Discount rates, market frictions, and the mystery of the size premium

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ABSTRACT

I document the empirical evidence showing that the size premium only exists when the median book-to-market ratios in the market is high. I argue that this evidence supports the hypothesis that the size effect is a consequence of market frictions and not a risk factor priced in equilibrium. High discount rates lower stock valuations and increase the overall book-to-market ratios in the market. They are also associated with the low risk bearing capacity, limited risk sharing and high uncertainty that increase market frictions. Ranking the years in book-to-market quantiles, as a proxy for discount rates, reveals that the size premium is usually statistically significant exclusively in the top book-to-market quantile. This evidence is robust to changes in the number of quantiles; in the US in different sub periods, and in the UK; considering both the Fama/French SMB factor or the individual size portfolios; and also controlling for market risk.

JEL classification: G11, G12, G14.

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Market frictions are intimately related to discount rates. We can expect market frictions to exist when risk bearing capacity is low, risk sharing is limited, uncertainty is large and consequently discount rates are high. These frictions, therefore, should be less relevant or non-existent in well functioning capital markets. If the size premium is driven by market frictions, the premium should only exist when these frictions are biding (for instance, when discount rates are high). Alternatively, if size is (even a proxy for) a risk factor that is systematically priced in equilibrium, the size premium should be consistently present in the data independently of the discount rates.

I investigate these hypotheses using the median of the book-to-market ratios (BM hereafter) of all stocks each year as a proxy for the discount rates in that year. The empirical evidence is that the size premium only exists in high BM years. Therefore, the hypothesis that size is a risk factor (or a proxy for a risk factor) that should be priced in equilibrium, as in Fama and French (1996) for instance, does not find support in the data. Low or medium BM years in fact often present negative size premiums, especially after controlling for the higher market risk of small stocks. The evidence suggests that the big common movements that we observe among small stocks do not generate a systematic risk premium.

I analyze US data from 1927 to 2012 and the individual sub-samples 1927-1963, 1950-2000, and 1963-2012 to confirm that the results are pervasive over time. I also analyze UK data from 1980 to 2011 and show that the effect is pervasive across markets as well. I rank the years of each sample period into 2, 3, 5, 7, or 10 BM quantiles based on how their beginning of year median BM compares with the historical (de-trended) BM average[1]. Next, I evaluate the annual returns earned on portfolios of stocks of different sizes during the years in each of these BM quantiles. I analyze the size premium considering both the difference in returns on 10 portfolios formed on size and the SMB factor of Fama and French (1996).

The statistical evidence of a positive size premium (for instance, above the traditional two standard error bound) is frequently restricted to the top BM quantile when we consider the SMB factor. In addition, there is no significant size premium in any of the sample periods if we remove the years in the top BM quantile from the sample. Furthermore, the significance of the SMB factor in the top BM quantile usually increases with the number of quantiles considered. I also control the results for market risk because the SMB factor is not market neutral. I show that the market

[1] I explain the process in details in section I.A.

premium does not explain the existence of the size premium in high BM years. I also show that controlling for market risk reduces even further the evidence of a size premium in the low and medium BM years.

The analysis of the 10 individual size portfolios gives further support to these conclusions. For instance, I show that the size premium arises due to the CAPM excess returns earned by small stocks in high BM years. These excess returns tend to be negative or insignificant in low or medium BM years and this is the reason why there is no size premium in low or medium BM years.

Another interpretation for the findings in the paper is that there is a link between the size and the value effects. The data suggests that the cross-section evidence of the size premium is in fact related to an intertemporal value effect, as far as the variation in the median BM over time is concerned.

A. Background

There is a recent debate (e.g., van Dijk, 2011) over whether size is a risk factor priced in equilibrium, as claimed in Fama and French (1996) for instance. The debate is fueled by the lack of empirical evidence about the size premium in recent papers such as Fama and French (2012), Israel and Moskowitz (2013), or Gregory, Tharyan, and Christidis (2013). The lack of evidence about the size premium contrasts with the abundant evidence about the presence and pervasiveness of the other factors used in empirical asset pricing. The momentum and value effects are widely reported in Fama and French (2012) and Asness, Moskowitz, and Pedersen (2013), for instance, while Cochrane (2011) provides a broad and enlightening discussion on the subject.

On the other hand, several explanations for a systematic size premium 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, 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).

Several models emphasizing frictions and the behavior of intermediaries have arised in recent years. 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 theories relying on market frictions, however, usually have difficulties explaining persistent, long lived effects. For instance, we should expect that arbitrageurs will exploit and eliminate any systematic arbitrage opportunity in equilibrium. So, market frictions should be more relevant in the short run, or after unusual events (Cochrane, 2011). This contrasts with what is expect from a risk factor priced in equilibrium, for instance.

There are, in fact, 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 underdiversified. 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.

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. Merton (1987) in fact shows that segmentation may arise endogenously given the low expected dollar returns from the investment in small stocks. 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, as in Garleanu and Pedersen (2011), or Frazzini and Pedersen (2013) when margin restrictions are biding.

Cochrane (2011) distinguishes frictions arising from segmented markets, intermediated markets, or from low liquidity. In practice, however, it is very difficult to pin down which single or combined frictions generate the size premium. Nevertheless, this paper provides empirical evidence that supports the market friction hypotheses (in general) as opposed to the risk factor hypotheses (in general). The central contribution of the paper is exactly to provide this evidence.

The remainder of the paper is organized as follows: Section I presents all the data and the variables that I use the analysis. Section II presents the empirical evidence about the size premium based on the Fama/French SMB factor. Section III presents the empirical evidence about the size premium at a less aggregate level, based on the individual size portfolios. I summarize the paper in Section IV.

I. Data and variables

I use the Keneth French's data library[2] on US stocks and Alan Gregory's data library[3] on UK stocks described in Fama and French (1993) and Gregory et al. (2013) respectivelly. The annual datasets are US 1967-2012 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 generate the results in Vassalou and Xing (2004), for instance, as explained in Da and Gao (2010).

The Fama/French factors for the US and the UK are constructed using the 6 value-weight portfolios formed on size and book-to-market. In the US, 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 the UK, 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 US, the SMB for January to December of year t, includes all NYSE, Amex, and NASDAQ stocks for which there is market equity data for December of $t-1$ and June of t, and (positive) book equity data for year $t-1$. In the UK, SMB for October of year t to September of $t+1$ includes only the Main Market stocks with (positive) book equity and

[2]http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html
[3]http://business-school.exeter.ac.uk/research/areas/centres/xfi/research/famafrench/files/

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 US, the market premium is the value-weight return of all CRSP firms incorporated in the US 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 UK, the market premium is the total return on the FTSE All Share Index minus the monthly return on three month Treasury Bills.

In the US, 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. They are formed at the end of each June using the June market equity and NYSE breakpoints. In the UK, the 10 size-portfolios for October of year t to September of $t+1$ include only Main Market stocks and exclude financials, foreign companies and 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 largest 350 firms breakpoints.

The UK sample is more concentrated in micro and small caps[4], as we see in Figure 1. Another difference is that the longer US sample generates a more accurate estimation of the BM trend over time, as we see in the next section.

[Place Figure 1 about here]

A. The book-to-market classification variable

I create a time series with the median BM ratios at the beginning of each year, and then I classify each year in BM quantiles according to this value (for instance into high, medium, or low BM).

In the US, 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 UK, we match March year t book value

[4] For instance, Fama and French (2008) define micro caps as the stocks in the lowest 2 US deciles and small caps as the ones in the lowest 2-5 US deciles.

with 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) in 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 (de-trended) average of $\ln(M_{BM,t})$, and e_t is an error term. Next, I define BM_t as the standardized forecasting error[5] 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 estimated intercept, time trend, and standard error of equation (1) in time $t-1$.

I classify the years in 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, later 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 US and the UK show negative time trends, but the estimated value in the UK is 50 percent larger (more negative) as we see in the table. Figure 2 shows that the high BM years in the early 1980s affect the estimated trend in the UK. The BM values are also high in the US around the same time. So, the true value of the trend in the UK may be closer to the US' trend. Nevertheless, the UK series is short and even ignoring the trend, as a robust check, does not change the BM classification substantially. These results are

[5] For both the US and the UK for the first 10 years (1927 - 1937 in the US, and 1980 - 1990 in the UK) I use the (full sample) standardized residual given the short historical data.

available upon request.

[Place Figure 2 about here]

[Place Table I about here]

II. The Fama/French SMB factor

The data reduction obtained by the Fama/French factor models 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 in Lewellen, Nagel, and Shanken (2010).

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.

High covariance in returns does not imply the existence of a risk premium. For instance, 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 that I analyze. 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 UK. 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 UK 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 compared to any other periods in the table. Not surprisingly, the only[6] sample period in which the high BM years have SMB below the two standard error bound is the US 1927-1963. The US 1927-1963 period is also the only full period with significantly low BM, which is more than two standard errors below zero. Even in this period, however, the point estimate of the SMB in high BM years is an order of magnitude larger than in the other periods.

The market premium is also larger than average in high BM years. The largest point estimates of the market premium tend to happen in high BM years, as it happens with the SMB factor. The market premiums in high BM years, however, do not tend to be the most significant across all years. The exception is the UK sample in which high BM years (marginally) have the most significant market premium.

Finally, apart form the UK, there is no clear difference between low and medium BM years in terms of the variables displayed. Even BM_t tends to be negative in most medium BM years, as it happens in low BM years.

Table II suggests that the size premium only exists when discount rates are high, considering the median BM as a proxy for discount rates. This is consistent with the market friction explanation for the size effect.

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 (also varying the number of 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 sample. I show how the SMB factor is exposed to market risk in

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

section II.C.

B. The SMB factor in different BM quantiles

Table III and Table IV describe the SMB factor as we rank the years in each sample according to their BM, grouping the years in different numbers of quantiles. I split 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. 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 years assumed to be "ordinary" 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 number of quantiles considered (Table IV, "Ex top" column). 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 all the sample periods considered.

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 number 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 quantile tends to have around 10 observations[7] and the data seems to become too noisy in smaller samples. The point estimates of the SMB factor in the top BM quantile tends to increase until the number of quantiles is 7.

B.1. A note on the UK results

The qualitative results are the same in the US and in the UK. In fact, the risk factor explanation for the size effect finds even less support from the UK data with a low and insignificant SMB (Table II). The quantitative results supporting the hypothesis that the market frictions affect especially the small firms and increase in high discount rate years (high BM years), however, is less clear in the UK than in the US. Here, 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 in each quantile.

Another explanation is that most UK firms are small. 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 UK. The UK companies tend to be much smaller than the companies in the US as we see in Figure 1. Relatively big firms in the UK may be still too small, and therefore they can be vulnerable to market frictions. These frictions only affect small firms in the US, but affect a larger share of the market in the UK.

A similar explanation may relate to the security transaction tax in the UK ("stamp duty") implying that the whole UK stock market is less efficient than the US market. The size effect becomes more difficult to detect because there is less size related variation in the way that the market friction affects the companies in the UK. The security transaction tax charged in the UK should reduce the liquidity of all securities (Campbell and Froot, 1993). The result is an increase in the market friction for all companies independently of their size. So the size premium is more difficult to detect in the UK because even big companies in the UK are more vulnerable to these

[7] For instance, in the UK 1980-2011, US 1963-2012 and US 1927-2012 the most significant top quantile is obtained with 3, 5, and 7 BM quantiles respectively. All of them have around 10 observations each. But the result is not robust because, for instance, the most significant top quantile happens in the US 1927-1963 sample, with 10 quantiles of around only 4 observations each.

market frictions.

The size related differences in returns arising from market frictions, thus, can be more difficult to detect in the UK. Nevertheless, the empirical evidence regarding the UK sample is largely consistent with the market friction explanation for the size premium. This is especially true after we consider the differences between the US and the UK market structures and characteristics.

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 3 portfolios containing small stocks and an offsetting short position on 3 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:

$$\beta_{SMB} = \frac{\beta_{small} - \beta_{big}}{2}. \tag{3}$$

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 especially in high BM years. It is possible, therefore, that the changes in the SMB factor are completely explained[8] by 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 riskfree rate, and e_t is an error term. Table V displays summary statistics for the regression in equation (4).

[8]To be precise, it is difficult to identify causality because both changes could be driven by a third factor.

[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). The small point estimates of β_{SMB} are also consistent with the fact that β_{SMB} should be half of 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.

The results change considerably if we split the years of each sample in 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. Just as in Table II, the period US 1927-1963 (being a period with significantly low BM years), is the one with the lowest and least significant intercept even for the high BM years within that period.

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 UK). However, the only intercept two standard errors below zero happens in the UK during the low BM years.

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 UK is the only unexpected value considering that small stocks usually have higher 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 the high BM terciles. 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. However, considering all the years in each sample, Table V shows that every intercept (risk adjusted excess return) is small with low t-statistics. This suggests that there is no evidence of risk adjusted excess returns earned by small stocks compared to big stocks even in the US 1927-2012 sample that is otherwise significant in 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.

I start the section 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 also look for evidence about whether the size effect is a risk factor priced in equilibrium, or a market friction effect. The more detailed data in this section confirms the previous results and supports the hypothesis that the size effect arises from market frictions. The size effect is only present when discount rates are high (in high BM years).

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 or medium BM years the point estimation of the intercepts are more similar and don't suggest the existence of a size premium. The only exception is the UK that shows an increase in returns from big to small companies in medium BM years as well. These values explain the results in Table II, showing that the SMB factor is only significant in high BM years (being also large, albeit not significant, in the UK 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 favourable 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. This indicates that 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 comes from size specific characteristics.

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 riskfree 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 5 size deciles) and the biggest stocks (in the highest 5 size deciles) are the same.

As a robust check, I also test if there is a difference in the average intercepts of big and small stocks, but considering that stocks smaller than the Russell 2000 upper limit are small, classifying the remaining as big. Stocks below (and including) the 6^{th} decile in the US, and around the 8^{th} decile in the UK are small according to this criteria (see Figure 1). In the US and in the UK 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 US and $s = 8$ for the UK.

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 5 size portfolios and correspond to the left hand side of the equation in (6). $S7 - B3$ and $S8 - B2$ are, respectively, the difference between the average intercepts of the 7 (8) smallest and the 3 (2) largest size portfolios in the US (and in the UK). These values correspond to the left hand side of the equation in (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 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[9] intercept has low t-statistics in low or medium BM years.

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 it happens 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, thus, support the CAPM in every period, except when the median BM (discount rates) is high. In fact, there isn't strong evidence of a risk adjusted size premium in any of the full sample periods considered. Therefore, there is very weak empirical support for the systematic risk hypothesis as an explanation for the size premium.

On the other hand, there is empirical support for the market friction explanation of the size premium. There are significant risk adjusted excess returns in high BM years that are non existent in other years. These excess returns are particularly large and concentrated in small stocks and generate a size premium consistent with the market friction hypothesis.

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

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. In this section, however, 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 run the regression in (5) considering only in the years in the respective top BM quantile. Intuitively, I start with the full sample and then I analyse 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 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 5 size portfolios and correspond to the left hand side of the equation in (6); $S7 - B3$ and $S8 - B2$ (for the UK) are the differences between the average intercepts of the 7 (or 8 in the UK) smallest and the 3 (or 2 in the UK) largest size portfolios. The values correspond to the left hand side of the equation 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 increase and become more significant as we restrict the sample to contain only increasingly higher BM years (Table X and Table XI). However, the significance and the point estimate of the size premium controlling for market risk decreases in some samples after a certain number of quantiles. This is particularly true in the UK. 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. In the top half BM years, the individual intercepts and the size premiums still tend to 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, the trend in the point estimates tends to become more clear. Also, the significance of the tests (6) and (7) tends to increase together with the significance of the individual intercepts.

The UK sample is the only one in which the size premiums given by the tests (6) and (7) are not significant in the top 10% BM years (i.e., considering the top of 10 BM quantiles). The low χ^2 value, however, contrasts with a clear trend in the individual point estimates of the intercepts. The intercepts increase from big to small stocks as expected. The trend is reflected on the large point estimates of the size premium in $S5 - B5$, and $S8 - B2$.

The results in this section, therefore, give further support to the hypothesis that market frictions generate the size premium. Consistent with this hypothesis, we verify that the size premium adjusted for market risk only appears when the discount rates (BM) are high and it is non existent otherwise. Furthermore, the effect tends to become stronger as discount rates (median BM) grow.

IV. Summary

The empirical facts presented in the paper suggest that the size effect cannot be a systematic risk factor priced in equilibrium as in Fama and French (1996), for instance. Among 5 samples, only 1 shows evidence of a significant SMB factor. And even in this sample, the significance disappears after we control for market risk. In addition, removing the high BM years from any sample reduces the significance of the size premium even further. If the size premium arose from a risk factor priced in equilibrium, it should be independent of the discount rates (or median BM values). The empirical evidence, therefore, does not support the hypothesis that size is a risk factor priced in equilibrium.

I propose that market frictions are the actual reason behind the size effect. I postulate that increased market frictions and high discount rates tend to happen at the same time. So, high BM years are associated with high discount rates, and also with large market frictions. The hypothesis predicts that the size effect will be present when the frictions are binding (and when the discount rates and the BM values are high). The effect should also be temporary to explain why the frictions still exist instead of being systematically eliminated by arbitrageurs.

Consistent with this hypothesis, the data shows that the size premium only exists in high BM years, and that the effect is temporary and relatively rare. There is co-movement among stocks of different sizes in a similar way that stocks of different industries covary. Neither of them correspond to a systematic risk premium.

Finally, the new evidence presented in this paper have broad implications for the market participants as well. After the size premium being reported in Banz (1981) and later popularized in Fama and French (1992) for instance, several financial instruments were built to benefit from an eventual premium earned on small stocks. The evidence now suggests that these instruments and the overall investment strategy of targeting small companies could be re-designed. I found no evidence of a systematic excess return earned on small stocks, especially considering that small stocks are more exposed to market risk. Given that the existence of the size premium is restricted only to certain points in time, a market timing strategy might be more appropriate to explore the size premium.

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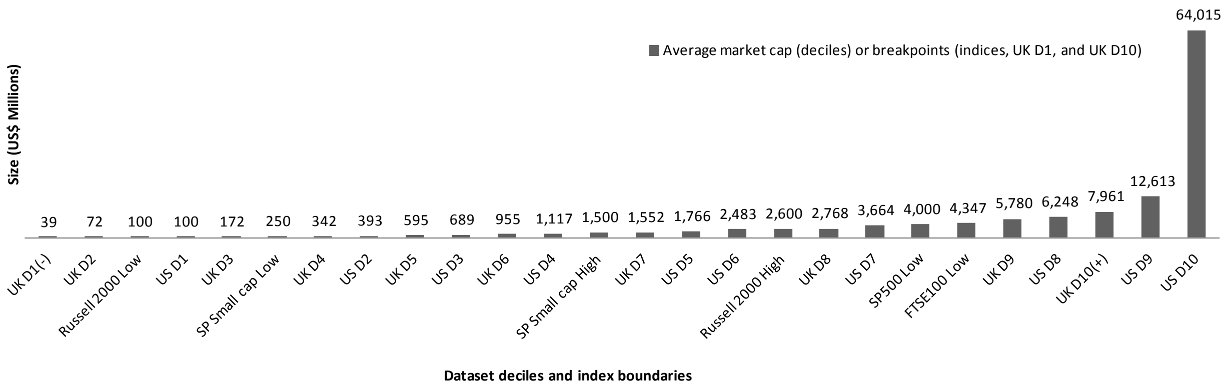

Figure 1. Size (market cap) for the UK, US, and market indices. The picture displays the average market cap in each UK and US deciles and how they compare to each other and to the ranges of the Russell 2000, S&P Small cap, FTSE 100 and S&P 500 indices. The UK deciles are UK D1, UK D2,..., UK D10, and the US deciles are US D1, US D2,..., US D10. All deciles are average market caps, except the first and the last UK deciles that 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; and the number of observations in each sample.

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 (α)	-23.6	-1.94	Intercept (α)	29.4	4.42
Trend (C)	-1.5	-2.33	Trend (C)	-1.0	-7.45
Observations	32		Observations	86	
R^2	0.12		R^2	0.39	

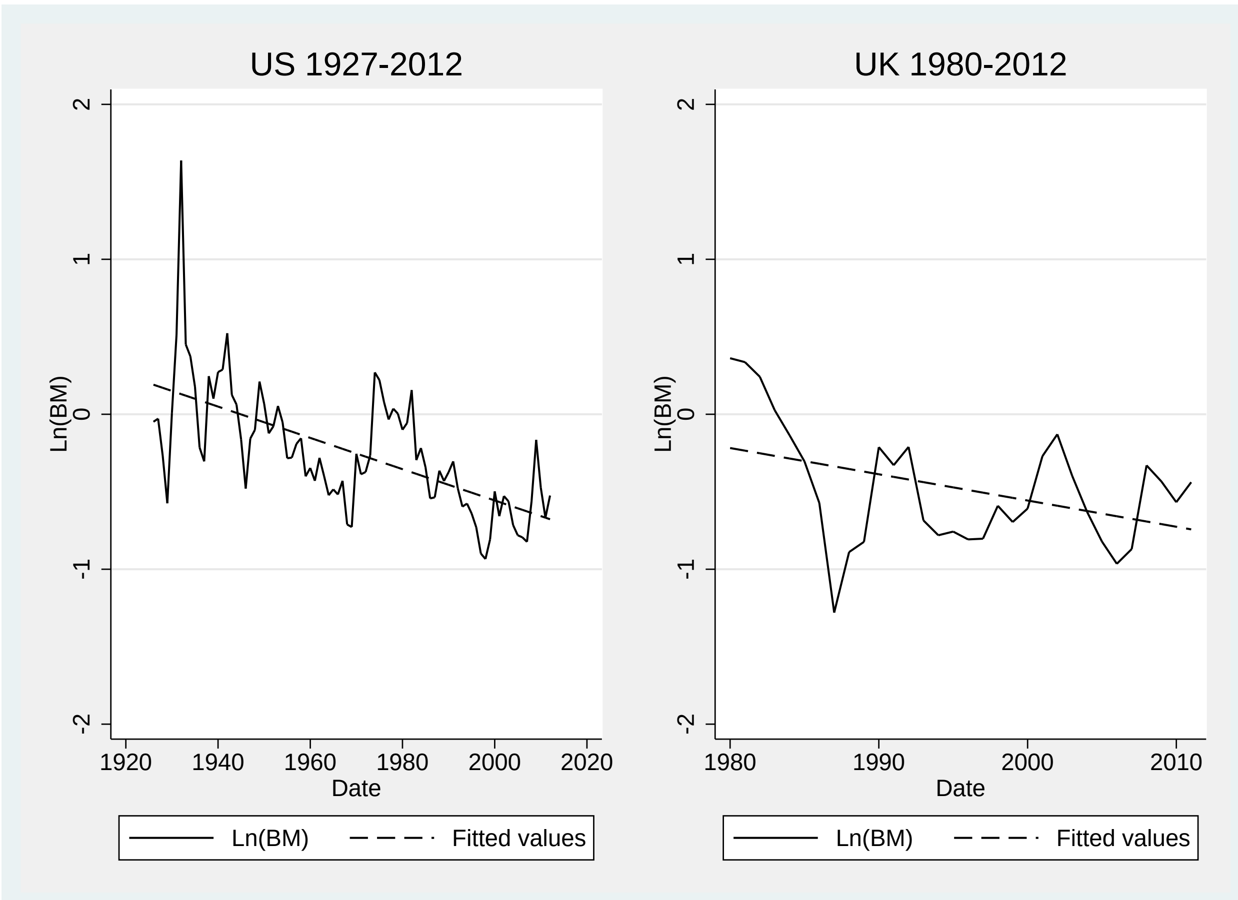

Figure 2. Book-to-market times series in the US and UK. Both panels plot the time series of $\ln(M_{BM,t})$ and the fitted values from equation (1): $\ln(M_{BM,t}) = C + \alpha.t + e_t$. The left panel displays the results from the US 1927-2012 and the right panel from the UK 1980-2011.

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, 3 sub samples US 1927-1963, US 1950-2000, and US 1963-2012; and the UK 1980-2011 sample. The panel splits horizontally into 4 parts: All Years, Low BM years, Medium BM years, and High BM years. "All years" contains the results considering the entire sample period. Low, Medium, and High BM years correspond to the 3 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 is the BM in year t. In the US, 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 UK dataset, the BM values are obtained matching the March year t book value with end of September year t market capitalization. For the US, the Market (premium) is the excess return on the market, value-weight return of all CRSP firms incorporated in the US 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. In the UK, the market premium is the total return on the FTSE All Share Index minus the return on three month Treasury Bills. 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. For the US, the SMB for July of year t to June of $t+1$, includes all NYSE, Amex, and NASDAQ stocks for which there is market equity data for December of t-1 and June of t, and (positive) book equity data for t-1. For the UK, the SMB for October of year t to September of $t+1$ includes only the Main Market stocks and excludes financials, foreign companies and AIM stocks. 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 sample, 3 sub samples US 1927-1963, US 1950-2000, and US 1963-2012; and in the UK 1980-2011 sample. 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 is the BM in year t. In the US, 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 UK dataset, the BM values are obtained matching the March year t book value with end of September year t market capitalization. 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. For the US, the SMB for July of year t to June of $t+1$, includes all NYSE, Amex, and NASDAQ stocks for which there is market equity data for December of t-1 and June of t, and (positive) book equity data for t-1. For the UK, the SMB for October of year t to September of $t+1$ includes only the Main Market stocks and excludes financials, foreign companies and AIM stocks. 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 sample, 3 sub samples US 1927-1963, US 1950-2000, and US 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 is the BM in year t. In the US, 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 UK dataset, the BM values are obtained matching the March year t book value with end of September year t market capitalization. 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. For the US, the SMB for July of year t to June of $t+1$, includes all NYSE, Amex, and NASDAQ stocks for which there is market equity data for December of t-1 and June of t, and (positive) book equity data for t-1. For the UK, the SMB for October of year t to September of $t+1$ includes only the Main Market stocks and excludes financials, foreign companies and AIM stocks. 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 sample, 3 sub samples US 1927-1963, US 1950-2000, and US 1963-2012; and in the UK 1980-2011 sample. 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 4 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 3 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 is the BM in year t. In the US, 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 UK dataset, the BM values are obtained matching the March year t book value with end of September year t market capitalization. For the US, the market premium is the excess return on the market, value-weight return of all CRSP firms incorporated in the US 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. In the UK, the market premium is the total return on the FTSE All Share Index minus the return on three month Treasury Bills. 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. For the US, the SMB for July of year t to June of $t+1$, includes all NYSE, Amex, and NASDAQ stocks for which there is market equity data for December of t-1 and June of t, and (positive) book equity data for t-1. For the UK, the SMB for October of year t to September of $t+1$ includes only the Main Market stocks and excludes financials, foreign companies and AIM stocks. 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 sample, and 2 sub samples US 1927-1963 and US 1950-2000. Table VII complements this table and reports the results for the US 1963-2012 sub sample and the UK 1980-2011. For the US, the size portfolios are for July of year t to June of $t+1$, and include all NYSE, Amex, and NASDAQ stocks for which there is market equity data for December of t-1 and June of t, and (positive) book equity data for t-1. I subtract the one-month Treasury bill rate to calculate the excess returns in the US. For the UK, the size portfolios for October of year t to September of $t+1$ include only the Main Market stocks and excludes financials, foreign companies and AIM stocks. I subtract the return on three month Treasury Bills to calculate the excess returns in the UK. All US returns are in US dollars and all UK returns are in GB pounds. The results split horizontally into 4 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 3 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 is the BM in year t. In the US, 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 UK dataset, the BM values are obtained matching the March year t book value with end of September year t market capitalization.

(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 other 2 sub samples US 1927-1963 and US 1950-2000. For the US, the size portfolios are for July of year t to June of $t+1$, and include all NYSE, Amex, and NASDAQ stocks for which there is market equity data for December of t-1 and June of t, and (positive) book equity data for t-1. I subtract the one-month Treasury bill rate to calculate the excess returns in the US. For the UK, the size portfolios for October of year t to September of $t+1$ include only the Main Market stocks and excludes financials, foreign companies and AIM stocks. I subtract the return on three month Treasury Bills to calculate the excess returns in the UK. All US returns are in US dollars and all UK returns are in GB pounds. The results split horizontally into 4 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 3 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 is the BM in year t. In the US, 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 UK dataset, the BM values are obtained matching the March year t book value with end of September year t market capitalization.

(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 2 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 5 size portfolios. $S5 - B5$ correspond to the left hand side of the equation in (6); $S7 - B3$ is the difference between the average intercepts of the 7 smallest and the 3 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 IX complements this table and reports the results for the US 1963-2012 sub sample and the UK 1980-2011.
For the US, the size portfolios are for July of year t to June of $t + 1$, and include all NYSE, Amex, and NASDAQ stocks for which there is market equity data for December of t-1 and June of t, and (positive) book equity data for t-1. All US returns are in US dollars. The results split horizontally into 4 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 3 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 is the BM in year t. In the US, 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 $t - 1$. The market premium in the US is the excess return on the market, value-weight return of all CRSP firms incorporated in the US 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.

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. 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. $S5 - B5$ correspond 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 7 (8 in the UK) smallest and the 3 (2 in the UK) largest size portfolios. 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 VIII complements this table and reports the results for the US 1927-2012 and the sub samples US 1927-1963 and US 1950-2000.
For the US, the size portfolios are for July of year t to June of $t+1$, and include all NYSE, Amex, and NASDAQ stocks for which there is market equity data for December of t-1 and June of t, and (positive) book equity data for t-1. For the UK, the size portfolios for October of year t to September of $t+1$ include only the Main Market stocks and excludes financials, foreign companies and AIM stocks. All US returns are in US dollars and all UK returns are in GB pounds. The results split horizontally into 4 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 3 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 is the BM in year t. In the US, 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 UK, the BM values are obtained matching the March year t book value with end of September year t market capitalization. For the US, the market premium is the excess return on the market, value-weight return of all CRSP firms incorporated in the US 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. In the UK, the market premium is the total return on the FTSE All Share Index minus the return on three month Treasury Bills.

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 2 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 is the BM in year t. In the US, 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 $t-1$. 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. $S5 - B5$ correspond to the left hand side of the equation in (6); $S7 - B3$ is the difference between the average intercepts of the 7 smallest and the 3 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.
For the US, the size portfolios are for July of year t to June of $t+1$, and include all NYSE, Amex, and NASDAQ stocks for which there is market equity data for December of t-1 and June of t, and (positive) book equity data for t-1. All US returns are in US dollars. The market premium in the US is the excess return on the market, value-weight return of all CRSP firms incorporated in the US 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.

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 is the BM in year t. In the US, 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 UK, the BM values are obtained matching the March year t book value with end of September year t market capitalization. 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. $S5 - B5$ correspond 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 7 (8 in the UK) smallest and the 3 (2 in the UK) largest size portfolios. 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 X complements this table and reports the results for the US 1927-2012 and the sub samples US 1927-1963 and US 1950-2000.

For the US, the size portfolios are for July of year t to June of $t+1$, and include all NYSE, Amex, and NASDAQ stocks for which there is market equity data for December of t-1 and June of t, and (positive) book equity data for t-1. For the UK, the size portfolios for October of year t to September of $t+1$ include only the Main Market stocks and excludes financials, foreign companies and AIM stocks. All US returns are in US dollars and all UK returns are in GB pounds. For the US, the market premium is the excess return on the market, value-weight return of all CRSP firms incorporated in the US 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. In the UK, the market premium is the total return on the FTSE All Share Index minus the return on three month Treasury Bills.

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