The cost of capital in internationally integrated markets: The case of Nestlé

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**Abstract**

This paper argues that the cost of capital for firms in small countries should be estimated using the global CAPM rather than a local CAPM. Two related formulas showing the mistake made when using a local CAPM rather than a global CAPM are presented. The global CAPM is implemented for the case of Nestlé and the results are compared to the cost of capital estimate one obtains for Nestlé using a local CAPM when the global CAPM is appropriate.

**Keywords:** Internationally integrated markets; cost of capital estimates; global CAPM.

**JEL classification:** G12; G15.

1. Introduction

There is a large amount of literature that addresses valuation issues for the USA. Although there are disagreements among financial economists on most valuation issues, these issues are well defined and generally have to do with the implementation of well-known models rather than with the general principles that should guide valuation. For instance, financial economists argue about how to measure risk in computations of the cost of capital, not whether risk affects the cost of capital. Despite the considerable controversies surrounding the capital asset pricing model (CAPM), most valuation approaches used in the USA take the CAPM as given and compute the discount rate for equity cash flows using the CAPM with some broad-based US index proxying for the market portfolio.

In contrast to the state of the art for the USA, the literature on valuation in small countries is almost non-existent. Academics and practitioners often simply mimic US practices and implement the CAPM with a broad-based local index proxying for the home country market portfolio. We call this implementation of the CAPM the local CAPM. An alternative to the local CAPM is what we call the global CAPM, namely a CAPM implemented with a broad-based global index proxying for the collective wealth of countries with easily accessible capital markets for investors who reside in any of these countries.

In this paper, we question the practice of using a local CAPM in cost of capital computations for small countries. In light of the popularity of CAPM approaches, our analysis is narrowly focused on the issue of whether one should use the local
CAPM. The reason why a local CAPM might be inappropriate is straightforward. Most US valuation approaches were developed at a time when the US stock market represented most of the world's stock market capitalisation and other stock markets were often closed to foreign investors. This is no longer the case. Many markets are now easily accessible and the share of the US stock market in world stock market capitalisation is substantially less than it was in the 1960s or 1970s. In most small countries, therefore, the cost of capital is not determined locally but globally. However, even if the cost of capital is determined globally, it does not necessarily follow that one makes a mistake using a local CAPM. We provide a simple formula that shows the magnitude of the mistake one makes by using a local CAPM instead of a global CAPM and that helps to understand when the local CAPM works and when it does not.

We proceed as follows. In Section 2, we provide formulas for the cost of capital when it is determined locally and when it is determined globally. We then show when using the wrong formula for the cost of capital leads to costly mistakes. In Section 3, we briefly review the evidence on international capital market integration. In Section 4, we use Nestlé as an example to discuss the issues that arise in the implementation of the global CAPM. In Section 5, we provide a conclusion.

2. The cost of capital and capital market integration

To make our point, we take as given the key assumptions that are needed for the capital asset pricing model (CAPM) used in most valuations to hold. We assume that when investors rank portfolios, they always prefer a portfolio with a greater expected return for a given variance of return and a portfolio with a lower variance of return for a given expected return. We assume that all investors are sufficiently alike in their preferences and beliefs that we can proceed as if there is only one type of investor per country and investors are the same across countries in their preferences and beliefs. We ignore taxes, transactions costs and other market frictions within countries.

In an international setting, a key issue is the impact of exchange rate fluctuations on asset prices. One way to deal with this issue is to assume that deviations from purchasing power parity are not important enough to affect asset prices. In this case, there are no differential demands for currencies among investors, and the traditional CAPM, which does not allow for a separate effect of exchange rate risk on the cost of capital, holds. Alternatively, one can assume that investors consume different baskets of commodities, so that they hold currencies in different amounts to hedge against purchasing power risks. In this case, the traditional CAPM does not hold and the cost of capital depends both on a firm's market risk and its currency risk. Stulz (1994a) reviews these various approaches. In this paper, we restrict the analysis to the traditional CAPM approach, since empirical implementations of the alternative approach that could be used for our purpose are not well developed.

Consider firm i in a small country, which we call the home country or country H. The question we want to ask is how much investors would pay for that firm. For simplicity, we assume that the firm is an all-equity firm. With this assumption, investors want to discount the cash flows of that firm at the discount rate which corresponds to the expected return they require to hold the firm's shares. To compute that expected return, they estimate how much risk the shares of firm i contribute to their portfolio. This means that to compute the cost of capital for firm i, we have to know something about the holdings of investors who invest in the shares.
of firm i. With our assumptions, all investors hold the portfolio that minimises the variance of their portfolio’s return given its expected return. Consequently, all investors hold the same portfolio of risky assets. In equilibrium, that portfolio has to be the market portfolio, i.e. a value-weighted portfolio where the fraction invested in a given firm’s equity corresponds to the market capitalisation of that firm’s equity divided by the market’s total capitalisation. Otherwise, some shares would be in excess supply which would be inconsistent with equilibrium. Since all investors hold the market portfolio, the risk of a security is determined by its contribution to the riskiness of the market portfolio, i.e. by the security’s beta, defined as the ratio of the covariance of the return of the security with the return of the market to the variance of the market.

To implement this approach, we must define the market portfolio. To do this, we consider two cases. The first case is the segmented market case. We assume that the investors in the home country cannot invest abroad and foreign investors cannot invest in the home country. In this case, the market portfolio that is relevant for the valuation of firm i is the market portfolio of the home country since domestic investors must hold the home country market portfolio for equilibrium to be obtained. With our assumptions, the capital asset pricing model applies within the home country and the required expected return on shares of firm i, $R_{iH}$, is given by the following formula:

$$R_{iH} = R_F + \beta_{iH} [E(R_H) - R_F],$$

where $R_F$ is the risk-free rate, $\beta_{iH}$ is the covariance between the return of share i, $R_i$, and the return of the market portfolio of the home country, $R_H$, divided by the variance of the return of the market portfolio, and $E(R_H)$ is the expected return of the home country market portfolio.

Using equation (1) to obtain the cost of capital is equivalent to mimicking the US approach. Instead of using the US market portfolio, valuation in the home country proceeds by using the home country market portfolio instead, but no additional changes are required. To get this result, we made a key assumption, namely that the home country is isolated from the rest of the world. We now turn to the case where this assumption does not hold and the home country is fully integrated in the world capital markets. In this case, the portfolio that minimises the variance of return for a given expected return for investors of the home country is no longer the market portfolio of that country, but is the market portfolio comprised of all markets that are freely accessible for investors of the home country. We call this market portfolio the global market portfolio to emphasise that it includes more securities than the home country portfolio, but does not include all securities in the world. There are securities that cannot be acquired by investors in the home country because they are traded in closed markets. Although these securities are part of world wealth and hence are part of the world market portfolio, they are not part of the global market portfolio as defined here. If investors of the home country only hold securities from their own country, they forego valuable benefits from international diversification. By selling part of their holdings of domestic securities and investing the proceeds in foreign securities, these investors can always decrease the variance of their portfolio without affecting its mean.

If home country investors can easily access foreign capital markets and investors in these countries can access the market of the home country, all these interrelated markets form one capital market for the purpose of estimating the risk of assets. In
this global capital market, the risk of a security is measured by its contribution to the risk of the portfolio held by investors measured by the global beta defined as the covariance of the return of the security with the return of the global market portfolio divided by the variance of the return of the global market portfolio. Instead of using equation (1) to compute the cost of capital, we now have to use:

\[
\hat{R}_{ig} = R_F + \beta_{ig} [E(R_G) - R_F],
\]

where \( \hat{R}_{ig} \) denotes the required expected return on security \( i \) when markets are global, \( \beta_{ig} \) is the global beta of share \( i \), and \( R_G \) denotes the return of the global market portfolio.

Equation (2) yields a formula for computing the cost of capital in the home country which is not equivalent to mimicking the approach used in the USA. To be more concrete about this, consider the case of valuing a company in France. With equation (1), one would use as the market portfolio some proxy for the French market portfolio, such as the CAC-40, the Morgan Stanley–Capital International (MSCI) index for France, or the Financial Times (FT) index for France. With equation (2), one would use a proxy for the global market portfolio, such as the MSCI world index. It seems rather unreasonable to assume that the French capital market is segmented from the other capital markets. On \textit{a priori} grounds, therefore, one would expect equation (1) to be inappropriate for France or for any capital market that is not isolated from other capital markets.

Investigating when equation (1) is appropriate even though the home country is integrated in world capital markets will allow us at the same time to determine when using equation (1) leads to substantial mistakes. If the home country is integrated in world capital markets, then the expected return on the market portfolio of the home country is determined by the global CAPM given by equation (2):

\[
E(R_H) = R_F + \beta_{HG} [E(R_G) - R_F],
\]

where \( \beta_{HG} \) is the global beta of the home country market portfolio, defined as the covariance of the return of the home country market portfolio with the return of the global market portfolio divided by the variance of the global market portfolio. Equation (3) determines the risk premium on the home country market portfolio when the country is integrated in global markets. We can therefore substitute this risk premium in equation (1) to obtain the cost of capital of firm \( i \) when the home country is integrated in world markets and when the local CAPM is used:

\[
\hat{R}_{iGH} = R_F + \beta_{ih} \beta_{HG} [E(R_G) - R_F],
\]

where the subscript \( iGH \) indicates that the required return is the required return obtained for security \( i \) when markets are global and the local CAPM is used.

Equation (4) makes clear an important feature of the CAPM in global markets. The risk premium used by the local CAPM for the home market portfolio, defined as the covariance of the return of the home country market portfolio with the return of the global market portfolio divided by the variance of the global market portfolio. Consequently, if the local CAPM yields the wrong cost of capital, it has to be because it uses the wrong \( \beta \). This is because using the CAPM with the local market portfolio allows for global markets to affect the cost of capital estimate for firm \( i \) only through the effect of global markets on the risk premium of the local market and not through the \( \beta \) of firm \( i \).

To understand when using the local CAPM gives the right estimate for the cost of capital, we need to find out when \( \hat{R}_{iG} = \hat{R}_{iGH} \). From equations (2) and (4), it follows
that:

\[ \hat{R}_G - \hat{R}_{GH} = [\beta_{iG} - \beta_{iHbig} \beta_{HG}] [E(R_G) - (R_F)]. \] (5)

Equation (5) means that the local CAPM and the global CAPM approaches give the same answer for the cost of capital of firm i when \( \beta_{iG} = \beta_{iHbig} \beta_{HG} \) (since the risk premium on the global market portfolio is positive). Obviously, this is the case if the return of the market portfolio of the home country always equals the return of the global market portfolio. However, using local pricing in global markets leads to a correct estimate of the cost of capital under more general conditions. The return on security i can be decomposed into a component perfectly correlated with the market portfolio of the home country and a component uncorrelated with that return:

\[ R_i = \alpha_{iH} + \beta_{iH} R_H + \varepsilon_{iH}, \] (6)

where \( \alpha_{iH} \) is a constant, \( \beta_{iH} \) is the beta of the i shares with respect to the market portfolio of the home country, and \( \varepsilon_{iH} \) is the part of the return of the i shares that is uncorrelated with the return of the market portfolio of the home country. In the same way, we can decompose the return of the market portfolio of the home country into a component correlated with the return of the global market portfolio and a component uncorrelated with it:

\[ R_H = \alpha_{HG} + \beta_{HG} R_G + \varepsilon_{HG}, \] (7)

We can then replace the return of the home country market portfolio in equation (6) by its value given by equation (7):

\[ R_i = \alpha_{iH} + \beta_{iH} [\alpha_{HG} + \beta_{HG} R_G + \varepsilon_{HG}] + \varepsilon_{iH}. \] (8)

The global beta of the i shares is the covariance of the return of these shares with the return of the global market portfolio divided by the variance of the return of the global market portfolio. Using the expression for the return of the i shares of equation (8), we can write the global beta of the i shares as:

\[ \beta_{iG} = \text{covariance}(R_i, R_G) / \text{variance}(R_G) \]
\[ = \text{covariance}(\alpha_i + \beta_{iH} \alpha_{HG} + \beta_{HG} R_G + \varepsilon_{HG}, R_G) / \text{variance}(R_G) \]
\[ = [\beta_{iH} \beta_{HG} \text{variance}(R_G) + \text{covariance}(\varepsilon_{iH}, R_G)] / \text{variance}(R_G) \]
\[ = \beta_{iH} \beta_{HG} + \text{covariance}(\varepsilon_{iH}, R_G) / \text{variance}(R_G). \] (9)

Equation (9) shows that the two approaches to obtain the cost of capital lead to the same answer only if the risk of the i shares that is uncorrelated with the return of the market portfolio of the home country, \( \varepsilon_{iH} \), is uncorrelated with the return of the global market portfolio. The risk represented by \( \varepsilon_{iH} \) is diversifiable in the home country. However, if covariance(\( \varepsilon_{iH}, R_G \)) is different from zero, this risk is not diversifiable internationally. This means that if firm i has risk that is diversifiable domestically but not internationally, the cost of capital for that firm is higher using the correct global CAPM than the incorrect local CAPM. In the global CAPM, there is a risk premium for risks diversifiable locally but not internationally. However, since these risks are diversified within the home market portfolio, they do not affect the beta of domestic securities with respect to that portfolio and the beta of the home market portfolio with respect to the global market portfolio does not reflect these risks either. Hence, using the local CAPM amounts to ignoring these risks. It is important
to note, though, that using the local CAPM does not mean ignoring all risks that are not diversifiable internationally. Since the risk premium on the home country market portfolio is determined globally, that risk premium reflects the risks of that portfolio that are not diversifiable internationally. Nevertheless, a domestic firm could have a low domestic beta because its return is uncorrelated with the globally diversifiable part of the domestic market portfolio and a high global beta because its return is highly correlated with the world market portfolio. Because that firm has a low domestic beta, its required rate of return on equity is low using the local CAPM. In contrast, when the correct global CAPM is used, that firm has a high cost of capital. Such a firm illustrates that when the global CAPM holds, the beta of the local CAPM captures both the riskiness of the stock that is diversifiable internationally but not locally and the riskiness of the stock that is not diversifiable internationally.

A convenient way to summarise the mistake one makes by using local pricing when global pricing should be used is given by the following equation:

$$\bar{R}_i - \bar{R}_G = \frac{\text{covariance}(\epsilon_{iH}, R_G)}{\text{variance}(R_G)}[E(R_G) - R_F].$$

(10)

One might be tempted to argue that most firms have some risk that is not diversifiable internationally, so that in general the expression given by equation (10) is positive and the local CAPM approach understates the cost of capital. Such a conclusion is wrong. As already discussed, the return on the home market portfolio includes an international component. Therefore, share i can be correlated with the global market portfolio even though the expression in equation (10) is identically equal to zero. Shares that are more correlated with the global market portfolio than the home country market portfolio have a higher expected return that predicted by the local CAPM, but shares that are less correlated with the global market portfolio than the home country market portfolio have a lower expected return than predicted by the local CAPM. For the market as a whole, the local CAPM neither underpredicts nor overpredicts. In other words, if $w_i$ is the weight of security i in the home country market portfolio, the value-weighted sum of the errors given by equation (10) equals zero since:

$$\sum w_i \text{covariance}(\epsilon_i, R_G) = \text{covariance}(\sum w_i \epsilon_i, R_G) = \text{covariance}(\epsilon_{HG}, R_G) = 0,$$

(11)

where the last equality follows from the fact that $\epsilon_{HG}$ is the residual of a regression of the home country market portfolio return on the global market portfolio return. On average, therefore, local pricing yields the correct answer. For any individual security in the home country, however, local pricing most likely yields the wrong answer as long as home country securities differ in the extent to which their return is correlated with the global market portfolio.

To get more of a perspective on the nature of the mistakes made by using local pricing, it is useful to look at an alternative representation of $\bar{R}_i - \bar{R}_G$. To obtain equation (10), we decompose the return of share i into a part correlated with the home country market portfolio and a part uncorrelated with the home country market portfolio. Alternatively, we can decompose the return of the domestic security into a part correlated with the world market portfolio and a part uncorrelated with it. That part of the return that is uncorrelated with the world market portfolio can then be decomposed into a part correlated with the home country market portfolio and a part that is idiosyncratic risk. This gives us:

$$R_i = \alpha_i + \beta_{iG} R_G + \gamma_{iH} \epsilon_{HG} + \epsilon_i,$$

(12)
where $\epsilon_{HG}$ is the part of the return of the home country market portfolio that is uncorrelated with the global market portfolio and $\epsilon_i$ is the part of the return of share $i$ that is uncorrelated with the global market portfolio and with the home country market portfolio. Using this decomposition, we can now compute the covariance of share $i$ with the home country market portfolio as follows:

$$\text{covariance}(R_i, R_H) = \text{covariance}(\alpha + \beta_{IG} R_G + \gamma_{IH} \epsilon_{HG} + \epsilon_i, R_H)$$

$$= \beta_{IG} \text{covariance}(R_G, R_H) + \gamma_{IH} \text{covariance}(\epsilon_{HG}, R_H).$$

Using this expression, we get an alternate formula for the cost of capital resulting from the use of local pricing instead of global pricing:

$$R_{ig} - R_{igH} = [\beta_{IG} - \beta_{IH} \beta_{HG}] [E(R_G) - R_F]$$

$$= [\beta_{IG} - (\beta_{IG} \beta_{GH} + \gamma_{IH} \beta_{RH}) \beta_{HG}] [E(R_G) - R_F]$$

$$= - \gamma_{IH} \beta_{RH} \beta_{HG} [E(R_G) - R_F],$$

where $\beta_{GH}$ is the beta of the global market portfolio with respect to the home country market portfolio, namely covariance($R_G, R_H$/variance($R_H$), and $\beta_{RH}$ is covariance($\epsilon_{HG}, R_H$/variance($R_H$)). To obtain the last line of equation (14), it is necessary to assume that the home market portfolio has a non-zero global beta. If the home market portfolio has a global beta of zero, then the risk premium on the home country market portfolio is zero and all home country stocks have a required expected rate of return equal to the risk-free rate when the local CAPM is used. If the beta of the home market portfolio is not zero, equation (14) implies that local pricing provides the wrong estimate for the cost of capital for securities that are uncorrelated with the part of the return on the home market portfolio that is diversifiable internationally. Suppose now that $\beta_{RH} \beta_{HG} > 0$. In this case, the local market approach overstates the return on security $i$ if that security’s return is positively correlated with the risk of the home market portfolio that is diversifiable internationally. This is because that risk is not diversifiable locally but is diversifiable globally. Consequently, it is not priced in global markets and does not affect the cost of capital of firm $i$. However, in a local CAPM, this risk is correlated with the return of the home country market portfolio and hence is priced.

The results demonstrated in this section are straightforward. Local pricing leads to the wrong cost of capital whenever a security has risk that is diversifiable locally but not globally or risk that is diversifiable globally but not locally. Risk diversifiable locally but not globally means that local pricing understates the cost of capital. In contrast, risk diversifiable globally but not locally implies that local pricing overstates the cost of capital.

3. How integrated are international capital markets?

The evidence on the degree of integration of international capital markets is puzzling. It is certainly the case that over the last 25 years, formal barriers to the movement of capital across frontiers have decreased dramatically. In particular, foreign exchange restrictions which 25 years ago constituted a major obstacle to investing abroad have disappeared for most countries. Formal barriers to foreign ownership of shares have not disappeared, but their prevalence has been reduced. Many countries which were completely inaccessible to foreign investors are now fully
accessible or have become more so. Through increases in tax harmonisation, the extent to which foreign and domestic investors are treated differently has fallen. As a result of this evolution, investors hold more foreign shares in their portfolios. However, portfolios are not diversified internationally to the extent that one would expect in the absence of barriers to international investment. There is a growing literature that focuses on the so-called home bias, namely investors' tendency to overweight strongly home country securities in their portfolios. 6

In contrast to the literature that focuses on portfolio holdings, the literature that investigates returns of securities across countries finds that most assets are priced as if markets are internationally integrated over the recent past. 7 In particular, this literature finds it difficult to reject versions of the global CAPM used here when the risk premium on the global market portfolio and the betas of the national portfolios are allowed to vary over time. However, such studies generally focus on the expected returns of national indices and hence have nothing to say about the magnitude of the pricing mistakes resulting from the use of a local CAPM instead of a global CAPM for individual shares.

Irrespective of whether one is influenced by the results on portfolio holdings or the results on asset returns, there is evidence that investors are not restricted to their home markets in their investments. This means that the key assumption of local pricing, namely that investors hold only domestic securities and that foreign investors do not invest in the domestic market, does not hold. One might argue that the literature on portfolio holdings suggests that the global CAPM does not hold since the global CAPM implies that investors should hold the global market portfolio. At the same time, however, it is perfectly possible for the global CAPM to hold even though nobody holds exactly the global market portfolio. The issue is whether the deviations of investors' holdings from the global market portfolio lead to systematic effects on asset returns. Asset pricing models that take into account barriers to international investment and/or differences in the extent to which investors want to hedge against unanticipated changes in consumption and investment opportunities can explain deviations in investors' portfolios from the global market portfolio. In these models, such deviations can but need not coincide with substantial departures in expected returns from the expected returns implied by the global CAPM. Existing empirical evidence does not seem to have been successful in providing strong evidence that the global CAPM misses determinants of expected returns. For instance, even though Dumas and Solnik (1995) show that the empirical evidence is consistent with currency factors affecting expected returns, they cannot reject the global CAPM with time-varying returns.

Based on the current state of our knowledge about international asset pricing, one cannot justify using the local CAPM for most small countries. At the same time, there is no evidence suggesting that one can obtain better estimates of the cost of capital in small countries using other asset pricing models than the global CAPM. This does not mean that such evidence could not eventually be produced, but only that at this point one cannot do better than using the global CAPM.

4. Implementing the formulas: the case of Nestlé

We now use data from Nestlé to have a better understanding of how to implement the global CAPM for valuation purposes. One would expect the difference between the local CAPM and the global CAPM to be small for Nestlé because Nestlé represents a
substantial fraction of the Swiss market capitalisation. Hence, the Swiss indices are highly correlated with Nestlé. Table 1 provides estimates of the beta of Nestlé bearer shares relative to a number of different indices using monthly returns in Swiss Francs from January 1990 to May 1993. This table shows that Nestlé has a beta close to one with respect to the Swiss indices, but a much smaller beta with respect to the proxies for the global market portfolio. In the same table, we also show beta estimates for indices of Swiss shares. Assuming that the Swiss market is internationally integrated and that the world indices are good proxies for the global market portfolio of the global CAPM, we can compare the cost of capital for Nestlé when it is computed using the local CAPM versus the global CAPM. With the Financial Times indices, we obtain:

\[ \beta_{HG} - \beta_{HG} = 0.585 - 0.85 \times 0.737 = 0.585 - 0.678 = -0.093. \]

This means that using the local CAPM for Nestlé overstates the riskiness of Nestlé shares. Instead of using a correct beta of 0.585 relative to the world market portfolio, one uses a beta of 0.678. Using the Morgan Stanley–Capital International (MSCI) indices instead, one gets a similar number.

The next question to investigate is how to determine the market portfolio risk premium. Although it is typical in the USA to use the arithmetic return per period computed over extremely long sample periods, such an approach cannot be easily implemented internationally since there is no data available for a global market portfolio over a long sample period. Even if such data was available, it is not clear what it would mean. The degree of integration of markets has changed dramatically over time. As markets become more integrated, so that the global market portfolio includes more of the world market portfolio, one expects the risk premium to fall because the global market portfolio becomes more diversified. This means that using the average arithmetic return of that portfolio over a long period of time amounts to taking the average over periods where markets were largely segmented and periods where there are few barriers to international investment.

One solution is to focus on the period where markets are fairly well integrated, namely the period after 1980. The problem with such an approach is that one then uses a fairly short period of time where stock markets did extremely well. To see this,

<table>
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<th>Indices</th>
<th>Beta estimate for Nestlé bearer shares</th>
<th>Beta estimate for FTA Switzerland</th>
<th>Beta estimate for MSCI Switzerland</th>
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<td>FTA Switzerland</td>
<td>0.885</td>
<td>—</td>
<td>—</td>
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<tr>
<td>MSCI Switzerland</td>
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consider using the period from September 1980 to September 1990. For that period, the annual return in Swiss francs of the Swiss market portfolio is 10.2% and the annual return in Swiss francs of the MSCI world market portfolio is 13.7%. Over the same period, an index of Swiss bonds had an annual return of 3.3%. This suggests a risk premium for the Swiss market portfolio over bonds of 6.9% and a risk premium for the world market portfolio of 10.4%. If one believes that 10.4% is the correct risk premium on the world market portfolio over Swiss bonds, then the difference between using the local CAPM and the global CAPM amounts to a risk premium of 0.97%. This estimate of the difference assumes that the global CAPM holds, so that the risk premium on the Swiss market is the product of the world market portfolio risk premium times the beta of the Swiss index with respect to the global market portfolio. Over the period 1980–1990, the Swiss market portfolio earned a lower risk premium than would be predicted by the global CAPM if the risk premium on the global market portfolio is 10.4%. One would expect the risk premium of the Swiss market portfolio to be $0.89 \times 10.4$, which is 9.3% instead of 6.2%.

How can one use a longer period of time to obtain an estimate of the global market portfolio risk premium? Suppose that the true beta of the US market with the world market portfolio is one. In this case, the risk premium on the US market portfolio equals the risk premium on the global market portfolio. The problem with this approach is that the historical average typically used, namely the one obtained with a sample period starting in the 1920s, overstates the true risk premium because it includes a long period of time where US investors could not diversify internationally. Over the period 1980–1990, the standard deviation of the dollar return of the US market is 16.3% and the standard deviation of the dollar return of the world market portfolio is 14.3%. Suppose that the relation between the two standard deviations correctly reflects the risk reduction brought about by diversifying internationally and that there are no national differences in risk tolerance. In this case, a simple calculation shows that the risk premium of the world market portfolio is 0.74 times the risk premium of the historical US market portfolio risk premium if one assumes that that risk premium corresponds to segmented markets. Hence, taking 8.4% as the historical risk premium for the USA, one obtains a global risk premium estimate of 6.22%. The risk premium computed as the return on a market minus the risk-free rate is not affected by the currency of denomination of the returns. This suggests that the risk premium in excess of the risk-free rate that should be used in our calculation with this reasoning is 6.22%. With this risk premium the mistake made by using the local CAPM for Nestlé instead of the world CAPM is about 0.6%.

5. Conclusion

In this paper, we argue that the cost of capital in a small country is determined globally and not locally. Therefore, valuation approaches in small countries should use a global CAPM rather than a local CAPM. We show how such a global CAPM can be implemented for the case of Nestlé. Further research should provide more information on the mistake made using a local CAPM rather than the global CAPM for a wide range of stocks.
Notes

1. See Kaplan and Ruback (1995) for a discussion of the implementation of the CAPM approach in the USA.
2. There is a single such portfolio as long as there are no redundant securities, i.e. securities whose return can be replicated through a linear combination of the returns of other securities.
3. For instance, many countries have securities that foreign investors cannot invest in. See Stulz and Wasserfallen (1995) for an analysis of these securities.
4. $\epsilon_{HG}$ is the residual of the regression of the home country market portfolio on a constant and the global market portfolio given by equation (7).
5. See Stulz (1994a) for a more extensive review of the issues raised here.
7. See Korajczyk and Viallet (1989) and Gultekin et al. (1989) for examples of studies showing that markets are more integrated in the 1980s than before. Harvey (1991) finds results partially supportive of a global CAPM with time-varying betas and price of risk, but finds that the model cannot explain the high returns for the Japanese stock market.
8. The data used here is from Odier et al. (1991).
9. Harvey (1991) has a beta estimate for the US market portfolio with respect to the MSCI world market portfolio of 0.96.
10. If the global CAPM holds, the risk premium divided by the variance of the excess return is equal to the aggregate relative risk aversion [see Chan et al. (1992) for more details]. Assuming that relative risk aversion is the same across countries and that the US market is historically segmented from the rest of the world, the ratio historical risk premium of the US market portfolio and the variance of the excess return of the US market portfolio is the same as the ratio for the global market portfolio ex ante risk premium and the ex ante variance of its return. Using this relation, the statement in the text follows. For a more detailed analysis, see Stulz (1994b).

References