Asset Price Boom and Financial Market Perception of System Risk

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ABSTRACT

Episodes of asset price booms have often been accompanied by an increase in private sector indebtedness and investment in an environment of low interest rates, low credit and regulatory standards, i.e. in an environment of reduced perception of system risk. This paper argues that asset price boom has an influence on a decreased perception of system risk in credit markets. In this study, we analyzed the influence of real estate and stock prices on the perception of system risk in the US since 1970 based on the co-integration VAR. The co-integration test suggests that long-term development of system risk perception in credit markets can be explained by asset price movements. Impulse response analysis based on Cholesky's standard decomposition reveals that there is significant dynamic interaction between stock prices and the perception of system risk in credit markets.

INTRODUCTION

Analysis of the connection among asset prices, credit booms and economic activity is mostly related to the literature on business cycle models that incorporate the financial accelerator effect first explained by Bernanke and Gertler (1995). Due to this effect, significant shocks to asset prices, relative to the prices of goods and services, change the net value of the potential debtor who determines the scope and the cost of external financing. If debtors have more valuable stock and real estate in their portfolios, the creditors consider them to be higher quality debtors and they can obtain loans from financial intermediates more easily. With more valuable assets in property, the debtor pays a lower premium for external financing and thereby has lower financing costs for spending or investment. Much empirical research confirms this effect in developed countries (Bernanke and Gertler, 1989; Bernanke, Gertler and Gilchrist, 1999; Kiyotaki and Moore, 1997; Gertler and Lown, 2000; Mody and Taylor, 2003; Kakes and Ullersma, 2003, 2005; Adrian and Shin, 2008, etc.). Although the financial accelerator theory explains well the cyclical movements of the real economy, we believe that it is inadequate for explaining cyclical developments in the financial system. In this paper, we claim that underestimating risk, with the financial accelerator effect, is one of the key factors in the occurrence of credit cycles. Minsky (1992) says that during economic and financial stability, investors and lenders reduce their risk aversion. They borrow and invest more in assets, and such behavior raises asset prices even more, which further encourages the growth of borrowing and investment in assets which in turn adds to the further growth of asset prices. With this approach, Roubini (2007) explains the emergence of the current financial crisis. Namely, current global financial crisis can be accounted for in crises largely connected to asset markets. Borio, Firfine and Lowe (2001) provide important theoretical bases of risk perception in the cyclic movement of the financial system and emphasize the importance of its further research. In his paper, Borio (2004) emphasizes the importance of further research into the links between collective behaviors and the risk assessment of individual financial institutions. Furthermore, Borio (2006, 2007) in the analysis of the challenges faced by monetary and regulatory authorities due to changes in the financial system has emphasized the importance of further research into risk misperception, calling it the "risk perception gap". He emphasizes the necessity of better measurement and risk control at the micro and macro level. Borio and Drehmann (2009.) argue that the current crisis in the United States could be predicted based on indicators, which also include asset prices.

Psychological causes explaining the financial cycle were introduced into economic theory by Guttentag and Herring (1986) and Herring (1999). Herring and Wachter (1999) explain the manner in which credit is associated with the cycle in real estate prices. To explain how long-term stability and growth in asset prices affect the occurrence of credit cycles with the coincidence of reduction risk and capital, they united the psychological discernment of individuals in regard to the incidence of events (Kahneman and Tversky, 1974) and the micro economic behavior of investors, creditors and regulators. They called their theory Disaster Myopia. The theory explains how, in times of low - frequency shocks; investors and creditors often underestimate the risk. Because a longer period has elapsed since the last shock, investors and creditors believe that the likelihood of a new shock is smaller and smaller, so eventually, after a certain period of time, the thought of this appearing seems almost impossible. The resulting excessive borrowing, raise in asset prices and the reduction of capital leads to financial instability. Additional psychological causes of financial instability can be found in the irrational behavior of investors and creditors. 'Herd' behaviors of investors when making long-term investments are explained by Scharfstein and Stein (1990). They argue that investors do not always make rational decisions, but these do have a significant impact and psychological components.

Consistent with the described theories that explain the role of psychological factors in the emergence of financial instability, we assumed that psychological causes can lead to erroneous perceptions of systemic risk in times of growth in asset prices.

The paper is organized as follows: in Section 2 the methodological approach and data used in the analysis are described. In Section 3 the empirical results are presented and discussed. Section 4 concludes the paper with a summary and states the potential benefits and costs from using the asset prices in forecasting future economic developments.

METHODOLOGY AND DATA

We analyzed and empirically tested the theoretical model on samples of data from the United States from 1970 to the end of 2008 using the quarterly data. The following data variables have been taken in consideration:

- System risk perception (SRP): System risk perception on credit markets is visible in interest rate risk premiums. Namely, when credit market participants are expecting an increase in system risk, the lower quality borrowers will be considered to be more risky than the high quality borrowers and therefore will pay higher interest rates then low risk borrowers. Considering the fact that there are no indicators at the aggregate level of the difference between interests on loans between high and low risk borrowers, the spread for low versus high quality bonds is taken. Precisely, the spread on Moody's Seasoned AAA and BAA Corporate Bond Yield is taken.
- Gross domestic product (GDP): Data for gross domestic product in the US are taken from OECD Main Economic Indicators data base. We took the real GDP as the broadest aggregate measure of the real activity. The nominal data were transformed to the index with 1985 as the base year. Nominal data are transformed to the real using the 2005 CPI index.
- Inflation (CPI): data were taken from the OECD Main Economic Indicators data base.
- Real interest rate (RIR): As a proxy of the real cost of financing, the real interest rate was calculated. The three month short-interest rate was taken from the OECD Main Economic Indicators data base. The real interest rate was calculated by reducing this rate with annual CPI inflation.[i]
- Exchange rate (EXR): Exchange rates between the US Dollar and the German Mark were taken for the period from 1970 to the end of 1999. From 1999 to 2008 the Exchange rates between the US Dollar and the Euro were taken and transformed to the German Mark according to the fixed conversion rate between the Euro and German mark. These data were taken from the web pages of the German central bank Deutsche Bundesbank. For model robustness checking the exchange rate between US Dollar and the Japan Yen was also used. These data were taken from the base International Financial Statistics (IFS) International Monetary Fund.
- Credit to the private sector/gross domestic product (CPS/GDP): Data for nominal credit to the private sector were taken from the base International Financial Statistics (IFS) International Monetary Fund. The levels of bank credit and credit of other financial institutions were used (line 22d + line 42d). After calculating the ratio to the GDP, the data were transformed to the index with 1985 as the base year.
- Stock price (SP): Data were taken from the base of Bank of International Settlements (BIS) in real terms and in index form with 1985 as the base year.
- Residential real estate prices (RREP): Data were taken from the base of the Bank of International Settlements (BIS) in real terms and in index form with 1985 as the base year.
- Commercial real estate prices (CREP): Data were taken from the base of Bank of International Settlements (BIS) in real terms and in index form with 1985 as the base year.
- Aggregate asset price index (AAPI): Data were taken from the base of the Bank of International Settlements (BIS) in real terms and in index form with 1985 as the base year. The aggregate asset price index was calculated and published by the Bank for International Settlements (BIS). Its components were stock, and commercial and residential real estate prices. Their weighting in the index was determined by the proportion of each asset in the portfolios of private investors, based on data from national accounts. Accordingly, residential and commercial real estate prices have the highest proportion in the index – an average of 80%. The lowest proportion is made up of stocks, because they still constitute a small fraction of total assets held by private investors. More about this index is in Arthur (2001).

The results of Standard argument Dickey-Fuller (Dickey and Fuller, 1981) unit tests reported in Table 1 suggested that all variables were integrated into the first level over the whole sample. Additionally, the ADF test was performed by considering trends and constants, and results indicated the same conclusion. In the next step of empirical testing, the model of the multivariate approach to co-integration analysis was used.

Table 1 Augmented Dickey-Fuller

Variable	*H0: Variable has unit root*			
	Level		Change	
	t-Statistic	Prob	t-Statistic	Prob
AAPI	-2.349	0.158	-6.746	0.000
SP	-1.361	0.599	-7.699	0.000
REEP	-4.753	0.000	-4.466	0.000
CREP	1.207	0.669	-2.278	0.186
CPS/GDP	0.279	0.976	-13.230	0.000
GDP	-0.036	0.952	-4.194	0.000
CPI	-2.653	0.084	-5.190	0.000
RIR	-2.740	0.069	-3.766	0.021
SRP	-2.266	0.184	-11.444	0.000
EXR (2) (1$ = ¥)	-4.847	0.000	-3.083	0.114
EXR (1$ = DM	-2.602	0.094	-9.849	0.000

*MacKinnon (1996) one-sided p-values.

Note: SRP - System risk perception; GDP - Gross domestic product; CPI – Inflation; RIR - Real interest rate; EXR - Exchange rate; CPS/GDP - Credit to the private sector/gross domestic product; SP - Stock price; RREP - Residential real estate prices; CREP - Commercial real estate prices; AAPI - Aggregate asset price index

The co-integration analysis was based on the VAR model:

$$\Delta Y_t = \sum_{k=1}^{k} \boldsymbol{A} \boldsymbol{Y}_{t-k} + \boldsymbol{\varepsilon}_t \qquad (1)$$

Where:

- Y_t – is a n*1 vector of endogenous variables, i.e. Y_t = [PSR RIR EXR CPS/GDP CPI SP RREP CREP GDP]'
  - SP – stock prices in US;
  - CPS/GDP – ratio of credit to the private sector to the GDP in US
  - GDP – real gross domestic product in US[ii]
  - EXR– exchange rate between US Dollar and German Mark
  - CPI – consumer price index in US
  - RIR– short term interest rate in US
  - PSR –credit markets perception of system risk in US
- K – optimal number of lags
- A – matrix of parameters
- ε_t – n x 1 vector of stochastic disturbance

In the first step of the estimation VECM model with associated co-integration vector it is necessary to select the optimal lag length of initial VAR. Results of order selection criteria are given in Table 2.

Table 2 Var lag order selection criteria's

is ***Lag***	***LogL***	***LR***	***FPE***	***AIC***	***SC***	***HQ***
0	-2765.789	NA	34397796	37.218	37.359	37.275
1	-1439.905	2509.390	1.239	20.079	21.208*	20.537
2	-1356.887	149.321	0.788	19.622	21.739	20.482*
3	-1291.612	111.273	0.640*	19.404*	22.508	20.665
4	-1248.227	69.883	0.704	19.479	23.572	21.142
5	-1206.272	63.636	0.800	19.574	24.654	21.638
6	-1159.862	66.032	0.870	19.608	25.677	22.074
7	-1108.650	68.052	0.907	19.579	26.635	22.446
8	-1051.818	70.182*	0.901	19.47	27.518	22.742

Note: * best lag order considering the criteria
LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion

Taking into account the Final prediction error and Akaike information criterion, the information criteria of the lag length of VAR k = 3 was chosen because diagnostic tests of vector auto-regression models in order of one and two and eight, according to the other criteria, were not significant.

In the next step, the Johansen co-integration test was implemented. Taking into account the result given in table 3 it can be concluded that H0 hypothesis can be rejected at the 5% level, i.e. Max – eigenvalue test indicates one co-integration vector.

Table 3 Johansen cointegration test

Maximum rank[a]	*Eigenvalue*	*Trace statistics*	*Eigenvalue*	*Max-Eigen statistic*
0*	0.346	65.589	46.231	0.000
1	0.189	32.448	40.077	0.279
2	0.177	30.176	33.876	0.129
3	0.132	21.952	27.584	0.222
4	0.098	15.913	21.131	0.230
5	0.050	7.939	14.264	0.384
6	0.002	0.309	3.841	0.578

[a] Max – eigenvalue test indicates one cointegrating equation at the 5% level (*)
[b] MacKinnon-Haug-Michelis (1999) p-values

From VECM (1) system the estimated function of perception of system risk on credit markets has the following form:

SRP = 0.100 RIR - 0.448 EXR + 0.027 CPS/GDP + 0.582 CPI - 0.002 SP - 0.012 GDP + 0.604 (2)

Tests of the t-statistic of estimated coefficients are presented in Table 4. According to the co-integrating coefficients in Table 4 in the long-term, decrease in system risk perception in credit markets (SRP) can be expected by 0.012 percentage points if real domestic product increases by 1% compared to the base value[iii] and decreases by 0.448 percentage points if the value of U.S. Dollar appreciates against the German Mark (EXR). On the other hand, the increase in real short-term interest rates in the interbank market (RIR) by one percentage point, inflation (CPI) by 1% compared to the base value[iv] and the share of loans to private sectors in gross domestic product (CPS/GDP) by 1% leads to an increase in the perception of systemic risk (SRP) in the following order: 0.100, 0.582 and 0.027 percentage points. The growth in stock prices (SP) by 1% compared to the base value[v] leads to a reduction in the systemic risk perception (SRP) for – 0.002 percentage points.

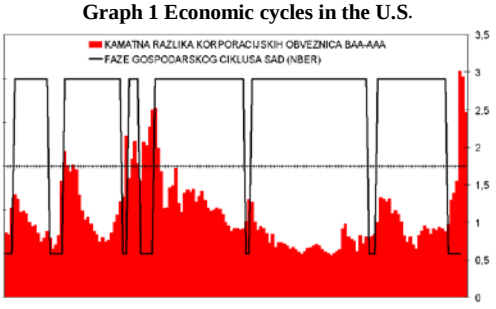
Table 4 Cointegration vector coefficients

Varijable	*Coefficient*	*Standard error*	*t-Statistic*
SRP	1		
RIR	-0.100	0.026	-3.804
EXR	0.448	0.187	2.394
CPS/GDP	-0.027	0.012	-2.357
CPI	-0.583	0.124	-4.694
SP	0.002	0.001	2.786
GDP	0.012	0.007	1.660
c	-0.604		

Note: SRP - System risk perception; GDP - Gross domestic product; CPI – Inflation; RIR - Real interest rate; EXR - Exchange rate; CPS/GDP - Credit to the private sector/gross domestic product; SP - Stock price; RREP - Residential real estate prices; CREP - Commercial real estate prices; AAPI - Aggregate asset price index

The described model and its results confirm that we can accept hypothesis H1, i.e. that growth in stock prices leads to a reduction in the perception of systemic risk. Also, the results of the estimated model indicate another important fact which can be interpreted from the estimated parameter with variable real gross domestic product. In fact, according to the results obtained from the empirical testing of the model on a sample consisting of thirty-eight years, i.e. almost four decades, it can be said that market participants experienced real gross domestic product growth, which characterizes the period studied, and signs of a drop in the perception of systemic risk. High growth rates in real economy, growth in the financial sector and financial assets to GDP, together with the successful achievement of goals by central banks created the belief among investors, creditors, regulators and macro policy makers that economic laws were defeated and that the era of large economic cycles was in the past. Figuratively speaking, "they have become a victim of their own success". Namely, in the reported period, the recession phases were short (Graph 1) and the market participants began to think that the regulators and macroeconomic policy makers had won the battle against recession.

Graph 1 Economic cycles in the U.S.



Note : The graph shows data from 1970: Q1 to 2008: Q4. Right scale: An indicator of the perception of systemic risk – spread between corporate bond issuer credit rating of AAA and BAA; Left scale: Phases of the economic cycle in the U.S.
Source: National Bureau of Economic Research - NBER i FED

There was an overall growth in private sector indebtedness, investments in assets and an increase in prices, which further led to GDP growth. A vicious circle was continued through further reduction in the perception of systemic risk, the growth of private sector indebtedness, and investments in stock and real estate. The described behavior of market participants is consistent with an explanation of the causes of financial crises of Minsky (1997), Guttentag and Herring (1986), Herring (1999) and the model assumptions presented in this paper.

The declining perception of systemic risk in the reporting period also contributed to the behavior of regulators. Also, it can be said that they have fallen under the influence of the wrong perception of systemic risk. Namely, in his speeches, Alan Greenspan often pointed out that growth in the financial industry and related financial innovations allow cheaper external financing and lowering the risk premium:

*"Innovation has brought about a multitude of new products, such as subprime loans and niche credit programs for immigrants. Such developments are representative of the market responses that have driven the financial services industry throughout the history of our country … With these advances in technology, lenders have taken advantage of credit-scoring models and other techniques for efficiently extending credit to a broader spectrum of consumers. … Where once more-marginal applicants would simply have been denied credit, lenders are now able to quite efficiently judge the risk posed by individual applicants and to price that risk appropriately. These improvements have led to rapid growth in subprime mortgage lending; indeed, today subprime mortgages account for roughly 10 percent of the number of all mortgages outstanding, up from just 1 or 2 percent in the early 1990s" (*Greenspan, 2005*).*

The collapse of the subprime market in early 2007 and its consequences for the rest of the financial markets and institutions has caused one of the biggest financial crises in recent times which speaks for itself in the impact of the illusion of success of market participants in the "***effective risk assessment."***

The arguments for the thesis that both regulators and macroeconomic policy makers have failed to assess the risks that come with the property market is also reflected in Greenspan's speech in 2002 in which he says:

*„Besides sustaining the demand for new construction, mortgage markets have also been a powerful stabilizing force over the past two years of economic distress by facilitating the extraction of some of the equity that homeowners have built up over the years" (*Greenspan, 2002).

After the outbreak of the crisis in a televised interview, Greenspan said:

"I was not aware of the bubble in the housing market until the end of 2005 and early 2006 the year. " (Greenspan, 2007 according to: Felsenthal, 2007*).*

Greenspan is not the only official who said that regulators did not recognize the systemic risk that accumulated in the period before the outbreak of the crisis in 2007. In his speech on 17 June 2010 the President of the Bank for International Settlements - BIS Jaime Caruana said:

"The main lesson from the financial crisis that began in 2007 year is that we ***are all misrepresentations systemic risk*** *... Why is this error occurred? We were not able to connect all the dots. First, the full impact of interconnectedness and common exposure within the financial system was not well estimated. Second, procyclicity was underestimated, i.e. the tendency of the financial system creating the ups and downs in the real economy... It was overestimated the ability of markets in creating effective discipline and self correction... To deal with these dimensions of systematic risk, policies for the preservation of financial stability must be linked into the wider system - perception. Experience suggests that preventive action to mitigate credit and asset prices booms and busts it may be complementary to traditional measures of monetary policy" (*Caruana, 2010, pp. 29*).*

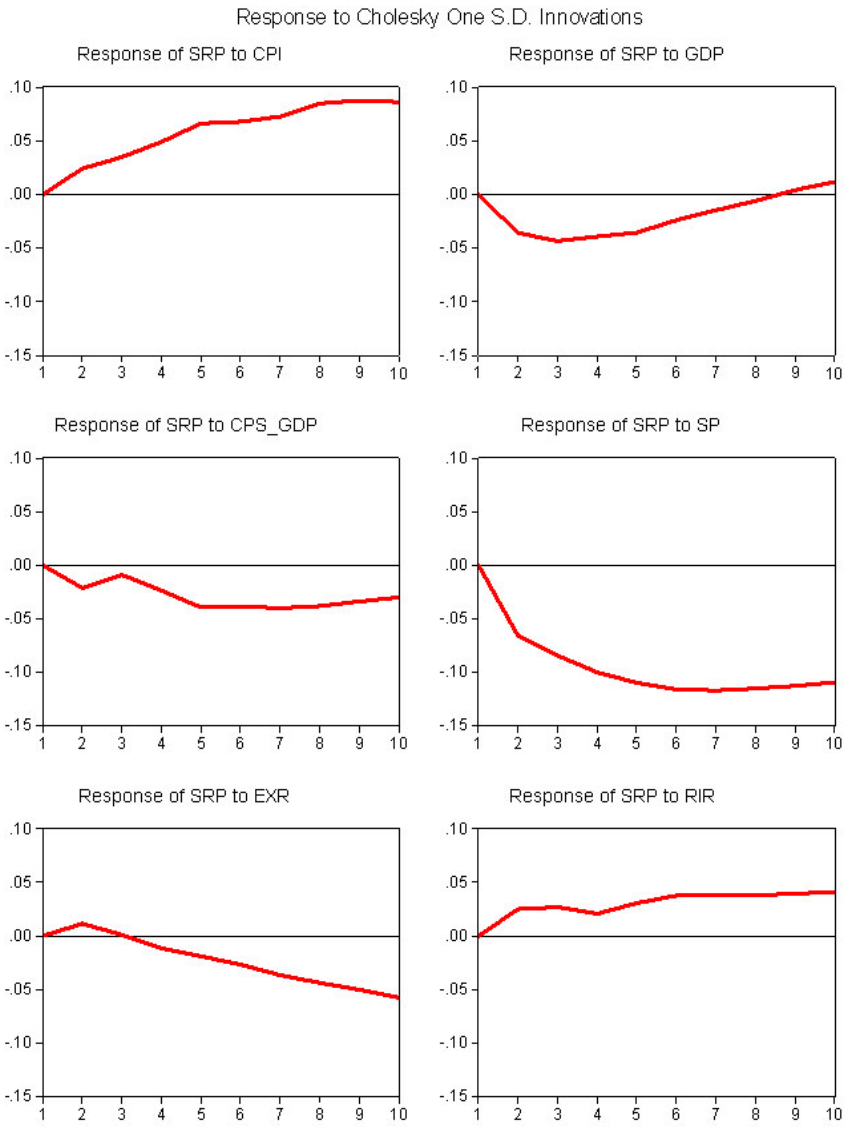
The above statement further supports the thesis and the results of this study that microeconomic agents, during the growth of asset prices, may wrongly perceive the systemic risk in that their aggregate behavior might create risk in achieving financial stability. Furthermore, the inability to "connect all the dots" is further in favor of the hypothesis of this paper - Regulators of the financial system concentrating primarily on the micro-regulation on financial markets cannot prevent financial instability. To connect the all microeconomic points in the financial system is only possible by macro preventive regulation of the financial system. The development of macro preventive regulation is necessary because it is obvious that market forces alone cannot correct the underestimation of the systematic risk that occurs during the growth of asset prices.

In further empirical testing, the same model for the perception of systemic risk in credit markets is tested with other indicators of asset price movement: aggregate asset price index, commercial real estate prices and residential real estate prices. All of these models are not statistically significant and/or Johansen's co-integration test has more co-integrating vectors[vi]. In some models, some of the variables are not statistically significant. Taking into consideration that the specific calculation of these indices and the public publication movements of prices form these markets, the results are justified and somewhat expected. Namely, the aggregate asset price index is calculated and published by BIS with the lag of almost a year. In addition, its value is not publicly disclosed. Information on its movements is available to a small number of creditors and investors and is not expected to affect the market perception of risk. Real estate price indexes, in general, in relation to stock prices indexes are a less reliable indicator of actual market developments. They are published with a time lag and with a lower frequency of publication. Movements in stock prices are, thank s to information technology, available almost simultaneously with the transaction. In addition, stocks are a more homogenous product and that facilitates their comparison.

Real estate markets are extremely heterogeneous and it can even be said that there are no two completely identical to the property.[vii] Also, trading in real estate is mostly done by direct negotiation between the buyer and the seller and the agreed price may not always be publicly available. These characteristics make it difficult to express a good real estate market index, which would be "ideal" to show the trend of the market. This is probably one of the reasons why we failed to prove the impact of commercial and residential real estate prices on perception of systemic risk. Furthermore, fundamentally speaking, the present value of the stock should maintain the present value of expected revenues from the company which in turn depends on future developments in the real economy. Studies have shown that the movement of stock prices signals the future trends in gross domestic product (Mauro, 2000; IMF, 2000). Namely, investors invest in assets because of the revenue it brings in the future. What they will be in the future mostly depends on the state of the economy at that future time. Also, in forecasting GDP the role of stock prices and real estate prices differ. IMF research results (2000) confirmed that stock prices are a better indicator of GDP growth than real estate prices. Namely, the income from stocks, dividends, depends on the expected growth of investment, productivity, sales, consumption, which is expected to increase with GDP growth. Thus, stock prices rise with the expected growth in GDP with the achievement of expected higher profits (Binswanger, 2001). Real estate prices, due to the fixed supply in the short term and less liquid markets, are not a good indicator of future GDP growth, but follow its trend. Whether stocks or real estate prices will predict well future trends, and to what extent, depends on the depth and breadth of their markets, their regulation and openness to the international capital of the country. International capital flows can strongly increase demand and thus price, regardless of economic developments. Examples of such events are great growth and a subsequent decline in asset prices in the countries of Southeast Asia. In small and open countries, stock markets have less power in market forecasts than in large and closed countries, such as markets in the US (Mauro, 2000). But, even countries with low market capitalization stocks can serve as a good indicator. The economies of these countries believe the stock market mirror of future economic trends and their participants behave in accordance with its signal[viii]. Given the above conclusions of the research presented, it is expected that the market participants with a perceived increase in stock prices pose a lower systematic risk.

After evaluating the vector co-integration model of systematic risk perception, an analysis of the dynamic interaction variables in the model follows. The variables were introduced into the model in the following order: the perception of systemic risk, interest rate, exchange rate, the share of loans in the gross domestic product, inflation, stock prices and gross domestic product. Cholesky’s decomposition involves a recursive ordering of the variables (Bahovec and Erjavec, 2009). The ordering adopted here is the following: spread between the corporate bond issuer credit rating of AAA and BAA as an indicator of the perception of systemic risk, inflation, real GDP, the ratio of loans to the private sector in gross domestic product, stock prices, exchange rate and real interest rates. The following order was introduced under the assumption that the perception of systemic risk does not respond immediately to change in other variables, but that it affects all the other variables in the quarter being observed. As can be seen in Graph 2, a perception of systemic risk most strongly responds to changes in stock prices and the impact is long term. After a change in one of the variables in the first quarter, namely, the "shock" of one standard deviation, the strongest reaction to the change of one standard deviation was in stock prices and the impact continued to increase until the eighth quarter, when it started to decrease.

Graph 2 Standard Cholesky decomposition (+/- 95% bands)



Note: SRP - System risk perception; GDP - Gross domestic product; CPI – Inflation; RIR - Real interest rate; EXR - Exchange rate; CPS/GDP - Credit to the private sector/gross domestic product; SP - Stock price; RREP - Residential real estate prices; CREP - Commercial real estate prices; AAPI - Aggregate asset price index

CONCLUSION

This article offers an overview of asset prices' role in credit market perception of system risk. Strong theoretical assumptions support the importance of asset prices, and stock and real estate prices in the perception of system risk. As was shown in this paper, stock prices have a significant influence on the credit market perception of system risk in United States. Due to the lack of indexes included in this analysis, and lack of aggregate asset prices index and real estate indexes, together with the absence of more adequate data, this finding is in the form of a conjecture and needs to be substantiated with further research. Despite these limitations, the results in this paper provide evidence on the role of asset prices in the credit market perception of system risk. Therefore, the results provide a significant contribution to better credit and investment decision making but also shed new light on ways to achieve financial stability. Therefore, the results have important implications for monetary policy and regulatory management.

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[i] Way this calculation for getting real interest rate on credit market is adequate more in Hofmann (2001)

[ii] The model was also tested with the included variable GDP gap calculated using HP filter instead real GDP variable, but the model was not statistically valid. In fact, this result could be expected due to nature HP filter calculation of GDP gap. Namely, HP filter takes into account the data from the entire time frame when determining the long-term trend and cyclical component – i.e. the gap component of Q1 1970th to Q4 2008 year. Given the fact that market perception of systemic risk is formed on the basis of information available to that point, i.e. at time t, the estimated GDP gap of participants in the credit markets can not be equal to that calculated with all data from a sample that includes both time points after time t.

[iii] GDP 1985 = 100

[iv] CPI 2005 = 100

[v] SP 1985 = 100

[vi] The occurrence of more cointegtaion vectors in the estimated models with indicators of real estate prices may be partly explained by connection of real estate prices and GDP. In fact, their prices are significantly dependent on the movement of GDP, but the very level of GDP depends on events in the real estate market. Perhaps the best examples of the interdependence are current events in the real estate market in the U.S. The same problem with the appearance of two cointegration vectors in the modeling of loans to private sectors in Germany had the Hofmann (2001). He solved the problem by breaking the model to two equations. He used one model to explain the movement of loans with GDP and short-term interest rates, and the second with property prices and short-term interest rates.

[vii] More abot real estate marcets in: Hilbers, Lei, Zacho (2001), Malpezzi, Wachter (2002), Herring i Wachter (1999), Tsatsaronis i Zhu (2004); Capozza et al. (2002).

[viii] In this context it is often quoted statement by P. Samuelson's "The Exchange is predicted nine of the last five recessions" (IMF, 2000).. Skeptical view of the informational role of asset prices more in: Gertler et al. (1998).