Financial Constraints and Stock Returns

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We test whether the impact of financial constraints on firm value is observable in stock returns. We form portfolios of firms based on observable characteristics related to financial constraints and test for common variation in stock returns. Financially constrained firms' stock returns move together over time, suggesting that constrained firms are subject to common shocks. Constrained firms have low average stock returns in our 1968–1997 sample of growing manufacturing firms. We find no evidence that the relative performance of constrained firms reflects monetary policy, credit conditions, or business cycles.

Do firms face financial constraints that hamper their ability to invest? By "financial constraints," we mean frictions that prevent the firm from funding all desired investments. This inability to fund investment might be due to credit constraints or inability to borrow, inability to issue equity, dependence on bank loans, or illiquidity of assets. We do not use "financial constraints" to mean financial distress, economic distress, or bankruptcy risk, although these things are undoubtedly correlated with financial constraints.

We study this economic question by relating asset returns to observable firm characteristics. Specifically, we test whether firms that appear to be financially constrained share common variation in their stock returns. If financial constraints are an important determinant of the value of a corporation, changes in their intensity should be reflected in stock returns. If changes in financial constraints are solely a firm-specific, idiosyncratic phenomenon, then constrained firms' returns have no reason to move together, controlling for other sources of common variation among asset returns (such as the

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overall market). However, if constrained firms are subject to common shocks, there will be common variation in the returns of firms with similar levels of financial constraint. For example, if an unexpected "credit crunch" makes it more difficult for some firms to invest, then these firms will have their expected future cash flows, and thus their stock prices, fall together.

In the terminology of asset pricing, we test whether there is a financial constraints factor in stock returns. A factor is simply a variable that explains variation in the stock returns of many firms. Because stock returns reflect news (changes in expected future returns or changes in expected future cash flows), factor realizations reflect news that is common to many firms. Our goal is to test whether part of the factor structure in stock returns reflects a particular source of economic information, the degree of financial constraints in the economy.

If we find no financial constraints factor, it would suggest that financial constraints do not expose firms to common shocks. If we do find a financial constraints factor, we can use the estimated time series of its returns to address questions in both finance and macroeconomics. In the area of finance, we test whether other factors in asset returns (such as the market factor, the book-to-market factor, and the size factor) subsume the constraints factor. We also test whether the constraints factor is priced; that is, whether it earns a risk premium to compensate for the risk it bears. There is no mechanical reason to expect the financial constraints factor to have a risk premium; unlike Fama and French (1993), we design our factor not to explain known anomalies in existing asset pricing models but to measure an economically meaningful concept.

In the area of macroeconomics, we test whether the financial constraints factor moves systematically over the business cycle, reflecting shocks to the macroeconomic environment, credit conditions, or monetary policy. A variety of macroeconomic models suggest that financial constraints are important determinants of real activity and asset prices [see Bernanke et al. (1996) for a review]. These different models have common predictions, and our tests do not discriminate between them. According to these models, imperfect capital markets serve to magnify macroeconomic shocks.

The following example illustrates our approach. It is a fact that the stock returns of oil firms move together; in this sense an "oil factor" exists. Suppose one didn't know this fact and wanted to test for the existence of an oil factor. The first step would be to find an observable characteristic that is likely to be correlated with exposure to the hypothesized factor. For example, one could observe whether the firm produces oil. Having observed the characteristic, one would then test for the existence of the oil factor by testing whether oil-producing firms have stock returns that move together over time. If one found that stock returns did move together, one would correctly conclude that oil producing creates exposure to some common variable. If one wanted to test the economic hypothesis that this common variation was caused by changes in oil prices, one would run a regression of the oil factor (constructed from oil firms' stock returns) on oil prices.

This article is organized as follows. In Section 1, we review relevant work. In Section 2, we describe our sample of growing manufacturing firms and our definition of financial constraints. In Section 3, we test for covariation in stock returns due to financial constraints and describe the time series of the constraints factor. In Section 4, we discuss the mean return of the constraints factor and relate our measure of the constraints factor to other asset returns. In Section 5, we examine macroeconomic issues using the financial constraints factor. In Section 6, we present conclusions.

1. Relation to Previous Research

In recent years, empirical work in macroeconomics and finance has suggested that aggregate movements in financial constraints might affect firm value. One set of results concerns interest rates. Interest rate spreads forecast both output and asset returns [Keim and Stambaugh (1986), Stock and Watson (1989)] and may measure the stance of monetary policy and credit conditions [Kashyap et al. (1993)]. Research also suggests that the severity of financial constrains varies over time. Gertler and Hubbard (1988), Kashyap et al. (1994), and Gertler and Gilchrist (1994) all show that credit constraints seem to bind more during recessions or when monetary policy is tight.

Research on small firms generates additional results. Gertler and Gilchrist (1994) find that small firms have sales and inventories that are more cyclical and more responsive to downturns in monetary policy. Fama and French (1993) find that small firms have common variation in their stock returns, and Thorbecke (1997) and Perez-Quiros and Timmermann (2000) find that small firm stock returns are especially sensitive to recessions and monetary policy. These results from small firms are suggestive but certainly not conclusive, because size and financial constraints are not perfectly correlated. Fazzari et al. (1988) find that size is not a good proxy for financial constraints compared to their preferred measure, and Kashyap et al. (1994) Gertler and Hubbard (1988) find similar results.

2. Data Construction and Firm Characteristics

2.1 Data construction

Our data comes from COMPUSTAT and the Center for Research in Securities (see the Appendix for more details). We construct a general index of financial constraints, using results from Kaplan and Zingales (1997) to sort firms into portfolios based on their level of financial constraint. Kaplan and Zingales (1997) study a sample consisting of manufacturing firms with positive real sales growth over the period 1969 to 1984. To maximize the applicability of their results, we restrict our attention to a sample consisting of all manufacturing firms in year t with positive real sales growth in year $t-1$.[1]

Kaplan and Zingales (1997) classify firms into discrete categories of financial constraint and then use an ordered logit regression to relate their classifications to accounting variables [using the Fazzari et al. (1986) sample of low-dividend manufacturing firms with positive real sales growth]. We use the regression coefficients to construct an index consisting of a linear combination of five accounting ratios, which we call the KZ index. The KZ index is higher for firms that are more constrained. The five variables, along with the signs of their coefficients in the KZ index, are: cash flow to total capital (negative), the market to book ratio (positive), debt to total capital (positive), dividends to total capital (negative), and cash holdings to capital (negative).[2] We provide additional information in the Appendix.

After calculating the KZ index for each firm, we form portfolios by ranking all firms each year by the KZ index. In this article, we will refer to the top 33% of all firms ranked on the KZ index as "constrained," and the bottom 33% as "unconstrained." We do so simply as a shorthand way of referring to these two portfolios; we do not mean to claim that the top third of KZ-sorted firms are all completely constrained and that the bottom third are all completely unconstrained. We do claim that as a group, the top third are more constrained than the bottom third. Although there is no uncontroversial measure of financial constraints, the KZ index is attractive because it is based on an in-depth study of firms. By construction, firms with a high KZ index have high debt, low cash, and low dividends.[3]

To enter our sample, a firm has to (a) have all the data necessary to construct the KZ index, (b) have an SIC code between 20 and 39, and (c) have positive real sales growth (deflated by the Consumer Price Index, CPI) in the prior year. These constraints make the sample a small subset of the universe of Center for Research in Security Prices (CRSP) stocks [the average annual number of firms satisfying both set (b) and set (a) is 46% of set (a), and the intersection of all three sets is 30% of set (a)]. The average annual number of firms satisfying all these requirements is 1056 over the sample period over 1968–97, ranging from 443 firms in 1971 to 1725 firms in 1996.

Kaplan and Zingales (1997) argue that in only 15% of the firm-years is there any likelihood that a firm is constrained. The fraction of firms classified by them as constrained ranges from 35% in 1974 to 6% in the early 1980s.

[1] Restricting attention to firms with growing sales also helps eliminate distressed firms from the construction of the financial constraints factor, helping ensure that we are measuring constraint and not distress.

[2] The market to book ratio's positive coefficient in this multivariate regression reflects the fact that in order to be constrained, a firm needs to have good investment opportunities.

[3] As we show in a previous version of this paper [Lamont et al. (1997)], sorting on interest coverage ratios, net cash flow, or dividend payout produce similar results to sorting on the KZ index. Thus, it seems unlikely that error in the measurement of financial constrains at the firm level is driving our results.

It is important to note that Kaplan and Zingales (1997) were studying only low-dividend firms. In contrast, we classify a firm as "constrained" if it is in the top 33% of all firms (including high-dividend firms) in each year. We choose 33% because we want to form diversified portfolios containing a large number of firms. By design, our procedure will include a large number of firms in the constrained portfolio, many of which would not be classified as constrained by Kaplan and Zingales (1997).

How closely does our sorting procedure correspond to the judgmental categorization of Kaplan and Zingales (1997)? For the 49 firm-years that Kaplan and Zingales classify as at least "possibly constrained" and that are also in our sample, 44 (90%) are in our constrained portfolio. Of the 324 firm-years that Kaplan and Zingales classify as at most "likely not constrained," 206 (64%) are in our constrained portfolio. Our procedure classifies this latter group as constrained because they have low dividends, which is why Fazzari et al. (1988) classified them as constrained.

2.2 Firm characteristics

We form portfolios based on independent sorts of the top third, middle third, and bottom third of size and of KZ. We classify all firms into one of nine groups: low KZ/small (LS), low KZ/medium size (LM), low KZ/big (LB), middle KZ/small (MS), middle KZ/medium size (MM), middle KZ/big (MB), high KZ/small (HS), high KZ/medium size (HM), and high KZ/big (HB). For example, the LS portfolio contains firms that are both in the bottom third sorted by size and in the bottom third sorted by KZ. Each June of year t, we form portfolios based on these sorts, measuring KZ using accounting data from the firm's fiscal year end in calendar year $t-1$ and measuring size using market capitalization in June of year t. We calculate subsequent value weighted returns on the nine portfolios from July of year t to June of year $t+1$ and reform the portfolios in June of $t+1$.

Table 1 shows returns and characteristics for these nine portfolios. The sample has monthly returns from July 1968 to December 1997; the period is limited by data availability, as our method requires extensive accounting information on each firm. We time-average the annual portfolio-weighted characteristic of each portfolio. Both the returns and the portfolio characteristics are value weighted.

The first column of Table 1 reports the average annual number of firms in each of the nine portfolios. The nine portfolios contain a fairly large number of firms and are well diversified.[4] This column shows that size is positively correlated with the KZ index: Small firms are disproportionately constrained by our measure, and constrained firms are disproportionately small. Table 1 also reports characteristics for three other portfolios that are

[4] The HB portfolio had the lowest minimum number of firms during the sample period, with 21 firms in 1971.

Table 1
Portfolio characteristics and returns, 1968–1997

		No. of firms	Monthly returns (excess)	β	Debt ratio	D/P	E/P	B/M	PR1YR (months $t-2$ to $t-12$)	Size (mkt cap bil $)
Low-cap firms (smaller)										
Low KZ	LS	86	0.45	1.16	12.25	2.75	6.79	0.80	16	0.02
Middle KZ	MS	90	0.67	1.20	22.49	1.70	7.65	1.02	12	0.02
High KZ	HS	173	0.38	1.30	36.14	0.38	3.28	0.97	16	0.02
Mid-cap firms										
Low KZ	LM	120	0.37	1.34	11.87	2.70	7.52	0.63	20	0.09
Middle KZ	MM	114	0.56	1.33	22.03	2.12	8.30	0.83	21	0.09
High KZ	HM	116	0.26	1.48	30.26	0.67	4.78	0.75	32	0.08
High-cap firms (bigger)										
Low KZ	LB	143	0.47	0.99	8.18	2.85	6.29	0.37	17	17.93
Middle KZ	MB	145	0.53	1.09	21.21	3.12	8.48	0.68	19	13.13
High KZ	HB	71	0.25	1.28	29.84	1.88	6.34	0.67	29	4.61
HIGHKZ			0.30	1.35	32.08	0.97	4.80	0.80	26	0.35
LOWKZ			0.43	1.16	10.77	2.77	6.87	0.60	18	0.73
HIGHKZ LOWKZ	FC		−0.13	0.19	21.31	−1.79	−2.07	0.20	8	−0.38

Summary statistics, from July 1968 to December 1997, for nine value-weighted portfolios formed by ranking in each June of year t all NYSE-AMEX-NASDAQ firms with the available COMPUSTAT accounting information on market capitalization and on the KZ index. The KZ index is a linear combination of five accounting ratios and is described in the text.

The rankings are performed independently, so that each portfolio contains firms that are both in a given size category and in a given KZ category. Low-cap firms are firms that are in the bottom third in a given year, sorted on market capitalization. Mid-cap firms are firms that are in the middle third in a given year, sorted on market capitalization. High-cap firms are firms that are in the top third in a given year, sorted on market capitalization. Similarly, Low, Middle, and High KZ are firms that are in the lowest, middle, and top third sorted by the KZ index in a given year.

$$\text{HIGHKZ} = (\text{HS} + \text{HM} + \text{HB})/3, \text{LOWKZ} = (\text{LS} + \text{LM} + \text{LB})/3, \text{FC} = \text{HIGHKZ} - \text{LOWKZ}.$$

We report the sample mean of each portfolio's monthly returns in excess of Treasury bill returns. We calculate average characteristics by taking the simple mean of the 20 annual values, where the annual values are the weighted average of the characteristics of the firms in the portfolio, using the portfolio weights.

β is the portfolio average of each firm's preformation market model slope coefficient, estimated using at most three and at least two years of preformation monthly returns. Debt ratio is the market debt ratio, calculated as the ratio of long-and short-term debt to the sum of long-and short-term debt and the December $t-1$ market capitalization and is reported in percent terms. D/P is the dividend yield, calculated as the ratio of the sum of common and preferred dividends to December $t-1$ market capitalization and is reported in percent terms. E/P is the earnings yield, calculated as the ratio of the sum of income before extraordinary items plus income statement deferred taxes minus preferred dividends to December $t-1$ market capitalization, and is reported in percent terms. B/M is the book-to-market ratio, calculated as the ratio of the sum of stockholders equity plus deferred taxes plus investment tax credit minus preferred stock plus postretirement benefit liabilities to December $t-1$ market capitalization and is reported as a fraction. Size is June t market capitalization in billions of nominal dollars. PR1YR is price momentum, the portfolio average of each stock's nominal return from July $t-1$ to May t and is reported in percent terms.

formed as linear combinations of the nine base portfolios. For these portfolios, the characteristics have been weighted in the same manner as the portfolio returns.

The first portfolio, which we will call HIGHKZ, is simply these equal-weighted average of the three size-sorted portfolios in the top third of the KZ sort: HIGHKZ = (HS+HM+HB)/3. The second portfolio, LOWKZ, is similarly the equal weighted average of the three size-sorted portfolios in the bottom third of the KZ sort: LOWKZ = (LS+LM+LB)/3. The third portfolio, FC, is the difference between these two portfolios: FC= HIGHKZ− LOWKZ. FC is a monthly time series of returns on a zero-cost factor-mimicking portfolio for financial constraints. FC is the return that one would get by buying constrained firms and shorting less constrained firms and represents our basic measure of the constraints factor, which we shall be using for the rest of this article.

The size-stratification of FC is similar to the procedure followed by Fama and French (1993). By forcing the long and short portfolios (HIGHKZ and LOWKZ) to equally represent small, medium, and large firms, the procedure ensures that one class of firms does not dominate the FC returns.[5] By controlling for firm size, we ensure that the returns on the FC portfolio are due to differences in financial constraints, not differences in size. This size stratification is important because the characteristics of size and KZ are correlated.

Table 1 shows that, by construction, constrained firms have high leverage, low dividends, and low earnings. In addition, constrained firms tend to have characteristics that are known to be associated with subsequent high returns: They have high market β's, higher than average book-to-market ratios, and higher than average price momentum.[6] Table 1 also shows average monthly excess returns for the different portfolios. The pattern of returns reveals one of the most puzzling findings of this article. As can be seen by the mean return on the FC portfolio, average returns on constrained firms are 13 basis points lower than average returns on unconstrained firms. One particular size class does not drive these low returns: Each of the three size-sorted constrained portfolios underperforms their two counterparts of the same size. This pattern is particularly striking due to the fact that constrained firms have high momentum, high book-to-market, and high market betas. We examine this puzzle further in Section 4.

3. Tests for Common Variation and Time-Series Properties

3.1 Testing for common variation

We now turn to the central issue of this article, testing for the existence of a constraints factor by testing for a source of common variation in the returns of constrained firms. We test whether constrained firms have returns that move together, controlling for other sources of common variation, such as the market factor, size factor, or industry factors. We regress returns on each of the nine size/KZ-sorted portfolios (shown in Table 1) on three reference portfolio returns. The first reference portfolio is a proxy for the market factor, the second reference portfolio is a proxy for the size factor, and the third reference portfolio is the FC portfolio.

[5] Another benefit of this portfolio-weighting scheme is it reduces idiosyncratic return variation. If one were to group all the constrained firms together into one portfolio (instead of three size-stratified portfolios), that portfolio would consist of many tiny firms and a few large firms. If one value weights this portfolio, the result is a high level of idiosyncratic risk.

[6] We here report further comparative statistics on the HIGHKZ portfolio vs. LOWKZ. Average level of stock price: \$21 for HIGHKZ vs. \$29 for LOWKZ. NASDAQ Fraction, 1975–97: 37% for HIGHKZ vs. 36% for LOWKZ. Frequency of delisting from CRSP in the subsequent year: 7% for HIGHKZ vs. 6% for LOWKZ.

We construct our size and market factor proxies using the portfolios in Table 1. Because our sample consists entirely of manufacturing firms with positive real sales growth, we devise tests that account for the fact that such firms have returns that move together because of common shocks to the manufacturing sector as a whole. Our proxy for the overall market consists of the portfolios of less constrained medium-sized and large firms: BIG = (LM+LB+MM+MB)/4. Our proxy for size consists of the less constrained small firms: SMALL = (LS+MS)/2.

We want to regress each of the nine return portfolios on measures of the market, size, and constraints factors. However, simply using BIG, SMALL, and FC in the regressions would result in spurious results because the same return series would be in both the dependent and independent variable. Therefore, for each of the nine portfolios we customize the three benchmark portfolios by excluding the left-hand-side variable from the construction of right-hand-side variables. For example, in regressions where LS is the dependent variable, SMALL is constructed excluding LS (so that SMALL consists only of MS). To facilitate comparisons across different regressions, we make the definition of the FC variable constant within size groups. Specifically, for a given size group we construct FC using only those constrained and unconstrained portfolios that are not in the given size group. For example, in regressions where LS is the dependent variable, FC is constructed excluding both constrained and unconstrained portfolios from the small size group (so FC in this regression is long on HM and HB, short on LM and LB, and excludes HS and LS).

Table 2 shows the results of these nine regressions. Looking first at the coefficients on BIG and SMALL, the pattern is no surprise: Big firms have high loadings on BIG, and small firms have high loadings on SMALL. The coefficient of interest is on FC. As the table shows, loadings on FC are higher for constrained firms and lower for unconstrained firms. FC is positive and significant for seven of the portfolios (and is zero or negative for low KZ small firms and low KZ big firms). Within each size class, FC loadings increase as KZ ranking increases (just as, within each KZ class, as size rises, loadings on BIG rise and loadings on SMALL fall).

In summary, Table 2 shows that constrained firms have stock returns that positively covary with the returns of other constrained firms. Thus, there is a constraints factor in stock returns.

3.2 Alternative measures of FC

We next turn to two alternate ways of measuring the constraints factor that control for additional possible common components of stock returns. We construct (1) a measure of FC that controls for industry and (2) a measure of FC that controls for size, book-to-market, and momentum.

First, we construct an industry-matched measure of the constraints factor. To ensure that the covariation we find is not simply due to common industry

Table 2
Covariance tests, 68:7–97:12

		Regression results					Variable definitions		
		Constant	BIG	SMALL	FC	R^2	BIG	SMALL	FC
Low-cap firms (smaller)									
Low KZ	LS	−0.19	0.25	0.76	0.00	0.86	(LM + LB + MM + MB)/4	MS	(+ HM + HB − LM − LB)/2
		(1.34)	(4.99)	(18.92)	(0.05)				
Middle KZ	MS	0.24	0.34	0.66	0.19	0.88	(LM + LB + MM + MB)/4	LS	(+ HM + HB − LM − LB)/2
		(1.87)	(7.57)	(18.92)	(3.25)				
High KZ	HS	−0.15	0.19	0.87	0.32	0.91	(LM + LB + MM + MB)/4	(LS + MS)/2	(+ HM + HB − LM − LB)/2
		(1.21)	(4.18)	(23.45)	(5.85)				
Mid-cap firms									
Low KZ	LM	−0.19	0.56	0.52	0.14	0.91	(+ LB + MM + MB)/3	(LS + MS)/2	(HS + HB − LS − LB)/2
		(1.79)	(15.53)	(19.11)	(3.04)				
Middle KZ	MM	0.06	0.60	0.48	0.26	0.93	(LM + LB + MB)/3	(LS + MS)/2	(HS + HB − LS − LB)/2
		(0.67)	(18.76)	(19.97)	(6.55)				
High KZ	HM	−0.27	0.69	0.48	0.45	0.93	(LM + LB + MM + MB)/4	(LS + MS)/2	(HS + HB − LS − LB)/2
		(2.57)	(16.89)	(14.99)	(9.65)				
High-cap firms (bigger)									
Low KZ	LB	0.15	1.01	−0.32	−0.06	0.70	(LM + MM + MB)/3	(LS + MS)/2	(HS + HM − LS − LM)/2
		(1.07)	(18.68)	(6.96)	(1.00)				
Middle KZ	MB	0.19	1.10	−0.31	0.16	0.74	(LM + LB + MM)/3	(LS + MS)/2	(HS + HM − LS − LM)/2
		(1.37)	(19.18)	(6.54)	(2.48)				
High KZ	HB	−0.22	1.23	−0.18	0.19	0.84	(LM + LB + MM + MB)/4	(LS + MS)/2	(HS + HM − LS − LM)/2
		(1.70)	(24.53)	(4.56)	(3.31)				

Results from analysis of the comovements of the nine value weighted KZ-size-sorted portfolios described in Table 1. We regress excess returns on each portfolio on three reference portfolios, a market proxy, a size factor proxy, and FC. We construct our size and market factor proxies using the portfolios in Table 1 as follows. Our proxy for the overall market is the return on a portfolio of less constrained medium-sized and large firms, BIG = (LM + LB + MM + MB)/4, in excess of Treasury bill returns. Our proxy for the size factor is the return on a portfolio of less constrained small firms, SMALL= (LS + MS)/2, in excess of Treasury bill returns. FC is the financial constraints factor defined in Table 1. In each regression, we omit the portfolio that is the dependent variable from the construction of the portfolios that constitute the regression's independent variables. In the case of FC, we also omit the matching portfolio on the short side. For convenience, Table 2 reports the definition of the independent variables in each regression. t-statistics are in parentheses.

shocks, we construct FCIND as a portfolio that is long on constrained firms and short on less constrained firms that are in the same industry. As before, we control for size by using size stratification in the portfolio weights. Like FC, FCIND goes long on HIGHKZ but has a different short portfolio. Specifically, for each firm in the constrained group (HS, HM, and HB), we find a firm in the same industry from the less constrained group (LS, LM, LB, MS, MM, and MB).[7] We form a matching group by sampling without replacement from the less constrained group, so that the high and low portfolios have an equal number of firms. We then size-stratify the matching group into three size portfolios and construct FCIND as the three constrained portfolios minus the three unconstrained portfolios.

Table 3 shows covariation tests using FCIND. Again, FCIND, SMALL, and BIG are constructed differently for each portfolio, as in Table 2. The results in Table 3 are similar to those in Table 2: More constrained firms have higher loadings on the constraints factor. We can reject the hypothesis that constrained firm returns do not covary with other constrained firms' returns, holding constant industry, for all three constrained portfolios.

Second, we construct a measure of the constraints factor, FCDGTW, that controls for size, book-to-market, and momentum, using the methodology of Daniel et al. (1997). Again, FCDGTW goes long on HIGHKZ but has a different short portfolio than FC. Daniel et al. (1997) create 125 characteristic-based benchmark portfolios. These portfolios are constructed from the entire universe of stocks, not just the manufacturing firms in our sample, and they do not exclude high-FC firms.[8] For each individual stock in the long portfolio, we find the corresponding characteristic-based benchmark and short it, using the same portfolio weight as the target stock has in HIGHKZ.

Table 3 shows results using FCDGTW. Again, the results are similar to Table 2. For the constrained firms, two out of the three portfolios have significantly positive loadings on the constraints factor (for the largest constrained firms, the coefficient on the constraints factor is the same as in Table 2, but the standard error is larger).

In summary, Table 3 shows that there is a constraints factor in stock returns that is not caused by stock return movements related to industry, size, book-to-market, or momentum.[9]

3.3 Preformation covariances

Daniel and Titman (1997) argue that forming portfolios based on characteristics is likely to produce portfolios that share common properties, such as

[7] As described in the Appendix, we use the Fama and French (1997) scheme based on four-digit SIC codes.

[8] We use the entire universe because using the methodology on our smaller sample would result in benchmark portfolios that are empty.

[9] In a previous version of this article [Lamont et al. (1997)] we perform more extensive robustness tests on different ways of constructing the constraints factor. We find that the low mean return on the constraints factor is not driven by trading exchange, extreme small size, initial public offerings, or failure to control for the characteristic of size.

Table 3
Covariance tests using alternative measures of the constraints factor, 68:7–97:12

		Constant	BIG	SMALL	FCIND	R^2	Constant	BIG	SMALL	FCDGTW	R^2
Low-cap firms (smaller)											
Low KZ	LS	−0.16	0.25	0.75	0.09	0.86	−0.24	0.27	0.77	−0.19	0.86
		(1.16)	(5.03)	(17.79)	(1.18)		(1.71)	(5.32)	(19.73)	(1.93)	
Middle KZ	MS	0.27	0.35	0.64	0.28	0.88	0.26	0.32	0.68	0.26	0.88
		(2.08)	(7.83)	(17.79)	(4.24)		(2.01)	(6.68)	(19.73)	(2.84)	
High KZ	HS	−0.13	0.21	0.84	0.36	0.91	−0.17	0.17	0.91	0.25	0.90
		(1.08)	(4.59)	(21.65)	(5.55)		(1.30)	(3.46)	(24.34)	(2.76)	
Mid-cap firms											
Low KZ	LM	−0.20	0.58	0.51	0.09	0.91	−0.20	0.58	0.51	0.10	0.91
		(1.92)	(16.02)	(18.01)	(1.73)		(1.92)	(16.05)	(17.76)	(1.28)	
Middle KZ	MM	0.04	0.62	0.46	0.23	0.93	0.01	0.62	0.49	0.06	0.92
		(0.47)	(19.29)	(17.94)	(4.74)		(0.11)	(18.64)	(18.43)	(0.78)	
High KZ	HM	−0.30	0.75	0.43	0.42	0.92	−0.33	0.77	0.45	0.31	0.91
		(2.69)	(17.84)	(12.51)	(7.24)		(2.76)	(17.26)	(12.31)	(3.51)	
High cap firms (bigger)											
Low KZ	LB	0.14	1.00	−0.30	−0.07	0.70	0.13	1.00	−0.29	−0.15	0.71
		(1.04)	(18.65)	(6.49)	(1.03)		(0.95)	(18.62)	(6.11)	(1.34)	
Middle KZ	MB	0.20	1.13	−0.33	0.15	0.74	0.14	1.11	−0.28	−0.19	0.74
		(1.38)	(19.63)	(6.77)	(2.01)		(0.97)	(19.32)	(5.55)	(1.65)	
High KZ	HB	−0.22	1.26	−0.20	0.17	0.84	−0.22	1.26	−0.20	0.20	0.84
		(1.70)	(25.23)	(5.01)	(2.56)		(1.66)	(25.05)	(4.81)	(1.79)	

Alternate ways of performing the covariance analysis of the nine value weighted KZ-size-sorted portfolios performed in Table 2. We replace the FC with financial constraints factors that are purged of well-known sources of stock return variation. Like FC, FCIND goes long on HIGHKZ, but has a different short portfolio than FC. The short portfolio consists of the firms from the less unconstrained 66% of firms that are in same industry classification as the firms in HIGHKZ. We then size-stratify the matching group into three size portfolios and construct FCIND as HIGHKZ minus these three matching portfolios. FCDGTW also goes long on HIGHKZ, but has a different short portfolio than FC. For each individual stock in the long portfolio, we find the corresponding characteristic-based benchmark portfolio of Daniel et al.(1997) and short it, using the same portfolio weight as the target stock has in HIGHKZ. As in Table 2, in each regression, we omit the portfolio that is the dependent variable from the construction of the portfolios that constitute the regression's independent variables, and we also omit in the case of FC the matching portfolio on the short side. t-statistics are in parentheses.

being in similar industries or regions. They conjecture that common variation in stock returns related to the book-to-market characteristic, documented by Fama and French (1993), might be spuriously reflecting other factors in stock returns. To test this hypothesis, Daniel and Titman (1997) sort stocks into portfolios based on year $t-1$ book-to-market and examine whether the covariances of returns within the portfolios rise between year $t-5$ and year t. Daniel and Titman (1997) conjecture that firms which have similar book-to-market in year $t-1$ may be firms that always covary together, even in years where they do not have similar book-to-market.

Similarly, we wish to test whether firms in our FC portfolio covary with one another because they have similar constraints, as opposed to covarying just because they are similar firms. In the previous subsection, we controlled for industry, size, book-to-market, and momentum, but these controls may not exhaust the list of potential confounding factors in stock returns.

A premise of Daniel and Titman's (1997) test is that their portfolios' book-to-markets change between year $t-5$ and year t. We therefore start by studying firms that are both in the original sample for six consecutive years and in the FC portfolio in year t. As before, we form portfolios based on accounting variables at the end of the prior year, so we use accounting data in year $t-6$ through year $t-1$ and returns in year $t-5$ through year t. Due to these data requirements, the sample runs from 1973:7 to 1992:6 and contains a smaller number of firms per year than the full sample.

We find that rankings on the KZ index change slowly. Of the year t constrained firms, 70% were also constrained in year $t-5$. Of the year t unconstrained firms, 72% were also unconstrained in year $t-5$. Again, constrained means the firm is in the top third of rankings on the KZ index in the universe of all firms, including firms without six-year histories.

Thus the premise of Daniel and Titman's (1997) test is questionable for the KZ characteristic. We therefore refine the test by splitting the sample of firms into two groups: switchers and stayers. We start with the sample of all firms with six-year histories who are in the FC portfolio in year t. Switchers are the 29% of firms whose constraint status differs between year $t-5$ and year t; stayers are the 71% of firms whose constraint status is the same in year $t-5$ and year t. Put differently, stayers were in the same KZ third at the end of year $t-6$ as they were at the end of year $t-1$, and switchers were not. Our refinement of the Daniel and Titman (1997) test is to focus on portfolios of these switching and staying firms.

The two hypotheses about the FC factor have different implications about the variance of the switchers portfolio return and the covariance of the returns on switchers and stayers. Under the hypothesis that the FC factor is a spurious reflection of other factors and that firms in the portfolio in year t are similar firms that always covary, both the switchers and stayers should always covary. Switchers should always covary with other switchers and should always covary with stayers. Under the hypothesis that the covariance

Table 4
Preformation monthly return variances and covariances, 73:7–92:6

	FC_{SWITCH}			FC_{STAY}		FC_{SWITCH} and FC_{STAY} regression results		
	Percent switching	Variance	Standard deviation	Variance	Standard deviation	Covariance	Coefficient on FC_{STAY}	R^2
$t-5$	100	9.18	3.03	16.55	4.07	1.98	0.12 (2.46)	0.03
$t-4$	74	12.13	3.48	16.34	4.04	3.72	0.23 (4.14)	0.07
$t-3$	61	11.55	3.40	18.55	4.31	4.86	0.26 (5.32)	0.11
$t-2$	46	13.31	3.65	17.47	4.18	5.39	0.31 (5.71)	0.13
$t-1$	29	17.62	4.20	16.43	4.05	8.57	0.52 (8.82)	0.26
t	0	14.47	3.80	15.71	3.96	6.57	0.42 (7.33)	0.19

Time-series properties of the returns on two portfolios, FC_{SWITCH} and FC_{STAY}. The portfolios are constructed from the sample of all firms which are in the FC portfolio in year t (so that they are in the top third or bottom third of all firms ranked by the KZ index at the end of year $t-1$) and which also have data available to construct the KZ index in year $t-6$. FC_{STAY} goes long on firms that are constrained in both year t and in year $t-5$ and goes short on firms that are unconstrained in both year t and in year $t-5$. In other words, FC_{STAY} takes positions in firms that were in bottom or top third of KZ rankings at the end of year $t-1$ *and* that were in that same third at the end of year $t-6$. FC_{SWITCH} consists of firms in the FC portfolio in year t but which are not in FC_{STAY}. In other words, FC_{SWITCH} takes positions in firms that were in bottom or top third of KZ rankings at the end of year $t-1$ but that were *not* in that same third at the end of year $t-6$. Both portfolios are size-stratified in a manner similar to the FC portfolio defined in Table 1, except the stratification is based on conditional (not independent) sorts. The size stratification is based on splitting the long (or short) portfolio in year $t-j$ into thirds based on market value year $t-j$. Both FC_{SWITCH} and FC_{STAY} are value-weighted portfolios based on market capitalization at the end of year $t-1$.

"Percent switching" in year $t-j$ shows the percentage of firms in the FC_{SWITCH} portfolio that are not in the same bottom or top third of KZ rankings as they are in year $t-1$. "Covariance" is the time-series covariance of FC_{SWITCH} and FC_{STAY}. Regression results show the ordinary least squares coefficient of FC_{SWITCH} on FC_{STAY}, t-statistics are in parentheses. The sample period is 1973:7–1992:6.

is a function of constraint status, then switchers should covary less with each other and with stayers when their constraint status is dissimilar and more when their constraint status is similar.

Table 4 shows the results for the two portfolios, FC_{SWITCH} and FC_{STAY}. Both portfolios are value weighted, size-stratified portfolios that go long on firms that are constrained in year t, and short on firms that are unconstrained in year t.[10] FC_{SWITCH} consists of firms whose financial constraint status switches between year $t-5$ and year t and who end up being in the FC portfolio in year t. Like FC, FC_{SWITCH} is a portfolio that in year t goes long on constrained firms and short on unconstrained firms. In other words, in every year FC_{SWITCH} positively weights firms in the top third and negatively weights firms in the bottom third of all firms ranked by the KZ index at the end of year $t-1$. The complementary portfolio is FC_{STAY}.

[10] Both portfolios have a much smaller number of firms than the FC portfolio shown in Table 1: In year t FC_{SWITCH} has an average of 126 firms, FC_{STAY} has an average of 312 firms, while FC has an average of 712 firms in the 1973:7–1992:6 period. To ensure well-diversified portfolios, we use conditional size sorts: The size stratification is based on splitting the long (or short) portfolio in each year into thirds based on market values as of the portfolio formation year.

We examine the returns on six different FC_{SWITCH} portfolios, each created with reference to a different year, from year $t-5$ to year t. The first column of Table 4 shows the composition of FC_{SWITCH}. By construction, the percent of FC_{SWITCH} firms in the same KZ third at the end of both year $t-j-1$ and year $t-1$ moves from zero in year $t-5$ to 100 in year t. For FC_{SWITCH} we have six separate time series of returns, each from 1973:7 to 1992:6. For example, the second row shows results for the time series of FC_{SWITCH} in year $t-4$, a portfolio that is long firms that will be constrained in four years but that were not constrained last year (and short firms that will be unconstrained in four years but that were constrained last year). Of these firms, the first column reports that 74% were not in their final (year t) constraint classification.

The first test is to examine the variance of FC_{SWITCH}. Moving from year $t-5$ to year t, the variance rises by 58% and the standard deviation rises by 25% (this increase is statistically significant). In contrast, Table 4 shows that the standard deviation of FC_{STAY} is fairly constant over the six periods and actually falls between year $t-5$ and year t. Thus, the evidence based on the univariate properties of FC_{SWITCH} and FC_{STAY} indicates that covariance is higher when financial constraint status is more similar.[11]

Table 4 also shows the covariance of FC_{SWITCH} and FC_{STAY}. If financial constraints drive the covariation of returns, the covariance should rise going from year $t-5$ to year t; if financial constraints do not matter, the covariance should be constant. Table 4 shows that the covariance rises dramatically from year $t-5$ to year t, going from about 2 to more than 6. We also display this information through univariate regressions of FC_{SWITCH} on FC_{STAY}, which correspond to the factor loading regressions shown elsewhere in this article. The coefficient on FC_{STAY} rises from 0.12 in year $t-5$ to 0.42 in year t, and one can reject the hypothesis of no difference in year $t-5$ and year t coefficients (and between year $t-5$ and year $t-1$) at a high level of confidence.

In summary, return covariances increase as constraint status becomes more similar. Thus there is a common component in stock returns due to financial constraints, one that is identifiably distinct from other sources of covariation of returns.

3.4 Time series summary statistics

Table 5 shows summary statistics for the three measures of the constraints factor. For comparison, we also show statistics for three stock market factors used by Fama and French (1993) and an analog to Fama and French's size factor that controls for KZ.

[11] Because the portfolio formation ranking on the KZ index occurs at the end of year $t-1$, year $t-1$ is an alternate endpoint in which the portfolios have similar constraint status. Moving from year $t-5$ to year $t-1$, the variance of FC_{SWITCH} rises by 92% and the standard deviation rises by 39%. Again, between year $t-5$ and year $t-1$ the increase in the standard deviation of FC_{SWITCH} is significant, while the standard deviation of FC_{STAY} falls.

Table 5
Summary statistics for factor returns, 68:7–97:12

	FC	FCIND	FCDGTW	RM-RF	HML	SMB	SIZE
Correlation matrix							
FCIND	0.91*						
FCDGTW	0.74*	0.80*					
RM-RF	0.41*	0.42*	0.39*				
HML	−0.09	−0.07	−0.23*	−0.39*			
SMB	0.45*	0.54*	0.52*	0.32*	−0.14*		
SIZE	0.22*	0.41*	0.36*	0.10	0.13	0.81*	
Other summary statistics							
Mean	−0.13	−0.12	−0.14	0.52	0.44	0.19	0.08
SD	2.20	1.96	1.36	4.47	2.62	2.89	4.70
Min	−5.07	−5.13	−3.77	−23.09	−10.04	−9.91	−12.92
Max	7.25	7.23	5.17	16.05	9.32	10.68	17.91

Summary statistics of the returns on three versions of the financial constraints factor, a size factor specific to our particular sample, and three other factors used in previous research. All data are monthly percent returns, July 1968 to December 1997. We define the financial constraint factors—FC, FCIND, FCDGTW—in Tables 1, 2, and 3. The portfolio SIZE is a constraint-stratified portfolio: SIZE = (LS+MS+HS−LB−MB−HB)/3.

The following three factors come from Fama and French (1993): RM-RF, the market factor, is the return on a value-weighted portfolio of NYSE/AMEX/NASDAQ stocks minus the return on a portfolio of Treasury bills. HML is high minus low, which measures the book-to-market factor by subtracting returns from a portfolio of high book-to-market firm stocks from the returns from a portfolio of low book-to-market firm stocks. SMB is small minus big, which measures the size factor by subtracting returns from a portfolio of big firm stocks from the returns from a portfolio of small firm stocks. An asterisk indicates that the correlation is significant at the 5% level.

The three Fama-French factors are RM-RF, HML, and SMB. RM-RF, the market factor, is the return on a value-weighted portfolio of NYSE/AMEX/NASDAQ stocks minus the return on a portfolio of Treasury bills. HML (high minus low) is the book-to-market factor, constructed by subtracting a low book-to-market portfolio return from a high book-to-market portfolio return. SMB (small minus big) is the size factor, constructed by subtracting a large firm portfolio return from a small firm portfolio return (size is measured by market capitalization). The portfolio SIZE is a constraint-stratified portfolio that is constructed using the base portfolios of Table 1. SIZE is long on small firms and short on big firms: SIZE =(LS+MS+HS−LB−MB−HB)/3.

Table 5 shows correlations among the returns on these zero cost stock portfolios. Examining the correlation of SIZE and FC helps evaluate the correlation of the size and constraints factors in stock returns because SIZE (unlike SMB) it is stratified by constraint. Because SIZE is constructed to be neutral with respect to the constraint characteristic, the correlation of SIZE and FC shows whether the size and constraints factors are correlated. The significant positive correlation means that part of the size *factor* in returns reflects something other than the *characteristic* of size in the underlying firms.

Figure 1 shows the time series of the cumulative returns on these portfolios from 1968 to 1997. The return on the factor-mimicking portfolio represents the return one would get from a self-financing strategy of buying a portfolio of highly constrained firms and shorting a portfolio of less constrained firms. The cumulative returns are simply the sum of these monthly returns and

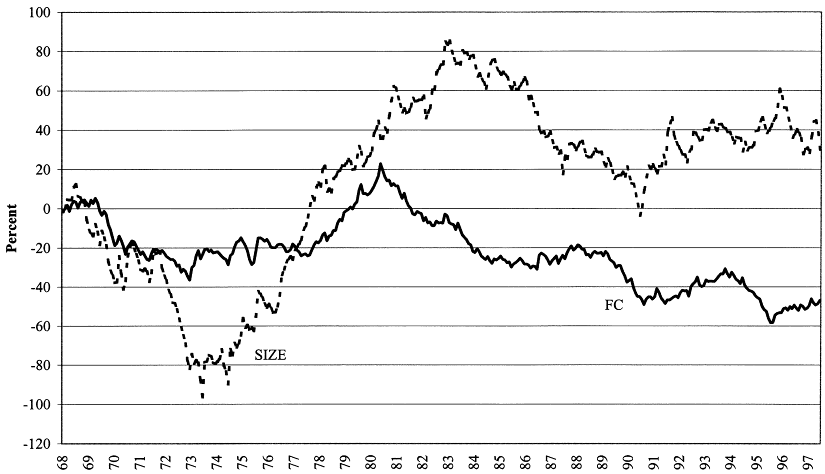

Figure 1
Cumulative returns
Cumulative returns are the sum of monthly returns. The FC portfolio is the returns on a group of constrained firms minus the returns on a group of unconstrained firms. The SIZE portfolio is the returns of small firms minus large firms. Details are in Tables 1 and 4.

show (approximately) the percent total return on the long portfolio minus the total return on the short portfolio. The Figure shows that from July 1968 to November 1980, the constraints factor earns positive average returns, and from November 1980 to December 1997 the losses averaged 34 basis points per month.

As noted by Fama and French (1995), small stock returns were particularly low in the 1980s; one explanation is that small stocks experienced low earnings in the 1980s. Our size stratification ensures that the *characteristic* of size is not responsible for FC's big negative returns in the 1980s. Figure 1 also shows the cumulative returns on SIZE, our FC-stratified measure of the size factor. Although it is clear the FC and SIZE are positively correlated (as shown in Table 5), the downturn for SIZE begins several years after the downturn for FC.

FC's negative unconditional mean for the entire sample period of 1968–97 is surprising on two counts. First, intuition suggests that if financial constraints are a bad thing, investors should be compensated for holding stocks whose returns positively covary with increases in financial constraints. Second, from the point of view of existing models, a zero-cost portfolio that loads on the market, size, value, and momentum factors should earn positive returns. In the next section, we verify that the average return on the constraints factor does indeed pose a challenge to existing empirical asset pricing models.

4. Financial Constraint Returns and Asset Pricing

4.1 The negative mean return and previous results

Bhandari (1988), Chan and Chen (1991), Fama and French (1992), and Shumway (1996) all find that firms with high measures of leverage, financial distress, or probability of default tend to earn *higher* returns than other firms. In contrast, we find that financially constrained firms earn *lower* returns than other firms.

Perhaps the most striking contradiction is with the results from Chan and Chen (1991). Like them, we form size-matched portfolios based on dividend payments and leverage. Chan and Chen find positive average returns for NYSE size-matched portfolios reflecting dividend payments and leverage. We find negative average returns. Why are our estimates of mean excess returns different from theirs? One explanation is that these differences are due to their different sample period (1956–1985). Bhandari (1988) studies NYSE firms 1948–1979 and shows that most of the premium earned by leveraged firms is earned prior to 1966. As shown in Figure 1, FC returns were on average positive between 1968 and 1982.[12]

A more consistent finding is contained in Christie (1990), who finds that zero-dividend firms earn negative size-adjusted excess returns. Fama and French (1993) also find that firms paying zero dividends have returns lower than predicted by their model. Lakonishok et al. (1994) find that, holding constant book-to-market, firms with lower cash flow and lower earnings tend to have lower returns. Dichev (1998) finds that firms with high bankruptcy risk earn lower-than-average returns since 1980.

4.2 Does the constraints factor reflect only known empirical factors?

Table 6 show pricing equations that regress the constraints factor on a set of other factor returns. There are two things to look for in this table. First, if these other factors correctly price the constraints factor, the intercept (α) in these regressions should be zero. Second, the R^2 in these regressions measures how much of the variation in the constraints factor can be explained using other systematic factors. If the R^2 is low, then the constraints factor measures an independent source of return variance.

We start by discussing the results for FC. The first row shows how well the constraints factor can be explained by the Capital asset pricing model (CAPM). The constraints factor has a market β of 0.2, which means that constrained firms have higher β's than unconstrained firms. The constraints factor is mispriced by the CAPM, with an α of -23 basis points per month.

The next row uses the Fama and French (1993) three-factor model. The mispricing increases slightly going from the CAPM to the three-factor model. The third row uses the five factors of Fama and French (1993), which

[12] Another difference is that we restrict our sample to firms with positive past sales growth. Thus, our sample is likely to be less distressed than other samples consisting of high-debt, low-dividend firms.

Table 6
Pricing tests on financial constraints factor

	α	RM-RF	HML	SMB	TERM	DEF	PR1YR	R^2
FC								
CAPM	−0.23	0.20						0.17
	(2.12)	(8.47)						
FF three-factor	−0.26	0.16	0.08	0.27				0.29
	(2.59)	(6.59)	(1.97)	(7.47)				
FF five-factor plus	−0.32	0.22	0.09	0.28	−0.15	−0.29	0.03	0.35
price momentum	(2.97)	(7.67)	(2.20)	(6.55)	(3.62)	(3.09)	(1.02)	
FCIND								
CAPM	−0.21	0.18						0.18
	(2.24)	(8.78)						
FF three-factor	−0.25	0.14	0.09	0.32				0.38
	(3.00)	(6.87)	(2.75)	(10.36)				
FF five-factor plus	−0.26	0.19	0.10	0.31	−0.12	−0.31	−0.01	0.44
price momentum	(2.88)	(7.82)	(2.83)	(8.85)	(3.69)	(4.01)	(0.54)	
FCDGTW								
CAPM	−0.19	0.12						0.15
	(2.87)	(7.96)						
FF three-factor	−0.16	0.07	−0.04	0.21				0.33
	(2.65)	(4.45)	(1.73)	(9.42)				
FF five-factor plus	−0.15	0.10	−0.03	0.19	−0.10	−0.18	−0.03	0.38
price momentum	(2.34)	(5.85)	(1.04)	(7.22)	(4.15)	(3.19)	(1.29)	

Results from asset-pricing tests of the three financial constraints factors—FC, FCIND, FCDGTW—defined in Tables 1, 2, and 3. The asset pricing models are the CAPM, the Fama and French (1993) three-factor model, and the Fama-French five-factor model plus price momentum. The CAPM consists solely of the Fama-French market proxy, RM-RF. The Fama-French three-factor model adds the HML and SMB portfolios to the CAPM specification. We describe these portfolios in Table 5. The Fama-French five-factor model plus price momentum adds three additional portfolios to the three-factor model. These portfolios include TERM, the return on a portfolio of long-term government bonds minus the return on Treasury bills, DEFAULT, the return on a portfolio of corporate bonds minus the return on a portfolio of long-term government bonds, and Carhart's (1997) PR1YR, which is a portfolio return constructed by subtracting the returns from a portfolio experiencing low returns in the past 11 months from the returns of a portfolio experiencing high returns in the past 11 months. Due to data constraints, the five-factor model plus price momentum regressions only cover the July 1968 to December 1995 period. All other regressions use the full sample period. t-statistics are in parentheses.

includes two bond market variables measuring term and default returns and a sixth factor measuring price momentum. The two bond market factors are constructed using data from Ibbotson Associates. TERM is the return on a portfolio of long-term government bonds minus the return on Treasury bills. DEFAULT is the return on a portfolio of corporate bonds minus the return on a portfolio of long-term government bonds. The momentum factor, PR1YR, is a portfolio that measures one-year price momentum (and is formed by sorting stocks on past returns) as in Jegadeesh and Titman (1993) and Carhart (1997). The six-factor model worsens the mispricing, and the R^2 is only 35%.

The results in Table 6 are similar using FCIND and FCDGTW. At most, 44% of the variation of the constraints factor can be explained using the other factors, and in all cases α is negative and more than two standard errors from zero.[13] In summary, neither the variation nor the mean return of the constraints factor are well explained by existing asset pricing models.

[13] We have also investigated the three-factor model for the three size-sorted constrained portfolios (HS, HM, and HB). We find that the three constrained portfolios all have negative α's of similar magnitude, indicating that the mispricing is not coming from one particular group of constrained firms.

4.3 Does the constraints factor price other assets?

Firms that omit dividends or that announce surprisingly low earnings have low subsequent returns [see Michaely et al. (1995) on dividend omission drift, and Bernard (1993) and Chan et al. (1996) on post–earnings announcement drift]. The low mean returns earned by constrained firms could be related to this phenomenon. Although we do not look at *changes* in dividends or earnings, our constrained firms have low *levels* of dividends and low earnings, so they may be similar to these firms and thus have a "negative drift."

Table 7 shows the performance of the constraints factor in explaining returns on two portfolios previously identified as anomalous. The table shows three factor pricing equations without the constraints factor and a specification that adds the constraints factor to the Fama-French three. Two things are of interest in the table: the α's, which show whether the use of the constraints factor can eliminate the mispricing, and the loadings on the constraints factor, which show whether the constraints factor shares covariance with these returns, controlling for other sources of covariance.

First we examine returns (in excess of the Treasury bill returns) from an equal-weighted portfolio of recent initial public offerings (IPOs) [see Ritter (1991) on IPO underperformance]. We use 1977–1994 data, taken from Brav and Gompers (1997). In the standard three-factor model, IPOs have a large and marginally significantly negative α. Adding the constraints factor has little effect on the α, although IPOs load positively (and significantly) on the constraints factor. The constraints factor adds little to explanatory power.

Next, we examine an equal-weighted portfolio of excess returns from firms that have recently omitted their dividends, taken from Michaely et al. (1995). Again, the standard three-factor model misprices this portfolio with a large negative α. Adding the constraints factor has little effect on the α, and the loading on the constraints factor is insignificant. Thus, there is little evidence that the constraints factor is connected to the dividend omissions puzzle.

Table 7
Financial constraint returns and other assets

	α	RM-RF	HML	SMB	FC	$\overline{R}^2$
Initial public offerings	−0.30	0.98	−0.24	1.18		0.89
	(1.91)	(24.38)	(3.46)	(18.52)		
	−0.25	0.94	−0.24	1.13	0.25	0.89
	(1.59)	(22.38)	(3.48)	(17.61)	(3.06)	
Dividend omissions	−0.49	1.11	0.74	1.52		0.87
	(2.71)	(25.83)	(10.32)	(23.55)		
	−0.51	1.10	0.74	1.48	0.11	0.87
	(2.69)	(23.26)	(10.15)	(19.65)	(1.08)	

Regressions of two excess return series on various combinations of the Fama-French three factors and the financial constraints factor, FC. The first portfolio is an equal-weighted portfolio of firms who in the last five years have had an IPO. The regression is estimated from January 1977 to December 1994; the data are from Brav and Gompers (1997). The second portfolio is an equal-weighted portfolio of firms who in the last three years have omitted a dividend. We construct this portfolio using data from Michaely et al. (1995). That portfolio contains 885 total firms from May 1965 to November 1990.

In summary, the constraints factor does not help explain the low mean returns on IPOs and dividend-omitting firms, at least not in the context of a Fama-French three-factor model. The constraints factor does help explain the variance of returns on IPOs, but adds little explanatory power.

4.4 Interpretation of asset pricing results

Our first result is that there is a constraints factor: Financially constrained firms have returns that move together. Our second result is that during the sample period, the constraints factor has a negative mean and is mispriced by both the CAPM and multifactor models. There are three possible explanations for this mispricing. All three explanations are economically interesting and merit future research.

First, the constraints factor's low returns could reflect irrationality on the part of market participants. Irrationality is a possible explanation for any stock market anomaly. Second, it could be that during this period a series of unexpected shocks to future cash flow occurred, surprises that reduced the value of financially constrained firms. Under this interpretation, the mispricing of the constraints factor is an anomaly that will not hold out of sample. There is some evidence for this interpretation, because other data sets produce different results. This explanation is interesting because the economic source of these cash flow shocks remains an open question.

Third, perhaps the constraints factor reflects a genuine risk faced by investors, a risk that is not adequately captured by existing multifactor models. Under this interpretation, the constraints factor belongs on the right-hand side of pricing equations, as in Table 7. Unlike other empirically identified factors (such as size and book-to-market), the constraints factor is designed to have an interpretable economic meaning. However, although the existence of a constraint premium seems economically understandable, the sign of the premium does not.

5. Financial Constraints and Macroeconomic Variables

The low returns earned by financially constrained firms are puzzling, but not directly relevant for using the financial constraints factor to test economic hypotheses that are unrelated to risk premia. In this section, we use the constructed constraints factor to test for connections between macroeconomic shocks and financial constraints. Our tests are very simple and should be regarded as an exploratory investigation.

Table 8 shows the monthly relationship between returns on portfolios of stocks and macroeconomic variables. The table shows regressions of stock returns on current and three lagged monthly macroeconomic variables, of the form

$$R_t = a + \sum_{j=0}^{3} c_j MACRO_{t-j} + \varepsilon_t. \quad (1)$$

Table 8
Macro variables and stock returns

	Dependent variable: SIZE			Dependent variable: FC		
	c_0	$\sum_{j=0}^{3} c_j$	R^2	c_0	$\sum_{j=0}^{3} c_j$	R^2
Δln(LEI index)	2.04	2.20	0.04	−0.14	0.56	0.03
	(2.68)	(2.18)		(0.38)	(1.16)	
ΔXLI index	0.20	1.51	0.06	−0.15	0.13	0.03
	(0.98)	(4.34)		(1.57)	(0.81)	
Δln(real M2)	1.07	1.11	0.02	0.62	−0.01	0.01
	(1.26)	(1.52)		(1.55)	(0.04)	
ΔFed funds rate	−0.14	−2.07	0.04	0.10	−0.10	0.00
	(0.36)	(3.52)		(0.52)	(0.37)	
ΔDiscount rate	−0.26	−3.64	0.04	0.31	−0.29	0.00
	(0.23)	(2.73)		(0.57)	(0.45)	
ΔCP spread	−3.64	−7.52	0.06	−0.16	−0.79	0.00
	(3.67)	(3.67)		(0.34)	(0.80)	

This table shows results from a regression of two monthly portfolio returns on current and three lagged values of macroeconomic variables, of the form $R_t = a + \sum_{j=0}^{3} c_j MACRO_{t-j} + \varepsilon_t$, where R is the portfolio return and MACRO represents the macroeconomic variable. We report both the contemporaneous coefficient, c_0, and the sum of the contemporaneous and lagged coefficients.

The two return series are SIZE and FC. SIZE is a constraints-neutral size factor and is defined in Table 5. FC is a size-neutral financial constraints factor and is defined in Table 1.

For each of the two return series, we run six different regressions on six different macroeconomic variables. LEI is the index of leading economic indicators prepared by the Conference Board (formerly produced by the Department of Commerce), adjusted to exclude the stock price component of the index; it is available from July 1968 to October 1997. XLI is the Stock and Watson (1989) experimental leading indicator, expressed in units of forecast percent change in economic activity; it is available from July 1968 to December 1997. Real M2 is M2 in billions of 1992 dollars, a vailable from July 1968 to October 1997. The Fed funds rate and the discount rate are both available from July 1968 to December 1997. The CP spread is the difference between the commercial paper yield and the six-month Treasury bill yield, available from July 1968 to August 1997. All series are expressed in percent terms. t-statistics are in parentheses.

The table displays both the contemporaneous coefficient, and the sum of all four coefficients.

We choose macroeconomic variables that are likely to reflect innovations in information about current and future economic activity or credit conditions. We examine two leading indicators of future economic activity. The first is simply the change in (log) index of leading economic indicators (the LEI, as calculated by the Department of Commerce and the Conference Board). Because the standard LEI contains a component reflecting aggregate stock returns, we construct a version excluding this component. The second, XLI, is the change in the experimental leading index developed by Stock and Watson (1989). The XLI is in units of annualized percent growth in economic activity over the next six months.

We examine four measures of monetary policy and credit conditions. The first is the change in log real M2, a standard measure of money supply. The second is the change in the Federal funds rate, the third is the change in the discount rate charged by the Federal Reserve, and the fourth is the change in the spread between the six-month commercial paper rate and the six-month Treasury bill rate [used as a measure of credit conditions by Kashyap et al. (1993)].

In Table 8 we expect positive correlations of stock returns with the first three series (the two leading indicators and the monetary policy variable), because high growth and looser money are generally considered to be good news for future profits. We expect negative correlations with the last three series (all based on interest rates), as higher interest rates and tighter credit conditions are bad news for future profits.

We examine two stock portfolios, one representing financial constraints and one representing size. The first is FC, a size-stratified portfolio that is long on constrained firms and short on unconstrained firms. The second is SIZE, a constraint-stratified portfolio that is long on small firms and short on big firms. The coefficients in the FC regressions show whether constrained firms have returns with higher macro correlations than unconstrained firms, and the coefficients in the SIZE regressions show whether small firms have returns with higher macro correlations than big firms.

The left half of Table 8 shows that, in general, small firms have stock returns that are more procyclical and more correlated with monetary policy. For all variables except M2, SIZE has a significant relationship with the sum of the coefficients, with the expected signs. These results are in line with previous research. The coefficients suggest that we have successfully identified macroeconomic variables that, at the monthly level, contain information about future cash flows (or discount rates). Thus, our simple univariate regressions have power to reject the null hypothesis that stock returns are uncorrelated with macroeconomic variables.

The right half of Table 8 shows that constrained firms are never significantly more sensitive to macroeconomic conditions than unconstrained firms. The results suggest that the constraints factor is not measuring aggregate changes in firm value due to changes in monetary policy, credit conditions, or macroeconomic shocks. Lack of monthly correlation between the constraints factor and macroeconomic variables does not imply that financial constraints are unimportant in terms of economic welfare or policy. If the constraints factor measures aggregate changes in financial constraints, it can be used to identify the shocks to aggregate financial health. For example, FC firms had very low returns in the 1980s, possibly reflecting a negative innovation in future expected earnings of financially constrained firms. The source of this economic shock remains to be identified.[14] Furthermore our tests are fairly rudimentary. More sophisticated analysis might yield different results.

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[14] We also split the sample and reestimated the FC regressions in Table 8 (the first half is 1968:7 to 1983:3 and the second half is 1983:4 to 1997:12). The two halves had very different mean returns on FC (as shown in Figure 1). The results were uninformative. We were unable to reject both the hypothesis that the coefficients reported in Table 8 were zero in both periods, and the hypothesis that the coefficients were the same in both periods.

6. Conclusions

We construct various zero-cost portfolios that are long financially constrained firms and short less constrained firms and find three results. First, these portfolios capture common variation in stock returns not captured by other sources of return comovements. Thus we conclude that there is a financial constraints factor, an identifiable independent common source of economic shocks to firm value. The evidence suggests that financial constraints do affect firm value and that the severity of constraints varies over time. Second, our investigation of the role of financial constraints in asset pricing reveals the surprising result that constrained firms earn lower returns than unconstrained firms, a result not explainable using existing asset-pricing models. Third, financially constrained firms do not have returns that are significantly more cyclical than average. Thus, the source of the common economic shocks to financially constrained firms remains an open question.

Consider the following explanation of the size effect in asset pricing, the fact that small firms have high returns and have common return variation. Small firms have more precarious access to external finance and are more exposed to variations in credit conditions and to macroeconomic fluctuations generally. Therefore, investors need to be compensated for holding small stocks. This explanation is attractive because it provides an economically meaningful story that is consistent with the following different pieces of evidence: Small firms have high returns, are more cyclical, have higher loadings on monetary policy, and tend to be more financial constrained than other firms. Unfortunately, the results in this article suggest that this explanation is wrong. Unlike small firms, financially constrained firms do not earn high returns and are not particularly exposed to macroeconomic risk or credit conditions.

Appendix

Our data-selection and portfolio-formation procedures are based on Fama and French (1993). For a stock to be included in our sample in a given year t, it must meet the following criteria:

1. CRSP classifies the stock as ordinary common equity for a nonfinancial firm in June of year t.
2. It has a CRSP stock price for December of year $t-1$ and June of year t.
3. It has at least two years of COMPUSTAT data prior to year t.
4. COMPUSTAT has valid information (i.e., neither the missing value or aggregated value flag) on the following annual data items in year $t-1$: 1 (cash and short-term investments), 6 (liabilities and stockholders' equity—total), 9 (long-term debt—total), 14 (depreciation and amortization), 18 (income before extraordinary items), 19 (dividends—preferred), 21 (dividends—common), 34 (debt in current liabilities), 60 (common equity—total), 172 (net income), and 216 (stockholders' equity—total). As we compute sales growth, we require data item 12 (sales) to be valid in year $t-1$ and year $t-2$. As we often use year $t-2$'s capital to deflate particular accounting variables, we require data item 8 (property, plant, and equipment) to be valid and nonzero in year $t-2$. Finally, we require data item 6

Table 9
Ordered logit from Kaplan and Zingales

Cash Flow/K	−1.002
	(0.234)
Q	0.283
	(0.078)
Debt/Total capital	3.139
	(0.449)
Dividends/K	−39.368
	(6.097)
Cash/K	−1.315
	(0.289)
Log likelihood	−699.2
Pseudo-R^2	0.134

This table reports the results of a restricted version of the central regression of Kaplan and Zingales (1997) run by Steven N. Kaplan. The regression is restricted to only those independent variables that are available on COMPUSTAT. We define these variables in the Appendix. The number of observations is 719. Standard errors are in parentheses.

(liabilities and stockholders' equity—total) and the sum of data items 9 (long-term debt), 34 (debt in current liabilities), and 216 (stockholders' equity—total) to be nonzero as the resulting values are in the denominator of ratios used in the construction of the Kaplan-Zingales index (see below).

For each year t in which a stock is selected, we obtain from CRSP the SIC code for industry categorization, market capitalization for December of year $t-1$ and June of year t, and monthly returns for the 12 months from July of t through June of $t+1$.

We obtain firm-level accounting variables from the annual expanded COMPUSTAT file maintained at the CRSP at the University of Chicago Graduate School of Business. This file is a merging of several COMPUSTAT current and historical files. Our return series begin in July 1968, based on accounting data from December 1967.

Table 9 shows the regression on which the KZ index is based. In addition to the five variables we use, Kaplan and Zingales (1997) also use three variables that they collected by hand and that are not available on COMPUSTAT. The authors kindly re-estimated their ordered logit without these variables, and without year dummies; Table A shows these results.

Based on Table 9, the KZ index is: -1.001909^* [(Item 18 + Item 14)/ 8] $+.2826389^*$ [(Item 6 + CRSP December Market Equity − Item 60 −Item 74)/ Item 6] $+3.139193^*$ [(Item 9+Item 34) / (Item 9+Item 34 + Item 216)] -39.3678^* [(Item 21 + Item 19)/Item 8] -1.314759^* [Item 1/Item 8]. Item numbers refer to COMPUSTAT annual data items described above. Data item 8 is lagged.

In constructing FCIND, we use CRSP's four-digit SIC codes to match by industry using the 48 industry groups defined by Fama and French (1997). For each firm in the HIGHKZ portfolio, we find a firm from the less constrained group (LS, LM, LB, MS, MM, and MB) that is in the same industry classification. If no such firm exists, which occurs infrequently, we chose the firm with the lowest KZ index in the sample of remaining potential matches.

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