

Michał Bulski

University of Economics in Katowice

INTEREST RATE RISK IN NONFINANCIAL COMPANY

Introduction

Risk is one of the most fundamental concept in economics. It has exceptional meaning in corporate finance, because all companies are exposed to different types of risk. Increasing significance of risk (Kasiewicz, 2000, p. 23) in nonfinancial company is caused by:

- free flow of capital, goods, people and services – risk has a dual meaning for company; as a threat and as an opportunity,
- progressive process of globalization and market deregulation – enormous influence on taking decision in company (more complex),
- growing importance and dependence on financial market – funds obtained from financial institutions affect the level of risk in nonfinancial company,
- ever more advanced technologies and innovations – in the liberalized market there are many financial instruments, that allow company to both reduce the risk and expose them*.

All these aspects make, that better managing – risk company can achieve competitive edge. The issue of risk in contemporary, fast-paced market is so serious, that companies which do not take the impact of threat loses competition (or even be eliminated).

In the context of dependence on financial markets, interest rate risk has a special significance. Changes in interest rates have impact on the overall business. Not only indebted companies are vulnerable to adverse changes in interest rates – many balance sheet items are dependent on the direction of their changes (Gup, Brooks, 1997, p. 7). The overall effect of interest rate risk to the nonfinancial companies has been comprehensively presented this paper.

* The recent financial crisis has highlighted this phenomenon. Incorrect assumption and expectations regarding the level of the exchange rates has led many polish companies, which used currency options, to multi – million zloty losses (including bankruptcy). The initial intention of eliminating the currency risk turned into toxic speculation. More on this subject can be found in: Boczkowski (2011, p. 9).

1. The concept of risk

Every decision taken in variable environment is associated with a greater or lesser risk. The issue of risk was subject of several studies and analysis over the centuries, especially the last century. Many economists attempted to determine definition of risk. Substantial contribution and also the distinction between risk and uncertainty brought F. Knight in 1921 (Borkowski, Hanisz, 2010, p. 26). According to him, the main feature which differentiates the risk and uncertainty is measurability, that is, uncertainty is category which cannot be measured while the risk can be estimated. The development of science in combination with modern technology and computerization of business processes enabled to risk assessment and management.

There are two essential factors, that have substantial impact on effective risk management. Firstly, access to information is the key issue in competitive, digital world. Asymmetry of information causes, that companies with better knowledge of threats can more precisely estimate the level of risks. Of course, having adequate and accurate information is related with costs (Bizon-Górecka, 2004, p. 48). Hence must be set the costs of acquiring and processing information with potential benefits. It is worth – emphasizing, that the time horizon has a crucial impact on the accuracy of information and the level of risk (Block, Hirt, 1987, p. 409). The chart below presents the relationship between the level of risk and time.

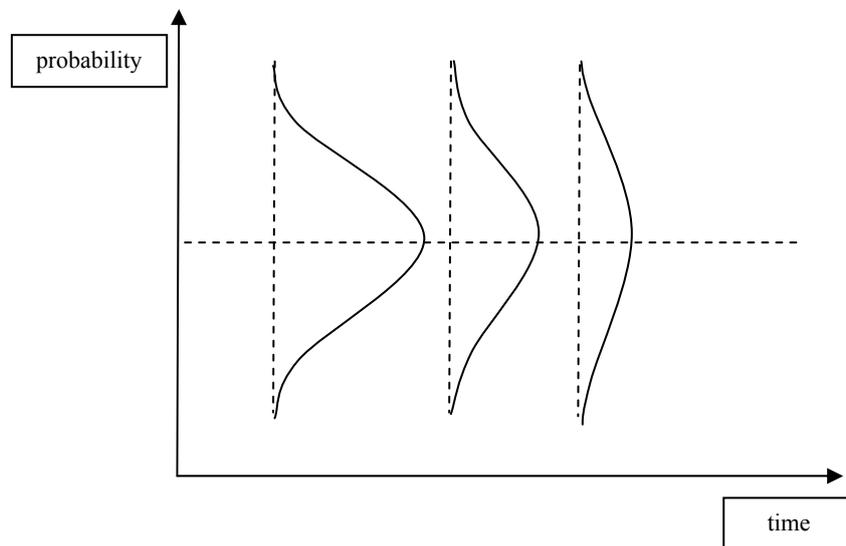


Fig. 1. Relationship between time and probability

Source: Block, Hirt (1987, p. 409).

The passage of time causes the normal distribution is more flattened, what is related with increased probability of obtaining the rate of return deviating from expected rate of return.

The second important factor is manager's attitude toward risk (Jajuga, 2009, p. 14). It is able to distinguish three main attitudes:

- risk aversion – manager expect additional compensation for taking additional part of risk,
- risk neutrality – the size of risk is indifferent when the decision is taken,
- risk seeking – manager can incur additional expenses when consider additional risk.

Generally, risk aversion prevail in economic activities. In companies such attitude has an impact on:

- investment decisions – each company carrying out investments is exposed to range of different risks; considering of these risks is important both in terms of short – term and long – term time horizon; investment decisions are particularly associated with financial decisions,
- financial decisions – the next area of business activity for development by the manager in the context of risk; particular relevance here is the level of interest rate risk, conditioning the proportions of equity and debt,
- decisions on dividend payment – taking a decision on allocation of net profit to pay dividends or retain in company constitutes an essential concern in company; however the decision is intrinsically linked to the risk that arises due to realization particular option (Damodaran, 2009, p. 56).

Above defined areas of business activity require additional division due to the potential impact of the entity for a particular kind of risk. Such distribution, proposed by Tarczyński and Mojsewicz (2001, p. 17), divide the total risk on systemic (external) and specific (internal). Systemic risk which the entity cannot eliminate is dependent among others, according to literal interpretation, of Monetary Authorities, Government, Capital (Commodity, etc.) Market. On the other hand, specific risk is the one, that is under the company's control. Sources of this risk should be sought in the management of the company, the decision taken. Furthermore, such an approach is consistent with the modern portfolio theory, widely used in investing in securities, allowing effectively reduce investment risk (Reilly, Brown, 2010, p. 241). Below presented the various types of risks, taking into account the impact of companies on them.

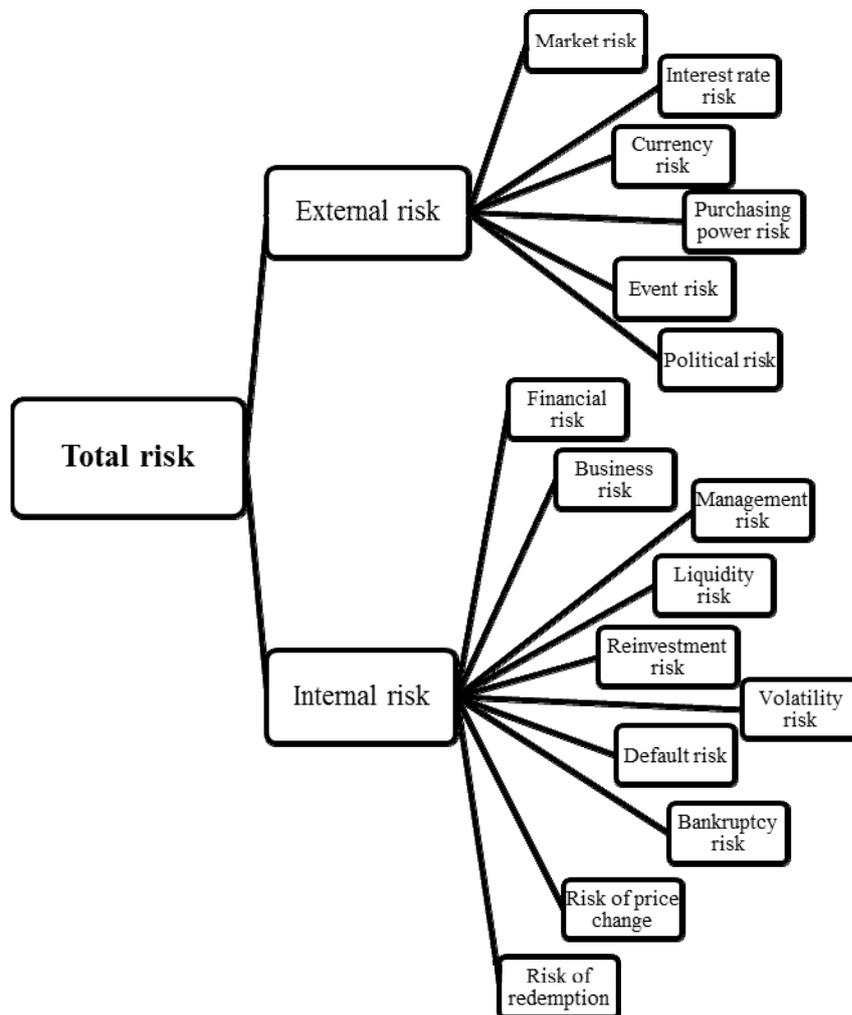


Fig. 2. Composition of total risk

Source: Own elaboration on the basis of Jajuga, Jajuga (1996, p. 99).

The risk of interest rate as a component of systematic risk, in context of three core areas of business, has been discussed in this article.

2. The importance of interest rate

The interest rate has a special importance in economy. Generally, it is the price paid for the use of money (<http://www.britannica.com/>), determined by:

- supply side (lender) – who demand compensation for lending money for a time,
- demand side (borrower) – who are willing to pay money for the disposal for some time.

There are many factors and institutions affecting the level of interest rates. The most important providers of the capital in each country are central banks. Fulfilling its main objective, by maintaining inflation on the low level^{*}, they set interests rates, at which lend money to private banks. Hence autonomous monetary policy has an enormous influence on the indebted nonfinancial companies.

In the present turbulent world, increasingly impact on the level of interest rates have governments. Most developed countries carrying out its economic policy is forced to borrow money from investors^{**}. Such a proceedings has certainly adverse influence on companies, also nonfinancial. Banks in the face of limited resources, investing in risk free securities issued by governments have fewer funds to credit companies. The degree of banks engagements in government – issued securities have a direct impact on interest rates level.

It is worth underlying, that such a factors like cyclicity of interest rates and the level of the economy's openness also affect the level of interest rates (Kalinowski, 2001, p. 23). Globalization of economies and financial markets caused that the business cycles of most developed countries are at the similar stage. Therefore the level of interest rates increase with economic recovery and decrease during recessions. Research have shown, that there are strong correlation of interest rates in most developed economies^{***}.

The last important factor, which has enormous influence the level of interest rates are the expectations of investors. Demand and supply forces determine size and direction of interest rates changes.

Presently there are many types of interests rates. Figure 3 presents different types of them (Cichy, 2010, p. 145).

* There are central banks, which in addition to the inflation target, have other immediate objectives. The typical example might be the Fed, in contrast to such a banks like European Central Bank or Polish Central Bank, where monetary policy is focused on both reducing inflation and maintaining long term economic growth. Such differences will certainly affect the situation in nonfinancial companies; the level of debt capital involvement in U.S. companies is higher than in European, mainly because of lower interest rates in last ten years

** Countries like USA, Japan, PIIGS (Portugal, Ireland, Italy, Greece, Spain) are so indebted, that most of them are facing insolvency, negative perspective of rating, necessity of implementing restructuring programs, etc.

*** Kalinowski M. (2001, p. 24). The recent financial crisis has confirmed coordinated action of Central Banks of most developed countries. During critical moment, which was the collapse of Lehman Brothers, Central Banks like the Fed, BoE, ECB, Swiss Central Bank, BoC and Riksbank simultaneously decreased the interest rates and took other intervention steps. More: Przybylska-Kapuścińska (2004, p. 57) ; <http://wiadomosci.gazeta.pl/Wiadomosci/1,80353,5785247.html>.



Fig. 3. The types of interest rates

Source: Own elaboration on the basis of Cichy (2010, p. 145).

Three main official interest rates set by Monetary Policy Council of National Bank of Poland are the most important for whole economy. They determine the minimum yield of open market operations (reference rate), the price of short term loan to banks against fixed collateral (lombard rate) and the compensation that central bank charge from commercial banks for short term loan (rediscount rate) (www.nbp.pl).

In addition, market sets other interest rates, for instance banks determine the price at which they lend (WIBOR – Warsaw Interbank Offered Rate) or borrow (WIBID – Warsaw Interbank Bid Rate) money to themselves. Time horizon of these rates ranges from 1 day to 12 months.

The last issues, which must be taken into consideration are inflation and its affect on the level of interest rates. Because the prices permanently change, distinction must be made to real and nominal interest rates (Lumby, Jones, 2011, p. 124-125). Especially important is to match different financial categories to proper interest rates; for example to discount real (nominal) cash flows, valuing real or financial investments, real (nominal) interest rates must be applied. Otherwise there is serious overestimation (underestimation) risk (Damodaran, 2007, p. 513).

Short description of interest rate aspects allow better understand its meaning and impact on nonfinancial companies.

3. The risk of interest rates in nonfinancial companies

3.1. The investment area

Investment activity is one of the most essential field in every company. Decisions undertaken within investment area affect future economic situation of company; what is more, such an activity has enormous impact on the other two: operational and financial. There are many reasons, why companies make capital expenditures in expectation of getting future, uncertain cash flows:

- company's capacity expansion,
- replacement used assets,
- gain competitive advantage (as a result of purchasing innovative or intangible assets),
- reduction of production costs,
- ensuring regular income in the form of dividend payments,
- the desire to earn on the purchased assets' value appreciation.

All above-mentioned aspects are consistent with the two main types of investments carried out by companies – physical and financial. The first one, from the perspective of nonfinancial company, determine the future operational activity. Business process complexity results, that every real investment must be preceded by effectiveness account (Krzemińska, 2000, p. 181). Generally there are two kinds of gauges: discounted and without taking into account the impact of interest rates. Generally, discounted methods are preferred, because they take into to account change in time value of money.

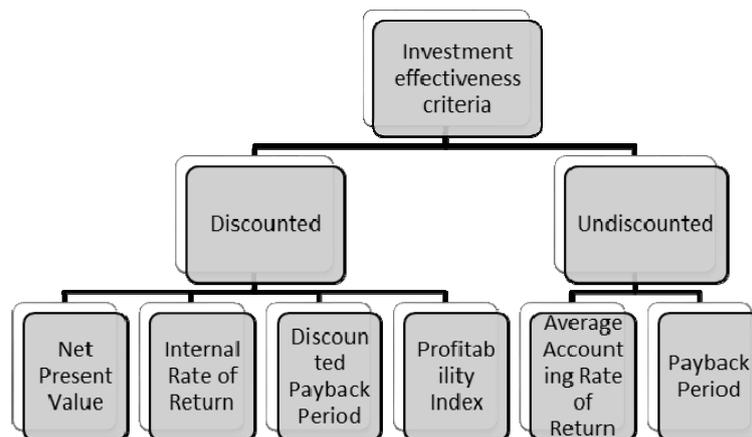


Fig. 4. The investment effectiveness criteria

Source: Own elaboration on the basis of: Smart, Megginson, Gitman (2004., p. 227-252).

There are few key factors, which are sensitive to the changes of interest rates in all above methods. First of all, company make necessary outlay; while capital expenditures are not limited only to fixed assets but also to net working capital (Rogowski, Michalczewski, 2005, p. 59). Both current assets and liabilities are major components of company's balance sheet, therefore their size changes, indirectly depended on the level of interest rates, must be taken into account.

Current assets consist of three main components: stocks, current receivables and short term investments (including cash). Consideration of current assets investment in context of physical investment is significant enough, because maintain at some level decrease operational cash flows. Inventories are mainly necessary in production process, thus some stocks must be kept. However holding raw materials, work in process or finished goods is related with some costs. In theory there are highlighted carrying out and ordering costs (Brealey, Myers, Allen, 2008, p. 822). But in practice, what is often ignored, the considerable affect on stocks has the level of interest rates. Investment in inventories is related with the opportunity cost. This cost is crucial for economy and finance because reflects lost investment opportunities of being terminated. Generally all assets and liabilities maintained by companies are burdened opportunity costs*. The main issue is to undertake decision (considering opportunity costs and other) which maximize owner's welfare. In the context of stocks, there is inversely proportional relationship between the level of interest rates and the size of held stocks. This phenomenon is particularly noticeable, when company is financed by banks or other financial institution. Then high cost of money has a bearing on the size of stocks held. Also holding – stocks companies, that are not powered by debt capital, are depended on interest rates fluctuation**. Hence, in the face of volatile interest rates, increasing number of companies are focused on maintaining only necessary size of stocks. Certainly the cost of lost opportunity (closely related with interest rates) has inspired managers and other policymakers to implement *just in time* management (Brigham, Gapenski, 2000, p. 235). Through the use of cost – save policy, companies reduce risk, including interest rate, and allows gain competitive edge.

The next short – term item related with interest rates are current receivables. Besides the opportunity cost, which has the same impact as the stocks, the coun-

* Managers often does not take into consideration this issue. But every decision is alternative – cost related, e.g. holding some inventories excludes lending it's contractors (investment decision); the hypothetical allocation of generated earnings on dividend payment can be replaced by repayment of outstanding liabilities (financial decision), etc.

** It is widely recognized, that the cost of common equity is determined by, inter alia, interest rates; regardless of what approach to calculations assumed. More: Courtois, Lai, Peterson (2010, p. 74

terparties credit policy is also the subject to the movements of the interest rates^{*}. Companies, which lend money, must take into account many parameters, including cost of trade credit. Because company operates within the framework of the free market and competition, its decision will be influenced by other entities (contractors, suppliers, financial institutions etc.). Therefore terms of the loan used by our suppliers and customers will have huge impact on company's credit policy (Dziawgo, Zawadzki, 1995, p. 28).

There are two possibilities of interest rate changes (and thus company must calculate of each interest rate risk):

- In case of the downward trend of interest rates (e.g. the central bank loosens monetary policy and reduces interest rates) the company may lose some of its existing contractors with unchanged trade credit policy^{**}. On the other hand lower interest rates provide an opportunity to obtain lower interest – bearing source of funding also for given company,
- Inverse to the above situation poses risk of higher interest – bearing raising capital when company finance its contractors from debt. Hence, higher level of interest rates may cause that company tighten its lending policy, and lose some customers.

Above considerations lead to conclusion, that the volatility of interest rates requires immediate response from company; otherwise it could have negatively impact on company's market position (including the potential loss of revenue). Furthermore, very important issue in the context of the impact of interest rates on receivables are overdue receivables. There are commonly known, that companies often use aggressive lending policy to stimulate sales and gain competitive advantage. Such situation can arise particularly when the cost of raising additional funds is relatively small. Then companies treat trade credit as an investment made at low cost (interest rates on the low level) with low risk (assuming that contractors pay off their liabilities). Troubles appears when companies are unable to get their receivables at maturity or at all (Zawadzka, 2010, p. 148). Sometimes company, which lend money its contractors, may have enormous troubles because of the magnitude of such activities. Substantial portfolio made up of unpaid receivables poses danger for company's financial liquidity (measured by adjusted current ratio or quick ratio). The issue becomes important in case of interest rates' volatility. Then indebted companies, which took trade credit (when the cost of money was low) cannot pay off their obligations (when cost of money has risen)^{***}. Worsening business cycle with weakening demand on go-

^{*} Empirical studies have shown that, the larger funds involved in current receivables, the higher opportunity cost and lower rate of return on invested capital. More: Sierpińska (1995, p. 28).

^{**} Such a situation may occur, when company's contractors find cheaper source of financing (bank or vendor) and lending strategy ceases to be competitive.

^{***} This can happens during short period, when the central bank can tighten monetary policy because of inflation risk.

ods and services, caused by interest rates changes, can also lead to payment backlogs (Bień, 2008, p. 232). Therefore lending money in the face of volatility of interest rates requires the prior economic calculation.

The last component of current assets is cash and short – term investments. Managing these type of current assets, in opposite to the variables directly affect the level of held cash:

- the development of financial markets,
- the volatility of company's cash flows (incomes and disbursements),
- actual cost of money and the interest rates expectations,
- the opportunity of speculative purchases.

There no doubts, that every company must maintain the appropriate level of money*. Optimal level is extrapolated by two variables: the liquidity and cost (Melvin, 2004, p. 215). Company should maintain a certain level of liquidity mainly due to transaction, precautionary and speculative motive. The first one ensures the necessary level of money to make ordinary transactions and payments resulting from the business; precautionary motive is related to the uncertainty of the future cash flows and the associated risks; the last refers to the possible opportunities for favorable price changes in the future (Golawska-Witkowska, Rzeczycka, Zalewski, 2006, p. 143). Simultaneously all these motives are strictly dependent on the cost and the level of interest rates. This means that the greater level of money company would like to maintain to make payments, to ensure against lack of liquidity or have opportunity to benefit from attractive purchases, the greater cost must bear. The cost will be higher if the level of the interest rates will be greater and vice versa (due to the higher opportunity cost and other costs related with the obtaining capital). Therefore, as in the case of stocks, greater level of money held by company increases liquidity and incurred costs. Hence changes of interest rates can lead to the changes of current and efficiency ratios. In the periods of low level of interest rates companies maintain substantial cash resources because the opportunity cost are respectively low; when interest rates are higher companies strive to purchase short – term securities (Sierpińska, Wędzki, 1997, p. 221).

The above-mentioned short-term securities, reported in the balance sheet, are common way of cash management. Companies often instead of holding money, engage in risky assets. The most popular securities are bills (mainly short – term Treasury bills), bonds and stocks (both long term securities). It is worth underlining, that all these assets are influenced by different types of risks, including the most important of them which is the interest rate risk (Ross, Westerfield, Jordan, 1999, p. 658). Valuation of these financial instruments refers to discounting by appropriate interest rate future cash flows. This approach result

* There are many patterns, which allow to calculate the optimal level of held money (e.g. the Baumol model, Miller – Orr model). More in: Leahigh (1999, p. 111).

that, the price of these assets is mainly dependent on the level of interest rate. Hence *ceteris paribus*, higher level of interest rates negatively affects the prices of debt securities, and inversely (Sierpińska, Jachna, 2007, p. 324). Therefore company's investment policy will bring outstanding gains, when managers purchase debt securities when interest rates are at the higher level and sell when low. Below charts confirm the effectiveness of such investment decisions.

The first chart shows the relationship between federal fund rate and the US 2 – year note price on the most developed capital market, the US debt market*.

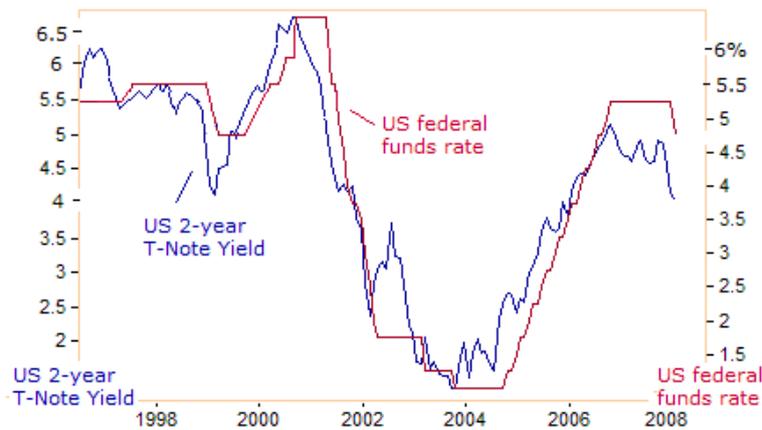


Fig. 5. The relationship between US federal funds rate and US 2 – year Note Yield

Source: Internet data.

There are strong correlation between these two curves. When the federal fund rate is on the low level, the 2 – year note yield is also on its minimum, what has an affection on the price of Treasury note (which is inversely correlated with price). The chart confirms, that this interest – rate's contrarian strategy enables to succeed. In terms of stocks the investment strategy is inverse. This mean that company can effectively manage its money by purchasing stocks when interest rates are on the low level and sell when high. Below chart shows changes of interest rates and stock's prices in last decade in US stock market.

* Charts comes from the Internet data.

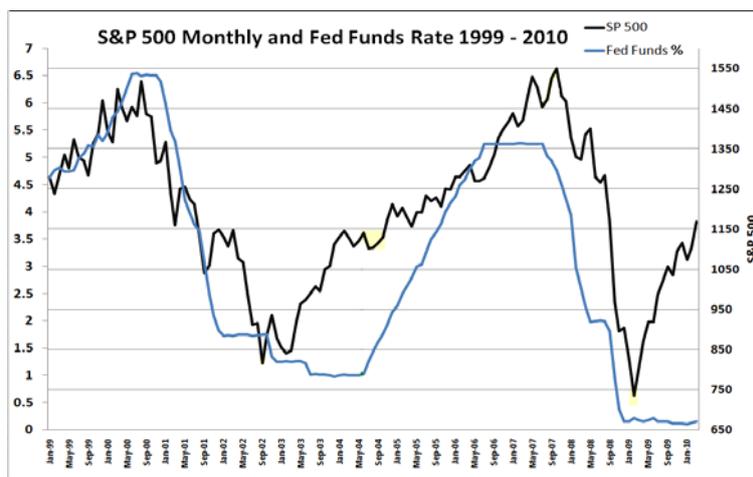


Fig. 6. The relationship between S & P 500 and federal funds rate

Source: Internet data.

All above consideration come down to current assets in the context of the level of interest rates. Regarding fixed assets, the interest rate dependence is slightly different than in the case of current assets. There is no basis to claim, as in the case of stocks or receivables, that greater fixed asset's expenditure are associated with the level of interest rates (and the opportunity cost). Company cannot minimize its fixed assets to a given level, because it is associated with reduction in size of business. Therefore this influence of the interest rate (in the context of opportunity cost) on the size of fixed assets is not relevant.

On the other hand, the issue of interest rate risk is significant, when the purchase of additional component of fixed assets is related with increasing debt. There is frequent situation, especially in the absence of equity. Then company incurring the debt, simultaneously increasing interest rate risk. The above considerations essentially exhaust the issues of interest rate risk in the company's investment area.

3.2. The financial area

The next area, in which the company is taking significant decisions influencing business, are finance. Capital is necessary to finance investments. There are several stages of activity each company, during which in many ways this activity is funded. The scarcity of resources causes, that at some stage there is a necessity to engage debt capital. This solution has consequences mainly in the form of interest rate risk. Due to various types of debt capital, the interest rate risk could have different impact. Generally there are two types of debt instruments:

- these, with fixed interest rate (e.g. bonds, loans) – interest rate risk is reduced to a decrease of interest rates; in this case company would pay higher costs than those resulting from market conditions (e.g. resulting from interest rate reduction by the Central Bank),
- the other ones, which interest is dependent on the level of interest rates; then increasing interest rate may lead to higher financial costs – risk of increasing interest rates.

The progressive globalization and the availability of foreign financial markets causes, that many companies take loans in foreign currencies. Companies often decide to this solution, because interest rates in other countries are on the lower level than domestic rates. But this approach carries dual risk. Besides loans in foreign currencies are associated with currency risk, companies are dependent on the changes of foreign interest rates. Therefore such decision should be preceded by future interest rate expectations and profit and loss account. Frequently the risk outweigh potential benefits (in the face of increasing volatility in the markets). The interest rate risk is surely higher in the case of companies not engaged in foreign trade (Najlepszy, 2007, p. 194). This can lead to situation, that company which does not achieve revenue in foreign currency, have to incur interest cost in currencies other than domestic. In the case of increasing level of foreign interest rates and depreciation of local currency, company may be exposed to default risk (Ryan, 2004, p. 468).

The debt issue (related with interest rate risk) should be also considered in terms of financial liquidity risk. Companies use debt to decrease the weighted average cost of capital (Fierla, 2008, p. 100). Thereby company exposing to the interest rate risk can accomplish higher rate of return on invested capital, increasing (also increasing financial leverage (Bulski, 2011)). This rate of return can be even more enhanced when company use short-term debt capital to finance its investment. Then lower level of interest rate (compared to long-term debt) can cause negative net working capital (Krzemińska, 2005, p. 33), and thus decreasing level of current ratio below one. Hence the desire to achieve higher incomes, without regard the interest rate risk, can lead to loss of financial liquidity and bankruptcy.

The above characteristics highlights the importance of the problem. Uncontrolled growth of debt, increasing exposure of interest rate risk, might be the beginning of the end of company.

3.3. Dividend payment area

Some companies decides to payout the part of their earnings to shareholders. It is complex decision, which implies a range of consequences.

Firstly, the company which do such a step, diminish itself the part or all profits. Simultaneously some investment projects, which could be financed from earnings, will not be realized or financed by other type of capital. Thereby companies can choose debt capital and also expose themselves to the interest risk rate.

Moreover companies, which considering dividend payment must take into account the future levels of interest rates. It means, that increasing interest rates expectations may cause to retain earnings in company*. Then, company can make some savings and in the future generate higher profits. Companies which retain more earnings have chance to achieve higher rate of growth (Zadora, 2010, p. 80).

The next issue in the context of dividend payment is company life cycle. Basing on the analysis carried out by A. Damodaran (2007, p. 1022), companies decides to make dividend payment when they are at the maturity phase (noting stable rate of growth). On the other hand, companies being in this phase, are increasingly fueled by debt capital. Additionally investors are cautious when company lower the amount of dividend. Hence, companies which are indebted and make dividend payment, may face troubles in case of interest rates volatility.

Conclusions

Every company's decisions, taken in volatile conditions, is associated with risk. Companies which does not manage can expose to losses or even be eliminated. Among many types of risk, the interest rate risk deserves special attention. Although commonly associated with indebted companies, the issue also applies to companies which does not use debt capital. This risk is particularly apparent in ordinary company's decisions (concerning the investment and dividend awards). All these aspects and their impact on company's situation (in the context of interest rate risk) have been presented in this paper.

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* The above considerations take into account situation, in which company's return on investment is higher than the return, which owners could obtain on other investment (thereby company should payout all earnings)

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RYZIKO STOPY PROCENTOWEJ W PRZEDSIĘBIORSTWIE NIEFINANSOWYM

Streszczenie

Każde przedsiębiorstwo funkcjonujące w gospodarce wolnorynkowej jest narażone na czynnik ryzyka. Postępujące procesy globalizacji, rozwoju technologii informacyjnych oraz deregulacji rynków finansowych wymuszają na przedsiębiorstwie konieczność efektywnego zarządzania ryzykiem, zwłaszcza ryzykiem stopy procentowej. W powyższym artykule przedstawiono główne obszary przedsiębiorstwa, w których to ryzyko jest szczególnie widoczne. Dogłębna analiza problemu pozwala twierdzić, iż przedsiębiorstwo powinno w sposób ciągły i wielokryterialny monitorować i reagować na zmieniający się poziom ryzyka stopy procentowej.