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TAX COMPETITION FOR INTERNATIONAL PORTFOLIO CAPITAL AMONG EMERGING MARKETS

An Approach Considering the Substitutability of Risky Assets

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HWWA-Diskussionspapier

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HWWA-Institut für Wirtschaftsforschung-Hamburg
1998
ISSN 1432-4458

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This is the revised version of a paper presented at the fourth Workshop of the University of the Federal Armed Forces, Hamburg and the HWWA-Institute for Economic Research, Hamburg. I am indebted to the participants of this Workshop, and especially to Dr. Norbert Funke, OECD, who provided very helpful comments.

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1. INTRODUCTION

World equity markets have undergone great changes in recent years. Investment barriers, especially those in developing countries, have been eliminated and new markets have emerged. In the early 1990s cross-border portfolio investments to Emerging Markets were among the most dynamic aspects of the global economy. Often cited phenomena in this context are competition for international portfolio capital and especially tax competition. Capital importing and exporting countries face the same problem: how can they attract and/or retain the highly mobile factor capital, and tax it without encouraging it to move elsewhere? It is generally thought that the increasing mobility of capital in globalized capital markets makes it impossible for governments to tax capital income in the future.

However, as long as international tax arbitrage considers the fact that capital assets located in different countries are not perfectly substitutable in portfolios it should be possible to tax financial assets differently without deteriorating the tax base of single countries. What distinguishes perfect from imperfect substitutes in international capital markets?

After drafting principles of international taxation we use the concept of modern portfolio theory to approach conditions for assets to be perfect substitutes on international capital markets. Then we investigate empirically if certain Emerging Stock Markets do have a monopoly power with respect to diversification and identify countries that offer similar diversification benefits and therefore stand in close competition for international portfolio capital with each other.

2. TAX COMPETITION FOR INTERNATIONAL PORTFOLIO CAPITAL

The taxation of international portfolio income[1] is supposed to be guided by the residence principle: the investor is taxed by his national treasury equally on his world income, implying that the domestic taxation determines the overall tax burden. If the source country of foreign capital income withholds taxes on the payments to non-residents, the resident country of the investor normally allows a credit for the tax paid abroad to avoid

1 For a discussion of basic concepts of international taxation, see Frenkel, Razin, Sadka, 1991.

double taxation. According to this principle tax competition among capital importing countries would not be possible. But especially in case of portfolio investment the residence-based taxation of capital income is very difficult or even impossible to achieve. Because governments are constrained by bank secrecy laws, investors often do not or do not completely declare their foreign capital income to their domestic treasury. The progressive removal of capital restrictions and technological innovations support this process. The ability to evade domestic taxation on foreign income, the existence of investors, which are tax exempt in their country of residence - e.g. US pension funds - and insufficient credits for withholding taxes paid abroad transform the residence-based taxation into a quasi source-based taxation. The withholding tax on capital income levied in the source country determines the effective tax rate.

Governments of the source countries are aware that lowering withholding taxes might induce international investors to make portfolio adjustments in favor of their country. These interdependencies from fiscal decisions involve that one country's tax policy affects the tax base and therefore the economic welfare of another. When national tax policies aim solely at the maximization of the national advantage (maximization of a social welfare function, or in case of a Leviathan-type government maximizing the tax revenue) without any international coordination or harmonization tax competition occurs. Since the 1980s many articles in international tax literature treat this topic by predicting the outcome of tax competition or comparing welfare effects of tax competition versus tax harmonization.[2]

Many tax competition models have one basic assumption: tax arbitrage takes place in a world where capital is perfectly mobile and substitutable across national borders.[3] It is assumed that there is no real distinction between financial assets and taxpayers have an incentive to favor those assets with the highest after-tax return. Capital flows across countries until after-tax returns from investment in all countries are equalized. Basic tax competition models, e.g. Razin, Sadka (1991), contend that, where individuals can evade domestic taxation on foreign source income, taxes on capital income will be driven to zero by international competition for revenue on a mobile tax base. Tanzi (1995) as well is skeptical about the possibilities to tax international income from financial capital and therefore proposes the introduction of a coordinated and harmonized minimum withholding taxation. However, he judges the case of real capital investment less skeptical: taxation is possible to the extend that there are country specific reasons for

2 See e.g. Razin, Sadka, 1991.

3 Gordon, Varian, 1989 is an exemption.

investment that lead to imperfect substitutability of investment across countries. In this context, the main difference between portfolio and real capital investment seems to be the degree of substitutability of investment alternatives, which is determined by the elasticity of the capital base with respect to rates of return.

It seems reasonable to assume that portfolio capital is more sensitive to differences in rates of return than foreign direct investment, and therefore that taxes influence portfolio allocation decisions more heavily. But is it reasonable to consider financial assets as perfect substitutes in portfolio investment?

The extent to which a country is able to access portfolio capital depends on portfolio behavior and country selection of international investors. Empirical evidence shows that generally portfolio investors do not place available funds in one stock promising the greatest return, but hold many stocks with different rates of return simultaneously. This suggests that investors do select stocks not exclusively on the basis of maximization of returns. Diversifying by holding portfolios of risky assets is meant to reduce risk. Taking this idea of diversification into account, we suggest that conventional tax competition models omit two important features of the real world: investments are risky and investors try to avoid risk. Therefore, besides rates of return financial assets have to be characterized by risk properties. The more diverse these characteristics of financial assets are, the less they have to be considered perfect substitutes and the easier it might be to tax them differently. In other words, if the risk associated with assets in a country is unique to that country, it has a monopoly power with respect to international diversification and might have the opportunity to tax capital income. Then tax competition for portfolio capital should be reconsidered.

3. SUBSTITUTABILITY OF RISKY ASSETS

How can the degree of substitutability of financial assets be determined in terms of risk characteristics? To answer this question we apply simple ideas from microeconomics to the concept of modern portfolio theory (Markowitz-Tobin Model) to derive conditions that have to be fulfilled for risky financial assets to be perfect substitutes in international stock markets.

3.1 Substitutability of Goods and Assets

Two goods are perfect substitutes if the consumer is willing to substitute one good for the other at a constant rate. With a constant marginal rate of substitution of one, the consumer always purchases the cheaper good and if both goods have the same price, he doesn't care which one he purchases. Thus, all goods which are held must have been purchased at the same price. Any little change in relative prices makes the consumer to switch completely toward the cheaper good. In case of imperfect substitutes, both goods substitute each other only to some degree, implying that the marginal rate of substitution is not constant. Again, when one good gets more expensive, the consumer substitutes away from that good to the other one. But the magnitude of this substitution depends on both the marginal rate of substitution and the magnitude of the price change. Whether different goods are perfect substitutes, imperfect substitutes or even complements[4] - i.e. to what extend the consumer adjusts his demand to changes in prices - depends on their attributes and the preferences of the consumer towards these attributes.[5]

Financial assets are characterized as providing a monetary flow that can be used to purchase consumption (Varian, 1993, p. 199). Under conditions of complete certainty about the future cash flow provided, investors do select stocks exclusively on the basis of maximization of returns. If one asset had a - even slightly - higher return than another, then no one would want to buy the asset with the lower return. In equilibrium, all assets that are actually held must pay the same rate of return. Since a dollar invested in either of them is worth the same amount, the investor is indifferent between investing in either asset. Indeed, financial assets as described above have identical characteristics except for the purely monetary difference and can therefore be considered as perfect substitutes with respect to rates of return.

However, in reality flows provided by financial assets have different risk characteristics, one asset might be riskier than another. Since a risk neutral investor doesn't care about the riskyness of his wealth the rate of return is the only attribute for him to distinguish assets and he considers risky assets as perfect substitutes with respect to return. On the other hand, if investors do care about the riskyness of wealth, but all assets under consideration have the same characteristics concerning these risk attributes, again, assets can only be distinguished by rates of return. Thus, for risk averse investors financial

4 Perfect complements are goods that are consumed together at a constant rate whatever the relative prices are.

5 For a discussion of substitutes and complements, see e.g. Varian, 1993.

assets are perfect substitutes with respect to return only if they have identical risk attributes.

How can we compare the degree of risk in assets? Using the concept of diversification we develop a measure to compare the riskyness of assets.

3.2 Portfolio Diversification

The idea of diversification simply contends that portfolio risk can be reduced by increasing the number of simultaneously held assets with heterogeneous risk structures. Diversification works when prices of different stocks do not move exactly together, typically because of firm- or country-specific business cycles or exogenous shocks.

3.2.1 Concept of Modern Portfolio Theory

According to modern portfolio theory[6] a diversifying investor's objective is to maximize his utility of final wealth subject to his budget constraint. His preferences can be described by considering just two statistics about the probability distribution of final wealth: utility is a function of the mean and standard deviation (or variance) of wealth.[7] It is assumed that the investor prefers more to less income (or wealth), but is a risk averter preferring smaller standard deviations. He makes no distinction among different forms wealth can take: He is indifferent between capital gains and dividends.

The existence of a riskless asset in the portfolio possibility set simplifies the portfolio optimization process. If the investor can lend at the risk-free rate of interest, he can hold a mixture of the risk-free investment and one particular portfolio of risky assets to get every efficient portfolio. Then we can separate the investor's decision process into two stages (Separation theorem): First, it is possible to determine the optimum portfolio of *risky* assets without having to know anything more than the above assumptions about the individual investor and his preferences. In a competitive market where no investor has more information than others, there is no reason to hold a different portfolio of risky assets from anybody else. Hence, if all investors want to hold risky securities in the same

6 See e.g. Elton, Gruber, 1995.

7 In the following we characterize portfolios in terms of rates of return, not in terms of wealth or income. Since end of period wealth is simply beginning wealth plus portfolio income (or times 1 plus the appropriate rate of return), all the properties discussed with respect to return also hold with respect to wealth, Elton, Gruber, 1995, p. 214.

relative proportions, the only way in which this is possible is if these relative proportions are identical to those in the market portfolio. Second, this portfolio of risky assets will be blended with the riskless asset, in order to obtain an exposure to risk that suits the particular investor's taste (Elton, Gruber, 1995, pp. 88).

3.2.2 Return and Risk of Portfolios and Gains from Diversification

The expected return on a portfolio r_p is simply the weighted average of expected returns r_i on all portfolio assets i.

$$r_p = \sum_{i=1}^{N} X_i r_i \tag{1}$$

Return on a security r_i is measured by the sum of the change in the market price of the security plus any income received over the holding period. Weight applied to each return is the fraction X_i of the portfolio invested in each asset, with $\Sigma X_i = 1$ for $i \in p$.[8] Standard deviation σ_p and variance σ_p^2 of a portfolio are more difficult to determine, because variances σ_i^2 of single asset returns and covariances σ_{ij} - measuring how returns on assets i and j move together - have to be considered:

$$s^2{}_p = \sum_{i=1}^{N} X_i{}^2 s_i{}^2 + \sum_{i=1}^{N} \sum_{\substack{j=1 \\ j \neq i}}^{N} X_i X_j s_i s_j r_{ij} = \sum_{i=1}^{N} \sum_{j=i}^{N} X_i X_j s_{ij} \tag{2}$$

From equation (2) we see that a combination of stocks that have low or even negative covariances with each other reduces portfolio risk. The lower the covariances between assets the higher the gains from diversification. Three different factors affect the covariance σ_{ij} of two assets: The variability of both (i and j) assets' returns, along with correlation - expressed by the correlation coefficient ρ_{ij} - between them. The sign of each covariance σ_{ij} is determined by the correlation coefficient ρ_{ij}. A small or even negative correlation coefficient can offset the effects of high variances.

The greatest payoff to diversification in a two asset portfolio comes when both stocks are negatively correlated. Then there is a portfolio (with a particular set of weights)

8 $X_i \geq 0$, no short sales allowed.

which completely eliminates risk. As the number of portfolio assets N gets large, the number of covariances (N^2 - N) gets much larger than the number of variances N.

Table 1
Portfolio Size and Number of Variances and Covariances

number of assets	number of variances	number of covariances
N	N	N^2-N
2	2	2
4	4	12
6	6	30
10	10	90
30	30	870

Therefore, the contribution of the variances of individual assets to the portfolio variance goes to zero: The risk (variance) of a well diversified portfolio reflects mainly the covariances, and approaches the average covariance of portfolio assets (systematic risk). In other words, individual asset risk can be eliminated by diversification, systematic market risk cannot be eliminated.

3.2.3 International Diversification

If one wishes to develop an international portfolio, many of the same considerations are involved as in developing a domestic portfolio. However, international investment requires country selection (and exchange exposure, which we do not consider here). We assume that investors determine country allocation before they select single assets within countries. The decision of how much to invest in each country depends on expectations concerning total returns in each country represented by a country index r_i, the variances of returns for each market index σ_i^2 and intercountry correlations ρ_{ij}.

Elton, Gruber (1995, p. 276) offer a simple formula to guide international portfolio decisions: hold foreign securities as long as

$$\frac{(r_f - r_{free})}{s_f} > \frac{(r_d - r_{free})}{s_d} * r_{f,d} \qquad (3)$$

where r_f, r_d are expected returns on foreign and domestic securities (in dollars), r_{free} is the risk-free rate of interest (in dollars), $\rho_{f,d}$ is the correlation coefficient between foreign and domestic securities, σ_f, σ_d are standard deviations of foreign and domestic securities, respectively. This formula shows that as long as ($\rho_{f,d}\,\sigma_f / \sigma_d$) is less than unity, it is

beneficial for the investors to diversify into foreign securities even if expected returns there are lower than those on domestic stocks. In contrast to the case with perfect foresight, where such return differentials lead to international arbitrage, under conditions of uncertainty investors intentionally hold assets with different returns simultaneously.

National diversification targets at the reduction of individual variance risk but is limited by the average covariance of returns of domestic assets. This systematic risk, representing the comovement with the domestic market, is undiversifiable. By combining securities from different countries with low or negative correlations the systematic portfolio risk of an internationally diversified portfolio can be reduced below the level of domestic market risk. Then the magnitude of the risk reduction is constrained by the international systematic risk, which is the average covariance with global market movements. An international investor will normally be able to achieve more benefits by diversifying his international investment across countries than by concentrating the entire international investment position in a single country.

3.3 Risk in an Asset

From these principles of diversification we now derive a measure for the amount of risk in an asset. The first thing one might think about is the variability or the variance of the asset's return. To verify if this is generally an appropriate measure, we consider portfolios with one, two and many assets.

3.3.1 Single-Asset-Portfolio

When a 'portfolio' contains only one security i the risk of the portfolio equals the variance of that asset (equ. (2)).

$$s^2_p = s_i^2 \tag{2a}$$

Hence, the risk of the single asset can be described by its variance. In order to expose the same amount of risk other assets need to have identical variances $\sigma_i^2 = \sigma_j^2$.

3.3.2 Two-Asset-Portfolio

Next we consider a portfolio with two risky assets. When both assets have identical variances ($\sigma_i^2 = \sigma_j^2$) and are perfectly positively correlated ($\rho_{ij} = 1$), the variance of portfolio return equals the variance of both assets.

$$s_p^2 = X_i^2 s_i^2 + X_j^2 s_j^2 + 2X_i X_j s_i s_j = X_i^2 s_i^2 + X_j^2 s_i^2 + 2X_i X_j s_i s_i \tag{2b}$$

$$= (X_i + X_j)^2 s_i^2 = s_i^2$$

Then gains from diversification are zero and risk is not reduced by holding a portfolio of both assets. In terms of risk it does not make any difference, if the investor holds only one stock or a combination of both. Both assets can be distinguished only in terms of expected return and the investor diversifies into both stocks only as long as expected returns are equalized. Any little a decrease in the return of one asset makes the investor to reallocate his portfolio completely toward the asset yielding the higher return. As a matter of course, these two assets which are identical with respect to risk are perfect substitutes.

Now we consider two stocks that do have identical variances, but are negatively correlated. We know that diversification into two stocks which are perfectly negatively correlated ($\rho_{ij} = -1$) gives the greatest possible diversification benefits. Whatever the portfolio allocation portfolio risk is smaller than single asset risk:

$$s_p^2 = X_i^2 s_i^2 + X_j^2 s_j^2 - 2X_i X_j s_i s_j = X_i^2 s_i^2 + X_j^2 s_i^2 - 2X_i X_j s_i s_i \tag{2c}$$

$$= (X_i - X_j)^2 s_i^2 < s_i^2$$

Even if one stock's return is substantially smaller than the other, it is still be beneficial to hold both stocks simultaneously as long as (see equ. 3)

$$\frac{(r_i - r_{free})}{s_i} > -1\frac{(r_j - r_{free})}{s_i}$$

$$(r_i - r_{free}) > -(r_j - r_{free}) \qquad (3a)$$

$$r_i + r_j > 2r_{free}$$

Here, changes in relative returns induce a shift, but not a plunge in portfolio allocation. Understanding portfolio theory as a normative theory, we see that in the first case the investor should adjust his portfolio more radically to changes in returns than in the latter. Therefore, the elasticity of substitution with respect to rates of return is higher in the first case.

Furthermore, when assessing substitutability of assets investors consider more than the variance of individual stocks: they also consider the interrelationship or correlations between stocks. This is because an investor's utility depends on the mean and variance of total wealth - not the mean and variance of any single asset.

3.3.3 Portfolio with Many Assets

In case of a large number of assets N, again, we must not look at the risk of a stock in isolation but compare the risk the asset brings to the portfolio. Portfolio variance is defined as:

$$\sigma_p^2 = X_1^2\,\sigma_1^2 + X_2^2\,\sigma_2^2 + ... + X_N^2\,\sigma_N^2 + X_1X_2\,\sigma_{12} + X_1X_3\,\sigma_{13} + ... + X_1X_N\,\sigma_{1N} + ... + X_{N-1}X_N\,\sigma_{N-1,N} \qquad (2c)$$

The N^{th} asset in a diversified portfolio, contributes its weighted variance σ_N^2 (the weight X_N^2 is supposed to be small because the portfolio has N assets and therefore single positions are small) and N - 1 weighted covariances σ_{Nj} to the overall portfolio risk.

Hence, assets with identical contributions to portfolio risk need to have identical variance /covariance structures. When N gets large, the Nth asset's contribution to the portfolio variance is mainly attributable to its covariances and we can neglect variances. Nevertheless, at a high number of assets available our problem is still very complex.

Because of the huge number of assets available to international investors in global capital markets, it is not possible for them and for us to consider all bivariate covariances to find close substitutes in international stock markets. But it is possible to approach the problem within a diversified portfolio, where a few markets have very high positions. From equation (2) we know that each covariance enters with a certain weight into portfolio risk. Therefore, the covariances of assets that are held in large portfolio positions have larger weights and count heavy in portfolio risk.

Table 2
Variance-Covariance Matrix

	a_1	a_2	a_3	a_4	...	a_N
a_1	σ_{11}	σ_{12}	σ_{13}	σ_{14}	...	σ_{1N}
a_2	σ_{21}	σ_{22}	σ_{23}	σ_{24}	...	σ_{2N}
a_3	σ_{31}	σ_{32}	σ_{33}	σ_{34}	...	σ_{3N}
a_4	σ_{41}	σ_{42}	σ_{43}	σ_{44}	...	σ_{4N}
...	...	...	...	...	...	...
a_N	σ_{N1}	σ_{N2}	σ_{N3}	σ_{N4}	...	σ_{NN}

If we take e.g. the perspective of an US investor who holds a strongly home biased portfolio[9] and is diversifying into Emerging Markets, the bivariate covariance between each Emerging Market and the US (Index) is of particular interest. Emerging Markets with similar covariance structures with the US-Index bring comparable risk to the portfolio and can be regarded as close substitutes for US investors.

3.3.4 World Market Portfolio

A simple investment strategy is to mix the world market portfolio with the riskless security. Because of the huge number of assets in this portfolio and the much higher number of pairwise correlations a more convenient measure of the risk of a single asset has been developed: beta, defined as the ratio of the covariance with the world market and the variance of the world market[10]:

$$b_i = \frac{s_{im}}{s_m^2}$$

9 In the US international diversification as an investment strategy has only been well accepted in recent years.

10 Brealey, Myers, 1984, pp. 145.

Beta i measures the marginal contribution of a stock i to the risk of the world market portfolio m or the asset's riskyness relative to the market as a whole. The beta of the market portfolio is 1. If a single stock has a Beta of 1, then it is just as risky as the market. When the market moves up 10 percent, the stock will, on average, move up by 10 percent. If a stock has a Beta of less than 1, then it is relatively insensitive to market movements. When the market moves up 10 percent, the stock will move up less than 10 percent. Stocks with negative betas move in opposite direction than the market and can reduce portfolio risk beyond unsystematic levels.

Since the denominator σ_m^2 is a constant for all assets, it is again the covariance σ_{im} - but here between the asset i and the world market - that is determining its risk. Perfect substitutes in stock markets need to have identical betas.

4. EMPIRICAL EVIDENCE OF PORTFOLIO INVESTMENT IN EMERGING MARKETS

Having developed conditions for perfect or close substitutes in international stock markets, it is interesting to examine some actual data concerning investment in Emerging Markets.

4.1 Correlation of Returns

The following table presents five-year correlations between equity markets in selected EMs and the US S&P 500 Index.

All returns were converted to US dollars at prevailing exchange rates before correlations were computed. Thus, the correlations coefficients are represented from the viewpoint of an US investor.[11] Most of these coefficients are relatively low compared to those found in domestic markets. The correlation between a market-weighted portfolio of the 1000 largest and the next 2000 largest stocks in the US market is on the order of 0,92 (Elton, Gruber, 1995, p. 266).

11 If we were representing the returns converted in other currencies, expected return and risk might be different. When home currencies of international investors from different countries do not move perfectly with the dollar, the country of domicile affects the expected returns and risk (including correlation coefficients) from international diversification.

Table 3
IFCI Total Return Index Correlations with S&P 500

	82-87*	84-89*	85-90*	86-91*	87-92	88-93	89-94	90-95	91-96
Argentina	0.02	-0.09	0.03	0.09	0.05	0.07	0.38	0.32	0.37
Brazil	0.07	0.03	0.03	0.12	0.18	0.18	0.26	0.42	0.11
Chile	0.17	0.31	0.34	0.40	0.16	0.19	0.33	0.25	0.18
China						0.15	0.24	0.19	0.19
Columbia	0.04	0.12	0.16	0.13	0.16	0.15	0.11	0.02	-0.13
Greece	0.26	0.18	0.13	0.19	0.03	0.03	0.03	0.21	0.02
India	-0.01	-0.04	-0.11	-0.03		-0.14	0.21	0.01	-0.08
Indonesia			0.20	0.19	0.17	0.15	0.29	0.26	0.40
Jordan	-0.17		0.02	0.16	0.24	0.21	0.09	0.09	0.09
Korea	0.3	0.22	0.30	0.27	-0.11	-0.16	0.02	-0.01	-0.01
Malaysia	0.4	0.53	0.66	0.71	0.55	0.41	0.34	0.18	0.16
Mexico	0.31	0.39	0.46	0.54	0.40	0.37	0.36	0.21	0.19
Pakistan	-0.11	-0.09	-0.17	0.06	0.26	0.22	0.13	0.04	0.07
Peru						0.48	0.31	0.20	0.12
Philippines	0.15	0.20	0.28	0.43	0.48	0.37	0.38	0.20	0.14
Portugal		0.14	0.17	0.26	0.35	0.33	0.39	0.39	0.21
Sri Lanka						-0.01	0.08	-0.16	-0.03
Taiwan	0.09	0.14	0.18	0.17	0.04	0.04	0.11	0.07	0.07
Thailand	0.29	0.26	0.43	0.54	0.42	0.33	0.38	0.21	0.19
Turkey		0.02	0.01	-0.02	-0.21	-0.21	-0.19	-0.12	-0.06
Venezuela	-0.08	-0.04	-0.1	-0.07	-0.21	-0.21	-0.11	-0.02	0.04
*: IFC Index, IFCI Index was created in 1992									

Source: IFC, Emerging Stock Markets Factbook, various issues

Malaysia, Mexico, Thailand experienced a comparable development of return correlation with the S&P 500. These countries and Chile have reached peak levels of correlation during the period 1986-1991. Then the correlations decreased again. The last period 1991-1996 saw even lower levels of correlation than the period 1982-1987. So far we find no strong evidence of a firm integration of these markets into world capital markets, leading to rising correlation coefficients and diminishing diversification benefits. On the other hand, in Argentina, Brazil and Indonesia the development of increasing correlations started later and reached highest levels during the last two periods. Nevertheless, throughout the last period, Brazil as well showed a falling tendency. India's and Venezuela's stock markets were negatively correlated with the S&P Index throughout the 80s and 90s, indicating that very high levels of diversifications benefits did not diminish throughout the period. Furthermore, the relative ranking of country correlations is not stable over time.

4.2 Covariance

However, risk depends not only on correlation coefficients, but also on the standard deviation of return. Emerging Markets typically tend to exhibit volatile returns, placing an upward pressure on a portfolio's risk. But relatively low correlations with each other and with more developed markets can offset strong adverse effects of high volatility. To get a comparison of this combined effect for selected EMs, the next table compares covariances of selected EMs with the US S&P Index (divided by the standard deviation of the S&P Index).[12]

Table 4
Comparison of Covariance Levels[13] of Selected Emerging Markets and the S&P 500 Index

1987		1989		1991		1993		1995		1996	
Venezuela	-1.5	Argentina	-3.3	Venezuela	-1.0	Turkey	-4.4	Turkey	-2.1	Columbia	-1.1
Zimbabwe	-1.0	Zimbabwe	-1.0	Zimbabwe	-0.9	Venezuela	-4.4	Zimbabwe	-2.0	Zimbabwe	-1.0
Jordan	-0.7	Venezuela	-0.5	Turkey	-0.6	India	-1.3	Sri Lanka	-1.5	Turkey	-1.0
Pakistan	-0.3	India	-0.3	India	-0.3	Korea	-1.3	Venezuela	-0.4	India	-0.7
India	-0.1	Pakistan	-0.3	Pakistan	0.4	Sri Lanka	-0.1	Korea	-0.1	Sri Lanka	-0.3
Columbia	0.3	Brazil	0.6	Nigeria	0.8	Greece	0.5	India	0.1	Korea	-0.1
Argentina	0.5	Turkey	0.7	Jordan	0.8	Taiwan	0.5	Columbia	0.2	Greece	0.1
Brazil	1.2	Columbia	0.7	Columbia	1.2	Jordan	1.3	South Africa	0.3	Jordan	0.4
Taiwan	1.4	Korea	1.7	Indonesia	1.9	Chile	1.5	Jordan	0.4	Venezuela	0.7
Philippines	1.7	Taiwan	2.1	Korea	2.3	Indonesia	1.6	Pakistan	0.5	Pakistan	0.7
Chile	1.8	Greece	2.2	Brazil	2.8	Columbia	1.9	Taiwan	0.8	South Africa	0.7
Korea	2.1	Philippines	2.2	Argentina	3.1	China	2.1	Malaysia	1.3	Taiwan	0.8
Thailand	2.5	Thailand	2.2	Greece	3.1	Argentina	2.4	China	1.6	Malaysia	1.2
Greece	2.6	Portugal	2.5	Taiwan	3.2	Portugal	2.5	Greece	1.9	Portugal	1.2
Malaysia	4.2	Chile	2.5	Chile	3.4	Malaysia	2.8	Thailand	1.9	Peru	1.2
Mexico	7.5	Malaysia	4.3	Portugal	4.1	Pakistan	2.9	Chile	2.1	Chile	1.3
		Mexico	6.2	Philippines	4.9	Thailand	3.1	Indonesia	2.3	Philippines	1.3
				Thailand	5.2	Mexico	3.2	Mexico	2.3	Brazil	1.4
				Malaysia	5.5	Philippines	4.3	Peru	2.3	Thailand	1.8
				Mexico	8.4	Hungary	4.5	Portugal	2.5	Czech Rep.	1.8
						Brazil	4.7	Hungary	3.6	China	2.0
						Peru	6.1	Czech Rep.	3.8	Mexico	2.0
						Poland	12.7	Argentina	5.7	Indonesia	3.1
								Poland	5.8	Argentina	3.7
								Brazil	7.4	Hungary	3.8
										Poland	4.5

Own calculations, data source: IFC, Emerging Stock Markets Factbook, various issues

The relative ranking of covariances is not identical to that of correlation coefficients. The evidence suggests that in some cases different levels of correlation between single EMs and the US were balanced by different levels of variance risk of individual countries.

12 This is identical in all cases and can therefore be eliminated.

13 See footnote 6.

The relative ranking of countries can be interpreted as an indicator for the degree of substitutability of countries in diversified portfolios. Close positions of two countries indicate that small changes in expected returns - or tax rates - might induce large portfolio adjustments. In case of pairwise opposite positions larger changes in expected returns would be needed for a comparable portfolio re-allocation. Identical changes in relative returns - e.g. induced by changes in tax rates - should induce higher portfolio reallocations between countries close in position than between countries of very different positions.

In the first years of the period under consideration Thailand, Mexico and Malaysia were close in ranking and had the highest values of the sample. Nevertheless the differences in values were very high. Later values of all three countries decreased substantially and the differences in values diminished. Korea, which was initially close to this group, increased in position and decreased in value, representing higher diversification advantages. Throughout the last years China approached Thailand, and Sri Lanka was close to India, which was in a good position over the entire period. Columbia's relative position increased, relative positions of Indonesia and especially of Argentina got worse. Venezuela is not close to other Latin American countries but to Turkey and Zimbabwe. Chile's position changed over time, and did not show any particularly close "neighbour" or good diversification advantages.

Throughout the last years Columbia, Zimbabwe, Turkey, India, Sri Lanka, Korea, and Venezuela offered much higher diversification benefits than e.g. Malaysia, Brazil, Thailand, China, Mexico, Indonesia or Argentina.

So far, we found indicators for similar diversification benefits and therefore close substitutes in international portfolios for: Malaysia, Thailand and Mexico; Thailand and China; India and Sri Lanka.

5. CONCLUSION

As in the case with perfect foresight, under conditions of uncertainty investors respond to changes in the assets' relative returns. An increase in the expected return of one asset here typically (if both assets are not perfectly correlated) induces a shift, but not a plunge toward that asset. Even when there are no explicit barriers to capital mobility risk-averse investors choose not to react to return differentials in such an extreme way as in a world with perfect foresight. Uncertainty and risk aversion justify the relatively inelastic

response to changes in relative returns. Only risk neutral investors would regard financial assets as perfect substitutes and attempt to eliminate completely differences in expected returns on different assets.

International tax arbitrage has to consider the fact that capital assets located in different countries are not perfectly substitutable in portfolios (Slemrod, 1988, p. 138). The more diverse risk characteristics (covariance structures) of financial assets are, the less they have to be considered being perfect substitutes and the easier it should be to tax them differently. The less diverse these characteristics are, the more elastic portfolio investment reacts with respect to changes in relative returns or tax differentials.

Portfolio managers need to estimate covariances or betas when optimizing country allocation. However, covariances and betas tend to be intertemporally unstable. When world markets become increasingly integrated single markets typically become more susceptible to the behavior of others.[14] Then markets could move in tandem and bivariate correlations of single markets tend to increase. Thus, international systematic risk (average covariance with global market movements) increases and diversification benefits from investing in certain markets get more limited. Certain countries might lose their diversification advantage, because they become closer substitutes to each other and competition for capital increases.

Hence, in developed - or fully integrated - capital markets it seems more reasonable to consider financial assets as perfect substitutes, because relative risk characteristics and diversification benefits are more limited. On the other hand, capital market integration of Emerging Markets is still far from being perfect. Empirical evidence shows that today Emerging Markets still have advantages in terms of diversification. Within the group of Emerging Markets we can identify subgroups which stand in close potential competition to each other: Malaysia, Thailand and Mexico were - according to their risk characteristics - close substitutes in international portfolios. Small changes in relative returns might have induced large portfolio shifts.[15] These countries should therefore follow the same tax policy concerning non-resident withholding taxation of capital income, if they do not want to cause large tax induced portfolio re-allocations. India, on

14 The relaxation of the legal environment builds the conditions necessary for integration, but segmentation can also be the result of market imperfections other than direct barriers to investment.

15 The empirical evidence is left to the following paper. This paper is part of a study that examines the role of uncertainty in international tax competition. It is a first approach to the topic. The research will be extended by testing empirically the sensitivity of international portfolio equity flows to tax factors.

the other hand, tends to offer a very different diversification profile from Thailand, Malaysia and Mexico, and might therefore be able to maintain relatively high levels of taxation without a significant loss of market share.

SYMBOLS AND ABBREVIATIONS

d	domestic
f	foreign
N	number of assets in a portfolio
p	portfolio
r_i	rate of return on asset i (or on index in country i)
r_{free}	risk free rate of interest
r_p	portfolio rate of return
X_i	investment position in market i
β_i	beta of asset (country index) i
ρ_{ij}	correlation coefficient of assets (country indexes) i and j
σ^2_i	variance of asset (country index) i's return
σ^2_m	variance of world market return
σ_{ij}	return covariance of assets (country indexes) i and j
σ_{im}	return covariance of asset (country index) i and the world market
EMs	emerging markets
IFC	International Finance Cooperation
IFCI Index	IFC Investable Index
S&P	Standard and Poor
US	United States of America

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