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ABSTRACT

The average year-end size premium is significant only when the beginning-of-year aggregate (median) book-to-market is high (top 10% to 20% in historical terms). This helps to explain why empirical research based on different time periods finds conflicting results regarding the existence of the size premium. This transitional dynamics also suggests that market frictions may explain the size premium. The effect is pervasive and it is present in different periods in the United States, and in the United Kingdom; considering the Fama/French SMB factor or the individual size portfolios; and controlling for market risk.

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The standard Fama and French methodology applied in cross-section (see, e.g., Fama and French, 1992) is to sort the stocks into portfolios based on a characteristic and analyze the differences in the mean returns on these portfolios. This 2-step methodology accomplishes a very useful data reduction relying on the covariance in returns within those groups of stocks. In this paper, I apply a similar methodology to panel data with the addition of a third step: Sorting the years into groups (according to their beginning-of-year aggregate book-to-market).[1] I then look into how the cross-sectional differences in the year-end mean returns change in each group of years.

This analysis reveals that the average year-end size premium tends to be significant only when the beginning-of-year aggregate BM (book-to-market) is high. High BM years are the ones with aggregate/median BM in the top quantile in historical terms. I divide the sample into 2, 3, 5, 7, and 10 BM quantiles. In each of these cases, the years in the individual quantiles tend to have insignificant size premiums. The exceptions are the years in the top BM quantile because they tend to have significant size premiums. Larger groups including all the years except the years in the top BM quantile also have insignificant size premiums. In addition, the significance of the size premium tends to increase with the aggregate BM (i.e., with the number of quantiles).

Next, I show that the size premium arises due to the positive CAPM excess returns earned by small stocks in high BM years and the negative excess returns earned by big stocks. These excess returns tend to be insignificant or have the opposite sign in low or medium BM years, when the size premium is non-existent.

For completeness, I define the size premium both as the SMB factor of Fama and French (1996) or simply as the difference in returns on 10 portfolios formed on size. I use US data from 1927 to 2012 and individual sub-samples 1927-1963[2], 1950-2000, and 1963-2012 to confirm that the results are pervasive over time. The same exercise with UK data from 1980 to 2011 shows that the effect is pervasive across markets as well.

I also control the results for market risk given that the size premium is not market neutral in general. This shows that the market premium does not explain the existence of the size premium in high BM years. However, controlling for market risk reduces even further the evidence of a size premium in the low and medium BM years.

[1] I explain the process in details in Section I.B: I sort the years into a number of groups/quantiles based on how their beginning-of-year aggregate/median book-to-market (BM) compares with the historical de-trended BM average for that year. The qualitative results are the same without de-trending the median BM series and are available upon request.

[2] This is a period when the CAPM is supposed to perform well, as mentioned in Campbell and Vuolteenaho (2004), for instance.

The relative lack of empirical support for the size premium in the literature contrasts with the abundant evidence about the existence and pervasiveness of the other factors commonly used in empirical asset pricing. For instance, Fama and French (2012) and Asness, Moskowitz, and Pedersen (2013) report the pervasiveness of the value (Fama and French, 1996) and momentum (Jegadeesh and Titman, 1993) effects. However, both studies find very little evidence of a size premium. The provocative "Is size dead?" (van Dijk, 2011) provides a comprehensive literature review on the subject.

Among other consequences, the lack of evidence regarding the size premium challenges the use of the three-factor model of Fama and French (1996) for routine risk adjustment in empirical work. It also raises doubts about the stylized facts that theoretical work should be able to explain.

Part of the research agenda laid out for instance in Cochrane (2011) relates to looking into how general are the factors driving asset prices. Much work has been done since then to understand the pervasiveness, the common factors, and the connections between time series and cross-section effects. Progress in this direction is given, for instance, by Asness et al. (2013), Fama and French (2012), Israel and Moskowitz (2013), and Lucca and Moench (2014).

My contribution to this empirical discussion is three-fold: Firstly, I show that there is a very precise relationship between the time series variation in the discount rates (considering the aggregate BM as a proxy for discount rates) and the cross-section effect known as the size premium. Secondly, I show that this phenomenon is pervasive both across markets and over time. Finally, I show that a common factor interpretation exists, assuming that the same factor that raises discount rates to extreme levels also generates the size premium.

Even though a common risk factor interpretation is possible, I offer an explanation for the size premium based on market frictions, relating to the ideas in Duffie (2010) for instance. I do not use specific market frictions data in this paper and therefore I do not formally test the market frictions hypothesis empirically. However, the transitional dynamics of the size premium that I reveal is consistent with the dynamics of a premium generated by market frictions. This dynamics, for instance, contrasts with what we would expect from an unconditional risk factor systematically priced in equilibrium. The fact that small stocks are particularly vulnerable to the several types of market frictions is also in line with the market frictions explanation.

A. Background

Several explanations for a systematic size premium have appeared since its discovery in Banz (1981) and later institutionalization in Fama and French (1992). One possibility is that the (estimated) effect arises systematically from poor empirical methodology. For instance, the size premium may arise from an omitted risk factor, as in Berk (1995), or from poor market portfolio proxies, as in Ferguson and Shockley (2003). Another part of the literature focuses on the investigation of the size effect as a measure of distress risk, as in Vassalou and Xing (2004) or Kapadia (2011), but challenged in Da and Gao (2010) or Campbell, Hilscher, and Szilagyi (2008). Finally, there are also the less specific risk factor explanations of Fama and French (1993, 1995, 1996), or Petkova (2006), who casts the investment problem within the ICAPM framework of Merton (1973).

Other models emphasizing frictions and the behavior of intermediaries have arisen in recent years to explain some stylized facts in asset returns. Examples of these models are Brunnermeier and Pedersen (2009), Duffie and Strulovici (2012), Garleanu and Pedersen (2011), Gabaix, Krishnamurthy, and Vigneron (2007), Hameed, Kang, and Viswanathan (2010), and others. The problem is that market frictions usually cannot explain persistent, long lived effects: Arbitrageurs should exploit and eliminate any systematic arbitrage opportunity in equilibrium. So, the frictions should be more relevant in the short run, or after unusual events (Cochrane, 2011). This implies that market frictions could not generate the unconditional size premium reported in Banz (1981), but they can generate the transitional size premium that I document in this paper.

Indeed, there are several characteristics of small stocks that make them vulnerable to market frictions. For instance, small stocks tend to be held by individual investors (Lee, Shleifer, and Thaler, 1991). The marginal investor in small stocks, therefore, is more likely to be under-diversified. The presence of specialized (as opposed to diversified) marginal investors is exactly the central condition to validate the results in models based on limits of arbitrage as in Gabaix et al. (2007) for example. Merton (1987) in fact shows that segmentation may arise endogenously given the low expected dollar returns from the investment in small stocks.

The low analyst coverage, as in Hong, Lim, and Stein (2000), adds to the low institutional participation implying that the small stocks segment of the market is more "obscure" in general. So, limited expertise, investor recognition, and attention costs, as in Hou and Moskowitz (2005), Hirshleifer, Lim, and Teoh (2009), or Van Nieuwerburgh and Veldkamp (2010), are all more likely in this segment of the market.

In addition, small stocks are not usually marginable and become particularly less attractive to risk tolerant investors when margin constraints are binding. Investors may require a margin premium to hold these assets in this case, as in Garleanu and Pedersen (2011) or Frazzini and Pedersen (2014).

The remainder of the paper is organized as follows: Section I presents the data and the variables that I use in the analysis together with an explanation for why I consider the median BM as a proxy for discount rates. Section II presents the empirical evidence about the size premium based on the Fama/French SMB factor and a brief discussion about the differences between the US and UK markets. Section III presents the empirical evidence about the size premium at a less aggregate level, based on the individual size portfolios. I control for market risk and present these results in both Sections II and III. I summarize the paper in Section IV.

I. Data and variables

I use Kenneth French's data library[3] on US stocks and Alan Gregory's data library[4] on UK stocks described in Fama and French (1993) and Gregory, Tharyan, and Christidis (2013), respectively. The annual datasets are US 1927-2012 and UK 1980-2011. The US returns are in USD from January to the end of December in year t and the UK returns are in GBP from October of year t to September $t+1$. I collect the series of monthly or annual values (when available) for each of the 10 size portfolios, the book-to-market breakpoints, the market premium, the risk free rate, and the Fama/French factor SMB.

I aggregate monthly returns to obtain the matched annual returns when needed. This happens, for instance, in part of the Fama/French dataset. They report the July to June returns on the size portfolios instead of the calendar years that I use elsewhere. I also drop the last year of data (2012) from the UK dataset because it does not correspond to a full year value. I use annual data in the empirical analysis to avoid the short-term reversal in returns that generates the results in Vassalou and Xing (2004), for instance, as explained in Da and Gao (2010).

The Fama/French factors for the United States and the United Kingdom are constructed using the six value-weight portfolios formed on size and book-to-market. In the United States, the breakpoints use all NYSE stocks that have a CRSP share code of 10 or 11 and have good shares and price data. It excludes closed-end funds and REITs. In

[3]http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

[4]http://business-school.exeter.ac.uk/research/areas/centres/xfi/research/famafrench/files/

the United Kingdom, the breakpoints use only the largest 350 stocks in the dataset.

SMB (Small Minus Big) is the average return on the three small portfolios minus the average return on the three big portfolios. In the United States, the SMB for January to December of year t includes all NYSE, Amex, and NASDAQ stocks for which there are market equity data for December of $t-1$ and June of t, and (positive) book equity data for year $t-1$. In the United Kingdom, SMB for October of year t to September of $t+1$ includes only the Main Market stocks with (positive) book equity and excludes financials, foreign companies, and AIM stocks.

The market premium is the excess return on the market relative to the short term interest rate. In the United States, the market premium is the value-weight return of all CRSP firms incorporated in the United States and listed on the NYSE, Amex, or NASDAQ that have a CRSP share code of 10 or 11 at the beginning of month t, good shares and price data at the beginning of t, and good return data for t, minus the one-month Treasury bill rate (from Ibbotson Associates). In the United Kingdom, the market premium is the total return on the FTSE All Share Index minus the monthly return on three month Treasury Bills.

In the United States, the 10 portfolios formed on size are constructed at the end of each June using the June market equity and NYSE breakpoints. The portfolios for July of year t to June of $t+1$ include all NYSE, Amex, and NASDAQ stocks for which there is market equity data for June of t. In the United Kingdom, the 10 size portfolios for October of year t to September of $t+1$ include only Main Market stocks and exclude financials, foreign companies, AIM stocks, and companies with negative or missing book values. The portfolios are formed at the end of each September using the September market equity and the breakpoints of the largest 350 firms.

A. Important differences in the datasets

The UK sample is more concentrated in micro and small caps, as we see in Figure 1.[5] Another difference is that the longer US sample generates a more accurate estimation of the BM trend over time, as we will see in the next section.

[Place Figure 1 about here]

[5]For instance, Fama and French (2008) define micro caps as the stocks in the lowest two US deciles and small caps as the ones in the lowest two-five US deciles.

B. The book-to-market classification variable

I sort the years into BM quantiles according to their beginning-of-year BM (for instance into high, medium, or low BM). In the United States, the book value is for the fiscal year ending in calendar year $t-1$ and market cap is for the end of December of calendar year $t-1$. In the United Kingdom, we match the March year t book value with the end of September year t market capitalization. These BM values generate the breakpoints normally used to sort stocks into value or growth cross-sectionally.

I analyze the historical trend of the median BM to classify the years (and not the stocks) into quantiles according to their BM. I implicitly assume that the median BM, $M_{BM,t}$, oscillates around an equilibrium. More specifically, I (recursively) estimate the equation:

$$\ln(M_{BM,t}) = C + \alpha \times t + e_t, \tag{1}$$

where $\ln(M_{BM,t})$ is the natural logarithm of the median BM in year t, α is the time trend, C is the average of $\ln(M_{BM,t})$ at time zero, and e_t is an error term. Next, I define BM_t as the standardized forecasting error[6] of equation (1) in year t:

$$BM_t \equiv \frac{\ln(M_{BM,t}) - E_{t-1}[\ln(M_{BM,t})]}{\hat{\sigma}_{t-1}} = \frac{\ln(M_{BM,t}) - (\hat{C}_{t-1} + \hat{\alpha}_{t-1} \times t)}{\hat{\sigma}_{t-1}}, \tag{2}$$

where $\hat{C}_{t-1}$, $\hat{\alpha}_{t-1}$ and $\hat{\sigma}_{t-1}$ are, respectively, the intercept, time trend, and standard error of equation (1) estimated at time $t-1$.

I sort the years into BM quantiles based on BM_t. The time trend in equation (1) reflects the long term technological changes that result in less use of physical capital. Usually, only physical capital is represented in the book value of assets/equity.

Equation (1) is not designed to give the best forecast of $\ln(M_{BM,t})$. The purpose of the equation is to measure the difference between $\ln(M_{BM,t})$ and its de-trended mean, scaled by the uncertainty in this estimation in equation (2).

Table I shows that the estimation obtained from the US sample is more accurate, with higher adjusted R^2 and more significant coefficients. Both the United States and the United Kingdom show negative time trends, but the estimated trend in the United Kingdom is stronger. Figure 2 shows that the high BM years in the early 1980s affect the estimated trend in the United Kingdom. The BM values are also high in the United

[6]However, I use the (full sample) standardized residual instead of the forecasting error for the first 10 years in each sample (1927-1937 in the United States, and 1980-1990 in the United Kingdom).

States around the same time. So, the true value of the trend in the United Kingdom may be closer to the trend observed in the United States.

The qualitative results do not change if I do not de-trend the BM series.[7] However, the high BM years tend to be concentrated at the beginning of the sample in this case. De-trending the series, therefore, allows a richer analysis of the dynamics of the size premium. We should nevertheless be careful to extrapolate these results into the future because the negative time trend cannot continue forever.

[**Place Figure 2 about here**]

[**Place Table I about here**]

B.1. Median book-to-market and discount rates

Cochrane (2011) attempts to settle a long discussion about what causes variation in quantities such as the dividend-price, earnings-price, or book-to-market. He argues that these quantities change in response to changes in discount rates, used as a synonym for risk premiums, or expected returns. This view contrasts with the previous ideas of unpredictable returns and the implication that these variables should forecast cash-flow variations instead (and **not** expected returns).

The central evidence that supports the explanation in Cochrane (2011) is that low prices relative to a value measure, such as dividends, earnings, or book value of equity, predict high future *returns* and not decreasing dividends, earnings, or book value of equity. The same argument, therefore, explains why high BM years are years when discount rates are high.

II. The size premium as the Fama/French SMB factor

The data reduction obtained by the Fama/French factors is useful because it captures the covariances in returns that are supposedly related to excess returns. From a theoretical perspective, this means that we only need to explain why there is a premium associated with a given factor, as stressed in Lewellen, Nagel, and Shanken (2010).

[7]These results are available upon request.

From an empirical perspective, it means that we can analyze the behavior of the Fama/French factors instead of analyzing each asset individually. More specifically, the size related covariance in returns allows us to investigate if this common movement corresponds to a risk premium, restricting attention to the SMB factor only. Another advantage is that the SMB factor is constructed as a double sort on value and size. This construction allows the SMB factor to be relatively free of value effects.

High covariance in returns does not imply the existence of a risk premium. Industry portfolios are examples of large co-movements in returns without a risk premium. In this section I look into what happens to the SMB factor when the median BM values (as a proxy for discount rates) vary.

A. Descriptive statistics

Table II displays summary statistics for the Market (premium), the Fama/French SMB factor described in Section I, and the BM classification variable BM_t from equation (2). I report the mean, standard deviation and the ratio of mean to standard deviation of these variables in each of the sample periods. The first column reports the general results for the sample period and is based on all the years in the sample. The next columns display the corresponding values of the variables in a breakdown of these years according to their BM terciles (low, medium, or high BM years).

[Place Table II about here]

The only sample period when the SMB factor is two standard errors above zero is the US 1927-2012 (Table II). The SMB is not significant in any of the US sub-samples nor in the United Kingdom. The breakdown of the sample periods in BM terciles shows that the SMB is never above the two standard error bound in low or medium BM years. The SMB is indeed significantly negative for the United Kingdom in low BM years with negative point estimates in several other samples.

On the contrary, the SMB tends to be the largest, most significant, and positive in high BM years. Not surprisingly, the only sample period in which the high BM years have SMB below the two standard error bound is the US 1927-1963.[8] This is the only full period with significantly low BM, which is more than two standard errors below zero. The low aggregate BM in the US 1927-1963 may also explain why this is a period when

[8]To be precise, the SMB in the United Kingdom is also only 1.98 standard errors from zero in high BM years.

the CAPM performs well according to Campbell and Vuolteenaho (2004). However, even in within this period the point estimate of the SMB in high BM years is an order of magnitude larger than in low and medium BM years.

The market premium is also larger than average in high BM years. The largest point estimates of the market premium (and the SMB) tend to happen in high BM years. But differently from the SMB, the market premiums in high BM years are not usually the most significant. The exception is the UK sample in which high BM years (marginally) have the most significant market premium.

Finally, apart form the United Kingdom, there is no clear difference between low and medium BM years in terms of the variables displayed. Even BM_t tends to be negative not only in low, but also in medium BM years. This suggests that the years in the top BM quantile tend to be outliers in terms of their median BM.

Table II suggests that the size premium only exists when discount rates are high, when the median BM is considered as a proxy for discount rates. In the next subsection, I confirm that this result is not driven by the number of BM quantiles considered. I also investigate what happens to the size effect in all the remaining years, excluding only the top BM quantile (for different numbers of BM quantiles).

Finally, I analyze the relationship that we see in Table II between the SMB factor and the market premium. I find no evidence that the market risk explains the large SMB values in high BM years. However, there is evidence that the market risk does explain the otherwise significant SMB factor in the US 1927-2012 (full) sample. I briefly show how the SMB factor is exposed to market risk in Section II.C.

B. The SMB factor in different BM quantiles

Table III and Table IV describe the SMB factor as we sort the years in each sample according to their BM, grouping the years into different numbers of quantiles. I sort the years of each sample into 1 (i.e., all years), 2, 3, 5, 7, or 10 BM quantiles. Table III displays the mean of the SMB factor in each sample. Table IV displays the t-Mean (the ratio of the SMB mean to its standard error). The tables describe each individual quantile in the first 10 columns on the left ("Bottom" to "Top"). The rightmost column, "Ex top", displays these estimates in a sample from which the respective top quantile is removed.

We can interpret the "Ex top" results as answering to what happens to the SMB factor in "ordinary" times, when discount rates (median BM) are "not very high". The number of "ordinary" years included in this calculation grows and allows higher discount rates (BM) as we increase the number of quantiles.

[Place Table III about here]

[Place Table IV about here]

The SMB factor is never above the two standard error bound if we exclude the top BM quantile years from the sample. This happens in all the samples and for all numbers of quantiles considered (Table IV, "Ex top" column). Therefore, there is no strong evidence of a size premium in at least 90% of the sample.

However, we start to assign high BM years (years with high discount rates, when we may observe market frictions) to non top BM quantiles if the number of quantiles is large enough. Indeed, the significance of the "ex top" SMB factor starts to increase with the number of quantiles after a certain number of quantiles. This happens in every sample period. For instance, in the US 1927-2012 period (Table IV, "Ex top" column), the size premium is weakly significant (at 10%) in the years with BM values in the lowest 80% (i.e., considering the lowest four of five BM quantiles) but not in the lowest 66% (i.e., considering two of three BM quantiles).

A closer look at the SMB factor in each BM quantile further explains the results above. The average SMB is larger than two standard errors above zero only in the top BM quantile in most sample periods and numbers of quantiles considered. In fact, the SMB is significantly negative more frequently than it is significantly positive in the years that are not in the top BM quantile.

The SMB factor in the top BM quantile tends to become increasingly large (Table III) and significant (Table IV) as the number of quantiles grows until a certain value, and then it starts to decrease. In most samples, the most significant top quantiles tend to have around 10 observations and the data seem to become too noisy in smaller samples.[9] The point estimates of the SMB factor in the top BM quantile tend to increase until the number of quantiles is seven.

[9]For instance, in the UK 1980-2011, US 1963-2012, and US 1927-2012 samples the most significant top quantile is obtained with three, five, and seven BM quantiles respectively. All of them have around 10 observations each. However, the most significant top quantile happens in the US 1927-1963 sample, with 10 BM quantiles that only have around four observations each.

B.1. A note on the UK results

The qualitative results are the same in the United States and in the United Kingdom. In fact, the unconditional risk factor explanation for the size effect finds even less support from the UK data given the low and insignificant estimation of the SMB factor (Table II). Just as in the United States, there is a precise relationship between the time series variation in the discount rates and the size premium in cross-section. This also justifies the common factor interpretation in both markets.

The quantitative results supporting the hypothesis that the market frictions affect especially the small firms and become binding only in high discount rate years (high BM years), however, is less clear in the United Kingdom than in the United States. Next, I offer a few possible explanations for this fact.

The first possible explanation is that the UK sample is short. The short sample results in a less accurate estimation of the historical equilibrium level for the BM, for instance. Without a long term BM reference level, it is more difficult to distinguish years of high or low BM. In addition, the small UK sample also results in less precise estimates of the SMB factor in each quantile.

Another explanation is that most UK firms are relatively small as we see in Figure 1. The size premium becomes smaller and more difficult to detect in this case because an increase in discount rates equally affects the (relatively) big and the small companies in the United Kingdom. Big firms for UK standards may still be too small and vulnerable to market frictions. These frictions only affect small firms in the United States, but affect a larger share of the market in the United Kingdom.

A similar explanation relates to the security transaction tax in the United Kingdom ("stamp duty") implying that the whole UK stock market is less efficient than the US market. Again, the size effect becomes more difficult to detect because there is less size-related variation arising from market frictions in the United Kingdom. The security transaction tax charged in the United Kingdom should reduce the liquidity of all securities (Campbell and Froot, 1993). The result is an increase in the market frictions for all companies independently of their size.

The size-related differences in returns arising from market frictions can thus be more difficult to detect in the United Kingdom. Nevertheless, the empirical behavior of the size premium in the United Kingdom is largely consistent with what we observe in the United States. This is especially true after we consider the differences between the US and the UK market structures and the characteristics of the US and UK samples.

C. A market risk explanation?

It is possible that the variation in the SMB factor reflects changes in the market premium. The SMB factor is created as a long position on three portfolios containing small stocks and an offsetting short position on three portfolios of big stocks. Small stocks tend to have larger CAPM betas than big stocks so the SMB factor should not be "market neutral".

The CAPM beta of a portfolio is the weighted average of the individual betas of its components. So, a positive weight on small stocks (with CAPM beta β_{small}) that is exactly offset by a negative weight on big stocks (with CAPM beta β_{big}) implies that the CAPM beta of the SMB factor (β_{SMB}) is given by:

$$\beta_{SMB} = \beta_{small} - \beta_{big}. \tag{3}$$

The value of β_{SMB} in equation (3) is usually positive considering that small stocks tend to have larger betas than big stocks. The SMB factor, therefore, should covary with the market premium. Table II also suggests an empirical positive relationship between the SMB and the market premium. It is possible, therefore, that the changes in the SMB factor are explained by the changes in the market premium.

I estimate equation (4) below to examine to what extent the market premium explains the variation in the SMB factor:

$$SMB_t = \alpha + \beta_{SMB}(R_{m,t} - R_{f,t}) + e_t, \tag{4}$$

where SMB_t is the SMB factor in time t, $R_{m,t}$ is the market return, $R_{f,t}$ is the risk free rate, and e_t is an error term. Table V displays summary statistics for the regression in equation (4).

[**Place Table V about here**]

The results from the entire sample period in the columns "All years" suggest that the variations in the market premium, $R_{m,t} - R_{f,t}$, are in fact important to explain the changes in the SMB. All the intercepts (α) have low t-statistics, while the market premium coefficients (β_{SMB}) are positive and above the two standard error bound as expected (except in the US 1963-2012 sample). The small point estimates of β_{SMB} are also consistent with the fact that β_{SMB} should be the difference between the underlying betas in equation (3).

So there is no evidence that the SMB factor systematically earns market-adjusted excess returns in any entire sample period. There is no evidence of risk-adjusted excess returns even in the US 1927-2012 sample, in which the SMB factor is significantly positive as we saw in Table II. The lack of risk-adjusted excess returns over entire sample periods does not support the risk factor explanation for the size effect. Indeed, this evidence is more consistent with the hypothesis that the size is an instrumental variable for beta, as in Chan and Chen (1988) for instance.

However, the results change considerably if we sort the years of each sample into BM terciles as we see in the remaining columns of Table V. The intercepts, α, (i.e., the SMB value controlling for market risk exposure) in each BM tercile tend to support the same conclusions that we draw from Table II.

High BM years in each sample are associated with large point estimates for the intercepts that also tend to have large t-statistics. In addition, the point estimates of the intercepts tend to be negative in all low and medium BM years (apart from the medium BM years in the United Kingdom). However, the only intercept two standard errors below zero happens in the low BM years in the United Kingdom. Just as in Table II, the period US 1927-1963 (being a period with significantly low BM values) is the one with the lowest and least significant intercept even for the relatively high BM years within that period.

Overall, there is mixed evidence about the significance of the market coefficients, β_{SMB}, especially in the low and medium BM years. The small point estimates of the coefficients seem consistent with equation (3). The significantly negative sign for the β_{SMB} in high BM years in the United Kingdom is the only unexpected result considering that small stocks usually have higher CAPM betas than big stocks.

In summary, the results in Table V indicate that the market risk cannot explain the large and significant values of the SMB factor in high BM years. This reinforces the evidence from Table II. The conclusions regarding the low and medium BM years are also similar after we control for market risk. Furthermore, considering all the years in each sample, Table V shows that every intercept (risk adjusted excess return) is small with low t-statistics. The evidence of risk-adjusted excess returns earned by small stocks compared to big stocks is weaker in this case and is not present even in the US 1927-2012 sample, which is otherwise significant before controlling for market risk (Table II).

III. Inside the SMB factor: The size portfolios

I consider the individual size portfolios looking for evidence of a size-related risk premium at a less aggregate level in this section. I follow the same procedure as before, analyzing the data in different BM quantiles and in each full sample period. One of the drawbacks of analyzing portfolios sorted on market cap alone (instead of the double sorting procedure to obtain the SMB factor in the previous section) is that part of the results may be driven by value effects. The advantage is to look into what happens with these portfolios in more detail.

I start the section by analyzing the (risk free) excess returns on each size portfolio and how they vary across BM quantiles in each sample period. Next, I extend the analysis focusing on the CAPM excess returns. So, I compare the variation in returns between small and big stocks controlling for market risk. Again, I analyze the results in different BM quantiles. Finally, I investigate what happens when discount rates are even higher, raising the breakpoint of the top BM quantile. This analysis is similar to the one in Section II.B.

In this section I confirm and detail the results from the previous sections. I show that the size premium arises in high BM years because small stocks tend to earn positive CAPM excess returns while big stocks tend to earn negative CAPM excess returns. During medium and low BM years, on the other hand, the evidence regarding excess returns (either negative or positive) is not strong.

A. *Descriptive statistics*

Table VI and Table VII show the mean risk free excess returns, standard deviations, and the ratio of the mean to its standard deviation ($t - Mean$) for 10 portfolios formed on size in the US 1927-2012 (and sub-samples), and in the UK 1980-2011. The columns "All years" display the results for each entire sample period. The columns "low BM", "medium", and "high" show the statistics for the years in each of the respective BM terciles.

[Place Table VI about here]

[Place Table VII about here]

The average excess returns on the size portfolios show a clear tendency to grow from big to small stocks suggesting a size premium in high BM years in every sample (Table

VI and Table VII). Considering all the years in each sample we observe a similar pattern between big and small companies. However, in the entire sample periods, the returns tend to be smaller and the difference in returns between small and big stocks also tends to be smaller. On the other hand, in low and medium BM years the point estimations of the intercepts are more similar and don't suggest the existence of a size premium. The only exception is the UK sample, which shows an increase in returns from big to small companies in medium BM years as well. These results are consistent with the ones in Table II and the fact that the SMB factor is only significant in high BM years (being also large, albeit not significant, in the United Kingdom in medium BM years).

The larger standard deviations show that small stocks tend to be riskier than big stocks regardless of the BM tercile considered. In column $t - Mean$ we see that the risk-return relationship tends to be more favorable to small stocks than to big stocks during high BM years. This suggests that the size effect is robust to market risk in high BM years. In contrast, the risk-return relationship considering all the years in the sample seems similar among big and small stocks. Therefore, market risk may explain the variation in returns among small and big stocks in the full samples (all years), consistent with Table V.

In the next section I disentangle market risk from the return on each size portfolio considering the CAPM intercepts of each size portfolio. The analysis explains how much of the variation comes from the overall market premium, and how much is related to size.

B. *Controlling for market risk: The CAPM intercepts*

I analyze the CAPM excess returns for stocks of all sizes during years with different BM levels (e.g., high, medium, or low BM years). Next, I compare the results of each BM quantile with the overall results from each full sample. In order to do that, I estimate the usual CAPM equation (5) with an intercept for the 10 size portfolios:

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_i(R_{m,t} - R_{f,t}) + e_{i,t}, \tag{5}$$

where $R_{i,t}$ is the return on each size-sorted portfolio i in time t, $R_{f,t}$ is the risk free rate, $R_{m,t}$ is the market return, and $e_{i,t}$ is an error term.

After obtaining these intercepts, I test if the average intercepts of the small and big stocks are the same (against the alternative hypothesis that they are different). So, I formally test:

$$H_0 : \sum_{i=1}^{5} \frac{\alpha_i}{5} - \sum_{i=6}^{10} \frac{\alpha_i}{5} = 0, \tag{6}$$

where α_i is the intercept (excess returns) of the portfolio created with stocks in the i^{th} size decile. So, I test if the average excess returns on the smallest stocks (in the lowest five size deciles) and the biggest stocks (in the highest five size deciles) are the same.

As a robust check, I test the Russell 2000 upper limit as the breakpoint for small and big stocks. Stocks below (and including) the 6^{th} decile in the United States, and around the 8^{th} decile in the United Kingdom are small according to this criterion (see Figure 1). In the United States and in the United Kingdom the test, similar to the one in (6), is:

$$H_0 : \sum_{i=1}^{s} \frac{\alpha_i}{s} - \sum_{i=(s+1)}^{10} \frac{\alpha_i}{10-s} = 0, \tag{7}$$

where s is the upper decile containing small stocks. So, $s = 6$ for the United States and $s = 8$ for the United Kingdom.

Table VIII and Table IX display the time series estimation of the excess returns (i.e., the CAPM intercepts), α, and their t-statistics, $t(\alpha)$, from equation (5). The tables also report the differences in the average intercepts between small and big stocks: $S5 - B5$ is the difference between the average intercepts of the smallest and the largest five size portfolios and correspond to the left-hand side of the equation in (6). $S7 - B3$ for the United States and $S8 - B2$ (for the United Kingdom) are the difference between the average intercepts of the seven smallest (eight in the United Kingdom) and the three largest size portfolios (two in the United Kingdom). These values correspond to the left-hand side of the equation in test (7). Finally, the tables also report the χ^2 statistics of the equality tests between the average excess returns on small and big stocks given by H_0 in (6) and (7).

[Place Table VIII about here]

[Place Table IX about here]

The point estimates of the intercepts tend to increase from big to small stocks, indicating that there is a size premium in high BM years even after controlling for market risk (Table VIII and Table IX). In fact, the χ^2 values of the tests in (6) and (7) are always large in high BM years. The evidence supporting the existence of a size premium in high BM years contrasts with the lack of such evidence in low and medium BM years.

In low and medium BM years the point estimates of the intercepts either decrease from big to small stocks or they show no clear trend. In fact, the only large χ^2 values for the tests in (6) and (7) in low or medium BM years are associated with negative size premiums (usually in medium BM years). In addition, almost every intercept has low t-statistics in low or medium BM years.[10]

The CAPM excess returns of the size portfolios estimated in the full samples (i.e., with all the years) are all below the two standard errors bound just as in the low and medium BM years. The χ^2 values corresponding to the differences in excess returns between small and big stocks are also small in every sample, regardless of the breakpoint used to distinguish small and big stocks (tests (6) or (7)).

The results in Table VIII and Table IX show that the CAPM seems to price the size portfolios reasonably well in medium and low BM years. The performance of the CAPM is only compromised in high BM years, when the discount rates are high. In fact, there isn't strong evidence of a risk-adjusted size premium in any of the full sample periods considered. Therefore, the empirical support for an unconditional risk premium related to size is very limited. On the other hand, the transitory dynamics of these excess returns (in "unusual" periods) and the fact that the premium is concentrated mostly in small stocks are consistent with a market frictions hypothesis, as explained earlier.

C. The CAPM intercepts when the BM increases further

This section is similar to Section II.B and investigates the excess returns earned on small and big stocks in years with increasingly higher BM. However, in this section the difference in returns between small and big stocks already control for market risk.

I split each sample period into 1 (i.e, all years in the sample) 2, 3, 5, 7, or 10 BM quantiles and estimate the coefficients in (5) considering only the years in the respective top BM quantile. Intuitively, I start with the full sample and then I analyze only the years when the median BM is among the top 1/2, 1/3, ..., 1/10 in that period. I report each of these results in Table X and Table XI.

Table X and Table XI display the time series estimation of the excess returns (i.e., the CAPM intercepts), α, and their t-statistics, $t(\alpha)$, from equation (5) in each of the

[10]In fact, only the $9th$ decile in the US 1950-2000 (in medium BM years) and the $4th$ decile in the United Kingdom (in low BM years) samples have estimated intercepts two standard errors away from zero in low or medium BM years.

top BM quantiles. In addition, the tables report the differences on the average intercepts between small and big stocks: $S5 - B5$ is the difference between the average intercepts of the smallest and the largest five size portfolios and corresponds to the left-hand side of the test in (6); $S7-B3$ and $S8-B2$ (for the United Kingdom) are the differences between the average intercepts of the seven smallest (or eight in the United Kingdom) and the three largest size portfolios (or two in the United Kingdom). The values correspond to the left-hand side of the test in (7). Finally, the tables also report the χ^2 statistics for the equality test of the average excess returns on small and big stocks given by H_0 in (6) and (7).

[**Place Table X about here**]

[**Place Table XI about here**]

The difference between the risk-adjusted returns earned on small and big stocks tends to grow and become more significant as we restrict the sample to contain increasingly higher BM years (Table X and Table XI). However, the significance and the point estimate of the size premium controlling for market risk decrease in some samples after a certain number of quantiles. This is particularly true in the United Kingdom. The effect is similar to what happens with the SMB factor (Table III and Table IV). However, the decreases in significance and magnitude of the size premium are more pronounced for the SMB factor than for the excess returns on the individual size portfolios.

There is no evidence of a risk-adjusted size premium if we consider any of the full sample periods as explained in the previous section. During the years in the top of two BM quantiles, the individual intercepts and the size premiums still have low t-statistics, but the point estimate of the size premium becomes positive in every sample. As we restrict the sample to even higher BM years (considering the top BM quantile from a larger number of quantiles), the trend in the point estimates tends to become clearer. In addition, the significance of the tests (6) and (7) also tends to increase with the significance of the individual intercepts.

IV. Summary

This paper documents a new stylized fact in asset returns: There is a pervasive positive year-end size premium as reported in Banz (1981), but only when the beginning-of-year aggregate BM is high. I provide this evidence in different time periods and stock markets as well as for different specifications of the size premium and definitions of a high BM value. The size effect is also around three times stronger than previously estimated: approximately 10% per year. In addition, the transitional nature of the size premium suggests that it can be explained by market frictions.

The paper advances an empirical research agenda investigating the pervasiveness of the factors driving asset prices and the relationship between time series and cross-section effects. I link the time series variation in the aggregate BM (discount rates) with the existence of the size premium in cross-section.

Apart from offering a new empirical puzzle for theoretical discussion, this finding has several important consequences for empirical work as well. It implies, for instance, that the three-factor model of Fama and French (1996) may not be the best choice for routine risk adjustment in empirical work: Using a conditional SMB factor can be more accurate. It also helps to explain the apparent lack of empirical evidence about the size premium in different samples: There is no evidence of a size premium in at least 66% of the time (or more than 90% of the time at the 5% level). In addition, it highlights the importance of the aggregate BM as a conditioning variable in the description of asset returns.

Finally, the investment products created on the assumption of an unconditional size premium could be re-designed: Passive small cap mutual funds, for instance, might want to adopt an active market timing strategy instead of the previously optimal "buy-and-hold" strategy.

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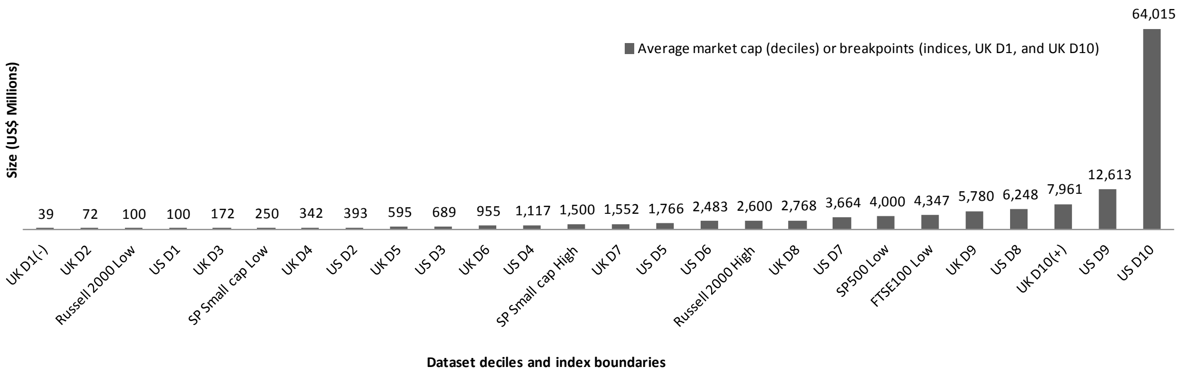

Figure 1. Size (market cap) for the UK, US, and market indices. The picture displays the average market cap in each UK and US decile and how they compare to each other and to the ranges of the Russell 2000, S&P Small cap, FTSE 100, and S&P 500 indices. The UK deciles are UK D1, UK D2,..., UK D10, and the US deciles are US D1, US D2,..., US D10. All deciles are average market caps, except the first and the last UK deciles, which are breakpoints. UK D1(-) is the upper bound for the market cap in the first decile. UK D10(+) is the lower bound for the 10^{th} decile.

Table I Summary statistics for equation (1), $\ln(M_{BM,t}) = C + \alpha.t + e_t$, in the US 1927-2012 and UK 1980-2011. The table displays the estimated values and t-statistics for the intercepts, C; the time trends, α; the number of observations in each sample; and the adjusted R^2.

Summary statistics for the regressions of $\ln(M_{BM,t})$ on a constant and time trend - UK and US					
UK	Coefficient (x100)	t-statistics	US	Coefficient (x100)	t-statistics
Intercept (C)	-23.6	-1.94	Intercept (C)	29.4	4.42
Trend (α)	-1.5	-2.33	Trend (α)	-1.0	-7.45
Observations	32		Observations	86	
R^2	0.12		R^2	0.39	

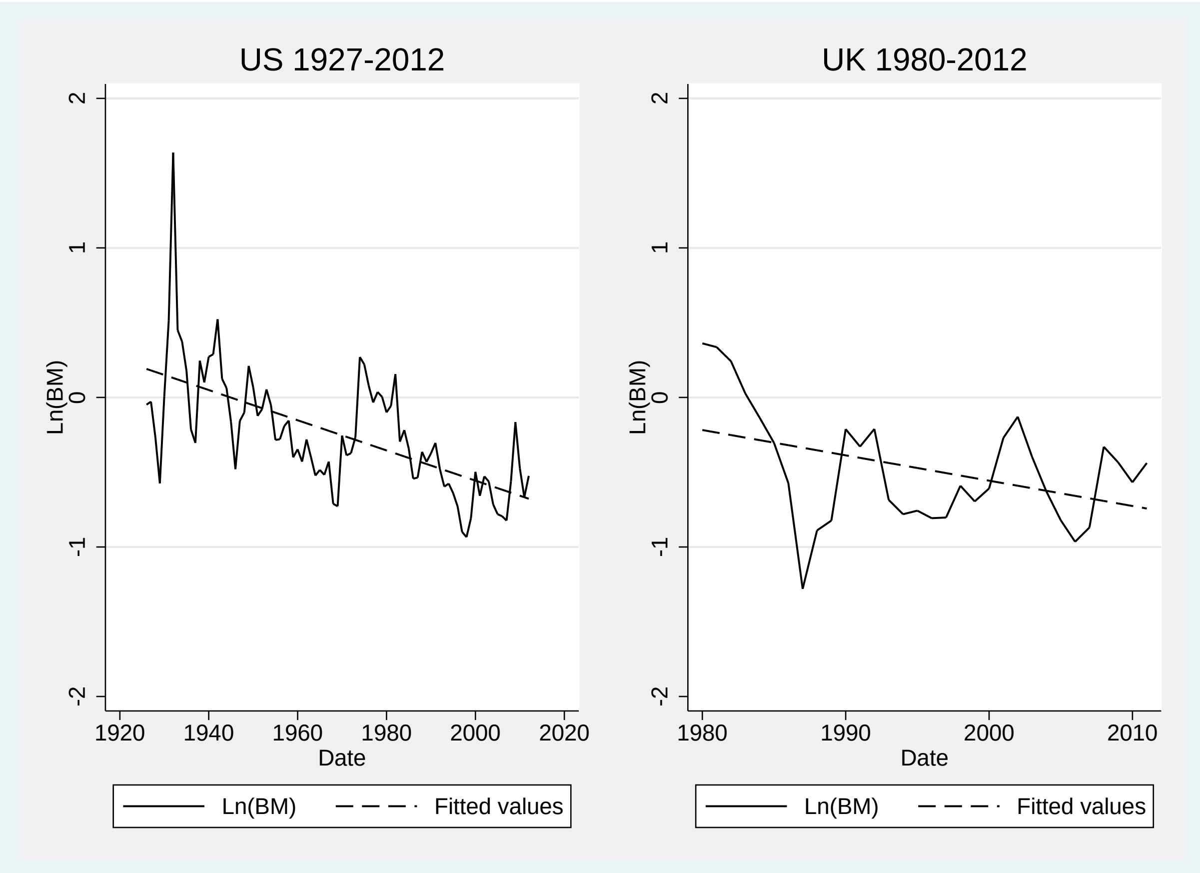

Figure 2. Book-to-market time series in the US and the UK. Both panels plot the time series of $\ln(M_{BM,t})$ and the fitted values from equation (1): $\ln(M_{BM,t}) = C + \alpha.t + e_t$. The left panel displays the results from the US 1927-2012 sample and the right panel from the UK 1980-2011 sample.

Table II Summary statistics for selected variables in the entire sample period and in different BM quantiles.
The table describes the US 1927-2012 sample; three sub-samples US 1927-1963, US 1950-2000, and US 1963-2012; and the UK 1980-2011 sample. The panel splits horizontally into four parts: All Years, Low BM years, Medium BM years, and High BM years. "All years" contains the results for the entire sample period. Low, Medium, and High BM years correspond to the three BM_t terciles: In a given sample, the years in which BM_t is in the lowest tercile across all the years are "Low"; the ones in the highest tercile are "High"; and the remaining ones are "Medium". BM represents BM_t, the (recursive) standardized forecasting error of $\ln(M_{BM,t})$ in equation (2). It represents how distant from the historical (de-trended) average the BM is in year t. The Market (premium) is the value-weighted return on the market minus the risk free rate. The Fama/French SMB (Small Minus Big) is the average return on the three small Fama/French portfolios minus the average return on the three big Fama/French portfolios. All US returns are in US dollars and all UK returns are in GB pounds. I report the mean, standard deviation (std dev) and the $t-Mean$, which is the ratio of mean to its standard error of each variable.

				Classifying the years in terciles according to their median book-to-market								
	All years			Low BM years			Medium BM years			High BM years		
	Market	SMB	BM	Market	SMB	BM	Market	SMB	BM	Market	SMB	BM
USA: 1927-2012												
Mean	8.04	3.58	-0.08	6.47	0.93	-0.97	4.71	-0.10	-0.14	13.12	10.14	0.89
Std dev	2.23	1.53	0.10	3.66	2.53	0.10	3.32	2.39	0.03	4.51	2.67	0.13
t-Mean	3.61	2.34	-0.84	1.77	0.37	-9.27	1.42	-0.04	-4.48	2.91	3.79	6.64
USA: 1927-1963												
Mean	10.83	3.32	-0.40	6.16	0.40	-1.35	11.17	0.96	-0.31	15.55	8.84	0.53
Std dev	3.93	2.36	0.16	7.54	4.30	0.18	3.85	2.28	0.05	8.37	5.03	0.20
t-Mean	2.75	1.40	-2.56	0.82	0.09	-7.70	2.90	0.42	-6.07	1.86	1.76	2.69
USA: 1950-2000												
Mean	8.89	1.97	0.10	8.02	0.46	-0.63	7.00	-1.82	-0.06	11.65	7.26	0.98
Std dev	2.48	1.88	0.11	3.34	2.96	0.05	3.75	3.63	0.04	5.64	2.92	0.18
t-Mean	3.58	1.04	0.86	2.41	0.16	-11.51	1.87	-0.50	-1.47	2.07	2.48	5.47
USA: 1963-2012												
Mean	6.17	3.58	0.15	7.62	-0.38	-0.60	3.17	3.88	0.03	7.82	7.48	1.09
Std dev	2.50	1.99	0.12	3.36	3.08	0.06	4.67	4.03	0.05	5.04	3.01	0.18
t-Mean	2.47	1.80	1.30	2.27	-0.12	-10.43	0.68	0.96	0.54	1.55	2.49	6.00
UK: 1981-2012												
Mean	6.71	0.87	0.01	-0.84	-6.69	-0.99	10.94	5.01	0.04	10.37	4.63	1.07
Std dev	3.36	1.81	0.17	5.78	2.47	0.17	6.19	3.22	0.10	5.12	2.34	0.17
t-Mean	2.00	0.48	0.05	-0.15	-2.71	-5.98	1.77	1.55	0.38	2.03	1.98	6.39

Table III The mean of the SMB factor in the US 1927-2012; three sub-samples 1927-1963, 1950-2000, and 1963-2012; and in the UK 1980-2011. Table IV complements this table and reports the $t - Mean$ of the SMB factor, the ratio of the mean of SMB to its standard error. I split each sample into (1), 2, 3, 5, 7, or 10 quantiles based on their BM_t value and report the results for all quantiles. BM_t is the (recursive) standardized forecasting error of $\ln(M_{BM,t})$ in equation (2). It represents how distant from the historical (de-trended) average the BM is in year t. Each row corresponds to a given number of quantiles used to split the data. The number of quantiles is reported in the first column: All years (i.e., the whole sample), 2, 3, 5, 7, or 10. The next 10 columns contain the results for each respective quantile, from 1 to 10, depending on the number of quantiles considered. The last column, "Ex top", displays the results considering all years except the ones in the highest book-to-market quantile. The Fama/French SMB (Small Minus Big) is the average return on the three small Fama/French portfolios minus the average return on the three big Fama/French portfolios. All US returns are in US dollars and all UK returns are in GB pounds.

Average SMB in each BM quantile - Various quantiles

	Bottom	2	3	4	5	6	7	8	9	Top	Ex top
US 1927-2012											
All years	3.58										
2 Quant.	0.77	6.52									0.77
3	0.93	-0.10	10.14								0.41
5	-0.32	2.30	-2.09	9.90	8.32						2.41
7	-4.18	3.71	1.96	-1.15	7.40	7.21	10.73				2.42
10	-2.49	1.86	-0.06	4.40	0.06	-4.51	10.11	9.67	6.40	10.49	2.87
US 1927-1963											
All years	3.32										
2 Quant.	1.36	5.39									1.36
3	0.40	0.96	8.84								0.67
5	0.39	0.98	1.28	2.67	12.18						1.25
7	1.72	1.03	0.00	0.45	-2.50	6.65	16.79				1.21
10	3.78	-3.00	1.19	0.71	3.96	-0.86	-5.79	6.90	17.53	5.05	3.17
US 1950-2000											
All years	1.97										
2 Quant.	-1.82	5.90									-1.82
3	0.46	-1.82	7.26								-0.68
5	-1.02	0.33	-0.94	3.21	8.68						0.33
7	-3.70	5.47	-4.11	-6.20	4.69	6.18	13.42				0.15
10	-4.02	3.19	5.26	-3.61	-7.62	5.73	-1.28	7.70	4.28	13.08	0.76
US 1963-2012											
All years	3.58										
2 Quant.	-0.49	7.65									-0.49
3	-0.38	3.88	7.48								1.75
5	-3.14	2.54	1.79	4.84	11.89						1.51
7	-2.92	5.52	-0.65	2.24	5.73	2.64	13.86				1.91
10	-3.28	-2.94	9.34	-4.26	-1.23	4.81	7.12	2.55	11.85	11.93	2.66
UK 1981-2012											
All years	0.87										
2 Quant.	-1.70	3.43									-1.70
3	-6.69	5.01	4.63								-0.84
5	-6.93	0.88	4.31	3.04	3.76						0.20
7	-8.00	-7.72	9.56	1.98	4.33	3.85	5.41				0.22
10	-8.73	-4.53	-10.02	11.78	5.36	3.53	-0.02	6.11	5.08	2.45	0.70

Table IV The $t - Mean$ of the SMB factor, the ratio of the mean of SMB to its standard error in the US 1927-2012; three sub-samples 1927-1963, 1950-2000, and 1963-2012; and in the UK 1980-2011 sample. Table III complements this table and reports the mean of the SMB factor. I split each sample into (1), 2, 3, 5, 7, or 10 quantiles based on their BM_t value and report the results for all quantiles. BM_t is the (recursive) standardized forecasting error of $\ln(M_{BM,t})$ in equation (2). It represents how distant from the historical (de-trended) average the BM is in year t. Each row corresponds to a given number of quantiles used to split the data. The number of quantiles is reported in the first column: All years (i.e., the whole sample), 2, 3, 5, 7, or 10. The next 10 columns contain the results for each respective quantile, from 1 to 10, depending on the number of quantiles considered. The last column, "Ex top", displays the results considering all years except the ones in the highest book-to-market quantile. The Fama/French SMB (Small Minus Big) is the average return on the three small Fama/French portfolios minus the average return on the three big Fama/French portfolios. All US returns are in US dollars and all UK returns are in GB pounds.

t-Mean of SMB in each BM quantile - Various quantiles											
	Bottom	2	3	4	5	6	7	8	9	Top	Ex top
US 1927-2012											
All years	2.34										
2 Quant.	0.42	2.72									0.42
3	0.37	-0.04	3.79								0.24
5	-0.08	1.07	-0.96	2.03	3.23						1.36
7	-0.98	1.20	0.68	-0.39	1.34	1.33	5.20				1.42
10	-0.41	0.40	-0.02	1.34	0.02	-1.64	1.41	1.38	1.47	4.08	1.74
US 1927-1963											
All years	1.40										
2 Quant.	0.44	1.48									0.44
3	0.09	0.42	1.76								0.28
5	0.06	0.22	0.43	0.46	1.68						0.55
7	0.21	0.17	0.00	0.13	-0.65	1.07	1.77				0.56
10	0.31	-0.66	0.15	0.30	0.80	-0.23	-5.62	0.84	1.38	11.96	1.23
US 1950-2000											
All years	1.04										
2 Quant.	-0.86	1.98									-0.86
3	0.16	-0.50	2.48								-0.29
5	-0.27	0.10	-0.16	1.01	2.05						0.16
7	-0.73	1.44	-1.47	-4.33	0.58	1.20	4.22				0.07
10	-0.69	0.96	0.87	-1.00	-6.49	0.50	-0.44	1.48	0.56	3.56	0.38
US 1963-2012											
All years	1.80										
2 Quant.	-0.20	2.54									-0.20
3	-0.12	0.96	2.49								0.69
5	-0.78	0.71	0.29	1.04	5.14						0.65
7	-0.58	1.44	-0.17	0.23	1.03	0.57	4.58				0.88
10	-0.48	-1.57	2.31	-1.01	-0.22	0.41	1.08	0.36	3.76	3.17	1.24
UK 1981-2012											
All years	0.48										
2 Quant.	-0.58	1.68									-0.58
3	-2.71	1.55	1.98								-0.36
5	-2.27	0.16	1.02	0.91	1.24						0.09
7	-2.20	-2.15	2.63	0.38	0.87	0.99	1.38				0.11
10	-1.90	-1.06	-2.35	2.90	0.69	0.62	-0.01	1.04	0.92	0.67	0.36

Table V Summary statistics for the regressions of the SMB factor on the market premium in equation (4): $SMB_t = \alpha + \beta_{SMB}(R_{m,t} - R_{f,t}) + e_t$ in the US 1927-2012; sub-periods 1927-1963, 1950-2000, 1963-2012; and in the UK 1980-2011. The table reports the intercepts, α; their t-statistics, $t(\alpha)$; the market premium coefficients, β_{SMB}; and their t-statistics, $t(\beta_{SMB})$. The panel splits horizontally into four parts: All years, Low BM, Medium, and High. "All years" contains the results for the entire sample period. Low BM, Medium, and High correspond to the three BM_t terciles: In a given sample, the years in which BM_t is in the lowest tercile across all the years are "Low"; the ones in the highest tercile are "High"; and the remaining ones are "Medium". BM_t is the (recursive) standardized forecasting error of $\ln(M_{BM,t})$ in equation (2). It represents how distant from the historical (de-trended) average the BM is in year t. The market premium is the value-weight return on the market minus the short term Treasury rate. The Fama/French SMB (Small Minus Big) is the average return on the three small Fama/French portfolios minus the average return on the three big Fama/French portfolios. All US returns are in US dollars and all UK returns are in GB pounds.

The SMB factor controlling for market risk

	α				$t(\alpha)$			
	All years	Low BM	Medium	High	All years	Low BM	Medium	High
US 1927-2012	1.31	- 1.17	- 0.63	6.45	0.87	- 0.49	- 0.25	2.35
1927-1963	- 0.26	- 1.87	- 0.83	4.21	- 0.12	- 0.53	- 0.27	0.80
1950-2000	0.17	- 0.31	- 3.96	5.47	0.08	- 0.09	- 1.01	1.69
1963-2012	0.95	- 0.67	- 4.60	7.21	0.44	- 0.13	- 1.44	1.79
UK 1981-2012	- 0.42	- 6.60	0.90	8.15	-0.23	- 2.62	0.33	4.07
	β_{SMB}				$t(\beta_{SMB})$			
	All years	Low BM	Medium	High	All years	Low BM	Medium	High
US 1927-2012	0.28	0.32	0.11	0.28	4.15	2.76	0.82	2.75
1927-1963	0.33	0.37	0.16	0.30	3.89	2.81	0.89	1.80
1950-2000	0.20	0.10	0.31	0.15	1.94	0.42	1.29	1.20
1963-2012	0.08	- 0.13	- 0.26	0.19	0.65	- 0.42	- 1.44	0.99
UK 1981-2012	0.19	0.11	0.38	- 0.34	2.08	0.81	3.13	- 3.14

Table VI Summary statistics: Mean, Standard deviation, and the ratio of the mean to its standard error in $t-Mean$ for the (risk free) excess year returns from January to December on the 10 portfolios formed on size in the US 1927-2012, and sub-samples 1927-1963 and 1950-2000. Table VII complements this table and reports the results for the US 1963-2012 and UK 1980-2011 samples. All US returns are in US dollars and all UK returns are in GB pounds. The results split horizontally into four parts: All years, Low BM, Medium, and High. "All years" contains the results considering the entire sample period. Low BM, Medium, and High correspond to the three BM_t terciles: In a given sample, the years in which BM_t is in the lowest tercile across all the years are "Low"; the ones in the highest tercile are "High"; and the remaining ones are "Medium". BM_t is the (recursive) standardized forecasting error of $\ln(M_{BM,t})$ in equation (2). It represents how distant from the historical (de-trended) average the BM is in year t.

(Risk free) Excess returns: 10 size portfolios – US 1927-2012, US 1927-1963, and US 1950-2000

	Mean				Standard deviation				t-Mean			
	All years	Low BM	Medium	High	All	Low	Medium	High	All	Low	Medium	High
US 1927-2012												
Small	15.7	10.1	5.7	31.7	4.4	7.4	6.1	8.5	3.6	1.4	0.9	3.7
2	13.0	7.4	5.2	26.7	3.8	6.3	5.1	7.9	3.4	1.2	1.0	3.4
3	12.8	6.9	7.1	24.8	3.5	5.7	4.5	7.3	3.7	1.2	1.6	3.4
4	12.2	7.7	5.5	23.9	3.2	5.5	4.3	6.4	3.8	1.4	1.3	3.7
5	11.5	7.1	5.4	22.2	3.0	4.8	4.0	6.2	3.8	1.5	1.4	3.6
6	11.4	7.9	6.9	19.6	2.9	5.0	3.7	5.9	3.9	1.6	1.9	3.3
7	10.8	6.8	6.6	19.5	2.8	4.7	3.6	5.8	3.9	1.4	1.8	3.3
8	9.8	6.0	5.7	18.1	2.6	4.0	3.4	5.5	3.8	1.5	1.7	3.3
9	9.1	6.7	5.9	15.1	2.4	3.9	3.3	5.0	3.8	1.7	1.8	3.0
Big	7.3	6.7	4.9	10.4	2.1	3.5	3.3	4.2	3.5	1.9	1.5	2.5
US 1927-1963												
Small	21.8	14.3	8.7	42.9	8.1	15.0	7.3	16.8	2.7	0.9	1.2	2.6
2	17.7	8.9	11.1	33.7	7.3	12.9	6.1	16.4	2.4	0.7	1.8	2.1
3	16.8	7.5	12.7	31.0	6.7	12.1	5.6	15.1	2.5	0.6	2.3	2.1
4	16.3	9.1	11.4	29.0	6.0	11.5	4.9	12.9	2.7	0.8	2.3	2.2
5	13.9	5.0	13.0	24.4	5.5	9.7	5.4	12.1	2.5	0.5	2.4	2.0
6	15.2	10.0	13.2	22.9	5.5	10.6	4.9	11.7	2.8	0.9	2.7	2.0
7	13.7	6.7	11.9	23.0	5.2	9.8	4.6	11.1	2.6	0.7	2.6	2.1
8	12.5	5.3	11.2	21.8	4.8	8.4	4.7	10.7	2.6	0.6	2.4	2.0
9	12.1	7.0	10.5	19.3	4.4	8.2	4.2	9.5	2.8	0.9	2.5	2.0
Big	10.2	6.3	11.3	13.3	3.6	6.9	3.7	7.6	2.8	0.9	3.0	1.7
US 1950-2000												
Small	11.7	9.4	5.1	20.6	4.3	6.0	8.6	7.7	2.7	1.6	0.6	2.7
2	11.4	8.6	5.5	20.2	3.8	4.9	7.0	7.5	3.0	1.8	0.8	2.7
3	11.4	8.3	7.0	19.0	3.4	4.3	5.9	7.1	3.4	1.9	1.2	2.7
4	11.2	7.4	6.3	20.0	3.4	4.2	5.9	7.0	3.3	1.8	1.1	2.9
5	11.4	9.2	6.0	19.0	3.2	4.3	4.7	6.9	3.6	2.1	1.3	2.7
6	10.2	7.0	6.9	16.6	3.0	3.8	4.7	6.5	3.4	1.9	1.5	2.6
7	10.5	8.0	7.8	15.6	2.9	3.7	4.1	6.5	3.7	2.1	1.9	2.4
8	9.8	8.0	7.1	14.4	2.6	3.4	3.5	6.2	3.8	2.4	2.0	2.3
9	9.2	7.6	8.4	11.7	2.4	3.0	3.3	5.8	3.8	2.6	2.5	2.0
Big	8.6	8.4	7.9	9.4	2.4	3.6	3.6	5.4	3.5	2.3	2.2	1.7

Table VII Summary statistics: Mean, Standard deviation, and the ratio of the mean to its standard error in $t - Mean$ for the (risk free) excess year returns from January to December on the 10 portfolios formed on size in the US 1963-2012 and the UK 1980-2011. Table VI complements this table and reports the results for the US 1927-2012 sample, and two other sub-samples US 1927-1963 and US 1950-2000. All US returns are in US dollars and all UK returns are in GB pounds. The results split horizontally into four parts: All years, Low BM, Medium, and High. "All years" contains the results considering the entire sample period. Low BM, Medium, and High correspond to the three BM_t terciles: In a given sample, the years in which BM_t is in the lowest tercile across all the years are "Low"; the ones in the highest tercile are "High"; and the remaining ones are "Medium". BM_t is the (recursive) standardized forecasting error of $\ln(M_{BM,t})$ in equation (2). It represents how distant from the historical (de-trended) average the BM is in year t.

(Risk free) Excess returns: 10 size portfolios – US 1963-2012, and UK 1980-2011

	Mean				Standard deviation				t-Mean			
	All years	Low BM	Medium	High	All	Low	Medium	High	All	Low	Medium	High
US 1963-2012												
Small	11.2	7.4	10.0	16.6	4.5	6.4	9.8	7.2	2.5	1.2	1.0	2.3
2	9.5	5.8	8.3	14.8	3.8	5.3	7.7	6.9	2.5	1.1	1.1	2.1
3	9.9	7.5	8.3	14.3	3.4	4.5	6.6	6.4	3.0	1.7	1.3	2.2
4	9.2	6.1	7.2	14.5	3.3	4.4	6.3	6.3	2.8	1.4	1.1	2.3
5	9.8	8.4	6.4	14.8	3.2	4.3	5.7	6.4	3.1	1.9	1.1	2.3
6	8.5	6.5	6.8	12.4	2.8	3.7	5.2	5.9	3.0	1.7	1.3	2.1
7	8.8	8.3	6.0	12.2	2.9	3.9	5.2	6.2	3.0	2.2	1.1	2.0
8	7.9	7.3	6.1	10.4	2.6	3.4	4.8	5.6	3.0	2.1	1.3	1.9
9	7.1	8.3	5.0	8.2	2.5	3.3	4.6	5.3	2.8	2.5	1.1	1.5
Big	5.4	8.0	2.7	5.5	2.4	3.6	4.5	4.8	2.2	2.3	0.6	1.2
UK 1981-2012												
Small	17.5	- 6.5	36.8	22.8	8.1	6.4	19.9	8.5	2.2	-1.0	1.9	2.7
2	15.3	- 4.3	33.4	17.0	6.4	7.4	14.2	7.3	2.4	-0.6	2.3	2.3
3	12.1	- 5.6	26.8	15.4	5.3	6.9	10.9	6.2	2.3	-0.8	2.5	2.5
4	12.2	- 8.1	28.5	16.7	5.7	6.3	11.9	7.4	2.1	-1.3	2.4	2.3
5	10.9	- 7.3	22.6	18.2	5.3	7.2	11.1	5.8	2.1	-1.0	2.0	3.1
6	10.6	- 6.0	22.0	16.4	5.0	6.5	10.7	5.3	2.1	-0.9	2.1	3.1
7	9.8	- 5.8	20.3	15.4	4.7	6.4	9.9	4.6	2.1	-0.9	2.0	3.4
8	8.7	- 5.6	16.5	15.8	4.1	6.3	8.5	3.7	2.1	-0.9	1.9	4.3
9	9.1	- 4.9	17.9	15.0	4.3	6.8	8.0	5.3	2.1	-0.7	2.2	2.8
Big	6.5	0.9	9.2	9.8	3.2	5.4	6.0	5.3	2.0	0.2	1.5	1.8

Table VIII Time series estimation of the CAPM intercepts in equation (5): $R_{i,t} - R_{f,t} = \alpha_i + \beta_i(R_{m,t} - R_{f,t}) + e_{i,t}$ for the 10 portfolios formed on size in the US 1927-2012 sample, and two sub-samples US 1927-1963 and US 1950-2000. The table reports the intercepts, α, and their t-statistics, $t(\alpha)$. The table also reports the differences in the average intercepts between small and big stocks: $S5 - B5$ is the difference between the average intercepts of the smallest and the largest five size portfolios. $S5 - B5$ corresponds to the left-hand side of the equation in (6); $S7 - B3$ is the difference between the average intercepts of the seven smallest and the three largest size portfolios in the US. It corresponds to the left hand side of the equation in (7). The table also reports the χ^2 statistics for the equality test of the average excess returns on small and big stocks given by H_0 in (6) and (7). Table IX complements this table and reports the results for the US 1963-2012 sub-sample and the UK 1980-2011 sample. All US returns are in US dollars.
The results split horizontally into four parts: All years, Low BM, Medium, and High. "All years" contains the results considering the entire sample period. Low BM, Medium, and High correspond to the three BM_t terciles: In a given sample, the years in which BM_t is in the lowest tercile across all the years are "Low"; the ones in the highest tercile are "High"; and the remaining ones are "Medium". BM_t is the (recursive) standardized forecasting error of $\ln(M_{BM,t})$ in equation (2). It represents how distant from the historical (de-trended) average the BM is in year t.

CAPM intercepts and size premiums – Size portfolios in the US 1927-2012, US 1927-1963, and US 1950-2000

	α				$t(\alpha)$			
	All years	Low BM	Medium	High	All years	Low BM	Medium	High
US 1927-2012								
Small	3.0	- 1.3	- 0.0	11.5	1.06	- 0.33	- 0.01	2.03
2	1.0	- 2.7	- 0.3	6.5	0.47	- 0.98	- 0.09	1.47
3	1.6	- 2.4	1.8	5.6	0.91	- 0.98	0.71	1.51
4	1.6	- 1.3	0.3	6.5	1.12	- 0.59	0.13	2.35
5	1.5	- 0.6	0.3	5.2	1.24	- 0.26	0.16	2.37
6	1.6	- 0.4	2.1	3.1	1.52	- 0.24	1.32	1.67
7	1.2	- 1.1	1.6	3.3	1.31	- 0.68	1.42	1.59
8	1.0	- 0.8	1.2	2.5	1.18	- 0.62	1.07	1.60
9	0.7	0.0	1.4	0.7	1.32	0.01	1.52	0.65
Big	- 0.1	0.6	0.3	- 1.6	- 0.35	0.83	0.59	- 2.20
	Average small - big intercepts						χ^2	
S5 - B5	0.85	-1.31	-0.92	5.46	0.51	0.68	0.19	7.58
S7 - B3	1.11	-1.34	-0.14	5.42	0.86	0.67	0.00	7.33
US 1927-1963								
Small	2.7	2.6	- 5.8	17.2	0.58	0.52	- 0.78	1.51
2	- 0.4	- 1.2	- 2.9	6.8	- 0.11	- 0.29	- 0.55	0.74
3	- 0.4	- 2.0	- 1.9	5.7	- 0.13	- 0.64	- 0.59	0.73
4	0.6	- 0.0	- 1.4	6.5	0.27	- 0.01	- 0.47	1.21
5	- 0.5	- 2.6	- 1.3	2.8	- 0.27	- 0.86	- 0.42	0.72
6	0.6	1.4	0.7	1.9	0.42	0.99	0.21	0.55
7	0.1	- 1.0	- 0.8	3.6	0.07	- 0.42	- 0.35	0.81
8	- 0.3	- 1.5	- 1.9	2.5	- 0.21	- 0.85	- 1.08	0.81
9	0.2	0.4	- 1.3	1.9	0.27	0.31	- 0.80	1.03
Big	0.3	0.7	0.7	- 0.8	0.75	0.94	0.83	- 0.83
	Average small - big intercepts						χ^2	
S5 - B5	0.21	-0.63	-2.12	5.97	0.01	0.07	4.40	2.53
S7 - B3	0.30	-0.28	-1.05	5.17	0.03	0.01	0.57	1.93
US 1950-2000								
Small	- 0.3	0.2	- 6.5	6.2	- 0.09	0.03	- 0.96	1.62
2	- 0.1	- 0.5	- 4.7	5.7	- 0.06	- 0.14	- 0.97	1.82
3	0.8	0.6	- 2.3	5.1	0.40	0.17	- 0.63	1.93
4	0.5	- 0.5	- 3.1	6.2	0.27	- 0.15	- 0.85	2.47
5	1.1	0.9	- 2.0	5.4	0.71	0.29	- 0.85	2.13
6	0.5	- 0.3	- 0.9	3.5	0.34	- 0.11	- 0.38	2.02
7	0.7	- 0.1	0.5	2.5	0.75	- 0.04	0.32	1.42
8	1.0	0.9	1.1	1.8	1.02	0.44	0.73	1.31
9	0.9	0.8	2.4	- 0.1	1.37	0.71	2.20	- 0.12
Big	0.1	0.1	1.3	- 1.7	0.12	0.10	1.54	- 1.62
	Average small - big intercepts						χ^2	
S5 - B5	-0.23	-0.15	-4.60	4.53	0.03	0.01	5.58	3.30
S7 - B3	-0.19	-0.56	-4.33	4.94	0.02	0.06	4.90	3.48

Table IX Time series estimation of the CAPM intercepts in equation (5): $R_{i,t} - R_{f,t} = \alpha_i + \beta_i(R_{m,t} - R_{f,t}) + e_{i,t}$ for the 10 portfolios formed on size in the US 1963-2012 sub-sample and the UK 1980-2011 sample. The table reports the intercepts, α, and their t-statistics, $t(\alpha)$. The table also reports the differences in the average intercepts between small and big stocks: $S5 - B5$ is the difference between the average intercepts of the smallest and the largest 5 size portfolios. $S5 - B5$ corresponds to the left-hand side of the equation in (6); $S7 - B3$ (and $S8 - B2$ for the UK) are, respectively, the difference between the average intercepts of the seven (eight in the UK) smallest and the three (two in the UK) largest size portfolios. It corresponds to the left-hand side of the equation in (7). The table also reports the χ^2 statistics for the equality test of the average excess returns on small and big stocks given by H_0 in (6) and (7). Table VIII complements this table and reports the results for the US 1927-2012 sample and the sub-samples US 1927-1963 and US 1950-2000. All US returns are in US dollars and all UK returns are in GB pounds.
The results split horizontally into four parts: All years, Low BM, Medium, and High. "All years" contains the results considering the entire sample period. Low BM, Medium, and High correspond to the three BM_t terciles: In a given sample, the years in which BM_t is in the lowest tercile across all the years are "Low"; the ones in the highest tercile are "High"; and the remaining ones are "Medium". BM_t is the (recursive) standardized forecasting error of $\ln(M_{BM,t})$ in equation (2). It represents how distant from the historical (de-trended) average the BM is in year t.

CAPM intercepts and size premiums – Size portfolios in the US 1963-2012, and UK 1980-2011

	α				$t(\alpha)$			
	All years	Low BM	Medium	High	All years	Low BM	Medium	High
US 1963-2012								
Small	3.1	- 2.2	5.4	6.7	0.92	- 0.40	0.72	1.83
2	1.9	- 3.8	4.3	5.1	0.79	- 1.02	0.82	1.57
3	2.9	- 0.1	4.6	5.0	1.53	- 0.02	1.21	1.93
4	2.2	- 1.7	3.6	5.5	1.25	- 0.54	1.03	2.11
5	2.8	1.0	2.8	5.5	1.86	0.29	1.32	2.18
6	2.1	- 0.4	3.6	3.6	1.67	- 0.15	1.64	2.17
7	1.9	0.5	2.6	2.8	1.86	0.26	1.50	1.73
8	1.8	0.6	3.0	2.0	1.83	0.30	1.92	1.39
9	1.1	1.2	2.0	0.1	1.61	0.88	1.59	0.09
Big	- 0.4	0.4	- 0.3	- 1.7	- 0.71	0.28	- 0.36	- 1.68
	Average small - big intercepts					χ^2		
S5 - B5	1.30	-1.85	1.97	4.20	0.67	0.61	0.33	2.94
S7 - B3	1.62	-1.70	2.28	4.75	1.04	0.53	0.46	3.45
UK 1980-2012								
Small	7.0	- 5.7	8.5	20.7	1.05	- 1.37	0.60	1.91
2	5.7	- 3.4	10.8	13.8	1.24	- 0.81	1.44	1.51
3	3.9	- 4.8	8.7	11.5	1.08	- 1.15	1.91	1.53
4	3.9	- 7.3	11.3	11.7	0.92	- 2.12	1.38	1.31
5	2.2	- 6.4	4.6	12.5	0.67	- 1.79	0.84	1.92
6	2.2	- 5.1	4.7	9.5	0.78	- 1.60	0.93	1.83
7	1.4	- 5.0	3.6	7.6	0.65	- 1.76	0.99	2.41
8	1.0	- 4.7	1.7	8.6	0.62	- 1.72	0.86	6.34
9	1.1	- 4.0	4.1	4.9	0.72	- 1.41	1.90	2.15
Big	0.2	1.7	- 1.1	- 0.8	0.35	1.46	- 0.75	- 0.87
	Average small - big intercepts					χ^2		
S5 - B5	3.33	-2.09	6.18	8.08	2.22	0.69	1.21	4.33
S7 - B3	2.75	-4.12	5.26	9.95	1.38	3.52	0.74	9.05

Table X Time series estimation of the CAPM intercepts, considering only the years in each sample's top BM quantile. The intercepts correspond to α in equation (5): $R_{i,t} - R_{f,t} = \alpha_i + \beta_i(R_{m,t} - R_{f,t}) + e_{i,t}$ for the 10 portfolios formed on size in the US 1927-2012 sample, and two sub-samples US 1927-1963 and US 1950-2000. The columns "All years", Top 1/2, 1/3, 1/5, 1/7, 1/10 represent the fraction of the sample used to obtain the values that I report. I obtain the results in these columns from the years in the top quantile when the sample is split, respectively, into (1), 2, 3, 5, 7, or 10 BM quantiles based on BM_t. BM_t is the (recursive) standardized forecasting error of $\ln(M_{BM,t})$ in equation (2). It represents how distant from the historical (de-trended) average the BM is in year t. The table reports the intercepts, α, and their t-statistics, $t(\alpha)$. The table also reports the differences in the average intercepts between small and big stocks: $S5-B5$ is the difference between the average intercepts of the smallest and the largest five size portfolios. $S5-B5$ corresponds to the left-hand side of the equation in (6); $S7-B3$ is the difference between the average intercepts of the seven smallest and the three largest size portfolios in the US. It corresponds to the left-hand side of the equation in (7). Finally, the table also reports the χ^2 statistics for the equality test of the average excess returns on small and big stocks given by H_0 in (6) and (7). Table XI complements this table and reports the results for the US 1963-2012 sub-sample and the UK 1980-2011 sample. All US returns are in US dollars.

CAPM intercepts and size premiums in the top BM quantiles – US 1927-2012, US 1927-1963, and US 1950-2000

			α						$t(\alpha)$			
	All years	Top 1/2	1/3	1/5	1/7	1/10	All years	Top 1/2	1/3	1/5	1/7	1/10
US 1927-2012												
Small	3.0	4.9	11.5	10.0	14.5	15.9	1.06	1.01	2.03	3.24	4.42	5.20
2	1.0	2.3	6.5	6.8	9.8	9.4	0.47	0.63	1.47	2.74	3.47	3.05
3	1.6	2.8	5.6	5.9	8.2	7.7	0.91	0.99	1.51	3.13	3.94	3.76
4	1.6	3.4	6.5	6.7	9.2	8.9	1.12	1.47	2.35	3.20	4.51	3.60
5	1.5	2.6	5.2	6.1	8.0	7.8	1.24	1.50	2.37	3.07	3.39	3.34
6	1.6	1.9	3.1	3.8	5.2	4.2	1.52	1.21	1.67	2.98	3.64	3.75
7	1.2	2.2	3.3	4.5	6.5	7.5	1.31	1.46	1.59	3.49	4.95	5.17
8	1.0	2.4	2.5	3.0	3.9	4.6	1.18	1.87	1.60	2.78	2.89	3.79
9	0.7	1.3	0.7	0.6	1.4	2.5	1.32	1.45	0.65	0.57	0.94	1.28
Big	-0.1	-0.6	-1.6	-2.1	-3.1	-3.2	-0.35	-1.04	-2.20	-2.86	-3.92	-4.01
		Average small - big intercepts							χ^2			
S5 - B5	0.85	1.79	5.46	5.15	7.18	9.96	0.51	0.89	7.58	8.35	14.74	13.28
S7 - B3	1.11	1.87	5.42	5.77	8.06	3.12	0.86	0.95	7.33	9.76	19.73	17.86
US 1927-1963												
Small	2.7	5.7	17.2	21.5	30.0	36.5	0.58	0.64	1.51	1.75	2.60	19.28
2	-0.4	1.1	6.8	9.5	17.6	11.9	-0.11	0.17	0.74	0.71	1.22	2.00
3	-0.4	2.5	5.7	8.7	16.1	6.8	-0.13	0.46	0.73	0.66	1.14	1.13
4	0.6	2.6	6.5	8.9	14.6	11.9	0.27	0.67	1.21	1.22	2.55	4.71
5	-0.5	0.9	2.8	5.9	9.0	3.1	-0.27	0.31	0.72	0.94	1.27	1.21
6	0.6	0.6	1.9	3.0	6.6	2.0	0.42	0.22	0.55	0.51	1.07	1.25
7	0.1	1.7	3.6	6.5	10.7	3.3	0.07	0.54	0.81	0.82	1.25	2.16
8	-0.3	1.2	2.5	5.4	7.9	5.5	-0.21	0.57	0.81	1.12	1.43	1.51
9	0.2	1.2	1.9	2.8	4.2	6.3	0.27	1.00	1.03	0.91	1.27	1.43
Big	0.3	-0.2	-0.8	-1.3	-2.2	-1.7	0.75	-0.32	-0.83	-0.88	-1.53	-2.05
		Average small - big intercepts							χ^2			
S5 - B5	0.21	1.68	5.97	7.66	12.04	14.05	0.01	0.34	2.53	6.05	11.81	189.98
S7 - B3	0.30	1.43	5.17	6.85	11.67	3.10	0.03	0.25	1.93	3.06	5.99	21.91
US 1950-2000												
Small	-0.3	3.9	6.2	10.9	17.2	14.9	-0.09	0.79	1.62	2.55	3.95	7.44
2	-0.1	4.0	5.7	9.2	13.2	12.0	-0.06	1.11	1.82	2.69	3.48	11.08
3	0.8	4.0	5.1	8.1	11.3	10.2	0.40	1.46	1.93	2.83	3.64	7.57
4	0.5	4.5	6.2	8.3	11.6	11.0	0.27	1.71	2.47	2.72	4.03	4.48
5	1.1	3.8	5.4	7.6	9.9	9.8	0.71	1.86	2.13	2.34	2.37	2.80
6	0.5	2.6	3.5	5.2	6.2	5.7	0.34	1.59	2.02	2.59	2.71	4.08
7	0.7	2.2	2.5	4.5	5.4	5.7	0.75	1.48	1.42	2.67	2.72	3.31
8	1.0	2.4	1.8	2.9	2.6	3.6	1.02	1.89	1.31	2.04	1.36	2.70
9	0.9	1.3	-0.1	0.4	1.0	1.7	1.37	1.25	-0.12	0.41	0.75	0.90
Big	0.1	-0.8	-1.7	-2.7	-3.7	-3.9	0.12	-1.01	-1.62	-2.29	-2.75	-3.06
		Average small - big intercepts							χ^2			
S5 - B5	-0.23	2.51	4.53	6.75	10.32	11.60	0.03	1.16	3.30	6.77	12.24	38.77
S7 - B3	-0.19	2.63	4.94	7.49	10.68	2.58	0.02	1.18	3.48	7.87	12.66	74.70

Table XI Time series estimation of the CAPM intercepts, considering only the years in each sample's top BM quantile. The intercepts correspond to α in equation (5): $R_{i,t} - R_{f,t} = \alpha_i + \beta_i(R_{m,t} - R_{f,t}) + e_{i,t}$ for the 10 portfolios formed on size in the US 1963-2012 and in the UK 1980-2011. The columns "All years", Top 1/2, 1/3, 1/5, 1/7, 1/10 represent the fraction of the sample used to obtain the values that I report. I obtain the results in these columns from the years in the top quantile when the sample is split, respectively, into (1), 2, 3, 5, 7, or 10 BM quantiles based on BM_t. BM_t is the (recursive) standardized forecasting error of $\ln(M_{BM,t})$ in equation (2). It represents how distant from the historical (de-trended) average the BM is in year t. The table reports the intercepts, α, and their t-statistics, $t(\alpha)$. The table also reports the differences in the average intercepts between small and big stocks: $S5-B5$ is the difference between the average intercepts of the smallest and the largest five size portfolios. $S5-B5$ corresponds to the left-hand side of the equation in (6); $S7-B3$ (and $S8-B2$ for the UK) are the difference between the average intercepts of the seven (eight in the UK) smallest and the three (two in the UK) largest size portfolios. It corresponds to the left-hand side of the equation in (7). The table also reports the χ^2 statistics for the equality test of the average excess returns on small and big stocks given by H_0 in (6) and (7). Table X complements this table and reports the results for the US 1927-2012 and the sub-samples US 1927-1963 and US 1950-2000. All US returns are in US dollars and all UK returns are in GB pounds.

CAPM intercepts and size premiums in the top BM quantiles – US 1963-2012, and UK 1980-2011

	α						$t(\alpha)$					
	All years	Top 1/2	1/3	1/5	1/7	1/10	All years	Top 1/2	1/3	1/5	1/7	1/10
US 1963-2012												
Small	3.1	4.7	6.7	13.6	18.0	12.6	0.92	0.97	1.83	3.86	4.65	6.57
2	1.9	4.4	5.1	10.7	13.0	9.6	0.79	1.28	1.57	3.34	3.01	1.86
3	2.9	4.6	5.0	9.7	11.6	8.8	1.53	1.78	1.93	4.13	3.88	2.87
4	2.2	4.5	5.5	10.1	11.3	9.0	1.25	1.84	2.11	4.26	3.47	2.03
5	2.8	4.4	5.5	9.5	11.2	9.6	1.86	2.27	2.18	3.40	3.51	2.34
6	2.1	3.3	3.6	6.6	6.9	5.8	1.67	2.12	2.17	4.15	3.81	3.46
7	1.9	2.8	2.8	5.7	6.3	6.9	1.86	1.99	1.73	3.66	4.85	7.37
8	1.8	3.0	2.0	3.9	4.2	5.2	1.83	2.24	1.39	2.51	3.87	6.81
9	1.1	1.4	0.1	1.2	2.0	4.0	1.61	1.23	0.09	0.86	1.11	2.07
Big	-0.4	-1.1	-1.7	-3.6	-4.1	-4.0	-0.71	-1.38	-1.68	-3.83	-3.97	-2.91
		Average small - big intercepts							χ^2			
S5 - B5	1.30	2.66	4.20	7.98	9.97	9.92	0.67	1.41	2.94	10.96	9.10	7.42
S7 - B3	1.62	3.00	4.75	8.90	10.50	3.56	1.04	1.70	3.45	14.30	10.38	9.79
UK 1980-2011												
Small	7.0	16.3	20.7	19.5	26.1	20.1	1.05	1.44	1.91	0.98	0.92	0.50
2	5.7	10.1	13.8	17.0	21.0	8.8	1.24	1.27	1.51	1.02	0.85	0.47
3	3.9	9.6	11.5	18.9	19.8	9.9	1.08	1.46	1.53	1.42	0.96	0.59
4	3.9	8.2	11.7	12.8	17.1	5.7	0.92	1.09	1.31	0.78	0.70	0.27
5	2.2	8.1	12.5	16.5	16.5	5.5	0.67	1.48	1.92	1.24	0.82	0.64
6	2.2	5.0	9.5	10.1	10.4	3.5	0.78	0.94	1.83	0.96	0.85	1.58
7	1.4	4.3	7.6	7.2	8.1	4.8	0.65	1.27	2.41	1.32	0.98	0.54
8	1.0	5.8	8.6	7.9	7.9	5.5	0.62	2.43	6.34	2.71	1.80	3.41
9	1.1	4.5	4.9	3.5	4.5	1.6	0.72	2.01	2.15	0.86	0.85	0.80
Big	0.2	-0.6	-0.8	0.6	-0.1	0.4	0.35	-0.58	-0.87	0.41	-0.07	0.18
		Average small - big intercepts							χ^2			
S5 - B5	3.33	6.69	8.08	11.06	13.96	10.00	2.22	4.73	4.33	3.17	2.29	1.22
S8 - B2	2.75	6.49	9.95	11.64	13.71	6.98	1.38	2.84	9.05	4.11	2.66	2.03