The pricing of corporate foreign trade risk

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Abstract

We show that across firms, the risk of exposure to foreign trade is priced. First, the ratio of firms' foreign sales (*FSratio*) is positively priced across stocks after controlling for other stock characteristics. A return factor of high-minus-low-*FSratio* stocks (*HMLFS*) generates a positive and significant risk-adjusted return (*alpha*). Second, we propose the return exposure to *HMLFS*, β_{HMLFS}, as the stock's systematic risk of foreign trade and expand the analysis to all firms, which includes those that are indirectly exposed to foreign trade. In an augmented CAPM, β_{HMLFS} is positively and significantly priced in the cross section.

Keywords: *exchange rate exposure*; *risk*; *asset pricing*; *export, foreign sales*.
JEL Classification: *M4*; *G12*; *G14*.

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1. Introduction

The exposure risk of firms that engage in foreign trade is elusive. The obvious measure – the exposure coefficient (*beta*) of stock returns to foreign exchange changes – has been found to be insignificant for exporting firms, and the cross-sectional relation between this *beta* and stock returns is found to be insignificant and non-monotonic. This is the "exposure puzzle" discussed in Bartram and Bodnar (2007) and Bartram, Brown and Minton (2010). (The evidence is reviewed below.) Exchange rate risk can be hedged, at least partially, but foreign trade risk goes beyond exchange rate risk and exists even in a regime of *fixed* exchange rates. This risk results from changes in prices of goods and services abroad, shocks to foreign demand and supply and shocks to relative production costs. This risk is borne not only by those firms observed to be engaged in foreign trade but also by firms that *indirectly* engage in foreign trade by doing business with exporting firms, e.g.. by supplying exporters with goods and services.

In this paper we propose a way to measure firms' exposure to systematic foreign trade risk and test whether this systematic risk is priced. Briefly, we find that stocks with higher systematic risk (*beta*) of a return factor based on firms' foreign sales (export sales plus foreign subsidiaries' sales) have significantly higher returns in a CAPM that includes the common risk factors of Fama and French (1993) and Carhart (1997) and a global return factor. This *beta* risk is priced for Fama and French's 100 (and 25) stock portfolios sorted on size and book-to-market ratio, for Fama and French's industry portfolios, and for individual stocks.

We begin our analysis with firms with foreign sales, which constitute about half of all firms in our sample. These firms are exposed to foreign trade risks resulting from foreign demand and foreign prices, which affect their sales and their value even if their currency risk were hedged. We find that firms with larger foreign sales ratio out of total sales (*FSratio*) have higher expected return after controlling for other firm characteristics. We then construct a return factor of high-minus-low *FSratio*-firms called *HMLFS*. We find that *HMLFS* has a positive and significant risk-adjusted excess return (*alpha*) after controlling for the risk factors of Fama and French (1993) and Carhart (1997) and the global market excess return.

The *HMLFS* factor enables us to measure the exposure of *all* firms to foreign trade risk by β_{HMLFS}, their return exposure to this factor. Naturally, returns of firms with high foreign sales will have positive β_{HMLFS}. But positive β_{HMLFS} will also apply to firms whose business is positively associated with that of firms with foreign sales, such as suppliers of goods and services to exporting firms. Such firms, while not having themselves foreign sales, are *indirect* exporters. Thus, by estimating the firms' β_{HMLFS} we account for the exposure of *all* firms to foreign trade risk even if we cannot directly observe the extent of their involvement in foreign trade.

We test whether β_{HMLFS}, the systematic risk of *HMLFS*, is priced in the context of a CAPM that includes our new factor *HMLFS*, the Fama-French (1993) and Carhart (1997) factors and the global market (MSCI) excess return. We employ three sets of test assets: (i) Fama-French's 100 portfolios of stocks sorted on size and book-to-market ratio; (ii) Fama-French's 43 industry portfolios (48 industries excluding financials and utilities); and (iii) all single stocks on CRSP that satisfy our data requirements. We estimate the factors' βs and then do cross-section Fama-MacBeth (1973) regressions of portfolio or stock returns on these factors' βs. We obtain that the coefficient of β_{HMLFS} is positive and statistically significant for all three sets of test assets, suggesting that the foreign-trade systematic risk is priced. Given that *HMLFS* is a factor that can be feasibly constructed, investors can combine stocks with positive and negative β_{HMLFS} to hedge this factor's risk.

We conduct a number of "horse-races" between the cross-sectional effect of β_{HMLFS} and the effects of related measures. The coefficient of β_{HMLFS} remains positive and significant even after including in the cross-section model the stock characteristic *FSratio*. This implies that the systematic risk of the *HMLFS* factor is priced in addition to the pricing of the stock characteristic *FSratio*. We also add to the cross-section model the (conditional) β of the U.S. dollar exchange rate changes. While this β has insignificant effect on the cross section of stock returns (as other studies have found), the coefficient of β_{HMLFS} remains positive and significant. Our results also remain significant when estimating the model using the Fama-French 25 (5x5) portfolios sorted on size and book-to-market ratio and using portfolios of stocks grouped by their 2-sigit SIC code.

Finally, we find that stocks with greater exposure to *HMLFS* are indeed exposed to foreign trade systematic risk. We document a positive and significant relation between U.S. export price changes and the returns on high-β_{HMLFS} stocks, after controlling for the effect of foreign exchange changes on export prices. As pointed out, high-β_{HMLFS} stocks include not only direct exporters but also firms that are suppliers to exporting firms or benefit from them indirectly. Thus, our method identifies a broad group of firms that are affected by foreign trade risk beyond those that have foreign sales.

Earlier empirical studies on the effect of *exchange rates* on stock returns usually find an economically small and typically statistically insignificant correlation between exchange rate changes and returns on exporting firms.[1] Bartram and Bodnar (2007) call this "the exchange rate exposure puzzle" and suggest that results from "the endogeneity of operative and financial hedging at the firm level" (p. 642). For example, firms utilize financial means – such as foreign debt and derivatives – to hedge exchange rate risks or utilize operational means to do this.[2] We contend that it is almost infeasible to hedge against a fall in prices of products sold abroad or against a decline in the quantity demanded there due to a fall in demand or change in supply. We differ from the other studies in that we introduce a new way to measure exposure to that risk.

Our foreign trade exposure variable, *FSratio*, is related to the analysis of Doidge, Griffin and Williamson (2006). They study firms in 18 countries and find that international sales are the most reliable measure related to exchange rate exposure.[3] While we too find that *HMLFS* is related to exchange rate changes, the correlation between them is only 10%, consistent with the findings of Doidge, Griffin and Williamson (2006) and of Griffin and Stulz (2001). The latter find a small (largely insignificant) effect of foreign exchange rate shocks on industry returns across countries.[4]

The paper proceeds as follows. In Section 2 we present our measure of foreign sales exposure and document its frequency and its relation to other firm characteristics. In Section 3 we test whether foreign sales exposure is priced, employing two different

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[1] The early studies include Jorion (1990), Amihud (1994), Bodnar and Gentry (1993) and Bartov and Bodnar (1994). Bartram and Bodnar (2007) provide a review of the many studies on the subject.
[2] See Geczy, Minton, and Schrand (1997), Allayannis and Ofek (2001), Allayannis, Ihrig and Weston (2001), and Bartram, Brown and Minton (2010).
[3] Doidge, Griffin and Williamson (2006) examine the contemporaneous relation between exchange rate changes and stock returns, but they do not study how exposure to foreign sales affects stock *expected* returns.
[4] In recent research on the cross-sectional pricing of exchange rate exposure, Kolari, Moorman, and Sorescu (2008, p. 1074; our emphasis) find that "stocks most sensitive to foreign exchange risk (in *absolute* value) have *lower* returns than others. This implies a non-linear, *negative premium for foreign exchange risk*." Apergis, Artikis, and Sorros (2011) find a non-monotonic inverse U-shaped relation of stock returns to foreign exchange sensitivity for German stocks. We find a *positive* relation between stocks' excess return and exposure to foreign sales risk, of which foreign exchange risk is only a small part.

methods – cross-section regression and testing a factor of high-minus-low foreign trade portfolio returns. Section 4 tests whether the *systematic risk* (β) of foreign trade exposure is priced. In section 5 we conduct several robustness tests. Section 6 offers concluding remarks.

2. Data, Variable Definition and Descriptive Statistics

We measure foreign sales exposure by $FSratio_{j,t}$, the Foreign Sales ratio of firm j in year t,

$$FSratio_{j,t} = ForeignSales_{j,t} / (ForeignSales_{j,t} + DomesticSales_{j,t}) \,. \qquad (1)$$

ForeignSales is the sum of sales from the nondomestic segments of the firm and export sales (the SALEXG variable) from its domestic segments, and *DomesticSales* is sales from the domestic segments minus export sales.[5] Compustat Segment database contains information on sales for geographic segments, both domestic segments and nondomestic segments.[6] For domestic segments, Compustat Segment also reports the information on export sales. Our analysis is for the years 1977-2011 (returns data are up to 2012), the starting year being determined by the availability of accounting data on non-domestic sales. Financial Accounting Standard (SFAS) No. 14, *Financial Reporting for Segments of a Business Enterprise*, was issued in December 1976 and became effective for

[5] SALEXG represents the revenue generated by the export of domestically produced goods and/or services to customers from outside of a company's home country. Ideally, we would have liked to use *net* foreign sales by subtracting foreign purchases, but data on the latter are unavailable. Foreign income, for which data exist, can be manipulated for tax and other purposes (there is an unresolved issue with transfer pricing) and it does not include export-related income.

[6] We classify total sales made by a geographic segment into domestic or nondomestic based on the GEOTP variable. GEOTP has three possible values: 1 indicating Total Foreign (no longer used), 2 indicating Domestic, and 3 indicating NonDomestic. We drop the 31 observations that are classified into 1.

financial statements for fiscal years beginning after December 15, 1976.[7] Among other things, it required information on sales to be reported on a geographic basis for those companies having foreign operations and export sales.

Data on stock returns and market capitalization are obtained from the CRSP database. We exclude the finance industry (SIC codes 6000-6999), the utility industry (SIC codes 4900-4999), and firm-years where domestic or foreign sales are negative (19 firm-years or 125 firm-months). We also delete firm-months where the market value of equity is below $10 million or the stock price is below $1 (as observed in the end of previous month). The final sample contains 102,519 firm-years and 1,105,432 firm-months. From Kenneth French's database we obtain data on the Fama-French (1993) and the Carhart (1997) factors, the returns on 100 (10x10) portfolios classified by size and by book-to-market ratio, and the returns on the Fama-French 48 industry portfolios, from which we exclude financial industries (Banking, Insurance, Real Estate, and Trading) and the Utility industry.

INSERT TABLE 1

Table 1 reports the summary statistics for *FSratio*. The fraction of firms with positive *FSratio* decreases from 51.2% in 1977 to below 40% in the mid-1980s and then increases to 67.3% in 2011. The mean (median) of *FSratio* for the subsample of firms engaged in foreign sales decreases from 30.0% (22.1%) in 1977 to around 20% (17%) in the mid-1980s, and then rises to 41.3% (38.2%) in 2011. This increase is consistent with the expansion of foreign trade in the recent decades and the upward trend in global diversification of U.S. industrial firms observed by Denis, Denis, and Yost (2002).

[7] SFAS No. 14 was superseded in June 1997 by SFAS No. 131, *Disclosure about Segments of an Enterprise and Related Information*. Berger and Hann (2003) find that the new standard increased the number of reported segments and provided more disaggregate information.

We begin by examining the relation between $FSratio_{j,t}$ and the characteristics of stock *j* in each month *t*: $\beta_{j,t}$ (systematic risk), $Size_{j,t}$, $BM_{j,t}$, $R11_{j,t}$ and $IVOL_{j,t}$ (idiosyncratic risk). β is the slope coefficient from a regression of a stock's monthly excess return on the market's excess return, *RMrf*, estimated over a rolling window of 60 months (minimum of 24 observations) up to month *t*. *Size* is the market capitalization, the product of stock price and number of shares outstanding. *BM* is the book-to-market ratio, calculated as in Fama and French (1992) as the ratio of the firm's book value of equity at the end of the fiscal year to its market capitalization at the end of December.[8] *Size* and *BM* are in natural logarithm. *R11* is the buy-and-hold eleven-month compounded return from month *t-12* up to month *t-2*. $IVOL_{j,t}$ is calculated, following Ang, Hodrick, Xing, and Zhang (2006), as the standard deviation of the residuals from a regression in each month *t* of the stock excess daily returns on the daily returns of the Fama and French (1993) factors $RMrf_t$, SMB_t and HML_t. We follow the convention of Fama and French (1992) and apply accounting data reported in calendar year *t* to return data over the twelve months beginning in July of year *t+1* to June of year *t+2*. We begin our analysis of stock returns from July 1978, using the year-end accounting statement for 1977, and end on December 2012 using year-end accounting data for 2011; there are altogether 414 months in our sample. Variables for each month *t* are their values known as of the end of month *t-1*.

INSERT TABLE 2

[8] Book equity is calculated following Fama and French (2008). It is equal to total assets (Compustat data item 6), minus liabilities (181), plus balance sheet deferred taxes and investment tax credit (35) if available, minus preferred stock liquidating value (10) if available, or redemption value (56) if available, or carrying value (130). Negative *BM* observations are deleted.

Table 2 presents the pairwise cross-stock correlation coefficients between seven variables that include $NoFS_{j,t}$, a dummy variable that equals 1 if $FSratio_{j,t} = 0$. The numbers presented are the time series means of the month-by-month cross-stock correlations between these variables. We observe that larger firms have higher ratio of foreign sales: *FSratio* and *NoFS* have their highest correlation (in absolute value) with *Size*, 0.247 and -0.212, respectively. We therefore control below for firm size when constructing our *FSratio*-based return factor. The pairwise correlations between *FSratio* and other variables are generally small in absolute value.

3. Effect of foreign sales exposure on expected return

3.1. Cross-section test using foreign sales ratio and other firm characteristics

We first test whether returns are higher for stocks with greater *FSratio*. The test employs cross-section Fama-MacBeth regressions of individual stock monthly excess returns $R_{j,t}$ (in excess of the risk-free rate) on $FSratio_{j,t-1}$, controlling for $\beta_{j,t-1}$, $Size_{j,t-1}$ (in logarithm), $BM_{j,t-1}$ (in logarithm), $R11_{j,t-1}$ and $IVOL_{j,t-1}$ (the values of the right-hand-side variables are known at the end of month *t-1*). Stock returns are adjusted for delisting.[9]

INSERT TABLE 3

The results are presented in Table 3. Columns (1) and (2) present the results for the entire sample period 7/1978-12/2012 (414 months), and columns (3) and (4) present the results for two, (approximately) equal, subperiods: 7/1978-12/1995 and 1996-2012.

[9] In case of delisting, if the delisting code is 500, 520, 551-573, 580, 574 or 584, we set the delisting return to be -30%, as in Shumway (1997). Otherwise, if monthly return on CRSP is available, we aggregate monthly return and delisting return as the last return. If monthly return on CRSP is not available, we use the delisting return as the last return of a stock. Results are similar without the delisting return adjustment.

The table presents the mean and *t*-statistic of the estimated coefficients of stock characteristics. For the coefficients of *FSratio*, which are the focus of our study, we add the following statistics:

(i) The median and test result of whether it is significantly different from zero, using Wilcoxon signed-rank test;

(ii) *NW t*-statistic, calculated by the Newey-West (1987) procedure with one lag. This is because the serial correlation of the monthly coefficients of *FSratio* is 0.20 with *t* =4.12. (Higher-order correlations are insignificant.)

(iii) *Pos/Neg*, the number of positive and negative coefficients.

(iv) The weighted mean; the weights are the reciprocal of the estimated standard errors, meaning that coefficients that are less-precisely estimated receive lower weight. This procedure follows Ferson and Harvey (1999, Appendix A) who propose it to correct for potential heteroskedasticity in the Fama-MacBeth estimations.

The results in Table 3, column (1) show that *FSratio* is positively and significantly priced for the entire period and for both subperiods. The mean coefficient of *FSratio* for the entire period is 0.554 with *t* = 2.89, or *t* = 2.64 by *NW*. The median coefficient of *FSratio* is 0.526, quite close to the mean. The economic significance of the estimated coefficient is illustrated as follows. In 2011, the inter-quartile range of *FSratio* among firms with positive ratio was 0.427 (= 0.601-0.174). A mean coefficient of 0.554 implies a difference in expected return of 0.237% per month (= 0.554*0.427) or 2.84% per year, after controlling for other stock characteristics. This is meaningful when compared, for example, with the annual premium on the *HML* factor which is about 4%

during the same period. The return-*FSratio* relation is stable over time: the means and medians of the coefficients are close in magnitude over the two subperiods; see columns (3) and (4) of Table 3. In Column (2) we include the dummy variable *NoFS* to account for a possible pricing effect of having no foreign sales. Its coefficient is negative with weak statistical significance (t = 1.70) while the coefficient of *FSratio* remains statistically significant. The estimated coefficients of *NoFS* for subperiods I and II (which we do not tabulate) are -0.105 (t = 1.63) and -0.066 (t = 0.85), respectively. Below we show that the excess return of the portfolio of *NoFS* stocks is not distinguishably different from that of the lowest- *FSratio* portfolio, that is, there is no significant shift in the valuation of *NoFS* stocks compared with stocks with the lowest *FSratio*.

The coefficients of the control variables have their well-known signs and they are generally significant except for the coefficient of β which is positive (as expected) but statistically insignificant. *Size* (in log) has negative and significant coefficients, the coefficients of *BM* (in log) are positive and significant, the coefficients of *R11* (which captures the momentum effect) are generally positive and significant (insignificant in the second subperiod), and the coefficients of *IVOL* are negative and significant as in Ang, Hodrick, Xing, and Zhang (2006).

Overall, the results support the hypothesis that corporate foreign sales exposure is priced in the U.S. capital market.

3.2. The factor HMLFS, High-Minus-Low Foreign Sales, and its risk-adjusted return

3.2.1. Portfolio formation

We test whether foreign sales exposure is priced by comparing the risk-adjusted excess returns on portfolios of stocks sorted on their *FSratio*.[10] The formation of stock portfolios follows Fama and French (1993) in constructing their *HML* factor (high-minus-low book-to-market stocks). Portfolio construction begins in July of each year and lasts for 12 months with rebalancing in July of the following year. To control for the effect of firm size, which is correlated with *FSratio* (see Table 2), we first divide our sample stocks into three size groups. The size breakpoints are based on NYSE listed companies only, and size (market capitalization) is as of the end of June of each year. Within each size tercile, we sort stocks by their *FSratio* of the preceding year into six portfolios: one containing stocks with *FSratio* = 0 and five quintile portfolios, where quintile 1 (5) is of stocks with the lowest (highest) *FSratio*.[11] For each of the three size groups, the quintile portfolios have the same number of stocks. We then calculate the average returns within each portfolio.[12] Finally, we average the portfolio returns across the three different size groups. For example, the return of portfolio 5 is the average of the three portfolio returns of the fifth *FSratio* quintile across the three size groups. The average return of each portfolio is either value weighted (VW), using the stock market capitalization at the end of the previous month, or return-weighted (RW), which is similar to equal weighting with correction for potential bias due to market microstructure noise. The weights are (1 + the stock's lagged monthly return); see Asparouhova, Bessembinder and Kalcheva (2010, 2013).

[10] For brevity, we do not report the excess return (raw return in excess of the U.S. risk free rate) of these portfolios here. The results are robust and can be found in the Table A1 of the Appendix.

[11] We follow Fama and French (1993) who, when constructing stock quintile portfolios by the earnings/price ratio or dividend/price ratio have one portfolio of all stocks for which these ratios are zero (or negative for earnings), and then five quintile portfolios of stocks ranked by these ratios.

[12] Returns are, again, adjusted for delisting.

3.2.2. Risk-adjusted excess return (alpha) of portfolio sorted on foreign sales

Having constructed portfolios of stocks sorted by their *FSratio*, we construct the *HMLFS* factor, the return on "*High-Minus-Low Foreign Sales*" portfolios, $HMLFS_t = R_{5,t} – R_{1,t}$ (portfolio 5-1). We regress the monthly excess return $R_{p,t} - rf_t$ of portfolio p (p = 0, 1, … 5 and 5-1) on the following five-factor model:

$$R_{p,t} - rf_t = alpha_p + \beta_{RMrf,p}RMrf_t + \beta_{SMB,p}SMB_t + \beta_{HML,p}HML_t + \beta_{UMD,p}UMD_t + \beta_{MSCIr,p}MSCIr_t + \varepsilon_{p,t} \; . \qquad (2)$$

This is the factor model of Fama and French (1993) and Carhart (1997), augmented by a global excess return factor *MSCIr* which is orthogonalized: we use the residuals (plus intercept) from a regression on $RMrf_t$ of the U.S. dollar denominated return on the MSCI index in excess of the U.S. risk-free rate. (The slope coefficient is 0.830, R^2 = 0.752.) We call model (2) the FFCM model.

We expect $alpha_p$, the risk-adjusted excess return, to be larger for portfolios of stocks with higher *FSratio*, which is associated with foreign sales risk.

INSERT TABLE 4

Table 4 presents the estimated $alpha_p$. The *alpha* of the portfolio *HMLFS* (portfolio 5-1), denoted $alpha_{5\text{-}1}$, is positive and statistically significant for the entire period and for each of the two subperiods. It is 0.256% with t = 2.56 (0.273%, t = 2.83) for VW (RW) monthly returns, respectively, which implies an annual excess return of 3.1% (3.3%). This is economically significant when compared, for example, with the *HML* mean annual return of 3.7% for this period. For portfolio *5-0*, $alpha_{5\text{-}0}$ is also positive and statistically significant. It is 0.280% (t = 2.59) for VW returns and 0.278% (t

= 2.86) for RW returns. Notably, $alpha_0$ is practically zero for nearly all estimations and it is not significantly different from $alpha_1$.

The $alpha_p$ intercepts generally rise in p, and while $alpha_5$ is slightly lower than $alpha_4$ it is still significantly higher than $alpha_1$. In the second subperiod, 1996-2012, $alpha_p$ rises monotonically in p. We observe in Section 4 that in the recent subperiod there is stronger effect of foreign sales exposure on expected return.

The slope coefficients (βs) of the four FFCM factors are presented in Panel B of Table 4, estimated in a regression where *HMLFS* is the dependent variable. Naturally, the coefficient of the global factor *MSCIr* is positive and significant. Its greater magnitude in the second subperiod reflects the greater global activity of U.S. companies in the recent period. On the other hand, *HMLFS* has little sensitivity to domestic market conditions as reflected in the generally insignificant coefficients of *RMrf*. As for the other factors, β_{HML} is positive and significant. β_{SMB} is statistically insignificant, perhaps because we control for size when constructing the portfolios. β_{UMD} is positive in the whole period but it is not consistently positive, being negative in the first subperiod.

In Panel C we test the effect on *HMLFS alpha* of adding to the FFCM model the factor *HMLfx*, the return on high-minus-low interest rate currencies, constructed by Lustig, Roussanov and Verdelhan (2011) for the period 11/1983-5/2010.[13] To save space, we present only the intercepts $alpha_{5-1}$ and the coefficients of *HMLfx*. We obtain that $alpha_{5-1}$ remains positive and significant for the entire period after controlling for *HMLfx*. The point estimates of $alpha_{5-1}$ is similar in both subperiods, though in the second subperiod $alpha_{5-1}$ is only weakly significant for VW returns (t = 1.71). The slope

[13] Data for this factor is kindly provided by the authors.

coefficient (β) of *HMLfx* is insignificant in the first subperiod and positive and significant in the second subperiod. This demonstrates – as with the higher second-period coefficient of *MSCIr* – the greater importance of global factors on firms that engage in foreign trade.

To obtain *out-of-sample* $alpha_t$ we regress $HMLFS_t$ (VW) on the FFCM factor returns over 48 months up to month *t*-1, then for month *m* we calculate $alpha_t$, the difference between $HMLFS_t$ and the predicted value of $HMLFS_t$, using month-*t*'s FFCM factor returns and their estimated coefficients from the preceding 48-month rolling regression. We plot the time series of $alpha_t$ in Figure 1 and presents statistics of $alpha_t$ in Panel D.

INSERT FIGURE 1

The mean out-of-sample $alpha_t$ is 0.416 (t = 3.70) and the fraction of positive values of $alpha_t$ is 0.563, significantly greater than the chance result of 0.50 ($p < 0.01$). The means of $alpha_t$ for the first and second subperiods are 0.391 (t = 3.14) and 0.436 (t = 2.48), respectively. Notably, the magnitudes are similar in both subperiods.

Finally, we test the effect of change in the U.S. dollar exchange rate on *HMLFS*. Together with shocks to foreign demand, foreign supply and foreign prices, it is expected to affect firms with foreign sales. We add to the FFCM model (2) the variable dFX_t, the monthly percent change in the U.S. foreign exchange index over the month.[14] *FX* is the price of U.S. dollar in foreign currency, so higher value means dollar appreciation. We expect the coefficient of *dFX* to be negative: Firms with higher foreign sales benefit when the dollar depreciates, i.e., when $dFX < 0$. This is what we obtain (see Appendix Table A2). The coefficient of dFX_t is -0.113 with t = 1.91 for VW *HMLFS* returns and -0.158

[14] The percent change is month-end to month-end. Source: the Trade Weighted Exchange Index, TWEXBMTH, available from the Federal Reserve Bank of St. Louis.

with t = 2.79 for RW *HMLFS* returns. These estimates are consistent with those of Marston (2001) and of Doidge, Griffin and Williamson (2006). However, when estimated separately in each subperiod, the coefficients of dFX_t are insignificant as in Amihud (1994) and Bartov and Bodnar (1994), and the contribution of *dFX* to the regression's R^2 is very small: it rises from 0.306 to 0.313 for VW returns. The intercept *alpha* of *HMLFS* remains positive and significant in all regressions.

4. Pricing of the systematic risk (β) of *HMLFS*, the foreign sales exposure factor

Our first set of tests demonstrates that stock returns are higher for firms with higher *level* of foreign sales ratio, *FSratio*. This has been a test of the effect of a *stock characteristic* on expected return, assuming that higher level of *FSratio* implies higher risk which is priced. In this section we perform our second set of tests by using *HMLFS* as a *risk factor* to test whether β_{HMLFS} – the systematic risk associated with foreign sales – is priced across stocks.

4.1. Data and outline of the estimation procedure

We use three sets of data, the first two obtained from the data library of Kenneth French and the third from CRSP:

(i) 100 (10x10) portfolios of stocks that are sorted independently into 10 size groups and 10 book-to-market (BM) ratio groups.

(ii) 43 industry portfolios which are the 48 industry portfolios of Fama and French, excluding four finance industry portfolios (banking, insurance, real estate and trading) and one utility industry portfolio.

(iii) Stock of industrial firms that satisfy the requirements described in constructing the sample for Tables 2, 3 and 4.

We employ Fama and MacBeth's (1973) two-step procedure. First, we estimate for each portfolio or stock *j* the time series regression of the FFCM model, augmented by *HMLFS*:

$$R_{j,t} - rf_t = alpha_j + \boldsymbol{\beta_{HMLFS,j} HMLFS_t} + \beta_{RMrf,j} RMrf_t + \beta_{SMB,j} SMB_t + \beta_{HML,j} HML_t + \beta_{UMD,j} UMD_t + \beta_{MSCIr,j} MSCIr_t + \varepsilon_{i,t} \quad (3)$$

$R_{j,t} - rf_t$ is the monthly return on portfolio or stock *j* in month *t* in excess of the one month T-bill rate. The slope coefficients $\beta_{K,j}$, K = *HMLFS, RMrf, SMB, HML, UMD* and *MSCIr*, are estimated over a window of 60 months (we require a minimum 24 of observations) which is rolling month by month.

INSERT TABLE 5

Table 5 presents statistics of the estimated $\beta_{HMLFS,j}$ for the three data sets. It includes the mean, median and cross-section standard deviation of $\beta_{HMLFS,j}$ across the portfolios or stocks starting from 6/1983 and ending in 11/2012. We present the average of the monthly series of these three statistics over the 354 sample months. The mean $\beta_{HMLFS,j}$ is close to zero for all three data sets because it is estimated from a multiple regression that controls for the effects of the market as well as four other factors, thus it reflects the *conditional* covariance of the test assets with *HMLFS*. That is, $\beta_{HMLFS,j}$ is the exposure of one test asset to foreign trade risk relative to the exposure of the entire market to the *HMLFS* risk. The average cross-section standard deviation is naturally larger for individual stocks than for portfolios, and it is larger for stock portfolios sorted by industry than for stock portfolios sorted by size and book-to-market ratio.

We expect that across industries, β_{HMLFS} and *FSratio* are positively correlated, and this is indeed what we find. In each year (July to June) we estimate β_{HMLFSn} for each industry *n* and for each month (estimating model (3) over the past 60 months), using the value weighted industry returns (data are from Ken French's website). We also calculate across the industry's constituent firms the monthly value-weighted average of $FSRatio_n$ (the firm's *FSratio* remains constant through the year). Averaging the monthly estimates over the months of each year *y* we obtain 43 annual estimates of $\beta_{HMLFSn,y}$ and average $FSratio_{n,y}$. We then calculate the annual cross-industry correlation, Corr($\beta_{HMLFSn,y}$, $FSratio_{n,y}$) for each year *y* and average these estimates over the 30 sample years. We obtain that the average Corr($\beta_{HMLFSn,y}$, $FSratio_{n,y}$) is 0.276. The positive β_{HMLFS}-*FSratio* cross-industry correlation remains unchanged after adding to model (3) the variable dFX_t, the exchange rate changes and estimating its coefficient β_{dFXn}. Then, Corr($\beta_{HMLFSn,y}$, $FSratio_{n,y}$) is 0.277 and Corr($\beta_{dFXn,y}$, $FSratio_{n,y}$) is -0.081. The low value of Corr($\beta_{dFXn,y}$, $FSratio_{n,y}$) is consistent with the results of Amihud (1994) and Bartov and Bodnar (1994) on the weak relation between the β of exchange rate changes for stocks of exporting firms. Below, we test the effects of both βs on the cross section of stock returns.

4.2. Second-step Fama-MacBeth cross-section estimations

Using $\beta_{K,j,t-1}$ that are estimated up to month *t-1*, *K = HMLFS, RMrf, SMB, HML, UMD* and *MSCIr*, we estimate for each month *t* the following cross-section regression:

$$R_{j,t} - rf_t = \lambda_{0,t} + \lambda_{HMLFS,t}\beta_{HMLFS,j,t-1} + \lambda_{RMrf,t}\beta_{RMrf,j,t-1} + \lambda_{SMB,t}\beta_{SMB,j,t-1}$$

$$+ \lambda_{HML,t}\beta_{HML,j,t-1} + \lambda_{UMD,t}\beta_{UMD,j,t-1} + \lambda_{MSCI,t}\beta_{MSCIr,j,t-1} + \nu_{j,t} \qquad (4)$$

We thus estimate *K* time series of $\lambda_{K,t}$ for which we calculate the mean and *t*-statistics. Our hypothesis is that $\lambda_{HMLFS} > 0$, i.e., expected return is increasing in β_{HMLFS}, the systematic risk of exposure to foreign sales. For the series $\lambda_{HMLFS,t}$ we add the following statistics: Median, weighted mean (the weights are the reciprocal of the coefficients' standard errors, thus greater weight means greater precision), *Pos/Neg* and a binomial test of whether the proportion of positive coefficients is significantly different from 0.50, the chance result.

INSERT TABLE 6 HERE

Table 6 reports the results of the second-step Fama-MacBeth procedure for the three data sets. Estimates are shown for the entire sample period, 7/1983 – 2012 (the first 60 months are used to estimate the first coefficients $\beta_{K,t-1}$) and for the two subperiods, 7/1983-12/1995 and 1996-2012. (The breakpoint is as in Table 4.)

Our hypothesis that λ_{HMLFS} is positive and significant is supported for *all* three data sets for the entire period; see columns (A1), (B1) and (C1). The mean λ_{HMLFS} is 0.461 and 0.468 in Panels A and B, which use portfolio returns, and it is 0.126 in Panel C which uses individual stock returns. The lower mean λ_{HMLFS} for the individual stocks may result from the well-known downward bias due to the error-in-the-variable (EIV) problem, which is greater when β_{HMLFS} is estimated for individual stocks compared to its estimation for stock portfolios.

As for the subperiods, we observe in Panels A and B that the mean λ_{HMLFS} is higher in the recent period (1996-2012) and quite significant. This may reflect the increasing foreign sales exposure of U.S. companies, documented in Table 1, which might have raised the estimated risk premium λ_{HMLFS}. From Table 1 (and also from Dennis, Dennis and Yost (2002)), we indeed observe an increase in global activity of U.S. corporations over time. In Panel C, column (9) the low estimated mean of λ_{HMLFS} seems inconsistent with this conclusion, although all other statistics for that subperiod show statistical significance. Also, the median is larger by 50% than the mean, suggesting that the mean is affected by negative outliers. Indeed, the low mean λ_{HMLFS} in column (9) is mainly because of a single negative outlier of $\lambda_{HMLFS,t}$, -9.365, which is 6.4 standard deviations below the mean. (It occurs on 1/2001.) Excluding this single estimate, the mean of λ_{HMLFS} is 0.168, closer to the median, with t = 1.83, which is marginally significant. As with the estimates in Panels A and B, this second-subperiod coefficient is larger than that of the first subperiod.

4.3. Out-of-sample alpha of HMLB, high-minus-low β_{HMLFS} portfolios

We sort stocks in each month t by their $\beta_{HMLFS,t-1}$ (estimated over the preceding 60 months) and divide them into five quintiles. We then construct $HMLB_t$, the month-m differential return (value-weighted) between the quintile portfolios with the highest and lowest β_{HMLFS}. We then estimate the rolling out-of-sample monthly $alpha_t$ of the portfolio $HMLB_t$, using the FFCM five-factor model (2) and repeating the procedure used in Table 3, Panel D for $HMLFS_t$. In month t we use the five factor βs, estimated from the past 48 month, and the five factor returns to calculate $HMLB^f_t$, the fitted value of $HMLB_t$. We thus obtain $alpha_t = HMLB_t – HMLB^f_t$. The estimation window is then moved by one month and the procedure is repeated. This produces a time series $alpha_t$ over 306 months from 7/1987 to the end of 2012 (we lose the first 108 observations to estimate β_{HMLFS} and then the βs of *HMLB*).

INSERT TABLE 7

The results are presented in Table 7. The mean $alpha_t$ is 0.505 (t = 2.03), or about 6% annually. The proportion of positive values of $alpha_t$ is 0.559, significantly different from 0.50, the chance result (p = 0.02). The mean $alpha_t$ is practically zero in the first subperiod whereas in the second subperiod it is 0.864 with t = 2.48, which is significant. Notably, the median $alpha_t$ is 0.477, which is close to the mean. The risk premium per unit of β_{HMLFS} can be calculated as follows. The difference between the average β_{HMLFS} (VW) of the top and bottom quintile portfolios is 3.14 and thus the risk premium per unit of β_{HMLFS} is 0.161 (= 0.505/3.14). This is close to 0.126, the slope coefficient of β_{HMLFS} in Table 6, column (C1) from a cross-section regression of individual stock returns on β_{HMLFS} (and other factors' βs).

4.4. Export prices and returns on the high-β_{HMLFS} portfolio

High-β_{HMLFS} firms are naturally those with high foreign sales (*FSratio*). But they also include firms with *indirect and unobserved* foreign sales because they supply goods and services to exporting firms. For example, a supplier of parts to a domestic exporter is naturally affected by the export market for its sales even if its *FSratio* = 0. Even a food business near an exporting firm would benefit if that firm's exports rise and it increases its labor force. Thus, β_{HMLFS} *captures both direct and indirect exposure to exports*.

We now link the stock returns of high- β_{HMLFS} firms (in excess of the risk-free rate), denoted $HiBrf_t$, with $dPexp_t$, the monthly percent change in the prices of "exports (end use): non-agricultural commodities" as defined by the Bureau of Labor Statistics (BLS):

$$dPexp_t = \beta_0 + \beta_{HiB}*HiBrf_{t-1} + \beta_{dFX}*dFX_{t-1} + \beta_{dPexp}*dPexp_{t-1} + \varepsilon_{i,t} , \qquad (5)$$

As before, dFX_t is the change in the U.S. dollar exchange rate, measured in units of foreign currencies. (Adding the five FFCM factor returns to model (5), we obtain that none has a significant coefficient.) The use of calendar-lagged values of *HiBrf* and *dFX* is not intended to estimate causality but to reflect the timing of the observed data, given the convention of the BLS. The export price index is for prices "in the month,"[15] that is, some prices are sampled during the month rather than at its very end. Yet, stock returns and exchange rates are measured on the last day of the month. Thus, $HiBrf_{t-1}$ and dFX_{t-1} are largely contemporaneous with $dPexp_t$. And, since stock prices and exchange rates adjust promptly to information, they reflect information on changes in export prices slightly before these changes are formally sampled by the BLS. Indeed, when we use the contemporaneous values $HiBrf_t$ and dFX_t in model (5), none is significant. The $Pexp_t$ monthly data started to be reported in January of 1989, providing us with 288 monthly observations.

We expect $\beta_{HiB} > 0$, meaning that export price increase benefits high-β_{HMLFS} firms which are engaged in exports, directly or indirectly (e.g., by being suppliers to exporting firms). We naturally expect $\beta_{dFX} < 0$ because the dollar devaluation ($dFX < 0$) raises export prices measured in U.S. dollars. With *dFX* included in the model, β_{HiB} reflects the *dPexp*-*HiBrf* relation after controlling for changes in *dPexp* due to *FX* changes.

The estimation results of model (5) are consistent with our hypotheses: β_{HiB} = 0.024 (t = 4.79), β_{dFX} = -0.061 (t = 4.84) and β_{dPexp} = 0.508 (t = 6.18); R^2 = 0.48. Prices

[15] We confirmed this in communication with the St. Louis Fed's data desk.

of stock with high *HMLFS* exposure rise with export prices, resulting in $\beta_{HiB} > 0$. When we omit dFX_{t-1} from model (5), the estimated value of β_{HiB} rises to 0.033 and its *t*-statistic rises to 5.28. When we replace in model (5) $HiBrf_{t-1}$ by $HMLFS_{t-1}$ we obtain that its coefficient is 0.014 with $t = 1.95$, which is marginally significant. When both $HiBrf_{t-1}$ and $HMLFS_{t-1}$ are in the model, β_{HiB} remains positive and significant (0.024, $t = 4.73$) while the significance of the coefficient of *HMLFS* declines.

We thus show the macroeconomic link between our stock return variable *HiBrf* and the "fundamental" factor that affects it, the export prices change, *dPexp*, after controlling for *FX* changes. Whereas firms can hedge against *dFX* in the financial markets, they can hardly hedge against changes in export prices which reflect macroeconomic conditions in the export destination countries. Indeed, the correlation between *HiBrf* and *dFX* is insignificantly different from zero. On the other hand, as seen from the estimation of model (5), the relation between *HiBrf* and dPexp is positive and significant, as expected.

5. Robustness tests of the pricing of the systematic risk β_{HMLFS}

5.1. Controlling for the stock characteristic FSratio

We examine the joint effects of β_{HMLFS}, the systematic risk of the *HMLFS* factor, and of *FSratio*, the level of foreign sales ratio. Each has been shown to have positive effect on the cross-section of stock returns. This attends to a broader question, raised by Daniel and Titman (1997) in the context of Fama and French's asset pricing models, of whether it is the stock characteristic or the systematic risk associated with this characteristic that is priced in the market.

We re-do the second-step Fama-MacBeth cross-section regression, adding to model (4) the variable $FSratio_{j,t-1}$, the lagged annual foreign sales ratio. Following the Fama-French (1992) convention, we apply $FSratio_j$ from annual reports in one year to the twelve monthly returns beginning in July of the following year. We do the analysis for the three data sets: two sets of portfolios and individual stocks. For the 100 Fama-French portfolios (by size and book-to-market) and for the 43 industry portfolios, the portfolio's $FSratio_j$ is the value-weighted *FSratio* of the portfolio's constituent stocks.

INSERT TABLE 8

Table 8 presents the Fama-MacBeth estimates of the coefficients of β_{HMLFS} and *FSratio*. (To save space, we do not report the coefficients of the other five factors' βs which are included in the cross-section model.) Consider the results for the 100 portfolios based on size and book-to-market, column (A1)-(A3), and for the 43 industry portfolios, columns (B1)-(B3). The coefficients of *FSratio* are statistically insignificant, while the coefficients of β_{HMLFS} and their statistical significance are similar to those in the respective columns in Table 6. This means that β_{HMLFS} is the main determinant of the cross section pricing of stock.

For individual stocks, columns (C1)-(C3), *FSratio* has positive and significant coefficient for the entire sample period and for the subperiod I, while it is positive and insignificant for subperiod II. The coefficients of β_{HMLFS} present a similar pattern and as before in Table 6, Panel C, and they are little changed from those reported there. When using the weighted mean, in which more-precisely estimated coefficients have greater weight, the effect of β_{HMLFS} is positive and significant throughout while the effect of *FSratio* is more weakly significant. ###

These results, especially those for stock portfolios, demonstrate that β_{HMLFS} is a more comprehensive measure of firms' exposure to foreign trade risk than *FSratio*, which accounts only for directly-observed foreign trade but not for the indirect exposure to foreign trade.

5.2. Testing the effect of the systematic risk of dFX, the change in exchange rate

We replicate the testing procedure using a *seven*-factor model that includes *FFCM* (five factors), *HMLFS* and *dFX*, the latter being the monthly change in the U.S. foreign exchange index (the price of foreign currencies in U.S. dollars). Other studies use *dFX* to estimate the firm exposure to foreign trade risk,[16] while we sugest to measure this exposure with the factor *HMLFS*. The augmented cross-section model (4) includes β_K where K = *RMrf, SMB, HML, UMD, MSCIr, HMLFS* and *dFX*. The results of the second-pass Fama-MacBeth regressions are in Table A3 of the Appendix. We obtain that the mean coefficient of β_{dFX}, denoted λ_{dFX}, is insignificantly different from zero. When estimated in the context of columns (A1), (B1) and (C1) in Table 6, we obtain that the mean λ_{dFX} is, respectively, -0.037 (t = 0.28), 0.141 (t = 0.74) and -0.031 (t = 0.83). The estimated means of λ_{HMLFS} in these models hardly change: They are 0.416 (t = 3.29), 0.447 (t = 2.68) and 0.129 (t = 2.09) in columns (A1), (B1) and (C1), respectively. These magnitudes are quite close to those reported in Table 6. We find that β_{dFX} is not priced, consistent with previous studies, while β_{HMLFS} is priced even after controlling β_{dFX}.

[16] See Jorion (1991) and the literature that followed.

5.3. Replacing HMLFS by the return on portfolio 5-0

We replace *HMLFS* (portfolio 5-1) by the factor 5-0, the return of quintile 5 (highest *FSratio*) minus the return on the portfolio of all stocks with *FSratio* = 0. The latter portfolio is much larger (in number of stocks) that portfolio 5.[17] For portfolio 5-0, *alpha* = 0.280 (t = 2.59), quite close to *alpha* of *HMLFS* (see Table 4). We replicate the entire Fama-MacBeth procedure using the factor 5-0 in lieu of *HMLFS* and obtain results that are similar to those presented in Table 6 (results are in Table A4 of the Appendix). The means of $\lambda_{5\text{-}0}$ (the coefficient of $\beta_{5\text{-}0}$) from this analysis are 0.448 (t = 3.94), 0.374 (t = 2.72) and 0.122 (t = 2.72) in columns (A1), (B1) and (C1), respectively. They are all positive and statistically significant as they are when using *HMLFS*.

5.4. Using Fama-French's 25 portfolios

We replicate our analysis for another data set, the commonly used Fama-French 25 (5x5) portfolios of stocks sorted by size and book-to-market ratio. The results are presented in Panel A of Table A5 in the Appendix. The mean λ_{HMLFS} is 0.629 (t = 2.62) and the median is 0.651, both significantly different from zero. This point estimate is larger than that for the 100 portfolios (Panel A of Table 6), possibly because here the portfolios are larger (include more stocks), which mitigates the errors-in-the-variables (EIV) problem in the estimation of β_{HMLFS} and thus reduces the downward bias in the estimation of λ_{HMLFS}.

[17] In the early period, portfolios 0 and 5 include 50% and 10% of the stocks, respectively. In the recent period, the respective numbers are about 35% and 13%.

5.5. Using 2-digit SIC code industry portfolios

We replicate our procedure using the 2-digit SIC code industry portfolios, by dropping utilities and financials (results are in Panel B of Table A5 in the Appendix). The number of 2-digit SIC industries varies over the years between 68 and 74, with a mean of 72. The resulting mean λ_{HMLFS} is 0.290 (t = 2.07), close to the median of 0.288, which is significantly different from zero. This point estimate is smaller than that for the Fama-French 43 industry portfolios (Panel B of Table 6), possibly because here the portfolios are composed of fewer stocks, which exacerbates the EIV problem in the estimation of β_{HMLFS} and thus increases the downward bias in the estimation of λ_{HMLFS}. Perhaps also the industry classification by Fama and French is more informative.

6. Conclusions

This paper tests whether the systematic risk of firm exposure to foreign trade is priced. It is difficult to measure this exposure. Studies that use exposure to foreign exchange risk find that it is not significantly priced. This paper suggests that the risk of exposure to foreign trade is broader than foreign exchange risk. Even if exchange rates were fixed or managed and even if the firms could completely hedge exchange rate changes, exporting firms are still exposed to foreign trade risk that cannot be hedged. Consequently, we expect that this risk is priced.

Our investigation consists of two types of tests. First, we use the ratio of foreign sales to total sales of firms, denoted *FSratio*, as a measure of exposure to foreign trade and find that higher *FSratio* predicts higher stock returns. Second, we construct a zero-investment portfolio, *HMLFS*, of high-minus-low-*FSratio* stocks and find a positive and significant average *HMLFS* return and risk-adjusted return (*alpha*).

The second set of tests expands our analysis to *all* stocks, including those that have no foreign sales (about half of the total number of firms in our sample). Many of these firms are indirectly exposed to foreign trade risk by engaging in business with direct exporters. We estimate β_{HMLFS}, the exposure of each firms to *HMLFS*, and test whether it is priced in a context of a CAPM that includes the factors of Fama and French (1993) and Carhart (1997) and the MSCI factor. In a cross-section Fama-MacBeth (1973) estimation we find that β_{HMLFS} is significantly priced. As test assets we use (i) the Fama-French 100 or 25 portfolios, sorted on size and book-to-market ratio, (ii) The Fama-French industry portfolios or portfolios of stocks aggregated by their two-digit SIC codes, and (iii) individual stocks. In all estimates, the coefficient of β_{HMLFS} is positive and statistically significant. The effect of β_{HMLFS} remains positive and significant when we control for another source of systematic risk – the β of foreign exchange changes – and for the level of *FSratio*. The coefficient of β_{HMLFS} is generally greater in the more recent period when global diversification of U.S. corporations increased.

In conclusion, we show that exposure of firms to foreign trade is a priced risk.

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Table 1. Summary statistics for foreign sales ratio (*FSratio*) in Compustat Segment file
Sales data are retrieved for all the geographic segments from the Compustat Segment File and are classified into domestic or nondomestic based on the GEOTP variable (2 indicates domestic and 3 indicates nondomestic sales). *ForeignSales* = sales from the nondomestic segments + export sales from the domestic segments. *DomesticSales* = domestic segments – export sales. *FSratio* = *ForeignSales*/(*DomesticSales* + *ForeignSales*). Excluded are firms from the finance industries (SIC codes 6000-6999) and firms in the utility industry (SIC codes 4900-4999), firms without stock return data on CRSP, firms whose market equity is below $10 million or whose price is below $1. We also delete firm years with negative *ForeignSales* or *DomesticSales* (19 firm years or 125 firm months). The final sample contains 102,519 firm years and 1,105,432 firm months. The table reports the total number of firms in our sample, number of firms with positive *FSratio*, and the mean, median, 25th percentile and 75th percentile of *FSratio* applied to the subsample of firm-years with positive *FSratio*.

	Total number	Fraction of firms	Statistics of *FSratio* for *FSratio*>0			
Year	of firms	with *FSratio*>0	Mean	Median	25th pct.	75th pct.
1977	1744	0.512	0.300	0.221	0.132	0.368
1978	2316	0.475	0.230	0.198	0.112	0.311
1979	2521	0.455	0.229	0.199	0.109	0.311
1980	2501	0.455	0.233	0.203	0.111	0.323
1981	2744	0.439	0.217	0.193	0.103	0.300
1982	2816	0.415	0.215	0.182	0.104	0.297
1983	2879	0.413	0.209	0.179	0.096	0.290
1984	3022	0.410	0.201	0.167	0.090	0.285
1985	2987	0.395	0.202	0.172	0.091	0.282
1986	3028	0.389	0.219	0.181	0.099	0.304
1987	3026	0.398	0.236	0.194	0.105	0.330
1988	2948	0.407	0.250	0.209	0.114	0.360
1989	2828	0.425	0.255	0.216	0.119	0.364
1990	2952	0.426	0.259	0.221	0.117	0.370
1991	3104	0.433	0.268	0.229	0.122	0.379
1992	3463	0.434	0.263	0.222	0.119	0.368
1993	3758	0.433	0.257	0.221	0.116	0.360
1994	4108	0.430	0.260	0.221	0.124	0.367
1995	4298	0.443	0.277	0.248	0.128	0.389
1996	4606	0.444	0.288	0.254	0.135	0.401
1997	4531	0.438	0.292	0.264	0.146	0.403
1998	4156	0.487	0.270	0.237	0.115	0.387
1999	3226	0.570	0.291	0.263	0.122	0.412
2000	2844	0.608	0.299	0.266	0.131	0.426
2001	2583	0.606	0.304	0.270	0.137	0.441
2002	2494	0.617	0.307	0.269	0.134	0.443
2003	2478	0.628	0.328	0.294	0.142	0.478
2004	2564	0.640	0.345	0.312	0.147	0.499
2005	2545	0.635	0.347	0.311	0.142	0.511
2006	2450	0.632	0.356	0.317	0.148	0.522
2007	2338	0.642	0.376	0.340	0.162	0.547
2008	2234	0.649	0.395	0.367	0.168	0.574
2009	2149	0.651	0.398	0.360	0.160	0.579
2010	2161	0.677	0.409	0.369	0.162	0.608
2011	2117	0.673	0.413	0.382	0.174	0.601

Table 2. Cross-stock correlations between the variables

This table reports the correlation matrix of the main variables. *FSratio* is the ratio of foreign sales to the sum of foreign and domestic sales (defined in Table 1). *NoFS* is a dummy variable that equals 1 if *FSratio* = 0 (zero otherwise). β (systematic risk) is the slope coefficient from a regression of stock monthly excess return on the market excess return *RMrf* over the past 60 months (with minimum of 24 observations). *Size* is the firm capitalization (in logarithm). *BM* is the book-to-market ratio (in logarithm), calculated as in Fama and French (1992). *R11* is lagged eleven-month buy-and-hold return, from month *t-12* to month *t-2*. *IVOL* is idiosyncratic volatility, the standard deviation of residuals from a regression of daily stock excess returns on the returns of the Fama-French factors during the month (following Ang, Hodrick, Xing, and Zhang (2006)). Stock market (return-based) variables for each month *t* are the values known as of the end of month *t-1*. Accounting data for a calendar year are matched with return-based data for the 12 month beginning with July of the following year, following the convention in Fama and French (1992). The numbers presented are the means of the month-by-month cross-stock correlations. There are 414 months, July 1978 to December 2012.

	FSratio	*NoFS*	*beta*	*Size*	*BM*	$R_{t-12,t-2}$	*IVOL*
FSratio	1						
NoFS	-0.707	1					
β	0.098	-0.075	1				
Size	0.247	-0.212	0.002	1			
BM	-0.020	0.008	-0.128	-0.247	1		
R11	-0.026	0.023	0.008	0.087	-0.168	1	
IVOL	-0.068	0.072	0.182	-0.405	-0.001	-0.065	1

Table 3. Cross-section effect of firm foreign sales exposure

Results from cross-sectional monthly Fama-MacBeth regressions of stock excess returns on *FSratio* and stock characteristics. Sample criteria appear in Table 1. Variable definitions appear in Table 2. *Size* and *BM* are in logarithm. We present the mean of the coefficients of these variables from monthly cross-sectional regressions and their *t* statistics (in parentheses). *NW* is the *t* statistic calculated by the Newey-West (1987) method with one lag. *Pos/Neg* is the number of positive and negative coefficients. *Weighted* is the weighted mean of the coefficients, with the weight being a reciprocal of the standard error of the estimated coefficient (following Ferson and Harvey (1999), giving higher weight to coefficients that are estimated more precisely). *, ** and *** indicate significance at 10%, 5% and 1% level, respectively (two-tail test). The sample period is July 1978 to December 2012, 414 months.

	7/1978-2012		7/1978-1995	1996-2012
	(1)	(2)	(3)	(4)
FSratio	0.554	0.382	0.519	0.590
	(2.89)***	(2.15)**	(2.01)**	(2.07)**
NW	(2.64)***	(2.02)**	(1.82)*	(1.91)*
Median	0.526**	0.209	0.560*	0.514*
Pos/Neg	232/182	222/192	119/91	113/91
Weighted	0.375	0.171	0.516	0.270
	(2.13)**	(1.04)	(2.08)**	(1.08)
NoFS		-0.086		
		(-1.70)*		
B	0.120	0.119	0.133	0.107
	(1.13)	(1.12)	(1.03)	(0.63)
Size	-0.114	-0.114	-0.097	-0.131
	(-3.02) ***	(-3.03)***	(-1.98)**	(-2.27)**
BM	0.247	0.246	0.296	0.196
	(4.28) ***	(4.26)***	(4.25)***	(2.12)**
R11	0.007	0.007	0.011	0.270
	(5.76)***	(5.72)***	(8.80)***	(1.31)
IVOL	-0.299	-0.299	-0.417	-0.178
	(-9.62)***	(-9.60)***	(-11.00)***	(-3.70)***
Constant	2.645	2.717	2.554	2.738
	(5.29)***	(5.38)***	(3.79)***	(3.69)***
R^2	0.046	0.047	0.041	0.051
N	414	414	210	204

Table 4. *FSratio* portfolios

Panel A: *alpha* (intercept) from a regression of portfolio returns on the FFCM five-factor regression model that includes the Fama-French (1993) factors *RMrf*, *SMB*, *HML*, Carhart's (1997) *UMD* and the (orthogonalized) global factor *MSCIr*, the residuals, plus intercept, from a regression of the excess return on the *MSCI* index on *RMrf*. The portfolios are of stocks ranked by their *FSratio* (foreign sales ratio; see Table 1 for definition and sample selection criteria). We sort all stocks into three size groups (the size breakpoints are defined only based on NYSE listed companies, following Fama and French (1993)). Within each size tercile, we sort all stocks into 6 portfolios: firms with zero *FSratio* are in portfolio 0 and all other stocks are sorted into quintiles, from quintile 1 (lowest *FSratio*) to quintile 5. We calculate the average return-weighted (RW, weights being 1+lagged return, to correct for microstructure noise) and value-weighted (VW) returns of each portfolio. Then, we average the portfolio returns across the three size groups for each of the 6 *FSratio* portfolios. For example, the return on quintile 5 is the average return of the three quintile-5 portfolios across the three size terciles. The 5-1 or *HMLFS* (high-minus-low *FSratio*) portfolio return is the return on quintile 5 (high *FSratio*) minus the return on quintile 1 (lowest *FSratio*).

Panel B: the coefficients from a regression of the return on the hedge portfolio *HMLFS* (high-minus-low foreign sales, portfolio 5-1) on the FFCM factor model.

Panel C: *alpha* from a regression of *HMLFS* (portfolio 5-1) on a six-factor model: FFCM + *HMLfx*, a factor of the returns on high-minus-low interest rate currencies (Lustig, Roussanov and Verdelhan (2011)). The sample period is 11/1983–5/2010.

Panel D: statistics of rolling *out-of-sample* $alpha_t$ of $HMLFS_t$ (portfolio 5-1, VW). $HMLFS_t$ is regressed over 48 months on the FFCM factor returns up to month t-1. The table presents statistics on $alpha_t$, the excess return in month t of $HMLFS_t$ over the predicted value of $HMLFS_t$, calculated using the realized FFCM factor returns for month t and the estimated coefficients from the preceding 48-month rolling regression.

For all the four panels, in parentheses are *t*-statistics based on robust standard errors (White, 1980). *, ** and *** indicate significance at 10%, 5% and 1% level, respectively (two-tail test).

Panel A. *alpha* of portfolios ranked by their *FSratio* on FFCM model						
Portfolio	Entire period 7/1978-2012		Subperiod I 7/1978-1995		Subperiod II 1996-2012	
	RW	VW	RW	VW	RW	VW
0	-0.075	-0.040	-0.107	-0.018	-0.006	-0.053
	(-1.33)	(-0.67)	(-2.03)**	(-0.33)	(-0.07)	(-0.57)
1	-0.071	-0.016	-0.232	-0.172	0.018	0.070
	(-1.05)	(-0.23)	(-3.32)***	(-2.26)**	(0.16)	(0.63)
2	0.036	0.048	-0.044	-0.013	0.148	0.152
	(0.57)	(0.80)	(-0.56)	(-0.17)	(1.66)	(1.64)
3	0.164	0.117	0.183	0.158	0.227	0.168
	(2.60)**	(1.93)*	(2.37)**	(2.25)**	(2.50)**	(1.92)*
4	0.256	0.271	0.306	0.328	0.344	0.349
	(3.27)***	(3.73)***	(3.56)***	(3.78)***	(2.97)***	(3.28)***
5	0.203	0.240	0.168	0.158	0.371	0.450
	(2.34)**	(2.86)***	(1.84)*	(1.64)	(2.74)***	(3.40)***
5-1	0.273	0.256	0.400	0.331	0.353	0.379
HMLFS	(2.83)***	(2.56)**	(3.71)***	(2.89)***	(2.33)**	(2.42)**
5-0	0.278	0.280	0.275	0.176	0.377	0.503
	(2.86)***	(2.59)***	(2.34)**	(1.42)	(2.44)**	(2.98)***
N	414	414	210	210	204	204
Panel B. factor loadings (β) of portfolio *HMLFS*, 5-1, FFCM model						
RMrf	0.025	-0.033	-0.032	-0.067	-0.017	-0.070
	(1.11)	(-1.40)	(-1.36)	(-2.58)**	(-0.42)	(-1.48)
SMB	-0.053	-0.014	-0.068	-0.068	0.004	0.050
	(-1.31)	(-0.37)	(-1.26)	(-1.48)	(0.07)	(0.92)
HML	0.410	0.395	0.149	0.182	0.512	0.480
	(8.93)***	(8.21)***	(2.81)***	(3.18)***	(9.40)***	(8.30)***
UMD	0.033	0.061	-0.007	-0.012	0.054	0.094
	(1.07)	(2.19)**	(-0.22)	(-0.38)	(1.55)	(2.85)***
MSCIr	0.106	0.136	0.024	0.057	0.533	0.530
	(2.60)**	(3.43)***	(0.76)	(1.75)	(4.23)***	(3.88)***
R^2	0.311	0.306	0.135	0.220	0.462	0.416
N	414	414	210	210	204	204
Panel C. *alpha* from a regression of *HMLFS* on the FFCM model + *HMLfx*						
	11/1983-5/2010		11/1983-1995		1996-5/2010	
	RW	VW	RW	VW	RW	VW
5-1	0.337	0.258	0.500	0.365	0.361	0.308
HMLFS	(2.89)***	(2.12)**	(3.70)***	(2.62)***	(2.07)**	(1.71)*
HMLfx	0.069	0.110	-0.051	-0.028	0.170	0.234
	(1.31)	(1.91)*	(-0.98)	(-0.50)	(2.13)**	(2.52)**
R^2	0.360	0.347	0.095	0.171	0.516	0.474
N	319	319	146	146	173	173

Panel D. Rolling o*ut-of-sample alpha* from a regression of *HMLFS* (VW) on the FFCM model			
	7/1983-2012	7/1983-1995	1996-2012
Mean	0.416	0.391	0.436
(*t*-stat)	(3.70)***	(3.14)***	(2.48)**
Median	0.305***	0.305**	0.290**
N	366	162	204

Table 5. Summary statistics of β_{HMLFS}, the systematic risk of foreign sales exposure

This table reports the average of the monthly estimates of the mean, median, and standard deviation of β_{HMLFS}, across the portfolios or stocks. For each portfolio or stock *j*, we estimate the factor loadings (β_K, *K = HMLFS, RMrf, SMB, HML, UMD* and *MSCIr*) from the regression model

$$R_{j,t} - rf_t = alpha_j + \beta_{HMLFS,j} HMLFS_t + \beta_{RMrf,j} RMrf_t + \beta_{SMB,j} SMB_t + \beta_{HML,j} HML_t + \beta_{UMD,j} UMD_t + \beta_{MSCIr,j} MSCIr_t + \varepsilon_{j,t} \quad (3)$$

HMLFS is our factor of High-Minus-Low Foreign Sales exposure (portfolio 5-1; see Table 4). *RMrf*, *SMB* and *HML* are the Fama-French (1993) factors, *UMD* is Carhart's (1997) momentum factor and *MSCIr* is the orthogonalized global excess return. The coefficients are estimated over rolling 60-month window (we require minimum of 24 observations), moving one month at the time, starting with a window that ends in 6/1983 to 11/2012.

We use three set of test assets: (i) 100 portfolios of stocks sorted on size and book-to-market ratio; (ii) 43 industry portfolios which are the 48 Fama-French portfolio excluding financials and utilities; and (iii) all stocks on CRSP that satisfy our data requirements. Data for (i) and (ii) are from Kenneth French's web site. The estimation period is 7/1978-2012.

Test assets	Mean	Median	Standard Deviation
(i) 100 portfolios sorted on Size and B/M	0.005	0.011	0.230
(ii) 43 industry portfolios -- 48 Fama-French portfolios, excluding financials and utilities.	0.126	0.107	0.433
(iii) Individual stocks, excluding financial and utilities	0.004	0.029	1.425

Table 6. The pricing of β_{HMLFS}, the systematic risk of foreign sales exposure

This table reports the second step of the two-pass Fama-MacBeth (1973) procedure. The first pass – the estimation of the systematic risk coefficients (β_K, *K = HMLFS, RMrf, SMB, HML, UMD* and *MSCIr*, is described in the legend of Table 5. In the second step we estimate a cross-section regression model (4) for each month *m*,

$$R_{j,t} - rf_t = \lambda_{0,t} + \lambda_{HMLFS,t}\beta_{HMLFS,j,t-1} + \lambda_{RMrf,t}\beta_{RMrf,j,t-1} + \lambda_{SMB,t}\beta_{SMB,j,t-1} + \lambda_{HML,t}\beta_{HML,j,t-1} + \lambda_{UMD,t}\beta_{UMD,j,t-1} + \lambda_{MSCIr,t}\beta_{MSCIr,j,t-1} + v_{j,t} \qquad (4)$$

The table presents for each series $\lambda_{K,t}$ the mean and *t*-statistic. *, * and *** indicate significance at 10%, 5% and 1% level, respectively. For $\lambda_{HMLFS,t}$ we also present the median, the number of positive/negative coefficients (*Pos/Neg*), and the weighted mean, the weight being the reciprocal of the estimated standard error of the coefficient in the cross-section regression (giving higher weight to coefficients that are estimated more precisely, see Ferson and Harvey (1999)). For *Pos/Neg* we test whether the proportion of positive coefficients is different from 0.50, the chance result.

We use three set of test assets: (i) The 100 Fama-Frech portfolios of stocks sorted on size and book-to-market ratio; (ii) 43 industry portfolios which are the 48 Fama-French portfolio excluding financials and utilities; and (iii) all stocks on CRSP that satisfy our data requirements. Data for (i) and (ii) are from Kenneth French’s web site. The estimation period is 7/1983 to 12/2012, 354 months.

	Panel A. 100 portfolios by Size and B/M			Panel B: 43 industry portfolios			Panel C: Individual stocks		
	1983-2012	1983-1995	1996-2012	1983-2012	1983-1995	1996-2012	1983-2012	1983-1995	1996-2012
N	354	150	204	354	150	204	354	150	204
	(A1)	(A2)	(A3)	(B1)	(B2)	(B3)	(C1)	(C2)	(C3)
$\boldsymbol{\beta_{HMLFS}}$	0.461	0.291	0.585	0.468	0.200	0.664	0.126	0.134	0.121
	(3.49)***	(2.31)**	(2.80)***	(2.83)***	(1.14)	(2.60)***	(2.03)**	(2.82)***	(1.18)
Median	0.559***	0.317***	0.723***	0.413***	0.125	0.614**	0.147***	0.137***	0.182*
Pos/Neg	209/145***	84/66*	125/79***	192/162*	78/72	114/90**	203/151***	89/61**	114/90**
Weighted	0.406	0.345	0.475	0.367	0.169	0.526	0.175	0.170	0.183
	(4.45)***	(2.90)***	(3.44)***	(2.84)***	(1.00)	(2.80)***	(4.19)***	(3.92)***	(2.50)**
β_{RMrf}	-0.272	-0.356	-0.210	0.285	0.353	0.234	0.056	-0.077	0.155
	(1.17)	(1.06)	(0.66)	(0.91)	(0.86)	(0.51)	(0.40)	(-0.47)	(0.73)
β_{SMB}	0.013	-0.271	0.221	-0.274	-0.226	-0.309	-0.079	-0.174	-0.010
	(0.08)	(-1.55)	(0.89)	(-1.43)	(-1.24)	(-1.02)	(-1.01)	(-2.33)**	(-0.08)
β_{HML}	0.352	0.470	0.264	0.453	0.456	0.450	0.157	0.130	0.177
	(2.22)**	(2.37)**	(1.13)	(2.41)**	(2.04)**	(1.60)	(1.61)	(1.45)	(1.14)
β_{UMD}	0.108	-0.325	0.426	0.628	0.852	0.463	-0.158	0.004	-0.277
	(0.50)	(-1.45)	(1.28)	(2.16)**	(3.11)***	(1.00)	(-1.93)*	(0.05)	(-2.13)**
β_{MSCI}	0.035	-0.270	0.258	0.109	0.124	0.097	0.019	0.027	0.014
	(0.27)	(-1.05)	(2.08)**	(0.56)	(0.33)	(0.50)	(0.53)	(0.47)	(0.29)
Constant	0.858	1.061	0.707	0.320	0.367	0.286	0.644	0.625	0.659
	(3.96)***	(3.50)***	(2.34)**	(1.23)	(0.88)	(0.86)	(3.46)***	(2.33)**	(2.56)**
R^2	0.307	0.290	0.319	0.359	0.339	0.374	0.032	0.021	0.040

Table 7: Rolling out-of-sample $alpha_t$ of the factor *HMLB*, high-minus-low β_{HMLFS} portfolios

Stocks are sorted every month by their $\beta_{HMLFS,j,t}$ (see legend in Table 6) and divided into quintiles. $HMLB_t$ (High-Minus-Low β) is the differential month-t return on the value-weighted portfolios of stocks with the highest and lowest $\beta_{HMLFS,j,t}$. $HMLB_t$ is then regressed over a rolling window of 48 months on the FFCM factor returns up to month t-1; $alpha_t$ is the difference between $HMLB_t$ and the predicted value of $HMLB_t$, using the realized FFCM factor returns for month t and the estimated coefficients from the preceding 48-month regression. The estimation rolls forward month by month. The sample period is from July 1988 to December 2012.

	Entire period 7/1988-2012	Subperiod I 7/1988-1995	Subperiod II 1996-2012
Mean	0.505	-0.212	0.864
(*t*-stat)	(2.03)	(-0.98)	(2.48)
Median	0.477**	0.019	0.915***
N	306	102	204

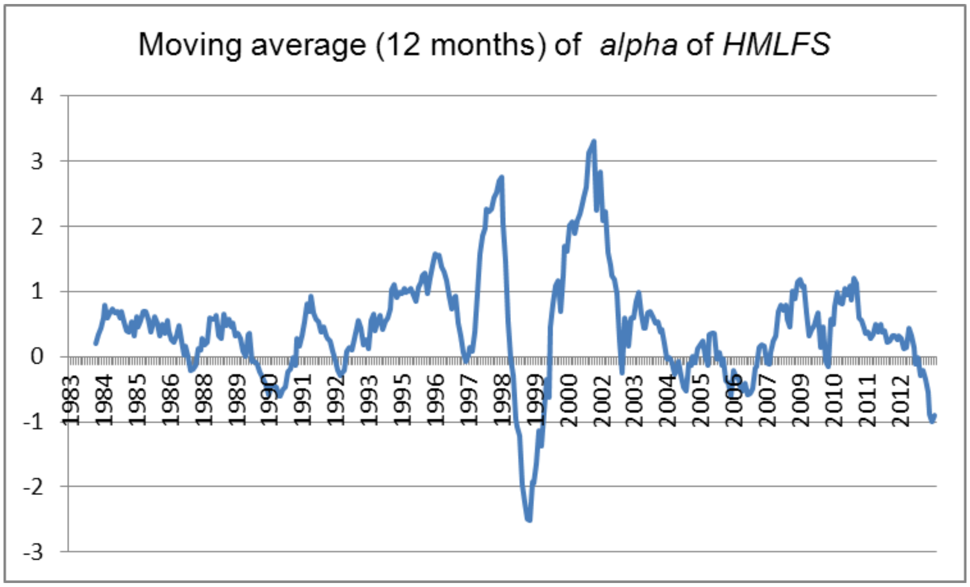
Table 8. The pricing β_{HMLFS} together with *FSratio*

This table presents estimation results of model (4) as it appears in the legend of Table 6 with an added variable, *FSratio*, the foreign sales ratio, defined in the legend of Table 1. *FSratio* of the 100 portfolios by size and book-to-market ratio is the value-weighted average of *FSratio* of the constituent stocks, and *FSratio* of the 43 industry portfolios is the value-weighted *FSratio* of the stocks that constitute the industry. We use the last annual foreign sales ratio available, following the Fama-French (1992) convention of applying $FSratio_j$ ratio from the annual reports in one year to the twelve monthly returns that begin from July of the following year.
To save space, the table presents only the coefficients of β_{HMLFS} and *FSratio*.

	Panel A. 100 portfolios by Size and B/M			**Panel B: 43 industry portfolios**			**Panel C: Individual stocks**		
	1983-2012	1983-1995	1996-2012	1983-2012	1983-1995	1996-2012	1983-2012	1983-1995	1996-2012
	(A1)	(A2)	(A3)	(B1)	(B2)	(B3)	(C1)	(C2)	(C3)
β_{HMLFS}	0.428	0.380	0.463	0.428	0.168	0.618	0.126	0.125	0.127
	(3.43)***	(3.25)***	(2.33)**	(2.49)**	(0.92)	(2.33)**	(2.04)**	(2.60)**	(1.25)
Median	0.405***	0.418***	0.405**	0.287**	-0.028	0.545**	0.160***	0.150***	0.214*
Pos/Neg	213/141***	95/55***	118/86**	190/164*	74/76	116/88**	203/151***	89/61**	114/90*
Weighted	0.359	0.393	0.324	0.355	0.131	0.525	0.173	0.160	0.191
	(4.38)***	(3.55)***	(2.69)***	(2.67)***	(0.73)	(2.78)***	(4.15)***	(3.65)***	(2.62)**
FSratio	-0.357	-0.555	-0.212	0.415	0.349	0.463	0.455	0.844	0.168
	(-1.49)	(-1.61)	(-0.64)	(1.24)	(0.66)	(1.06)	(2.58)**	(3.15)***	(0.72)
Median	0.096	0.054	0.100	0.131	0.307	-0.158	0.349**	1.017***	0.058
Pos/Neg	180/174	75/75	105/99	180/174	80/70	100/104	196/158	92/58	104/100
Weighted	-0.091	-0.446	0.094	0.417	0.386	0.430	0.321	0.928	0.054
	(-0.52)	(-1.48)	(0.44)	(1.55)	(0.81)	(1.30)	(1.96)*	(3.63)***	(0.25)
Other five ***β*** *coefficients* & constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.324	0.309	0.334	0.384	0.363	0.400	0.034	0.023	0.043
N	354	150	204	354	150	204	354	150	204

Figure 1: Out-of-sample moving average of *alpha*$_t$ of *HMLFS*

In this figure, we show the estimates for the out-of-sample $alpha_t$. We regress $HMLFS_t$ (VW) on the FFCM factor returns over 48 months up to month t-1, then for month t we calculate $alpha_t$, the difference between $HMLFS_t$ and the predicted value of $HMLFS_t$, using month-m's realized FFCM factor returns and their estimated coefficients from the preceding 48-month rolling regression. The figure presents a twelve-month moving average of $alpha_t$.



APPENDIX (Tables A1-A5)

Table A1. Excess returns

This table report the excess return (raw return minus the risk free interest rate) of different *FSratio* portfolios. We follow Fama and French (1993) to calculate the portfolio returns for different *FSratio* portfolios. First, we sort all the stocks into three size groups. The size breakpoints are defined only based on NYSE listed companies. Within each size tercile, we sort all the stocks into 6 portfolios: 0 is the portfolio of firms with zero *FSratio*, and all the other firms are sorted into quintiles, from quintile 1 to quintile 5. Then we calculate the average returns across the three different size groups for each of the 6 portfolios. For example, the reported quintile 5 portfolio return is the average return across the three within-size-group quintile 5 portfolios. We also report the return of two long-short portfolios: quintile 5 (high *FSratio*) minus quintile 1 (low *FSratio*) *FSratio* portfolio. EW/RW/VW represent equally weighted, return weighted and value weighted portfolio returns, respectively (RW: weights being 1+lagged return, to correct for microstructure noise). The sample period is from July 1978 to December 2012.

	1978-2012			1978-1995			1996-2012		
	EW	RW	VW	EW	RW	VW	EW	RW	VW
0	0.661	0.622	0.639	0.706	0.665	0.716	0.614	0.578	0.559
	(2.48)	(2.35)	(2.44)	(1.95)	(1.85)	(2.07)	(1.56)	(1.48)	(1.42)
1	0.560	0.524	0.566	0.537	0.500	0.542	0.585	0.548	0.591
	(1.85)	(1.74)	(1.89)	(1.38)	(1.29)	(1.39)	(1.25)	(1.18)	(1.30)
2	0.700	0.661	0.667	0.679	0.639	0.661	0.721	0.684	0.673
	(2.42)	(2.29)	(2.35)	(1.77)	(1.68)	(1.73)	(1.66)	(1.57)	(1.60)
3	0.869	0.823	0.768	0.882	0.843	0.817	0.857	0.804	0.717
	(3.09)	(2.94)	(2.85)	(2.34)	(2.25)	(2.22)	(2.04)	(1.93)	(1.81)
4	0.958	0.922	0.927	1.001	0.969	0.968	0.914	0.874	0.885
	(3.38)	(3.27)	(3.37)	(2.67)	(2.60)	(2.62)	(2.14)	(2.06)	(2.17)
5	0.960	0.927	0.932	0.941	0.909	0.856	0.980	0.945	1.011
	(3.34)	(3.25)	(3.41)	(2.58)	(2.51)	(2.44)	(2.19)	(2.13)	(2.40)
5-1	0.400	0.403	0.366	0.405	0.409	0.314	0.396	0.396	0.420
	(3.45)	(3.49)	(3.09)	(3.83)	(3.85)	(2.69)	(1.89)	(1.91)	(2.01)
5-0	0.300	0.305	0.293	0.235	0.244	0.140	0.366	0.366	0.451
	(2.96)	(2.96)	(2.73)	(2.10)	(2.20)	(1.16)	(2.15)	(2.10)	(2.52)

Table A2. Portfolio' sensitivity to foreign exchange rate change

This table reports the return sensitivity of *HMLFS* to the change of foreign exchange rate, dFX_t, the month-t percentage change of the U.S. dollar exchange rate (the price of U.S. dollar in units of foreign currency). The regression model includes the FFCM factors and *dFX*:

$$HMLFS_t = \alpha + \beta_{dFX} dFX_t + \beta_{MktRf} MktRf_t + \beta_{SMB} SMB_t + \beta_{HML} HML_t + \beta_{UMD} UMD_t + \beta_{MSCIr} MSCIr_t + \varepsilon_t$$

The FFCM factors are detailed in the legend of Table 4. To save space, we report only *alpha* (the intercept) and the coefficient of *dFX*. *t*-statistics based on robust standard errors are in the parentheses. The sample period is from July 1978 to December 2012.

	7/1978-2012		7/1978-1995		1996-2012	
	RW	VW	RW	VW	RW	VW
$alpha_{5-1}$	0.252	0.241	0.385	0.314	0.338	0.380
HMLFS	(2.64)***	(2.41)**	(3.64)***	(2.80)***	(2.23)**	(2.39)**
dFX	-0.158	-0.113	-0.078	-0.085	-0.094	0.005
	(-2.79)***	(-1.91)*	(-1.23)	(-1.27)	(-1.10)	(0.05)
FFCM included	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.324	0.313	0.143	0.227	0.465	0.416
N	414	414	210	210	204	204

Table A3. Testing the effect of the systematic risk of *dFX*, the change in exchange rates

This table extends Table 6, adding β_{dFX}, the *beta* coefficient of *dFX*, which is the monthly percent change in the U.S. foreign exchange rate. The Table reports the second step of the two-pass Fama-MacBeth (1973) procedure. The legend is identical to that of Table 6 with the added term in the cross-section model (4), $\lambda_{dFX,m} * \beta_{dFX,j,m-1}$. The mean λ_{dFX} appears in bold. The sample period is from July 1983 to December 2012.

	Panel A. 100 portfolios by Size and B/M			**Panel B: 43 industry portfolios**			**Panel C: Individual stocks**		
	1983-2012	1983-1995	1996-2012	1983-2012	1983-1995	1996-2012	1983-2012	1983-1995	1996-2012
N	354	150	204	354	150	204	354	150	204
	(A1)	(A2)	(A3)	(B1)	(B2)	(B3)	(C1)	(C2)	(C3)
$\boldsymbol{\beta_{HMLFS}}$	0.416	0.328	0.480	0.447	0.217	0.617	0.129	0.131	0.128
	(3.29)***	(2.77)***	(2.38)**	(2.68)***	(1.23)	(2.39)**	(2.09)**	(2.76)***	(1.26)
Median	0.431***	0.436***	0.431***	0.262**	0.076	0.478**	0.161***	0.140***	0.192*
Pos/Neg	211/143***	90/60***	121/83***	189/165	78/72	111/93	204/150***	89/61**	115/89**
Weighted	0.376	0.364	0.390	0.292	0.125	0.421	0.174	0.166	0.185
	(4.47)***	(3.24)***	(3.12)***	(2.24)**	(0.74)	(2.23)**	(4.18)***	(3.82)***	(2.54)**
β_{RMrf}	-0.250	-0.431	-0.116	0.178	0.045	0.276	0.056	-0.078	0.155
	(-1.04)	(-1.33)	(-0.34)	(0.57)	(0.11)	(0.61)	(0.40)	(-0.47)	(0.72)
β_{SMB}	-0.023	-0.277	0.164	-0.257	-0.093	-0.377	-0.076	-0.175	-0.003
	(-0.14)	(-1.66)	(0.67)	(-1.33)	(-0.50)	(-1.23)	(-0.98)	(-2.36)**	(-0.02)
β_{HML}	0.339	0.395	0.298	0.426	0.437	0.418	0.155	0.128	0.175
	(2.13)**	(2.04)**	(1.26)	(2.25)**	(1.92)*	(1.48)	(1.60)	(1.43)	(1.13)
β_{UMD}	0.210	-0.178	0.495	0.477	0.831	0.216	-0.157	0.007	-0.277
	(1.03)	(-0.92)	(1.53)	(1.61)	(2.95)***	(0.46)	(-1.91)*	(0.10)	(-2.13)**
β_{MSCI}	0.038	-0.405	0.364	0.061	0.037	0.079	0.019	0.025	0.014
	(0.30)	(-1.70)*	(2.78)***	(0.32)	(0.10)	(0.41)	(0.52)	(0.45)	(0.30)
$\boldsymbol{\beta_{dFX}}$	**-0.037**	**0.068**	**-0.115**	**0.141**	**0.487**	**-0.113**	**-0.031**	**-0.025**	**-0.036**
	(-0.28)	**(0.31)**	**(-0.66)**	**(0.74)**	**(1.67)***	**(-0.45)**	**(-0.83)**	**(-0.50)**	**(-0.66)**
Constant	0.865	1.158	0.649	0.416	0.659	0.238	0.646	0.634	0.654
	(3.85)***	(3.77)***	(2.04)**	(1.59)	(1.57)	(0.71)	(3.47)***	(2.36)**	(2.55)**
R^2	0.321	0.306	0.332	0.393	0.367	0.413	0.033	0.022	0.042

Table A4. Replacing *HMLFS* (portfolio 5-1) by the return on portfolio 5-0

This table replicates Table 6 with the following difference. We replace the factor *HMLFS*, which is the differential return between the 5th and 1st quintile of *FSratio* with the return on portfolio 5-0, the differential return between the 5th quintile of FSratio stocks and the portfolio of stocks with *FSratio* = 0. Portfolio 5-0 has a positive and significant *alpha* (see Table 4). The remaining legend is identical to that of Table 6. The sample period is from July 1983 to December 2012.

	Panel A. 100 portfolios by Size and B/M			**Panel B: 43 industry portfolios**			**Panel C: Individual stocks**		
	1983-2012	1983-1995	1996-2012	1983-2012	1983-1995	1996-2012	1983-2012	1983-1995	1996-2012
N	354	150	204	354	150	204	354	150	204
	(A1)	(A2)	(A3)	(B1)	(B2)	(B3)	(C1)	(C2)	(C3)
$\boldsymbol{\beta_{5\text{-}0}}$	0.448	0.113	0.694	0.374	0.088	0.585	0.122	0.062	0.166
	(3.94)***	(0.91)	(4.01)***	(2.72)***	(0.59)	(2.76)***	(2.72)***	(1.44)	(2.34)**
Median	0.310***	0.183	0.521***	0.294**	-0.002	0.521**	0.140***	0.099*	0.144***
Pos/Neg	211/143***	83/67	128/76***	191/163*	74/76	117/87**	203/151***	84/66*	119/85**
Weighted	0.218	0.108	0.361	0.144	0.009	0.306	0.115	0.093	0.140
	(2.65)***	(0.95)	(2.99)***	(1.34)	(0.06)	(1.85)*	(3.20) ***	(2.30)**	(2.39)**
β_{RMrf}	-0.240	-0.351	-0.159	0.225	0.318	0.156	0.054	-0.071	0.145
	(-0.99)	(1.07)	(-0.46)	(0.72)	(0.77)	(0.35)	(0.38)	(-0.43)	(0.68)
β_{SMB}	-0.025	-0.284	0.165	-0.252	-0.171	-0.312	-0.087	-0.178	-0.021
	(-0.16)	(-1.68)*	(0.68)	(-1.32)	(-0.94)	(-1.02)	(-1.12)	(-2.39)**	(-0.17)
β_{HML}	0.315	0.393	0.258	0.454	0.453	0.455	0.151	0.119	0.174
	(1.97)**	(2.02)**	(1.08)	(2.41)**	(2.07)**	(1.59)	(1.54)	(1.35)	(1.11)
β_{UMD}	0.195	-0.156	0.453	0.631	0.924	0.416	-0.150	0.013	-0.270
	(0.94)	(-0.80)	(1.37)	(2.17)**	(3.35)***	(0.90)	(-1.82)*	(0.17)	(-2.06)**
β_{MSCI}	0.040	-0.411	0.372	0.115	0.201	0.051	0.015	0.024	0.009
	(0.31)	(-1.67)*	(2.82)***	(0.60)	(0.54)	(0.27)	(0.41)	(0.42)	(0.18)
Constant	0.855	1.078	0.692	0.372	0.402	0.349	0.655	0.626	0.676
	(3.76)***	(3.57)***	(2.11)**	(1.41)	(0.96)	(1.03)	(3.51)***	(2.33)**	(2.63)**
R^2	0.307	0.293	0.317	0.360	0.340	0.374	0.033	0.022	0.041

Table A5. The pricing of β_{HMLFS}, the systematic risk of foreign sales exposure: 25 Fama-French size and book-to-market sorted portfolios and 2-digit SIC industry portfolios

This table is identical to Table 6, except that it uses two different test assets:
(i) Panel A: The 25 Fama-French size and book-to-market portfolios are downloaded from French's website.
(ii) Panel B: The 2-digit SIC industry portfolios are constructed by the authors. We exclude financials and utilities. We also exclude industry portfolios with less than three stocks in them.

	Panel A. 25 portfolios by Size and B/M			**Panel B: 2 digit SIC industry portfolios**		
	1983-2012	1983-1995	1996-2012	1983-2012	1983-1995	1996-2012
	(A1)	(A2)	(A3)	(B1)	(B2)	(B3)
$\boldsymbol{\beta_{HMLFS}}$	0.629	0.436	0.771	0.290	0.173	0.376
	(2.62)**	(1.77)*	(2.05)**	(2.07)**	(1.11)	(1.75)*
Median	0.651***	0.671**	0.581**	0.288***	0.015	0.388***
Pos/Neg	208/146***	90/60***	118/86**	196/158**	76/74	120/84***
Weighted	0.538	0.504	0.574	0.252	0.177	0.300
	(2.84)***	(2.21)**	(1.93)*	(2.28)**	(1.21)	(1.92)*
β_{RMrf}	-1.121	-0.960	-1.238	-0.160	-0.360	-0.012
	(-3.33)***	(-1.95)*	(-2.70)***	(-0.53)	(-0.83)	(-0.03)
β_{SMB}	-0.007	-0.339	0.238	-0.154	-0.280	-0.061
	(-0.03)	(-1.77)*	(0.89)	(-1.06)	(-1.67)*	(-0.28)
β_{HML}	0.272	0.412	0.168	0.178	0.229	0.141
	(1.49)	(1.98)**	(0.61)	(0.97)	(1.07)	(0.51)
β_{UMD}	0.083	-0.539	0.540	-0.353	-0.106	-0.534
	(0.22)	(-1.37)	(0.91)	(-1.35)	(-0.36)	(-1.33)
β_{MSCI}	0.084	-0.677	0.643	0.056	-0.232	0.268
	(0.30)	(-1.21)	(2.52)**	(0.34)	(-0.74)	(1.60)
Constant	1.877	1.740	1.978	0.712	1.067	0.452
	(6.30)***	(4.20)***	(4.73)***	(2.60)**	(2.23)**	(1.41)
R^2	0.638	0.659	0.644	0.246	0.220	0.266
N	354	150	204	354	150	204