

Measuring of the Yield and Risk of Emerging Markets and Developed Stock Markets

Radim Gottwald

Mendelova univerzita v Brně

Abstract

Financial analysts have recently paid more attention to so-called emerging markets that are slowly reaching the level of developed stock markets. The objective of this paper is to evaluate the level of yields and risk attributed to developed stock markets (USA, United Kingdom and Germany) and to emerging markets (Brazil is South America, Mexico in Central America, Hong Kong in Asia and Australia). These levels are set separately for the periods from 30 September 2004 to 30 September 2008 and from 30 September 2008 to 30 September 2012. The author compares the changes in levels between both periods and also development of the level of yields and risk within whole period of 12 months periodicity. The macroeconomic situation of these countries during selected period is monitored by means of GDP growth. The values of the stock indices are taken from major stock exchanges in these countries and bond yields are also used. Different standard deviations from the yield of the stock index, variation coefficients and Sharpe ratios are calculated. The author investigates to what extent it is true that higher yields can be achieved on emerging markets, but at the expense of a higher risk than on developed stock markets. Based on founded results it is clear that higher yields can be achieved on emerging markets at the expense of higher risk than on developed ones, but not in every case.

Keywords: emerging market, developed stock market, stock exchange index, Sharpe ratio

Introduction

Several decades ago emerging markets would not have been too interesting for investors. Liquidity and market capitalization on these rather local markets was relatively low. Investors had more trust in developed stock markets to which they allocated the majority of their investments. Investments in emerging markets were only an add-on in the investment portfolio. Over the past 20 years, however, emerging markets have been receiving – unlike developed

stock markets – more attention from investors. As the stock markets keep on evolving, the question is whether these differences are as pronounced as they were in the past or whether they are partly shrinking as a result of globalization. The objective of this paper is closely related to this question. The author realizes research in this economic field and this paper presents interesting results of the research. The contribution of the paper, described in detail in the paper's conclusion, primarily consists in author's analysis of actual and recent development related to both emerging markets and developed stock markets. The relation between such specific market segments is monitored by many investors looking for an optimal market to invest their money.

The objective of this paper is to evaluate the level of yields and risks related to selected developed stock markets and selected emerging markets. It is also investigates how true is the statement that emerging markets can offer a higher yield, but at the expense of higher risk than on developed stock markets.

Selected countries were chosen because of geographical diversity. Data of markets from various continents including North America (USA), Central America (Mexico), South America (Brazil), Europe (United Kingdom, Germany), Asia (Hong Kong) and Australia (Australia) were used. This choice enables global economics insight. Moreover, USA, United Kingdom and Germany are very often presented as representatives of developed stock markets. The rest of the countries are often presented as representatives of emerging markets, which provide a certain perspective for potential investors.

Emerging markets have been the subject of research for many scholars. Bruner (2003) analyzes emerging markets from 1990 to 2003 and says higher profits can be made on these markets, however at the expense of increased volatility and risk of a financial crisis in the region which results in a fall of stock indices. He studies the macroeconomical aspects and political aspects of markets together with market liquidity, market openness and transparency. Barry, Peavy and Rodriguez (2000) who analyzed emerging markets from 1975 to 1995 say that emerging markets were showing increased volatility during the whole period. While in the period from 1985 to 1995 they provide a higher average yield, they reach lower average yields during the preceding period of 1975 to 1985. El Hedi Aroui, Jawadi and Nguyen (2010) analyze emerging markets for the period from 1992 to 2009 and say that these markets show higher yields and higher volatility. Nowadays it is recommended to invest in emerging markets firstly for investors with a low aversion to risk who seek non-standard yields or compile a dynamic component in mixed portfolios. The correlation between these markets and developed ones is generally regarded as low. The profitability of emerging markets and developed markets is analyzed by Griffin, Kelly and Nardari (2009). Based on data from 56 different markets, they find that post-earnings drift, short-term reversal and momentum strategies earn similar profits in emerging and developed markets. They also show that deviations from efficiency are greater in developed markets and that firm-level variance ratios are similar across developed and emerging markets. Zhang (2010) uses a specific measure to measure liquidity in emerging markets. Using data from 20 emerging markets, concretely from Africa, Latin

America, Europe, East Asia and South Asia for the period from 1996 to 2007, he concludes that this measure shows the highest correlations with the liquidity benchmarks. Bekaert, Harvey and Lundblad (2006) focus on the impact of liquidity on expected returns in emerging markets. Considering a simple asset pricing model with market portfolio and liquidity as risk factors, they suggest that local market liquidity is an important driver of expected returns in emerging markets.

Methodology

The yield and risk levels were set separately for the period from 30 September 2004 to 30 September 2008 and for the period from 30 September 2008 to 30 September 2012. So that, for the sake of a better picture regarding the changes and developments on emerging markets, the current period covering the past eight years is divided into two sub-periods. Regarding the historical culmination of the economic crisis, autumn 2008 – 30 September 2008 was chosen as the threshold date. Even if it had been possible to choose a longer period of time, we have to bear in mind that the development on emerging markets is quite progressive and the data from older periods have little in common with current data. Changes to the levels between these two periods are compared as well.

Author uses quarterly values of stock indices of the most important stock exchanges in the respective countries – always as of 31 March, 30 June, 30 September and 31 December, plus quarterly values of the yields of two-year government bonds issued by different national institutions. To be specific, the American Standard & Poor's 100 index, the English FTSE 100 index, the German DAX index, the Brazilian Bovespa index, the Mexican Banamex-30 index, the Hong Kong Hang Seng index and the Australian ASX index were applied. Several statistical indicators were used for the calculation. The average yield of the stock index is set as:

$$\bar{y}_i = \sqrt[n]{\frac{y_1}{y_0}} - 1$$

where y_1 is the value of the stock index at the end of selected n -year period and y_0 is the value of the stock index at the beginning of the n -year period. The standard deviation in the yield of the stock index is calculated based on the formula:

$$\sigma = \sqrt{\frac{1}{T} \cdot \sum_{r=1}^T (y_r - \bar{y}_i)^2}$$

where y_r are gradual yields related to a r -year period out of a total of T periods (here 16 periods, i.e. quarterly values within four years). This deviation is used for determining the risk level. The higher the deviation, the higher the total range in which the yield of the stock index lies, i.e. the higher

the investment risk. This formula:

$$v_y = \frac{\sigma}{y_i}$$

is used to calculate the variation coefficient. By using this coefficient, the relative size of the spread of values relative to the average can be calculated. The Sharpe ratio can be expressed as:

$$S = \frac{\bar{y}_i - \bar{y}_b}{\sigma}$$

where y_b is the average yield of a national bond. This ratio measures the yield by using the risk-adjusted yield. The higher this ratio, the higher yield the investor has achieved per unit.

Then the level of yields and risk attributed to developed stock markets and emerging markets are also measured separately during each 12 months. Similarly, GDP growth is measured to present the macroeconomic situation of countries. The source of data is the database of Patria Finance, a.s. and Trading Economics. Through Patria Online, a.s. (2013) and Trading Economics (2013), input data necessary for the implementation of an empirical analysis, i.e. historical values of stock indices, government bonds and GDP growth, were collected. These databases are used to realization of research in this economic field.

Results

The overall yield and risk indicators are gradually calculated for every stock index. Tab. 1 shows these indicators which relate to the period from 30 September 2004 to 30 September 2008.

Tab. 1: Indicators related to period from 30 September 2004 to 30 September 2008

Country	$\bar{y}_i$	σ_i	v_y	$\bar{y}_b$	S
USA	0.46%	0.0511	11.15	0.57%	-0.02
United Kingdom	1.77%	0.0559	3.17	0.56%	0.22
Germany	10.63%	0.0839	0.79	0.04%	1.26
Brazil	20.83%	0.1185	0.57	1.51%	1.63
Mexico	19.00%	0.1125	0.59	0.86%	1.61
Hong Kong	8.25%	0.1057	1.28	0.39%	0.74
Australia	5.95%	0.0724	1.22	4.82%	0.16

Source: Own processing using Patria Online, a.s. (2013)

$\bar{y}_i$ is the average yield of the stock index, σ_i is the standard deviation from the stock index yield, v_y is the variation coefficient, $\bar{y}_b$ is the average yield of the national bond and S is the Sharpe ratio. Tab. 1 shows clearly that the highest average yield of the stock index was achieved in American emerging markets, i.e. Brazil and Mexico. This yield is however connected with the highest standard deviation. In the USA a lower average yield of the stock

index was recorded, but also the standard deviation was smaller as well. In principle, it was confirmed that achieving a higher yield for an investment is connected with higher risk and vice versa. The average yield of the Hong Kong and Australian stock index matches that of the mean values of developed stock markets, i.e. the USA (respective the United Kingdom) and Germany. The US variation coefficient deviates significantly from other indicators and is evidence of a high spread of yields during the sub-periods in respect of the average yield. By taking into account the Sharpe ratio, the negative value in the USA and the almost zero value in Australia and United Kingdom are interesting. They can be interpreted as a loss and/or very low yield per one risk unit. Tab. 2 shows the overall yield and risk indicators related to the period from 30 September 2008 to 30 September 2012.

Tab. 2: Indicators related to period from 30 September 2008 to 30 September 2012

Country	$\bar{y}_i$	σ_i	v_y	$\bar{y}_b$	S
USA	5.20%	0.1069	2.05	0.37%	0.45
United Kingdom	4.03%	0.0941	2.33	0.37%	0.39
Germany	5.47%	0.1259	2.30	0.03%	0.43
Brazil	4.54%	0.1388	3.06	1.21%	0.24
Mexico	9.90%	0.1440	1.45	0.71%	0.64
Hong Kong	3.71%	0.1311	3.53	0.22%	0.27
Australia	-1.24%	0.0982	-	4.01%	-0.53

Source: Own processing using Patria Online, a.s. (2013)

The values in Tab. 2 indicate that the highest average yield of a stock index was achieved in Mexico, but at the expense of higher risk. In Australia the index value even dropped and because of the negative values in the sub-periods it does not make sense to calculate this variation coefficient in this case. The principle that achieving a higher yield is connected with higher risk and vice versa was not confirmed for this period. Negative Sharpe ratio was confirmed for Australia which is most likely due to a higher yield of Australian government bonds. The highest yield per one risk unit was recorded for developed stock markets. When comparing corresponding values from the periods from 30 September 2004 to 30 September 2008 and from 30 September 2008 to 30 September 2012 through Tab. 1 and 2, the following findings apply. For all countries but not the USA and United Kingdom the average yield of the stock index dropped, standard deviations rose and the Sharpe ratio dropped. For Germany, Brazil, Mexico and Hong Kong, it was logical that the variation coefficient grew. Investments on these markets are therefore connected with lower yields and higher risks. Higher yields and higher risks are apparent in the USA and United Kingdom.

To focus more detailly on the level of yields and risk attributed to developed stock markets and emerging markets, these indicators are also measured separately during each 12 months. Tab. 3 shows the average yield of the stock index calculated separately during each 12 months related to the period from 30 September 2004 to 30 September 2012.

Tab. 3: Yields related to period from 30 September 2004 to 30 September 2012

Country	2004	2005	2006	2007	2008	2009	2010	2011
USA	6%	9%	15%	-24%	-10%	5%	0%	30%
United Kingdom	20%	9%	9%	-25%	5%	8%	-8%	12%
Germany	30%	19%	31%	-26%	-3%	10%	-12%	31%
Brazil	36%	15%	66%	-18%	24%	13%	-25%	13%
Mexico	37%	32%	43%	-22%	12%	13%	-4%	20%
Hong Kong	18%	14%	55%	-34%	16%	7%	-21%	18%
Australia	25%	11%	29%	-30%	2%	-2%	-12%	8%

Source: Own processing using Patria Online, a.s. (2013)

There are some periods with similar increase or decrease of values by all countries. Solely positive values are measured in 2004, 2005, 2006 and 2011 while negative values are measured in 2007 and 2010 (except for the USA). There are also some periods with similar maximum values by some countries. Developed stock markets like the USA and Germany reached maximum values alternatively the second best value in 2011 alternatively in 2006. All emerging markets reached these ones in 2006 alternatively in 2004. Tab. 4 shows the standard deviation from the stock index yield calculated separately during each 12 months related to the period from 30 September 2004 to 30 September 2012.

Tab. 4: Risks related to period from 30 September 2004 to 30 September 2012

Country	2004	2005	2006	2007	2008	2009	2010	2011
USA	0.04	0.03	0.03	0.02	0.15	0.09	0.08	0.06
United Kingdom	0.02	0.03	0.03	0.06	0.13	0.10	0.07	0.04
Germany	0.03	0.06	0.06	0.08	0.17	0.03	0.14	0.09
Brazil	0.12	0.06	0.07	0.12	0.19	0.11	0.07	0.11
Mexico	0.09	0.05	0.12	0.09	0.25	0.05	0.11	0.04
Hong Kong	0.06	0.04	0.09	0.09	0.21	0.06	0.10	0.06
Australia	0.04	0.03	0.02	0.06	0.16	0.07	0.07	0.06

Source: Own processing using Patria Online, a.s. (2013)

There are some periods with similar maximum values by all countries. Such values are measured in 2008 by all countries. Also, values in 2005 are lower than values in 2007 (except for the USA) while values in 2010 are higher than values in 2011 (except for Brazil). Levels of the yield and risk are connected with indicators related to macroeconomic situation of countries. Tab. 5 shows the GDP growth from 2004 to 2011.

There are some periods with similar increase or decrease of values by all countries. Solely positive values are measured in 2004, 2005, 2006, 2007 and 2011 while negative values are measured in 2009. There are also some periods with similar minimum values by some countries. All countries reached minimum values in 2009. The next interesting fact is that overall GDP growth between 2004 and 2011 is higher by emerging markets (Brazil 349%, Australia 202%, Mexico 65%, Hong Kong 53%) than by developed stock markets (Ger-

many 46%, USA 38%, United Kingdom 31%). Summarizing based results, it is clear that development of yield, risk and GDP growth during period before and after the financial crisis in 2008 show a similar trend. This crisis is connected with relatively significant temporary decrease of yield and growth GDP and, on the contrary, temporary increase of risk.

Tab. 5: GDP growth

Country	2004	2005	2006	2007	2008	2009	2010	2011
USA	7%	6%	8%	5%	2%	-2%	4%	4%
United Kingdom	18%	4%	7%	15%	-5%	-18%	3%	8%
Germany	12%	2%	5%	14%	9%	-8%	-1%	8%
Brazil	20%	33%	23%	25%	21%	-4%	31%	19%
Mexico	8%	12%	12%	9%	6%	-19%	18%	11%
Hong Kong	4%	7%	7%	9%	4%	-3%	7%	9%
Australia	31%	13%	11%	14%	21%	-11%	22%	21%

Source: Own processing using Trading Economics (2013)

Discussion

Results did not fully confirm the general claim that higher yields can be achieved on emerging markets at the expense of higher risk than on developed ones. Tab. 1 and 2 show that within the two periods Mexico is the only country with a higher yield and higher risk than in the case of developed stock markets of the USA, United Kingdom and Germany. The reward risk trade-off rules say generally that if investors want to achieve a higher yield, they need to face a higher risk. The results relating only to emerging markets and/or only to developed stock markets confirm this rule within the period from 30 September 2004 to 30 September 2008, but do not confirm this rule within the period from 30 September 2008 to 30 September 2012. Higher risks are usually connected with higher yields. But still, when benchmarking e.g. Hong Kong as the representative of emerging markets against Germany as the representative of developed stock markets, this is not the case. It is also interesting that from emerging markets it was only Australia that showed – even during each of the two periods – a risk level matching that of developed stock markets. Regarding emerging markets, the so-called de-coupling theory is often mentioned. Based on this theory, the correlation between emerging and developed stock markets is gradually loosened. De Aenlle (2008) says that according to this theory the trend on emerging markets is not dependent on the trend in the USA. At times of a recession in the USA, emerging markets respond less sensitively than they did in the past, which is mostly because of the fact that emerging countries do more business among themselves nowadays and are not so dependent on the USA as they were in the past. We cannot therefore say that emerging markets and developed stock markets would grow or fall over the same period. There deductions of the de-coupling theory however contradict general market globalization and the investment psychology.

Research in this area can continue in different directions. Mutual correlation between different markets can be measured and the impact of globalization of world markets and financial crises on these markets can be assessed. Likely future trends can be estimated based on the development of correlation between emerging markets and developed stock markets. Through the correlation analysis for different types of markets which works with diverse criteria it can be found whether or not emerging markets tend to get closer to developed markets or whether the difference can be regarded as constant in time.

Conclusion

After characterizing emerging markets and quoting some studies focused on these markets, the yield and risk level applying to developed stock markets and emerging markets is calculated. The levels are set gradually for the periods from 30 September 2004 to 30 September 2008 and from 30 September 2008 to 30 September 2012 by using standard deviations from stock index yields, variation coefficients and Sharpe ratios. Changes to the levels between these two periods are compared as well. The level of yields and risk are also measured within whole period in a 12 months periodicity. The indicator GDP is used to describe macroeconomic situation of countries. The author of this paper comes to the following conclusion about the statement that higher yields can be achieved on emerging markets, but at the cost of higher risk than on developed stock markets: the analysis did not verify this statement.

The contribution of the paper is further mentioned. The paper brings desired information in several ways. Attention was paid both to the current situation on emerging markets and developed stock markets and to recent history. The results relating to the correlation between these markets are essential for a number of entities acting on capital markets, mostly for potential investors, stock brokers, financial analysts, investment consultants and mediators of financial services. These entities may then translate the results into their investment decisions concerning where to allocate available finances. These specific markets segments are monitored by entities, that can direct their intended investments in foreign stock markets not only to developed stock markets such as Germany and the USA, but also to emerging markets. Gottwald (2012) says that these entities choose their investment policy by taking into account a variety of factors and methods adopted in market comparisons and may ease their investment decisions. They can reduce their information costs. The paper also brings more up-to-date data than those used in the quoted studies investigating emerging markets.

Acknowledgement

Results introduced in the paper have been founded with support from the European Commission, Jean Monnet Multilateral Research Group Grant No. 530069-LLP-1-2012-1-CZ-AJM-RE “CEE Banking sector stability after the reform of the European financial supervision”. This publication reflects the views

only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Reference

- BARRY, C. B., J. W. PEAVY and M. RODRIGUEZ, 2000. *Emerging Stock Markets: Risk, Return and Performance*. 1st issue. West Sussex: John Wiley & Sons. ISBN 978-09-4320-545-8.
- BEKAERT, G., C. R. HARVEY and C. T. LUNDBLAD, 2006. Liquidity and Expected Returns: Lessons from Emerging Markets. In *Social Science Research Network* [online]. 2006 [cit. 01-03-2013]. Available from: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=424480
- BRUNER, R. F., 2003. *Investing in Emerging Markets*. 1st issue. Charlottesville: The Research Foundation of AIMR. ISBN 978-09-4320-564-9.
- DE AENLLE, C., 2008. Decoupling: Theory vs. Reality. In *New York Times* [online]. 2008 [cit. 01-03-2013]. Available from: <http://www.nytimes.com/2008/01/27/business/>
- EL HEDI AROURI, M., F. JAWADI and D. K. NGUYEN, 2010. *The Dynamics of Emerging Stock Markets: Empirical Assessments and Implications*. 1st issue. Berlin: Physica-verlag. ISBN 978-37-9082-388-2.
- GOTTWALD, R., 2012. The Use of Indicators in Modified Historical Model to Estimate the Intrinsic Value of a Stock. *Journal of Competitiveness*. Zlín: Univerzita Tomáše Bati, 4(2), 97–110. ISSN 1804-171X.
- GRIFFIN, J. M., P. J. KELLY and F. NARDARI, 2009. Are Emerging Markets More Profitable? Implications for Comparing Weak and Semi-Strong Form Efficiency. In *Social Science Research Network* [online]. 2009 [cit. 01-03-2013]. Available from: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=959006
- PATRIA ONLINE, 2013. *Patria Online, a.s.* [online]. 2013 [cit. 01-03-2013]. Available from: <http://www.patria.cz>
- TRADING ECONOMICS, 2013. *Trading Economics* [online]. 2013 [cit. 01-03-2013]. Available from: <http://www.tradingeconomics.com>
- ZHANG, H., 2010. *Measuring Liquidity in Emerging Markets* [online]. 2010 [cit. 01-03-2013]. Available from: <http://www.acemsjtu.com/upload/publish/img/111221350580.pdf>

Měření výnosnosti a rizikovosti emerging markets a vyspělých akciových trhů

V poslední době se do pozornosti řady finančních analytiků dostávají tzv. emerging markets, tedy rozvíjející se trhy, které se pomalu přibližují vyspělým akciovým trhům. Cílem článku je vyhodnotit, jaká úroveň výnosnosti a rizikovosti se vztahuje k vyspělým akciovým trhům, konkrétně USA, Velké Británii a Německu a emerging markets, konkrétně jihoamerické Brazílii, středoamerickému Mexiku, asijskému Hongkongu a Austrálii. Tyto úrovně jsou stanoveny zvlášť pro období 30. 9. 2004 – 30. 9. 2008 a pro období 30. 9. 2008 – 30. 9. 2012. Autor srovnává změny v úrovních mezi oběma obdobími a také vývoj úrovně výnosnosti a rizikovosti v rámci celkového období s periodicitou 12 měsíců. Prostřednictvím růstu HDP je též sledována makroekonomická situace daných států ve zkoumaném období. Jsou použity hodnoty burzovních indexů nejvýznamnějších burz v daných státech a hodnoty výnosností státních dluhopisů. Jsou vypočteny jednotlivé směrodatné odchylky výnosnosti burzovního indexu, variační koeficienty a Sharpovy poměry. Autor zjišťuje, do jaké míry je pravdivé všeobecné tvrzení, že na emerging markets je možné dosáhnout vyšší výnosnosti, ale za cenu vyšší rizikovosti než na vyspělých akciových trzích. Na základě zjištěných výsledků je zřejmé, že tvrzení, že na emerging markets je možné dosáhnout vyšší výnosnosti, ale za cenu vyšší rizikovosti než na vyspělých akciových trzích, neplatí vždy.

Klíčová slova: emerging market, vyspělý akciový trh, burzovní index, Sharpův poměr

Kontaktní adresa:

Ing. Mgr. Radim Gottwald, Ústav financí, Provozně ekonomická fakulta, Mendelova univerzita v Brně, Zemědělská 1, 613 00 Brno, e-mail: radim.gottwald@mendelu.cz

GOTTWALD, R. Measuring of the yield and risk of emerging markets and developed stock markets. *Littera Scripta*. 2013, **6**(1), 30–39. ISSN 1805-9112.
