

# FFR Level in the Period 2000-2007 and the Emergence of the Asset Price Bubble on the US Real Estate Market

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## **Abstract**

This article aims at investigating the impact of the level of the Fed funds rate in the United States in the period 2000-2007 on the emergence of the asset price bubble on the US real estate market, burst of which triggered the financial crisis in the US and globally. Rather than constructing a single theoretical or empirical model of this potential influence, a more eclectic approach is taken. The argument is structured around three fundamental questions (1) whether the Fed funds rate had been low compared to benchmarks in the given period; (2) whether low short-term rate itself had been able to inflate a real estate bubble; (3) whether alternative explanations of the bubble causes were sufficient. For each of the issues a number of qualitative explanations and quantitative models is provided and analysed. Based on the gathered data, models, and arguments, the paper concludes that the influence of the Fed funds rate on the bubble's emergence is not to be underestimated. This conclusion should be kept in mind in the context of future directions for monetary policy in the US and globally, as the extremely low interest rates applied by central banks to date might be inflating the next bubble.

**Keywords:** Monetary policy, subprime crisis.

**JEL Code:** E58, G01.

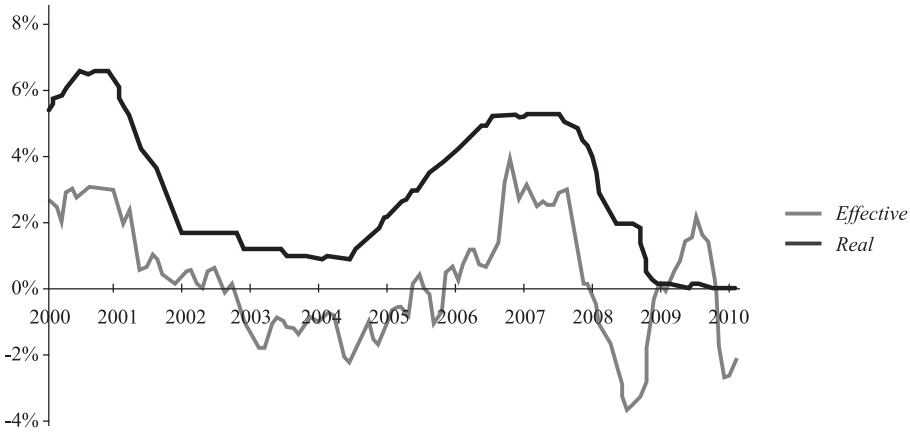
## **Introduction**

In order to investigate the impact of the level of the Fed funds rate in the United States in the period 2000-2007 on the emergence of the asset price bubble on the

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US property market, let us first define the level of the rate. In the period 2001-2007, the average level of the effective Fed funds rate was 2.72%, with median level of 2.01% and standard deviation of 1.60%. Real interest rates at the same time were on average as low as 0.13%, with median of 0.10% and standard deviation of 1.44% (figure 1). It is also worth to note the negative real interest rates between October 2002 and April 2005, regardless of the lack of recession in the US at that time (Zandi, 2009, p. 88).



**Figure 1.** Effective Fed funds rate and real short-term interest rates. USA, 2000-2010. Source: Federal Reserve System, Principal Global Indicators.

The two main reasons for such FFR levels were the (1) fear of deflation and (2) Greenspan put (Bernanke, 2010, p. 2-4; Greenspan, 2010, p. 39). The fear of deflation was driven by the bust of the dot-com bubble and subsequent economic slowdown and unemployment growth, as well as geopolitical factors – 9/11 terrorist attacks, wars in Afghanistan (2001) and Iraq (2003) that could further weaken the American economy. It was strengthened by the falling indices of CPI (at the level of 1,33% in the first quarter of 2002 and falling again since March 2003) and PPI (negative since July 2001). Keeping the FFR low for almost three years balanced at that time – according to Greenspan – the risk of deflation and of possible growth in inflation or asset prices.

Greenspan put meant taking no action against potential speculative bubbles (so ignoring early warnings of a growing bubble) by the Fed and only entering the play once the bubble burst. Greenspan (2007, p. 200) claimed that trying to fight against asset bubbles during the boom, by increasing interest rates, is pointless because – due to complexities of economic phenomena, issues with data reliability and defects of econometric forecasting – it is too difficult to tell apart the healthy economic growth and a speculative bubble. In his opinion, delicate fine-

tuning of the interest rates would not suffice to stop the growth of asset prices and prevent the bubble, sharp increase was compared to „killing the patient to cure the disease“ by wiping out the economic growth (Greenspan, 2007, p. 201). This is why Greenspan sought to keep the consumer price inflation stable, rather than to prevent bubbles. In line with this policy, Fed led by Greenspan only reacted to bubbles after their bust, by drastically decreasing interest rates, for example in 1987 (after a fall in stock prices), 1990 (during the Persian Gulf war), 1993 (because of the tequila crisis), 1997 (during the Asian crises), 1998 (due to the problems of the Long Term Capital Management fund), 2000 (when the dot-com bubble burst). It is worth to note that market agents, aware of the fact that Fed would decrease the interest rates significantly after a bubble's bust yet would not take any actions beforehand, soon turned this last resort strategy into a way of increasing expected returns (Mueller, 2010).

### **Was the FFR low compared to benchmarks?**

Defining a proper evaluation method of interest rates leads to the normative question of how they should be set by central banks in the first place. One option is looking at the economy from the holistic perspective and taking discretionary decisions based on the assessment of the current and future economic situation (Filar, 2004). The second approach is more data-driven: looking at specific parameters (e.g. inflation, economic growth), particular levels of which should bring an a priori defined reaction. This makes the monetary policy more systematic and predictable than it is when decisions are taken in a one-off manner (Filar, 2004). Finally, a two-fold approach is also possible: taking into account the rule-driven calculation and adjusting for the general assessment of the economic situation, taking into account risk of deflation, necessity to inject large quantities of liquidity into the economy in case of a liquidity or payment crisis, the fact that interest rules can be misleading at very low or very high inflation rates, etc. (Taylor, 2005).

As much as different approaches can be taken at the stage of setting the rates, their rigid ex post evaluation can in fact only be carried if an actual interest rate applied is compared to the level suggested by some monetary policy rule. Simple look at the interest rate levels would never be constructive as the decision to call a rate “right”, “too low” or “too high” will always depend on numerous factors, for example on how developed the analysed economy is or in which stage of the business cycle it is in a given moment.

Following Athanasios Orphanides (2007, p. 2-9) we can isolate (1) rules referring to the monetary base, such as (a) “*k*-percent” money growth rule of Milton Friedman, and (b) McCallum rule (McCallum, 2000, p. 52); as well as (2) rules referring to the short-term policy rate, such as (a) Wicksell rule and (b) Taylor rule (Taylor, 1993). Since the Taylor rule has been the most widely applied as a reference point for central banks setting the interest rates, it will be our reference point for the analysis of the FFR level in the period 2000-2007. Its major

advantages over  $k\%$  and McCallum rules include the fact that it relates directly to the interest rates, which makes it possible to evade the issue of unstable money demand, driven by short-term shocks or long-term changes attributed to financial innovation. As opposed to the Wicksell rule, on the other hand, it takes into consideration the current state of the real economy and not only the price stability, while remaining fairly simple and disregarding the analytical model used for description of the economy as such (Orphanides, 2007, p. 4-5).

Taylor rule is given by the following equation (Taylor, 1993):

$$r = \pi + ay + b(\pi - \pi^*) + 2$$

where:

- $r$  is the proper Fed funds rate,
- $\pi$  is the rate of inflation over the previous four quarters,
- $\pi^*$  is the targeted inflation rate, typically equal to 2,
- $y$  is the percentage deviation of the real GDP ( $Y$ ) from the trend real GDP ( $Y^*$ ), that is  $y = 100((Y - Y^*)/Y)$
- $a$  and  $b$  are coefficients, originally set for the American economy at the level of 0.5; later – following Brayton et al. (1996) – the value of a coefficient changed to 1 (Taylor, 1998, p. 16); later – following Poole (2007, p. 6) – increased to 1.5 (figure 2a).

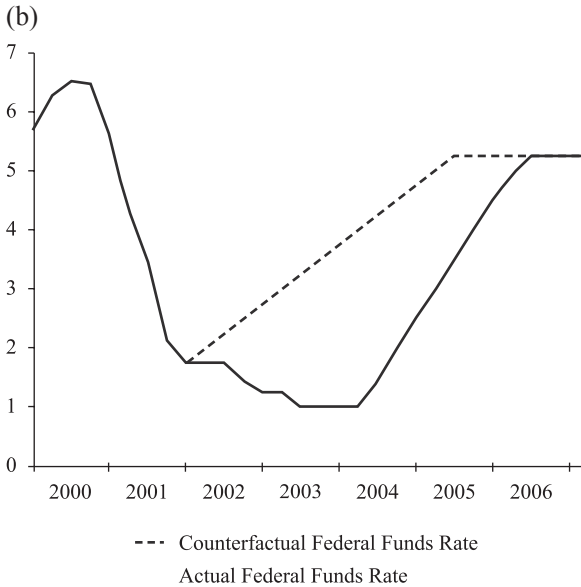
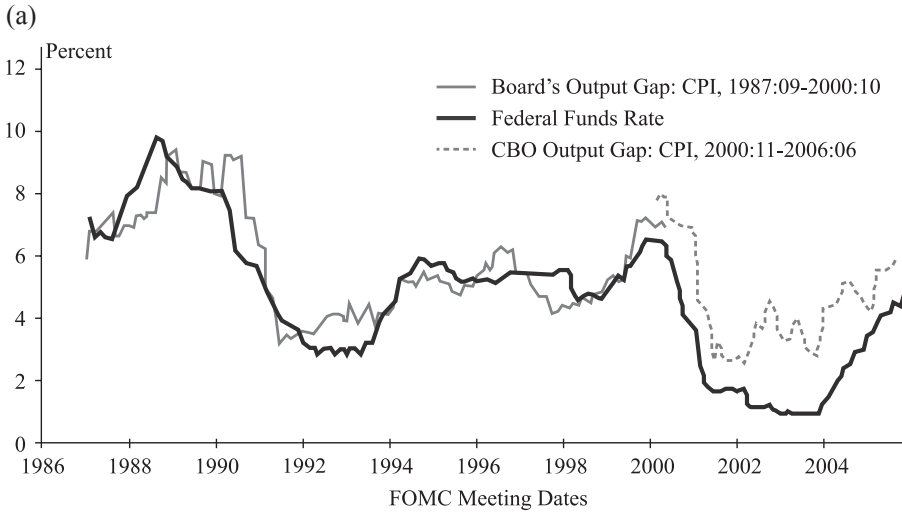
The rule matches the monetary policy of the Fed carried during the Great Moderation period (20 years since early 1980.) – period of long-term economic growth and little fluctuations of GDP around the trend.

Evaluation of the interest rates in the US in the period 2000-2007 suggests that the level of the Fed funds rate was lower than suggested by the Taylor rule, as often emphasized by John Taylor himself (figure 2). However, it is worth to note the limitations of the rule, which are often quoted as an argument against (a) setting interest rates in line with any monetary policy rule in general (b) criticism of claiming interest rates in the period 2000-2007 were too low.

These limitations can be broadly divided into two groups: (1) dependence of the rule on multiple assumptions, to which the recommended result is very sensitive (Bernanke, 2010, p. 6-8, Kohn, 2007, p. 3-7), and (2) being only able to assess the level of interest rates *ex post* rather than *ex ante* (Bernanke, 2010, p. 8-11).

Regarding the multiple assumptions limitation with reference to the Taylor rule, the issues worth noting include the metrics of inflation, estimation of the output gap, and value of the coefficients.

In his original paper, Taylor (1993) suggested using the GDP deflator as an inflation metrics. However, currently the most frequently used metrics is the CPI (Barnes, 2010), used by William Poole (2007, p. 5) in the already quotes research (figure 2 a). Furthermore, the Federal Open Market Committee sets the inter-

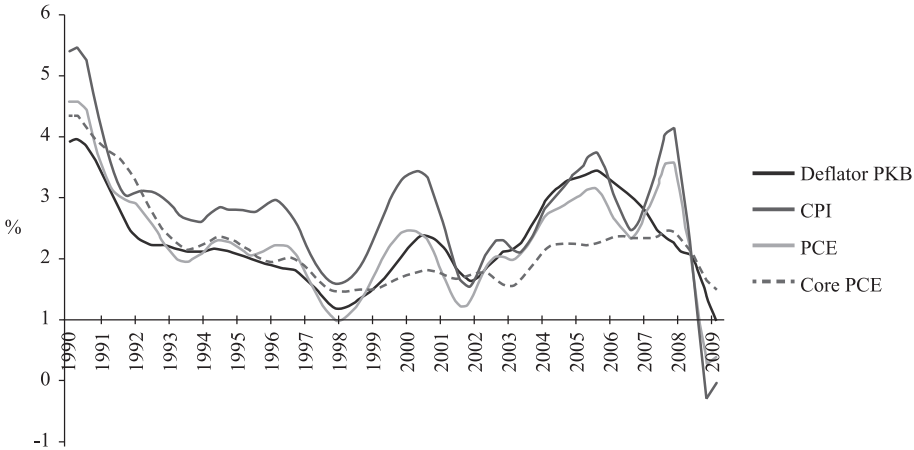


**Figure 2.** Comparison of the FFR and proper FFR according to the Taylor rule for the USA, proposed by (a) Poole (1986-2006) and (b) Taylor (2000-2007).

Source: Poole, 2007, p. 6; Taylor, 2007, p. 3.

est rates using either PCE (Personal Consumer Expenditure price index; Kohn, 2007, p. 3) or core PCE (excluding food and energy due to high volatility of their prices; Poole, 2007, p. 5). As differences between inflation measured with those indices can be even as high as 1% (figure 3), the choice of the index is of vital importance.

Issues arise also when the trend of the real GDP and, consequently, the output gap is to be estimated. In order to calculate it, the Fed uses the FRB/US model (Bernanke, 2010, p. 6), yet obviously different models could be used instead – for example, Dokko et al. (2009) mentioned the Congressional Budget Office (CBO) model – and the results would differ.



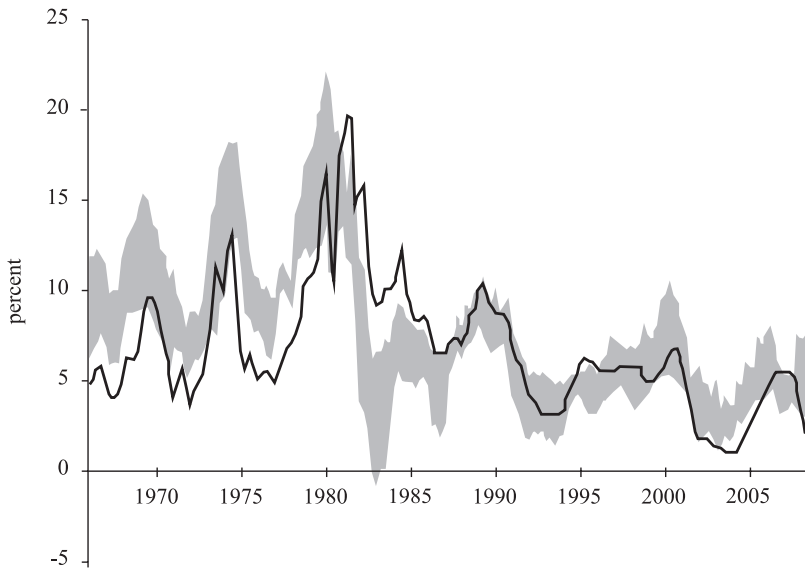
**Figure 3.** Inflation measured with different indices. USA, 1990-2009, quarterly moving average.

Source: Principal Global Indicators. (GDP deflator, CPI) and Bureau of Economic Analysis (PCE and core PCE).

The third issue is the mentioned beforehand problem of coefficients  $a$  and  $b$ , as it defines which of the Fed's objectives is of higher importance while setting the interest rates (fighting the inflation versus supporting the economic growth), as well as how significant change in the interest rates should be driven by a particular deviation of inflation from target and a particular level of the output gap. The latter is important regardless of the economic situation; the former becomes especially important in case of stagflation, when Fed's objectives are contradictory.

Considering the different assumptions, Dokko et al. (2009) from Washington Fed proposed an interval which should encompass the "proper" Fed funds rate levels calculated using different versions of the Taylor rule (figure 4). According to this figure, difference between the interval and actual level of FFR in the first decade of the XXI century was not the highest in history.

This does not however seem to prove the FFR in the period 2000-2007 not being too low nor not remaining too low for a long period. Gordon (2009, p. 6) claims that regardless of parameters used in the Taylor rule the interest rates were too low for too long in the years before the subprime crisis. Taylor (2010a) argues that even if PCE is used for measuring inflation, interest rates will still be too low



**Figure 4.** Short-term interest rate and Taylor's rule recommendations in different variants. USA, 1965-2009.

Source: Dokko et al., 2009, p. 9.

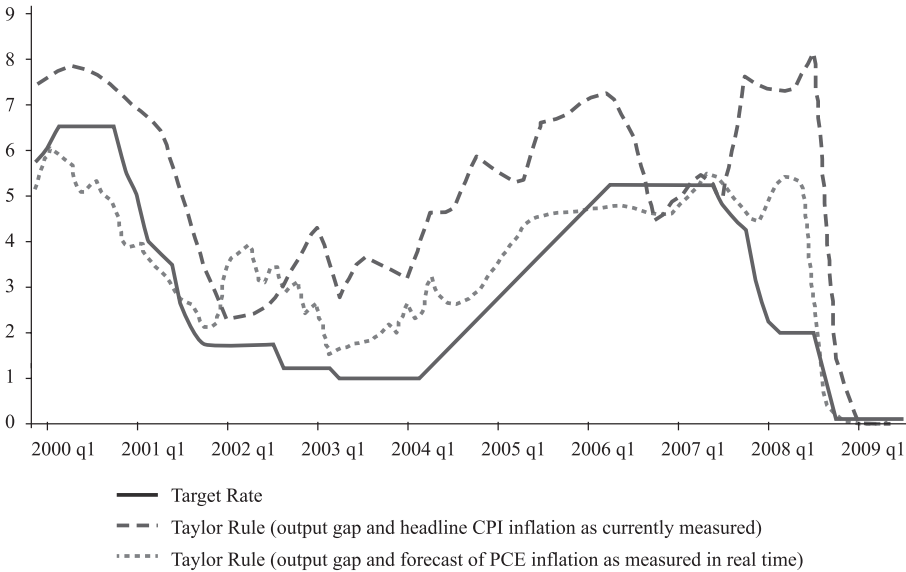
compared to the rule, and claims the deviation from the rule was the highest since the crises in the 1970. His most famous chart comparing the actual and proper short-term interest rates level for the United States in the previous decade is presented at figure 2b.

In terms of the ex post assessment limitation, it is worth to note the reasoning of Ben Bernanke (2010, p. 8-11). As he pointed out, FOMC – while setting the interest rates – uses forecasts of inflation and GDP (Orphanides, Wieland, 2008, p. 307-324), while evaluation of their level is carried ex post, based on actual data on inflation and GDP for the analysed quarter and three previous ones. The key advantage of setting the FFR based on forecasts is – according to Bernanke (2010, p. 9) – the fact that it prevents the central bank from overreacting to short-term changes in inflation. As output gap forecasts and actual values typically do not differ significantly, the deviation of inflation from forecasts matters.

Figure 5 shows the recommended level of the Fed funds rate according to one of variants of the Taylor rule (probably with coefficients  $a = 1.5$ ,  $b = 0.5$ , inflation target = 2%, inflation index – CPI) and the recommended level of Fed funds rate according to the same Taylor rule's version, yet using the output gap and inflation level forecast. Clearly the difference between Fed funds rate and Taylor's rule recommendation is much smaller when the forecasts are used.

The idea of basing the monetary policy on forecasts rather than on actual data seems slightly controversial according to John Taylor (2010a). He notes that the problem of short-term inflation fluctuations can be avoided if average values

of indices are used. What is more, the question of which forecasts to use while calculating the optimal Fed funds' rate level remains unanswered, whereas, since the proper answer to changes in the forecasted level of inflation should be different than the answer to changes in the actual inflation, using the Taylor rule in the version suggested by Bernanke does not seem reasonable.



**Figure 5.** Fed funds rate, Taylor's rule in a standard version and using output gap and inflation forecasts. USA, 2000-2009.

Source: Bernanke, 2010, slide 4.

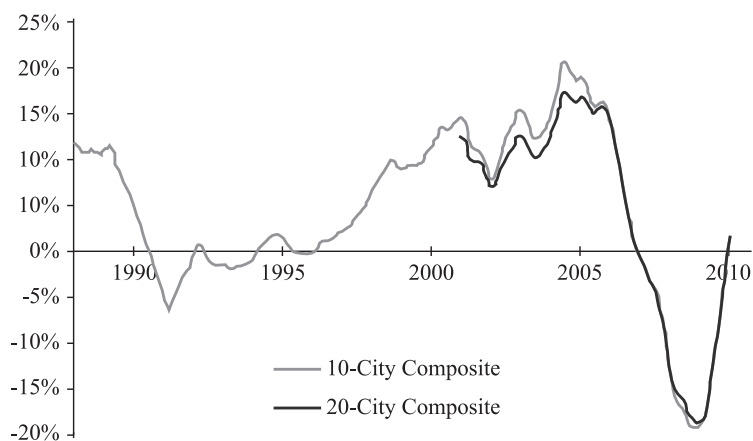
## Could the short-term rate inflate the bubble?

The question of whether a short-term interest rate, such as the Fed funds rate, could inflate the recent bubble on the US real estate market, can be broadly approached from two angles: (1) timing, so whether the increase of asset prices followed the loose monetary policy or the other way around, (2) strength of the impact, which can be considered from the one-country and multi-country perspective. Let us look at these in turn.

Considering the timing perspective, it is worth to note the argument of Ben Bernanke (2010, p. 11-12) who claimed that property prices started to grow earlier than the relaxation of the monetary policy. In fact, they began to rise rapidly in the late 1990., then grew at the level of 7-9% yearly in years 1998-1999 and 10-12% in years 2001-2003. Since the fastest price gains happened in 2004-2005, Bernanke does not exclude the impact of the monetary policy. However, he



argues that the growth of house prices (figure 6) was too high to be caused only by the level of the Fed funds rate.



**Figure 6.** Case-Schiller house price index. USA, 1988-2009.

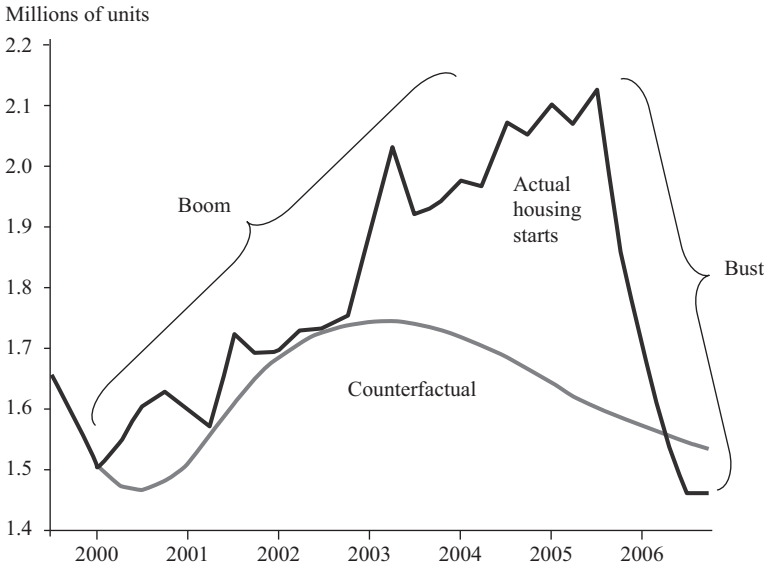
Source: Standard & Poor's.

Also according to Robert Schiller (2007, p. 2), boom on the real estate market started before the Fed's relaxation of the monetary policy. He assumes the boom started in 1998, while the Fed funds rate decreased a lot only in 2001, after the burst of the dot-com bubble. Schiller attributed the growth of property prices to psychological factors: after some initial increase, the society started to expect further growth, which became a self-fulfilling prophecy (Schiller, 2007, p. 7-9). This argument brings a question of how important the decreases in the FFR level were in fuelling the expectations of further price growth. Short-term interest rates act as a reference point for the society – their decrease is followed by the expectation of long-term interest rates fall and increase in asset prices (Dokko et al., 2009, p. 17).

The lack of clear answer on the timing dimension makes it necessary to consider whether impact of the FFR on the economy could be strong enough to drive the bubble on the real estate market in the United States. This hypothesis was tested quantitatively by numerous researchers. Let us look at their models and argumentation.

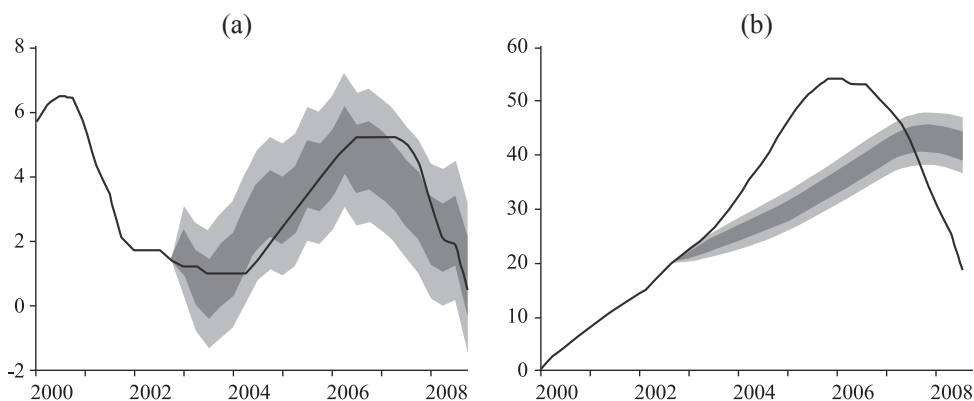
John Taylor investigated the relationship between the interest rate and the number of the housing starts and between the interest rates and the house price increases (Taylor 2010b, p. 28). He argued that the jump in the housing starts would have been significantly smaller had the FFR been in line with the Taylor rule (Taylor, 2007; figure 7). This argument is certainly a simplification - low interest rate should typically bring cheap credit, followed by housing demand, followed by the prices and then the increased supply (housing starts) as a response

of the housing sector to high demand and potentially high profits. Another issue that weakens Taylor's argument is the fact that he does not provide details of his counterfactual analysis of the housing starts which brings doubts about exact assumptions taken.



**Figure 7.** Actual housing starts and the counterfactual scenario, based on the assumption of monetary policy in line with the Taylor rule. USA, 2000-2006. Source: Taylor, 2008, p. 19.

Significantly more advanced methods of empirical analysis were used by Dokko et al. (2009, p. 27-29). They applied a VAR model investigating the relationship between the real GDP and real personal consumption expenditures, the nominal share of residential investment in GDP, real house prices, core PCE inflation, unemployment rate, and the nominal Fed funds rate, using the data from the period 1977-2002. The model showed the nominal interest rates that should have been used in the period 2003-2008 keeping the relationship between the variables from the period 1977-2002 and using the historic data from the period 2003-2008 for other variables. A similar analysis was carried to determine the house prices keeping all other variables at their historic levels and extrapolating relationships between them. According to this model, the actual nominal interest rates were reasonably close to the forecast, so in the period 2003-2008 the Fed funds rate were close to the level they should have judging by the historic experience (figure 8a). On the other hand, the actual house prices were higher than estimated by the model, which suggests factors from outside of the model influencing their level (figure 8b).



**Figure 8.** VAR model determining (a) nominal interest rates (b) house prices. USA, 2000-2008.

Source: Dokko et al., 2009, p. 28-29.

Commenting on the strength of influence of low short-term interest rates on the increase in housing prices in the US, Bernanke (2010, p. 13-14) quoted also research carried by del Negro and Otrok (2007, p. 1962-1985) and Jarociński and Smets (2008, p. 339-365). Both teams used the Bayesian VAR models for their analyses. Del Negro and Otrok argue based on their models that the influence of the monetary policy in on the change of house prices in the United States was limited<sup>1</sup>. However, Jarociński and Smets<sup>2</sup> claimed that “there is (...) evidence that monetary policy has significant effects on housing investment and house prices and that easy monetary policy designed to stave off perceived risks of deflation in 2002-2004 has contributed to the boom in the housing market in 2004 and 2005” (Jarociński, Smets, 2008, p. 362). This misalignment in results – despite a similar method – suggests that VAR models cannot provide a definite answer to the question of actual impact of the monetary policy on the boom. This can be partially attributed to the fundamental assumption of the autoregressive models, that is the possibility to extrapolate the relationships between variables over time, which means lack of a major structural change in the economy observed (in this case – in the early 2000s.) Bernanke (2010, p. 14) claims this is a reasonable argument to be cautious while drawing conclusions based on these models.

The analysis of importance of the short-term interest rates would not be complete without considering examples from countries other than the United States – after all, bubble’s existence was not only an American phenomenon. Both Alan

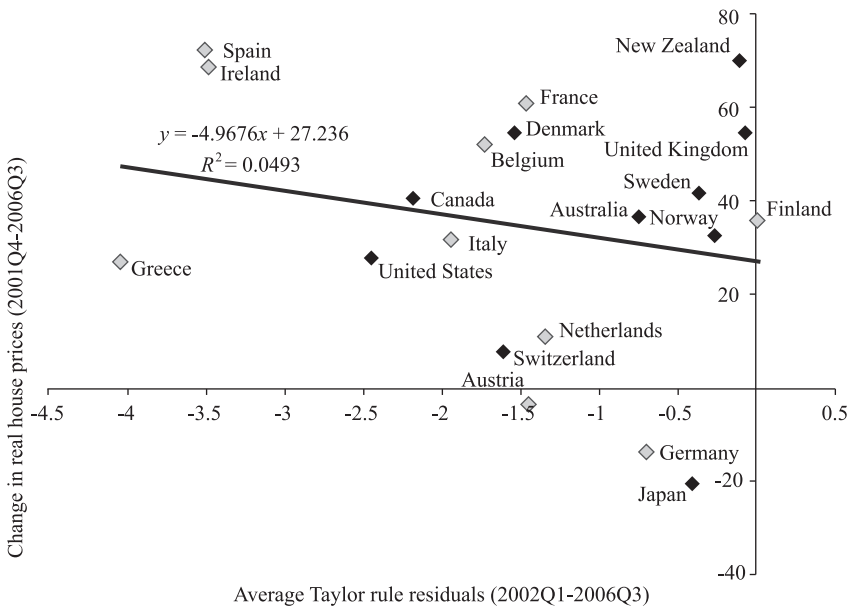
<sup>1</sup>They used a Bayesian VAR model with the following variables: Housing Price Index decreased by inflation measured by core PCE, real per capita income, Fed funds rate, GDP deflator, growth in real GDP, 30-year mortgage rate (del Negro, Otrok, 2007, p. 8-10).

<sup>2</sup>They used Bayesian VAR models in versions LVAR and DVAR, using the following variables: Fed funds rate, 10-year Treasury constant maturity rate, real private residential fixed investment in GDP percentage, real GDP, real personal consumption expenditures, GDP deflator, difference between the Case-Shiller index and the GDP deflator, commodity price index, M2 money stock.

Greenspan (2010, p. 42) and Ben Bernanke (2010, p. 16-19) argue that there is no international evidence of correlation between interest rates and the size of a bubble on housing markets. Let us consider two empirical models that deal with this argument.

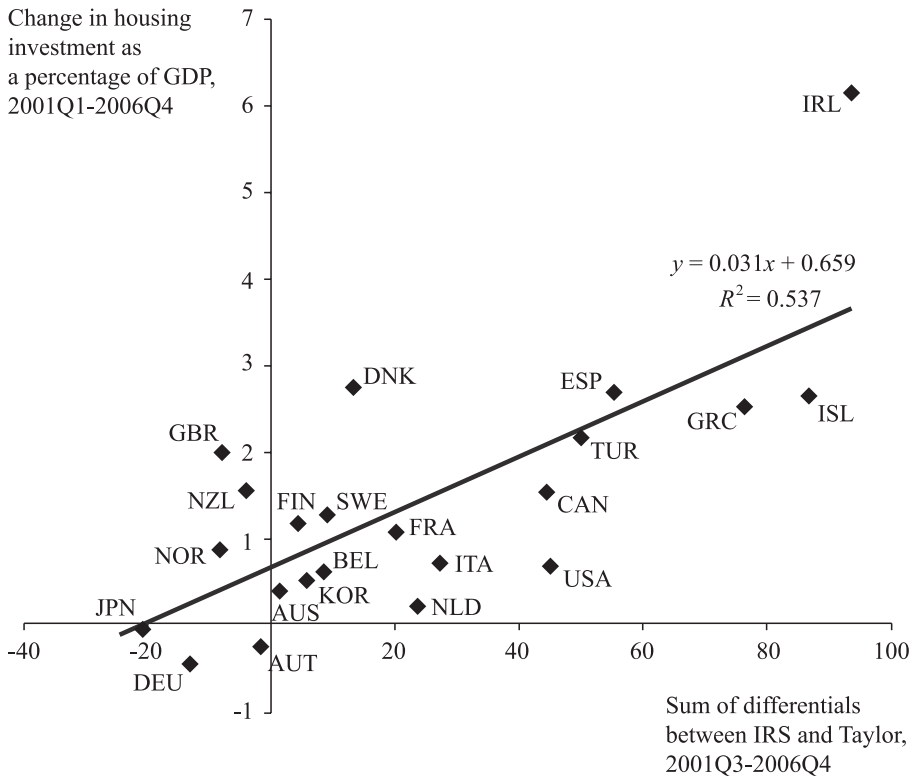
The first model was prepared by the International Monetary Fund (Fatás et al., 2009, figure 9), based on a sample of 20 developed countries. According to the research almost all of the countries had monetary policy looser than recommended by Taylor (even though in case of the US the deviation was among the greatest). Also, according to the research, more restrictive monetary policy does not mean slower increase in house prices as the relationship between the two variables was statistically insignificant, and the monetary policy explained only 5% of the house prices fluctuations. Dokko et al. (2009, p. 31-32), relating to this research, emphasized the case of the United Kingdom, where following the Taylor rule did not prevent the society from dramatic increase in property prices. The situation was fairly similar in New Zealand.

On the other hand, the 2008 OECD paper (Ahrend, Cournède, Price, 2008), quoted for example by John Taylor (2010a) brings different conclusions. 22 countries were examined for the deviation from the Taylor rule and investment in housing as a GDP percentage (figure 10). The relationship turned out to be significant: 54% of the changes in the investment level were explained by the deviation from the rule.



**Figure 9.** Deviation from the Taylor rule versus change in real house prices. Sample of 20 countries.

Source: Dokko et al., 2009, p. 32, following the International Monetary Fund.



**Figure 10.** Deviation from the Taylor rule versus a change in housing investment as a GDP percentage. Sample of 22 countries.  
Source: Ahrend, Cournède, Price, 2008, p. 19.

Similarly as when looking at the autoregressive models, we do not reach conclusive answer on the existence and strength of a relationship between deviation from the Taylor rule and size of the bubble, as it depends too strongly on the metrics used and the sample. However, as one of the models – the OECD model – shows such a relationship between the variables, empirical research does not allow rejecting the hypothesis of such relationship’s existence.

**Are the alternative explanations of the bubble causes sufficient?**

Let us come back for a moment to the evaluation of the autoregressive models carried in the previous section. It was argued there that the results of Dokko et al. (2009) suggested influence of a variable remaining outside of their model on the real estate bubble. It was also suggested that the fundamental assumption of autoregressive models – lack of a structural change on the analysed market in the investigated period – might be too strong with regards to the US real estate bubble. These observations, together with the inconclusiveness of the results pre-

sented in the previous section makes it necessary to consider other factors that could be central to the development of the bubble on the US property market. It is also worth to investigate whether these factors could be in any way related to the FFR level or, in a broader context, Fed's policy. The literature suggests the following factors worth considering as central to the bubble's development: (1) development of the credit market and securitization, (2) long-term, rather than short-term interest rates and the global savings glut.

Changes on the mortgage credit market seem clear when one considers the significant increase of the share of adjustable-rate mortgages (ARM) on the US market in years 2004-2005. What should be noticed here is the fact that the interest rate of such mortgages is more closely tied to the current level of the Fed funds rate than the interest rate of fixed-rate mortgages (FRM). It could be therefore argued that the low FFR made the ARM credits cheaper, which increased the demand for them – making the influence of the credit market structure on the bubble tied to the FFR level. This reasoning was referred to by Bernanke (2010) and Greenspan (2010), who have opposite views on the importance of credit market structure and interest rates in the context of a bubble.

According to Bernanke (2010, p. 14-15), short-term interest rates could not influence the preference of ARM over FRM as the monthly payment for an ARM was only 16% lower than of FRM. According to the Fed's calculations, had the Fed funds rate been in line with the Taylor rule, ARM's interest rates would have been only 0.71 percentage point higher than it was, and a monthly payment paid by a customer would have been 75 USD higher. However, having compared the monthly costs of other mortgages with ARM and FRM and noticing bigger differences, he believes a choice of credit type could have been more important for a debtor than an interest rate type. He claims, that "the availability of (...) alternative mortgage products proved to be quite important and, as many have recognized, is likely a key explanation of the housing bubble" (Bernanke, 2010, p. 16).

Greenspan (2010, p. 42) approached the matter differently: in his view, the low Fed funds rate does make ARM's interest lower, which brings higher demand for financing houses with ARMs and theoretically could become an important factor of the bubble's creation. However, he claims that a decision to buy a house is taken earlier than the decision how to finance it, therefore low interest on ARMs could not act as an important factor driving the demand for houses. He quotes the fact that the peak of ARM demand happened two years before the house price peak – during the last two years before the bust, the housing market was financed to a lesser extent by ARMs yet the demand for houses and the prices were still growing<sup>3</sup>. This reasoning seems legitimate in a standard market situa-

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<sup>3</sup>Two years before the house price peak the nominal interest rates were growing, and so were the house prices. The increase in nominal interest rates could act as a signal that ARMs interest will increase as well, therefore those interested in mortgages might have decided on FRMs

tion. However, in case of a bubble, more and more people decide on purchasing real estate even if they would not have considered it normally, may it be their first house, a more attractive property, or a pure investment. From this perspective, the key clients are those from the subprime segments, who have suddenly been given a chance to purchase their own house, as well as investors, whose activity drives the prices up<sup>4</sup>.

Securitization and transfer of risks onto the capital markets, happening in parallel to the credit expansion, is the second factor worth considering as an alternative bubble explanation. A common truth, emphasized e.g. by Greenspan (2010, p. 10) is that without the financial assets being funded predominately by debt, the bust of 2007 would not have brought such severe consequences for the economy. What was the scale of the securitization? According to Thompson et al. (2007, p. 8), CDO issuance in the United States reached the level of 312 billion USD, while the home equity ABS market was worth 630 billion USD. For comparison, current account deficit of the US was in that period at the level of 760 billion USD (according to the Bureau of Economic Analysis). Underestimation of the risk related to the mortgage market at that time, as well as their wide distribution via sales of asset-backed securities clearly helped fuel the bubble on the housing market.

Could the credit market structural changes and securitization alone generate a bubble of such a scale as experienced by the US real estate market in 2007? According to many economists, e.g. Taylor and Calomiris quoted beforehand, these issues have only a secondary impact, while the key sources of the trouble were the loose monetary policy and regulations facilitating location of the money excess on the property market. Without too low interest rates the credit expansion would not have reached such a scale - as Gordon (2009, p. 6) put it, the "low interest rates made it particularly profitable for banks and nonbanks to make mortgage loans" - which is understandable as low interest rates on one hand make it easy for banks to raise capital, on the other - if long-term interest rates are also low - create high demand and allow the banks to make profits on fees while originating the mortgages. Assuming therefore the credit expansion and securitization being the variables inflating the bubble, it is difficult to claim they were entirely independent of the Fed policy.

Yet another factor involved in the bubble creation worth considering is the concept of the global saving glut, related to the long-term interest rates.

Alan Greenspan (2010, p. 40-41) argued that the interest rates that do impact the low prices of mortgages are not the Fed funds rate - as believed by e.g. John Taylor - but the long-term interest rates which in turn are a consequence of numerous factors independent of the Fed. Even though typically short-term interest

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rather than on ARMs.

<sup>4</sup>The process of boom's creation was described in detail by Zandi (2009, p. 52-60) and corresponds with Minsky's "follow the leader" process.

rates determine long-term interest rates, this relationship disappeared in the key period from the perspective of the bubble's emergence, 2002-2005 (Greenspan 2010, p. 38-39, figure 11).



**Figure 11.** A choice of interest rates. USA, 2000-2007.

Source: International Monetary Fund.

The persistence of low long-term interest rates is explained by Greenspan (2010, p. 5, 43) and Bernanke (2010, p. 18) by the concept of the saving glut, created by Bernanke a few years earlier (e.g. Bernanke, 2005).

The quick growth of the current account deficit in the United States in the previous decade corresponds with the difference between the level of American investments in capital goods or real estate and domestic savings (Bernanke, 2005, p. 3). Therefore, the reason for the deficit is a too low level of domestic savings versus the investment needs.

It is, according to Bernanke, a consequence of the emergence of a global saving glut, coming not from – as one might expect – industrialized countries (which should save more due to the ageing of their societies), but from developing countries. Bernanke (2005, p. 5) seeks a reason for their transformation from a net borrower to a net creditor in the wave of crises in the second half of the 1990., owed to the outflow of foreign capital from the developing countries. Fall in exchange rates and asset prices, weakening of the banking sector and recession that came together with the crises made the developing countries change their strategy of managing international capital flows and become capital exporters. The drive to savings was present not only in the countries actually affected by the crises, such as Korea, Thailand, but also in China, for the sake of preventing the potential crises in the future. All these countries started to increase their levels



of reserves and seek export-led growth. Increase in their levels of reserves happened via selling their own Treasury bonds (impulse to save) and purchasing US Treasury bonds. Own bonds were then repaid by rolling the debt and decreasing the budget deficits. Another important source of reserves, mostly for the Middle East, Russia, Nigeria, or Venezuela, were the money gained while selling the oil, prices of which were on the increase (Bernanke, 2005, p. 5-6).

A group of developing countries can only increase its current account surplus when the rest of the world increases their deficits. The reasons for the fall in savings in the developed countries are divided by Bernanke (2005, p. 6-7) in two groups: those present in the period 1996-2000 and those occurring only after 2000.

In the first period, high stock prices, development of new technologies, rise in productivity, as well as low political risk, good regulatory environment, and strong property rights made the US economy attractive to international investors. Well-developed financial markets, the dollar's status of the international currency, the fact that most countries kept their reserves in USD and often had fixed exchange rate to the American currency (as, for example, China) further facilitated the process. Inflow of capital into the United States resulted in stock price growth and USD's appreciation, followed by increase in wealth of the American society and their consumption expenditures, including on imported goods. Stock price rises brought further investments into the US and decreased the residents' perceived need to save (owed to high perceived wealth of the society and expectations of the future income gains).

After the dot-com bubble, the transmission mechanism changed and low interest rates, rather than high stock prices, became the key reason for low savings of the American society (Bernanke, 2005, p. 7). The global savings moved from the equity and Treasury bonds markets to the real estate market. Inflow of long-term savings with fixed investment opportunities on the targeted market was supposed to decrease the long-term interest rate. The mechanism is intuitive: as the interest rate is a "price" of the money, the more money flows in while the demand is fixed, the cheaper the money becomes. Low interest rates on mortgages led to demand for houses and growth of their prices, while the possibility of refinancing the credits further decreased the propensity to save of the US citizens<sup>5</sup>. At the same time, foreign investors did not need to invest into real estate directly – rather, they could purchase asset-backed securities, with low perceived risk and high returns (Zandi, 2009, p. 79-80).

The idea of the saving glut, rather than low FFR being the reason for low long-term interest rates was criticized by John Taylor (2010b, p. 30-31). On the

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<sup>5</sup> Bernanke (2005, p. 8) emphasizes that other developed countries, such as France, Italy, Spain, Australia, the United Kingdom, went through a similar process. However, it did not occur in countries with slow growth of the economies and lack of booms on the housing markets, in such countries as Germany or Japan.

global scale, in his opinion, one can notice the savings shortage rather than excess, as confirmed e.g. by the IMF research he quotes, with the global rate of savings as a GDP percentage being particularly low in the period 2002-2003, especially compared to 1970. and 1980. Regardless of the actual shift of roles between developed and developing economies, since the surplus and shortage must be equal on the global scale, influence of some global saving glut on the low long-term interest rates could not have happened.

This opinion differs from Charles Calomiris's approach (2008, p. 18), according to whom the saving glut is a fact, yet one of the reasons for the glut was the loose monetary policy in the United States. A similar thought is included in the de Larosière (2009, p. 15) report: loose monetary policy and the saving glut coexisted, and more restrictive monetary policy could have limited the housing price increases in the US.

## **Conclusions**

Even though over 5 years have passed since the bust of the most recent bubble on the US real estate market, the fierce discussion regarding the principal causes of the bubble is still on. The purpose of this article was to structure it and provide insights on how likely the key role of FFR in emergence of the bubble was.

It seems from the analysis that the Fed funds rate's level in the period 2000-2007 was low – regardless of the difficulties in assigning such a name due to different versions of monetary policy rules and possible unfairness of such a judgment attributed to difficulties of ex ante evaluation while setting interest rates. Analysis of the timing of real estate price increase, autoregressive models evaluating strength of FFR influence, as well as multi-country studies do not give clear conclusions on how important this factor was, yet they do not provide sufficient arguments to exclude it. Finally, alternative explanations of the bubble, related to the credit market structure and changes in the global economy seem to be tied to the FFR level itself. The general conclusion can only be, therefore, that the impact of the low level of the Fed funds rate in the period 2000-2007 on the emergence of the bubble on the North American property market existed. As difficult as it is to define whether monetary policy was the standalone key factor driving the boom, it is impossible to claim it had no influence whatsoever.

## **References**

- Arghyrou M. G. (2008) Monetary policy before and after the euro: Evidence from Greece. *Empirical Economics*, Springer, vol. 36(3), June, pp. 621-643.
- Arghyrou M. G., Gadea M. D. (2008) The single monetary policy and domestic macro-fundamentals: Evidence from Spain. *Cardiff Economics Working Papers E2008/23*, Cardiff University.
- Acharya V., Richardson M. (eds) (2009) *Restoring Financial Stability: How to Repair a Failed System*. John Wiley & Sons, Inc., New Jersey.

- Allen W., Wood G. (2006) Defining and achieving financial stability. *Journal of Financial Stability*, vol 2, issue 2, pp. 152–172.
- Balassa B. (1964) The purchasing power parity doctrine: a reappraisal. *Journal of Political Economy* 72, pp. 584-596.
- Balcerowicz L. (2012) On the Prevention of Crises in the Eurozone. Paper presented at the European University Conference ‘Governance for the Eurozone: Integration or Disintegration,’ Florence, April 26.
- Bank of England (2009) The role of macroprudential policy. A Discussion Paper. November.
- Bank of Spain (2003) Annual report 2002. Banco de España, Madrid.
- Bank of Spain (2009) Informe Anual 2008. Banco de España, Madrid, pp. 187–88.
- Beynet P., Fuentes A., Gillingham R., Hagemann R. (2011) Restoring Fiscal Sustainability in Spain. OECD Economics Department Working Papers, No. 850, OECD Publishing.
- Bień A. (1988) Optymalny obszar walutowy. Teoria i praktyka. PWE, Warszawa.
- Bini Smaghi L. (2011) Eurozone, European crisis & policy responses. Speech at the Goldman Sachs Global Macro Conference, Hong Kong, 22 February.
- Blanchard O. (2006) Portugal, Italy, Spain, and Germany. The implications of a suboptimal currency area. Speech at the WEL-MIT meeting, NYC.
- Borio C. (2003) Towards a macroprudential framework for financial supervision and regulation? BIS Working Papers, no 128, February.
- Borio C., Drehmann M. (2009) Towards an operational framework for financial stability: ‘fuzzy’ measurement and its consequences. BIS Working Papers, no 284, June.
- Buiter W. H. (2008) Central banks and financial crises. Financial Markets Group, Discussion Paper 619, London School of Economics, London, UK.
- Carney M. (2009) Some consideration on using monetary policy to stabilize economic activity. Remarks at Jackson Hole conference, Wyoming, 22 August.
- Caruana J. (2005) Monetary policy, financial stability and asset prices. Occasional Papers, 0507, Bank of Spain.
- Catalán M., Moretti M. (2006) Regulation, Supervision, and Governance of the Spanish Cajas. Spain: FSAP Technical Note, IMF Country Report No. 06/215.
- CEBS (2010) 2010 EU wide stress testing documents. Available online at <http://www.eba.europa.eu/EuWideStressTesting.aspx>
- Clarida R., Gali J., Gertler M. (1998) Monetary Policy Rules in Practice: Some International Evidence. *European Economic Review*, 42, pp. 1033-1067.
- Clement P. (2010) The term “macroprudential”: origins and evolution. BIS Quarterly Review, March.
- Covitz D., Liang N., Suarez G. (2009) The Anatomy of a Financial Crisis: The Evolution of Panic-Driven Runs in the Asset- Backed Commercial Paper Market. Finance and Economics Discussion Series Working Paper 2009 36,

Board of Governors of the Federal Reserve.

- Crockett A. (2000) Marrying the micro- and macroprudential dimensions of financial stability. BIS Speeches, 21 September.
- Davis A., McLennan S., (2006) Securitization in the United Kingdom. UK Tax Reforms Make Life Simpler. The 2006 Global Securitization Guide, Gide Loyrette Nouel MNP, p. 35.
- Diamond D. W., Dybvig P. (1983) Bank Runs, Deposit Insurance and Liquidity. *Journal of Political Economy*, 91(3), pp. 401–419.
- Fernandez de Lis S., García-Herrero A. (2010) Dynamic Provisioning: Some Lessons from Existing Experiences. ADBI Working Paper No. 218, May 26.
- Financial Stability Board (2011) Shadow Banking: Scoping the Issues. A Background Note of the Financial Stability Board.
- Fisher J. D. M., Quayyum S. (2006) The Great Turn-of the Century Housing Boom. *Economic Perspectives*, Federal Reserve Bank of Chicago, pp. 29-44.
- Flaig G., Wollmershaeuser T. (2007) Does the Euro-Zone Diverge? A Stress Indicators for Analyzing Trends and Cycles in Real GDP and Inflation. CESifo Working Paper No. 1937.
- Frankel J., Rose A. (1998) The Endogeneity of the Optimum Currency Area Criteria. *Economic Journal*, 108, pp. 1009-1025.
- Kaufman G. G. (2000) Banking and Currency Crises and Systemic Risk: A Taxonomy and Review. DNB Staff Reports 48, Netherlands Central Bank.
- Galati G., Moessner R. (2011) Macroprudential policy - a literature review. BIS Working Papers 337, Bank for International Settlements.
- Gallin J, (2003) The long-run relationship between house prices and income: evidence from local housing markets. United States Federal Reserve Board
- García-Herrero A., Fernandez de Lis S. (2008) The Housing Boom and Bust in Spain: Impact of the Securitisation Model and Dynamic Provisioning. *Housing Finance International*, September 2008.
- Garriga C., (2010) The Role of Construction in the Housing Boom and Bust in Spain. FEDEA Working Papers 2010-09.
- Goodhart C. (2010) The Role of Macro-Prudential Supervision. Speech at the Federal Reserve Bank of Atlanta 2010 Financial Markets Conference, Atlanta, Georgia, May 12.
- Gorton G. B. (2010) Slapped by the Invisible Hand: The Panic of 2007. Oxford University Press.
- Hanson S., Kashyap A., Stein J. (2011) A Macroprudential Approach to Financial Regulation. *Journal of Economic Perspectives*, American Economic Association, vol. 25(1), winter, pp. 3-28.
- Hart O., Zingales L. (2010) A New Capital Regulation for Large Financial Institutions. Available online: [http://faculty.chicagobooth.edu/luigi.zingales/papers/A\\_New\\_Capital\\_Regulation\\_ALER\\_version.pdf](http://faculty.chicagobooth.edu/luigi.zingales/papers/A_New_Capital_Regulation_ALER_version.pdf).
- Hayo B., Hofmann B. (2006) Comparing monetary policy reaction functions: ECB versus Bundesbank. *Empirical Economics* 31, pp. 654-662.

- Haughwout A. F., Peach R. W., Sporn J., Tracy J. S. (2012) The Supply Side of the Housing Boom and Bust of the 2000s. FRB of New York Staff Report No. 556., March.
- International Monetary Fund (2009) Lessons for monetary policy from asset price fluctuations. World Economic Outlook, Chapter 3, Washington, October.
- International Monetary Fund (2010) Global Financial Stability Report. Washington, April.
- Jones C. (2012) The UK Housing Market Cycle and the Role of Planning: The Policy Challenge Following the Financial Crisis. In: Challenges of the Housing Economy: An International Perspective (eds. C. Jones, M. White, N. Dunse), Wiley-Blackwell, Oxford, UK.
- Kashyap A., Rajan R., Stein J. C. (2008) Rethinking Capital Regulation. In: Maintaining Stability in a Changing Financial System, pp. 431–71. Federal Reserve Bank of Kansas City.
- Kenen P. (1969) The theory of optimum currency areas: An eclectic View. In: Monetary Problems of the International Economy (eds. R. Mundell and A. Swoboda). University of Chicago Press, Chicago.
- Kim K., Suh S. (1993) Speculation and price bubbles in the Korean and Japanese real estate markets. Real Estate Finance Econ 6, pp. 73–87
- King M. (2009) Speech at the Lord Mayor's Banquet for Bankers and Merchants of the City of London at the Mansion House. London, England. 17 June.
- Kohansky G., Mitropoulos A., Thaker K. (2011) A Model of Sustainable House Prices for the UK. Fitch Ratings, September 6.
- Kohn D. (2008) Monetary policy and asset prices revisited. Speech to the Cato Institute's annual monetary policy conference, Washington DC.
- Krugman P. (1993) Lessons of Massachusetts for EMU. In: The Transition to Economic and Monetary Union in Europe (eds. F. Giavazzi, F. Torres). New York: Cambridge University Press, pp. 241-261.
- Lim C., Columba F., Costa A., Kongsamut P., Otani A., Saiyid M., Wezel T., Wu X. (2011) Macprudential Policy: What Instruments and How to Use Them? Lessons from Country Experiences. IMF Working Paper 11/238.
- Lopez-Garcia, M. A. (2004) Housing, prices and tax policy in Spain. Spanish Economic Review 6, pp. 29-52.
- Lopez-Salido D., Restoy F., Valles J. (2005) Inflation differentials in EMU: the Spanish case. Banco d'Espagna Working Paper Nr. 0514.
- MacLennan D., Muellbauer J., Stephens M. (1999) Asymmetries in Housing and Financial Market Institutions and EMU. CEPR Discussion Papers 2062, C.E.P.R. Discussion Papers.
- McKinnon R. (1963) Optimum currency areas. American Economic Review 53, pp. 717-725.
- McQuinn K., O' Reilly G., (2007) A Model of Cross-Country House Prices. Research Technical Papers 5/RT/07, Central Bank of Ireland.
- Modigliani F., Miller M. H. (1958) The Cost of Capital, Corporation Finance and

- the Theory of Investment. *American Economic Review*, 48(3): pp. 261–97.
- Mundell R. A. (1961) A theory of optimal currency areas. *American Economic Review* 51, pp. 657-665.
- Muellbauer J. (2007) Housing and Personal Wealth in a Global Context. Working Papers UNU-WIDER Research Paper, World Institute for Development Economic Research (UNU-WIDER).
- Myers S. C. (1977) Determinants of Corporate Borrowing. *Journal of Financial Economics*, 5(2), pp. 147–75.
- Myers S. C., Majluf N. (1984) Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have. *Journal of Financial Economics*, 13(2) pp. 187–222.
- OECD (2005) Economic Survey of Spain 2005. OECD Policy Brief, March.
- Persaud A. (2009) Macro-Prudential Regulation. ECMI (European Capital Markets Institute) Commentary, No. 25/4 August.
- Rogers J. H. (2007) Monetary union, price level convergence, and inflation: how close is Europe to the United States? *Journal of Monetary Economics* 54, 785-796.
- Rosenberg Ch. R., Tirpak M. (2008) Determinants of Foreign Currency Borrowing in the New Member States. IMF Working Paper, July.
- Salmon K. (2010) Boom to bust – reconstructing the Spanish economy’, *International Journal of Iberian Studies* 23 (1), pp. 39-52.
- Samuelson P. A. (1964) Theoretical notes on trade problems. *Review of Economics and Statistics* 46, pp. 145-154.
- Schinasi G. J. (2004) Safeguarding financial stability, theory and practice. International Monetary Fund.
- Shirakawa M. (2009) Some Thoughts on Incentives at Micro- and Macro-level for Crisis Prevention. Remarks at the Eighth Bank for International Settlements Annual Conference. Basel, Switzerland. 26 June.
- Sławiński A. (2007) Znaczenie czynników ryzyka towarzyszących wchodzeniu Polski do ERM2 i do strefy euro. Referat na Kongres Ekonomistów Polskich. Warszawa, 29-30 listopada.
- Sławiński A. (2010) Joining the euro zone: From the perspective of emerging Europe countries. *Folia Oeconomica*, No. 239/2010.
- Stein J. C. (2010) Monetary Policy as Financial-Stability Regulation. Available online at <http://www.economics.harvard.edu/faculty/stein/files/Monetary-PolicyAsRegulation-8-2010.pdf>
- Sureda-Gomila A. (2011) Real Estate Boom and Crisis in Spain. In: *Global Housing Markets: Crises, Policies, and Institutions* (eds. A. Bardhan, R. Edelstein C. Kroll), pp. 157-172
- Taylor J. B. (1993) Discretion versus Policy Rules in Practice. *Carnegie-Rochester Conference Series on Public Policy*, no. 39, December, pp. 195-214.
- Taylor J. B. (2007) Housing and Monetary Policy. Speech at the Jackson Hole conference, September.



- Taylor J. B. (2010) *Zrozumieć kryzys finansowy*. Wydawnictwo Naukowe PWN, Warszawa.
- The Economist (2005) Special report: The global housing boom. In come the waves. June 16, the print edition. Available online at <http://www.economist.com/node/4079027>
- Topel R., Rosen S. (1988) Housing Investment in the United States. *Journal of Political Economy* 96, no. 4, pp. 718-740.
- Walsh C. (2009) Using Monetary Policy to Stabilize Economic Activity. Paper prepared for the symposium Financial Stability and Macroeconomic Policy, Jackson Hole, Wyoming, August.
- Weistroffer C. (2012) Macroprudential supervision: In search of an appropriate response to systemic risk. Deutsche Bank Research, 24 May.
- White W. (2012) Credit Crises and the Shortcomings of Traditional Policy Responses. Speech at the Second International Research Conference on 'Monetary Policy, Sovereign Debt and Financial Stability – The New Trilemma'. Mumbai, February 1-2.
- Wicksell K. (1898) *Interest and prices*. London, Macmillan, 1936. Translation of 1898 edition.
- Wilmarth A. E. (2002) The Transformation of the U.S. Financial Services Industry, 1975-2000: Competition, Consolidation and Increased Risks. *University of Illinois Law Review*, No. 2, May.
- Wyplosz C. (2006) European Monetary Union: the dark sides of a major success. *Economic Policy*, CEPR & CES & MSH, vol. 21(46), pp. 207-261.