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**Hedge Funds and Emerging Markets:
Exploring the links in the 2007 – 2009
Financial Crisis**

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Declaration of Authorship

The author hereby declares that she compiled this thesis independently, using only the listed sources and literature.

Prague, May 18, 2010

Olga Kesslerová

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Further, I would also like to express my gratitude to all those who gave me the possibility to complete this thesis.

Anotace

Předkládaná diplomová práce si klade za cíl poskytnout základní přehled fungování hedgeových fondů, a především se pak zaměřit na hedgeové fondy působící na rozvíjejících se trzích (emerging markets hedge funds). Přes diskuzi možné úlohy těchto institucionálních investorů během měnové krize v Asii v letech 1997-1998 se dostáváme k dokumentaci situace na těchto trzích bezprostředně před a během globální finanční krize v období 2007-2009. Následná empirická (ekonometrická) analýza má za pomoci vybraných indexů ukázat, popř. vyvrátit možnou oboustrannou souvislost mezi aktivitami hedgeových fondů a vývojem cen některých finančních aktiv (konkrétně kurzů měn, cen akcií a dluhopisů) na rozvíjejících se trzích v diskutovaném období. Za tímto účelem je využit model vektorové autoregrese, jehož výsledky jsou dále interpretovány v kontextu Grangerovy kauzality.

Klíčová slova

Hedgeové fondy, rozvíjející se trhy, finanční krize, akcie, dluhopisy, kurzy měn, vektorový autoregresní model, Grangerova kauzalita

Annotation

The main target of this diploma thesis is a description of hedge funds universe with a stress on hedge funds operating on emerging markets. We attempt to assess a possible role of hedge funds in the global economy during financial turmoils. The thesis comments the situation on emerging markets during the currency crises in late 1990s, and compares the development with that of recent global crisis of 2007 – 2009. Consequent empirical analysis of different hedge funds indices and suitable proxies for prices of local stocks, bonds, and currency exchange rates, examines possible bilateral causal relationships between the activity of hedge funds and prices of basic financial assets on emerging markets. We propose vector autoregression model, and interpret the results in a sense of Granger causality.

Keywords

Hedge funds, emerging markets, financial crisis, stocks, bonds, currency exchange rate, vector autoregression, Granger causality

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1. Introduction

The alternative investment universe consists of investments outside the publicly traded debt, equity, and real estate. It includes investments ranging from managed futures, venture capital, to private placements, LBO funds, natural resource partnerships and commodity investments, to hedge funds. Hedge funds have been in existence for almost more than 60 years. Despite this fact, they have remained one of the most misused and misunderstood areas of finance. The recent growth, they have scored, as one of the fastest growing sector of the economy, has hold financial markets` and the business` press interest. Not only thanks to the spectacular success of George Soros who gained USD 1.1 billion on speculating against the British pound in 1992, or the infamous collapse of Long Term Capital Management that shook the financial markets in the third quarter of 1998. Indeed, hedge funds, as one of the fastest growing financial sector, experienced tremendous growth throughout the 1990s. During the last years, they have been taking on a more pronounced role in corporate dealings, publicly meddling in everything from merger decisions to executive compensation.

Since nothing like typical hedge fund exists, no standard definition could be introduced¹. In general, it is a privately offered pooled investment vehicle whereas among unique characteristics that, with rare exceptions distinguish hedge funds today, belong the following. A hedge fund is a limited partnership from the viewpoint of the ownership structure, with an investment management as a main function. Performance related fees serve as a compensation for managers. Lockup periods for holding the investment by the fund in connection with high minimum investment level, ranging usually between USD 100,000 – USD 5 million, with USD 1 million common (Reserve Bank of Australia (1999)), is requested. Exclusion from particular regulation enables implementation of widest possible range of financial instruments, investment strategies and approaches, however, at the expense of prohibition of advertising and soliciting funds from the public. Dynamic trading strategies ensure some diversification benefits thank to a low correlation between hedge funds returns and market returns. Moreover, last but not least, skilled managers are believed to deliver excess return regardless the general direction of markets (so called absolute return objective).

¹ For different hedge fund definitions, see Riemlová (2007, p.14).

So far, the innovative behaviour of hedge funds has resulted in certain reduction of investors' economic losses during market downturns, and consequently, in broadly accepted belief that hedge funds have generally coped well with the financial crisis. On the other hand, these innovative market players have often been blamed for destabilization of financial markets. The role of market leaders that has been attributed to them, concerning the volume they trade as highly leveraged institutions, may result in self-fulfilling prophecy. Typical examples were speculative attacks on currencies during the late 1990s. However, recent turbulence on the financial markets that rooted in the US subprime mortgage crises and subsequently in banking sector hit them seriously as well. Broad decline in asset values due to necessary writing-downs, decline in investors as well as banks' risk appetite, and subsequent changes to the regulation were virulent also to hedge funds' returns.

The thesis intends to describe the hedge fund universe and their theoretical background; to introduce not only those trumpeted characteristic that enable hedge funds their extreme flexibility in investment strategies, but also different drawbacks that may be attributed to their operating. Moreover, we will particularly stress on hedge funds investing in emerging markets (EM). Unique features and performance characteristics will be introduced. Consequently, the object of our empirical part is an assessment of possible affect of EM stocks and bonds prices, as well as of the currencies of particular regions, on EM hedge funds performance. In addition, also the opposite causality will be explored. Is there any impact of hedge funds activities on prices of basic financial assets on emerging markets during the ongoing global financial turmoil? Especially, we will analyze following hypotheses.

- I. Prices of basic financial assets on emerging markets (particularly, stocks, bond, and currencies) influence performance of hedge funds operating on those markets.
- II. Activity of emerging market hedge funds had possible impact on the development of stocks and bonds indices, and currency exchange rates of emerging economies.

The rest of the thesis is structured as follows. Section 2 offers some general descriptive characteristics of hedge funds universe, introduces basic investment strategies, and theoretically comments on performance issue. In section 3 we discuss emerging markets, hedge funds operating on these markets, especially in context of the

current financial turmoil. In section 4 we describe the data and methodology of oncoming empirical analysis. The results are presented. Our conclusions are set out in section 5.

1.1 Literature review

This thesis is related to existing broad literature on hedge funds as follows. The theoretical foundations, including description of hedge funds` unique features and trading strategies, were studied primarily from Ackermann, McEnally, Ravenscraft (1999), Tremont Partners (1999) and Fung, Hsieh (1997, 1999). Details on hedge funds` regulation that potentiates innovative behaviour of these institutional investors were mainly derived from precise study of Shadab (2009). This is also related to a very substantial literature on hedge funds performance. The topic has been analyzed in many different ways whereas results diverge. Ackermann, McEnally, Ravenscraft (1999), Cappocci (2001) evaluated hedge funds performance comparing the returns earned with those of mutual funds. Diversification benefits were also concerned when hedge funds joined other traditional assets in a portfolio. However, we focused mainly on key papers of recent years which involved not only traditional risk-return approach but also considered higher moments of return distribution. These are for instance, Posthuma and van der Sluis (2005), Amenc, Goltz, and Martellini (2005), Kat (2005), Amin and Kat (2003), Rouah (2005), Eling (2006), or Fung, Hsieh, Naik, and Ramadorai (2006). Results of these studies vary depending on the period considered, the database used, and the risk-adjusted performance model employed.

Our thesis is inspired not only by growing foreign literature on hedge funds` problematic, but above all, by the current extensive analysis of the industry, during the ongoing subprime mortgage crisis, in the thesis of Simona Riemlová (2007). Our work contributes to that analysis by offering the additional in-depth view of hedge funds operating on emerging markets. Among other authors, Riemlová also identified emerging markets as potential growth market for hedge funds; still imperfect, full of mispricings, thus extremely prosperous from the viewpoint of hedge funds` investment techniques. We will monitor the situation on emerging markets throughout the progressing financial crisis and discuss potential impact of hedge funds` activities on those markets. However, little research has been done on the combination of emerging markets and hedge funds (partly due to lack of data). Among other

authors, that dedicated themselves to the topic, belong Strömqvist (2007, 2009), Ryback (2007), Bhardwaj (2009), or Füss and Kaiser (2009). Our knowledge was however supported by findings of Bekaert and Harvey (September 2002, December 2002), who made substantial contributions to literature on EM finance. Paper by Fung, Hsieh, and Tsatsaronis (2000) also dealt with the same topic. Finally, other studies in this field described EM in the context of financial crisis: Dornbusch (2001), Brown, Goetzmann, and Park (1998), Frank and Hesse (2009), Dooley and Hutchison (2009), or Azman-Saini (2006).

2. General description of hedge funds` universe

2.1 Main characteristics

There are several widely known characteristics of hedge funds which significantly distinguish these alternative investments from traditional investment vehicles as mutual funds. These attractive, mainly organizational features arise from limited state regulation, and in general, aim to align hedge funds` managers` incentives with investors` interests.

Unlike mutual funds that are in a sharp contrast regulated by the SEC with the obligation of prospectus disclosing, in order to inform investors in-depth about investing strategies, hedge funds operate covertly². They can extraordinarily gain from a largely unregulated organizational structure, employ flexible investment strategies, and attract relatively sophisticated investors, in an expense of advertisement prohibition. Moreover they are characterized by substantial managerial investment and strong managerial incentives in a form of performance based fees (Ackermann, McEnally, Ravenscraft (1999)). We will briefly discuss all of these features in the following sections.

2.1.1 Regulation

“Hedge funds are not, should not be, and will not be unregulated!”

Christopher Cox (Chairman of SEC),

testimony before the Senate Banking Committee (in Coming, 2008)

It seems to be reasonable to start the description of hedge funds with discussion of their regulation³. The reason is clear - this regulatory aspect determines other hedge funds` characteristics fundamentally.

² Nevertheless, The Investment Company Act of 1940 allows mutual funds to participate also in activities attributed typically to hedge funds, such as short selling, leverage (up to 50 % of their net assets), concentrated investment and derivatives; only if they state them explicitly in their prospectus. Anyhow, mutual funds rarely use these possibilities, as they have chiefly more conservative investors who are not limited on withdrawals, thus the cash flow is noticeable larger than at hedge funds, moreover notification requirements for using certain strategies would harm the effect of such an investment (Ackermann, McEnally, Ravenscraft (1999)).

³ Our discussion of law applicable to hedge funds is relevant primarily to US hedge managers, and is by no means exhaustive. Hedge funds domiciled in other onshore locations often operate under the same

In general, contrary to common belief, many sources of law apply to hedge funds (Shadab (2009)). Firstly, hedge funds are governed by the entity law of the state or offshore jurisdiction in which they are organized, together with the law of contract attributable to the operating agreement of particular fund. Secondly, as these funds provide more type of services, they are also subject to other regulatory requirements connected to that kind of service. Namely, as investment advisors to the fund they manage, the US hedge funds managers are also governed by the investment advisor law. In addition, as we will discuss further, various securities regulations are applicable to hedge funds as they issue securities and are also purchasers and sellers of other companies` securities. Public disclosures in connection with trading registered securities are naturally also required. Last but not least, in the USA they are regulated also by federal prohibitions on fraud, market manipulation, and insider trading.

However, what is unique and what assigns them the superior position on markets is total exclusion from law applicable to investment companies. Despite the fact, that hedge funds operate as an investment company they meet some criteria to qualify for exclusion from the definition of such an entity. Firstly, “they have no more than 100 investors and sell their securities only through a private sale” (Shadab (2009), p.12)⁴. Secondly, they “sell securities to qualified purchasers through a private sale” (Shadab (2009), p.12)⁵, where the purchaser is named as “qualified” as long as he or she owns at least USD five million in investments as a natural person or USD 100 million as a company. Moreover, if the number of investors is limited to 499 overall, the entity gains also exclusion from registration under the Securities and Exchange Act (1933). As a consequence of such exclusions, hedge funds avoided reporting requirements obligatory for investment companies, regulatory restrictions on leverage and trading strategies, and investor protection legislation. Thus for many authors, hedge funds are ideal for studying the impact of regulation, alternative investment techniques, and incentive alignment on performance (unfortunately, this is beyond the scope of our thesis). Paradoxically, terms of those exclusions could be also viewed as a certain type of indirect regulation.

regulatory regime as conventional funds managers (in Europe for instance), therefore face stricter such as minimum capital requirements, restrictions on retail investor participants, etc (Cumming (2008)).

⁴ Exclusion under section 3(c) (1) of Te Company Act (1940).

⁵ Exclusion under section 3(c) (7) of Te Company Act (1940).

Nevertheless, like other traditional market participants, hedge funds are subject to a variety of universal reporting requirements⁶ such as: the SEC portfolio reporting (investment managers with equity holdings more than USD 100 million periodically report their trading positions), five percent ownership SEC reports relevant to investors who hold at least 5 % of the total value of the stocks of a public company (must be reported within 10 days of acquiring the stock); in addition, reporting requirements of large positions of recently issued Treasury securities, and in the foreign exchange to the Treasury. Different rules effective on markets in which hedge funds seek to sell or buy financial products, are also relevant to them; for instance reporting large positions on US futures markets to the US Commodity Futures Trading Commission, or requirements under the Financial Industry Regulatory Authority (FINRA) applied when selling through a broker-dealer as a placement agent.

However, it is more than obvious that the issue of hedge funds` regulation have remained to be an open question. Recent call for greater hedge funds` transparency and regulation after the financial crisis may be solved by the managers themselves in environment of increased competition on financial markets (as discussed in Riemlová, 2007). The regulatory environment of hedge funds will be definitely tightened. Nevertheless, conventional wisdom presented throughout literature demands only same basic regulation of hedge funds, addresses basic common-sense protections for investors, particularly with respect to disclosure, custody of fund assets, valuation approaches adopted by the fund, and periodic audits. However, hedge fund that discloses all information needed to attract new investors must be able to remain the entity with original exceptional statute and core. Undoubtedly, any dramatic change in the regulatory structure of hedge funds would prevent them from efficient and flexible operating on financial markets.

To conclude this chapter on hedge funds regulation, we add some notes on hedge funds` *capacity*. Particular regulatory environment, types of market participants, the overall health of the global economy and related liquidity in the markets, are all variables that influence capacity of the hedge funds` industry. When talking about “capacity” we refer primarily to the maximum assets that a hedge fund could

⁶ Classical institutional investors publicly offered, such as mutual funds, are in the USA restricted by number of the SEC` regulatory requirements, in consequence, *hedged mutual funds* came into existence. They are accessible to broad public (US\$ 1,500 usually as an investment minimum). These funds are quasi hedge funds, allowed to sell short up to a half of their own assets, applying leverage at no more as one third of their assets (Jílek (2006)).

successfully manage without a decline in performance (some authors also refer to the maximum number of people that a hedge fund can employ and to the overall size of the infrastructure they manage). Manageable asset size depends on the investment strategy employed; how fast the market imperfections could be exploited and thus eliminated. Trading on currency market or large capitalization stocks make huge asset investment possible, while for instance, exotic fixed income arbitrage or small capitalization stocks bear only limited asset size under management of the particular fund. Thus institutional investors were constrained before the financial crisis to invest as much of their portfolios into hedge funds as they would like to. Reason of that is a threat of slippage (sometimes called also friction), the phenomena, when market prices are influenced simply by entering or exiting a position, whereas the larger the position, the greater the effect of slipping (Tremont Partners (1999)). High-risk premiums are thus just other side of one coin – investors take risks held by a small number of participants only, and thus perceive those above standard premiums (Amenc, Goltz, Martellini (2005)).

2.1.2 Leverage & short selling

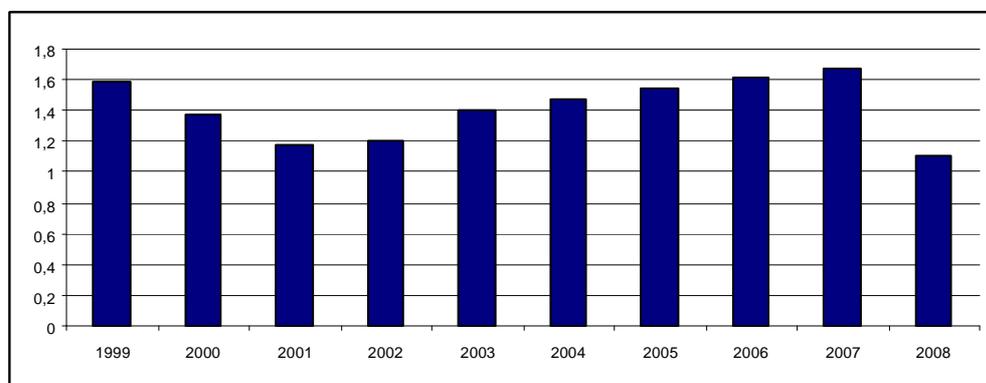
As we discussed in the previous text, due to limited regulation, hedge fund managers enjoy considerable investment freedom, being extremely flexible in their investment options. In order to attempt superior returns, hedge funds are allowed to employ short selling, leverage, derivatives (for risk protection as well as speculation), illiquid securities, and highly concentrated investment positions, as well as quick movements across different asset classes in order to attempt market timing (Ackermann, McEnally, Ravenscraft (1999)). We will describe particular trading strategies in chapter 2.3, whereas the following text briefly discusses leverage and short selling, as a substance of hedge funds trading strategies and overall industry.

Leverage, as an aggressive investment approach, can be simply summarized with a little exaggeration as “doing a lot with a little”. Balance-sheet leverage is actually the degree to which an investor or business utilizes borrowed money. It could be expressed in several ways; in case of balance sheet leverage, the concept utilizing debt-to-equity ratio of a company belongs to the most common. Whereas economic (off-balance sheet) leverage measures an economic risk relative to capital, assuming the use of repurchase agreements, reverse repos, short positions, or derivative contracts (Reserve Bank of Australia (1999)).

Using leverage (borrowed capital) investors can multiply their returns relative to original equity if markets move in expected direction. In addition, borrowing is also associated with tax advantage. On the other hand, leverage (representing a liability of the company) also boosts possible losses if investors` predictions fail. Especially thanks to the latter, hedge funds have been often blamed for increasing a possible systematic risk posed by high level of leverage.

Nevertheless, despite the fact, that leverage belongs among defining characteristics of hedge funds, not all of these funds embody such a tool. Often they have very controlled, or only conservative levels. Recent studies indicate that around 72 % of hedge funds employ leverage (Merrill Lynch, Global Fund Manager Survey, 2008, on CPIC webpage). In extreme case of Long Term Capital Management hedge fund, the balance sheet leverage immediately before its collapse in 1998 reached astonishing level of leverage of 30:1 (Prabhu (2001))⁷. The growth of leverage in hedge fund industry throughout last two decades, reaching the peak in 2007, is depicted in Figure 1. Alternative leverage measure as the gross market exposure to the assets under management is used. As a consequence of lack of liquidity on markets, hedge funds cut leverage during 2008 to 1.1 times the assets.

Figure 1: Gross (longs + absolute value of shorts) market exposure to AUM⁸ in the hedge-fund industry



Source: Hennessee Group LLC, Financial Services Authority, IFSL in IFSL (2009)

To accomplish their investments goal hedge funds rely also on *short selling* looking for overpriced securities, or using the short position only for hedging as a market neutral seller with no view of a particular company` s outlook. A short sale is

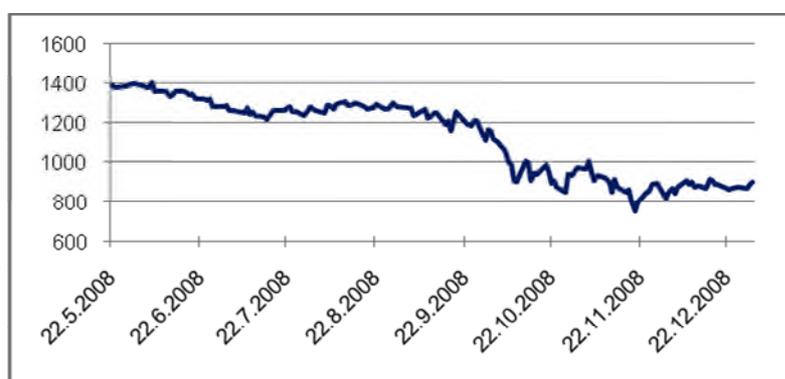
⁷ Reserve Bank of Australia (1999) documented futures, forward and options contracts of LTCM reaching even 300 times its capital (off-balance sheet leverage).

⁸ The term “assets under management” (AUM) refers to the value of assets managed and/or advised by particular hedge fund managers (Ryback (2007)).

“any sale of a security the seller does not own or a sale that is completed by delivery of a borrowed security” (Coalition in Private Investment Companies, p.2). Through their prime broker, the short seller promises the lender to replace the borrowed shares in the future, and pays certain costs until the borrowed shares are returned. Shorting is more common in fixed-income and commodity markets than in equities.

Engaging in short selling introduces risks and attached possible costs. Whereas “long” purchase of securities has limited losses when markets go down (investors can only lose the money invested plus fee), short selling during increasing markets entails theoretical possibility of unlimited losses if prices go permanently up. On the other hand, according to the Securities and Exchange Commission (in Coalition of Private Investment Companies), short selling provides the market with two important benefits, market liquidity and pricing efficiency while driving down overpriced securities. However, heavy equity market losses in September and October 2008 (see Figure 2) encouraged quite a few regulatory agencies to initiate a discussion on feasible restrictions on short selling.

Figure 2: S&P 500 Closing price fluctuations, May – December 2008



Source: Yahoo Finance

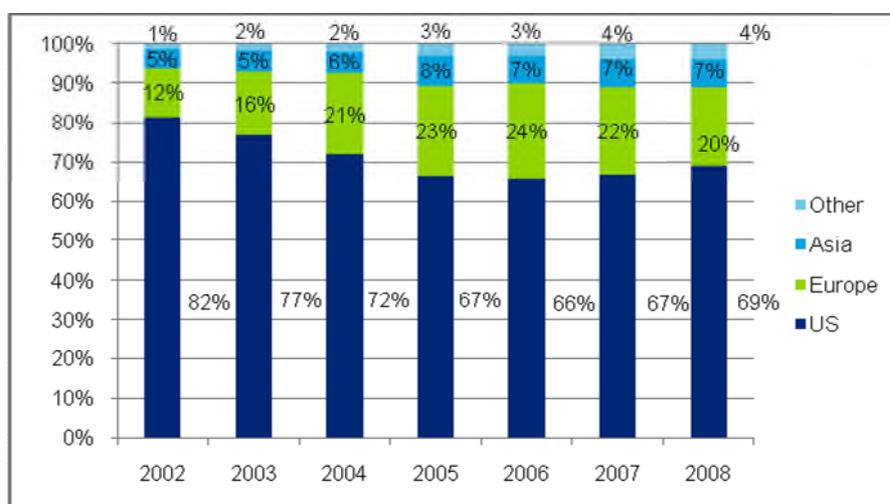
2.1.3 Geographical distribution

Geographical distribution of hedge funds can be discussed either from the perspective of a domicile of a fund, or a location of management. Hedge funds are generally registered (domiciled) in onshore (meaning mostly the US) and also offshore locations. Offshore funds are structured in the same way as their onshore equivalent (however, sometimes structured as mutual funds or classic corporation rather than limited partnerships) but they are based offshore - or at least based outside high taxation countries like the US for example. The benefit of an offshore investment fund

over its onshore equivalent usually results from affordable professional services, business-friendly regulation and favourable taxation environment. These funds also offer far greater potential for growth as the number of investors is not limited. However, they can be riskier and more volatile. In fact, according to IFSL (2009), at the end of 2008, around a half of the number of hedge funds were registered offshore (despite, there was greater assets outflow in offshore location during 2008). Among the most popular offshore locations belong traditionally the Cayman Islands (67 % of number of offshore funds), British Virgin Islands (11 %) and Bermuda (7 %) followed by Dublin and Luxembourg (IFSL (2009)). In comparison, nearly two-thirds of number of onshore funds account to the US, whereas European countries are domiciles for the most of the remainder.

Contrary, onshore locations are the most popular centres for managing hedge funds. Despite the fact, that Europe and Asia have become more important during the last six years, hedge funds are still predominantly managed from the US (as shown in Figure 3).

Figure 3: Management location of global hedge fund assets (% share of assets under management)



Source: IFSL (2009)

The US dominant position of over two-thirds of assets under management was confirmed during 2008 due to bigger redemptions in Europe. The world`s leading centre for hedge funds management is New York (accounts for around 60 % of US domiciled hedge assets)⁹, followed by London. Around two-thirds of 1,300 European-based hedge funds in 2008 were, according to IFSL (2009), located in London (18 % of

⁹ Other important centers in the US include California, Connecticut, Illinois and Florida.

global hedge funds assets under management managed there). This city is also a leading centre for hedge funds services such as administration, prime brokerage, custody and auditing. In addition, European funds` managers operate also from France, Spain and Switzerland. Speaking about Asia and more particularly China, they have exhibited increasing importance as a source of funds, whereas management of these funds is still operated broadly from the US or the UK.

Other important centres include Honk Kong, Australia, Singapore and Japan.

2.1.4 Un-corporate governance – managers as partners

Three core components that constitute a hedge fund are: investors, the fund itself, and the investment adviser/management company. As shown in Figure 4, the base of a hedge fund service consists furthermore of one or more prime brokers, a custodian, and an administrator of a fund (Shadab (2009)).

The structure of hedge funds typically complies with some type of un-corporate form¹⁰, often with the limited partnership or alternatively limited liability companies (LLCs). This joint ownership structure brings practical crucial advantage, which is a minimization of tax burdens¹¹.

The limited partnership entity consists of two type or partners. Primarily, managers of hedge funds are *general partners* determining investment strategy, making choices in portfolio holdings, and making operational decisions. They are supposed to bear unlimited liability for losses and debts, and to invest a significant amount of their own wealth to the fund¹². However, Shadab (2009) argues that a direct personal liability of these managers is open to doubts as the entity of the hedge fund`s general partner is typically a company organized as an LLC or some other limited liability entity.

Limited partners embodied by passive investors without any right to vote, are not liable for the fund`s debt, they are only subject to possible losses of capital and any profits not yet distributed. As limited partners cannot freely transfer their control rights and resell shares, hedge funds governance takes place through flat organization structure (which enables quick absorption of new information and corresponding

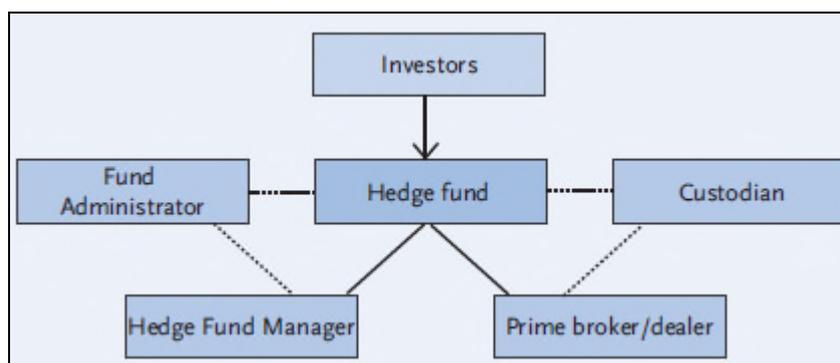
¹⁰ Hedge funds typically adopt similar structure to that of venture capital funds (they also tend to be limited partnerships with strong performance fees).

¹¹ The limited partnership and LLC respectively are not taxed in the US at the company level. All corresponding income, gains, losses, and deductions are subject only to personal income tax of general and limited partners (Shadab (2009)).

¹² The average investment of managers is estimated to account for 7.1 % of fund assets (Shadab (2009)).

reaction to coming market conditions) with absence of outside monitoring. However, even though the un-corporate governance structure of hedge funds implies certain operational freedom, a bulk of inner rules determining the mutual relationship investor-manager is utilized in lengthy and detailed operating agreements. Precise rights and duties of managers as well as investors are defined there.

Figure 4: Operational structure



Source: IFSL (2009)

Prime broker provides brokerage (as an intermediary between a buyer and a seller) and other financial services including: financing, clearing and settlement of trades, custodial services, risk management and operational support facilities (IFSL (2009)). Brokerage universe was negatively affected in 2008 as the main income comes from cash lending to support leverage and stock lending to short sellers (both these practices have been on decline since the financial distress).

Next, administration of hedge funds is usually outsourced by different *funds administrators*¹³ operating huge variety of tasks from accounting, investor services such as reporting, to risk analysis, or calculating the net asset value. Administrators played much more important role until the year 2008 when they recorded a fall in assets under their administration by around 30 % (IFSL (2009)). *Custodian* holds fund`s assets as well as the actual securities, clears and settles all trades and monitors corporate actions such as dividend payment. In addition, hedge funds industry employs a great variety of other financial and/or administrative services providers such as auditors¹⁴, legal or investment advisors (sometimes also as a general partner), or accountants for instance.

¹³ Citco Fund Services is a leader of the industry with USD billion 375 under administration, followed by The State Street Alternative Investment Solutions (243), and Goldman Sachs Administration Services (182) (IFSL (2009)).

¹⁴ Sometimes, the requirement of audited annual reports is a part of a contract between investors and the hedge funds. Moreover, some offshore locations such as the Cayman Islands or Bahamas require hedge funds to have their financial statements audited (IFSL (2009)).

2.1.5 Sophisticated investors

Hedge funds are also characterized by rather larger, sophisticated investors, who are able to understand and bear investment risk (on the contrary, mutual funds target rather retail investors). While investing in hedge funds, investors are not protected by any additional restrictions that aim to protect less sophisticated investors investing in traditional retail funds. As a consequence, hedge funds are on the contrary limited by the regulation in advertising their services to the broad public. As we discussed in 2.1.1, hedge funds must either restrict number of their beneficial owners to no more than 100 persons and entities, or to super-accredited “qualified purchasers”¹⁵.

Therefore, their investors were traditionally wealthy individuals, institutions (as the biggest private banks, trust departments of private banks, financial advisors, brokerage firms, mutual funds companies, commercial banks, insurers, etc.), or more recently also endowments¹⁶, or even pension funds as another representatives from the institutional investors` universe. Overall trend of overtaking the decisive share in capital inflows into hedge funds by institutional investors over high net worth individuals is shown in Figure 5. It was in 2008 when the institutions supplied more capital (usually through funds of hedge funds or multi-strategy managers) than wealthy individuals.

Figure 5: Institutional share of hedge fund capital flows (% share)



Source: IFSL (2009)

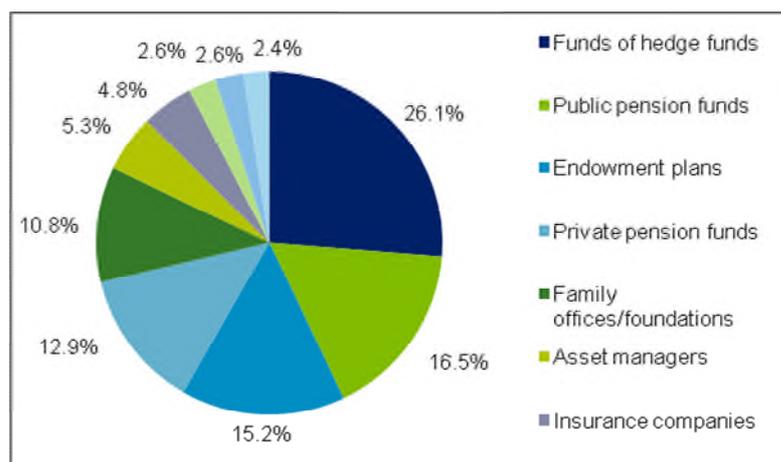
These institutional investors can take on large risks; they have ability to make judgments on their own, without the help of SEC regulations for instance, and with

¹⁵ The term is defined in the Rule 2a51-1, under the Investment Company Act of 1940.

¹⁶ For example, Harvard University endowment is operated as a hedge fund (Fung, Hsieh (1999)).

sufficient wealth to perform the necessary due diligence themselves. Being specific, as can be seen in Figure 6, among investors utilizing hedge funds, as at 2008, belonged mainly: funds of hedge funds with a 26% share, public pension funds, endowments and private pension funds (16.5%, 15.2%, 12.9% share, respectively), and family offices and/or endowments that also count above 10% share.

Figure 6: Institutional investors in hedge funds, 2008



Source: Prequin Ltd.(2008)

Legal determination of hedge funds, the limited partnership structure with its restriction on number of partners, leads also to minimum investment requirements per investor, ranging usually between US\$ 100,000 – US\$ 5million, with USD 1 million common (Reserve Bank of Australia (1999))¹⁷. Moreover, investors` liquidity is limited by so called lockup periods (usually of 3-12 months). In addition, restrictions on withdrawals are imposed (withdrawals in quarterly intervals, announced 30 – 90 days in advance, are allowed).

2.1.6 Hedge fund fee structure

Hedge fund industry fees are far above the fees charging throughout the asset management industry including the publicly registered mutual funds. Unlike mutual funds, hedge fund managers receive not only annual *management fee*, but also strong performance incentive in a form of *performance based fees*. On average, hedge fund manager receives 1 – 3 % of assets under management per annum¹⁸, and in addition

¹⁷ Compare with Ackermann, McEnally, Ravenscraft, (1999), who stated rather narrower range of US\$ 250.000 – US\$ 1 million, for initial investment.

¹⁸ Management fees should cover all fixed costs of running hedge funds business, while these costs vary substantially depending on the size and investment strategy employed (picking single stocks vs. multi investment global cross border strategies).

primarily 14 – 20 % of annual returns in excess of prior losses and net of management fees (Shadab (2009)). On the contrary, typical long only manager obtain on average 10 to 85 basis points of asset under management (Tremont Partners (1999)). Possible explanation for these above average fees requested by hedge funds is that they provide superior risk-adjusted returns (at least, they are supposed to do) in the situation of excess demand, as hedge funds have limited capital inflows especially during the last two decades.

Actually, performance incentives are not a newly born concept; they were common before 1970. According to Ackermann, McEnally, Ravenscraft (1999), at the end of 1960s, approximately 40 % of all new investment companies required performance related fees. Afterwards, in 1970, Congress amended The Investment Company Act of 1940 introducing the rule of symmetrical performance fees (also known as “fulcrum fees”), which involved paying the fee by managers if the profit fell. As a consequence of this regulation, two years later in 1972, only 10 % of funds insisted on performance fees; by 1995 even only 117 funds of the 6,997 mutual funds in the Morningstar database employed such fees (Ackermann, McEnally, Ravenscraft (1999)). Thus we can believe, performance related fees have survived in the hedge funds industry as it is excluded from this kind of regulation.

Hedge funds performance fees are limited by exceeding of types of investment returns` thresholds – the more common *high water mark*, and a *hurdle rate*. Limiting the performance fees allocation by the high water mark means that the manager receives performance fees only if the value of the pool of particular investment is greater than its last greatest value. In other words, this fund can charge incentive fees only if possible decrease in the investment value is brought back above the previous greatest value of the investment, thus losses are offset. In addition, management based fees may be exercised also only after overstepping some hurdle rate (some minimum return established as a performance target). Particular hurdles may be calculated annually or on a cumulative basis, and may be expressed as an absolute figure or tied to some performance benchmark (Shadab (2009)).

Performance incentives were often blamed from imposing excess risk on hedge funds investing. As we discussed earlier, incentive contract and ownership structure are not only the key hedge funds characteristics that are believed to push their performance above that of mutual funds, moreover, these two elements are at the same time mechanisms helping to mitigate principal-agent problem. To have these mechanisms

complete, we should also name market forces¹⁹ and government regulation²⁰. Nevertheless, those latter factors are nowadays typically mutual funds` domain. Portfolio managers` investment decision, in light of principal-agent model depicting the relationship between investors and funds` managers, is dealt in Starks (1987). The author analyzed the impact of incentive contracts on portfolio managers` decision in a question of level of risk being taken, and the optimal amount of recourses to expand on managing the portfolio. Two different situations are considered, symmetric performance fee schedule, and the bonus performance fee schedule which is typical for hedge funds. Both ensure the payment of fee for managers after surpassing some benchmark return, while the former is symmetric, penalizing managers for underperformance in comparison with particular benchmark. It has been found, that the symmetric performance fee schedule did not eliminate both potential agency problems. Even though the manager`s as well as the investor`s desired risk level is aligned when the manager under the optimal symmetric performance fee contract selects the portfolio risk level, the amount of recourses being used on managing the portfolio is always lesser than the investor would desire. This latter agency problem is not mitigated under the symmetric performance schedule. However, the bonus performance fee incentive contract exhibits even worse results. Starks found, that given bonus performance schedule, portfolio managers choose even lower level of recourses to improve portfolio returns but also the level of undertaking risk is higher than it would be optimal from investors` perspective (Starks (1987)). Nevertheless, we must argue, in case of hedge funds, managerial ownership stake shifts the manager to the more risk-averse position towards optimal level of investment risk.

On the contrary, there is also evidence proving that the opposite is truth; “increase in incentive fees decrease managerial risk taking” (Carpenter (1995) in Ackermann, McEnally, Ravenscraft (1999), pp. 837). However, many authors (IFSL (2009), for instance) expect the reduction of hedge funds` fees in order to attract new investors after the sizeable redemptions during 2008.

¹⁹ Market forces ensure channels that enable sharing of appropriate information on funds` performance. Managers willing to act on that information may reduce the capital inflow to low performing funds. Some support for this hypothesis was found (Sirri, Tufano (1998) in Ackermann, McEnally, Ravenscraft (1999)) in mutual funds industry. The impact of this mechanism on hedge funds industry is assumed to be weaker, as the information on funds` performance is less available.

²⁰ Regulation should enable agents to gain unfair advantage on the principals` account.

2.2 *Brief history, current size of hedge funds industry*

2.2.1 History of hedge funds

At the beginning, there was an aim to hedge against the likelihood of a declining market, which was simultaneously determining fact as well as defining characteristic of a newly born segment of the investment management community. The very first hedge fund was established in the USA in 1949 by Alfred Winslow Jones. In order to ensure a conservative, still yielding profile of investing, he used two speculative tools – leverage to obtain higher profits, and short selling of basket of different stock to control risk. Such a strategy was based on key assumption that performance depends mainly on stock selection than market direction. This premise implies an existence of possible net profit from investing in all markets when selecting and taking long position on stocks that rise more than the market and shorting stocks that rise less than the market during a bull market; or when selecting and taking long position on stocks that fall less than the market and shorting those that fall more than the market during a bear market. According to Tremont Partners (1999), Jones` s model performed better than the market of those days.

In 1952 he converted his general partnership to a limited partnership, operating for almost seventeen years in complete secrecy. Additionally, performance based compensation was added to employed leverage and short selling as another key characteristic. Jones` s idea became a model for the whole delivering hedge funds industry.

The bull market of 1960s brought excitement; by the end of the decade, approximately 200 hedge funds were in existence (Tremont Partners (1999)), managed by people like George Soros or Michael Steinhardt. Nevertheless, many of those managers were lured by exceptional returns created by leveraged positions and underestimated a need of short selling that impaired absolute performance during optimistic era on financial markets of the decade. Those “hedgers” went into the bear market of the early 1970s absolutely un-hedged; in fact, they were long, highly leveraged and perfectly exposed. Thanks to the prevailing long positions on the market, few managers had chance to short the market, and many funds were put out of the business.

Upcoming decade of 1980s experienced only a modest number of newly established hedge funds²¹, rising assets to manage mainly on word-of-mouth-reference basis, as the most hedge fund managers in the USA were not registered with the Security Exchange Commission (SEC), and in consequence any way of public advertisement was prohibited to them. Hedge funds of those days operated as exclusive clubs of wealthy individuals and their private bankers. In addition, starting during the previous decade, the more tax efficient offshore funds were developed; and above all, in 1984, at the age of 82, Alfred Jones set up the first fund of funds offering a wide array of managers for a lower minimum investment.

Rather successful hedge funds of 1980s outperforming in bull markets just as in bear market environment, ensured a renewed boom of the industry during 1990s. Talented managers were leaving large companies to manage their own money within convenient hedge funds` ownership structure. Hedge funds attracted substantial capital. During 1990s, hedge funds multiplied their numbers more than 15 times worldwide and become a mainstream not only for high-net-worth individual investors.

Currently, investors may invest in one fund, obviously also in more funds, or in a *fund of funds*, i.e. a managed portfolio of single hedge funds (five-100, Tremont Partners (1999)), closed-end registered investment company, representing a hedge fund industry`s closest equivalent to a mutual fund. Without enormous resources to portfolio construction and individual fund selection, investor obtains an exposure to a variety of single hedge funds and private-equity funds and particular investment strategies. In a nutshell, investments into a fund of funds brings above all diversification of assets in terms of geographic mandate and investment style and protect investor capital through due diligence, risk monitoring, and reporting. It is expected that funds of funds manage in excess of USD100-120 billion in capital worldwide (Acito and Fisher in Koh, Koh, Lee, and Phoon (2005)).

More recently, *investable hedge funds indices* offered by different data providers have also become popular among passive institutional investors²².

²¹ Only 68 funds were identified in 1984 when Tremont Partners, Inc., a diversified financial services company specializing in hedge funds, began tracking their performance.

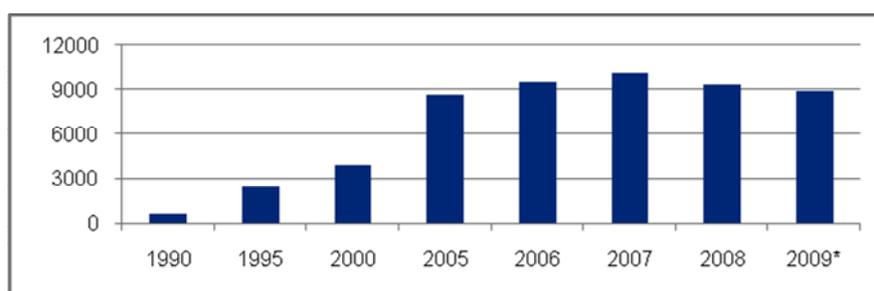
²² For more on investing in hedge funds through multimanager vehicles, see Jones, M. A. in Georgiou, Hübner, Papageorgiou, and Rouah (2005), ch. 14.

2.2.2 Current size of the industry

Last 20 years have brought enormous expansion of the whole industry where barriers to entry are quite low. Mainly in the USA, where the process of evidence is supported by several data vendors, there were approximately 160 funds operating almost USD 12 billion in the year 1990, whereas eleven years after, 6,000 US hedge funds held more than USD 500 billion in assets under management (Jílek (2006)). Based on IMF (2007) data, the number of hedge funds has risen since the late 1980s by more than 25 % per year. Specifically, in 2006, there were nearly 8,000 hedge funds managing in total more than USD 1.4 trillion worldwide. This could be compared with Hedge Fund Research, Inc. which published even higher number (9,462 funds in 2006) with peak of 10,076 funds in 2007 and 8,923 hedge funds in the second quarter of the year 2009.

Progress of a number of hedge funds during last 20 years worldwide is shown in Figure 7, in addition, assets under management development in the overall industry during the last decade is depicted in Figure 8. Both number of funds and size of the industry in assets cumulated during the year 2007. However, thanks to the ongoing global economic slowdown, this peak values are followed by a sharp decline in the year 2008. As many hedge funds were driven to the closure, their number dropped by 10 % (IFSL ((2009). Investors, looking for safer investment, intensified their redemptions of capital, and thus caused lack of liquidity to be fatal for many of the funds.

Figure 7: Number of hedge funds: 1990-2009

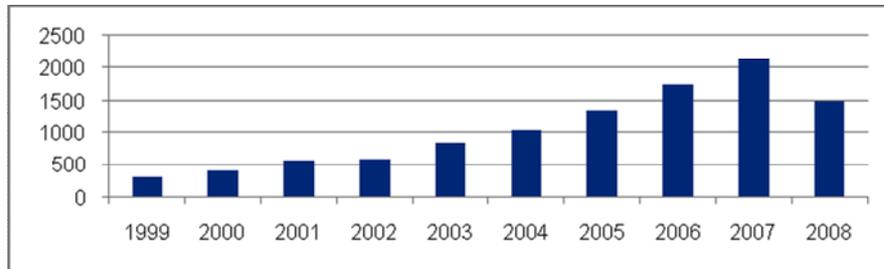


Source: Hedge Fund Research, Inc., available at www.hedgefundfacts.org (*second quarter of 2009)

Assets under management decreased by 30% in 2008 (IFSL ((2009). The biggest decline on record to USD 1,500 billion in assets was due to losses, accelerated withdrawals and liquidations of funds. On a regional level, crucial reason of asset outflow in the US and Japan accounted for losses of investments, whereas in Europe and emerging markets, hedge funds suffered more from redemptions. High level of liquidation was responsible for a fall in assets in Asia. However, assets under

management do not necessarily offer a good insight into the potential market impact of hedge funds, due to the effect of leverage and “herd behaviour” (Reserve Bank of Australia (1999)).

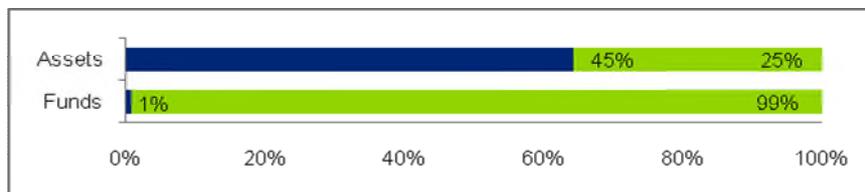
Figure 8: Assets under management worldwide (USD billion assets)



Source: IFSL (2009)

New launches of funds are currently on a decline and their number as well as assets under management data, indicate increasing concentration in the industry that was already started in the last decade. According to IFSL (2009), the top 100 hedge funds²³ (1 % of the whole population) accounted for around three-quarters of total industry assets in 2008 (see Figure 9), up from 54 % in 2003.

Figure 9: Industry concentration, 2008 (% share)



Source: IFSL (2009)

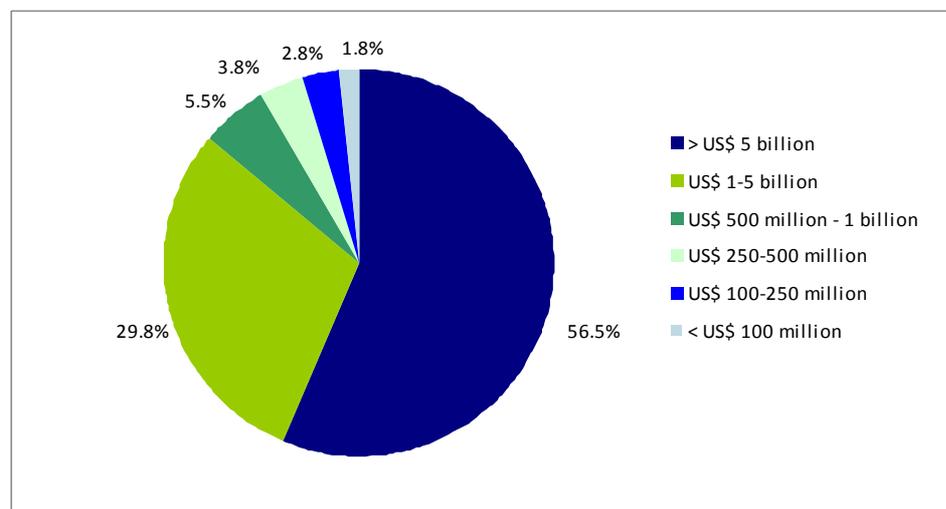
When dividing all funds in categories according to the size of assets they operate in the second quarter of the year 2009, we can observe capital distribution that is aligned with increasing concentration hypothesis. More than 80 % of all hedge funds belong to two top categories as of an asset size (each holding more than USD 1 billion under management).

The increasing popularity of hedge funds industry during its robust growth for the last decade caused one remarkable phenomena. Within the limitation of funds` capacity (see 2.1.1), a number of prosperous money managers had to stop accepting new large flow of assets pouring into their funds. Since the investing activity of most of them could be viewed above all as a form of an arbitrage, then it is obvious that the

²³ The largest hedge fund is Bridgewater Associates with USD billion under management at the end of 2008, followed by JP Morgan (USD 33 billion) and Paulson & Co (USD 29 billion) (IFSL ((2009)).

abnormal return associated with their activity could decrease, or even disappear, as more capital is involved. Reduction of assets under management and consequently also of management fees, were compensated from a point of view of managers by the substantial performance fees²⁴.

Figure 10: Assets under management* (% of total number of hedge funds)



Source: Hedge Fund Research, Inc., available at www.hedgefundfacts.org (*second quarter of 2009)

However, the real size of the whole hedge funds industry is nearly impossible to estimate; concrete figures vary depending on source being used. There is a number of reasons for this. As stated above, hedge funds operate in a culture of secrecy, which is partly statutory, partly self-imposed. They are neither allowed to advertise nor to present themselves as an investment opportunity to broad public; restrictions are also imposed on public reporting on performance. In addition, managers are not interested in being in the spotlight due to strategies employed or even positions taken. Making such information public could endanger their profitable trading. Situation is even impaired by a double counting problem, because many of the (funds of) funds invest in other hedge funds. As a consequence, there are no authoritative estimates. The only possible sources of information remain commercial databases and index data providers. However, hedge funds report to them on voluntarily basis.

²⁴ According to Tremont Partners (1999), hedge fund manager can earn as much or even more than traditional long only manager operating 5 to 10 times more capital.

2.3 Primary investment categories of hedge funds

Thanks to absence of legal restraints on their investment strategies, hedge funds are far from being a homogenous part of financial markets. The industry is made up of very diverse array of investment funds, whereas not all of them technically “hedge” their investment (Shadab ((2009). Categories structures vary from one hedge funds data provider to another²⁵. However, broadly speaking, we can follow the concept of Posthuma and Van der Sluis (2005), and distinguish two basic categories – relative value styles and directional strategies. *Relative value* managers aim to eliminate traditional risks and create value by different arbitrage opportunities holding usually long and short position at the same time. Lower volatility accompanied by the lower exposure to traditional risk premiums is determining for this style. Contrary, *directional strategies* take dynamical directional bets on the traditional assets such as equity, currencies and commodities. Returns display higher volatility and higher exposure to traditional risk premiums, especially under extreme market conditions (Fung, Hsieh (1999)). Over a longer horizon, long and short position may cancel due to their dynamical changes²⁶.

We identified three broad categories among all self-described investment strategies stated in different data providers` overviews, and grouped subcategories of hedge funds into those three categories to make the division more simple and transparent.

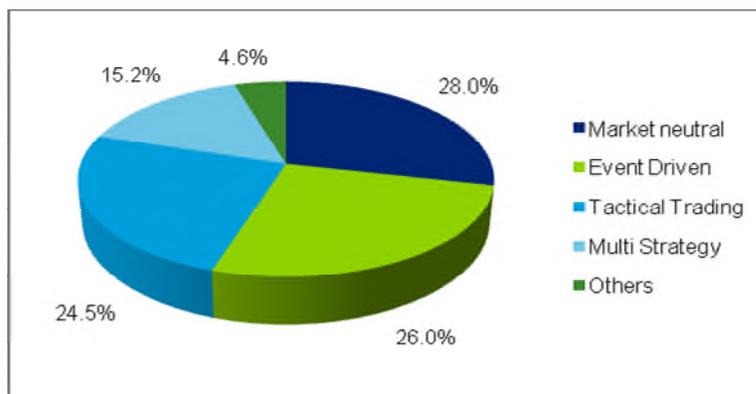
- Market neutral or relative value, including long/short (relative value)
- Event – driven (relative value)
- Tactical trading funds (directional strategies).

Nevertheless, depending on source and author, categories may vary, including many other subcategories which could be considered more or less as general investment styles (opportunistic strategies – value, growth, short term, etc.).

²⁵ For instance, as defined by Tremont Partners, Inc. and TASS Investment Research Ltd., 11 primary investment categories cover the hedge fund industry. These are long/short equity, equity market neutral, equity trading, event driven, convertible arbitrage, fixed income relative value/arbitrage, global macro, short sellers, emerging markets, managed futures, and funds of funds (Tremont Partners (1999)). On the contrary, Managed Account Reports (MAR) identifies hedge fund types as follows: event driven, global, global macro, market neutral, short sales, U.S. opportunistic, funds of funds (Ackermann, McEnally, Ravenscraft (1999)).

²⁶ The terminology may differ, in Fung, Hsieh (1999) “non-directional” for relative value, and “market-timing” for directional strategies is used.

Figure 11: Strategy focus, 2009*



Source: Derived by the author from data of the Investment strategy Components of Credit Suisse/Tremont Hedge fund index, available at www.hedgefundfacts.org (*second quarter of 2009)

2.3.1 Market neutral (and/or relative value funds, and long/short strategies)

Approximately 28 % of strategies employed by hedge funds account for market neutral (see Figure 11). However, no unitary perception of “market neutrality” does exist. We can for instance employ beta market neutrality concept, when a fund is market neutral if generating returns uncorrelated with a corresponding market index²⁷. Alternatively, a fund can be classified as a dollar neutral if the dollar value of a long position on a particular market is offset by a dollar value of a short position on the same market²⁸ (Patton (2004)).

Market neutral funds managers seek to exploit market inefficiencies in pricing relations of comparable instruments, employing strategies independent of market direction, usually being simultaneously long and short. Market neutral funds are considered to be risk reducers, and relatively conservative form of assets management as the strategy is fundamentally based on different kind of arbitrage.

- *Convertible bond arbitrage* offers a hedged position when typically convertible bonds are bought (or in general any convertible security), and at the same time underlying common stock of the company are sold short. The design of such an investment implies a profit generation from the bond and the short sale, while

²⁷ Contrary, directional strategies aim to anticipate market movements.

²⁸ For more details on market neutrality concept, see Patton (2004). The author introduced five different concepts of the market neutrality (mean neutrality, variance neutrality, value-at-risk neutrality, tail neutrality and complete neutrality) in the paper, and developed statistical test for each neutrality concept. Using his test, Patton found that more than 30 % of market neutral funds failed the tests, nevertheless these funds fulfilled the neutrality concepts relatively better than funds from other categories; meaning market neutral funds tend to be the most neutral funds of the hedge funds universe.

protection principal from the directional market movements. According to Tremont Partners (1999), two different components of the overall return from a convertible arbitrage position can be identified: static return (coupon from the convertible plus interests on the cash from short sale minus dividends on the underlying short stock), and volatility return (emerges as short stock price fluctuates and the corresponding short position is adjusted to hedge the underlying convertibles). In both cases of return, leverage often multiplies gain. Hedge funds focusing on convertible arbitrage may operate on a single market, or they may invest globally.

- *Fixed income arbitrage* profits from price anomalies between related interest rate instruments. Usually T – bonds are bought and others are sold short to replicate the bond purchased in maturity and terms of rate. In order to exceed transaction costs, managers may employ leverage ranging from 10 times up to 150 times net asset value. Fixed income arbitrage typically delivers steady returns with low volatility as the directional risk is reduced by hedging against interest rate movements, or by the use of spread trade (Tremont Partners (1999)). Managers trade globally, though some of them are focused on particular market (usually US market). Government bond arbitrage, interest rate swap arbitrage, forward yield curve arbitrage, as well as mortgage backed securities arbitrage could be classified as a subtype of fixed income arbitrage.
- *Long/short strategy* is a directional strategy where long and short positions are run to reduce market risk by purchasing undervalued securities and shorting the overvalued ones. Since generating profit on a large diversified portfolio is very difficult in this case, proper stock selection is crucial. The whole risk–return scale is covered by the positions taken; whereas value, as well as growth, small, and medium to large capitalization stocks are traded. The strategy may involve options and futures hedging.
- *Stock index arbitrage* means buying a basket of stocks, whereas short selling stock index futures, or the reverse.

- In addition, market neutral managers also gain from situations of price anomalies as a consequence of different government intervention, policy changes or forced selling²⁹ (Reserve Bank of Australia (1999)).

Despite the fact that arbitrage is regarded as low-risk activity, in connection with substantive leverage it can be quite an adventure, as reputable collapse of Long-Term Capital Management, ranking also among this group of funds, exemplified.

2.3.2 Event-driven funds

Approximately 26 % of strategies employed by hedge funds account for event driven strategies (see Figure 11). The strategy is determined by investing in fixed interest and equity markets with attempt to capture price movements as a consequence of particular actual or anticipated corporate event, such as a merger, bankruptcy announcement or corporate re-organisation. We count mainly risk (merger) arbitrage and distress securities investing among the event driven funds; in addition, they include also regulation D and high yield investing (Tremont Partners (1999)).

- *Risk arbitrage* investors are simultaneously involved in long and short position in both companies of merger or acquisition. Managers usually buy stock in a company being acquired, and sell stock in its acquirers seeking to capture price differential between the target and acquirer, whereas the convergence of both prices is expected. The outcome of the risk arbitrage strategy is supposed to be relatively uncorrelated to overall market direction. Potential risk results from possibility that the deal may fail, so called “deal risk” (Tremont Partners (1999)).
- *Distressed securities* managers are lured by debt, equity or debt claims of companies in reorganisations and financial distress which imply the need of legal action, typically bankruptcy. Distress securities are generally traded at substantial discount to par value, nevertheless often lead to holding cheap equity in the newly reorganized company. In general, managers follow both passive as well as active approach, whereas active managers can assist the recovery process, on the contrary, passive managers hold the securities until they increase in value, or they trade them.
- *Regulation D (Reg D)* investing strategy serves as mean of raising money on the private capital markets for micro and small capitalization public companies. Stocks,

²⁹ The latest are not typical arbitrage as defined by risk-free transaction principle. Rather, corrections of deviations from historical prices are expected, and use as a basement for speculative transactions.

convertibles or other derivatives are offered to investors in exchange for a capital injection. Non-traditional feature of those convertible bonds or convertible preferred issues, that should prevent the investor from declining stock price, is a floating exercise price (Tremont Partners (1999)).

- *High yield (or “junk bonds”)* strategy deals with high yield securities, either they are bought/held or traded. Investors await upcoming credit upgrade or outstanding high coupon issue. According to Tremont Partners (1999), until recently high yield was primarily a US focused strategy, however, today it could be implemented globally (including emerging market bonds as well).

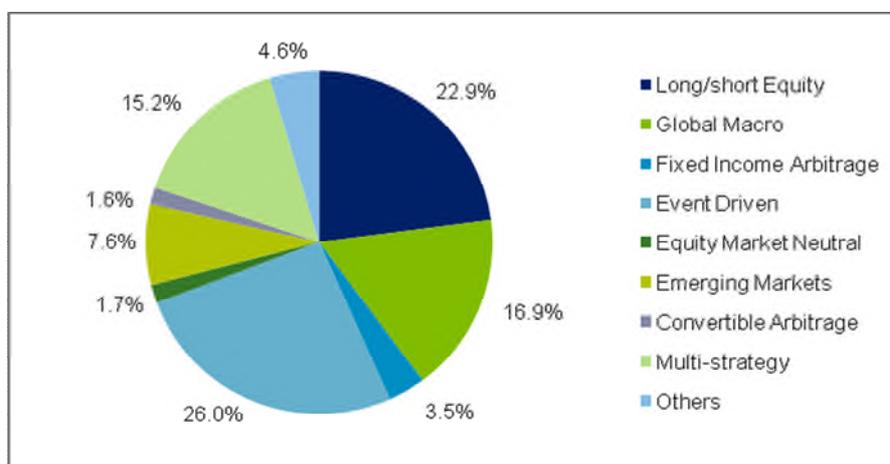
2.3.3 Tactical–trading funds

Approximately 24.5 % of strategies employed by hedge funds account for tactical trading (see Figure 11). Tactical-trading funds are managed either in systematic way or in discretionary approach. The former involves following trends identified by technical analysis using proprietary computer models, while discretionary managers use a less quantitative approach, relying on both fundamental and technical analysis (Reserve Bank of Australia (1999)). Tactical trading strategy is supposed to be the most volatile, including macro and global funds, operating on spot or futures markets where they speculate on the direction of market prices of currencies, commodities, in addition also equities and bonds are traded. Some funds of great renown could be count within this category, namely Tiger fund as a global fund, or George Soros` s Quantum Group operating as a global macro fund.

- *Global funds (incl. emerging market funds)* will be in the spotlight during the second part of our thesis, as they invest in emerging markets or specific regions. Emerging markets strategy involves equity and fixed income investing focusing on less mature financial markets around the world (Tremont Partners (1999)). For many observers “emerging market hedge fund” is only a contradiction in terms, as many emerging markets permit short selling and they do not offer futures or other derivatives suitable for hedging.
- *Global macro* managers are opportunistic traders, being possibly both long and short in capital or derivative markets all round the world. They make a profit from changes in global economies, usually based on major interest rate shifts or other economic trends or events (Ackermann, McEnally, Ravenscraft (1999)).

Substantive leverage as well as derivatives could be employed. According to Tremont Partners (1999), these funds could operate both on developing and emerging markets.

Figure 12: Strategy focus, 2009*



Source: Investment strategy components of Credit Suisse/Tremont Hedge fund index, available at www.hedgefundfacts.org (*second quarter of 2009)

As previously noted, above stated categorization of hedge funds` strategies is definitely not exhaustive. Literature which deals with hedge funds topic is full of other types of funds and their subtypes. We can see as many different categories as authors we have studied. Further, the strategy mix of hedge funds has also changed during last two decades. According to Ibbotson, Chen (2006), global macro strategies were regarded as dominant throughout the industry in 1990, while today the equity-based strategies (like long/short, event driven) are predominant (Figure 12). Moreover, increasing diversification in strategies while using less leverage, is likely to occur in the upcoming years (IFSL ((2009).

2.4 Hedge funds` performance

In this chapter we will focus our attention to much discussed topic of hedge funds` performance and performance persistence. Different performance measurement models are introduced as they emerged. Data-conditioning biases and they impact on performance is briefly explored; numerous evidence and different studies` results are referenced.

Thanks to several interesting characteristics implied by the limited government oversight, such as flexible investment strategies (incl. leverage and short selling), and strong managerial incentives in a form of performance based fees and managerial own

investment, hedge funds can take advantage of their superior position on the market. All of those unique features, that distinguish these funds from other traditional investment vehicles, are believed to have fundamental positive impact on performance.

Hedge funds explore and utilize investment possibilities inaccessible for other institutional investors. They seek to deliver absolute return, expressed usually as a risk-free rate plus a given number of basis points. In other words, the performance is not tied to any reference benchmark, such as a market index or a peer group of managers³⁰. Contrary, others institutional managers track the index and aim to collect as much capital as possible. As emerged from Amenc, Goltz, Martellini (2005), investors appreciate this absolute return approach mainly for following reasons: firstly, it ensures relatively stable performance with tendency towards lower levels of volatility, secondly, the performance is achieved regardless of prevailing economic conditions, and without exposure to major draw downs of the stock and bond markets; last but not least, hedge funds deliver their investors potential diversification benefits. We will discuss these facts throughout the section.

2.4.1 Exposure to risk factors

Any active investment strategy is a source of two types of rewards: normal return and abnormal return. Together with statistical noise, these three components make up the excess return on the portfolio (Amenc, Goltz, Martellini, 2005). The normal return represented by beta (also called beta benefits) is provided to investor as a systematic market reward for risk exposures (traditionally, cash, stock and bond returns). Contrary, return that is not attributable to risk exposure, represented by alpha, the abnormal return, constitutes value added by funds - skills, expertise, innovative aspect, and disposal of superior information of particular portfolio manager³¹. The hedge fund legal regime is likely to be another source of alpha (Shadab ((2009). Alpha management, although sometimes questioned, is relevant especially for different hedge

³⁰ Nevertheless, according to Amenc, Goltz, Martellini (2005), benchmarking of hedge funds returns through peer grouping is becoming common practice.

³¹ Asness in Ibbotson, Chen (2006) proposed also beta exposure to other hedge funds as another source of alpha return.

funds strategies. Hedge funds` managers are allowed to exploit their skills significantly therefore they have optimal conditions for over-performance (alpha benefits seeking)³².

It is widely believed in the hedge funds universe that positive return over the risk-free rate can be delivered. What is more, this can be done without being exposed to market risk. In other words, excess return can represent compensation for those managerial skills rather than for market risks taking. However, as argued in Amenc, Goltz, Martellini (2005), to adopt such an idea, we must accept important assumptions that hedge fund investment can have a net zero exposure to market risk, and market risk is the only risk factor. To put it simply, the single-factor capital asset pricing model (CAPM), as expressed in Appendix 1, must hold. Moreover, the investment beta must be zero.

However, both assumptions contradict empirical evidence. Beta neutrality is very rare; even strategies that claim market neutrality have non-zero beta³³. Furthermore, growing academic literature on hedge funds risk-return characteristics have developed multifactor models considering wide range of additional risk factors hedge funds are exposed to.

Researches follow and further develop basic models of mutual funds performance proposed by Fama and French, who identified besides the market exposure two additional risk premiums: the small cap and the value premium. Afterwards, Carhart suggested adding a momentum factor to a model. Betas now represent exposure to different multiple risk factors; whereas alpha is still a product of timing and selection skills (for further illustration of hedge funds risk exposures, see Appendix 3). To go even further, recent studies argued, that linear relation between risk and return of hedge funds is too tight constraint. New models are developed with factors that exhibit nonlinear payoffs of the world of dynamic trading strategies and derivatives. This issue is not further dealt in here, but is covered for instance in Posthuma, Van der Sluis (2005), or Amin, Kat (2003).

Multiple risk exposure is not necessarily an obstacle. Contrary, since the risk/return characteristics of hedge funds differ from those of investment in stocks and

³² Ibbotson, Chen (2006) decomposed returns not only for active investment in general, but specifically for hedge funds. They added hedge fund fees (costs) to alpha and beta as another return component (for more, see Appendix 2).

³³ See Patton (2004).

bonds, hedge funds can play an important role in risk reduction through diversification and yield enhancement strategies.

2.4.2 Diversification benefits

“Don’t put all your eggs in one basket.”

(Tobin in Buiter (2003), pp. 3)

“Diversification entails investing in a collection (portfolio) of assets whose returns do not always move together with the result that overall risk is lower than for individual assets” (Mishkin (2007), pp. 37). In general, participants on financial markets expect higher return as a compensation for higher risk taken. On the other hand, through appropriate diversification we can reduce idiosyncratic (unique) risk without reducing returns (Shadab ((2009). To diversify effectively, an investor must broaden different sources of risk, entailing investing in a portfolio of numerous securities from a wide range of issuers, and types of assets (stocks, bonds, commodities, real estate, etc.)³⁴. However, such a diversification imposes additional transaction costs to an individual investor with limited amount of capital. Therefore, financial intermediaries, such banks, mutual funds, and hedge funds can be helpful, as they utilize their specialized skills and recourses to make sufficiently informed investment decisions. Further, they take advantage of scale economies.

We found rich evidence throughout the literature of very low or even negative correlation of hedge funds returns with those of other assets classes (among others, Fung, Hsieh (1999), and Liang (1998) comment the issue). Peskin, Urias, Anjilvel, Boudreau (2000) documented this effect; they even found low correlation among hedge fund managers themselves. According to Rouah (2005), hedge funds are attractive diversification tools as well, chiefly thanks to dynamic trading strategies involving use of options, leverage short selling etc. Authors consider optimal allocation into portfolios ranging from 5 up to 20 %³⁵. Besides, Amenc, Goltz, Martellini (2005) found that hedge funds` diversification effects hold even in down markets and are more stable across different countries.

³⁴ According to Shadab (2009), empirical research shows that including securities of 20 different companies into a portfolio is sufficient to diversify idiosyncratic risk.

³⁵ Compare with 10-20% in Amin, Kat (2003).

2.4.3 Higher moments

Multiple risk exposure and nonlinear relationship with other asset classes is not the only obstacle in hedge fund performance measurement. As argued by many authors, the dynamic and nonlinear dimension of hedge fund risk cannot be covered only by simple standard risk measures, such as mean and volatility (the first two moments of the return distribution). As suggested by empirical evidence, hedge funds do not fulfil the restrictive assumptions of normally distributed returns. Many strategies show asymmetry around the mean³⁶ which is indicated by the *skewness* (the third standardized moment, a measure of asymmetry) different from zero. Likewise, excess *kurtosis* (the fourth standardized moment, a measure of tail thickness, a probability of extreme positive or negative outcomes) should be considered during extreme market events³⁷ (Amenc, Goltz, Martellini (2005)). Risk averse investors who are aware of non-normal distribution of hedge fund returns find negative skewness (payoffs patterns characterized by a large number of small positive outcomes and an occasional poor result) and high kurtosis (high probability of extreme outcomes) to be remarkably undesirable feature. Table 1 summarizes the average skewness and kurtosis as discussed in Kat (2005) that was found in the returns of individual funds from our hedge funds strategy groups³⁸.

Table 1: Average skewness and kurtosis of individual hedge fund returns

	Merge Arbitrage	Distressed Securities	Equity Market Neutral	Convertible Arbitrage	Global Macro	Long/short Equity	Emerging Markets
SKEWNESS	-0.50	-0.77	-0.40	-1.12	1.04	0.00	-0.36
KURTOSIS	7.60	8.92	5.58	8.51	10.12	6.08	7.83

Source: Kat (2005)

From data summarized above we can deduce, that an average hedge fund`s returns tend to be non-normally distributed; negative skewness, as well as substantial kurtosis may occur. Furthermore, standard deviations, skewness and kurtosis of returns distribution may change as other asset classes are involved. Kat (2005) investigates risk characteristics not only for individual funds within particular strategies, but also for equally weighted portfolios of all funds in each group. As shown in Appendix 4, forming portfolios of hedge funds leads to a reduction in standard deviation (with the

³⁶ Option based strategies, for instance.

³⁷ For a normal distribution, the skewness is zero, whereas the kurtosis is three, meaning that the return is within three standard deviations from the mean.

³⁸ For another evidence of negative skewness, see Amin and Kat (2003), or Eling (2006).

exception of emerging market funds). However, unfavourable skewness decreases even lower. Even worse, after the creation of portfolios the correlation with the stock market (S&P 500 was used as a proxy) increases in all categories. In other words, while investing in fund of funds we are not really market neutral as we may expect. Finally, Kat (2005) combined hedge funds with stocks and bonds (Appendix 5). As expected, the well-known low correlation between the hedge fund return and stocks and bonds return lead to an improvement of mean-variance characteristics; however we observe further drop in skewness accompanied by further rise in kurtosis. One possible solution how to neutralize the effect of negative skewness is to buy a put on the hedge fund portfolio in order to sever the link between the portfolio and stock market during bullish markets (Kat (2005)). Unfortunately, the market for put options on hedge funds is still underdeveloped; counterparties are unlikely to find, or it is expensive.

2.4.4 Data-conditioning biases

Accurate measurement of hedge funds performance is difficult. They report only on voluntary basis, without any due diligence, to several data vendors (Hedge Fund Research, Inc., TASS/Tremont, Managed Accounts Reports, Zurich Capital Markets, International Securities and Derivatives Market (CISDM), Morningstar, etc.). These databases are incomplete and far from being homogenous (see Appendix 6). Indexes are constructed from different data, using different methods of construction³⁹. As pointed out by many authors, hedge fund indexes suffer from two major drawbacks: they lack full representation and they are biased. These biases depend on database used and period under consideration.

As discussed among others in Ackermann, McEnally, and Ravenscraft (1999), *survivorship bias* (including *termination* and *self-selection biases*, whereas these two countered each other) refers to the situation when only live funds` returns are taken into account, whereas poorly performing funds are systematically omitted from the database⁴⁰. This upward bias is estimated to reach 2-3 % per year (Rouah (2005), Ibbotson, Chen (2005)). *Liquidation bias* (could be also assumed as a subcategory of survivorship bias) arises from the delay between last reports to data vendors

³⁹ Since reporting is not mandatory for hedge funds managers, it is really difficult to estimate the real assets under management. Therefore, databases (except for CFFB/Tremont) use equally weighted, as opposed to value-weighted indexes construction (Amenc, Goltz, Martellini (2005)).

⁴⁰ A fund can that stop report to databases may also attempt to conceal its successful strategy, or be closed to new investors from capacity reasons.

of unsuccessfully performed fund and the actual winding down of the fund operations. Average delay accounts to only 18 days (Ackermann, McEnally, and Ravenscraft (1999)) with corresponding bias of 0.7 %. *Backfill bias*, or *instant history bias*, means that returns of newly added funds are backfilled. However, hedge funds typically begin to report data only after running up a good track record, so again, bias the data upward (Rouah (2005)). Next, *multi-period sampling bias* arises when the requirement of a minimum history on time-series data excludes some funds that have been in existence for less than a required period. Finally, we name *stale pricing* as the last from the most significant measurement biases. Stale pricing results, when a fund holds securities, for which up-to-date pricing is hard to obtain. Through serial correlation in returns, downwards biasing in volatility and correlation estimates may be caused.

While investigating hedge funds performance, we always have to keep in mind that various biases inherent in hedge funds databases can distort estimates of performance and may lead investors to be overoptimistic about the benefits of hedge funds (Hagelin, Pramborg, Stenberg (2005)). Overall, the effect of survivorship bias is the most important and most studied, as pointed out by Rouah (2005).

2.4.5 Performance evidence

“Hedge fund returns are not superior to the returns on other asset classes, they are just different.”
(Kat (2005), p. 55)

Several authors have used traditional performance measures such as Jensen's alpha, Sharpe ratio, and asset class factor models to investigate whether hedge funds indeed deliver a superior risk-return characteristics⁴¹. This research, mainly of 1990s, offers arguments in favour of hedge funds. Both micro (fund specific characteristics as size, fund age, performance fees, lockup etc.) and macro (market) factors⁴² were found in different literature as an aspect of funds performance. Yet, factual results are often controversial as there is no consensus on the “right” model; performance of hedge

⁴¹ Among the most cited belong for instance Fung, Hsieh (1997) or Ackermann, McEnally, Ravenscraft (1999).

⁴² Some hedge funds strategies are influenced by macro factors that have also significant impact on traditional asset classes (market return and volatility, credit spread, yield curve) – these market forces may be regarded as return enhancers; contrary, there are also many return diversifiers with little effect on stock and bonds.

funds has varied through time, therefore results also depend on period under consideration; and last but not least, there is a limited access to individual fund data.

Ackermann, McEnally, Ravenscraft (1999) found that hedge funds consistently outperform mutual funds⁴³, but not standard market indexes; however, they are more volatile than both mutual funds and market indices. Significant excess return of hedge funds is documented in Kooli (2005) and for longer period also in Capocci and Hubner (2001). Further to those researches, Peskin, Urias, Anjilvel, and Boudreau (2000), and also Koh, Koh, Lee, and Phoon (2005) suggested pooling hedge funds, which can significantly reduce risk, measured by the volatility. Superior performance was assigned to incentive fees in work of Ackermann, McEnally, Ravenscraft (1999). Contrary, Liang (1998) found no such an evidence, however, he attributed better performance of funds to watermark provision (contrary, a hurdle rate does not seem to be critical for fund`s performance), and to lockup periods. Fung, Hsieh, Naik and Ramadorai (2006) investigated a comprehensive data set of funds of funds, using seven-risk-factor model they conclude that funds of funds consistently delivered alpha in period from 1995 to 2004, moreover, larger funds performed worse than smaller⁴⁴, but have lower risk.

However, the outcome is not that straightforward when authors started to assume non-normality of returns distribution and non-linear relation to other assets. For instance, Amin and Kat (2003)⁴⁵ found hedge funds inefficient as a stand-alone investment. However, when they were mixed with S&P 500 into a portfolio the result was much better, whereas 10-20% portion of hedge funds in the portfolio were optimal. Hagelin, Pramborg, Stenberg (2005) showed in their paper that gains from allocating into hedge funds occur even when possible effects of deviations from normality in returns data are taken into account. However, they argued that the existence of lockup periods prevents investors from rebalancing of their portfolios and thus caused the deviations from optimal portfolios (see also the discussion on “style drift” in Posthuma and Van der Sluis (2005)).

While investigating performance persistence in hedge funds industry (the phenomena, when funds with above average performance in one period will have above

⁴³ For the same results, see Peskin, Urias, Anjilvel, and Boudreau (2000), and Liang (1998).

⁴⁴ For the same results, see Peskin, Urias, Anjilvel, and Boudreau (2000).

⁴⁵ Using a continuous-time version of Dybvig`s payoff distribution pricing model for a data from May 1990 – April 2002.

average performance also in the consequent period), authors usually rank the returns of hedge funds in deciles and analyse the transition probabilities from one decile to another. Posthuma and van der Sluis (2005) found evidence of persistence of hedge funds performance at the semi-annual and annual return horizon, whereas the effect was more pronounced in extreme rankings (past losers tend to be losers also in an upcoming period and the same for past winners⁴⁶). In contrast, Capocci and Hubner (2001) found no persistence in performance for best and worst performing funds, but it existed in middle decile funds. Bares, Gibson, and Gygar (2003) observed persistence mainly over one- to three-month holding periods; however, this rapidly vanished as the period was lengthened. Contrary, Peskin, Urias, Anjilvel, and Boudreau (2000), and Rouah (2005) found little convincing evidence that winning funds could repeat their success⁴⁷.

To illustrate basic hedge funds performance characteristics of the second half of last decade, Table 2 and Figure 13 follow.

Table 2: Summary Statistics for Edhec and MSCI Indexes (January 2004- August 2007)

	Annualized Mean Return	Annualized Volatility	Sharpe Ratio ⁴⁸	% of Months with Negative Returns	Minimum Monthly Return	Sortino Ratio ⁴⁹
Equity-Market Neutral	10.4%	2.2%	3.4	5.0%	-1.1%	2.81
Convertible Arbitrage	12.0%	3.8%	2.3	14.0%	-3.2%	0.96
Global Macro	12.0%	4.2%	2.1	18.0%	-2.9%	1.22
Event Driven	11.8%	6.1%	1.4	21.0%	-8.9%	0.50
Long/short Equity	12.8%	7.6%	1.3	30.0%	-5.5%	0.75
MSCI World Equity	6.7%	16.2%	0.2	45.0%	-13.8%	0.16
MSCI World Bonds	6.5%	7.0%	0.5	46.0%	-3.3%	0.52

Source: Armenc, Goltz, Martellini (2005)

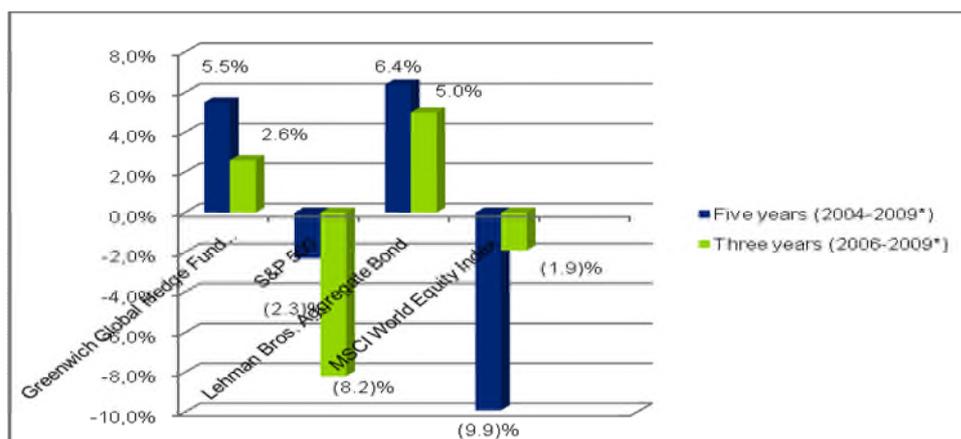
⁴⁶ For similar results, see also Fung, Hsieh, Naik, Ramadorai (2006).

⁴⁷ Persistence among losers, not among winners found further in Agarwal and Naik, Edwards and Caglayan (both in Rouah (2005)).

⁴⁸ Sharpe ratio measures expected return in excess of the risk-free rate (sometimes called as Risk premium), per unit of expected risk, where risk is defined as the return standard deviation. In our case, the Sharpe ratio is calculated using a risk-free rate of 3 %.

⁴⁹ Sortino ratio also measures a risk adjusted return of an asset class, but the volatility used in the Sharpe ratio is replaced with a down-side deviation from a target return. In our case, the Sortino ratio is calculated using a minimum acceptable return of 3 %.

Figure 13: Global hedge funds returns – compound annual growth rate



Source: Greenwich Alternative Investments, LLC, available at www.hedgefundfacts.org (*as of June 30, 2009)

2.5 The call for greater transparency

To conclude theoretical part on hedge funds in general, we will shortly address transparency issue. Many objectors have called for greater transparency throughout the hedge funds industry, especially since the bail out of Long Term Capital Management in 1998, and exaggerated especially after the subprime-initiated financial crisis and the Madoff scandal. Greater transparency is widely believed to ensure essential level of investors` protection, and to provide preconditions for effective due diligence. However, this is not always the case. According to Tremont Partners (1999, p.26), “transparency is a double-edged sword with the potential to be misunderstood and misused”.

Firstly, fund managers often invest into costly financial analyses to assess employed trading strategies, integrity and potential growth of earnings generated by those investment techniques. They may also gather information about competitors` business and significant transactions on markets. Analytical techniques have been developed at great expense, additionally, accountants, researchers, and different financial analysts are paid⁵⁰. Disclosure of trading position of such a fund is therefore disputed at least from the perspective of “free-rider” problem. Other investors are enabled to gain advantage of information obtained without previous costs, and benefit

⁵⁰ It is estimated that hedge fund industry employed at the end of 2008 some 150,000 people worldwide, about 6 % down on the previous year (IFSL ((2009).

on the information while reducing the profit of those funds that had provided original costly research.

Secondly, public disclosure of short positions may possibly seriously harm the company which stocks are shorted and cause panicky selling of that stocks, especially if it would be disclosed by the prominent investor. Nevertheless, short selling of the company's stocks may actually occur for various reasons. For instance, as locking in a spread or hedging an investment in convertible bonds, when the investor do not have any negative view of a company's outlook. Final main argument against the public disclosure of trading positions and investment strategies points out the possibility of consequent countermeasures of competitors, such as a "squeezing the shorts" (short sellers are under pressure in a situation of increasing stock prices when buying the stock in order to close losing positions, and thus increase prices even further).

In a nutshell, full portfolio transparency may reduce the hedge fund managers' ability to deliver inherent extra return, resulting from skilled considerations and opportunity to take positions in securities when others are not allowed⁵¹. However, it is more than presumable that ongoing financial crisis and changing institutional environment will have a significant impact on the hedge funds industry. More formal procedures and controls, as well as increased transparency are likely to be implemented, investors will spend more time conducting due diligence and assessing of valuation approaches.

⁵¹ We found animadversion of hedge funds' duty to report publicly for instance in Coalition of Private Investment Companies' works (CPIC) – the institution commented at least two times on this issue. Firstly, in 2008 they argue that a proposal by the SEC to require a public reporting of short sale positions would have severe negative consequences as discussed in the main text above; later, the SEC relaxed the requirement and started to gather the information privately, only for its own monitoring activities. Later, in April 2009, CPIC again made similar arguments as a reaction to the UK Financial Services Authority's proposal requiring public reports of short sellers individual positions (www.hedgefundfacts.org/hedge).

3. Emerging market hedge funds

As described in 2.3, emerging market hedge funds are regarded as a separate investment strategy of the broad hedge fund universe. However, throughout available literature, this hedge funds` group is often treated in different ways. We can interpret this subcategory from a viewpoint of a geographical mandate, meaning the geographic location where the fund invests the majority of its assets, or the style mandate, which indicates the focus on a specific investment style (Barclay Hedge (2008)). Put it together, while addressing emerging market hedge funds, we mean funds that trades mainly limited range of financial instruments of emerging regions, whereas their particular investment strategy may coincide with other technical strategies described in 2.3.

3.1 Emerging markets

In general, emerging markets (EM)⁵² can be defined as “countries or regions in early stages of economic development that are expected to grow rapidly and emerge from their less developed states” (Bekaert and Harvey in Füss and Kaiser (2009), pp.3). These economies are transitional, meaning they are in the process of moving from the closed economy to an open market economy while building accountability within the system. Economic reforms are expected to deliver transparency and efficiency in their capital markets, whereas exchange rates are also often reformed as a stable local currency builds confidence and attracts foreign investors. As a consequence, foreign as well as local investments increase.

The World Bank currently defines emerging market economy on the basis of its per capita income, whereas low to middle levels (a gross national income of USD 11,905 or less per capita) are attributed to emerging economies (www.data.worldbank.org). Over 140 countries, representing 84% of the world’s population, meet these criteria (Vital Wave Consulting, 2009). In May 2009, the IMF announced that developing countries account for 44.6% share of world economy, measured by GDP, with the economies of China and India considered to be by far the two largest (12 %, 4.4 % respectively).

⁵² The term was coined in 1981 by A. W. Van Agtmael of the International Finance Corporation of the World Bank.

However, by 2015, the combined GDP of emerging-market nations is predicted to surpass that of the top 20 developed economies (Vital Wave Consulting, 2009).

In the world of financial investing, the FTSE` countries classification play an important role – in Appendix 7, we introduce the FTSE⁵³ 2009 classification of emerging markets where particular countries are listed. On the background of this classification that mostly overlapped those of majority of hedge funds data providers, we identified four broad regions of emerging markets. These are: Asia excluding Japan, Latin America, Eastern and Central Europe with Russia, Middle East and Africa (MENA⁵⁴).

3.1.1 Investment specifications

Since these markets are in transition, they represent rather riskier investment - their growth rates are highly volatile, inflation reaches high levels, and domestic markets are notably dependent on particular political system. Relatively immature financial markets are unsteady due to a lack of market depth. Further, these markets feature plenty of information asymmetries and structural inefficiencies thus they are more likely to expose to speculative or panic reactions, constrained by limited liquidity and size of acceptable deals. Investors may face to corruption, legal risks or political instability that may substantially level up transaction costs. All in all, this implies somewhat unpredictable and uncontrollable investment environment. However, there has been a general improvement in many parameters (such as liquidity), perhaps due to increased globalization and financial integration that accelerated in the mid-1990s.

On the other hand, emerging markets provide an outlet for expansion, new source of revenues. Domestic currencies are usually weak, allowing foreign investors to get more value for their dollars. Opportunities to identify mispriced fundamentals are wide. As a consequence of increasing foreign investments, overall welfare improve, employment levels rise, labour and managerial skills become more refined, and

⁵³ FTSE Group (FTSE) is a world-leader in the creation and management of over 120,000 equity, bond and alternative asset class indices. FTSE is an independent company jointly owned by The Financial Times and the London Stock Exchange. FTSE does not give financial advice to clients, which allows for the provision of truly objective market information (www.ftse.com).

⁵⁴ The term MENA, for "Middle East and North Africa", is an acronym often used in academic and business writing. The term generally covers an extensive region, extending from Morocco in northwest Africa to Iran in southwest Asia. It generally includes all the Arab Middle East and North Africa countries.

a sharing and transfer of technology occurs. In the long run, productivity levels rise and the gap between emerged and emerging regions is lessening.

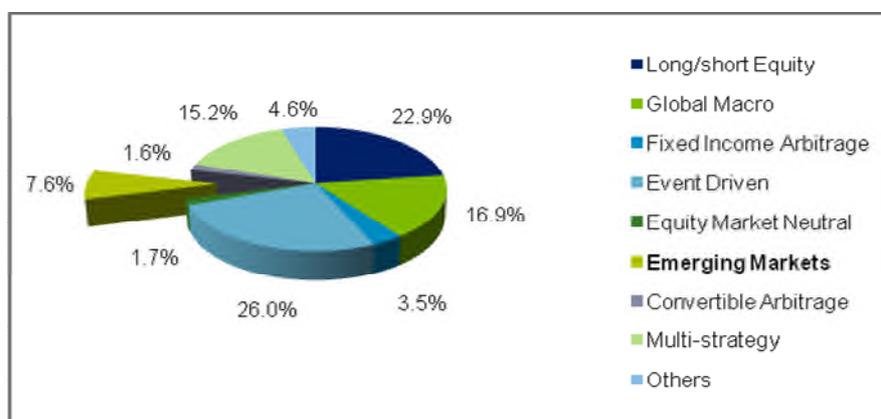
As stated in Fung, Hsieh, and Tsatsaronis (2000), the average annual rate of return during the period 1992 - 2000 for EM debt reached 12 % (with the st. dev. of 17 %), whereas equities performed worse, delivering a 4 % return (with the st. dev. of 23 %). Further, in section 3.2.2, we will discuss ability of hedge funds operating on EM to outperform stocks and bonds while implementing active investment management.

3.2 Hedge funds operating on emerging markets

As described above, emerging capital markets exhibit low liquidity, high market inefficiency, and tremendous mispricings, thus they can offer breeding ground for hedge funds strategies. Hedge funds are supposed to be well equipped to take advantage of specific opportunities on these markets due to their flexibility and lock-up periods imposed on investors` capital. They are designed to gain from market volatility as they have the opportunity to take both long and short position. They can better handle market illiquidity thanks to their ability to lock for longer period of time in their investment. Theoretically, EM hedge funds are supposed to provide added value due to active management. We will attempt to answer the question if they have succeeded in doing so in upcoming sections. We will shed more light on the topic, where only little research has previously been done, on the combination of EM and hedge funds.

To begin with, compare corresponding share of EM hedge funds among the broad hedge funds universe that is depicted in Figure 14.

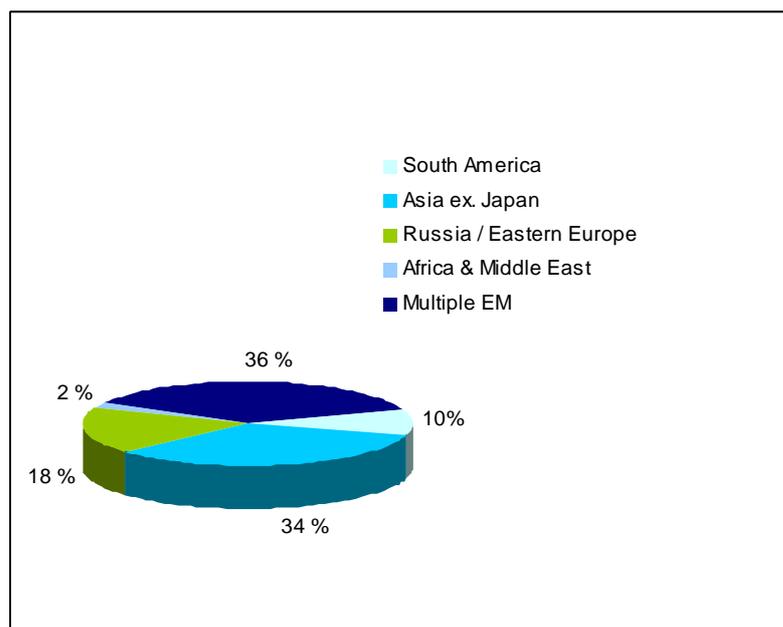
Figure 14: Strategy focus, 2009*



Source: Investment strategy components of Credit Suisse/Tremont Hedge fund index, available at www.hedgefundfacts.org (*second quarter of 2009)

The strategy is rather minor accounting for 7.6 % of all funds in the industry. Whereas, Brazil, Russia, India and China (the BRIC countries) are considered to be the largest expanding market for hedge funds where investors will spur demand for this alternative investment vehicle. Potential is also seen in some Middle East countries like Bahrain and Qatar. For sub-regional composition of EM assets before the financial crisis of 2007 - 2009, see Figure 15.

Figure 15: Sub-regional composition of EM assets in 2007 (% of total AUM)



Source: HFR (2008)

Among other EM hedge funds` features, Bhardwaj (2009) documented hefty, still below-industry-average fees, demanded by EM hedge funds. On average, they charge 1.6 % in management fees and 16.3 % in advisor incentive fees based on particular fund` performance. EM hedge funds have quite a short life span, whereas only few have a track record of more than 10 years. Strömquist (2007) stated the average life span of EM hedge fund as 4.4 years (compare to non-emerging market strategy with 4.5 years). This can be confronted to a span of about 3.5 years (Lavinio in Koh, Koh, Lee, and Phoon, 2005)⁵⁵. Among the top prime brokers of EM hedge funds belong Morgan Stanley and UBS, with Credit Suisse and Citibank increasing market share. Similarly, Citco and HSBC represent main administrators (HFR).

⁵⁵ Strömquist refers to a period of 1994 – 2004; the period under the consideration of Lavinio was not stated.

3.2.1 Emerging market hedge fund – only a contradiction?

Hedge funds operating on EM are defined as entities investing predominantly in the capital markets of developing countries, where they are also often domiciled or located (whereas we observed a continuing trend of localization, especially in China, Russia, and India)⁵⁶. They trade narrower range of financial assets, predominantly equities, corporate as well as sovereign bonds, and/or currencies. There are a number of sub-sectors, including arbitrage, credit and event driven, fixed income bias, and equity bias (www.hedgeindex.com). They can either have a regional focus (whereas among the most popular target regions belong Asia and Latin America, followed by Eastern Europe in recent years), or they invest across borders following broader theme (Füss and Kaiser (2009))⁵⁷. Generally speaking, in such small markets, hedge funds can take advantage of size, which generates other advantages. Managers dealing in below-investment grade debt in a particular emerging market country or region can find themselves among the largest investors in that narrow universe of securities. They are viewed as buyers or sellers of a last resort. As a result, these managers tend to get the first call on breaking news leading to advantage in superior information (Tremont Partners (1999)).

Despite many favourable characteristics of EM that give advantages to hedge funds as befitting investors, many constraints are posed onto their investment flexibility. The opportunity to employ dynamic trading strategies in emerging markets is significantly reduced. Since there is a lack of effective instruments, limitations of derivatives, leverage, and short selling, managers mainly follow simple buy-and-hold strategies⁵⁸. Moreover, they cannot get in and out the positions quickly due to lack of sufficient liquidity. As a result, an efficient hedging capability is reduced. In addition, if the value of an information signal is insufficient to outweigh the costs associated with transacting, market participants will not trade. And finally, the smaller, less liquid markets do not offer sufficient privacy to hedge fund managers who, as we

⁵⁶ According to Füss and Kaiser (2009), a physical presence in the investment region, in a form of research office, for instance, can enhance the fund` performance significantly. Managers of those funds generally exhibit better knowledge about their markets; they often tend to maintain relationship with domestic private and public institutions.

⁵⁷ Investors keep in mind specifications of different regions – some economies, as South Africa with large external deficits and short term capital inflows financing are far more risky than those with external surpluses and huge foreign reserves (as China for instance).

⁵⁸ According to Füss and Kaiser (2009), only between 20 % and 50 % off EM hedge funds employ leverage.

already know, do not want to disclose more information than necessary. As discussed in Strömquist (2007), managers are wary of being identified on the other side of government or central bank transactions. Economic retaliation and political retribution may follow immediately in political systems of many of emerging economies. Therefore, we can argue that thanks to different investment limitations, these hedge funds are from many points of view similar to mutual funds.

3.2.2 Performance potential

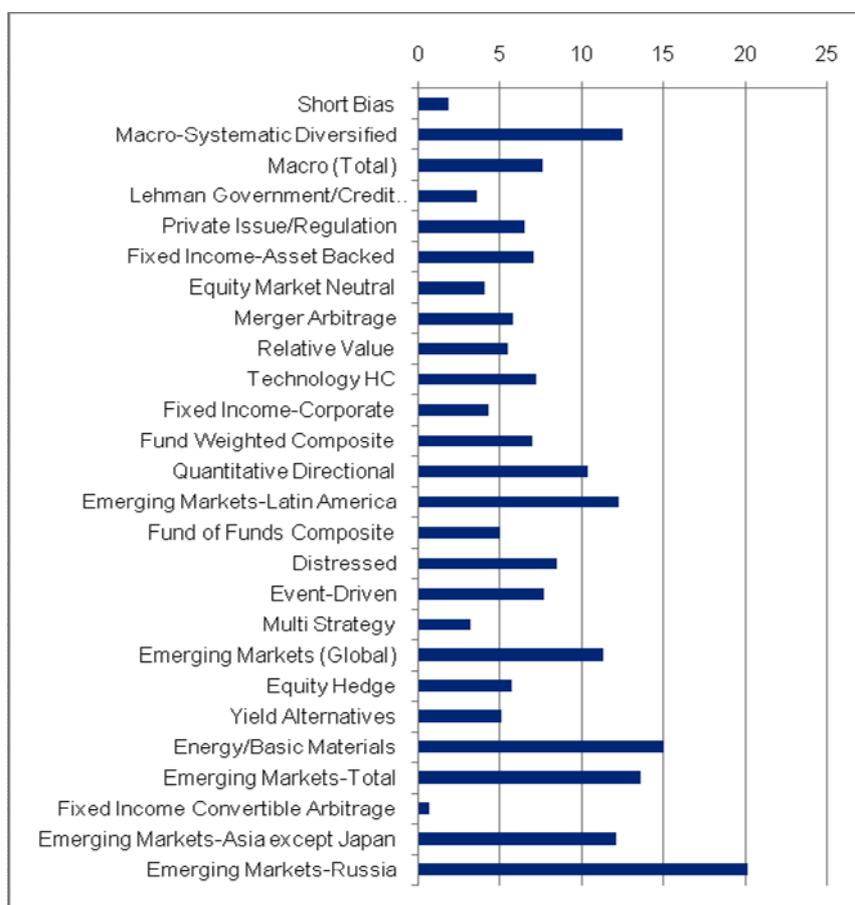
Basically, EM hedge funds are supposed to deliver high returns, high risks, and low correlation with financial markets of developed economies. The correlation of the investment with traditional EM returns is by far higher. Asian hedge fund returns are for instance pretty correlated with stock returns (according to Bhardwaj (2009), correlation of 0.92 with the MSCI EM Index suggests that many hedge funds are following a strategy similar to this index), however, less with those of bonds. Contrary, Eastern European funds exhibit high co-movements with bond markets (Füss and Kaiser (2009)) as stock markets are immature there. Contrary to hedge funds operating on developed markets that focus primarily on incorrect valuation between different financial instruments and capturing risk premia, emerging market hedge funds are dominated by equity, and to lesser extent, by debt investment⁵⁹ (Füss and Kaiser (2009)). As emerged from further description, the performance of EM hedge funds has historically been characterised by cyclical extremes relative to the rest of the hedge fund industry.

EM hedge funds performed rather poorly in the past. Comparing return characteristics of different hedge funds strategies during the period 1994 – 2004, Strömquist (2007) documented lower average total monthly returns accompanied by even higher standard deviation of funds operating on EM. Further, they also underperformed those of non-emerging market funds on cumulative basis over the period; mainly due to the crisis times from the end of 1997 to the end of 1998. In addition, the author studied the risk adjusted returns as a specific hedge funds performance measure and found no evidence of net-of-fee alpha with statistical significance. This result indicates that EM hedge funds did not deliver any value above

⁵⁹ To address the basic factor models introduced in 2.4., investment tools employed by EM hedge funds represented mainly by stocks and bonds imply the relatively high beta in comparison to other hedge funds strategies.

the existing risk factors in the period 1994 – 2004; passive investment strategies were preferable from investors` point of view⁶⁰. What is even worse, the author did not prove diversification benefits when EM hedge funds were involved into the portfolio. Somewhat more positive results than those of on strategy level brought analysis on individual fund level – there was a handful of emerging market managers who were able to deliver risk-adjusted returns. However, analyzing corresponding capital inflows reject the hypothesis that investors could differentiate between out- and under-performing funds.

Figure 16: Performance of hedge fund strategies 2003-2009 (%)



Source: Hedge Fund Research, Inc., available at www.hedgefundfacts.org

⁶⁰ By contrast HFR president K. J. Heinz stated that the average gain of EM hedge funds since 1990 has been 13 % with volatility similar to that of S&P 500 which returned 7.3% over the same period (HFR (2010)). Or Bhardwaj (2009) documented a healthy annualized total return of TASS database EM index of 10.8 % over a decade 1999 – 2008 (compare to 9.3% of EM stock markets during the same period). However, this index is not investable, thus we argue that picking individual funds (and paying all relevant fees) would most probably diminish this superior performance.

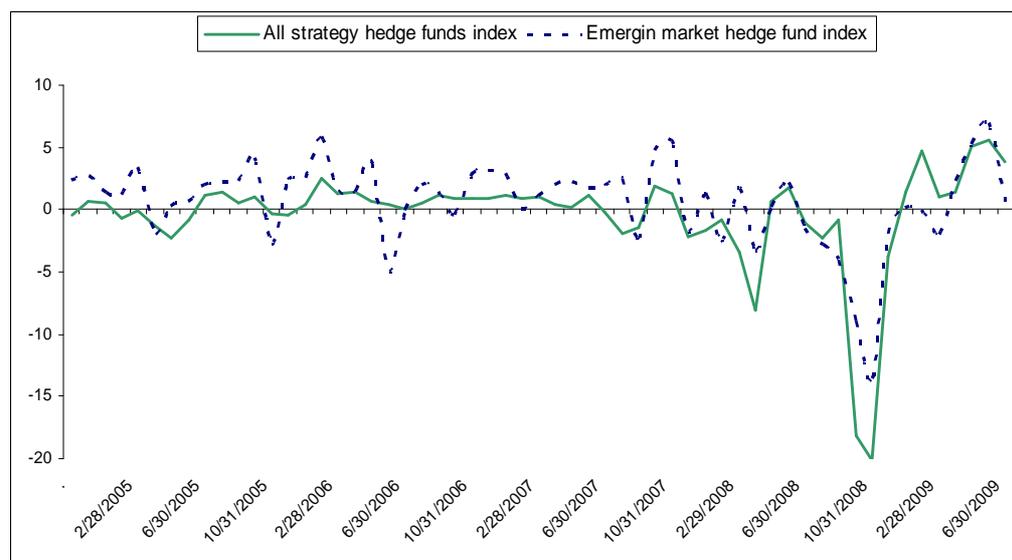
Indeed, past performance track does not appoint EM hedge funds as superior investment. Nevertheless, according to many authors⁶¹, despite they used to underperform during the past, EM hedge funds withstand finally the ongoing global recession with surprising success exhibiting the upward trend in performance over time. EM hedge funds` managers were able to reverse sharp 2008 losses with strong gains in 2009. Comparing cumulative returns of different hedge fund strategies during the period 2003-2009, we found EM hedge funds among industry leaders (especially those investing in Russia), see Figure 16.

To be specific, *the Hedge Funds Research Emerging Market Index* displayed 40.4 % return for the year 2009 which has been the best twelve months for the strategy since 1999. Thus, it outperformed majority of hedge funds composite indices and filled the expectations that bigger risk is rewarded by the bigger benefit. Profits were led by funds investing mainly in Russia, Latin America, and Emerging Asia, increasing mainly from shorting the dollar and holding long positions in EM stocks. This above standard performance followed the historic decline of 37.26 % in the same index during 2008, the worst performance year since the beginning of the category tracking in 1990 (Hedge Funds Review, 2009)⁶². Less volatile performance was delivered by the *Credit Suisse Tremont Index* (see Figure 17), however, the pattern coincide with that of above described *Hedge Fund Research Index*. For performance of particular EM region, see 3.3.4.

⁶¹See Bhardwaj (2009), Strömquist (2007), Hedge Funds Review (2009), Shadab (2009), IFSL (2009), for instance.

⁶² According to HFR, 2008 performance was even worst than the record decline of nearly 33 % in 1998 during the Asia crisis, and was accompanied by nearly 43 % asset decline on year to year basis.

Figure 17: EM HF index vs. All HF strategy index (RoR %) – Credit Suisse/Tremont (12/2004 – 6/2009)



Source: www.hedgeindex.com

Unfortunately, according to numerous empirical evidences EM hedge funds suffer from a lack of sufficient asset injections. As shown by Strömqvist (2007), good performance of EM hedge funds is surprisingly not rewarded with capital inflows. Despite the level of capital flows has increased during recent years, the share on total capital inflows to the whole hedge funds industry was reduced, indicating that investors have reallocated money to other strategies (the flow for the average non-emerging market fund is twice as high and the volatility of inflows is significantly lower). This anomalous fact may reduce incentives for managers to improve performance, take risky bets, or even make skillful managers to exit the industry. Despite the recent superior returns, risk-averse investors continued to withdraw assets from emerging markets during the time of financial turmoil. These findings contradict optimistic forecasts of many authors that EM hedge funds are the fastest growing segment of the hedge fund industry.

We may attribute this anomaly to risk-aversion of investors who could observe some significantly negative returns of these funds during the period. This can be clearly documented using the table of EM hedge funds' statistics, attached to Figure 24. In all free cases of hedge funds time series, the median is nearly twice as high as the mean, indicating some high negative values in the time series (for similar findings, see Strömqvist (2007)). Moreover, investors could still be aware of historic relative performance of the strategy and higher non-emerging market funds' returns, which have negative impact on capital inflows of the strategy in question.

3.3 Financial crisis on emerging markets

There has been an increasing interest in the activity of hedge funds. During the last two decades, highly leveraged hedge funds have been blamed for earning superior returns at the cost of financial stability. Several events were associated with hedge funds activities, including the speculative attack on the sterling launched in 1992, the global bond rally in 1993, the Asian currency crisis of 1997, followed by the Russian debt crisis in 1998, which caused the liquidity problems and in consequence contributed to the Long Term Capital Management failure, or the collapse of technology sector in 2000. Associated funds' activities that were criticized involve: dealing in thin markets with substantial volume, herding, colluding and manipulating asset prices, thus contributing to the development of financial bubbles (Azmain–Saini (2006), Strömquist (2009)).

From our point of view, the whole issue is of crucial importance as especially many Asian or Latin America emerging markets are sensitive to those speculative and destabilizing activities. These markets can be described as medium-sized economies, where financial markets are generally less liquid, and participants can build positions which are large relative to size of markets (Reserve Bank of Australia (1999)). A classical example is a row of currency crisis during the late 1990s in South-East Asia. Particularly, hedge funds were blamed for coming into markets that were already under intense pressure and sold a large volume, pushing the currencies over the brink. In addition, a highly leveraged strategy - currency carry trade⁶³ - was widely adopted during the two years preceding the crisis. Its crucial role was reflected in implied volatilities of EM currencies and a scramble for USD (Frank, Hese (2009)). As warned by Dornbusch (2001), currency crisis are quite expensive. Their costs occurred in three ways: as a substantial increase in public debt (after the government bail-outs of financial institutions of public interest), decrease in output, and possible controversial redistribution of income and wealth.

However, as pointed out throughout literature available after the immediate wave of hysteric reactions, the crisis were rooted in problems of the real economy when excess capacity and increasing costs led to a sharp fall in profitability. Moreover,

⁶³ “The carry trade involves borrowing from a low-interest-rate currency and lending to a high-interest-rate currency, without hedging exchange rate movements. Betting that the high-interest-rate currency will not depreciate by more than the interest rate differential, the trader captures the differential if the exchange rate moves within a narrow range”(Fung, Hsieh, Tsatsaronis (2000), pp.380).

despite that fact that a substantial proportion of external trade was with countries of Asian region, local currencies were pegged principally to the dollar. However, these pegs appeared not to be sustainable with the economic policies and financial structure of the Asian countries, especially at the moment of excessive borrowing by banks and corporations in the region (Edwards in Fung, Hsieh, Tsatsaronis (2000)). Real exchange rates of many local currencies appreciated due to the weak Japanese economy, increased exports competing with that of China and Mexico, and many exporting industries that exhibited excess capacity (Fung, Hsieh, Tsatsaronis (2000)). High interest rates powered the crisis on during initial phases, and occurred again in stabilization phase to deteriorate the public finance, after the crisis period of falling output and tax revenues. On July 2, 1997, after the large losses of reserves that were sacrifice during the defence phase, the Thai central bank was forced to allow the baht to float; further, other currencies as the Malaysian ringgit, the Indonesian rupiah, the Philippine peso, and the Korean won were brought down. To address different specifications of particular countries, we name a bulk of nonperforming loans, in real estate and consumer finance in Thailand, and in stock markets (as loans financing a market boom) in Malaysia, that sharpened even further the situation in these countries. Similarly, Indonesia and Korea suffered from bad balance sheets with huge debt-equity ratios and large foreign exchange exposures (Dornbusch (2001)). These currencies have lost by the end of 1997 between 44 % and 56 % of their value against the USD (Fung, Hsieh, Tsatsaronis (2000)). Contrary, the Honk Kong dollar withstood the speculation attacks. Across the South-East Asia region, many local corporations and banks that had borrowed in foreign currencies were driven to bankruptcies.

However, the build-up phase of the carry trade is characteristic more for international commercial and investments bank than for hedge funds – they seemed neither to play the critical leading role⁶⁴ nor to corner the markets (Eichengreen, Mathieson (1999)). Moreover, as documented in Strömqvist (2009), hedge funds operating on emerging markets had bet long position in local shares therefore they lost approximately 20% of their value up to the mid-2008. This interesting point is surely not in line with the idea that hedge funds made a huge profit as speculators against the

⁶⁴ The aggregate short position of the twelve largest hedge funds never exceeded USD 6 billion during the critical July 1997, which is relatively small to the total AUM and to the size of official reserves as well (Fung, Hsieh, Tsatsaronis (2000)).

currencies while disrupting markets. The authors also attributed the crisis to fundamental and structural imbalances in the financial system itself.

Although recent empirical studies fail to find evidence that hedge funds were directly responsible for that crisis as their initiators or that they had greater impact on different events of financial instability than other investors⁶⁵, attention should have been paid to their trading strategies as a source of valuable insights. The consecutive bets on the depreciation of currencies in question, made by many financial institutions including hedge funds, were rather indicators than the cause of the crisis. Hedge funds with their flexible strategies could serve as a source of valuable insights if their trades are monitored. Any financial turmoil has serious impact on emerging economies, often resulting in a decline in economic activity, overall welfare⁶⁶, and deterioration of country`s credit rating resulting in a higher international cost of capital. Keeping this in mind, the Bank for International Settlements has issued guidelines on conducting business with highly leveraged institutions⁶⁷ right after the infamous Asia currency crisis. We will comment on possible role of hedge funds during the main financial crisis and particular implications for emerging markets in following sections.

3.3.1 Emerging markets heading the financial turmoil of 2007 – 2009

Governments of many EM countries took a lesson from events that caused acute damages on their developing economies during the late 1990s. Fortunately, prior to current crisis many of them undertook reforms designed to insulate them from adverse shocks that possibly could shake markets in the rest of the world. These policies that are concisely summarized in Dooley and Hutchison (2009, pp.1) include: “substantial increase in reserve assets and substantial reductions in net government debt. Moreover, the currency exposure of EM governments was reduced in some cases to long dollar positions, commercial bank net foreign exchange borrowings were strictly limited and nonfinancial firms` foreign currency debt was monitored, and in many cases, strictly controlled. Finally, emerging markets were generally experiencing current account and primarily fiscal surpluses”. Conway (2008) pointed

⁶⁵ Discussed in Eichengreen in Fung, Hsieh, Tsatsaronis (2000).

⁶⁶ As documented by Sandleris and Wright (2009), the sovereign default of Argentina in 2001 was accompanied by the output fall of 20 % from its previous peak, unemployment reached almost 20 %, and poverty nearly doubled leaving the half of the population below the poverty line. Currently discussed crisis in Asia affected poverty rates in Indonesia (they more than doubled) and child mortality rates (increase by 30 %), or domestic violence in Malaysia (increase by 20 %), for instance.

⁶⁷ Basle Committee on Banking Supervision - BIS, January 1999.

out that local banks have little exposure to the toxic assets that have been part of the reason for the meltdown in the global financial system. There was no need to place new government debt, contrary, corporate sectors were becoming much stronger and need to expand (namely commodity-related sectors and communications, where markets are far from saturated and thus promised a big potential). This was supported by the record inflows from foreign investors in 2005 - 2007 (Conway, 2008). The expansion was financed through the issuance of new corporate debt, especially in countries with strong long-term growth potential - BRIC countries, and Mexico. Especially China, where domestic demand for Chinese products provided around four times more contribution to its domestic economic growth than total exports did already in 2007. Later, domestic demand even offset declining export, accounted up to 60% of global growth in 2009 (Goldman on www.roubini.com⁶⁸).

Strong demand from within their own growing economies, and trade with other growing emerging market countries (particularly China and India), make these economies much more self-sufficient. As they were in relatively good conditions and economic outlook promised sturdy growth, the emerging markets were viewed as an engine of the global economy, not affected by the subprime crisis, carrying the global economy for several years while the US and Europe recovered⁶⁹. However, these optimistic hopes fell away as soon as the development changed dramatically during the autumn 2008.

3.3.2 Were emerging markets decoupled?

A lot has been written on current global financial turmoil originated from subprime mortgage crisis. We do not aim to broaden the existing literature on the topic; we will rather focus on the issue of hedge funds in relation to emerging markets. We will attempt to comment on development of basic financial assets, stocks, bonds, and domestic currencies. From the view point of EM as our research question, we identified three phases of the decaying financial crisis, as discussed in Dooley and Hutchison (2009).

The first phase lasted 18 months from February 2007 to May 2008. These months, often referred in literature as a period of a “decoupling” of emerging markets

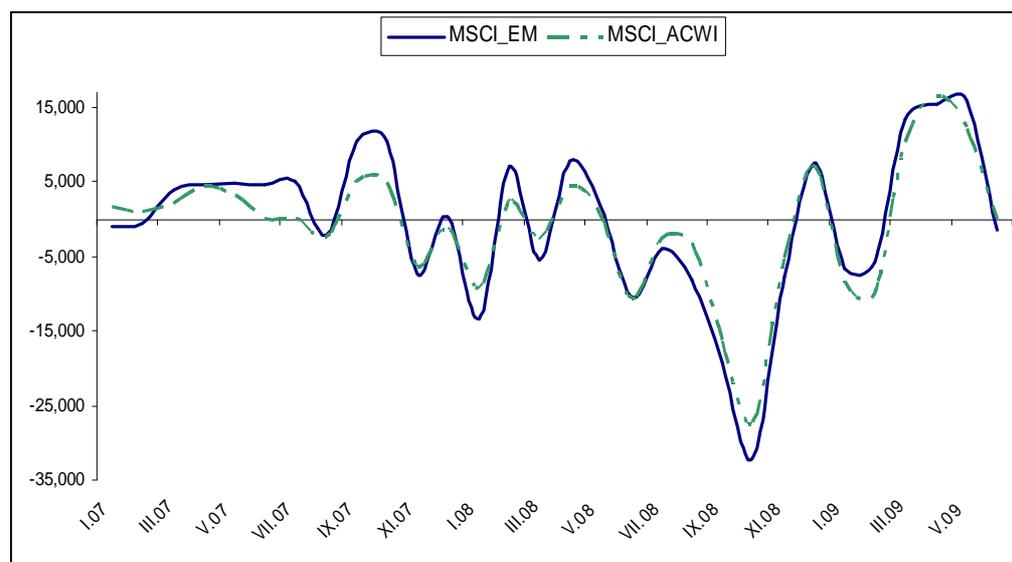
⁶⁸ Downloaded on Mar 9, 2009.

⁶⁹ Decoupling of emerging markets was predicted for instance by the Bank for International Settlements (see Ramakrishnan (2007)).

from industrial world, fit into our narrative description in the previous section. As can be seen in Figure 18, after the slowdown in housing appreciation in 2006 that drove many of subprime loans to defaults, the US subprime crisis weakened global stock markets, whereas EM stocks outperformed during the whole period (by about 40% relative to the US stocks, as documented in Dooley and Hutchison (2009)). In addition, domestic currencies supported by the currency carry trade appreciated against the dollar, which we will show in our empirical analysis (Figure 25).

The relative performance of credit markets in the US and on EM did not seem to reflect any doubts that the subprime crisis would have serious negative impact on the rest of the world. We could observe a decline in index of credit default spreads for EM sovereign bonds until early 2008. Investors did not expect sovereign bonds to be vulnerable to default risks as domestic currencies appreciated and EM central banks accumulated sufficient international reserves while cutting benchmark rates.

Figure 18: EM stocks vs. All country world index (monthly RoR %)



Source: Bloomberg, www.msibarra.com

The second phase was much shorter, covering the period between May 2008 and September 2008. The very last day of the phase, September 15, the day of Lehman Brothers, a second major US investment bank, failure, is a true break event of the financial crisis development, sending all the markets into a new panic.

However, in the period that forewent on the instant the “Lehman Day”, especially emerging credit markets still exhibited decoupling ability relative to the US, widening spreads. The experts` forecasted identically rather optimistic economic outlook for the second part of year 2008 and global deterioration during the upcoming

year. Contrary, there was a consensus on growing economic activity of emerging markets. For example, Morgan Stanley estimated global real GDP growth at 3.6% in 2008 and 0.9% in 2009; in both cases carried by emerging economies with the growth of 6.3% in 2008 and 3.1 % in 2009. JP Morgan published 1.2% growth in real global GDP during 2008 and only 0.6% growth a year later, whereas 6 % (2008) and 5.2 % accounted for EM (www.roubini.com)⁷⁰. The only sign during those days that the disaster may be just round the corner was a sharp fall in commodity, and especially oil prices at the beginning of the second phase⁷¹. Speaking about commodity prices, their weakening had a negative effect only in a limited number of emerging economies that are, in net terms, producers rather than consumers (those in the Middle East, and Russia, for example). Others, more than 25 emerging markets would benefit. The collapse in oil and commodity prices had also a negative impact stocks and EM exchange rates (Dooley and Hutchison (2009)) with a sharp depreciation in mid-2008 (see Figure 18, and Figure 25 respectively).

Finally, *the third phase* was largely unanticipated and different from previous experience. The period was dominated by the credit crunch that offset previous record net private flows from 2007 that peaked 4.5 % of emerging markets` GDP (IMF, 2009). Increase in counterparty risks paralysed international financial markets right after the bankruptcy of Lehmans. Consequent financial shock hit also nonfinancial sector via tight financing conditions making credit more scarce and costly, and poor liquidity. The shock spread directly to the emerging markets as international trade declined sharply⁷². According to IMF (CPIC), by autumn 2008, total losses from financial turmoil and weakened economies worldwide had exceeded USD 1 trillion.

EM equities fell together with the US stock market to levels 40 % below their pre-crisis levels. Emerging Europe and Latin America exhibited the largest declines in sovereign and corporate bond returns, whereas corporate spreads have risen above those of sovereign debt, suggesting that investors consider emerging market sovereign

⁷⁰ Downloaded on Mar 9 2009, similarly Dooley and Hutchison (2009).

⁷¹ As discussed in Hamilton (2009), between 2001 and the mid-2007, the real oil prices nearly tripled, heading to record price of USD 145/barrel on July 3, 2008. However, this was followed by even more spectacular price collapse, with the price down to USD 40 by the end of December 2008. The author attributed the oil price collapse not only to the overall reduction in the global economic activity, but also to miscalculations of the long-run price elasticity of oil demand and to speculative investing in oil contracts.

⁷² The contraction of both imports and exports across developed and developing countries as well accounted for about 30 % between the period September 2008 and January 2009 (Dooley and Hutchison, 2009).

debts more protected, especially by high official international reserves (IMF, 2008). Nonetheless, these reserves in connection with robust domestic demand kept spreads well below those peak levels after the Asian crisis, the Argentina default or the dot-com collapse. Local currencies experienced particular pressures that resulted in easing reserve requirements in many banking sectors. Since currencies follow usually a similar general pattern to EM equity prices, they declined as well, of about 10%. Depreciations often outweighed prior appreciations of domestic currencies from early 2007 through mid-2008 (Dooley and Hutchison (2009); for illustration, see Figure 18, and Figure 25 respectively).

From that point on, there has not been any plausible reason to believe that emerging markets had decoupled from the global economic collapse. As found by Dooley and Hutchison (2009), bad financial news emanating from the US have had large impacts on credit default swap spreads in emerging markets, effectively transmitting the financial crisis to those markets. Developing economies were seriously hit by the rising risk aversion among investors, the reduced availability of funding⁷³ and a weakening of growth prospects. Global economy headed to the biggest recession since 1930s⁷⁴ that lasted for 14 months in developed economies (between June 2008 and July 2009). The emerging markets were finally recoupled, but the decline did not start until October 2008, some five months after that of the developed world, and ended three months earlier, in May 2009.

3.3.3 Hedge funds among the victims

Decaying financial crisis differs substantially from those of previous years. As pointed out by Strömquist (2009), this time, roots were in a bank crisis, resulting in restrictive lending, higher borrowing costs, and assets blocked by many bankruptcies. Despite the fact that hedge funds outperformed stocks during the crisis period (Strömquist (2009); Shadab (2009)) they were not absolutely immune, they were newly also among victims. The downturn has affected most type of assets and markets, which reduce diversification benefits attributed to hedge funds. Different types of premiums for duration and liquidity risks disappeared in those times, leaving risk

⁷³ As emerged from IMF (2008), despite the costs of borrowing for emerging markets escalated, it remained below the peaks during 2001 -2002 and right after Asian crisis 1997 – 1998.

⁷⁴ According to the World Bank (www.roubini.com, downloaded Mar 9 2009), the global GDP declined in 2009 for the first time since World War II, with its growth more than 5 ppts below potential. World trade exhibited the sharpest decline in 80 years.

premium insufficient to compensate increased risks. As a consequence of the financial instability, several countries imposed in autumn 2008 restrictions of shortselling (primarily of shares in financial companies)⁷⁵, thus harmed hedge funds even more (especially those focusing on arbitrage strategies) and disabled protection of long positions. Hedge funds were not only hit by unfavourable conditions on markets, they were also infected by their own toxic assets holdings. They could not avoid huge problems associated with write-downs the value of their assets as they had invested in securities backed by mortgages and securities themselves backed by mortgaged-backed securities (known as collateralized debt obligations, or CDOs)⁷⁶.

Despite the fact, that hedge funds` prices as a whole displayed rather stable trend in comparison with those of stocks during the initiatory phases of the crisis (October 2007 – June 2008), subsequent development evolved far negatively for hedge funds during the latter part of 2008, driven by unexpected reversal and Lehman collapse in September. Investors in many largest hedge funds (as those managed by Bear Sterns, Goldman Sachs, Citadel, and Peleton Partners) realized huge losses (September-November 2008) without a possibility to withdraw due to restrictions imposed on redemptions. These restrictions were necessary to protect remaining investors from even bigger potential losses from selling illiquid assets in falling market. Contrary to Asian crisis, when especially funds focusing on developing markets were seriously hit, as many as 89 % of all hedge funds displayed negative returns in this period (Strömquist (2009)) whereas convertible as well as fixed income arbitrage, and long short equity were among the worst performing strategies. Contrary, equity market neutral belonged to the best performing strategies. Before the crisis, the most employed strategy by hedge funds was the long/short equity strategy which accounted for more than 41 % share at the beginning of 2007. However, during the crisis, event-driven and multi-strategy techniques (from the style mandate, ignoring the geographical one) were the only with the positive assets inflow. Thus they strengthened their positions at the expense of long/short equity strategy (IFSL ((2009).

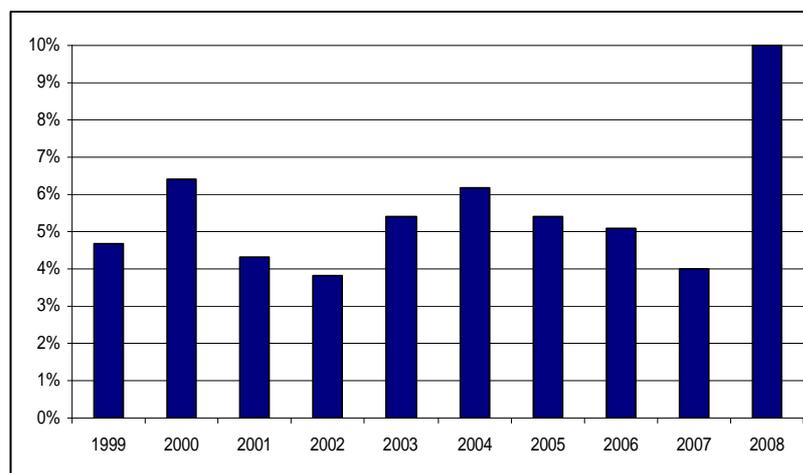
Many hedge funds died during that period, and few were born. This fact is supported by a sharp increase in their attrition rate which is estimated as “the number

⁷⁵ Prohibition on shortselling was taken by the authorities in the USA as well as the UK for instance, and was implemented in September 2008.

⁷⁶ Hedge funds belonged to other financial institutions that together lost a total of USD 760 billion through September 2008 from writing down the value of loan assets including debt securities backed by mortgages (Shadab ((2009).

of hedge funds dying during a given year, divided by the number of funds alive at the beginning of the year” (Roah (2005), pp.270). Development in hedge funds attrition rate is depicted below, the increase in attrition rate between 2007 and 2008 was more than 100% (Figure 19).

Figure 19: Hedge funds attrition rates

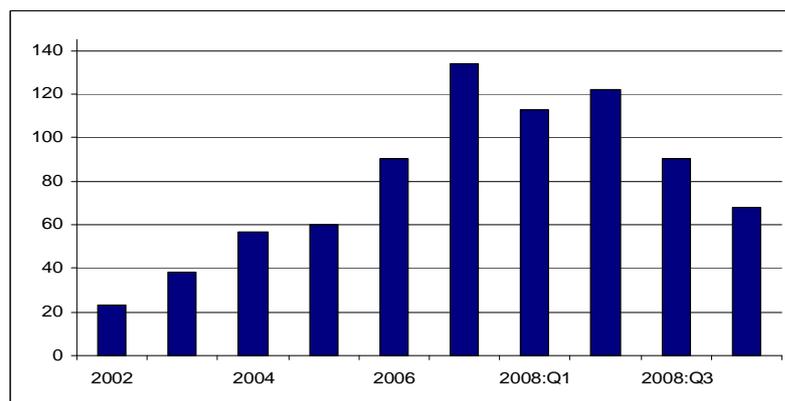


Source: IFSL (2009)

Besides changes in funds` numbers, also AUM changed significantly. Estimated AUM of EM hedge funds have dropped from their peak in the late 2007 due to a combination of risk aversion in connection with reputation damage inflicted by the Madoff fraud, plentiful redemptions, and last but not least negative performance (IFSL ((2009). Retail investors have shifted heavily from emerging markets to mature market corporate bonds and/or guaranteed government debts (IMF (2009)). Figure 20 displays AUM of EM hedge funds estimated by the IMF as it fluctuated during the time of financial turmoil⁷⁷. Between 2007 and 2008:Q4 EM hedge funds lost approximately 50% of their AUM.

⁷⁷ These numbers differs from those of Bhardwaj (2009), who estimated total AUM in EM hedge funds as USD 363 billion in 2007 (based on BarclayHedge data), followed by a sharp decline in 2008 to USD 153 billion. However, we compared data throughout our literature (see, for example HFR (2009), and HFR (2010)) and found numbers of IMF more accurate.

Figure 20: EM hedge funds – estimated AUM (in USD billions)



Source: IMF (2009)

Finally, addressing the question if hedge funds could contribute, or even cause current financial crisis, we conclude, that according to emerging consensus in broad literature available to us, hedge funds in general, and those operating in emerging markets especially, were not responsible for decaying financial turmoil⁷⁸. The main argument for this is that of Eichengreen and Mathieson (1999) stressing the relative small capital in comparison with that of other institutional investors as large international commercial or investment bank, sovereign wealth funds, pension funds, or insurance companies⁷⁹. They are not large enough to influence local prices solely. Large price movements are more probably driven by several types of investors that follow the same trend. We also claim that hedge funds are not more prone to initiate herding as they aim to operate keeping their strategies secret to other investors. Above all, global financial crisis of 2007 – 2009 had its origins primarily without any doubt, in a bubble of rising real estate prices, subprime mortgage expansion in the US and consequent securitization that spread toxic assets round the globe. At the same time, weak underwriting standards, unsound risk management practises, increasing complex and opaque financial products, and excessive leverage combined to create vulnerabilities in the whole system (CPIC). In later phases of the crisis, hedge funds were also among victims, negatively affected on a broad front. However, we aim

⁷⁸ See the analysis of Brown, Goetzmann, and Park (1998), Boorman (2009); or declarations of the IOSCO Technical Committee, the BIS, the UK Financial Service Authority, or “de Larosiere Group for the European Union, that the current crisis was not a hedge fund driven event (in CPIC).

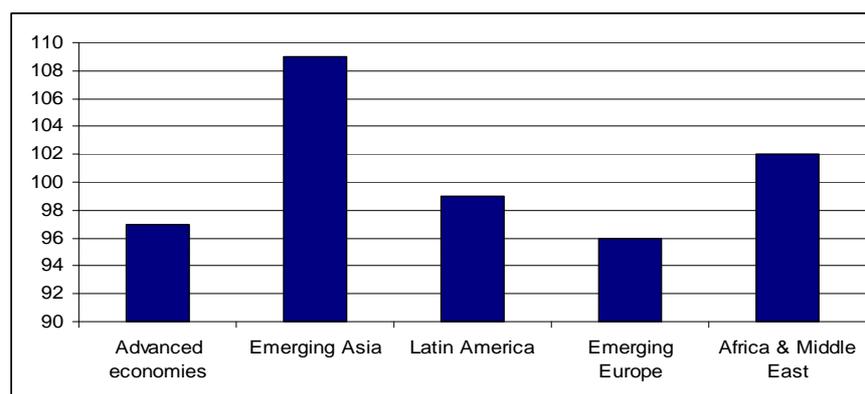
⁷⁹ Strömqvist (2009) quotes the journal Alpha Magazine pointing out that the largest hedge fund in the world is JP Morgan Asset Management that operated USD 45 billion at the end of 2007. This is according to the author only a few per cent of the capital managed by other market players as the largest fund or pension companies. However, we must accept this only with a caution. As we already know, hedge funds are highly leveraged institutions (note, only partially valid for EM hedge funds) therefore their real market impact is likely to be more dramatic.

to explore possible linkage between hedge funds and main assets of emerging markets by ourselves in empirical part of this thesis.

3.3.4 EM hedge funds have surfed the wave of EM recoveries

Despite the increased volatility on markets, investors again started to allocate to EM hedge funds during 2009 expecting that these economies would play a significant role in the ongoing multi-speed recovery, when it gradually come in 2010 (for a deeper insight, see IMF (2010)). These expectations are reflected upon HFR (2010) estimation of the average amount of AUM that should increase between 2009 and 2010 by 36 % on year to year basis - partially due to performance based gains and partly due to capital inflows. In this section that concludes our theoretical part, we will comment on the recovery process in EM hedge funds industry. Positive development will be supported by current performance and statistics of funds` numbers⁸⁰.

Figure 21: Change in GDP (2009:Q4 GDP in % of 2008:Q2 GDP)



Source: IMF (2010)

Emerging Asia (besides Latin America) entered the crisis with generally strong external balances and large international reserves (in contrast to emerging Europe, for instance). The deep local funding market mitigated the cross boarder funding risks. Especially China's grow supported by massive fiscal and monetary stimuli (various infrastructure investments in total amount of USD 500 billion; Frank, Hesse (2009)), led recovery that is likely to be sustained into 2010. Experts anticipate the region GDP growth to accelerate to 9.5 % this year (Qu Hongbin, Chief Economist, China in HSBC (2010)), from 8.7 % in 2009 (see Figure 21).

⁸⁰ If not stated otherwise, the performance data and particular region characteristics in this section come from HFR (2010) and HFR (2009).

Emerging Asia has belonged among the most monitored region in the hedge fund industry as over 470 funds allocate their capital there⁸¹. Approximately a half of total EM hedge funds` AUM is invested in the region, whereas especially recent regulatory developments in China financial markets have promised a further industry growth in the Asia. Currently, nearly 13.5 % of all emerging Asia hedge funds are located in China. Emerging Asia hedge funds exhibited an amazing recovery in 2009 with gains of 50.4 %, reversing 2008 declines of approximately 33.5 %.

Eastern Europe & Russia are considered to be the most volatile of the EM regions. Many economies were threatened significantly by the decaying financial turmoil. Intense bank crisis in Western Europe disrupted cross-border bank funding (IMF (2009)). As a result, external debt spreads rose sharply, stock markets collapse and currencies came under pressure. Consequent depreciations in connection with large foreign exposures of corporations and households that were built up before the period of financial instability resulted in severe loan write-downs across the region⁸². The expected mild recovery of this region will be led by manufacturing and service sectors, yet still dependent on the pace of recovery in the Eurozone (the situation in Europe is different from that of Asia, where domestic demand offset declining exports). Reversely, improvement in banking sector will be lagged. Real GDP growth rate for Emerging Europe region is estimated as 2.8% in 2010 in comparison with the previous year` decline of 3.7% (IMF (2010)).

However, this region has attracted so far as much as over 160 hedge funds with approximately 20 % of all EM hedge fund capital (up sharply from 14 % in 2002). Whereas Russian hedge funds dominate the Eastern Europe sample and accounts for 6 % of all EM hedge funds (other region samples are much more diverse). According to HFR (2010), despite the huge losses of 57% in 2008, these funds gained as much as 51.4 % in 2009.

Latin America, similar to emerging Asia, disposed with well-capitalized, locally funded banking system less impacted by the crisis than that of emerging Europe. Contemporary situation of two biggest leading economies of Brazil and Mexico is different. Brazil has currently reached its pre-crisis growth trend, with real GDP

⁸¹ This accounts for almost 45% of all EM hedge funds. If compared to Figure 15, a 10 ppt increase in regional share is observed. This clearly documented the rising popularity of emerging Asia region among hedge funds investors.

⁸² As stated in IMF (2009), foreign currency loans (mainly in dollars, euros, and Swiss francs) made up at least half of total loans in the Baltics, Bulgaria, Croatia, Hungary, Romania, Serbia, and Ukraine.

growth of 5.6 % in 2010 (A. Loes, Chief Economist, Brazil; in HSBC (2010)). Investment rising rapidly, perhaps also in anticipation of the additional infrastructure investments associated with the upcoming sporting events in Brazil⁸³. Positive growth and interest rate differentials are likely to generate enough inflow of capital to compensate for the current account deficits. Contrary, thanks to relatively close ties to the US economy, Mexican economy hitting harder than other Latino America economies, experienced a drastic recession which started in the last quarter of 2008 and ended officially in mid-2009. With recovery now under way, it is estimated that the country will register real GDP growth of 3.6% in 2010 (S. Martin, Chief Economist, Central America; in HSBC, 2010). Whereas the overall region experienced negative growth rate in 2009 (see Figure 21).

However, in line with better funding conditions in Latin America, hedge funds posted relatively the mildest losses of 29.1 % during 2008, of the four major EM regions. Consequently, their strong performance of 41.6 % in 2009 was led predominantly by mining (for example copper, the benchmark commodity and the main component of Chilean export, rose by 127% during 2009) and commodity sectors. Overall, it is a region of interest of about over 100 funds (with the smallest average fund size of the four regions), out of which 7.5 % is headquartered in Brazil. Total investment in Latin America accounts for about USD 12.3 billion.

Finally, *Middle East/North Africa* went through only a moderate economic slowdown, whereas besides emerging Asia, it was the only region with positive growth rate during 2009 (Figure 21). Estimated GDP growth for the year 2010, amounts 4.8 % (IMF (2010)).

Hedge funds investing with the dedicated focus on MENA region comprise more than 2.5 % of total EM hedge funds capital reflecting an increase from less than 0.5 % in 2002. These approximately 20 funds exhibited a performance gain of 28.3 % during 2009, which meant the best year since 2005 when in this region, hedge funds started to be tracked by HFR. This performance was obtained despite the tremendous volatility on local equity markets and sovereign credit concerns that occurred during the period.

⁸³ World Cup in 2014 and the Rio Olympics in 2016.

4. Empirical evidence

This chapter is devoted to the empirical analysis of possible causal relationships between returns of EM hedge funds and prices of fundamental financial assets of emerging markets. Particularly, we focused on the period 2002 – 2009. Following our description of emerging market currency crisis and feasible role of hedge funds, we attempt to document the possible impact of hedge funds activities on emerging markets during the credit crisis of 2007-2009; how they could contribute to financial turmoil. In order to be able to determine and explore the links on the background of the credit crisis, we performed the analysis of our data set on two different time periods – January 2002 – June 2007 (excluding the crisis time)⁸⁴, and January 2002 – June 2009 (including months of financial turmoil). In addition, we also expect that financial assets` prices determine the hedge funds` returns, which we also attempt to demonstrate using our data sets.

4.1 Data

To be able to model hedge funds` activity, we collected three different hedge funds indices⁸⁵. As a proxy for prices of basic financial assets we used corresponding indices, as it is described in the following paragraph. Indices are reported monthly for hedge funds, and daily for financial assets under our considerations⁸⁶. With one exception of Morningstar hedge funds database, indices are quoted in price terms of USD. Morningstar hedge funds index is reported in term of monthly rate of returns. Therefore, we recalculate all remaining time series to obtain rates of returns using following formula for logarithmic return: $\ln(X_t / X_{t-1})$, where X_t represents particular value of the index at the end of month t .

4.1.1 Data description

As we previously referred, in the world of hedge funds where secrecy and flexibility are key aspects of business, data collecting process, provided by a variety of

⁸⁴ We adopted the concept used in Dooley and Hutchison (2009), who interpreted mid-2007 as the start point of the subprime crisis.

⁸⁵ Following Azman – Saini (2006), we analyze hedge funds` returns as a proxy for their activity.

⁸⁶ In this case, we did not calculate an average for each month, contrary, we found more consistent with the methodology of hedge funds` indices, to use the very last reported value for each month.

data vendors, is rather problematic. There is no universal hedge fund index that can adequately represent hedge fund world. Reporting of monthly net asset values are not obligatory for managers; particular index does not have to illustrate the overall industry properly. We made efforts to smooth discrepancies of datasets by using indices of emerging market hedge funds obtained from three different data vendors and thus get at least rough proxy for the sector. For the purpose of our analysis, we covered the period under consideration (January 2002 – June 2009) by monthly observations collected from EurekaHedge, Credit Suisse/Tremont, and Morningstar databases.

EurekaHedge monthly index values (net asset value (NAV)) are mathematical means (average) of the monthly returns of all hedge fund constituents in the index at the time. Unlike the majority of other indices, this index is not asset-weighted. *The Emerging Markets index of EurekaHedge (E_EM_HF)* comprises of funds that allocate 90% of their strategy to emerging markets (either funds that allocate to a single emerging market country, emerging market region or globally). Emerging markets are defined by EurekaHedge as developing Europe (Central and Eastern), Latin America, Russia, Asia (excluding Japan, Australia and New Zealand), the Middle East, Africa and the Caribbean, and therefore the index is appropriate from the viewpoint of our regions` categorisation⁸⁷.

The Credit Suisse/Tremont Hedge Fund Index is, unlike that of EurekaHedge, an asset-weighted hedge fund index derived from the TASS database. The index consists of funds with a minimum of USD 50 million assets under management, a minimum one-year track record, and current audited financial statements. The index is rebalanced monthly, and funds are reselected on a quarterly basis. Latin America, emerging Europe, Middle East & Africa and Asia region excluded Japan, is comprised in their *Emerging Market Hedge Funds Index (CS_T_EM_HF)* provided by CS/Tremont⁸⁸.

Morningstar Hedge Funds Emerging Markets Index (M_EM_HF) is also an asset-weighted index of monthly returns, derived from a simple average of constituent funds` month-end net asset values. The index is rebalanced monthly to its equally weighted status. As in previous cases of EurekaHedge and CS/Tremont, returns are net of fees, and only single-managed entities are involved; meaning, funds of funds are excluded from particular indices. Accordingly, the index treats emerging Asia, Latin

⁸⁷ Index was downloaded with permission at www.eurekaHedge.com (index description attached).

⁸⁸ Index was downloaded at www.hedgeindex.com (index description attached).

America, Africa & Middle East, and emerging Europe, as regions of emerging market economies⁸⁹.

Throughout our analysis, we also consider following basic financial assets: emerging market stocks, emerging market sovereign, as well as corporate, bonds, and exchange rates of emerging market currencies in relation to USD.

To represent stocks traded on emerging markets, we use *the Morgan Stanley Capital International Emerging Market Index (MSCI_EM)* which is designed to measure equity market performance in global emerging markets. It is a free float-adjusted market capitalization index. As of June 2009 the *MSCI Emerging Market Index* consisted of the following 22 emerging market country indices⁹⁰: Brazil, Chile, China, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Israel, Korea, Malaysia, Mexico, Morocco, Peru, Philippines, Poland, Russia, South Africa, Taiwan, Thailand, and Turkey. Therefore, our pre-defined regions are sufficiently covered⁹¹. As proxy for investments in government bonds, *the Morningstar Emerging Market Sovereign Bond Index (M_EM_Bsov)* is used. The index includes the most liquid sovereign bonds issued in USD by the governments of the most prominent emerging markets⁹². Further, as a proxy for corporate bonds` returns we chose *the Credit Suisse Emerging Market Corporate Bond Index (CS_EM_Bcor)*, a performance benchmark devoted to USD denominated fixed income issues from Latin America, Eastern Europe and Asia. Prices are updated daily based on current transactions and market-making activities. Bond rating categories involved include wide range from high grades to distressed categories⁹³. Finally, in order to track the whole universe of emerging market currencies` exchange rates, we created an equally weighted average of monthly FX rates of emerging countries` currencies (*FX*) in a form of USD/EM currency⁹⁴.

⁸⁹ Index was downloaded from Bloomberg terminal (Bloomberg ticker: MSHFEMMI). Index description obtained at www.morningstar.com.

⁹⁰ We checked the structure of countries involved in the index haphazardly during the whole period under our consideration, and found the index appropriate for our analysis even after periodic rebalancing procedure.

⁹¹ Index is downloaded from Bloomberg terminal (Bloomberg ticker: NDUEEGF). Index description obtained at www.msibarra.com.

⁹² Index is downloaded from Bloomberg terminal (Bloomberg ticker: MSBIESTR). Index description obtained at www.morningstar.com.

⁹³ Index is downloaded from Bloomberg terminal (Bloomberg ticker: CEMBTOTR). Index description obtained at www.allbusiness.com.

⁹⁴ For the period under our consideration, we used average monthly FX rates for all 22 countries involved in MSCI Emerging Market index as of June 2009 (Brazil, Chile, China, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Israel, Korea, Malaysia, Mexico, Morocco, Peru, Philippines, Poland, Russia, South Africa, Taiwan, Thailand, and Turkey), expressed as USD/EM

During our basic visual data inspection we also have need of some instrumental proxies for emerging markets` returns as a whole and reasonable risk free rate. The *MSCI All Country World Index (MSCI_ACWI)* is a free float-adjusted market capitalization weighted index that is designed to measure the equity market performance of developed and emerging markets. As of June 2009 the index consisted of 45 country indices comprising 23 developed and 22 emerging market country indices. Following Strömquist (2007), we use the index as a market benchmark⁹⁵. Finally, risk free rates are proxied by using the three month T-bill⁹⁶.

4.1.2 Basic data inspection

It is generally believed, that hedge funds outperformed stock markets and deliver superior risk-adjusted returns. However, emerging markets represent unique investment world where generally accepted facts about hedge funds may not be valid any more. Before we start to analyse potential causal relationships among our time series of hedge funds returns and financial assets of our interest, we attempt to obtain some basic idea about EM hedge funds` performance from visual data inspection.

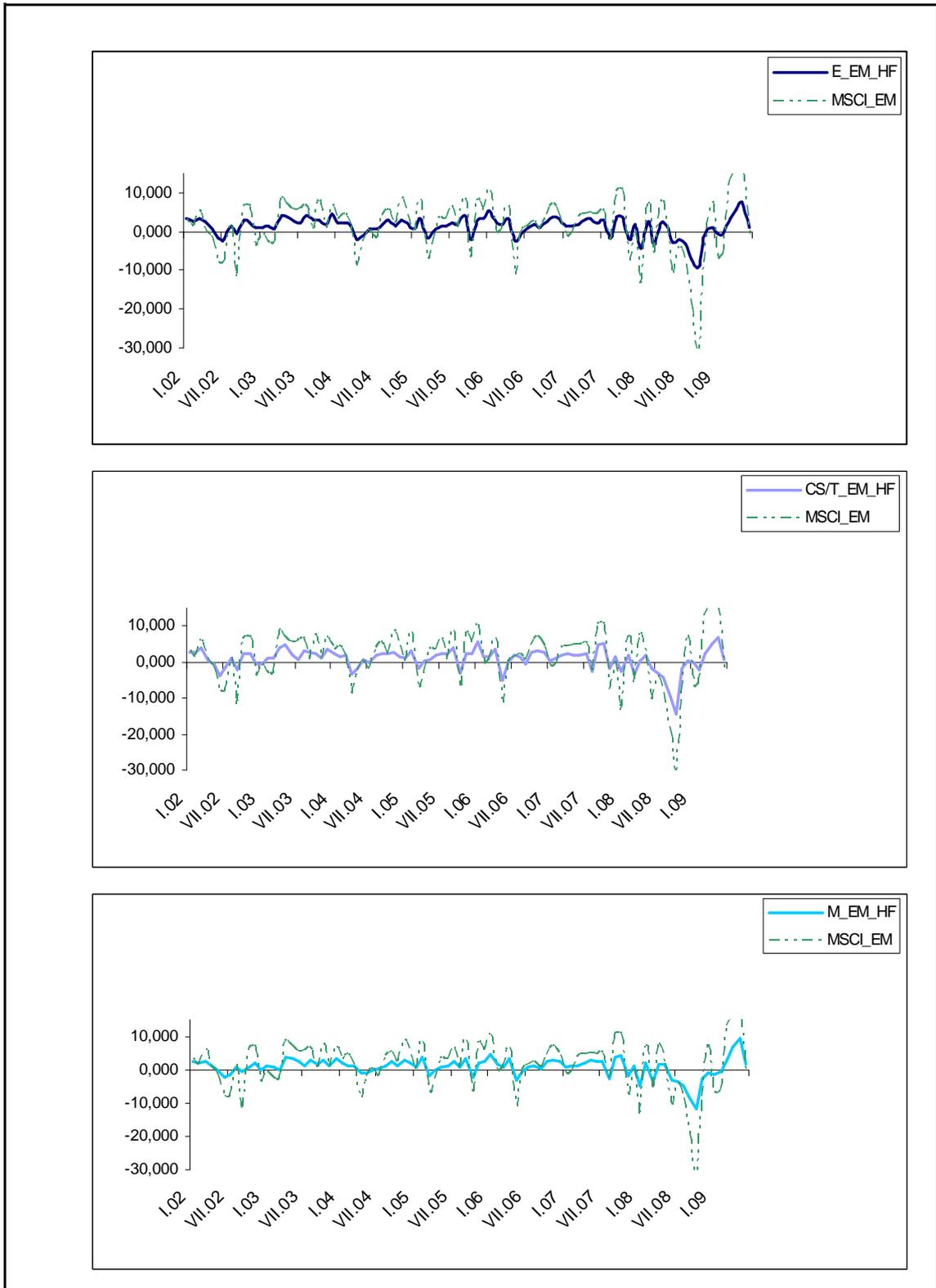
As can be seen from Figure 22, our hedge funds indices performed rather poorly in the past, beaten by the emerging market stock index (*MSCI_EM*). Nevertheless, in comparison with the stock index, investments in EM hedge funds offered more stable returns with demonstrable better resistibility to market turbulences that have occurred beginning the year 2008. Figure 23 shows the monthly total returns of hedge funds and stock index levels denominated in USD, with the base date January 2002 set at 100. Again, also in terms of levels (NAV), stock index behaved much more volatile underperforming hedge funds during the first years under considerations. However, since the second half of the year 2005, the stock index NAV has increased steeper surpassing Credit Suisse/Tremont hedge fund index. The market instability of credit crisis is easily notable on the graph, followed by the sharp decrease in all indices involved. Again, stocks displayed the most extreme values, nearing the bottom of financial downturn during the second half of 2008 and the first half of 2009.

currency. We constructed equally weighted average FX rate of those 22 FX rates. We find this approach good applicable as we use MSCI Emerging market index as a proxy for stock markets in emerging economies. Moreover, this set of countries covers all of our pre-defined regions. FX rates were downloaded at www.oanda.com.

⁹⁵ The index, as well as its description was downloaded from www.msibarra.com.

⁹⁶ Downloadable at www.federalreserve.gov.

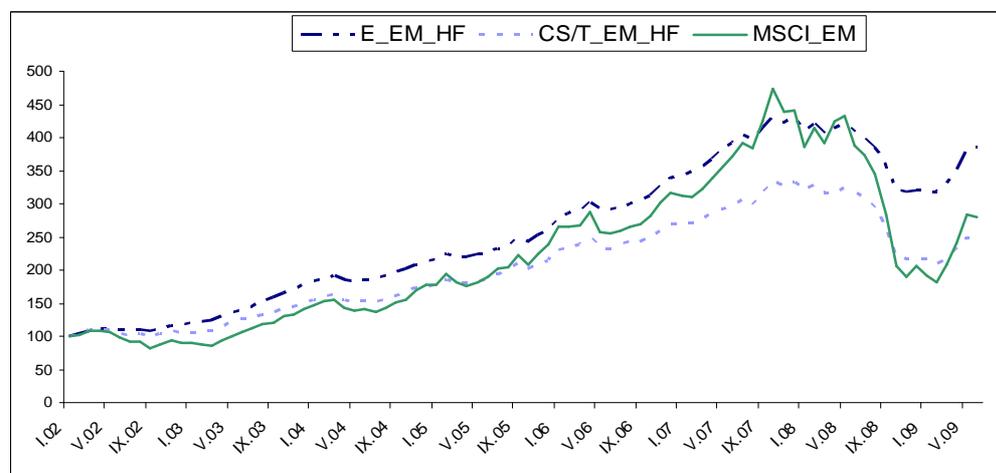
Figure 22: Monthly returns (%) – hedge fund indices vs. MSCI_EM (January 2002 – June 2009)



Source: Bloomberg, Eurekahedge, Credit Suisse/Tremont

NAV plot also illustrates predominantly directional trading of EM hedge funds as described in 2.3.

Figure 23: NAV- Eureka hedge, Credit Suisse/Tremont indices vs. EM stocks (January 2002 – June 2009)

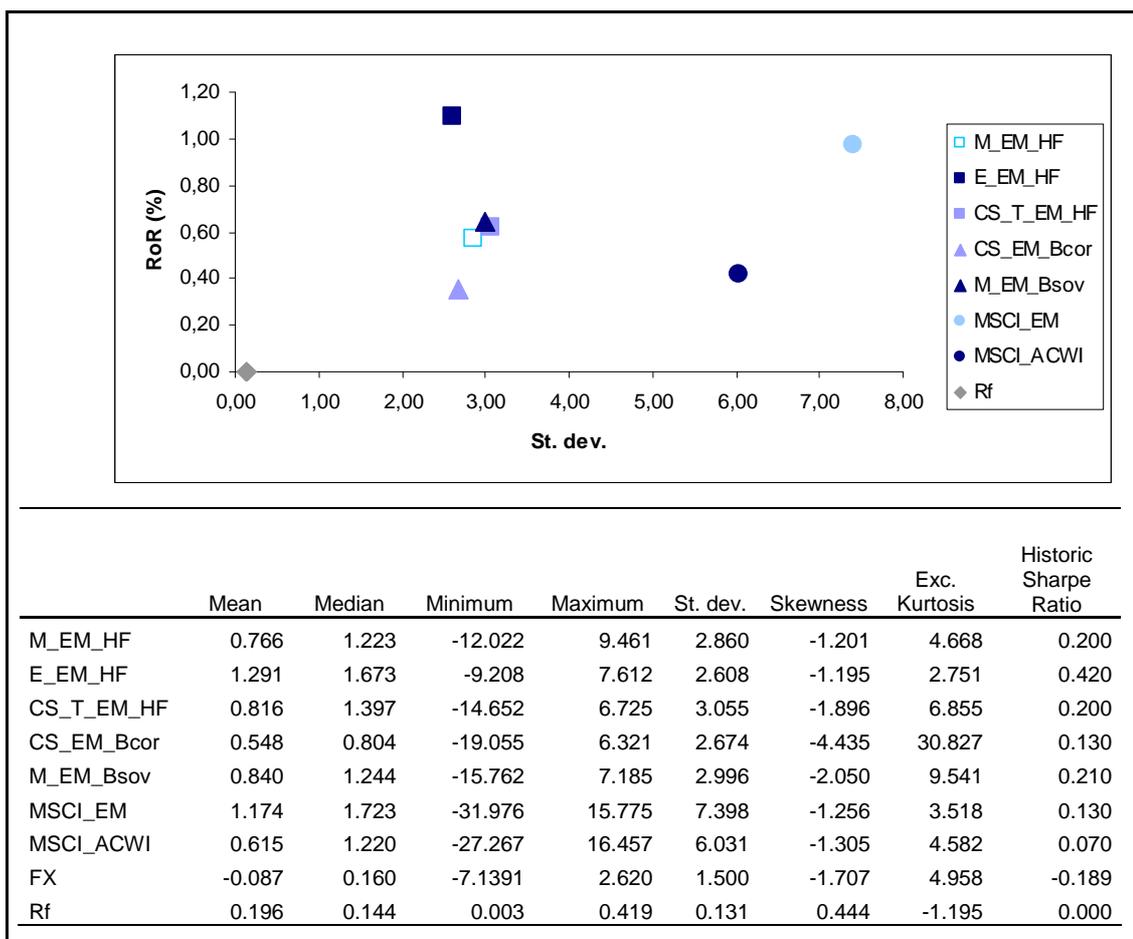


Source: Bloomberg, Eureka hedge, Credit Suisse/Tremont

To illustrate the reward-to-risk efficiency of hedge funds compared to other financial assets, we calculated the performance measure already introduced in our thesis, average historic Sharpe ratios (see Figure 24). Monthly indices` returns in excess of a risk-free rate were divided by the standard deviations of corresponding time serie (for detailed description of calculation, see Eling (2005)). As this ratio measures returns per unit of risk, it is generally considered to be improving as its value increases, and vice versa. However, Sharpe ratio must be interpreted with caution. It uses variance – the dispersion of investments from their mean value – as a risk measure, thus no distinction between the upside and downside deviation is made. As a consequence, investment with extreme positive returns is penalized for superior returns. Some authors use instead return deviation below a minimal acceptable rate and derive this Sortino ratio (see Table 2). Despite the fact, that there are arguments in favour of both indices, we implemented Sharpe ratio as a mainstream characteristic. If we plot rate of returns of all indices involved against the standard deviations, we are not surprised by T-bills being the less risky investment; however on expense of low returns. Comparing hedge funds with bonds, we found hedge funds` investments on emerging markets more or less the same risky (in terms of returns` standard deviations), with better performance on average. Surprisingly, stocks displayed the most volatile profile during our observable period, whereas compared to the global stocks, emerging markets delivered higher returns, as well as higher volatility. All in

all, Eurekahedge index is the winner from the risk-return viewpoint among all other strategies. In addition, time series statistics attached in the table below, documented fairly well the importance of assessment of higher moments of hedge funds returns` distribution. However, negative skewness and excess kurtosis is present especially in bonds`, and also in stocks returns. As we have already noted, emerging markets returns in general suffer from higher-moment problems, which is valid also for our data set.

Figure 24: Historic Sharpe ratios derived from time series statistics

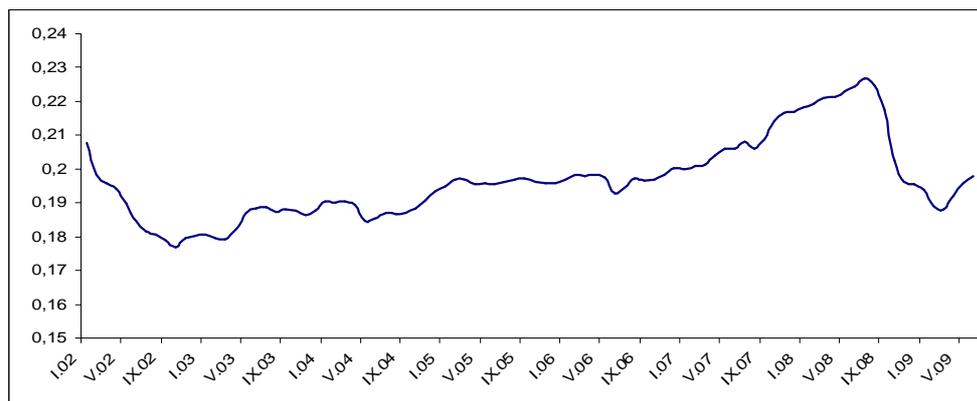


	Mean	Median	Minimum	Maximum	St. dev.	Skewness	Exc. Kurtosis	Historic Sharpe Ratio
M_EM_HF	0.766	1.223	-12.022	9.461	2.860	-1.201	4.668	0.200
E_EM_HF	1.291	1.673	-9.208	7.612	2.608	-1.195	2.751	0.420
CS_T_EM_HF	0.816	1.397	-14.652	6.725	3.055	-1.896	6.855	0.200
CS_EM_Bcor	0.548	0.804	-19.055	6.321	2.674	-4.435	30.827	0.130
M_EM_Bsov	0.840	1.244	-15.762	7.185	2.996	-2.050	9.541	0.210
MSCI_EM	1.174	1.723	-31.976	15.775	7.398	-1.256	3.518	0.130
MSCI_ACWI	0.615	1.220	-27.267	16.457	6.031	-1.305	4.582	0.070
FX	-0.087	0.160	-7.1391	2.620	1.500	-1.707	4.958	-0.189
Rf	0.196	0.144	0.003	0.419	0.131	0.444	-1.195	0.000

Source: Bloomberg, Eurekahedge, Credit Suisse/Tremont, and author`s analysis (using Gretl software)

Our composite **FX** index is not involved in above described risk-reward analysis. However, as can be seen in attached table, emerging market currencies displayed as the only asset negative mean during the period, which also implies negative Sharpe ratio. Domestic currencies were in their sharp decline during the first half of the year 2002, and during the period May 2008 – May 2009 (see Figure 25), which weighted down mild appreciation in between.

Figure 25: FX development (USD/ composite domestic currency)



Source: Author`s analysis using www.oanda.com data

As the last step, we analyzed correlations among the assets` returns. The hedge funds` weak correlation with traditional asset classes is broadly accepted throughout the literature. However, as we already argued, emerging markets - with their specific disposals - impose significant limitations on flexibility of investments. As reported in Table 3, hedge funds operating on emerging markets moved in the period January 2002 – June 2009 along with stock markets, exhibiting strong correlation with *MSCI_EM* index (higher than 0.9 in cases of all three indices)⁹⁷, slightly weaker, still strong correlation with global stock markets (nearly 0.9 for all hedge funds indices), and somewhat weaker correlation with universe of bonds (whereas corporate bonds are more correlated with EM hedge funds than emerging sovereign bonds⁹⁸). This high level of correlation indicates that hedge funds on emerging markets are basically more buy-and-hold focused when utilizing investment strategies across various asset classes (remember the regulation that forbids short-selling, or derivatives implementation, for instance). Currencies exhibited only moderate correlation with hedge funds returns (in the range of 0.54 – 0.62), whereas hedge funds` returns and our risk-free proxy, the three-month T-bills` returns vary independently on each other.

Compared to the second table, where we illustrate correlation for period without the credit crisis (ended June 2007), the first set of coefficients is in all cases higher.

⁹⁷ Kat (2005) attributed strong correlation between hedge funds and stock markets to the skewness effect. Despite the fact that many hedge funds do not invest in equity, they are highly sensitive to other factors that often accompanied decline in stock prices: widening of credit spreads, a significant drop in market liquidity and higher volatility. These side-by effects impact negatively also hedge funds` returns.

⁹⁸The strong correlation between two bonds` classes is implied by the structure of corporate sector in emerging economies as itself. About 79% of the securities in the index *CS_EM_Bcor* are classified as pure "corporate." Others from companies that are majority owned, or implicitly backed, by their government are classified as "quasi-sovereign."

This is clearly in line with broadly accepted perception that during crisis time, correlation coefficients become higher, which is usually attributed to increase in volatility (Yoon (2005)) and could be regarded as an evidence for contagion of financial crisis⁹⁹.

Table 3: Correlation coefficients

Jan/2002 – Jun/2009	M_EM_HF	E_EM_HF	CS_EM_HF	CS_EM_Bcor	M_EM_Bsov	MSCI_EM	MSCI_AWI	FX	RF
M_EM_HF	1.000	0.975	0.949	0.661	0.590	0.923	0.878	0.584	0.110
E_EM_HF		1.000	0.947	0.638	0.630	0.935	0.891	0.536	0.111
CS_EM_HF			1.000	0.718	0.696	0.915	0.868	0.618	0.154
CS_EM_Bcor				1.000	0.866	0.646	0.670	0.603	-0.047
M_EM_Bsov					1.000	0.660	0.684	0.496	-0.052
MSCI_EM						1.000	0.958	0.581	0.107
MSCI_AWI							1.000	0.609	0.070
FX								1.000	0.208
RF									1.000

Jan/2002 – Jun/2007	M_EM_HF	E_EM_HF	CS_EM_HF	CS_EM_Bcor	M_EM_Bsov	MSCI_EM	MSCI_AWI	FX	RF
M_EM_HF	1.000	0.961	0.924	0.343	0.463	0.904	0.836	0.400	0.046
E_EM_HF		1.000	0.918	0.383	0.546	0.901	0.850	0.371	0.029
CS_EM_HF			1.000	0.444	0.590	0.885	0.818	0.379	0.049
CS_EM_Bcor				1.000	0.815	0.260	0.240	0.369	-0.127
M_EM_Bsov					1.000	0.492	0.483	0.265	-0.115
MSCI_EM						1.000	0.934	0.389	0.062
MSCI_AWI							1.000	0.459	0.031
FX								1.000	0.149
RF									1.000

Source: Author's analysis

4.2 Methodology

Throughout our empirical analysis, we attempted to shed a light on possible causality relationships among our time series. We introduced a popular procedure to

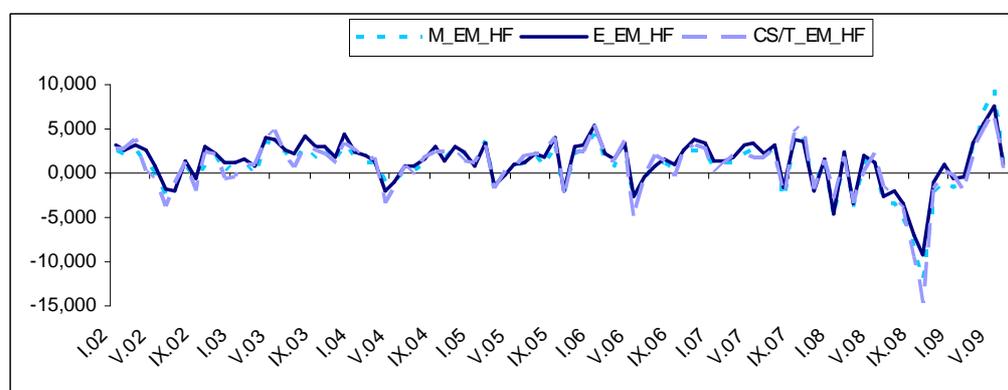
⁹⁹ Similarly, see also empirical findings of Frank and Hesse (2009), who documented that especially the Lehman collapse caused the largest increase of co-movements between financial variables during the credit crisis of 2007-2009. Further, also Füss and Kaiser (2009) increase in correlations between most hedge funds indices and equities during down markets.

approach causality that was proposed by Granger (1969). We considered all variables being endogenous and hypothesized that each variable depends on the other.

4.2.1 Principal component analysis

As we demonstrated previously in Table 3, the correlation coefficients of hedge funds indices that we use are equal to nearly one. In addition, Figure 26 illustrates similar patterns exhibited by the particular indices. Hence, in order to simplify the analysis given multivariate time series, we reduced the dimension of our hedge funds` data to one, using one of the most common statistical methods in dimension reduction – principal component analysis (PCA)¹⁰⁰.

Figure 26: Monthly returns (%) of EM hedge funds` indices – comparison (January 2002 – June 2009)



Source: Bloomberg, Credit Suisse/Tremont, Morningstar

Given a k -dimensional random variable $\mathbf{r} = (r_1, \dots, r_k)^T$ with covariance matrix Σ_r , PCA is a concept when usage of a few linear combinations of r_i can explain the structure of Σ_r , transforming k correlated variables into a smaller number of uncorrelated variables called principal components. They are orthogonal projection of the original data. The first principal component accounts for as much of the variability in the data as possible, and each succeeding component accounts for as much of the remaining variability as possible. For dataset under our consideration, \mathbf{r} represents EM hedge funds` returns, and k is a number of indices involved. If $y_i = \mathbf{w}_i^T \mathbf{r}$ is a linear combination of the random vector \mathbf{r} (where we standardize the vector \mathbf{w}_i without any effect on proportions, so that $\mathbf{w}_i^T \mathbf{w}_i = 1$), then, in line with standard properties of a linear combination of random variables, we have

¹⁰⁰ PCA was invented in 1901 by Karl Pearson

$$\begin{aligned}\text{Var}(y_i) &= \mathbf{w}_i^T \sum_r \mathbf{w}_i, & i = 1, \dots, k, \\ \text{Cov}(y_i, y_j) &= \mathbf{w}_i^T \sum_r \mathbf{w}_j, & i, j = 1, \dots, k.\end{aligned}$$

The idea of PCA is to find linear combination \mathbf{w}_i such that y_i and y_j are not correlated for $i \neq j$, whereas $\text{Var}(y_i)$ are as large as possible. After a spectral decomposition of non-negative definite matrix \sum_r we get the eigenvalue-eigenvector pairs of \sum_r : $(\lambda_1, \mathbf{e}_1), \dots, (\lambda_k, \mathbf{e}_k)$, where $0 \leq \lambda_k \leq \dots \leq \lambda_2 \leq \lambda_1$. Consequently, the i th component of \mathbf{r} is $y_i = \mathbf{e}_i^T \mathbf{r}$, where

$$\begin{aligned}\text{Var}(y_i) &= \mathbf{e}_i^T \sum_r \mathbf{e}_i, & i = 1, \dots, k, \\ \text{Cov}(y_i, y_j) &= \mathbf{e}_i^T \sum_r \mathbf{e}_j, & i \neq j, \text{ hold (Tsay (2005)).}\end{aligned}$$

We performed PCA using our econometric software and chose the first principal component (PC) as a new proxy for EM hedge funds` returns. The proportion of data variance explained by this first principal component is 97 %, so we reduced dimension of our dataset without much loss of information.

4.2.2 Vector autoregression – Granger causality

To test, whether, after controlling for past values, certain variables are helpful to forecast another variable, we implemented vector autoregression (VAR). VAR is a general framework used to describe the dynamic interrelationship between stationary variables. Whereas “the stochastic process $\{\mathbf{x}_t = 1, 2, \dots\}$ is stationary if for every collection of time indices $1 \leq t_1 < t_2 < \dots < t_m$, the joint distribution of $(\mathbf{x}_{t_1}, \mathbf{x}_{t_2}, \dots, \mathbf{x}_{t_m})$ is the same as the joint distribution of $(\mathbf{x}_{t_1+h}, \mathbf{x}_{t_2+h}, \dots, \mathbf{x}_{t_m+h})$ for all integers $h \geq 1$,” (Wooldridge (2009))¹⁰¹.

Performing the VAR, time series are modelled in terms of their own past, meaning that every variable is regressed on its own lagged values¹⁰², and lagged values of other variables under consideration. Numbers of lags of all variables in the system should capture all the dynamics of the modelled reality. One of the main uses of VAR models is therefore forecasting. The structure of the VAR model provides information about a variable`s or a group of variables` forecasting ability for another variable.

¹⁰¹ Rate of returns are in general considered as stationary data (actually, they are the first difference of NAV indices). Stationarity of our dataset was examined by a visual inspection, and confirmed afterwards using KSSP test (Kwiatkowski-Phillips-Schmidt-Shin (1992) test for the null hypothesis that an observable time serie is level or trend stationary). Contrary, the original indices that we obtained in levels (NAV) follow some time trend.

¹⁰² Inclusion of a lagged dependent variable should effectively absorb residual autocorrelation in the equation (Dooley and Hutchison (2009)).

To interpret the results which lagged variables is useful for prediction of particular dependent variable, *Granger causality* concept is used in our analysis. Time serie $\{z_t\}$ Granger causes $\{y_t\}$ conditional on $\{w_t\}$ if

$$E(y_t / \mathbf{I}_{t-1}) \neq E(y_t / \mathbf{J}_{t-1}),$$

where $\{w_t\}$ represent several additional series, and \mathbf{I}_{t-1} contains past information on $\{y_t\}$, $\{z_t\}$ and $\{w_t\}$, while \mathbf{J}_{t-1} contains past information on $\{y_t\}$ and $\{w_t\}$ (Wooldridge, 2009). However, it is certainly reasonable, to consider the usage of this conditional (extended) Granger causality carefully. It could be also possible that $\{z_t\}$ Granger causes $\{y_t\}$ ¹⁰³, but $\{z_t\}$ does not Granger cause $\{y_t\}$ conditional on $\{w_t\}$. Therefore we determined not only numbers of particular lags, but also the inclusion of individual variables, to get the most stable model. Nevertheless, as highlighted in Wooldridge, Granger causality should be interpreted in caution. Since there are only lagged values of the endogenous variables appearing on the right-hand side of the equations, simultaneity is not an issue. Contemporaneous causality between variables cannot be described, we are not enabled to determine the exogeneity or endogeneity of explanatory variables in particular equations¹⁰⁴.

Following the VAR methodology, we derived system of equations as stated below:

(1)

$$PC = \alpha_1 + \beta_{11}PC_{t-1} + \beta_{12}PC_{t-2} + \gamma_{11}CS_EM_Bcor_{t-1} + \gamma_{12}CS_EM_Bcor_{t-2} \dots + \delta_{11}M_EM_Bsov_{t-1} + \delta_{12}M_EM_Bsov_{t-2} \dots + \varepsilon_{11}MSCI_EM_{t-1} + \varepsilon_{12}MSCI_EM_{t-2} + \dots + \zeta_{11}FX_{t-1} + \zeta_{12}FX_{t-2} + \dots + u_{1t}$$

(2)

$$CS_EM_Bcor = \alpha_2 + \beta_{21}CS_EM_Bcor_{t-1} + \beta_{22}CS_EM_Bcor_{t-2} + \gamma_{21}PC_{t-1} + \gamma_{22}PC_{t-2} \dots + \delta_{21}M_EM_Bsov_{t-1} + \delta_{22}M_EM_Bsov_{t-2} \dots + \varepsilon_{21}MSCI_EM_{t-1} + \varepsilon_{22}MSCI_EM_{t-2} + \dots + \zeta_{21}FX_{t-1} + \zeta_{22}FX_{t-2} + \dots + u_{2t}$$

(3)

¹⁰³ $E(y_t / \mathbf{I}_{t-1}) \neq E(y_t / \mathbf{J}_{t-1})$, where \mathbf{I}_{t-1} contains past information on y and z , while \mathbf{J}_{t-1} contains past information only on y (Wooldridge, 2009).

¹⁰⁴ Note, that Granger causality is a weaker condition than the condition of endogeneity, whereas for the endogeneity of $\{y_t\}$ necessarily holds, that both current and past values of $\{z_t\}$ affect $\{y_t\}$ (Anders, 1995). Contrary, for Granger causality, only one significant non-zero lag of $\{z_t\}$ implies an existence of the relationship.

$$\begin{aligned}
M_EM_Bsov = & \alpha_3 + \beta_{31}M_EM_Bsov_{t-1} + \beta_{32}M_EM_Bsov_{t-2} + \gamma_{31}PC_{t-1} + \gamma_{32}PC_{t-2} \\
& + \delta_{31}CS_EM_Bcor_{t-1} + \delta_{32}CS_EM_Bcor_{t-2} + \dots + \epsilon_{31}MSCI_EM_{t-1} + \\
& \epsilon_{32}MSCI_EM_{t-2} + \dots + \zeta_{31}FX_{t-1} + \zeta_{32}FX_{t-2} + \dots + u_{3t}
\end{aligned} \tag{4}$$

$$\begin{aligned}
MSCI_EM = & \alpha_4 + \beta_{41}MSCI_EM_{t-1} + \beta_{42}MSCI_EM_{t-2} + \gamma_{41}PC_{t-1} + \gamma_{42}PC_{t-2} + \dots \\
& + \delta_{41}CS_EM_Bcor_{t-1} + \delta_{42}CS_EM_Bcor_{t-2} + \dots + \epsilon_{41}M_EM_Bsov_{t-1} + \\
& \epsilon_{42}M_EM_Bsov_{t-2} + \dots + \zeta_{41}FX_{t-1} + \zeta_{42}FX_{t-2} + \dots + u_{4t}
\end{aligned} \tag{5}$$

$$\begin{aligned}
FX = & \alpha_5 + \beta_{51}FX_{t-1} + \beta_{52}FX_{t-2} + \gamma_{51}PC_{t-1} + \gamma_{52}PC_{t-2} + \dots + \delta_{51}CS_EM_Bcor_{t-1} + \\
& \delta_{52}CS_EM_Bcor_{t-2} + \dots + \epsilon_{51}M_EM_Bsov_{t-1} + \epsilon_{52}M_EM_Bsov_{t-2} + \dots + \\
& \zeta_{51}MSCI_EM_{t-1} + \zeta_{52}MSCI_EM_{t-2} + \dots + u_{5t},
\end{aligned}$$

Where u_{it} 's are the stochastic error terms and are called innovations or shocks in the language of VAR. In our case, eq. (1) questions whether the EM stocks, currencies, corporate and sovereign bonds Granger caused EM hedge funds` returns. Subsequently, eq. (2) – (5) investigate the Granger causality from EM hedge funds to particular financial assets, in other words, whether EM hedge funds` returns have predictable power of basic financial assets based on historic data.

Consequently, under the null hypothesis that particular variable $\{z_t\}$ does not Granger cause corresponding dependent variable, any lags of $\{z_t\}$ we add to the equation, should have a zero population coefficient. Using a t test for restrictions on the particular lag of the variable, and F test for more lags of the variable we had added to the equation, we tested for a significance of regression` coefficient, and for a joint significance, respectively (Wooldridge (2009)).

4.3 Results

We are aware that in order to derive some conclusion on possible causal linkages between hedge funds and other financial assets during the financial crisis of 2007-2009, we should perform our VAR analysis in two subsequent periods (pre-crisis: January 2002 – June 2007; and the remaining period of global financial turmoil:

July 2007 – June 2009¹⁰⁵). However, available data observations for the second period are not sufficient for the VAR. Therefore, we will perform two-step analysis – for the whole period, and for the period without crisis months. Consequently, we will attribute differences in causal linkage to the global financial instability.

As a first step, we performed VAR analysis on the complete data set (January 2002 – June 2009). To mitigate the potential collinearity problem among different factors, we followed Liang (1998) and used stepwise method to select among our variables according to the standard Akaike's information criterion (AIC). Using backward elimination, which involves starting with all candidate variables and testing them one by one for statistical significance, deleting any that are not significant, we aimed to catch the most relevant factors while avoiding the redundant ones. This means that in the very last phase of the backward elimination, we investigated not only conditional Granger causality, but also the bivariate relationship between two time series. Continuously, we have employed this procedure for different numbers of lags up to twelve.

Finally, comparing minimum AIC and results of particular F tests (with the null hypothesis that coefficients are jointly equal zero), we identified the most stable model, reported below (see Table 4)¹⁰⁶. Note, that we reported only significant variables in each equation (meaning, the p-value is sufficiently low for corresponding coefficients)¹⁰⁷. Resulting model includes all variables under our consideration, and covers five lagged time periods (the number of lags in the system does not diverge from the theoretical assumption of 6-12 lags for monthly data, suggested throughout the literature; Wooldridge (2009), for instance). Our model has the lowest AIC of 18.47¹⁰⁸, R^2 ranging between 43 % and 58 %. We also inspected Durbin-Watson (DW) statistics, which is around two in all cases¹⁰⁹. Before we introduce our results, note, that

¹⁰⁵ After data visual inspection, we chose June 2007 (when indices volatily occurred) as our structural break.

¹⁰⁶ Results for other models are available upon request.

¹⁰⁷ We assume statistical significance at 1% (***) , 5% (**), and 10% (*) level.

¹⁰⁸ Criterion, introduced by Akaike in 1969, for choosing between competing statistical models (originally proposed for time-series). We chose the model that minimizes $G^2 - 2\nu$, where G^2 is the likelihood-ratio goodness-of-fit, and statistic ν is the number of degrees of freedom associated with the model (<http://www.modelselection.org/aic/>).

¹⁰⁹ The DW statistic, in a form of $DW = \sum(\epsilon_t - \epsilon_{t-1})^2 / \sum \epsilon_t^2$, can take values between zero (if the correlation coefficient between residuals is exactly plus one) and four (if the corresponding correlation coefficient between residuals is exactly minus one). Thus values close to zero or four indicate serial correlation, whereas values close to two indicate no serial correlation.

coefficients of VAR analysis are to be understood as (contemporaneous) effects of one percentage point change in corresponding indices of right-hand side variables.

From the viewpoint of our first research question, we found that EM hedge funds' returns are significantly Granger caused by their own past values (lag 3), EM currencies' exchange rates (lag 2, and lag 5), and not surprisingly, also by EM stocks (lag 3, and lag 5). Contrary, both sovereign and corporate bonds failed to Granger cause hedge funds' returns. Following statements result from values of particular coefficients.

Hedge funds' indices carry some predictive information about their future value in three months; the higher the index, the higher its value will be in three months. Resulting time span can be attributed to announcement period (many data vendors report the performance of indices quarterly; Morningstar for instance). EM currencies were found to be helpful for predicting the hedge funds' returns in two and five months. In addition, EM stocks Granger caused hedge funds' returns in a sense, that the lower the stock performance, the better the performance of hedge funds. Assuming the low coefficients, this may suggest slightly predominant short positions in stocks during the period. Similar result is shown also by the *FX* coefficients (slightly negative in aggregate), where the average effect suggests bets on currencies depreciation during the period.

Table 4: VAR – Gretl output (January 2002 – June 2009)

VAR system, lag order 5				
OLS estimates, observations 2002:01-2009:06 (T = 85)				
AIC = 18,47				
Equation 1: MSCI_EM				
	Coefficient	Std. Error	t-ratio	p-value
MSCI_EM_lag5	-0,63	0,38	-1,67	0,10
FX_lag2	-2,95	1,32	-2,24	0,03
FX_lag5	1,90	0,92	2,06	0,04
PC_lag3	4,09	1,96	2,09	0,04
CS_EM_Bcor_lag1	1,36	0,77	1,75	0,09
CS_EM_Bcor_lag4	1,40	0,75	1,88	0,06
CS_EM_Bcor_lag5	-1,50	0,73	-2,05	0,04
<i>Unadjusted R2 = 0,45</i> <i>F-statistic (25, 59) = 1,93 (p-value = 0,02)</i> <i>Durbin-Watson statistic = 2,20</i> <i>F-tests of zero restrictions:</i> <i>All vars, lag 5 F(5, 59) = 2,35, p-value 0,05</i>				
Equation 2: FX				
	Coefficient	Std. Error	t-ratio	p-value
<i>no significance at all</i>				
<i>Unadjusted R2 = 0,58</i> <i>F-statistic (25, 59) = 3,23 (p-value = 0,00)</i> <i>Durbin-Watson statistic = 2,08</i> <i>F-tests of zero restrictions:</i> <i>All vars, lag 5 F(5, 59) = 0,45, p-value 0,81</i>				
Equation 3: PC				
	Coefficient	Std. Error	t-ratio	p-value
MSCI_EM_lag3	-0,16	0,09	-1,74	0,09
MSCI_EM_lag5	-0,15	0,09	-1,78	0,08
FX_lag2	-0,61	0,30	-2,06	0,04
FX_lag5	0,40	0,21	1,92	0,06
PC_lag3	1,10	0,44	2,49	0,02
<i>Unadjusted R2 = 0,47</i> <i>F-statistic (25, 59) = 2,09 (p-value = 0,01)</i> <i>Durbin-Watson statistic = 2,17</i> <i>F-tests of zero restrictions:</i> <i>All vars, lag 5 F(5, 59) = 1,70, p-value 0,15</i>				
Equation 4: CS_EM_Bcor				
	Coefficient	Std. Error	t-ratio	p-value
<i>Unadjusted R2 = 0,49</i>				

Const	0,99	0,59	1,68	0,10	*	<i>F</i> -statistic (25, 59) = 2,28 (p-value = 0,00)
MSCI_EM_lag3	-0,24	0,14	-1,69	0,10	*	Durbin-Watson statistic = 2,08
FX_lag3	-1,63	0,46	-3,57	0,00	***	<i>F</i> -tests of zero restrictions:
PC_lag3	1,71	0,68	2,51	0,01	**	All vars, lag 5 <i>F</i> (5, 59) = 1,89, pvalue 0,11
Equation 5: M_EM_Bsov						
	Coefficient	Std. Error	t-ratio	p-value		
const	1,62	0,69	2,34	0,02	**	
MSCI_EM_lag1	-0,28	0,16	-1,74	0,09	*	
MSCI_EM_lag3	-0,31	0,17	-1,88	0,06	*	
FX_lag3	-1,44	0,54	-2,69	0,01	***	
FX_lag4	0,87	0,47	1,84	0,07	*	Unadjusted R2 = 0,43
FX_lag5	0,78	0,38	2,07	0,04	**	<i>F</i> -statistic (25, 59) = 1,80 (p-value = 0,03)
PC_lag1	1,41	0,77	1,84	0,07	*	Durbin-Watson statistic = 2,05
PC_lag3	2,05	0,80	2,56	0,01	**	<i>F</i> -tests of zero restrictions:
CS_EM_Bcor_lag1	0,56	0,32	1,77	0,08	*	All vars, lag 5 <i>F</i> (5, 59) = 2,52, pvalue 0,04
For the system as a whole Null hypothesis: the longest lag is 4 Alternative hypothesis: the longest lag is 5 Likelihood ratio test: Chi-square(25) = 59,61 (p-value 0,00)						

Source: Author`s analysis

To address our second hypothesis, we found out that despite the certain difficulty in attributing causality from bonds to hedge funds, our empirical evidence supports the opposite direction relationship in a sense of Granger causality. The possible reason may be the relatively underdeveloped bond markets in emerging economies, so bonds are more likely to be dependent on hedge funds. While corporate bonds can be predicted using only the third lag of hedge funds` indices, forecasting of sovereign bonds` returns is improved using the first as well as the third lag of *PC*. In both cases, the coefficient of *PC* lagged values is positive (ranging from 1.41 to 2.05), and highly significant. Besides the bonds, also EM stocks appeared to be Granger caused by hedge funds` returns (again, a three-month lag is significant). Interestingly, any asset classes exhibited significant predicting power towards EM currencies. Mutual relationships among financial assets, attributing predicting power of particular asset class to another, are to be derived from Table 4 as well. Nevertheless, we will not comment on this, as the interest of our thesis is primarily focused on hedge funds` activity.

As a second step, we performed identical analysis considering time period of January 2002 – June 2007, in order to be able to assess how these causalities were affected by the global financial turmoil. Resulting model is a second-order VAR (the longest lag length is two). However, it is not that stable as in the previous case, moreover, findings are not that straightforward. We attributed this fact to contraction of time period under our consideration.

Table 5: VAR – Gretl output (January 2002 – June 2007)

VAR system, lag order 2					
OLS estimates, observations 2002:01-2007:06 (T = 64)					
AIC = 16,48					
Equation 1: MSCI_EM					
<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>		
<i>no significance at all</i>					
<div style="float: right;"> <i>Unadjusted R2 = 0,12</i> <i>F-statistic (10, 53) = 0,70</i> <i>(p-value = 0,72)</i> <i>Durbin-Watson statistic = 2,06</i> <i>F-tests of zero restrictions:</i> <i>All vars, lag 2 F(5, 53) = 2,35</i> <i>p-value 0,55</i> </div>					
Equation 2: FX					
<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>		
CS_EM_Bcor_lag2	-0,3	0,16	-1,86	0,09	*
FX_lag1	0,28	0,13	2,18	0,03	**
<div style="float: right;"> <i>Unadjusted R2 = 0,47</i> <i>F-statistic (10,53) = 4,79 (value=0,00)</i> <i>Durbin-Watson statistic = 2,12</i> <i>F-tests of zero restrictions:</i> <i>All vars, lag 2 F(5,53) = 2,20, p-value 0,07</i> </div>					
Equation 3: PC					
<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>		
<i>no significance at all</i>					
<div style="float: right;"> <i>Unadjusted R2 = 0,12</i> <i>F-statistic (10, 53) = 0,73 (p-value = 0,69)</i> <i>Durbin-Watson statistic = 2,05</i> <i>F-tests of zero restrictions:</i> <i>All vars, lag 2 F(5, 53) = 0,52, p-value 0,76</i> </div>					
Equation 4: CS_EM_Bcor					
<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>		
const	0,69	0,37	1,85	0,07	*
CS_EM_Bcor_2	-0,55	0,25	-2,23	0,03	**
M_EM_Bsov_2	0,27	0,14	1,92	0,06	*
FX_1	0,36	0,19	1,87	0,07	*
<div style="float: right;"> <i>Unadjusted R2 = 0,30</i> <i>F-statistic (10, 53) = 2,24 (p-value = 0,03)</i> <i>Durbin-Watson statistic = 2,05</i> <i>F-tests of zero restrictions:</i> <i>All vars, lag 2 F(5, 53) = 0,92, p-value 0,02</i> </div>					
Equation 5: M_EM_Bsov					
<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>		
const	1,35	0,73	1,84	0,07	*
CS_EM_Bcor_2	-0,83	0,48	-1,71	0,09	*
M_EM_Bsov_2	0,55	0,27	1,99	0,05	*
<div style="float: right;"> <i>Unadjusted R2 = 0,19</i> <i>F-statistic (10, 53) = 1,26 (p-value = 0,28)</i> <i>Durbin-Watson statistic = 2,08</i> <i>F-tests of zero restrictions:</i> <i>All vars, lag 2 F(5, 53) = 1,93, p-value 0,10</i> </div>					
For the system as a whole Null hypothesis: the longest lag is 1 Alternative hypothesis: the longest lag is 2 Likelihood ratio test: Chi-square(25) = 55,14 (p-value 0,00)					

Source: Author`s analysis

The results for the VAR analysis excluding the crisis time period are summarized in Table 5: VAR – Gretl output (January 2002 – June 2007). The outcome is more affected by the common drawback of VAR – over-parameterized models. Despite the fact, that this model as a whole, appeared to be the most stable according to AIC and *F* tests from the all lag-variable combinations for pre-crisis period, two equations from our five-variable system displayed insignificant results (we cannot reject the null hypothesis of coefficients jointly equal zero). Namely, we failed to establish Granger causality enhancers of stocks and hedge funds. What is more, remaining causalities we identified do not involve hedge funds` returns as prediction enhancers. Using a 10 percent significant level as a testing criterion, we only detected mutual Granger causality running among both corporate and sovereign bonds, and EM

domestic currencies. We observed some shortening of predictive horizon in comparison with the whole sample period from mainly three to two months.

All in all, we failed to prove our hypothesis for period January 2002 – June 2007. However, including crisis period into our analysis, we found evidence in sense of Granger causality of mutual effects on basic financial assets and hedge funds returns on emerging markets. This bidirectional Granger causality suggests that the markets are not efficient during the period; consequently, financial assets` prices can be predicted by using the price information attributed to historic data of other assets. We state, that hedge funds may have affected emerging markets stocks and bonds during the global financial turmoil¹¹⁰.

¹¹⁰ Similar issue was analyzed by Azman – Saini (2006), who utilized monthly data from January 1994 to April 2002 in order to explore the nature of causal linkages between hedge funds and exchange rates of Thai baht and Malaysian ringgit. He found mixture evidence, whereas hedge funds Granger caused only ringgit in period 1994 – 1997, and contrary, only baht during the period of volatile markets in 1997-2002. In addition, Füss and Kaiser (2009) found in Asia a long term causal relationship in a Granger causality sense that runs from hedge funds and stocks to bonds. Whereas in Latin America, traditional assets market influence hedge funds prices. Further, Fung and Hsieh (2000) conclude that there was only little evidence that hedge funds systematically caused market prices to deviate from economic fundamentals.

5. Conclusion

Hedge funds are private pooled investments which currently fall outside many of the rules and regulations concerning investors' protections and disclosure requirements that govern other traditional investment vehicles, such as mutual funds. As a consequence, they can gain tremendous investment freedom, trading a huge variety of securities, usually on a leveraged basis. They "collect money that is left on the table", they trade when other market participants cannot, choose not to, or must be on the other side of the transaction. However, investors are still sometimes untrusting due to unregulated aspects of hedge funds, or redemption restrictions. Moreover, high initial investments requirement may prevent some of them from investing in hedge funds.

The initial part of this thesis aims to shed light on expanding hedge funds universe with the stress on performance characteristics. We documented growing evidence that supports the surmise that hedge funds can substantially reduce downside risk in portfolios while delivering excess returns (high alpha) uncorrelated with traditional market assets. Therefore they are also supposed to provide meaningful diversification benefits in portfolios. However, we discussed not only the results of traditional risk-reward analysis, but also considered the existence of fat tails (deviations from normally distributed returns that imply severe damages occurring with low probabilities), and different data biases. We admitted that hedge funds lose some of their attractiveness after reflecting skewness and kurtosis of return distribution. The first theoretical part is concluded by up-to-date topic of hedge funds transparency.

Recent turbulent development on financial markets has provoked need for more effective due diligence. We believe, that market participants, especially institutional investors, will be transparent in their own interest. Regulators should focus mainly on risk management and valuation approaches of hedge funds' counterparties as large international investment and commercial banks. It was not clear if those financial institutions are themselves always aware of specific risk associated with hedge fund investments, or if their retail clients are fully informed about prospective allocation of capital into hedge funds.

Consequent part of our thesis introduces emerging markets as a suited investment environment for hedge funds. These markets feature plenty of information

asymmetries, structural inefficiencies, and tremendous mispricings. Hedge funds are supposed to be well equipped to take advantage of specific opportunities on these markets due to their flexibility. Theoretically, they are designed to gain from market volatility while quickly changing long and short positions. Nevertheless, closer insight detected different limitations imposed on hedge funds flexible investments in form of local regulation or lack of sufficient liquidity. In the case of emerging markets, investment strategies actually appear often more based on equity or bonds.

Since emerging markets are generally less liquid whereas participants can build positions which are large relative to size of markets, they are also sensitive to various speculative and destabilizing activities. There have been concerns that chiefly hedge funds are contributing to financial instability while rapidly building up or liquidating of large positions. One of the most typical examples of financial instability events when hedge funds were charged of playing a pivotal role are currency crisis in South-East Asia in the late 1990s. However, we have not been successful in finding any decisive evidence throughout available literature that hedge funds were obviously at the front of the herd during attacks against local currencies. Despite their certain contribution to worsening pressures, prevailing amount of authors attributed the crisis to numerous real economy problems of the region. The exculpatory evidence is even more eloquent in the case of the global financial crisis of 2007-2009.

As we anticipated further, the global credit crisis has been testing the resilience and sustainability of emerging markets' policies. The high growth rates, massive foreign exchange reserves, balanced budgets and rising consumerism in the emerging markets were firstly believed to ensure "decoupling" from worsening conditions in developed economies. Indeed, the global financial crisis had taken some time to spread from the industrialised countries to the emerging markets. But in October 2008, the contagion spread rapidly, affecting all emerging markets, without any distinction. Even strong performers are not shielded against pure financial contagion. In the third phase of the crisis, beginning from the "Lehman Day", all emerging market asset classes were hit – stocks, bonds and currencies. Credit crunch accelerated serious negative impacts on the world trade and sharp decline in investors' confidence.

Contrary to Asian crisis, when especially funds focusing on developing markets were seriously hit, as many as 89 % of all hedge funds displayed negative returns during the last period of the recent financial crisis. However, our strategy in question, emerging market hedge funds, became suddenly leaders of the industry with upward

trend in time. EM hedge funds delivered 40.4 % return for the year 2009, which has been the best twelve months for the strategy since 1999. Thus, it outperformed majority of other strategies and composite indices and filled the expectations that bigger risk is rewarded by the bigger benefit. Profits were led by funds investing mainly in Russia, Latin America, and Emerging Asia, increasing mainly from shorting the dollar and holding long positions in EM stocks. This above standard performance followed the historic decline of 37.26 % in the same index during 2008, the worst performance year since 1990 when the year to year decline in AUM reached approximately 50%.

Finally, in our empirical part, we attempt to analyze possible affects of EM stocks and bonds prices, as well as local currencies exchange rates on EM hedge funds performance. In addition, also the opposite causality was explored.

We have not find any evidence of direct interrelations during the recent global financial turmoil between hedge funds` activity and prices of stock, bonds, and currencies on emerging markets throughout available literature. However, our own analysis using a principal component of three different EM hedge funds indices shown possible relationships in sense of Granger causality. We run vector autoregression for two subsequent periods (pre-crisis: January 2002 – June 2007, and the remaining period of global financial turmoil: July 2007 – June 2009). All in all, we failed to prove our hypothesis for the pre-crisis period. Using a 10 percent significant level as a testing criterion, we only detected mutual Granger causality running between both corporate and sovereign bonds, and EM domestic currencies. However, including crisis period into our analysis, we found evidence in sense of Granger causality, of mutual effects on basic financial assets and hedge funds returns in emerging markets. From the viewpoint of our first research question, we found that EM hedge funds` returns are significantly Granger caused by their own past values, EM currencies` exchange rates, and not surprisingly, also by EM stocks. Contrary, both sovereign and corporate bonds failed to Granger cause hedge funds` returns. This bidirectional Granger causality suggests that the markets are not efficient during the period; consequently, financial assets` prices can be predicted by using the price information attributed to historic data of other assets. We state, that hedge funds may have affected emerging markets stocks and bonds during the global financial turmoil.

Bibliography

ACKERMANN, C., MCENALLY, R., RAVNSCRAFT, D. *The Performance of Hedge Funds: Risk, Return, and Incentives*. The Journal of Finance, Vol. IV, No. 3, 1999, pp. 833-874.

AMENC, N., GOLTZ, F., MARTELLINI, L., *Hedge Funds from the Institutional Investor's Perspective*. EDHEC Risk and Asset Management Centre, 2005.
http://docs.edhec-risk.com/EAID-2007/doc/HF_from_Its_Perspective.pdf

AMIN, G. S., KAT, H. M., *Hedge Fund Performance 1990-200: Do the "Money Machines" Really Add Value?* Journal of Finance and Quantitative Analysis, Vol. 38, No. 2, June 2003.
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=270074

ANSON, M. J., *Handbook of Alternative Assets*. John Wiley and Sons, Inc., September 2006, 720 p. ISBN: 978-0-471-98020-9.

AZMAN-SAINI, W.N.W., *Hedge Funds, Exchange Rates and Causality: Evidence from Thailand and Malaysia*. October 2006.
<http://www.informaworld.com/smpp/content-content=a793014988-db=all-jumptype=rss>

BARCLEY HEDGE. *Directory of Funds of Hedge Funds*. 7th Annual Ed. 2008.
www.barclayhedge.com

BARES, P. A., GIBSON, R., GYGER, S., *Performance in the Hedge Funds Industry: An Analysis of Short and Long-Term Persistence*. Journal of Alternative Investments, Vol. 6, No. 3, pp. 25-41, Winter 2003.
<http://ssrn.com/abstract=489441>

BEKAERT, G., HARVEY, C. R., *Emerging Markets Finance*. December, 2002.
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=350180

BEKAERT, G., HARVEY, C. R., *Research in Emerging Market Finance: Looking to the Future*. September 2002.
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=795364

BOORMAN, J., *The Impact of the Financial Crisis on Emerging Market Economies: The Transmission Mechanism, Policy Response and Lessons*. Global Meeting of the Emerging Forum 2009 – Discussion Draft, June 2009.
http://www.emergingmarketsforum.org/papers/pdf/2009-EMF-Global-Boorman_Financial_Crisis.pdf

BROWN, S., GOETZMANN, W. N., PARK, J., *Hedge Funds and the Asian Currency Crisis of 1997*. NBER Working Paper No. 6427, February 1998.
<http://www.nber.org/papers/w6427>

BUITER, W. H., *James Tobin – An Appreciation of His Contribution to Economics*. NBER Working Paper No. W9753, June 2003.
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=414251

CAPOCCI, D.P.J., *An Analysis of Hedge Fund Strategies*. HEC-ULG Management School – University of Liège, PhD Thesis in Management, 2007.
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1008319

CAPOCCI, D.P.J., HUBNER, G., *An Analysis of Hedge Fund Performance*. University of Liège, Working Paper No. 0109, 2001.

http://papers.ssrn.com/sol3/papers.cfm?abstract_id=368460

CARHART, M. M., *On Persistence in Mutual Fund Performance*. Journal of Finance, Volume 52, Issue 1, March 1997, pp. 57-82.

[http://stuwwww.uvt.nl/fat/files/library/Carhart.%20Mark%20M.%20-%20On%20Persistence%20in%20Mutual%20Fund%20Performance%20\(1997\).pdf](http://stuwwww.uvt.nl/fat/files/library/Carhart.%20Mark%20M.%20-%20On%20Persistence%20in%20Mutual%20Fund%20Performance%20(1997).pdf)

CARPENTER, J. N., *The Optimal Dynamic Investment Policy for a Fund Manager with an Incentive Fee*. Working Paper New York University, 1995.

http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1298323

COALITION OF PRIVATE INVESTMENT COMPANIES, *Financial Detectives: Defending Shareholder Value by Demanding Accountability – A Primer on Short Selling*. 2009.

<http://www.financialdetectives.org/wp-content/uploads/2009/04/financial-detectives.pdf>

CONWAY, A., *2009: A Year in Emerging Markets*. Schroders, December 2008.

<http://www.schroders.com/staticfiles/Schroders/Market%20Strategy%20And%20News/Articles%20and%20Interviews/English/A-year-in-Emerging-Markets-2009-20081210-AUEN.pdf>

CUMMING, D., *Hedge Fund Regulation and Performance*. September 2008.

http://aima-canada.org/doc_bin/A_Cumming_Returns_Paper_2008.pdf

DOOLEY, M. P., HUTCHISON, M. M., *Transmission of the US Subprime Crisis to Emerging Markets: Evidence on the Decoupling-recoupling Hypothesis*. NBER Working Paper No. 15120, June 2009.

<http://www.nber.org/papers/w15120>

DORNBUSCH, R., *A Primer on Emerging Market Crisis*. NBER Working Paper No. 8326, June 2001.

<http://www.nber.org/papers/w8326>

EICHENGREEN, B., MATHIESON, D., *Hedge Funds: What Do We Really Know?* International Monetary Fund, 2999.

<http://www.hedgefundprofler.com/Documents/118.pdf>

ELING, M., *Autocorrelation, Bias, and Fat Tails – Are Hedge Funds Really Attractive Investments?* Derivatives Use, Trading & Regulation, Vol. 12, No. 1, 2006, pp. 28-47.

<http://ssrn.com/abstract=869769>

ENDERS, W., *Applied Econometric Time Series*. John Wiley & Sons, 1995. ISBN 0-471-03941-1

FAMA, E.F., FRENCH, K.R., *Common risk Factors in the Returns on Stocks and Bonds*, Journal of Financial Economics 33, No. 1, 1993, pp. 3-56.

<http://home.business.utah.edu/finml/fin787/papers/FF1993.pdf>

FAMA, E.F., FRENCH, K.R., *The Capital Asset Pricing Model: Theory and Evidence*. Journal of Economic Perspectives, Vol. 18, No. 3, 2004, pp. 25-46.

<http://www-personal.umich.edu/~kathrynd/JEP.FamaandFrench.pdf>

FRANK, N., HESSE, H., *Financial Spillovers to Emerging Markets During the Global Financial Crisis*. IMF Working Paper – WP/09/104, May 2009.

http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1408887

- FUNG, W., HSIEH, D.A., *Empirical Characteristics of Dynamic Trading Strategies: The Case of Hedge Funds*. *Review of Financial Studies* 10, 1997, pp. 275-302.
<http://faculty.fuqua.duke.edu/~dah7/rfs1997.pdf>
- FUNG, W., HSIEH, D.A., *A Primer on Hedge Funds*. *Journal of Empirical Finance*, Vol.6, 1999, pp. 309-331.
<http://faculty.fuqua.duke.edu/~dah7/primer.pdf>
- FUNG, W., HSIEH, D. A., *Measuring the Market Impact of Hedge Funds*. *Journal of Empirical Finance*, Vol. 7, Issue 1, May 2000, pp. 1-36.
<http://www.sciencedirect.com>
- FUNG, W., HSIEH, D. A., NAIK, N. Y., RAMADORAI, T., *Hedge Funds: Performance, Risk, and Capital Formation*. AFA Chicago Meetings Paper, 2006.
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=778124
- FUNG, W., HSIEH, TSATSARONIS, K., *Do Hedge Funds Disrupt Emerging Markets?* *Brookings-Wharton Papers on Financial Services*, 2000, pp. 377-401.
http://muse.jhu.edu/journals/brookings-wharton_papers_on_financial_services/v2000/2000.1fung.html
- FÜSS, R., KAISER, D. G., *Dynamic Linkages between Hedge Funds and Traditional Financial Assets: Evidence from Emerging Markets*. European Business School Research Paper No. 09-19, April 2009.
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1112247
- GRANGER, C. W. J., NEWBOLD, P., *Spurious Regressions in Econometrics*. *Journal of Econometrics* 2, 1974, pp. 111—120.
<http://www.sciencedirect.com>
- GREGORIOU, G. N., HÜBNER, G., ROUAH, F., *Hedge Funds – Insights in Performance Measurement, Risk Analysis, and Portfolio Allocation*. John Wiley & Sons, Inc., 2005, 653 p. ISBN 978-0-471-73743-8.
- HAGELIN, N., PRAMBORG, B., AND STENBERG, F., *Hedge Fund Allocation under Higher Moments and Illiquidity*. In *Hedge Funds: Insights In Performance Measurement, Risk Analysis, And Portfolio Allocation*, G. Gregoriou, G. Huebner, N. Papageorgiou, F. Rouah, eds., John Wiley & Sons, 2005, pp. 105-128.
<http://ssrn.com/abstract=796605>
- HAMILTON, J. D., *Causes and Consequences of the Oil Shock of 2007-08*. *Brookings Papers – An Economic Activity*, March 2009.
http://www.brookings.edu/economics/bpea/~media/Files/Programs/ES/BPEA/2009_spring_bpea_papers/2009_spring_bpea_hamilton.pdf
- HEDGE FUND RESEARCH (HFR), *Emerging Markets Hedge Funds Preserve Gains as Sovereign Risk Rises*. February 2010.
https://www.hedgefundresearch.com/pdf/pr_20100217.pdf
- HEDGE FUND RESEARCH (HFR), *Emerging Markets Hedge Funds Lead Industry Recovery*. May 2009.
https://www.hedgefundresearch.com/pdf/pr_20090529.pdf
- HEDGE FUND RESEARCH (HFR), *Emerging Markets Hedge Fund Industry Report – Year End 2007*. January 2008.

HSBC, *Emerging Markets Insights 2010*. HSBC` Emerging Markets Insights annual reports, 2010.

http://www.hsbc.com/1/PA_1_1_S5/content/assets/emi/2010/1001_em_insights_report.pdf

IBBOTSON, R.G., CHEN, P., *The A, B, Cs of Hedge Funds: Alphas, Betas, and Costs*. Yale ICF Working Paper, No. 06-10, September 2006.

http://papers.ssrn.com/sol3/papers.cfm?abstract_id=733264

INTERNATIONAL FINANCIAL SERVICES LONDON, *Hedge Funds Survey 2009*. IFSL Research Survey, April 2009.

<http://www.ifsl.org.uk/output/ReportItem.aspx?NewsID=73>

INTERNATIONAL MONETARY FUND, *World Economic Outlook, April 2010: Rebalancing Growth*. World Economic and Financial Surveys, IMF, 2010.

<http://www.imf.org/external/pubs/ft/weo/2010/01/pdf/c1.pdf>

INTERNATIONAL MONETARY FUND, *Global Financial Stability Report: Responding to the Financial Crisis and Measuring Systematic Risk*. World Economic and Financial Surveys, IMF, April 2009.

<http://www.imf.org/external/pubs/ft/qfsr/2009/01/pdf/text.pdf>

INTERNATIONAL MONETARY FUND, *World Economic Outlook, October 2008: Financial Stress, Downturns, and Recoveries*. World Economic and Financial Surveys, IMF, 2008.

<http://www.imf.org/external/pubs/ft/weo/2008/02/pdf/text.pdf>

INTERNATIONAL MONETARY FUND, *Global Financial Stability Report, Market Developments and Issues*. IMF, April 2007.

JÍLEK, J., *Deriváty, hedžové fondy, offshorové společnosti*. Grada 2006, 260 p. ISBN 80-247-1826-X.

KAT, H. M., *Integrating Hedge Funds into the Traditional Portfolio*. Alternative Investment Research Centre Working Paper Series, Working Paper No. 0022, 2005.

<http://www.ijournals.com/toc/jwm/7/4?cookieSet=1>

KAZEMI, H., SCHNEEWIES, T., *Conditional Performance of Hedge Funds*. 2003.

<http://cisdm.som.umass.edu/research/pdffiles/conditionalperformanceofhedgefunds.pdf>

KOH, F. C. C., KOH, W. T. H., LEE, D. K. C., PHOON, K. F., *Investing in Hedge Funds: Risks, Returns, and Performance Measurement*. In *Hedge Funds: Insights In Performance Measurement, Risk Analysis, And Portfolio Allocation*, G. Gregoriou, G. Huebner, N. Papageorgiou, F. Rouah, eds., John Wiley & Sons, 2005, pp. 341-364.

http://papers.ssrn.com/sol3/papers.cfm?abstract_id=637461

KOOLI, M., *Further Evidence on Hedge Fund Performance: A Calendar-Time Approach*. In *Hedge Funds: Insights In Performance Measurement, Risk Analysis, And Portfolio Allocation*, G. Gregoriou, G. Huebner, N. Papageorgiou, F. Rouah, eds., John Wiley & Sons, 2005, pp. 323-340, 2005.

LIANG, B., *On the Performance of Hedge Funds*. May 1998.

http://papers.ssrn.com/sol3/papers.cfm?abstract_id=89490

MALLIN, CH. A. *Corporate Governance*. Oxford University Press, 2004.
ISBN 0-19-926131-8, Ch.6.

MCGUIRE, P., TSATSARONIS, K., *Estimating Hedge Fund Leverage*. BIS Working Paper No. 260, September 2008.
<http://www.bis.org/publ/work260.pdf?noframes=1>

MISHKIN, F. S., *The Economics of Money, Banking, and Financial Markets*. 8th ed. The Edison-Wesley Series in Economics, 2007, 660 p.
ISBN 0-321-28726-6.

PATTON, A. J., *Are "Market Neutral" Hedge Funds Really Market Neutral?* Duke University - Department of Economics; University of Oxford - Oxford-Man Institute of Quantitative Finance, 2004.
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=557096

PESKIN, M.W., URIAS, M.S., ANJILVEL, S., BOUDREAU, B.E., *Why Hedge Funds Make Sense*. Morgan Stanley Dean Witter Overview, November 200.
<http://www.scribd.com/doc/19606896/Morgan-Stanley-Whay-Hedge-Funds-Make-Sense>

POSTHUMA, N., VAN DER SLUIS, P. J., *Analyzing Style Drifts in Hedge Funds*. In *Hedge Funds: Insights In Performance Measurement, Risk Analysis, And Portfolio Allocation*, G. Gregoriou, G. Huebner, N. Papageorgiou, F. Rouah, eds., John Wiley & Sons, 2005, pp. 83-104.

PRABHU S., *Long-Term Capital Management: The Dangers of Leverage*. Duke University, Durham, May 2001.
<http://econ.duke.edu/dje/2001/prabhu.pdf>

PREQUIN Ltd., *Overview of the Global Hedge Fund Institutional Universe: Special Report*. November 2008.
http://www.prequin.com/docs/reports/Prequin_Research_November08.pdf

RAMARKRISHNAN, V., *Subprime Contagion Less in Emerging Market*. Reuters, September 2007.
<http://www.reuters.com/article/idUSBOM23423620070912>

RESERVE BANK OF AUSTRALIA, *The Impact of Hedge Funds on Financial Markets*. Paper submitted to the Financial Stability Forum Working Group on Highly Leveraged Institutions, for its meeting on 4 June 1999.
http://www.rba.gov.au/PublicationsAndResearch/SubmissionsToParliamentaryCommittees/impact_of_hedge_funds.pdf

RIEMLOVÁ, S., *Hedge Funds; Performance Within the Subprime Mortgage And Financial Crisis 2007/2008*. Univerzita Karlova v Praze. Fakulta sociálních věd. Institut ekonomických studií. 2007, pp .101, Tutor: PhDr. Petr Teplý.
<http://ies.fsv.cuni.cz/work/index/show/id/1002/lang/en>

RYBACK, W. A., *Hedge Funds in Emerging Markets*. Financial Stability Review No. 10, Banque de France, April 2007.
http://www.banque-france.fr/gb/publications/telechar/rsf/2007/etud15_0407.pdf

ROUAH, F., *A Literature Review of Hedge Fund Performance Studies*. In *Hedge Funds: Insights In Performance Measurement, Risk Analysis, And Portfolio Allocation*, G. Gregoriou, G. Huebner, N. Papageorgiou, F. Rouah, eds., John Wiley & Sons, 2005, pp. 259-272.

SANDLERIS, G., WRIGHT, M. L. J., *The Costs of Emerging Market Financial Crisis: Output, Productivity and Welfare*. November 2009.
<http://federation.ens.fr/ydepot/semin/texte0910/SAN2009COS.pdf>

SCHNEEWEIS, T., KAZEMI, H., MARTIN, G., *Understanding Hedge Fund Performance: Research Results and Rules of Thumb for the Institutional Investor*. 2001
<http://cisdm.som.umass.edu/research/pdf/understandingperformance.pdf>

SHADAB, H. B., *The Law and Economics of Hedge Funds: Financial Innovation and Investor Protection*. *Berkeley Business Law Journal*, Vol. 6, No.1, 2009.
<http://www.law.uiuc.edu/~shared/pdfs/LEofHedgeFunds-Shadab.pdf>

STARKS, L. T., *Performance Incentive Fees: An Agency Theoretic Approach*. *Journal of Finance and Quantitative Analysis* 22, 1987, pp. 17-32.
<http://www.mcombs.utexas.edu/faculty/laura.starks/starks%20ifqa%201987.pdf>

STRÖMQVIST, M., *Should You Invest in Emerging Market Hedge Funds?* September, 2007.
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=985547

STRÖMQVIST, M., *Hedge Funds and the Financial Crisis of 2008*. Riksbank - Economic Commentaries No. 3, March 2009.
http://www.riksbank.com/upload/Dokument_riksbank/Kat_publicerat/Ekonomiska%20kommentarer/2009/ek_kom_no3_eng.pdf

TSAY, S. R., *Analysis of Financial Time Series*. John Wiley & Sons, 2nd ed., 2005. ISBN 978-0-471-69074-0

VITAL WAVE CONSULTING, *Emerging Markets Definition and World Market Segments*. 2009.
<http://www.vitalwaveconsulting.com/pdf/Emerging%20Markets%20Definition%20and%20World%20Market%20Groups.pdf>

WOOLDRIDGE, J. M., *Introductory Econometrics – A Modern Approach*. South – Western Cengage Learning, 4th ed., 2009. ISBN 978-0-324-78890-7

TREMONT PARTNERS, Inc. Partners INVESTMENT RESEARCH Ltd., *The Case for Hedge Funds*. *The Journal of Alternative Investments* Winter 1999, Vol. 2, No. 3, pp. 63-75.

YOON, G., *Correlation Coefficients, Heteroskedasticity, and Contagion of Financial Crisis*. January 2005.
http://www.univ-orleans.fr/deg/GDRecomofi/Activ/yoon_birmingham.pdf

ZIMMERMANN, V., PREVOST, C., *Hedge Fund Marketing: Pros, Cons, and Structuring Agreements with Third-party Marketers*. *Alternative Investment Quarterly*, Third Quarter 2002.
http://www.intercontillimited.com/mfutsarchive/hedge_fund_marketing.pdf

DATA SOURCES

Bloomberg

www.allbusiness.com

www.bis.org Bank for International Settlement

www.economist.com The Economist

www.eurekahedge.com EurekaHedge Indices

http://finance.yahoo.com Yahoo! Finance

www.ftse.com The index company

www.hedgefundfacts.org/hedge Coalition of Private Investment Companies (CPIC)

www.hedgeindex.com Credit Suisse/Tremont Indices

www.hedgefundsreview.com Hedge Funds Review

www.hennessigroup.com Hennessie Group LLC Hedge fund industry information

www.hsbc.com/emergingmarketsindex HSBC

www.ifsl.org.uk International Financial Services London (IFSL)

www.imf.org International Monetary Fund (IMF)

www.jstor.org JSTOR

www.modelselection.org

www.morningstar.com Morningstar

www.msibarra.com MSCI Barra

www.oanda.com Oanda – Historical Exchange Rates

www.prequin.com Prequin

www.reuters.com Reuters

www.roubini.com Roubini Global Economics (formerly known as RGE Monitor)

www.ssrn.com Social Science Research Network

www.worldbank.org The World Bank

Appendix

Appendix 1: CAPM

The capital asset pricing model (CAPM)¹¹¹ is rather primitive performance model that is used to determine a theoretically appropriate required rate of return of an investment. The model takes into account two possible sources of investment returns. Firstly, higher return can be a compensation for higher risk taken which enters to expected rate of return through the asset's sensitivity to non-diversifiable risk (also known as systematic risk or market risk) in the financial market. This sensitivity is represented by the slope of regression beta (β). Secondly, it considers average return accrued over compensation for exposure to different sources of systematic risk; return which is attributable to particular skill of an asset manager in implementing investment strategies (Shadab ((2009). This variable is often represented by the quantity α ("Jensen`s alpha"), which is technically an intercept of the estimated regression (Equation 1).

The model was introduced by Jack Treynor (1961, 1962), William Sharpe (1964), John Lintner (1965) and Jan Mossin (1966) independently, building on the earlier work of Harry Markowitz on diversification and modern portfolio theory.

Equation 1: CAPM

$$R_{Pt} - R_{Ft} = \alpha_p + \beta_p (R_{Mt} - R_{Ft}) + \varepsilon_{Pt} \quad t = 1, 2, \dots, T$$

where

$(R_{Pt} - R_{Ft})$ is an excess return of fund P above a risk-free rate in month t

R_{Mt} is a return of the market portfolio on month t

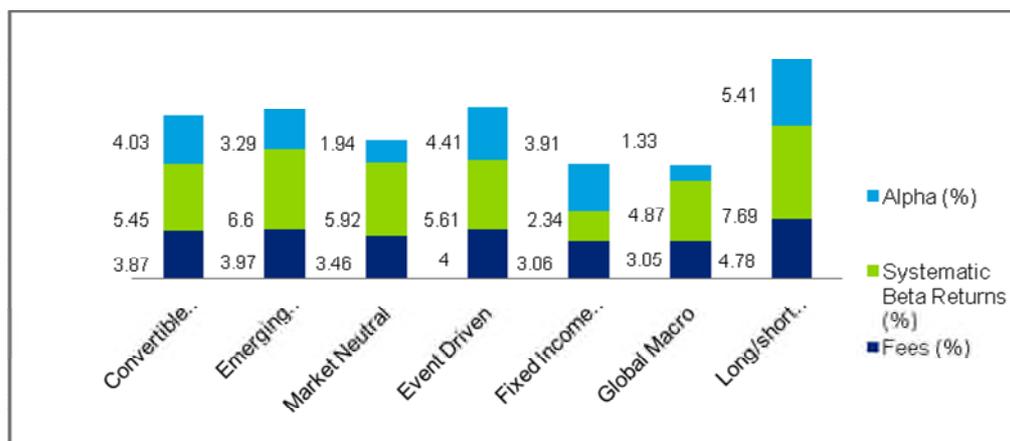
ε_{Pt} is an error term.

Appendix 2: Source of hedge funds returns according to Ibbotson

Ibbotson, Chen (2006) decomposed returns not only for active investment in general, but specifically for hedge funds. They added hedge fund fees (costs) as another return component. Using a universe of almost 3,000 hedge funds in the TASS database from January 1995 through April 2006 authors estimated the equally weighted funds` performance of 12.72 %. This pre-fee return was attributable to a fee (3.74 %) component, an alpha (3.04 %), and a beta (5.94 %) return. Authors pointed out, that significantly positive alphas were approximately equal to the fees component, meaning that excess returns were shared roughly equally between managers and investors.

¹¹¹For more, see Fama, French (2004).

Figure 27: Source of hedge funds returns: alphas, betas, costs (1995-2006)



Source: Ibbotson, Chen (2006)

Appendix 3: Multi-factor models

Two basic multi-factors models that dominate primarily mutual funds literature and have been frequently adopted also for hedge funds are as follows:

The 3-factor model of Fama and French (1993) introduces specific company factors while incorporates the size and the book-to-market ratio of the particular firm into the CAMP regression.

Equation 2: The 3-factor model of Fama and French (1993)

$$R_{Pt} - R_{Ft} = \alpha_P + \beta_{P1} (R_{Mt} - R_{Ft}) + \beta_{P2}SMB_t + \beta_{P3}HML_t + \epsilon_{Pt} \quad t = 1, 2, \dots, T$$

where

SMB_t is the factor-mimicking portfolio for size, the spread between small and large capitalization stocks (“small minus big”)

HML_t is the factor-mimicking portfolio for book-to-market equity, the spread between the value and growth stocks (‘high minus low’)¹¹².

Carhart’s 4-factor model (1997) is an extension of the Fama and French (1993) factor model. It takes into account an additional factor for the momentum effect. The model is estimated with the following regression:

Equation 3: Carhart’s 4-factor model (1997)

$$R_{Pt} - R_{Ft} = \alpha_P + \beta_{P1} (R_{Mt} - R_{Ft}) + \beta_{P2}SMB_t + \beta_{P3}HML_t + \beta_{P4}PRIYR_t + \epsilon_{Pt}$$

$$t = 1, 2, \dots, T$$

where

$PRIYR_t$ is a return on value-weighted, zero-investment, factor-mimicking portfolios for one-year momentum in stock returns (buying past top-decile funds and selling past bottom-decile funds)¹¹³.

¹¹² For a detailed description of the factor construction, see Fama, French (1993), pp.9.

As shown in **Table 6**, Amenc, Goltz, and Martellini (2005) explored how different strategies are influenced by different risk factors. All strategies we discussed earlier except global macro have positive exposure to the equity market, as represented by the S&P 500 index. In addition, the small capitalization versus large capitalization spread has a positive impact on equity based categories (namely, equity-market neutral, long/short, and event driven), meaning that particular return comes from holding the small-cap by the managers. Value versus growth spread appeared to have a significant impact only when long/short equity strategy is employed. Negative relation suggests that buying growth and selling value stocks can explain a part of the hedge fund managers` return.

Table 6: Risk exposure of selected hedge fund strategies – correlation coeff., January 1997 – August 2004*

	<i>Equity Factors</i>				<i>Others</i>
	Change in Volatility Index ¹¹⁴	Value vs. Growth	Small Cap vs. Large Cap	S&P 500	Commodity Index
Equity -Market Neutral	-0.22		0.25	0.42	
Convertible Arbitrage				0.19	
Long/Short Equity	-0.51	-0.21	0.32	0.74	
Event Driven	-0.55		0.33	0.65	
Global Macro					0.21

	<i>Bond factors</i>				
	Term Spread	Credit Spread	Bond Return	Historical Volatility of Bond Returns	3-month T-Bill
Equity -Market Neutral	-0.45	-0.34	0.20		0.48
Convertible Arbitrage	-0.18				0.23
Long/Short Equity	-0.17	-0.32			0.17
Event Driven		-0.23			
Global Macro			0.45	-0.28	

Source: Amenc, Goltz, Martellini (2005) (entries represent only those correlation coefficients significant at the 5 % level)*

Appendix 4: Individual hedge Fund and Hedge Fund Portfolio Risks

		Merge Arbitrage	Distressed Securities	Equity Market Neutral	Convert. Arbitrage	Global Macro	Long /short Equity	Emerging Markets
Individual Hedge Funds	St. Dev.	1.75	2.37	2.70	3.01	5.23	5.83	8.33
	Skewness	-0.50	-0.77	-0.40	-1.12	1.04	0.00	-0.36
	Corr. S&P 500	0.47	0.37	0.07	0.19	0.14	0.35	0.44
Portfolio of Hedge Funds	St. Dev.	1.04	1.54	1.14	1.64	2.43	2.95	6.15
	Skewness	-2.19	-2.60	-0.41	-1.35	0.87	-0.29	-0.65
	Corr. S&P 500	0.56	0.47	0.19	0.38	0.37	0.63	0.67

Source: Kat (2005)

¹¹³ For a detailed description of the factor construction, see Carhart (1997), pp.61.

¹¹⁴ Volatility Index (VIX.) – Chicago Board Options Exchange

Appendix 5: Effects of combining hedge funds with stocks and bonds

% HF	Standard Deviation	Skewness	Kurtosis
0	2.49	-0.33	-0.03
5	2.43	-0.40	0.02
10	2.38	-0.46	0.08
15	2.33	-0.53	0.17
20	2.29	-0.60	0.28
25	2.25	-0.66	0.42
30	2.22	-0.72	0.58
35	2.20	-0.78	0.77
40	2.18	-0.82	0.97
45	2.17	-0.85	1.19
50	2.16	-0.87	1.41

Source: Kat (2005)

Appendix 6: Heterogeneity in competing hedge fund indexes (January 1998 – December 2003)

	Max Diff (%)	Date	Lowest Return (%)	Highest Return (%)
Convertible Arbitrage	7.55	Dec 01	EACM (-6.93)	Hennesse (0.62)
Global Macro	14.17	Oct 98	CSFB (-11.55)	Altvest (2.62)
Equity Market Neutral	5.00	Dec 99	Hennesse (0.20)	Van Hedge (5.20)
Event Driven	5.37	Aug 98	CSFB (-11.77)	S&P (-6.40)
Long/short Equity	9.51	Feb 00	Altvest (3.55)	CSFB (13.01)

Source: Amenc, Goltz, Martellini (2005)

Appendix 7: FTSE country classification (September 2009)

Advanced emerging	Brazil, Hungary, Mexico, Poland, South Africa, Taiwan
Secondary emerging	Argentina ¹¹⁵ , Chile, China, Colombia, Czech Republic, Egypt, India, Indonesia, Malaysia, Morocco, Pakistan, Peru, Philippines, Russia, Thailand, Turkey, United Arab Emirates
Frontier	Bahrain, Bangladesh, Botswana, Bulgaria, Côte d'Ivoire, Croatia, Cyprus, Estonia, Jordan, Kenya, Lithuania, Macedonia, Malta, Mauritius, Nigeria, Oman, Qatar, Romania, Serbia, Slovakia, Slovenia, Sri Lanka, Tunisia, Vietnam

Source: www.ftse.com

¹¹⁵ To be moved to Frontier in September 2010.

Teze diplomové práce

Jméno studenta: Olga Kesslerová

Předpokládaný název práce: *Hedge funds and emerging markets: exploring the links in the 2007-2009 credit crisis*

Vedoucí práce: PhDr. Adam Geršl PhD.

Charakteristika tématu:

Hedgeové fondy patří mezi nejvíce inovativní, zároveň však i kontroverzní hráče na finančních trzích. Díky své vlastnické struktuře stojí z velké části mimo dosah regulace, a mohou tak využívat téměř neomezenou paletu realizovatelných investičních strategií, což je předurčuje k poskytování dodatečné likvidity a stimulace efektivity trhů. Na straně druhé, nedostatečná transparentnost spolu s vydatným využíváním finanční páky vede k obavám, zda tito specifictí institucionální investoři nepůsobí současně jako destabilizátoři finančních trhů.

Zamýšlená práce si klade za cíl poskytnout základní přehled fungování hedgeových fondů, a především se pak zaměřit na hedgeové fondy působící na rozvíjejících se trzích (emerging markets hedge funds). Součástí práce bude dále podrobná dokumentace situace na těchto trzích bezprostředně před a během kreditní krize v období 2007-2009. Následná empirická (ekonometrická) analýza má za pomoci vybraných indexů ukázat, popř. vyvrátit možnou oboustrannou souvislost mezi aktivitami hedgeových fondů a vývojem cen některých finančních aktiv (sledovat budeme především vývoj kurzu měn, cen akcií a dluhopisů) na rozvíjejících se trzích v diskutovaném období.

Hypotézy:

Analýzou časových řad indexů hedgeových fondů se pokusíme prokázat vliv vývoje cen vybraných finančních aktiv (konkrétně pak akcií, dluhopisů a kurzů měn) na výkonnost hedgeových fondů na rozvíjejících se trzích.

Taktéž doložíme případnou existenci opačného efektu, tedy situace, kdy hedgeové fondy přímo působí svojí aktivitou na vývoj na finančních trzích; konkrétně pak, jak mohly a mohou tyto fondy přispět k prohloubení hypoteční a úvěrové krize v letech 2007 – 2009.

Osnova:

- Úvod
- Hedgeové fondy
 - Obecné charakteristiky
 - Legislativní prostředí, vlastnická struktura
 - Investiční strategie
- Hedgeové fondy působící na rozvíjejících se trzích

- Investiční strategie
- Výkonnost
- Rozvíjející se trhy
 - Vývoj před hypoteční a úvěrovou krizí
 - Rozvíjející se trhy během úvěrové krize
- Empirická analýza vybraných „emerging markets hedge funds“ indexů
- Srovnání výkonnosti hedge fondů na rozvíjejících se trzích s vývojem základních tříd finančních aktiv během hypoteční a úvěrové krize; hledání možných souvislostí
- Závěr

Metodika práce:

Komparace časových řad
Statistická analýza