the extent of mispricing indicated by the regression constant (alpha). The average of the absolute value of the intercepts has decreased from 0.63 in the Fama-French model to 0.49 in our four-factor model. This indicates that adding the group affiliation factor improves the explanatory power of the model. In other words, there is a group affiliation factor in Indian stock returns.[14] A second important result from the estimation of equation (5.2) is that the difference in mispricing between group companies portfolios and stand-alone companies portfolios has diminished. The difference in average alpha's has decreased from 0.76 to 0.41. Hence, the group affiliation factor explains almost half of the difference in realized returns between group affiliates and stand-alones (after controlling for the three Fama-French factors).[15]

One may argue that the problem of using a portfolio both as the dependent variable and as part of an explanatory variable is not limited to the group affiliation factor.[16] The size and book-to-market factor are also constructed

[14]This is equivalent to saying that there is common variation in the returns to group company shares.

[15]Note that the difference between returns on group companies and stand-alone companies is still substantial (5 percent per year). This implies either that there are other sources of common variation for which we did not control, or that group companies are simply outperformed by stand-alone companies.

[16]Note that this is an econometric problem. From a theoretical point of view, sorting portfolios based on characteristics related to expected returns is exactly the right thing to do if one wants to investigate whether these characteristics are related to returns (Cochrane, 2001).

Table 5.6. Group affiliation factor
Dependent variable in each model is the average return on a portfolio consisting of either group companies or stand-alone companies that are in the intersection of the respective size and book-to-market categories. GMS is the adjusted group affiliation factor, as described in equation 5.3. $\bar{R}^2$ denotes adjusted R^2. Statistical significance at the ten-, five-, and one-percent level is indicated by †, *, and **, respectively.

	Constant	RMRF	SMB	HML	GMS	$\bar{R}^2$
			GROUP COMPANIES			
Small-cap firms						
low B/M	1.419	1.202^{**}	$0.421^{\dagger}$	$0.417^{\dagger}$	1.390^{*}	0.52
	(1.20)	(9.31)	(1.95)	(1.90)	(2.12)	
medium B/M	-0.417	1.024^{**}	0.298^{*}	-0.029	0.600^{**}	0.72
	(-0.70)	(12.03)	(2.71)	(-0.37)	(2.81)	
high B/M	-0.350	0.889^{**}	0.126^{*}	-0.114^{**}	0.298^{**}	0.85
	(-0.99)	(19.16)	(2.14)	(-4.70)	(2.95)	
Mid-cap firms						
low B/M	-0.204	0.909^{**}	0.414^{**}	0.146	0.437^{*}	0.69
	(-0.34)	(10.76)	(3.58)	(1.21)	(2.25)	
medium B/M	$0.012^{\dagger}$	0.852^{**}	0.155	$0.171^{\dagger}$	0.908^{**}	0.72
	(0.03)	(13.73)	(1.56)	(1.74)	(4.48)	
high B/M	0.273	1.059^{**}	-0.035	0.169^{**}	0.879^{**}	0.77
	(0.51)	(18.70)	(-0.43)	(2.99)	(4.97)	
Large-cap firms						
low B/M	0.120	0.900^{**}	0.407^{**}	0.298^{*}	0.900^{**}	0.67
	(0.19)	(11.51)	(3.14)	(2.19)	(3.31)	
medium B/M	-0.314	0.960^{**}	$0.196^{\dagger}$	0.289^{*}	0.926^{**}	0.72
	(-0.60)	(14.23)	(1.76)	(2.32)	(4.14)	
high B/M	-1.329	1.175^{**}	-0.008	0.313^{*}	0.918^{**}	0.61
	(-1.46)	(12.67)	(-0.06)	(2.64)	(2.83)	
			STAND-ALONE COMPANIES			
Small-cap firms						
low B/M	0.860	1.230^{**}	0.938^{**}	-0.253	0.197	0.51
	(0.64)	(6.88)	(2.84)	(-1.05)	(0.32)	

Table 5.6. (continued)

medium B/M	-0.279	0.982**	0.262*	-0.084	0.435*	0.73
	(-0.51)	(14.84)	(2.50)	(-1.34)	(2.36)	
high B/M	-0.041	0.872**	-0.108	0.042	0.349*	0.74
	(-0.09)	(16.33)	(-1.53)	(1.27)	(2.65)	
Mid-cap firms						
low B/M	0.160	0.838**	0.454**	0.089	0.217	0.68
	(0.26)	(11.31)	(4.26)	(0.72)	(0.96)	
medium B/M	-0.453	0.904**	0.211*	0.125†	0.641**	0.69
	(-0.85)	(13.18)	(2.00)	(1.65)	(3.16)	
high B/M	0.292	0.981**	-0.148	0.245**	0.327	0.74
	(0.61)	(17.72)	(-1.80)	(3.48)	(1.71)	
Large-cap firms						
low B/M	0.705	0.970**	0.541**	0.173	0.528*	0.70
	(1.08)	(11.97)	(4.15)	(1.10)	(2.09)	
medium B/M	0.372	1.064**	0.143	0.352**	0.239	0.65
	(0.49)	(12.78)	(1.22)	(2.68)	(0.97)	
high B/M	1.309	1.198**	-0.390**	0.572**	-0.066	0.64
	(1.51)	(11.14)	(-3.56)	(5.04)	(-0.21)	

using the portfolios whose returns we want to explain. This problem has been noted in the literature (see, for example, Lamont et al., 2001). We believe that the problem may be more severe in the case of our group affiliation factor. Since group affiliation is a binary variable, the (unadjusted) group affiliation factor will always contain the dependent variable. Hence, our use of an adjusted group affiliation factor. With continuous variables like size and book-to-market equity, the respective factors use only a subset of all portfolios. Nevertheless, we believe that it is important to recognize that the size and book-to-market factors may also lead to spurious regressions. To control for the potential endogeneity problems, we reestimated our models using size and book-to-market factors that are adjusted in a similar way as the group affiliation factor. The results are very similar to the ones presented above. The fit of the model improves (the average adjusted $R^2 = 0.71$), the group affiliation factor is significant in 12 out of 18 models, and the difference between the average alpha for group company and stand-alone portfolios is -0.48.

Overall, these results strongly suggest that there is common variation in portfolios sorted on group affiliation which is not captured by the three Fama-French factors, and that this common variation is reflected in average returns.[17]

5.5 Group diversification, risk, and return

If we follow Fama and French in their interpretation of the factors as being proxies for risk, our results can be interpreted as showing that group affiliates have a lower risk premium than stand-alone firms simply because they are affiliated to a group. This is consistent with our finding that the group factor is on average negative, i.e., group affiliation is associated with lower realized returns. In this section, we investigate the economic interpretation of the group affiliation factor in more detail.

One possible reason why group affiliates may have lower risk premia is that they are less prone to default risk exactly because they are a member of a group. Especially in times of economy-wide (financial) distress it is valuable to own shares in a company that is relatively immune to this distress. As a consequence, investors may require a lower return. If this interpretation of our results is correct, we would expect the importance of the group affiliation factor to depend on the ability of a group to keep its affiliates out of financial distress. We test this idea by analyzing whether and how the importance of the group affiliation factor is affected by the degree of diversification of the business group.

First, we determine for each group company how many different industries are affiliated to its business group. We use the number of different industries as a measure of group diversification.[18] By construction, this variable is equal to zero for stand-alone companies. Next, we construct four diversification categories. The first category contains all stand-alone companies (about 40 percent of the sample). The other categories are not diversified (firms that belong to a group with only a single industry), moderately diversified (firms

[17] Of course, a group company's returns may be related to the returns of other members of the same group, simply because they are affiliated to the same group. Note that this cannot explain the common variation in the returns to *all* group companies.

[18] This means that we ignore diversification at the firm level. There is no reason to expect that this would affect returns.

Table 5.7. Average returns on group diversification portfolios
The table reports average monthly returns. Both the average returns and the average number of firms are taken over time and size categories.

	mean	median	# firms
Stand-alone companies	2.222	1.46	351
Not diversified groups	2.177	0.719	143
Moderately diversified groups	2.037	0.902	142
Most diversified groups	1.405	-0.388	158

that belong to a group with 2 or 3 different industries), and most diversified (firms belonging to groups with 4 or more different industries). The last three categories each account for about one third of the group affiliates in our sample.

We construct portfolios based on independent sorts on market capitalization (size) and group diversity. A firm is classified as small, medium or large, and in one of the four diversification categories. The portfolios are based on the intersections of these classifications, resulting in twelve portfolios.[19] Table 5.7 shows that the average return is highest for stand-alone companies, and that the return to group companies is decreasing in the diversification level of the business group. Also note that the difference is most pronounced for the most diversified groups portfolios. To further analyze the role of diversification, we estimate equations (5.1) and (5.2) for our twelve portfolios.

Table 5.8 reports the results of estimating the Fama-French three-factor model. After controlling for the Fama-French factors, we find that the magnitude of the alpha's does not have a one-to-one correspondence with diversification. For small and large companies, we still find that stand-alone companies have higher returns (higher alpha's) than group companies, for all degrees of diversification. For medium sized companies, the pattern is less clear-cut. Moreover, for different group company portfolio's, alpha's are not linearly decreasing in diversification. Note that the fit of the model is

[19] We also performed the analysis with 36 portfolios, based on size (3 categories), book-to-market equity (3), and diversification (4). This analysis is problematic, however, because there are too many portfolios which contain no or only a very small number of stocks.

Table 5.8. Fama-French regressions on diversification portfolios
SA refers to portfolios of stand-alone companies, ND to portfolios of affiliates of not diversified groups (1 industry), MD to portfolios of affiliates of moderately diversified groups (2 or 3 industries), and HD to portfolios of affiliates of highly diversified groups (4 or more industries). $\bar{R}^2$ denotes adjusted R^2. Statistical significance at the ten-, five-, and one-percent level is indicated by †, *, and **, respectively.

	CONSTANT	RMRF	SMB	HML	$\bar{R}^2$
Small-cap firms					
SA	0.247	0.925**	0.544**	0.137	0.72
	(0.44)	(12.76)	(4.37)	(0.95)	
ND	-0.21	0.960**	0.529**	0.266†	0.61
	(-0.29)	(10.01)	(3.58)	(1.68)	
MD	-0.181	0.845**	0.417	0.249†	0.53
	(-0.27)	(9.40)	(2.44)	(1.62)	
HD	-1.07	0.949**	0.397*	0.457**	0.59
	(-1.59)	(9.56)	(2.34)	(2.97)	
Mid-cap firms					
SA	-0.65	0.957**	0.235*	0.117	0.73
	(-1.42)	(15.31)	(2.18)	(1.47)	
ND	-1.108*	0.876**	0.28*	0.21†	0.64
	(-2.20)	(12.04)	(2.35)	(1.77)	
MD	-0.549	0.912**	0.16	0.308**	0.61
	(-1.10)	(11.42)	(1.12)	(2.81)	
HD	-0.859†	0.921**	0.168	0.268*	0.62
	(-1.61)	(12.19)	(1.27)	(2.28)	
Large-cap firms					
SA	0.046	0.928**	-0.143†	0.181**	0.78
	(0.12)	(18.41)	(-1.81)	(3.67)	
ND	-0.759	0.985**	0.227**	-0.08†	0.77
	(-1.44)	(14.05)	(2.79)	(-1.68)	
MD	-0.327	0.977**	0.067	0.198*	0.68
	(-0.64)	(14.87)	(0.63)	(1.98)	
HD	-0.581	0.926**	-0.085	0.195**	0.69
	(-1.24)	(15.34)	(-0.89)	(4.52)	

Table 5.9. Group affiliation factor and diversification
SA refers to portfolios of stand-alone companies, ND to portfolios of affiliates of not diversified groups (1 industry), MD to portfolios of affiliates of moderately diversified groups (2 or 3 industries), and HD to portfolios of affiliates of highly diversified groups (4 or more industries). $\bar{R}^2$ denotes adjusted R^2. Statistical significance at the ten-, five-, and one-percent level is indicated by †, *, and **, respectively.

	CONSTANT	RMRF	SMB	HML	GMS	$\bar{R}^2$
Small-cap firms						
SA	0.399	0.929**	0.509**	0.124	0.387	0.72
	(0.67)	(12.87)	(3.86)	(0.88)	(1.42)	
ND	0.042	0.966**	0.471**	0.245†	0.639†	0.62
	(0.06)	(10.19)	(3.11)	(1.62)	(1.93)	
MD	0.194	0.854**	0.332*	0.217	0.949**	0.57
	(0.27)	(9.97)	(2.01)	(1.56)	(2.82)	
HD	-0.778	0.956**	0.331*	0.432**	0.738*	0.61
	(-1.04)	(9.75)	(1.96)	(3.03)	(2.10)	
Mid-cap firms						
SA	-0.231	0.948**	0.199*	0.082	0.628*	0.75
	(-0.46)	(15.45)	(1.93)	(1.08)	(2.43)	
ND	-0.437	0.863**	0.221*	0.154	1.006**	0.70
	(-0.79)	(12.14)	(2.11)	(1.37)	(3.13)	
MD	0.256	0.896**	0.09	0.242*	1.206**	0.69
	(0.48)	(11.85)	(0.75)	(2.39)	(3.52)	
HD	-0.075	0.905**	0.10	0.203†	1.176**	0.70
	(-0.13)	(11.83)	(0.89)	(1.82)	(3.65)	
Large-cap firms						
SA	0.349	0.934**	-0.189*	0.131†	0.375*	0.80
	(0.82)	(19.41)	(-2.39)	(2.90)	(2.31)	
ND	-0.424	0.992**	0.176*	-0.136**	0.414*	0.78
	(-0.75)	(15.31)	(2.20)	(-3.07)	(2.16)	
MD	0.501	0.994**	-0.061	0.062	1.023**	0.79
	(0.93)	(17.43)	(-0.85)	(0.80)	(5.18)	
HD	0.07	0.939**	-0.185*	0.087*	0.805**	0.78
	(0.14)	(18.56)	(-2.28)	(2.26)	(4.34)	

almost the same as in section 5.3, where we estimated the same model using portfolios based on size, book-to-market, and group affiliation (the average adjusted R^2 now is one percentage-point higher). The average (absolute) mispricing is 0.55, versus 0.63 in the section 5.3.

Estimating our four-factor model (5.2) to explain the returns on the twelve portfolios, we find that the group affiliation factor GMS is significant in 10 out of 12 cases (see table 5.9). Moreover, the average explained variation increases to 71 percent, whereas the explained variation increases for 11 out of 12 portfolios. Only for the small, stand-alone portfolio does the extra factor not lead to an increase in adjusted R^2. Furthermore, we find that the factor loadings are higher for group affiliates than for stand-alone companies. These results are consistent with earlier findings.[20]

Looking at the differences within the size categories, we see that for all three size categories the factor loadings on the group affiliation factor are higher for moderately and most diversified groups than for not diversified groups and stand-alone companies. This pattern also emerges when we look at the increase in explained variation. Adding the group affiliation factor enhances the explanatory power of the model especially for (the returns on) firms in moderately and highly diversified groups. This suggests that the traditional Fama-French model misses a factor that is most important for these firms.

5.6 Conclusion

In this chapter, we estimated an asset pricing model for Indian stock returns. As a benchmark, we estimate the Fama-French three-factor model. It turns out that the size and value effect are present in the returns on shares of Indian firms. Moreover, we find that group companies yield lower returns than stand-alone companies in India. This difference in returns cannot be explained by known sources of risk, as captured by the Fama-French 3-factor model. In fact, there is common variation in the returns on group affiliates.

[20] Note that this is also a test of the explanatory power of the group factor: does it also price assets other than the portfolios that are based on the same criterion as the factor itself (group affiliate vs. stand-alone)? Although the current categories are related to the group affiliate vs. stand alone distinction, we believe that the results can be interpreted as supportive of our four-factor model.

This suggests that stock returns in India are not only determined by exposure to market risk or style characteristics (such as size and book-to-market equity), but also by the stock's group affiliation status. The group affiliation factor explains about fifty percent of the unexplained difference in returns between group companies and stand-alones. This is an important result, that should be taken into account when analyzing and evaluating the effect of group affiliation on firm value.

We also find some evidence that the factor loadings on the group affiliation factor are increasing in the degree of group diversification. Although this suggests that the group affiliation factor may be related to financial distress, the evidence is not conclusive. A more detailed analysis of the effect of group characteristics on the factor loadings may tell us more about the economic interpretation of the group affiliation factor.