“Do momentum strategies generate profits in emerging stock markets?”

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SECTION 1. Macroeconomic processes and regional economies management

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Do momentum strategies generate profits in emerging stock markets?

Abstract

This paper empirically investigates whether momentum strategies applied to past returns of national stock indices generate profits. Emphasis is placed on emerging capital markets of Africa, Asia, Europe, Latin America, and the Middle East. The main source of momentum profits are the equity markets themselves, but profits can be enhanced by exploiting exchange rate fluctuations. The author finds that the extra returns from momentum strategies are larger for emerging markets than for developed markets. The paper finds that momentum profits are higher in the pre-market liberalization period than in the post-liberalization period. The author postulates that the higher momentum profits generated by emerging markets are due to market isolation, and that market liberalization reforms recently introduced in these countries tend to reduce the gains from momentum strategies.

Keywords: momentum strategies, emerging markets.
JEL Classification: G15.

Introduction

The random walk hypothesis has been an important subject to financial economists for many years and has received empirical support from early research, which confirmed that stock price changes are unpredictable. However, more recent research in finance provides empirical evidence that historical stock prices do not follow random walks (Lo and MacKinlay, 1990). Deviations from the random walk hypothesis imply that price changes are forecastable to some degree. Moreover, some of these studies indicate that it is possible to earn significant profits due to market inefficiencies.

Contradicting the overreaction theory or contrary strategies (DeBondt and Thaler, 1985, 1987; Shefrin and Statman, 1985; Poterba and Summers, 1988; DeLong, Shleifer, Summers, Waldmann, 1990; Lehmann, 1990; and Conrad, Kaul, and Nimalendran, 1991), Jagadeesh and Titman (1993) report that over an intermediate horizon of three to twelve months, past winners (stocks that increase in value) on average continue to outperform past losers (stocks that decrease in value) by about 1% per month. They conclude that there is "momentum" in stock prices. Investment strategies that exploit the momentum in stock prices buy past winners and sell past losers. Since Jagadeesh and Titman's discovery, this approach to investing has become popular, and momentum has become a distinct, well-recognized investment style in the USA and other markets (Chan, Jegadeesh, and Lakonishok, 1996).

In contrast to many hypotheses explaining stock price reversals or the overreaction hypothesis, there are only a few possible explanations for the momentum or continuation effect. First, stock prices underreact to information. Chan, Jagadeesh, and Lakonishok (1996) show that stock prices underreact to earnings news and a substantial portion of the momentum effect is concentrated around subsequent earnings announcements. These authors find that the returns for companies that are ranked the lowest by past earnings surprises are persistently below average in the following two to three years. They attribute the momentum in stock returns to the delayed reaction of stock prices to the information in past returns and in past earnings. Hong, Lim, and Stein (2000) show that the underreaction of stock prices depends on analysts' coverage. Schnusenburg and Madura (2000) find that several national market indices in the Morgan Stanley Capital International (MSCI), world index underreact to both positive and negative information. Results from applying filter rules out-of-sample suggest that investors can profit from mispriced market indices.

Another explanation for the momentum effect is the tendency of professional money managers to follow one another in their trading, a phenomenon known as herding behavior. DeLong, Shleifer, Summers and Waldmann (1990) show that momentum traders, also referred as trend chasers or positive feedback traders, can destabilize stock prices and affect the efficiency of the market. They note that trend chasing by institutional investors can cause momentum, or positive autocorrelation, in stock prices. Hong and Stein (1999) also report the causal link between herd behavior by institutions and price momentum. In other study, Grinblatt, Titman and Wermers (1995) document that the majority of mutual funds buy stock based on their past returns, and

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funds showing the greatest tendency to buy past winners also tend to buy or sell in herds. Badrinath and Wahal (2002) document that institutions act as momentum traders when they enter stocks, but they also report that the equity trading practices of institutions do not seem to destabilize asset prices.

Some academic studies have investigated the profitability of the momentum strategy for international stocks. Rouwenhorst (1997) reports that momentum strategies are profitable for equities in 12 European markets. Rouwenhorst (1999) also investigates momentum for a sample of 20 emerging markets. He finds that emerging market stocks exhibit momentum. This author creates portfolios based in individual stocks. Chan, Hameed and Tong (2000) use returns of international equity market indices for 23 countries. They find that the momentum profits in these international equity markets are statistically and economically significant, especially for short holding periods (less than four weeks). Additionally, they investigate how exchange rate movements affect the profitability of international momentum strategies and conclude that the exchange rate effect is not significant. These authors also emphasize the relevance of momentum strategies for country selection. This is interesting because the impact of country selection in investment strategies has become more important as the number of international equity funds has grown (Keppler, 1990; and Macedo, 1995).

1. Market liberalization in emerging markets

Many developing countries have implemented capital market reforms in the last 20 years. Bekaert and Harvey (2000) provide a list of economic events that could indicate a country is involved in financial liberalization and reform process, such as purchase of domestic shares by foreign investors, free repatriation of capital, remittances of dividends and capital gains, foreigners having the same rights as domestic investors, the first ADR introduction, first country fund introduction, and a substantial increase in net US capital flows.

Bekaert and Harvey (2000) attempt to provide official dates for equity market liberalization for some emerging markets. This is the date of formal regulatory change after which foreign investors officially have the opportunity to invest in domestic equity securities and domestic investors have the right to transact in foreign equity securities abroad. However, other authors give different dates for market liberalization (Henry, 2000; Kim and Singal, 2000). The problem in dating market liberalization is that market liberalization reforms involve major economic and financial events that make the dating difficult and judgmental. There is agreement, however, that most of the liberalization processes of emerging markets took placed in the late 1980s and early 1990s (Bekaert and Harvey, 2000; Bekaert, Harvey and Lundblad, 2003).

2. Purpose, motivation, and contribution of the research

The purpose of this research is to investigate whether momentum strategies constructed on past returns of international stock market indices generate abnormal returns. The paper places especial emphasis on emerging markets of Africa, Asia, Europe, Latin America, and the Middle East.

The motivation of this research is threefold. First, most of the previous studies of momentum strategies concentrate in developed markets. In fact, only a few studies include emerging countries in their analysis, and their samples contain only a small number of emerging markets. Our sample contains a large number of emerging markets. A second motivation of this paper resides in conflicted results of momentum strategies reported by previous authors for emerging capital markets. In effect, Rouwenhorst (1999), and Chan, Hameed and Tong (2000) report that the emerging markets in their global samples exhibit profitable momentum strategies; on the other hand, Bekaert, Erb, Harvey and Viskanta (1997) find that momentum strategies are not consistently profitable for emerging markets. This paper attempts to provide additional empirical evidence about the relevance of momentum profits for emerging markets. A third motivation of this research is to investigate the effect on momentum strategies of market liberalization reforms introduced in many emerging markets during the sample period. In this paper we postulate that market liberalization reforms tend to reduce the momentum strategy profits from emerging capital markets.

The contribution of this paper is as follows. In this research, we extend the analysis of momentum strategies for international stock indices to 48 international equity markets. This is the largest sample of global equity markets in the financial literature. Moreover, our sample includes a larger number of emerging markets from Africa, Asia, Europe, Latin America, and the Middle East, than any previous study of momentum strategies. In this respect, we expected to contribute to clarify the existence or nonexistence of momentum profits in emerging markets. Our sample also covers a more recent time period from 1987 to 2001, which allows us to test the significance of momentum profits in the pre-market liberalization and post-liberalization eras. Finally, we apply the momentum strategies to a global portfolio, regional portfolios of emerging mar-

kets, and individual countries, to test whether momentum strategies generate profits, and hence whether these strategies are useful for country selection, an important investment strategy given the growing number of international equity mutual funds.

3. Data

We collect weekly equity market index returns for 48 countries from the Global Financial Data. The sample contains the following emerging markets: African/European/Middle Eastern countries: Egypt, Ghana, Greece, Israel, Jordan, Kenya, Nigeria, Poland, Portugal, Russia, Tunisia, and Turkey; Asian countries: China, India, Indonesia, Korea, Malaysia, Philippines, Sri Lanka, Taiwan, and Thailand; Latin American countries: Brazil, Chile, Colombia, Mexico, Panama, Peru, and Venezuela. The developed countries in the sample are: Australia, Austria, Canada, Denmark, Finland, France, Germany, Hong Kong, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Singapore, South Africa, Spain, Switzerland, the UK, and the USA. The World Index corresponds to the MSCI World Composite. The index values are converted from foreign currency values to US dollar values based on daily exchange rates retrieved from the Global Financial Data tape. Table 1 presents the list of countries, the name of the country equity index, the name of the local currency, and the sample time period (for most countries the sample covers the time period from January 1987 to December 2001, but for a few indices the length is slightly different).

Many of these markets operate in different time zones with different trading hours. Therefore, the returns on a given calendar day may represent the returns realized over a different day. However, the potential estimation biases introduced by non-synchronous data are not a problem in our research because we use weekly returns. In addition, we have defined a week differently for the evaluation period than for the holding period. For the evaluation period a week goes from Wednesday to Wednesday. For the holding period, a week starts and ends on Thursday.

4. Methodology

We apply first the momentum strategies to a global portfolio of the whole sample and the entire time period. Following, we construct regional portfolios of emerging markets of Africa/Europe/Middle East, Asia, and Latin America, and a portfolio of developed countries. Finally, we investigate the momentum strategies for individual countries. The sample is also divided in sub-periods in order to investigate the impact of market liberalization reforms and financial crises.

The basic momentum strategies consist of buying (or selling short) individual stock market indices based on how much the individual stock market outperformed (or underperformed) the world market portfolio. The portfolio weights for trading strategies are determined by the past performance of the individual indices relative to the average performance of the global market portfolio (constructed with all countries in the sample). The portfolio weights are consistent with the momentum strategy whereby an investor in any period will buy the winner countries and sell short the loser countries of the previous period. Because of individual stock market returns and the cross-sectional averages, countries that deviate more from the average in one period will have greater absolute weight in the portfolio in the next period. We test the momentum strategies using five different holding periods: one week, two weeks, four weeks, 12 weeks, and 26 weeks.

The trading strategies involve investing in foreign equity indices. Since they are considered from the point of view of an American investor, the profits from investing in foreign markets are converted into US dollars. Therefore, exchange rate movements are also taken into account in the computation of the portfolio weights.

Let us define the following notation: K_{it} is the the US dollar return from investing in equity index i at time t; k_{it} is the local currency return of index i at time t; e_{it} is the percentage rate of change at time t of the exchange rate of local currency i with respect to the US dollar; $w_{it}(n)$ is the fraction of the momentum portfolio devoted to stock index i at time t, where n is the number of weeks of the holding period.

4.1. Basic momentum strategies. We have the following relationship:

$$K_{it} = k_{it} + e_{it}.$$

We consider an American investor who buys or sells equity indices at time t, based on their performance at the previous time period $t-1$. The momentum portfolio is constructed by evaluating the performance of stock index i with respect to the other stock indices at time $t-1$, as follows:

$$w_{it}(n) = 1/N[K_{it-1} - K_{mt-1}],$$

where

$$K_{mt-1} = (1/N)\sum_{i=1}^{N} K_{it-1}$$

is the cross-sectional average of stock index returns across N markets at time $t-1$. The portfolio weights are consistent with the momentum strategies where

an investor in period t will prolong the winner market indices and shorten the loser market indices of the period t–1. In this way, because the portfolio weights are proportional to the differences between the individual stock market returns and the cross-sectional averages, countries that deviate more from the average at time t–1 will have greater absolute weight in the time t portfolio.

The investor will earn in period t a profit equal to

$$P_t = \sum_{i=1}^{N} w_{it}(n) K_{it}(n).$$

Since $\sum_{i=1}^{N} w_{it}(n) = 0,$

this strategy will lead to zero-cost portfolio.

The aggregate investment long and short in the zero-cost strategies at time t, is given by

$$I_t(n) = \sum_{i=1}^{N} | w_{it}(n) | .$$

The arbitrage strategies are zero-cost ones, therefore, the portfolio weights can be arbitrarily scaled to obtain any level of profits. In order to give some economic meaning to the profits, we calculate a measurement of return by dividing the expected profits by the length of the holding period and by the amount of investment in the long or short position:

$$P_t / (0.5 \times n \times I_t(n)) .$$

The above measurement of return is the per-period profits for every dollar invested in the long or short position for the arbitrage strategy. Alternatively, this measurement of return can be seen as the difference in per-period returns between winner and loser portfolios.

4.2. Decomposition of momentum profits. The profits from the momentum strategies can be decomposed in four components (Chan, Hameed and Tong, 2000): an equity component, a currency exchange component, and two interaction components. Recall that

$$K_{it} \cong k_{it} + e_{it}, \text{and}$$
$$w_{it}(n) = (1/N)[(k_{it-1} + e_{it-1}) - (k_{mt-1} + e_{mt-1})],$$

where

$$k_{mt-1} = (1/N) \sum_{i=1}^{N} k_{it-1},$$

$$e_{mt-1} = (1/N) \sum_{i=1}^{N} e_{it-1}.$$

Therefore, the expected total profit from the momentum strategy in period t, P_t, can be expressed in four components as follows:

$$P_t^1 = 1/N \sum_{i=1}^{N} E\{(k_{it-1} - k_{mt-1}) k_{it}\},$$

$$P_t^2 = 1/N \sum_{i=1}^{N} E\{(k_{it-1} - k_{mt-1}) e_{it}\},$$

$$P_t^3 = 1/N \sum_{i=1}^{N} E\{(e_{it-1} - e_{mt-1}) k_{it}\},$$

$$P_t^4 = 1/N \sum_{i=1}^{N} E\{(e_{it-1} - e_{mt-1}) e_{it}\}.$$

The first component, P_t^1, is the equity component and corresponds to profits due to the predictability of equity returns based on past equity performance. This component is positive if the equity market, which performs better than average in period t–1, is expected to rise further in period t. The fourth component, P_t^4, is the exchange rate component and reflects profits due to predictability of exchange rate returns based on their past performance. The component is positive if a country, whose currency appreciates (relative to a basket of currencies) in period t–1, experiences further currency appreciation in period t. The other two components of the total profit from the momentum strategy correspond to the interaction components. The second component, P_t^2, reflects profits due to predictability of exchange rate returns based on past equity performance. The component is positive if a country which equity market performs better than average in period t–1, experiences currency appreciation in period t. The third component, P_t^3, accounts for profits due to predictability of equity returns based on past exchange rate performance. This component is positive if a country, whose currency appreciates (relative to a basket of currencies) in period t–1, experiences a rise in the equity market in period t.

5. Analysis of empirical results

The basic momentum strategies are implemented as follows. At time t we prolong the winner markets and short the loser markets, with the portfolio weights computed with the equation given in the methodology. We use five different holding periods with n = one week, two weeks, four weeks, twelve weeks, and twenty-six weeks. The total or aggregate momentum profit across all markets at time t is computed as

$$P_t = \sum_{i=1}^{N} w_{it}(n) K_{it}(n).$$

In addition, the total profit is decomposed in the four profit components indicated in the methodology.

5.1. Whole sample – entire time period. Table 2 reports the results for a portfolio of the whole sample for the whole time period. The total momentum

profits in cents are small but statistically significant for all the intervals. The z-statistics are asymptotically distributed as N (0, 1), under the null hypothesis that the "true" profits are zero, and are corrected for heteroskedasticity and autocorrelation based on Newey-West adjustment (1987). The first profit component (the equity component), P_t^1, is more important than the other three components for the one-week, two-week, and four-week periods. Even though the contribution of the first profit component to the total profits is smaller for the 12-week, and the 26-week periods, the empirical evidence presented in Table 2 (see Appendix) suggests that the most significant source of momentum profits seems to be the predictability within the equity markets themselves.

As Table 2 indicates we have found stronger evidence of positive autocorrelation at shorter horizons, such as 1-4 weeks. This is different from the evidence for momentum profits in the U.S., where the most profitable strategies appear at longer horizons, such as 6-9 weeks. The difference could be due to the underlying factors causing the momentum profits. Explanations for the existence of momentum profits suggest there are momentum strategies based on past returns or price momentum, and momentum strategies based on earnings surprises or earnings momentum (Chan, Jegadeesh and Lakonishok, 1996). In the US momentum profits seem to be associated with price momentum, under which superior performance persists over a period of six months after earnings announcements. In effect, Chan, Jegadeesh and Lakonishok (1996) suggest that the profitability of momentum strategies in the US is due to the component of medium-horizon returns that is related to unexpected high earnings firms. Givoly and Lakonishok (1979) also report sluggishness in the response of prices to revisions in analysts' forecasts of earnings. On the other hand, under the so-called earnings momentum strategies, momentum profits arise from the exploitation of market underreaction to information, such as information related to short-term earnings. In this situation momentum profits are generated in short horizons. Our results suggest that momentum profits in international portfolios and emerging markets seem to be generated by strategies based on earnings momentum. We conclude that momentum strategies in international portfolios should be implemented differently than in the US. A global asset allocation strategy would require reallocating investments from losers to winners every 1-4 weeks.

The exchange rate component, P_t^4, is also statistically significant, suggesting that the exchange rate plays an important role in generating momentum strategy profits. Table 2 also show that all the components of momentum profits are positive, indicating positive relationship between equity returns, exchange rates, and their lagged returns. Unlike Chang, Hameed, and Tong (2000), our results indicate that exchange rate fluctuations add to momentum profits and there are positive relationships between exchange rates returns and equity returns. The difference between those authors' results and ours could be due to differences in the data sets. Our data set includes more emerging markets than theirs. It is known that currencies of emerging markets fluctuate more than currencies of developed countries. We conclude that profits from momentum strategies in international portfolios depend not only on the equity market, but also on the currency exchange market and the interrelationship between these two markets.

In order to assess the economic significance of momentum profits, we have also computed the weekly returns by dividing the total profits by the length of the holding period and by the total investment long or short. As indicated in the methodology, these returns can be seen as the difference between the weekly returns of winner portfolios and loser portfolios. We can observe that the weekly returns are relatively large and statistically significant.

5.2. Whole sample – sub-time periods. In order to investigate the impact of market liberalization we split the sample in two sub-periods. As we have already indicated most emerging markets completed their market liberalization process in the early 90's. Therefore, we have split the data in a pre-market liberalization era, covering the time period from January 1987 to December 1993, and a post-market liberalization era, from January 1994 to December 2001. The choice of the time periods is a compromise between the pre-market liberalization and post-market liberalization eras and the necessity to keep a reasonably long sample period for both sub-samples, in order to maintain the power of the tests.

We expect momentum profits to be larger in the pre-market liberalization era, characterized by market isolation, than in the post-market liberalization era, characterized by openness to foreign investors and increasing market integration. That is the case reported in Table 3 (see Appendix). In effect, the momentum profits for the pre-market liberalization period are larger and more statistically significant than those of the post-market liberalization period. They are also larger than those reported in Table 2 for the whole sample period, especially for the 1-week, 2-week, and 4-week horizons. As in the case of the whole sample, the equity component, P_t^1, remains the most important contributor to the over-

all momentum profits in the pre-market liberalization era, for the one-week, two-week, and four-week holding periods. The exchange rate component of the momentum profit, P_t^4, is also statistically significant and larger in the pre-market liberalization era. Clearly, the momentum profits for the post-market liberalization period are smaller than those of the pre-market liberalization period and statistically insignificant for many of the profit components. Therefore, the results reported in Table 3 suggest that momentum strategy profits tend to shrink with market liberalization. If a market becomes more integrated after implementing a market liberalization process, then our results are consistent with the hypothesis that market integration reduces the benefits of international portfolio diversification.

According to Bekaert and Harvey (2002) in a segmented market assets are mainly priced off the local market return. Since the local expected return is a product of the local beta coefficient times the local market risk premium, and given the high volatility of local returns, it is likely that the local expected return is high. On the other hand, in the integrated capital market the expected return is determined by the beta with respect to the world market portfolio multiplied by the world risk premium. It is likely that this expected return is much lower. Therefore, in the transition from a segmented to an integrated market, expected returns should decrease. However, in our tests momentum strategies still generate statistically significant total profits in the post-market liberalization era. In this respect, our results agree with Li, Sarkar and Wang (2002), who report that the integration of world equity markets reduces, but does not eliminate, the diversification benefits of investing international.

5.3. Regional portfolios – entire time period. Table 4 (see Appendix) presents the results of the momentum strategies applied to portfolios of countries grouped by regions of the world. We created three regional portfolios of emerging markets: Asian countries (Panel A), African, European, and Middle Eastern countries (Panel B), and Latin American countries (Panel C). We also created a portfolio of developed countries (Panel D). As in the case of the global portfolio, the first component of the momentum profits is the most important for the regional portfolios. As in the case of the global portfolio, the total profits are larger for the 1-week, 2-week, and 4-week holding periods. The momentum profits are highly significant for the portfolio of Latin American countries. They are also significant for the portfolio of African, European, and Middle Eastern countries. On the other hand, the momentum profits are very small and generally insignificant for the portfolio of developed countries. The results are also weak for the portfolio of Asian emerging markets, this could be due to the more advanced stage of Asian markets relative to the emerging markets of the other regions. The exchange rate component of the momentum profit is generally statistically insignificant, except for the Latin American portfolio, where currency fluctuations are more pronounced. These results confirm our a priori hypothesis and we conclude that generally the momentum strategies seem to work better in emerging countries, which are characterized by relatively less sophisticated capital markets and are less integrated with the rest of the financial world.

5.4. Regional portfolios – sub-time periods. Table 5 (see Appendix) present the results of momentum strategies applied to regional portfolios of emerging markets for the pre-market liberalization period and the post-market liberalization period. Confirming our hypothesis, the momentum profits are larger in the pre-market liberalization than in the post-market liberalization era for the Latin American and Asian portfolios. Especially for the Latin American portfolio the momentum profits are larger and more statistically significant in the pre-market liberalization era. However, the results for the African/European/Middle Eastern portfolio are generally weak, with no indication of significant higher momentum profits in the pre-market liberalization period. This could be due to the relatively small foreign portfolio investment in this region.

5.5. Individual countries – entire time period. In this section we discuss the results of the momentum strategies for individual countries. Our objective here is to examine whether individual markets earn momentum profits after adjusting for world beta risk.

We compute first the momentum profit for country i at time t as $P_{it}(n) = w_{it}(n) \times K_{it}(n)$.

Then we normalize the momentum profit by dividing it by the aggregate investment long or short in the zero-cost strategies, $I_t(n)$. Finally, the normalized momentum profits (R_{it}) are regressed on the excess world market return (R_{mt}):

$$R_{it} = \alpha_i + \beta_i (R_{mt}) + \varepsilon_{it}.$$

The estimate of α_i measures the abnormal profits of country i. By stacking the above regression for all countries we create a multivariate regression model system with the disturbances ε_{it} being i.i.d. within each equation, but allow them to be heteroskedastic and contemporaneously correlated across equations. The system of regressions is estimated with genera-

lized least squares. Only the abnormal profits, alphas, are reported in Table 6 (see Appendix). It can be observed that alphas are generally positive, but small and insignificant. Most of the statistically significant alphas are for the 1-week and 2-week holding periods. The results of this simple market model suggest that risk factors are important in explaining momentum profits.

However, the joint test that alphas are zero for all countries (the world) is rejected at the 5% significant level for the 1-week horizon, and partially rejected for the 2-week horizon, but it cannot be rejected for longer horizons. Our result implies that simple beta risk adjustment could explain most of the profits at long horizons (four, twelve, and twenty six weeks), but not at short horizons (one and two weeks). The simple beta risk adjustment could not explain either the momentum profits for some emerging markets, especially the Latin American countries of Brazil, Chile, Peru, and Venezuela; China; the African countries of Ghana and Kenya, and the Eastern European countries of Russian and Turkey. The developed countries of Australia, Hong Kong, Japan, New Zealand, and Spain also exhibit statistically significant momentum strategies.

Conclusion

The purpose of this research is to investigate whether momentum strategies constructed on past returns of international stock market indices generate profits. The study puts emphasis on emerging markets of Africa, Asia, Latin America, Europe, Latin America, and the Middle East.

The motivation of this research is threefold. Firstly, our emphasis is on emerging markets, while most previous studies of momentum strategies concentrate on developed markets. In fact, only a few studies include emerging countries in their analysis, and their samples contain only a small number of emerging markets.

A second motivation of this paper is to contribute to clarify the controversy about the importance of momentum profits in emerging markets, giving the conflicting results of momentum strategies for emerging capital markets reported by previous authors.

A third motivation of this research is to investigate the hypothesis that profits from momentum strategies are affected by market liberalization reforms.

We collect weekly equity market index returns for 48 countries from the Global Financial Data. The sample contains 28 emerging countries from Africa, Asia, Europe, Latin America, and the Middle East, and 20 developed countries. For most countries the sample period goes from January 1987 to December 2001.

The profits from the momentum strategies can be decomposed in four components: equity component, currency exchange component, and two interaction components. We apply first the momentum strategies to a global portfolio of the entire sample. Then, we test the momentum strategies in portfolios composed of emerging markets of Asia, Europe/Africa/Middle East, and Latin America, respectively, and a portfolio of developed countries. Finally, we investigate the momentum strategies for individual countries. The sample is also divided in sub-periods in order to investigate the impact of market liberalization reforms on the profits from momentum strategies.

Our empirical results indicate that momentum strategies generate statistically and economically significant profits for all countries portfolio and for the regional portfolios, especially for short horizons of 1-4 weeks. Momentum profits are also enhanced by exchange rates. As postulated, momentum strategy profits are especially large for emerging markets. We also find that momentum profits are higher in the pre-market liberalization period than in the post- liberalization period. Momentum profits are also important for some individual countries for short horizons, but not for horizons longer than four weeks.

We conclude that the higher momentum profits generated by emerging markets are partially due to market isolation, and that market liberalization reforms recently introduced in these countries tend to reduce the gains from momentum strategies. That is, our results suggest that momentum strategy profits vary according to the different stages of economic and financial development of the countries under analysis. In this respect, our results seem to have practical implication for country selection in international portfolio investment of mutual funds.

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Appendix

Table 1. Stock indices of 48 countries and the World Index from January 2, 1987 to December 31, 2001

Country	Index name	Currency	Sample period
Australia	Australia All Ordinary Index	Australian Dollar	01/02/87-12/31/01
Austria	Austria Trading Composite Index	Austrian Schilling	01/02/87-12/28/01
Brazil	Brazil Bolsa de Valores Sao Paulo Composite Index	Brazilian Real	01/02/87-12/31/01
Canada	Canada S&P/TSX 300 Composite Index	Canadian Dollar	01/07/87-12/31/01
Chile	Santiago SE Indice General de Precios de Acciones	Chile Peso	01/02/87-12/28/01
China	Shenzhen SE Composite	China Yuan	04/09/91-12/31/01
Colombia	Colombia IGBC General Index	Colombian Peso	01/02/92-12/31/01
Denmark	Copenhagen KAX All-Share Index	Danish Krona	01/02/87-12/28/01
Egypt	Cairo SE EFG General Index	Egyptian Pound	01/06/93-12/31/01
Finland	Finland SBF-250 Index	Finnish Markka	01/02/87-08/31/01
France	France SBF-250 Index	French Franc	01/02/87-12/28/01
Germany	Germany Frankfurter Allgemeine Aktien Index	Deutsch Mark	01/02/87-12/28/01
Ghana	Ghana SE Databank Index	Ghanaian Cedi	11/12/90-12/31/01
Greece	Athens SE General Index	Greek Drachma	01/31/87-12/28/01
Hong Kong	Hong Kong Hang Seng Composite Index	Hong Kong Dollar	01/02/87-12/31/01
India	Mumbai (Bombay) SE Sensitive Index	Indian Rupee	01/02/87-12/31/01

Table 1 (cont.). Stock indices of 48 countries and the World Index from January 2, 1987 to December 31, 2001

Country	Index name	Currency	Sample period
Indonesia	Jakarta SE Composite Index	Indonesian Rupiah	01/02/87-12/28/01
Israel	Israel All-Share Index	Israelian New Shequel	01/04/87-12/31/01
Italy	Banca Commerciale Italiana General Index	Italian Lira	01/02/87-11/30/01
Japan	Japan Nikkei 225 Stock Average Index	Japanese Yen	01/05/87-12/28/01
Jordan	Jordan AFM General Index	Jordan Dinar	01/31/87-12/31/01
Kenya	Nairobi SE Index	Kenya Schilling	01/31/87-12/31/01
Korea	Korea SE Stock Price Index	South Korean Won	01/05/87-12/28/01
Luxemburg	Luxemburg SE LUXX Index	Luxemburg Franc	01/01/87-12/28/01
Malaysia	Malaysia KLSE Composite Index	Malaysian Ringgit	01/02/87-12/31/01
Mexico	Mexico SE Indice de Precios y Cotizaciones	Mexican Peso	01/02/87-12/31/01
Netherlands	Netherlands CBS All-Share Price Index	Dutch Guilder	01/02/87-12/28/01
New Zealand	New Zealand SE All-Share Price Index	New Zealand Dollar	01/01/87-12/31/01
Nigeria	Lagos SE Index	Nigerian Naira	12/31/87-12/31/01
Norway	Oslo SE All-Share Index	Norwegian Kroner	01/02/87-12/28/01
Panama	Panama Bolsa de Valores Indice General	Panama Balboa	01/18/94-12/31/01
Peru			
Philippines	Manila SE Composite Index	Philippine Peso	01/02/87-12/28/01
Poland	Vienna OETEB Poland Traded Index	Poland Zloty	01/05/95-12/31/01
Portugal	Portugal Banca Torres & Acores General Index	Portuguese Escudo	01/06/87-12/28/01
Russia	Russia AK&M Composite	Russia Ruble	09/08/93-12/31/01
Singapore	Singapore SES All-Share Index	Singapore Dollar	01/02/87-12/31/01
South Africa	Johannesburg SE Overall Index	South African Rand	01/02/87-12/31/01
Spain	Madrid SE General Index	Spanish Peseta	01/02/87-12/28/01
Sri Lanka	Colombo SE All-Share Index	Sri Lankan Rupee	01/05/87-12/31/01
Switzerland	Swiss Market Index	Swiss Franc	01/04/88-12/28/01
Taiwan	Taiwan SE Capitalization-Weighted Index	Taiwanese Dollar	01/06/87-12/31/01
Thailand	Thailand SET General Index	Thailand Baht	01/02/87-12/28/01
Tunisia	Tunisia Indice BVM	Tunisia Dinar	07/31/93-12/31/01
Turkey	Istanbul SE IMKB-100 Price Index	Turkish Lira	01/02/87-12/28/01
United Kingdom	UK Financial Times SE 100 Index	Sterling Pound	01/02/87-12/28/01
United States	S&P 500 Composite Index	US Dollar	01/02/87-12/28/01
Venezuela	Caracas SE General Index	Venezuela Bolivar	01/08/93-12/31/01
World	MSCI World $ Composite		01/02/87-12/28/01

Table 2. Profits from momentum strategies implemented on stock indices of 48 countries, full sample period (1/2/1987 to 12/31/2001)

	1-week	2-week	3-week	12-week	26-week
P_t^1	0.00016 (4.51)	0.00015 (6.48)	0.00008 (3.69)	0.00004 (1.32)	0.00005 (3.02)
P_t^2	0.00004 (4.99)	0.00004 (4.52)	0.00005 (5.24)	0.00006 (5.71)	0.00004 (5.04)
P_t^3	0.00008 (7.87)	0.00008 (5.99)	0.00007 (5.33)	0.00007 (6.48)	0.00006 (6.05)
P_t^4	0.00006 (8.09)	0.00007 (8.75)	0.00006 (9.60)	0.00005 (7.18)	0.00004 (6.74)
P_t	0.00029 (4.00)	0.00033 (9.81)	0.00026 (8.20)	0.00021 (5.73)	0.00019 (7.42)
Aggregate investment	21.044	21.023	21.024	20.780	20.475
Weekly return	0.02241 (10.38)	0.01073 (11.60)	0.00402 (8.49)	0.00113 (7.24)	0.00053 (8.52)

Table 3. Profits from momentum strategies implemented on stock indices of 48 countries, two sub-periods: pre-market liberalization period (1/2/1987 to 12/31/1993) and post-market liberalization period (1/2/1994 to 12/31/2001)

Panel A (January 2, 1987 to December 31, 1993)					
	1-week	2-week	3-week	12-week	26-week
P_t^1	0.00032 (4.69)	0.00021 (4.92)	0.00016 (3.85)	0.00007 (1.57)	0.00010 (2.88)

Table 3 (cont.). Profits from momentum strategies implemented on stock indices of 48 countries, two sub-periods: pre-market liberalization period (1/2/1987 to 12/31/1993) and post-market liberalization period (1/2/1994 to 12/31/2001)

	1-week	2-week	3-week	12-week	26-week
P_t^2	0.00009 (5.98)	0.00009 (5.47)	0.00009 (5.37)	0.00010 (5.36)	0.00008 (4.99)
P_t^3	0.00014 (7.68)	0.00014 (6.26)	0.00010 (4.36)	0.00013 (5.47)	0.00010 (5.12)
P_t^4	0.00011 (9.30)	0.00013 (8.58)	0.00010 (9.49)	0.00009 (7.33)	0.00008 (6.43)
P_t	0.00052 (3.41)	0.00056 (8.49)	0.00046 (7.40)	0.00038 (5.07)	0.00036 (6.84)
Aggregate investment	10.868	10.871	10.840	10.578	10.259
Weekly return	0.04097 (10.32)	0.01776 (10.26)	0.00697 (7.72)	0.00207 (6.79)	0.00099 (8.18)
Panel B (January 2, 1994 to December 31, 2001)					
	1-week	2-week	3-week	12-week	26-week
P_t^1	0.00002 (0.72)	0.00010 (4.50)	0.00001 (0.64)	-0.00000 (-0.26)	0.00001 (0.98)
P_t^2	0.00000 (0.35)	-0.00000 (-0.13)	0.00001 (1.26)	0.00002 (2.20)	0.00000 (1.33)
P_t^3	0.00003 (3.10)	0.00002 (1.65)	0.00003 (3.28)	0.00002 (4.26)	0.00002 (3.70)
P_t^4	0.00001 (1.94)	0.00002 (3.07)	0.00002 (3.52)	0.00001 (1.89)	0.00001 (2.47)
P_t	0.00009 (3.55)	0.00013 (6.17)	0.00008 (4.06)	0.00006 (3.19)	0.00005 (3.33)
Aggregate investment	10.176	10.151	10.183	10.201	10.216
Weekly return	0.00630 (3.58)	0.00463 (6.40)	0.00149 (3.97)	0.00033 (2.90)	0.00016 (3.25)

Table 4. Profits from momentum strategies implemented on regional portfolios of national stock indices, full sample period (1/2/1987 to 12/31/2001)

Panel A: Emerging Asian countries					
	1-week	2-week	3-week	12-week	26-week
P_t^1	0.00009 (1.24)	0.00007 (2.14)	0.00003 (0.75)	0.00000 (0.12)	0.00003 (1.15)
P_t^2	-0.00001 (-1.20)	-0.00002 (-1.73)	-0.00000 (-0.28)	-0.00000 (-0.63)	-0.00001 (-1.13)
P_t^3	0.00001 (1.70)	0.00001 (1.26)	0.00001 (0.93)	0.00000 (0.19)	0.00001 (1.48)
P_t^4	-0.00000 (-0.32)	-0.00000 (-0.23)	0.00000 (0.02)	0.00000 (0.19)	-0.00000 (-0.12)
P_t	0.00009 (1.24)	0.00008 (2.36)	0.00004 (1.01)	0.00001 (0.23)	0.00003 (0.94)
Aggregate investment	22.695	22.688	22.615	22.358	22.009
Weekly return	0.00768 (3.30)	0.00256 (2.76)	0.00031 (0.69)	-0.00005 (-0.34)	-0.00000 (-0.01)
Panel B: Emerging African, European, and Middle Eastern countries					
	1-week	2-week	3-week	12-week	26-week
P_t^1	0.00016 (1.39)	0.00020 (3.03)	0.00001 (0.15)	-0.00007 (-1.33)	0.00005 (1.22)
	1-week	2-week	3-week	12-week	26-week
P_t^2	-0.00001 (-0.79)	-0.00001 (-0.48)	0.00001 (0.89)	0.00002 (1.24)	0.00001 (0.88)
P_t^3	0.00004 (1.71)	0.00001 (0.37)	0.00002 (1.12)	0.00004 (3.12)	0.00002 (1.67)
P_t^4	-0.00001 (-1.40)	0.00001 (1.37)	0.00001 (2.06)	0.00001 (1.86)	0.00001 (1.67)
P_t	0.00007 (0.42)	0.00019 (3.64)	0.00010 (2.13)	0.00001 (0.14)	0.00008 (1.98)
Aggregate investment	23.829	23.802	24.025	23.671	23.774
Weekly return	0.01039 (3.96)	0.00626 (5.53)	0.00105 (1.65)	0.00003 (0.15)	0.00021 (2.17)

Table 4 (cont.). Profits from momentum strategies implemented on regional portfolios of national stock indices, full sample period (1/2/1987 to 12/31/2001)

Panel C: Emerging Latin American countries					
	1-week	2-week	3-week	12-week	26-week
P_t^1	0.00067 (4.85)	0.00041 (3.41)	0.00042 (3.56)	0.00012 (1.00)	0.00007 (0.66)
P_t^2	0.00026 (5.19)	0.00023 (4.53)	0.00020 (3.58)	0.00027 (4.62)	0.00015 (3.20)
P_t^3	0.00045 (7.15)	0.00040 (5.39)	0.00028 (3.87)	0.00030 (4.14)	0.00024 (3.90)
P_t^4	0.00035 (9.80)	0.00037 (8.13)	0.00027 (8.35)	0.00024 (6.15)	0.00020 (5.39)
P_t	0.00166 (8.79)	0.00137 (6.66)	0.00109 (5.99)	0.00088 (4.13)	0.00071 (4.45)
Aggregate investment	35.372	35.334	35.337	35.248	34.907
Weekly return	0.04192 (10.71)	0.01906 (9.24)	0.00667 (6.48)	0.00217 (6.67)	0.00090 (5.70)
Panel D: Developed countries					
	1-week	2-week	3-week	12-week	26-week
P_t^1	-0.00000 (-0.30)	0.00002 (2.64)	0.00001 (0.81)	-0.00000 (-0.41)	0.00002 (3.51)
P_t^2	0.00000 (1.07)	-0.00000 (-0.21)	-0.00000 (-0.77)	0.00000 (0.40)	-0.00000 (-0.63)
P_t^3	0.00000 (1.61)	0.00000 (0.80)	0.00000 (0.98)	0.00001 (3.11)	0.00002 (0.95)
P_t^4	-0.00000 (-1.04)	0.00001 (2.10	0.00000 (0.92	0.00000 (0.38)	-0.00000 (-0.33)
P_t	0.00000 (0.04)	0.00003 (3.30)	0.00001 (1.31)	0.00001 (0.96)	0.00002 (2.69)
Aggregate investment	13.760	13.745	13.685	13.511	13.199
Weekly return	0.00033 (0.40)	0.00144 (3.65)	0.00025 (1.33)	0.00007 (1.16)	0.00007 (2.35)

Table 5. Profits from momentum strategies implemented on regional portfolios of national stock indices, two sub-periods: pre-market liberalization period (1/2/1987 to 12/31/1993) and post-market liberalization period (1/2/1994 to 12/31/2001)

Panel A: Emerging Asian countries (January 2, 1987 to December 31, 1993)					
	1-week	2-week	3-week	12-week	26-week
P_t^1	0.00019 (1.24)	0.00013 (2.09)	0.00009 (1.34)	-0.00002 (-0.43)	0.00006 (1.18)
P_t^2	0.00000 (0.36)	0.00000 (0.07)	0.00000 (0.96)	-0.00000 (-0.40)	-0.00000 (-0.31)
P_t^3	0.00000 (-0.03)	0.00001 (1.23)	0.00000 (0.12)	-0.00000 (-0.56)	0.00000 (0.36)
P_t^4	-0.00001 (-3.55)	-0.00000 (-0.92)	-0.00000 (-0.54)	0.00000 (1.21)	-0.00000 (-0.21)
P_t	0.00018 (1.18)	0.00017 (2.70)	0.00011 (1.69)	-0.00002 (-0.46)	0.00002 (0.44)
Aggregate investment	11.078	11.057	11.015	10.758	10.441
Weekly return	0.01519 (3.62)	0.00472 (3.00)	0.00125 (1.70)	-0.00019 (-0.81)	0.00001 (0.13)
Panel B: Emerging Asian countries (January 2, 1994 to December 31, 2001)					
	1-week	2-week	3-week	12-week	26-week
P_t^1	0.00000 (0.13)	0.00002 (0.66)	-0.00003 (-0.74)	0.00002 (0.76)	0.00000 (0.28)
P_t^2	-0.00003 (-1.41)	-0.00003 (-1.91)	-0.00001 (-0.71)	0.00000 (-0.51)	-0.00001 (-1.22)
P_t^3	0.00003 (1.96)	0.00001 (0.83)	0.00002 (0.96)	0.00000 (0.47)	0.00002 (1.55)
P_t^4	0.00000 (0.27)	-0.00000 (-0.08)	0.00000 (0.12)	0.00000 (0.02)	-0.00000 (-0.07
P_t	0.00001 (0.36)	0.00000 (0.15)	-0.00003 (-0.72)	0.00003 (0.96)	0.00003 (0.94)

Table 5 (cont.). Profits from momentum strategies implemented on regional portfolios of national stock indices, two sub-periods: pre-market liberalization period (1/2/1987 to 12/31/1993) and post-market liberalization period (1/2/1994 to 12/31/2001)

	1-week	2-week	3-week	12-week	26-week
Aggregate investment	11.616	11.631	11.600	11.600	11.567
Weekly return	0.00116 (0.50)	0.00067 (0.64)	-0.00051 (-0.97)	0.00007 (0.42)	-0.00001 (-0.17)
Panel C: Emerging African, European, and Middle Eastern countries (January 2, 1987 to December 31, 1993)					
	1-week	2-week	3-week	12-week	26-week
P_t^1	0.00025 (1.13)	0.00017 (1.42)	0.00000 (0.05)	-0.00016 (-1.50)	0.00007 (0.94)
	1-week	2-week	3-week	12-week	26-week
P_t^2	-0.00001 (-0.68)	0.00000 (0.20)	0.00002 (0.68)	0.00000 (0.35)	0.00003 (1.37)
P_t^3	0.00003 (1.59)	-0.00000 (-0.16)	-0.00000 (-0.15)	0.00003 (1.89)	-0.00002 (-0.90)
P_t^4	-0.00003 (-1.92)	-0.00000 (-0.17)	0.00000 (-0.12)	0.00000 (1.09)	0.00000 (0.22)
P_t	0.00004 (-0.11)	0.00017 (1.75)	0.00007 (0.80)	-0.00012 (-1.36)	0.00009 (1.19)
Aggregate investment	11.562	11.632	11.770	11.400	11.424
Weekly return	0.01244 (2.75)	0.00566 (3.02)	0.00050 (0.45)	-0.00042 (-0.98)	0.00027 (1.43)
Panel D: Emerging African, European, and Middle Eastern countries (January 2, 1994 to December 31, 2001)					
	1-week	2-week	3-week	12-week	26-week
P_t^1	0.00008 (0.86)	0.00023 (3.25)	0.00001 (0.21)	0.00000 (0.01)	0.00003 (0.82)
P_t^2	-0.00001 (-0.49)	-0.00002 (-0.78)	0.00001 (0.58)	0.00003 (1.23)	-0.00000 (-0.26)
P_t^3	0.00004 (1.12)	0.00002 (0.44)	0.00004 (1.29)	0.00005 (2.49)	0.00004 (3.51)
P_t^4	0.00000 (0.10)	0.00002 (2.40)	0.00002 (2.62)	0.00002 (1.51)	0.00002 (2.19)
P_t	0.00016 (2.55)	0.00021 (4.16)	0.00013 (2.53)	0.00012 (2.45)	0.00007 (1.93)
Aggregate investment	12.266	12.170	12.255	12.271	12.350
Weekly return	0.00861 (2.94)	0.00678 (5.02)	0.00152 (2.23)	0.00042 (1.91)	0.00016 (1.91)
Panel E: Emerging Latin American countries (January 2, 1987 to December 31, 1993)					
	1-week	2-week	3-week	12-week	26-week
P_t^1	0.00145 (5.10)	0.00073 (2.87)	0.00079 (3.15)	0.00034 (1.28)	0.00013 (0.58)
P_t^2	0.00051 (5.03)	0.00044 (4.19)	0.00039 (3.41)	0.00050 (4.14)	0.00027 (2.77)
P_t^3	0.00083 (6.50)	0.00079 (5.07)	0.00050 (3.30)	0.00058 (3.72)	0.00050 (3.64)
P_t^4	0.00066 (9.88)	0.00071 (7.69)	0.00051 (7.88)	0.00046 (5.62)	0.00040 (4.94)
P_t	0.00331 (8.75)	0.00259 (6.04)	0.00203 (5.35)	0.00178 (3.89)	0.00173 (4.11)
Aggregate investment	24.453	24.396	24.279	23.983	23.287
Weekly return	0.08081 (11.59)	0.03425 (8.82)	0.01146 (5.64)	0.00446 (7.16)	0.00181 (5.77)
Panel F: Emerging Latin American countries (January 2, 1994 to December 31, 2001)					
	1-week	2-week	3-week	12-week	26-week
P_t^1	-0.00000 (-0.16)	0.00014 (3.10)	0.00011 (2.53)	0.00006 (-1.38)	0.00002 (0.46)
P_t^2	0.00005 (1.56)	0.00005 (1.98)	0.00003 (1.25)	0.00007 (2.72)	0.00004 (2.11)
P_t^3	0.00012 (3.85)	0.00007 (2.64)	0.00008 (3.72)	0.00007 (3.12)	0.00004 (3.89)
P_t^4	0.00007 (2.99)	0.00007 (4.22)	0.00006 (3.86)	0.00005 (4.30)	0.00004 (3.91)

Table 5 (cont.). Profits from momentum strategies implemented on regional portfolios of national stock indices, two sub-periods: pre-market liberalization period (1/2/1987 to 12/31/1993) and post-market liberalization period (1/2/1994 to 12/31/2001)

	1-week	2-week	3-week	12-week	26-week
P_t	0.00024 (2.80)	0.00032 (4.51)	0.00028 (4.27)	0.00013 (1.98)	0.00014 (2.21)
Aggregate investment	10.919	10.938	11.058	11.264	11.620
Weekly return	0.00833 (2.49)	0.00599 (3.63)	0.00261 (3.47)	0.00025 (0.98)	0.00017 (1.38)

Table 6. Risk-adjusted momentum profits for individual countries, full sample period: January 2, 1987 to December 31, 2001

	1-week	2-week	4-week	12-week	26-week
Australia	0.00005 (1.66)	0.00007 (2.95)	-0.00006 (-2.12)	0.00004 (1.81)	0.00005 (1.05)
Austria	0.00002 (0.56)	0.00010 (2.45)	-0.00001 (-0.31)	-0.00005 (-1.23)	-0.00004 (-0.93)
Brazil	0.00444 (8.01)	0.00419 (6.68)	0.00434 (7.05)	0.00433 (7.27)	0.00355 (6.32)
Canada	0.00000 (0.15)	-0.00001 (-0.55)	0.00001 (0.95)	0.00001 (0.63)	0.00001 (1.17)
Chile	0.00007 (2.20)	0.00004 (1.48)	0.00002 (0.65)	-0.00000 (-0.14)	-0.00000 (-0.05)
China	0.00049 (1.98)	0.00002 (0.11)	0.00004 (0.15)	0.00018 (1.15)	0.00006 (0.29)
Columbia	0.00003 (0.46)	-0.00001 (-0.11)	0.00002 (0.45)	0.00004 (0.78)	-0.00001 (-0.19)
Denmark	0.00000 (0.02)	0.00001 (0.71)	-0.00000 (-0.18)	0.00001 (0.29)	-0.00001 (-0.69)
Egypt	0.00011 (1.08)	-0.00001 (-0.09)	-0.00000 (-0.04)	-0.00002 (-0.28)	0.00000 (0.03)
Finland	0.00004 (0.40)	0.00001 (0.06)	0.00016 (1.45)	0.00001 (0.08)	0.00008 (1.01)
France	0.00000 (0.09)	0.00006 (1.97)	0.00000 (0.00)	-0.00001 (-0.23)	-0.00003 (-1.25)
Germany	-0.00004 (-1.74)	0.00007 (2.63)	0.00001 (0.29)	-0.00003 (-1.47)	-0.00001 (-0.34)
Ghana	0.00018 (2.26)	0.00025 (3.03)	0.00025 (3.17)	0.00002 (0.40)	0.00014 (2.25)
Greece	0.00006 (0.80)	0.00012 (1.59)	-0.00000 (-0.00)	-0.00011 (-1.63)	0.00007 (0.96)
Hong Kong	0.00010 (2.01)	0.00009 (1.88)	-0.00007 (-1.71)	-0.00006 (-1.59)	-0.00003 (-0.82)
India	-0.00006 (-0.62)	0.00007 (0.78)	0.00008 (0.85)	0.00001 (0.11)	0.00008 (1.03)
Indonesia	0.00046 (1.42)	0.00012 (0.99)	0.00015 (1.05)	-0.00008 (-0.74)	0.00005 (0.65)
Israel	0.00039 (1.07)	0.00004 (0.63)	-0.00040 (-1.40)	-0.00025 (-1.02)	0.00004 (0.39)
Italy	0.00003 (1.03)	0.00002 (0.57)	-0.00003 (-0.91)	0.00004 (1.21)	-0.00002 (-0.47)
Japan	-0.00008 (-2.16)	0.00007 (1.86)	-0.00002 (-4.42)	-0.00001 (-0.40)	0.00001 (0.32)
Jordan	-0.00002 (-1.13)	-0.00000 (-0.25)	-0.00002 (-1.24)	0.00000 (0.04)	0.00002 (1.53)
Kenya	0.00010 (1.21)	0.00012 (1.95)	0.00004 (0.48)	0.00001 (0.21)	0.00013 (2.20)
Korea	-0.00007 (-0.82)	0.00008 (1.37)	0.00000 (0.03)	0.00005 (0.80)	-0.00008 (-1.28)
Luxemburg	0.00002 (0.83)	0.00001 (0.59)	-0.00001 (-0.25)	0.00002 (0.73)	-0.00002 (-0.94)
Malaysia	-0.00009 (-1.54)	-0.00007 (-1.12)	-0.00002 (-0.42)	-0.00009 (-1.80)	0.00005 (1.18)

Table 6 (cont.). Risk-adjusted momentum profits for individual countries, full sample period: January 2, 1987 to December 31, 2001

	1-week	2-week	4-week	12-week	26-week
Mexico	0.00011 (0.88)	0.00004 (0.32)	-0.00008 (-0.68)	-0.00017 (-1.55)	0.00001 (0.08)
Netherlands	-0.00002 (-0.84)	0.00005 (2.11)	0.00001 (0.41)	-0.00003 (-1.16)	-0.00002 (-1.09)
New Zealand	0.00007 (2.51)	0.00006 (1.98)	0.00001 (0.54)	0.00001 (0.44)	0.00001 (0.40)
Nigeria	0.00002 (0.40)	0.00000 (0.05)	0.00007 (1.43)	0.00004 (0.85)	0.00004 (0.67)
Norway	0.00000 (0.12)	0.00008 (2.75)	-0.00004 (-1.53)	0.00001 (0.27)	0.00000 (0.11)
Panama	-0.00003 (-0.99)	0.00002 (1.15)	0.00002 (1.13)	0.00003 (2.12)	0.00000 (0.30)
Peru	0.00330 (4.97)	0.00324 (5.07)	0.00241 (3.98)	0.00149 (2.37)	0.00167 (2.88)
Philippines	0.00002 (0.27)	-0.00004 (-0.52)	-0.00007 (-0.94)	-0.00002 (-0.35)	-0.00003 (-0.33)
Poland	-0.00007 (-0.69)	-0.00009 (-1.00)	-0.00007 (-0.85)	-0.00011 (-1.26)	0.00001 (0.11)
Portugal	0.00010 (1.49)	0.00011 (1.94)	0.00002 (0.34)	0.00002 (0.41)	0.00003 (0.62)
Russia	0.00102 (2.50)	0.00069 (1.87)	0.00042 (1.14)	0.00079 (2.99)	0.00013 (0.51)
Singapore	0.00002 (0.67)	-0.00002 (-0.93)	-0.00002 (-1.11)	0.00004 (1.54)	0.00004 (1.52)
South Africa	-0.00007 (-1.95)	0.00004 (0.70)	0.00001 (0.44)	-0.00001 (-0.51)	0.00000 (0.02)
Spain	0.00001 (0.38)	0.00012 (4.48)	0.00004 (1.36)	-0.00006 (-1.93)	0.00002 (0.60)
Sri Lanka	0.00014 (2.60)	0.00000 (0.11)	0.00002 (0.55)	-0.00003 (-0.85)	0.00002 (0.44)
Switzerland	0.00003 (0.80)	0.00001 (0.31)	-0.00000 (-0.01)	-0.00001 (-0.38)	0.00002 (0.41)
Taiwan	0.00016 (1.35)	0.00024 (1.96)	-0.00003 (-0.27)	0.00005 (0.48)	0.00009 (0.86)
Thailand	0.00008 (0.99)	0.00003 (0.36)	-0.00005 (-0.32)	-0.00003 (-0.47)	-0.00008 (-1.15)
Tunisia	0.00002 (0.39)	0.00011 (2.12)	-0.00004 (-0.95)	0.00000 (0.00)	0.00004 (1.13)
Turkey	0.00024 (0.90)	0.00045 (2.20)	0.00023 (1.24)	0.00034 (1.71)	0.00017 (0.90)
United Kingdom	0.00002 (1.03)	-0.00000 (-0.06)	-0.00002 (-1.08)	0.00001 (0.62)	0.00002 (1.02)
United States	-0.00001 (-0.54)	-0.00002 (-1.15)	0.00000 (0.26)	0.00000 (0.29)	0.00002 (1.13)
Venezuela	0.00042 (2.08)	0.00011 (0.70)	0.00007 (0.39)	0.00030 (1.77)	-0.00010 (-0.63)
World	-0.00002 (-2.29)	0.00000 (0.37)	-0.00001 (-0.64)	-0.00001 (-0.74)	0.00001 (0.60)