Global Pricing of Equity

Jeff Diermeier and Bruno Solnik

Global equity management has historically been structured around country asset allocation. This approach was supported by the observations that the country factor is the major source of influence on stock-price behavior and that the correlation between equity and currency is close to zero and unstable. If a corporation is regarded as a portfolio of international activities, however, its stock price should be influenced by international factors in relation to the geographical breakdown of its activities rather than where its headquarters is located or its stock is traded. We examined a large cross-section of security prices and found that regional factors and currency factors have a strong influence on asset returns beyond that of domestic factors. Moreover, the sensitivity of individual company returns to nondomestic factors is closely related to the extent of their international activities, as proxied by the relative importance of foreign sales to total sales. We review the implications of these findings for the asset management profession.

Investors are continually searching for better ways to describe the characteristics of their portfolios. Those investing in global equities typically create metrics to view the country, currency, industry, and other common factor attributes of their portfolios. To date, actual management of these portfolios has been fairly simple and based on the following observations:

- Country factors are the major source of influence on stock-price behavior, and the correlation between these country factors is weak. For example, the stock prices of all French companies are strongly influenced by French factors; Peugeot's stock price behaves much as that of any other French company rather than as the stock prices of other non-French car manufacturers.
- The correlation between equity and currency is close to zero and unstable, so country exposure matches currency exposure. For example, the stock price of Peugeot (which is very French in terms of currency exposure and is treated as a franc or euro asset) does not systematically go up when the French franc depreciates.

Both approaches are grounded in extensive academic evidence based on data up to the mid-1990s.[1] As a result, global equity management has historically been structured primarily around country asset allocation. Portfolio managers typically use a two-step procedure, with the first step being country allocation and the second, selection of industries and stocks within countries.

To support the application of this procedure, global portfolio data are usually arranged in a type of balance-sheet accounting, revealing benchmark, portfolio, and active capitalization weights by country and currency. Each security is presumed to be 100 percent allocated to the headquarters or stock-listing location of the company. For example, a French franc company listed in Paris is valued as a French asset, irrespective of the degree of its international activities.

The full allocation of country and currency weight by home market makes sense in a world of highly "segmented" pricing, where all that matters is the location of a company's headquarters and its principal trading venue (see, for example, Froot and Dabora 1999). This logic breaks down, however, in a world where companies work and compete on a global basis and are recognized as doing so by investors when they price securities. Thus, as corporations expand and diversify their international activities, the relative importance of domestic factors for such corporations should decline. For example, the stock price of a German company that acquires a U.S. company (such as Daimler-Benz acquiring Chrysler) should be influenced by U.S. factors in proportion to the value of its U.S. component. If a corporation is regarded as a portfolio of international activities, its stock price should be influenced by international factors in relation to the

Jeff Diermeier is chief investment officer at UBS Asset Management, Chicago. Bruno Solnik is professor of finance at HEC Paris.

geographical breakdown of its activities. Similarly, the currency exposure should be influenced by the geographical distribution of the company's activities.[2] This globalization applies not only to a few well-known multinational corporations but also, to a lesser extent, to the large number of less-well-known companies that have progressively stepped up their global activities by increasing exports, foreign direct investment, or merger and acquisition (M&A) activities.[3]

In integrated, or global, pricing, the market would reflect the value and changes to value of the nondomestic as well as domestic activities of the company. In essence, a French company with foreign activities could expect investors to value each stream of "national" earnings at the relevant "national" discount rate adjusted for the company's specific risk characteristics.

We present strong evidence in support of such global pricing effects. We examined a large cross-section of security prices and found that asset returns are significantly determined by regional factors and currency factors as well as domestic factors. Moreover, the sensitivity of individual company returns to nondomestic factors is closely related to the extent of their international activities.

Methodology

Various methods can be used to classify the "nationality" of a company. One can use the company's primary listing location, its headquarters location, or the primary location of its shareholders. Such primitive but often-used classification approaches fail to recognize that the company may operate on a global scale and that share prices reflect information that is publicly and widely available to all international investors. Another approach is to focus on share-price movements and statistically estimate the response of individual securities to domestic market factors and international (or regional) market factors. These estimates say little about the story behind the price responses, and the securities' responses may not be stable and persistent. A third approach is to examine fundamental accounting and economic data, such as the data in the World Investment Report published by UNCTAD (United Nations Conference on Trade and Development), in which the transnationality of a company is estimated by the proportion of foreign sales, foreign employees, and foreign assets in its makeup. Although this approach is intuitively appealing, such fundamental data need to be related to observed pricing relationships in the marketplace to be useful.

We combined the second and third estimation approaches to prove that global pricing exists, which confirms the problematic nature of the conventional approach. Our method involved a basic model that makes use of statistical estimation, and we compared those estimates with fundamental business data. We demonstrate how fundamental data are rationally priced in the statistical exposures we estimated.

The exact derivation of the model, under the assumption of global financial integration, is given in **Exhibit 1**. We made two simplifying assumptions. First, the value of a purely domestic company is influenced by a single country factor (which could be correlated with other country factors). Second, in the absence of additional information, we expected the sensitivity (beta) of a purely domestic company to be 1 relative to the domestic factor. Under global market integration, a company should be valued as a portfolio of international activities. Country factors can still exist, because national business cycles, government policies, and so on, are not fully synchronized, but a company with extensive foreign activities should be strongly influenced by foreign factors.[4] To reflect this assumption, Equation 5 in Exhibit 1 states that a company's stock price should be influenced by international factors in relation to the geographical breakdown of its activities, $\varpi_{i,k}$.[5]

To test this "global pricing" story, we first computed statistical estimates of factor exposures from stock market data: Do individual stock returns load up on other country index returns? Second, we compared the factor exposures with fundamental measures of international activity. In other words, we investigated whether the degree of internationalization of the activities of a company has the expected influence on the relative importance of domestic and international market factors in explaining equity returns.

To estimate factor exposures, we conducted for each company a time-series regression of the stock returns on the domestic market factor, the foreign country factors, and the foreign currency factors, as shown in Equation 5. Instead of using every single foreign country as a factor, we grouped them into three regional factors and used the leading currency associated with each region.[6] The domestic factor was estimated by using a domestic index cleansed of multinational companies. The exact definition of the factors is detailed in the next section.

Our model was

$$R_i = \alpha_i + \beta_i I_{dom} + \sum_{reg} \gamma_{i,reg} I_{reg} + \sum_{reg} \delta_{i,reg} C_{reg} + \varepsilon_i,$$

Exhibit 1. Theoretical Derivations

Denote the value of company i expressed in its domestic currency (currency i) as V_i. Decompose this value as the sum of the present value of distributable earnings derived in each country k. Denote the value of the distributable earnings derived in country k (expressed in currency k) as $V_{i,k}$; it is the value of a hypothetical company whose distributable earnings are influenced by the country k factor. The exchange rate of currency k (in units of domestic currency i) is S_k. Then,

$$V_i = \sum_k S_k V_{i,k}. \quad (1)$$

Assume a simple one-country factor model for a purely domestic company, where the expected elasticity (beta) to country factors is set equal to 1 in the absence of any additional information. The rate of return on the country-k component, $V_{i,k}$, is denoted $R_{i,k}$ and can be written as

$$R_{i,k} = \alpha_{i,k} + I_k + \varepsilon_{i,k}, \quad (2)$$

where I_k is the country k index return measured in currency k, $\alpha_{i,k}$ is a constant, and $\varepsilon_{i,k}$ is a residual error term specific to company i.

Assume no correlation between currency and country factor risks; then, the currency return, C_k, adds to the local currency stock market return and the total return on company i is given by

$$R_i = \sum \varpi_{i,k} R_{i,k} + \sum \varpi_{i,k} C_k, \quad (3)$$

where $\varpi_{i,k} = (S_k V_{i,k})/V_i$ and is the relative importance of country k in the total value of the company.

Hence,

$$R_i = \alpha_i + \sum \varpi_{i,k} I_k + \sum \varpi_{i,k} C_k + \varepsilon_i, \quad (4)$$

where α_i and ε_i are weighted averages of $\alpha_{i,k}$ and $\varepsilon_{i,k}$ and the exposure to each country factor should be equal to the relative importance of the country in the economic activity of the company.

If a company engages in corporate currency hedging, the correlation between stock return and currency return is not zero, so

$$R_i = \alpha_i + \sum \varpi_{i,k} I_k + \sum \psi_{i,k} C_k + \varepsilon_i, \quad (5)$$

where $\psi_k < \varpi_k$.

where

I_{dom} = the return on the domestic index
I_{reg} = the returns on the three regional indexes computed in their local currencies
C_{reg} = the returns on the three regional currencies measured in the domestic currency

and the coefficients β_i, $\gamma_{i,reg}$, and $\delta_{i,reg}$ are the exposures to the various factors. According to the global pricing model developed in Equation 5, these exposures should equal percentage $\varpi_{i,k}$ of the company's activities in the relevant country/region.

We measured the net international exposure as simply the sum of the three regional exposures, $\sum \gamma_{i,reg}$, and measured the net currency exposure as simply the sum of the three foreign currency exposures, $\sum \delta_{i,reg}$. Note that the domestic factor is to some extent correlated with international factors, as mentioned, but the correlation is much weaker than for the usual market-capitalization-weighted country index, which includes both purely domestic companies and multinational companies. This correlation also means that when we refer to "net international exposure," we mean the international exposure beyond that already reflected in the domestic factor.

We found the correlation between our domestic factors and foreign currency to be weak. We do not report it here, but as expected, it was well below the correlation of the usual market-cap-weighted country index with foreign currency.

Next, we performed a cross-sectional regression of the international exposures we estimated on the extent of international activity for all companies listed in a given country. Rather than looking at individual companies separately, we compared the estimated exposures with the degree of internationalization of the company's activities by a cross-sectional regression within each country of domicile.

We ran the following cross-sectional regression separately for each type (domestic, international, and currency) of exposure estimate:

$$Expo_i = \lambda_0 + \lambda_1 F_i + e_i,$$

where $Expo_i$ is the exposure of stock i to a specific factor and F_i is the degree of foreign activity of company i proxied by the foreign sales ratio (foreign/total).

In the first regression, $Expo_i$ was equal to β_i; in the second regression, $Expo_i$ was equal to the net international exposure, $\sum \gamma_{i,reg}$; in the third regression, $Expo_i$ was equal to the net currency exposure, $\sum \delta_{i,reg}$.

For the domestic factor, we expected to find the intercept, λ_0, to be equal to 1 and the slope, λ_1, to be negative. On average, the domestic beta of a purely domestic company should be equal to 1. In contrast, a multinational company with little domestic activity should have zero sensitivity to the domestic factor. For international factors, we expected the intercept to be equal to 0 and the slope to be positive. A purely domestic company should have no international market exposure ($\lambda_0 = 0$) beyond that already present in the domestic factor.

The exposure to international factors should increase with the extent of international activities. Actually, we would argue that the slope should be –1 for the domestic exposure and +1 for the international exposure under the global portfolio approach.[7] In contrast, we expected to find all slopes to be 0 if the "location of trade" story (market segmentation) prevails.

Data

We describe here the sample of companies and time period in our study, the method we followed to infer the extent of global influences on stock pricing, and the fundamental business data we used.

Stock Prices. For the sample of companies described here—which were domiciled in Japan, the United States, or one of six European countries—we used weekly returns (Friday close) from July 1989 to January 1999.[8] Companies' dividend-adjusted returns came from Datastream. The association of a company name with a particular country (as given in the various data sources on foreign activities) and the stock quotation code required careful examination. We excluded companies that had a major corporate event (e.g., major cross-border acquisition) in the study period.

Statistical Estimates. We assessed the extent of global stock pricing by statistical inference from regressing stock returns of a company on a set of domestic and international market factors.

- *Domestic factor.* In the literature, the domestic factor is summarized by the return on the national stock index. The return on a market-cap-weighted national stock index, however, can be largely determined by multinational companies, which tend to be the largest companies in any country. For example, the top six Dutch multinational companies represent more than 60 percent of the total Dutch market capitalization. Thus, if return on the national stock index is used, separating the influence of truly domestic factors from that of international factors is difficult.

To circumvent this problem, we created a domestic index that is different from the national index. We constructed a portfolio of national companies with primarily domestic activities.[9] The index is an equally weighted portfolio of all the companies in our sample that had a percentage of domestic revenues at least equal to a certain threshold, which differed by country. The determination of the threshold was arbitrary and country dependent so as to create a diversified index. The national thresholds selected and the number of companies that met the threshold and composed each index are given in **Table 1**. We conducted numerous experiments to check that our results are not sensitive to the threshold levels.

Table 1. Universe of Companies

Country	Number of Companies	Threshold of Domestic Operations for Inclusion in Domestic Index
France	89	75%
Germany	85	85
Italy	44	85
Japan	208	99
Netherlands	39	65
Switzerland	86	60
United Kingdom	200	99
United States	462	99
Total	1,213	

- *International market factors.* The value of a company should be influenced by the economic conditions in the countries in which it operates. In this study, we used regional stock indexes as international market factors. The regions are Europe, North America, and Asia. Our choice is a compromise between using either one single world factor or every single country factor. The net international market exposure is equal to the sum of the regional market exposures. All regional indexes were recalculated to exclude the country of nationality of the company studied (for example, we used the European index ex the United Kingdom for British companies). For U.S. and Japanese companies, we used only the two regions that did not include them because these countries are the dominant market components of their regions. All the regional indexes were measured in the region's major currency: the U.S. dollar for North America, the Japanese yen for Asia, and the European Currency Unit (ECU, the predecessor of the euro) for Europe. Hence, currency effects appear in the exposure to currency factors.
- *Currency factors.* Currencies should affect stock pricing to the extent that international factors do. But the influence of currency factors could extend beyond that of geographical factors. Furthermore, many companies adopt an active approach to currency risk management. Hence, we included as international factors the exchange rate of the domestic currency with that of each of the regions. The currencies we used are the most important currencies in world trade. For example, the currency factors for British companies are the British pound value of one ECU, one yen, and one dollar. The net foreign currency exposure is equal to the sum of the three.

Fundamental Business Data. Our requirements meant that the fundamental business data had to have several properties. The data themselves

needed to have an intuitive relationship with the notion of foreign activity. The sample of companies needed to be diverse in terms of foreign activity from purely domestic to heavily multinational companies. We did not need an exhaustive sample of companies to test for global pricing, so quality of data took precedence over number of companies.

Data availability and quality severely constrained this study. Efforts to construct a clean database turned out to be substantial and time-consuming, even though the raw data were supplied by well-known vendors. Our experience suggests that for global market analysis to achieve maturity, companies will need to be required to present foreign fundamental data in a standardized, rigorous fashion.

We selected data for the percentage of domestic and foreign sales as our measure of foreign activity. We generally took the data from annual reports that are made available by Datastream, Worldscope Global, and FactSet Research Systems. Financial institutions Nomura Securities and Morgan Stanley also provided some data.[10] The data varied in quality and consistency—in part, because of different national accounting standards and methods. Different sources reported markedly different foreign revenue ratios for numerous companies. For example, one source reported Boeing as having foreign revenues of only 1 percent. The problem may be the result of vendors handling "foreign sales," "export sales," and "foreign revenues" differently. Some financial companies reported insignificant foreign sales at the holding-company level without consolidating foreign sales of subsidiaries. Some European companies reported European sales as "domestic," whereas others reported only their own country sales as domestic. Many companies simply did not report the geographical breakdown of their activity in any reliable way.

Our primary sources for European, Japanese, and U.S. companies were, respectively, Datastream, Nomura, and Morgan Stanley. We used the most comprehensive measure of foreign revenues, where revenues included foreign and export sales, when this information was available. We used the domestic-to-foreign sales ratio for 1997 (available at the end of 1998 and cleaned in 1999) for the entire period of the study.[11] The resulting database contained 1,213 companies from the eight countries (see Table 1).[12]

Empirical Results

We report in this section our estimates of the factor loadings and the results of the cross-sectional regressions of domestic exposures on foreign sales ratios.

Estimating the Factor Loadings. For all companies in our sample, we estimated the exposures by using the equation for R_i given previously and computed the net international exposure by summing the exposures in the three regions. We found persuasive evidence for global pricing.

For example, SmithKline Beecham is a British company with only 8 percent of its sales in the United Kingdom.[13] Hence, its stock price exposure to the domestic (U.K.) market should be only 8 percent whereas its risk exposure to foreign market factors should amount to 92 percent. Similarly, it should be valued as a primarily nonsterling asset because most of its revenues come from abroad. The foreign currency exposure of the stock price measured in British sterling should be large and similar to the foreign market exposure, unless currency hedging or similar behavior is taking place.

We found in the time-series regression estimates of exposures a domestic market exposure for SmithKline Beecham of 17 percent. The net exposure to international markets was found to be 94 percent (8 percent to Asia, 31 percent to Europe, and 55 percent to the United States), and the net foreign currency exposure was 46 percent (8 percent to the yen, 27 percent to the euro, and 27 percent to the dollar). Exposure or sensitivity in this case means that, for example, because SmithKline Beecham's exposure to the U.S. stock market is 0.55, on average, the stock price of SmithKline Beecham (measured in sterling) goes up by 0.55 percent when the U.S. stock market goes up by 1 percent.[14]

Foreign currency exposure being lower than international market exposure suggests that SmithKline Beecham engages in various forms of corporate currency hedging. The foreign currency exposure of 0.46 means that SmithKline Beecham is not fully a sterling asset. When sterling drops against all currencies, the stock price of SmithKline Beecham expressed in sterling tends to go up by 0.46 times the depreciation. Thus, a U.S. investor buying this stock is only partly exposed to sterling. Conversely, a British investor owning the stock is strongly exposed to foreign currencies.

International Factor Exposure and Foreign Sales. Our theoretical model suggests that factor exposures ought to be related to the extent of companies' international activities. Our proxy for companies' international activities is the ratio of foreign sales to total sales. Thus, in examining a portfolio of securities, we expected to find that companies with a low exposure to their domestic factor should have a high proportion of foreign sales. Similarly, companies with a high exposure to foreign (market and currency) factors should

have a high proportion of foreign sales. The currency-hedging activities of companies would be reflected in differing foreign market and currency exposures. We tested these hypotheses via cross-sectional regressions in which the portfolio of securities we considered formed the constituents of each individual country we examined.

Results for the cross-sectional regressions of domestic exposures on foreign sales ratios are presented in **Table 2**. Results for the regressions of net international market exposure (sums of regional exposures, $\sum\gamma$) on foreign sales ratios are presented in **Table 3**. Results for the regressions of net foreign currency exposure (sum of regional currency exposures, $\sum\delta$) on foreign sales ratios are presented in **Table 4**.

To illustrate the results, we will use the portfolio of Dutch companies. In the regression between domestic exposure and the degree of international activity (Table 2), the intercept is 1.07 (with a standard error of 0.10) and the slope is –0.79 (with a standard error of 0.15). In other words, a purely domestic company is expected to have a domestic beta of 1.07 (not significantly different from 1 at the

Table 3. International Market Exposure, July 1989–January 1999 Data
(standard errors in parentheses)

Country	Intercept (λ_0)	Slope (λ_1)	R^2	Number of Companies
France	0.13	0.61	13%	89
	(0.10)	(0.16)		
Germany	–0.04	0.73	31	85
	(0.06)	(0.12)		
Italy	–0.03	0.49	40	44
	(0.04)	(0.09)		
Japan	–0.03	0.59	22	208
	(0.02)	(0.08)		
Netherlands	–0.12	0.79	49	39
	(0.09)	(0.13)		
Switzerland	–0.08	0.55	32	86
	(0.07)	(0.09)		
United Kingdom	0.01	0.35	22	200
	(0.02)	(0.05)		
United States	0.03	0.13	2	462
	(0.01)	(0.04)		

Note: The dependent variable, $Expo_i$, is the international market exposure of each company i, and the explanatory variable is its 1997 foreign sales ratio. The R^2 is adjusted for degrees of freedom.

Table 2. Domestic Exposure, July 1989–January 1999 Data
(standard errors in parentheses)

Country	Intercept (λ_0)	Slope (λ_1)	R^2	Number of Companies
France	0.79	–0.53	17%	89
	(0.07)	(0.12)		
Germany	1.03	–0.32	4	85
	(0.07)	(0.15)		
Italy	1.01	–0.32	13	44
	(0.06)	(0.12)		
Japan	1.06	–0.56	10	208
	(0.03)	(0.12)		
Netherlands	1.07	–0.79	41	39
	(0.10)	(0.15)		
Switzerland	0.97	–0.51	29	86
	(0.07)	(0.09)		
United Kingdom	0.96	–0.28	4	200
	(0.04)	(0.07)		
United States	0.93	0.26	3	462
	(0.02)	(0.09)		

Note: The dependent variable, $Expo_i$, is the domestic exposure of each company i, and the explanatory variable is its 1997 foreign sales ratio. The R^2 is adjusted for degrees of freedom.

Table 4. Foreign Currency Exposure, July 1989–January 1999 Data
(standard errors in parentheses)

Country	Intercept (λ_0)	Slope (λ_1)	R^2	Number of Companies
France	0.08	0.40	6%	89
	(0.10)	(0.17)		
Germany	–0.06	0.38	9	85
	(0.06)	(0.12)		
Italy	0.02	0.01	0	44
	(0.07)	(0.13)		
Japan	–0.03	0.56	24	208
	(0.02)	(0.07)		
Netherlands	–0.13	0.46	19	39
	(0.10)	(0.15)		
Switzerland	0.02	0.08	0	86
	(0.06)	(0.08)		
United Kingdom	–0.05	0.29	17	200
	0.02)	(0.04)		
United States	0.00	0.16	3	462
	(0.01)	(0.05)		

Note: The dependent variable, $Expo_i$, is the foreign currency exposure of each company i, and the explanatory variable is its 1997 foreign sales ratio. The R^2 is adjusted for degrees of freedom.

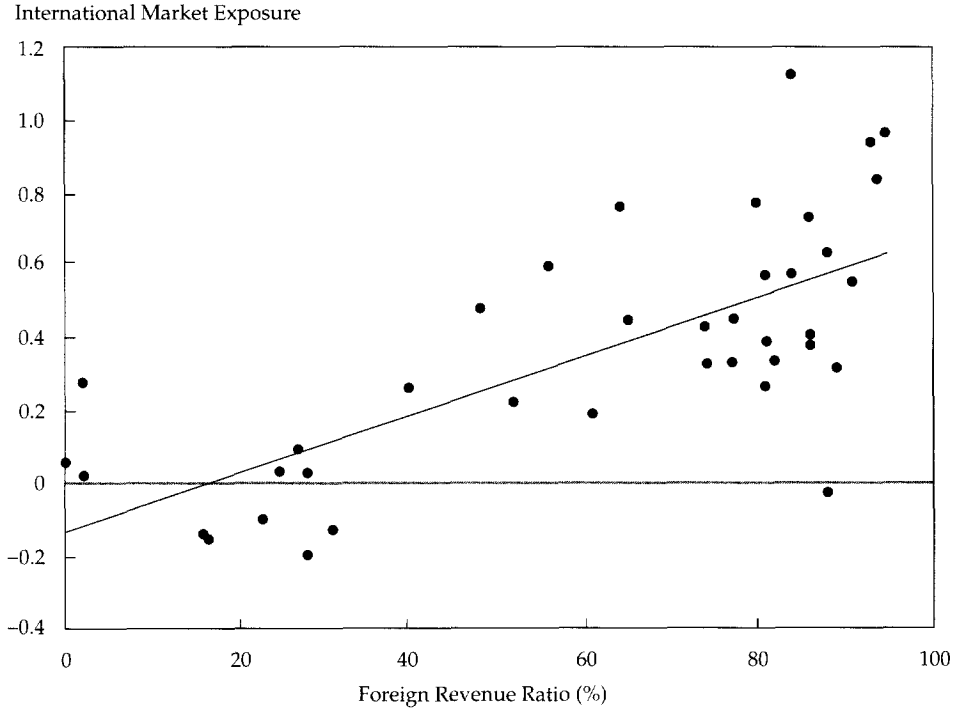
1 percent confidence level). As the degree of internationalization of Dutch companies increases, their domestic exposure decreases, with a slope of –0.79 (not significantly different from –1 at the 1 percent confidence level). For example, a company that derives 50 percent of its revenue outside the Netherlands is expected to have a domestic exposure of only 0.67. Conversely, as Table 3 shows, the international exposure is close to 0 for purely domestic Dutch companies (–0.12 and not significantly different from 0 at the 1 percent level) and increases with the degree of international activity (slope +0.79 and not significantly different from 1 at the 1 percent confidence level). We reach a similar conclusion for currency exposure (Table 4), which increases with the degree of international activity (slope of 0.46). Note, however, that the currency slope of 0.46 is well below the international market slope of 0.79, suggesting that Dutch companies engage in various forms of currency hedging. Thus, buying stocks of Dutch multinationals cannot be regarded as a pure euro investment. A visual presentation of the results for international market exposure for the Netherlands is in **Figure 1**.

General conclusions can be drawn from Tables 2–4. We will focus on Tables 3 and 4, which reflect the extent of international pricing. As Table 3 shows, the slopes are positive and statistically significantly different from 0 for all the countries, which indicates that foreign sales activity indeed translates into international stock pricing. The adjusted R^2s are quite large, except for the United States, where the relationship is weak. The evidence for European and Japanese companies is strong. Even though our indicator of international activity is crude and static (the 1997 foreign sales ratio), it is effective in discriminating among companies.[15]

In the United States, we found multinationals to be only slightly more exposed to international market factors than domestic companies. This puzzling result confirms the findings of Lombard, Roulet, and Solnik (1999). One explanation is that the U.S. economy is so large and open, an economy in which companies from all over the world compete, that it is more international internally than other economies. Still, a U.S. company with extensive operations in a given region should be more affected by a sudden recession in that region than the typical domestic U.S. company.

A comparison of Tables 3 and 4 shows that we found the slopes for foreign currency exposure to be always smaller than the slopes for international market exposure (except in the case of the United States, where they are almost identical). This result suggests that companies engage in various forms of currency hedging. The effect is most pronounced in

Figure 1. Regression between International Market Exposure and the Degree of International Activity: Netherlands, July 1989–January 1999 Data



Switzerland and Italy. Indeed, Swiss companies are seldom listed abroad and are known for attempting to smooth earnings reported in Swiss francs. Japanese companies are the most sensitive to foreign currency factors, which indicates that the stock prices of Japanese export companies react positively and strongly to a drop in the value of the yen. Similar evidence was presented in a recent working paper by Bodnar, Marston, and Dumas (2000).

We conducted several robustness checks (not reported here for the sake of brevity). We checked the sensitivity of the results to the construction of the domestic indexes by varying the thresholds for inclusion, excluding the companies that made up the domestic indexes from the analysis, and using other proxies for the domestic indexes (including indexes constructed from "local" companies as defined by FTSE International). The coefficients changed slightly, but our conclusions remained unaffected.

Where the data were available, we tried other proxies for the degree of international activity—profits and assets.[16] In these tests, the sample of companies was much smaller and was biased toward multinational companies. Again, our conclusions remained the same. A joint multivariate estimation (as described in Note 7) pointed in the same direction.

Finally, we split the period into two five-year subperiods and reran the tests. We did not find an increase in the extent of global pricing (slope, λ_1). This result suggests that the world financial market was already integrated in the early 1990s (at least for developed markets). What is changing is that corporations are becoming more global in their business activities through increased exports and cross-border M&A.

Conclusions and Implications for Asset Management

The main conclusions of this research can be summarized as follows:

- Strong evidence supports the idea that companies are priced globally, with the market taking into consideration the portfolio of international and domestic value within a company's aggregate value.
- To assume that the location of a company's headquarters or where its stock is listed captures the major determinant of its stock-price behavior is incorrect.
- For most developed countries, a relationship exists between the degree of domestic (international) stock exposure, as inferred from return data, and domestic (international) sales. The greater the proportion of international sales, the greater the likelihood that the stock responds to nondomestic factors. The results are less pronounced for U.S. companies.
- Foreign stock market exposures exceed foreign currency exposures, which suggests that companies carry out some currency hedging. Nevertheless, the stock prices of several international companies are exposed to foreign currencies. As a result, if investors fully hedge their accounting currency exposure back to their home currencies, they could end up with some overhedging.

These findings have implications in terms of academic research, portfolio management, and financial analysis. First, we did not provide a formal test of global market integration (through an international asset-pricing model), but our results suggest some direction for academic research. We found that the observed dominance of country factors is not inconsistent with global pricing. A large number of companies are still primarily domestic in their activities, but as their international involvement expands, country factors should become increasingly correlated and their importance should diminish relative to "real" factors, such as industry factors.

In addition, formal tests of international market integration have relied on country indexes, not individual companies.[17] Our results suggest that analysts need to use company-level information about the geographical distribution of a company's activities to disentangle the effects of economic activity and location of listing on stock returns.

The conventional methods used in asset management to describe markets and currency allocations are problematic and biased. Clearly, the market looks to where business activities take place as part of the underlying fundamentals when pricing assets, which has important ramifications for the portfolio manager.

For example, heavily *home-biased* portfolios, isolated to some fragment of a global capital market, appear to be randomly undiversified portfolios with no incremental return expectation to offset the idiosyncratic risk. A Swiss institutional investor focusing on Swiss stocks will end up with some global exposure, however, because some Swiss securities are not truly "domestic." In **Table 5**, we report the cap-weighted average exposures, based on our data, of all constituents (both the "local" companies and the "multinational" companies) of this market. The loading on the domestic Swiss index is only 0.45, which suggests a response to the Swiss factor that is far from unitary. The aggregate loading of 0.60 on foreign markets

Table 5. Exposures for a Cap-Weighted Portfolio of Swiss Stocks, July 1989–January 1999 Data

Factor	Average Exposure
Domestic (β)	0.45
Foreign market (γ)	
Asia	0.07
Europe	0.38
United States	0.15
Total	0.60
Foreign currency (δ)	
Asia	0.10
Europe	0.10
United States	–0.07
Total	0.13

reflects the transnationality of some companies that happen to be domiciled in Switzerland, such as Nestlé, Novartis, Roche, and UBS. Thus, our bottom-up analysis is in clear and critical contrast to traditional accounting-based portfolio measures of market exposure.

Furthermore, our analysis suggests that a portfolio manager who swaps, for example, Alusuisse (with a domestic exposure of 1.04) for Roche (with a domestic exposure of 0.04) significantly alters the Swiss exposure of his or her portfolio, although traditional measures would show the Swiss exposure to be unchanged. A diversified Swiss portfolio may afford some global exposure, but it carries a lot of idiosyncratic risk. It is highly weighted toward five or six names, and several major industries (especially in the technology, media, and telecommunications sectors) are simply absent. Furthermore, a Swiss company is not necessarily the best worldwide investment opportunity in each of the industries in the portfolio.

Portfolio managers should be aware that conventional approaches to currency allocation are likely to produce systematic overhedging when portfolios are to be fully hedged. This overhedging problem is embedded in currency-hedged benchmarks because the underlying companies have already provided some currency hedging. Similarly, applying fixed hedge ratios to all stocks of a foreign country or region is not appropriate.

It has become fashionable to deal with the complexity of global asset management by retaining the country asset allocation approach while introducing a new asset class—multinationals. Our results suggest that portfolio managers should avoid this inadequate shortcut. We did not find that big multinationals constitute a separate asset class. The world is not split into two types of companies—local and multinational. Rather, geographical diversity is a matter of degree, and the progressive nature of the relationship between international activity and international exposure appears to be intuitive. In other words, the more international a company is, the more it is exposed to international factors.[18]

In short, analysis of global investment opportunities is considerably more complex than in the past. The analysis should still be country specific to some extent; country factors are still important. Analyses of the industry and the individual company and its diversity, however, are becoming important. This increased complexity in global portfolio management provides opportunities for superior return and risk management for those with the better understanding of the global (and domestic) influences on stock pricing.

Our results also have implications for the organization of research departments. The simple paradigm of country allocation followed by allocation within countries breaks down when the companies themselves are global. Analysis of the individual company and its diversity has become critical. Cavaglia, Brightman, and Aked (2000) found that global industry factors have been rising in importance relative to country factors. They suggest that industry factors may capture the principal diversity among companies. Thus, research departments should be organized around industries rather than countries. Our findings should encourage analysts to vigorously pursue information about the geographical breakdown and currency practices of the companies being studied. In light of the paucity and nonstandard nature of the global data, the security analyst who understands the true nature of a company's country and currency exposures should have a distinct competitive advantage. Future research will need to examine the interplay of traditional and nationally based style factors—value, growth, and size.

Despite global integration, investors in all countries retain a pronounced home bias in their investments. This practice is sometimes justified by the increased correlations between national stock markets, which reduces the benefits of international risk diversification. The current level of international correlation still, however, justifies greater international investment than is currently observed among institutional investors. Furthermore, a cross-country, cross-industry approach is required to capture the full risk benefits of international diversification, but this approach is rarely practiced.

Fundamentally, a "nationalistic" approach by asset managers to equity investment, with a separation of domestic versus foreign investments, is increasingly difficult to justify. In a world where financial markets have become very integrated across borders and where corporations pursue global strategies, investment managers should respond with truly global financial analysis and portfolio construction. Industries cut across national boundaries, and factors that affect stock pricing are global. The question is no longer: Should I put 10 percent of portfolio assets abroad? The question now is: How can I afford not to be global in all aspects of my investment management approach?

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Notes

1. Lombard, Roulet, and Solnik (1999) provide a literature review. See also Beckers, Connor, and Curds (1996), Drummen and Zimmermann (1992), Griffin and Karolyi (1998), Griffin and Stulz (2001), Heston and Rouwenhorst (1994), and Rouwenhorst (1999).
2. Many analysts would argue that a corporation, especially a multinational corporation, is a complex organization that does not simply equal the sum of its national components. An investigation of these alleged organizational complexities is left for future research.
3. Cross-border M&A has increased rapidly in the past 10 years. Interactive Data Corporation reports that cross-border M&A averaged an annual rate of US$40 billion in 1989–1993, US$160 billion in 1994–1998, more than US$500 billion in 1999, and more than US$1 trillion in 2000.
4. Consistent with international asset pricing, country factors are also correlated with the world factor, just as national business factors are correlated with the world business cycle.
5. In a way, this approach assumes that corporations achieve through direct investment the benefits of international diversification suggested by early work on international portfolio diversification.
6. This approach allowed us to take into account the fact that some companies focus on some regional markets (e.g., Europe for British firms) but did not pose the degrees of freedom problem that would be encountered if all country factors had been used.
7. See Equation 5. The estimated slope could differ from unity for various practical reasons. One reason is that our indicator of international activity is an imperfect one. Another reason will be apparent later: The domestic factors are proxied by the return on a portfolio of companies with mostly domestic activities. Some of these companies have a limited amount of international activity, however, so the domestic factor proxy is not fully domestic. Finally, the two-step econometric procedure we used is sensitive to measurement error in the variables. An alternative econometric procedure would be to use a multivariate estimation for all companies, where each company's exposure is directly constrained to be of the form $\lambda_0 + \lambda_1 F_i$. This procedure suffers from serious error-in-measurement problems, however, and results are more difficult to interpret than in the procedure we used because they do not rely on the risk-exposure measures traditionally used.
8. We limited the countries to those for which we had a sufficient number of companies to conduct cross-sectional tests.
9. A similar approach is used in most factor models. Lombard, Roulet, and Solnik followed the same route.
10. Morgan Stanley reports the breakdown of sales and other indicators by region without specifying the domestic component.
11. This 1997 indicator overstates the true extent of international activities for some of the companies for the period. Other measures of activity—namely, earnings and assets—were less available than sales data but were used for some robustness checks, which did not find major differences in conclusions.
12. The number of companies may look small compared with the universe, but we set a priority on data reliability and our methodology does not require an exhaustive sample. For example, all the data sources provided information on only about 500 U.S. companies. We required the companies to be continuously listed over the period under study and rejected those with fundamental business data of questionable quality, which left us with 462 U.S. companies in the study.
13. In December 2000, SmithKline Beecham merged with Glaxo Wellcome to become GlaxoSmithKline.
14. Actually, SmithKline Beecham reported that U.S. sales amount to about 50 percent of its total sales.
15. A downward bias in the estimated slope can be expected for many econometric reasons. Our domestic factor is not purely domestic for many countries because it includes companies with some international operations. Hence, the slope should not be unitary. Second, our indicator of international activity is not a perfect one; measurement error introduces a downward bias. In addition, our indicator applies to international activity at the end of the period, but on average, companies were less international at the start of the period. So, we should not be surprised to find a slope less than 1.
16. Actually, we found these three indicators to be strongly correlated (with a correlation higher than 0.9), as Rugman (1976) noted.
17. Bekaert and Harvey (1995); Dumas and Solnik (1995); De Santis and Gerard (1997).
18. Additional empirical evidence in support of this conclusion can be found in Cavaglia and Aked (1999). Their study used foreign sales and earnings data to corroborate evidence of global pricing for the 200 largest multinationals.

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