

## **Monetary Policy and Housing Bubbles: A Multinational Perspective**

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### **Abstract**

This study examines the impact of monetary policy on housing prices in various countries in recent years. Using Taylor's rule as a benchmark, monetary policy was found to be too loose in several countries including Ireland, Spain and the United States. Ireland and Spain represent special situations since their respective monetary policies are conducted by the European Central Bank as opposed to domestic central banks. The ECB policy was found to be appropriate or slightly restrictive for France and Germany, but too loose for Ireland and Spain. Next, a model was developed to explain the behavior of housing prices. Results indicate that loose monetary policy significantly affected housing price inflation in Ireland, Spain and the United States. Simulations suggest that growth rates in housing prices could have been reduced by 57% in Ireland, 38% in Spain and 50% in the United States.

**Keywords:** monetary policy, housing bubble, financial crisis

## **INTRODUCTION**

During 2008-2009, the global economy suffered through its worst economic downturn since World War 2. Economists and policymakers agree that the housing bubble in the United States, as well as some other countries, were the primary cause. What caused the housing bubbles? Many reasons have been cited including poor regulation of financial derivatives such as credit default swaps; weak lending standards employed by mortgage lenders; reckless borrowing by homebuyers; and excessive leverage by investment banks (see Rodrik 2008 and Blinder 2009). Another reason suggested by many is loose monetary policy in the US during the early to mid 2000s (for example, see Taylor 2007). Many think that the Fed reduced the federal funds rate too much and/or kept it low for too long thus leading to excess liquidity which helped to fuel the housing bubble. Alan Greenspan (2009) has defended Fed policy by noting that fixed-rate mortgages didn't display the typical response to increases in the federal funds rate as well as pointing to housing bubbles in other economies that couldn't be directly linked to a low U.S. federal funds rate. This raises an issue – could other central banks have kept their policy rate too low and thus contributed to housing bubbles in their countries?

## **LITERATURE REVIEW**

Much of the recent research on the behavior of housing prices preceded the current crisis and involved questions as to whether housing prices were too high relative to fundamentals. McQuinn and O'Reilly (2006) examined the behavior of housing prices in Ireland from 1980 to 2005. They find that a model based on disposable income and interest rates accurately describes housing prices for most of the period, but divergence begins in 2002, implying the possible emergence of a housing price bubble. Malzubris (2008) finds that much of the increase in housing prices in Ireland from 1992 to 2006 can be explained by demographics, increased disposable income, very low interest rates, tax treatment of housing and increased purchases of houses for investment purposes. He estimates that housing prices in Ireland were overvalued by between 20 and 40% at the peak in 2006. Pages and Maza (2003) find that the relaxation of credit constraints, evidenced by growth in housing loans and declines in nominal mortgage rates, account for a substantial portion of house-price growth in Spain from 1976 to 2002.

Mayer and Hubbard (2009) explore the global nature of the housing bubble, examining rapid increases in housing prices that took place in countries including Australia, Ireland, Spain, the United Kingdom, and the United States. Unlike the others, housing prices in parts of Australia (such as Sydney) stagnated in the mid 2000s after rising rapidly earlier in the decade. They conclude that rising real estate prices cannot be explained solely by increased economic growth or lax regulation in a particular country. They cite speculation by purchasers as playing a key role, particularly late in the boom in housing prices in many countries. Importantly, they

find that changes in interest rates played a major role in the US housing boom as well as booms in other countries.

Thus, though other factors are cited in particular studies, a common thread of the previous research is that interest rates and credit availability play a major role in explaining the behavior of housing prices. This leads us to the question as to what role they played in the housing bubbles that took place in various nations in the early to mid 2000s.

## TAYLOR'S RULE

In order to examine whether interest rates were indeed too low, two steps need to be taken. First, if a central bank's policy rate is too low, it must be too low relative to some benchmark. Though no universally accepted benchmark exists, a popular tool is Taylor's rule (Taylor 1993). For example, in *Monetary Trends*, the Saint Louis Federal Reserve publishes the federal funds rate according to its version of Taylor's rule. Otmar Issing (2000), former member of the executive board of the European Central Bank, has stated that "The Taylor rule has become quite important for us, because it gives us guidance for the stance of monetary policy." Orphanides (2007), a current governor of the ECB, has stated that Taylor's rule provides "a useful framework for the analysis of historical policy and for the econometric evaluation of specific alternative strategies that a central bank can use as the basis for its interest rate decisions." Also, a review of the minutes of the Federal Open Market Committee from 1993-2001 shows members regularly referred to estimations of Taylor's rule when discussing monetary policy (Asso, et. al., 2007). Thus, central bankers in both the United States and Europe have relied on Taylor's rule to inform them about monetary policy. The version of Taylor's rule employed by the Saint Louis Fed is as follows:

$$f_t^* = 2.5 + \pi_{t-1} + 0.5(\pi_{t-1} - \pi^*) + 0.5y_{t-1} \quad (1)$$

where

- $f_t^*$  is the target for the federal funds rate (monetary policy rate)
- $\pi$  is the inflation rate
- $\pi^*$  is the desired rate of inflation
- $y$  is the output gap

The actual policy rate can be compared to that suggested by Taylor's rule to determine whether the rate is too low and, if so, by how much. The next step is to estimate the relationship between this gap (difference between the rate indicated by Taylor's rule and the actual rate) and the rate of increase in housing prices. If a significant relationship is detected, it would indicate that monetary policy contributed to the housing bubble; the higher the estimated coefficient, the more policy contributed to the bubble.

Many have criticized the Fed for keeping the federal funds rate for too low and for too long. Below is a chart comparing the federal funds rate to that suggested by Taylor's Rule as defined by the Saint Louis Federal Reserve.

[figure 1 about here]

As one can see, the federal funds rate was too low for an extended period of time (2000 to 2006), with a sizeable gap for several years. Thus, there is evidence that US monetary policy was indeed too loose. Was the Fed alone or is there evidence that other central banks engaged in loose monetary policy? Since several countries in the European Monetary Union (EMU) experienced housing bubbles, it's worth considering whether the European Central Bank was too lax in its conduct of monetary policy. The ECB faces a unique dilemma in that it sets monetary policy for many different countries, each experiencing different business cycles. Anecdotal evidence suggests that some countries in the EMU didn't experience a housing bubble, for example Germany, while other countries experienced bubbles, such as Ireland and Spain. Since the ECB must set one interest rate for all countries instead of different rates for different countries based on the varying economic conditions, it's possible that monetary policy was too loose in some countries but appropriate or tight in other countries. As mentioned by Mayer and Hubbard (2009), housing bubbles are thought to have existed in Ireland, Spain and the United Kingdom. France and Germany are also considered since they are the two largest economies in the European Monetary Union. Thus, interest rates based on Taylor's rule were estimated for these countries and compared to that set by the ECB or, in the case of the UK, the Bank of England (see figures 2-6):

[figures 2-6 here]

As one can see, the rate set by the ECB was below that suggested by Taylor's rule for the entire period for both Ireland and Spain, sometimes considerably below the recommended level. For France, the results are mixed with the ECB rate a little too high at the beginning and end of the period and about the same during the middle of the period. The rate is highly correlated to that suggested for Germany, with the ECB rate being slightly higher for much of the period. Thus, it appears that the ECB set a rate that was appropriate for the large economies of France and Germany but much too low for the smaller economies of Ireland and Spain.

One can view this from a slightly different perspective. Table 1 presents information regarding the average difference between the policy rate indicated by Taylor's rule and the actual

rate as well as the proportion of time in which actual rates were “too low” (actual rate below Taylor’s rule). Similar to what is shown on the charts, four of the six countries exhibited positive gaps, on average, with the largest gaps in Ireland, Spain and the United States. The difference was positive in every quarter for Ireland and Spain and 91% of the time in the United States. This provides further evidence of monetary policy being too loose for too long in those three nations. There is also some evidence of loose monetary policy in the United Kingdom, though the evidence is not as strong. As with the charts, monetary policy appears to be slightly restrictive in France and Germany, with a negative average gap for each country. The question arises: did the loose monetary policy contribute to the housing bubbles in Ireland, Spain, the United Kingdom and the United States?

[table 1 about here]

## EMPIRICAL MODEL

Given the evidence of loose monetary policy in nations that experienced housing bubbles, it is worth exploring whether monetary policy was a contributing factor and, if so, how much. Thus, several countries that are thought to have experienced housing bubbles are considered including the Ireland, Spain, the United States, and the United Kingdom. A standard housing price model (for example, see Pages and Maza 2003) is developed such that:

$$\% \Delta Ph_t = B_0 + B_1 \% \Delta Ph_{t-1} + B_2 \log Ph_{t-1} + B_3 \log RDI_{t-1} + B_4 \text{mortgage}_{t-i} + B_5 \text{gap}_{t-i} + \varepsilon \quad (2)$$

where:

- Ph is the housing price index for the respective country
- $\% \Delta Ph$  is the percent change in the housing price index for the previous 4 quarters
- RDI is real disposable income per capita
- Mortgage is the average mortgage rate
- gap is the difference between the interest rate suggested by Taylor’s rule and that employed by the respective central bank.

The first two terms on the right-hand side involve the relationship of the behavior of existing housing prices to increases in housing prices. One would expect  $B_1$  to be positive to reflect the persistence of housing price inflation. A reason for persistence is that many homeowners use the equity in their current home to help purchase new homes (“trading up”; see Stein 1995). Higgins, et. al. (1999) show the inverse relationship between the current level of housing prices and future price increases ( $B_2$  is expected to be negative). This simply reflects the normal demand relationship; higher existing prices lead to less demand resulting in lower prices.

Higher per capita real disposable income increases purchasing power thus increasing housing demand and housing prices (Pages and Maza 2003). The last two variables represent the impact of interest rates and credit. Higher mortgage rates discourage housing demand thus leading to lower housing prices. The last term is the key to this study and measures how monetary policy affected the price of houses. Loose monetary policy, as indicated by a positive gap, is expected to lead to higher housing prices ( $B_5$  is expected to be positive). The significance and size of the coefficient would provide evidence of the role and magnitude of the effect of monetary policy.

## **EMPIRICAL RESULTS**

Quarterly data were obtained from the respective national government agencies and/or central banks. The model was estimated for each country for the period from 2000 to 2008, based on data availability. In every case except for the United States, per capita real disposable income was not statistically significant and thus was dropped from the model (this proved helpful later when simulating alternative policies). The appropriate amount of lags for the interest rate variables was determined using Akaike's information criteria (see Kennedy 1998). In two cases (Ireland and Spain), a two-lagged period was optimal while three lags was optimal for the United Kingdom and four lags for the United States. Next, the models were examined for standard econometric issues. In three of the four cases, ARCH effects were detected, a common problem when studying financial time series (Kennedy 1998). Thus, a GARCH model was estimated for those countries (Ireland, United Kingdom and the United States) while a standard OLS model was used for Spain. Results can be found in table 2.

[table 2 about here]

Persistence in housing prices was detected as evidenced by the significant coefficient for lagged percent change in housing prices. The coefficients were close to 0.7 in the three European nations but much higher in the United States. As expected, higher existing housing prices discouraged demand and thus were negatively related to increases in housing prices (significant in all four countries). In each case, mortgage rates were negatively related to the growth in housing prices, also through their effect on housing demand.

The measure of the looseness of monetary policy (interest rate suggested by Taylor's rule minus that set by the respective central bank) was significantly related to housing price inflation in each case. Thus monetary policy seems to have contributed to the housing bubbles in each of the four countries examined. However, it's important to assess how much it contributed to the

bubbles. One cannot just look at the size and significance of the coefficient since it does not take into account the magnitude of the looseness of monetary policy nor the persistence of housing price inflation. That is, if monetary policy led to higher housing prices which then persisted, the effect would be felt for an extended period of time and the impact would be higher than implied if one just considered the coefficient. Thus, the model was simulated for each country assuming that the central bank strictly followed Taylor's rule instead of the policy enacted. This would account for both the degree of looseness of monetary policy as well as the persistence of price increases.

The results of the simulations show that tighter monetary policy could have had a noticeable effect on containing the housing bubbles in the respective nations. For example, the US housing price index rose from 147 in the first quarter of 2001 to 231 at its peak in the third quarter of 2007, an average annual growth rate of 7.2% per year. The simulation indicates that if the Fed followed Taylor's rule, the U.S. housing price index would have risen to 185, an average rate of 3.6% per year, thus cutting the growth rate of housing prices in half. Similarly, average home prices in Ireland would have risen at an annual rate of 4.2% instead of 9.8% from the first quarter of 2001 to its peak in the first quarter of 2007. Spanish housing prices would have risen by 8.2% per year instead of 13.2% from the beginning of 2003 to its peak at the end of 2007. Whereas tighter monetary policy as reflected by adherence to Taylor's rule would have helped to contain housing bubbles in Ireland, Spain, and the United States, it doesn't appear to have played as much of a role in the United Kingdom. Housing price inflation would have been reduced if the British central bank followed Taylor's rule, but not by much, declining from an annual rate of 12.7% per year to 12.4%. Further evidence of the results of the simulation can be seen in the following charts:

[figures 7-9]

## **SUMMARY AND CONCLUSION**

Given what most economists recognize as the worst global recession since World War 2, there is much interest to identify its primary causes. Though many factors played a role, the intent of this study is to explore the contribution of loose monetary policy in nations that experienced housing bubbles. Taylor's rule was used to gauge whether central banks set monetary policy rates too low and, if so, how much it impacted housing price inflation. Countries considered included those that experienced housing bubbles such as Ireland, Spain, the United Kingdom and the United States. The latter two nations have their own central banks but monetary policy for the first two countries is conducted by the European Central Bank. The ECB must set one rate for all members of the European Monetary Union, not instituting separate rates for particular countries. Evidence was found indicating that though the policy rate was reasonably appropriate for large economies such as France and Germany, the rate was too low

for Ireland and Spain. Loose policy was also found in the United States and, to a lesser extent, the United Kingdom.

Results of the estimation of a housing price model reveal that loose monetary policy resulted in significantly higher housing price inflation in each country. To assess the degree of the impact, simulations were carried out to compare the evolution of housing prices that would have taken place if central banks followed Taylor's rule instead of the policies actually employed. Results indicate that tighter monetary policy would have resulted in a much lower increase in housing prices in three of the nations; reducing the growth rate of housing prices by 38% in Spain, 50% in the United States and 57% in Ireland. Thus, there's support for the view that central banks had a significant impact on housing bubbles.

A lesson for the Fed is to be cautious in implementing any risk-management approach to monetary policy. Greenspan believed that the probability of deflation in 2003 was so small but "because the implications for the economy were so dire should that scenario play out, we chose to counter it with unusually low interest rates" (Greenspan 2005). Policy designed to avoid an unlikely outcome contributed to the dire outcome that it was intended to avoid. A lesson for the ECB is that it has a unique challenge. It faces a difficult balancing act in seeking to set rates for many nations facing very distinct business cycles. Policy which is appropriate for a few countries may not be appropriate for all.



## REFERENCES

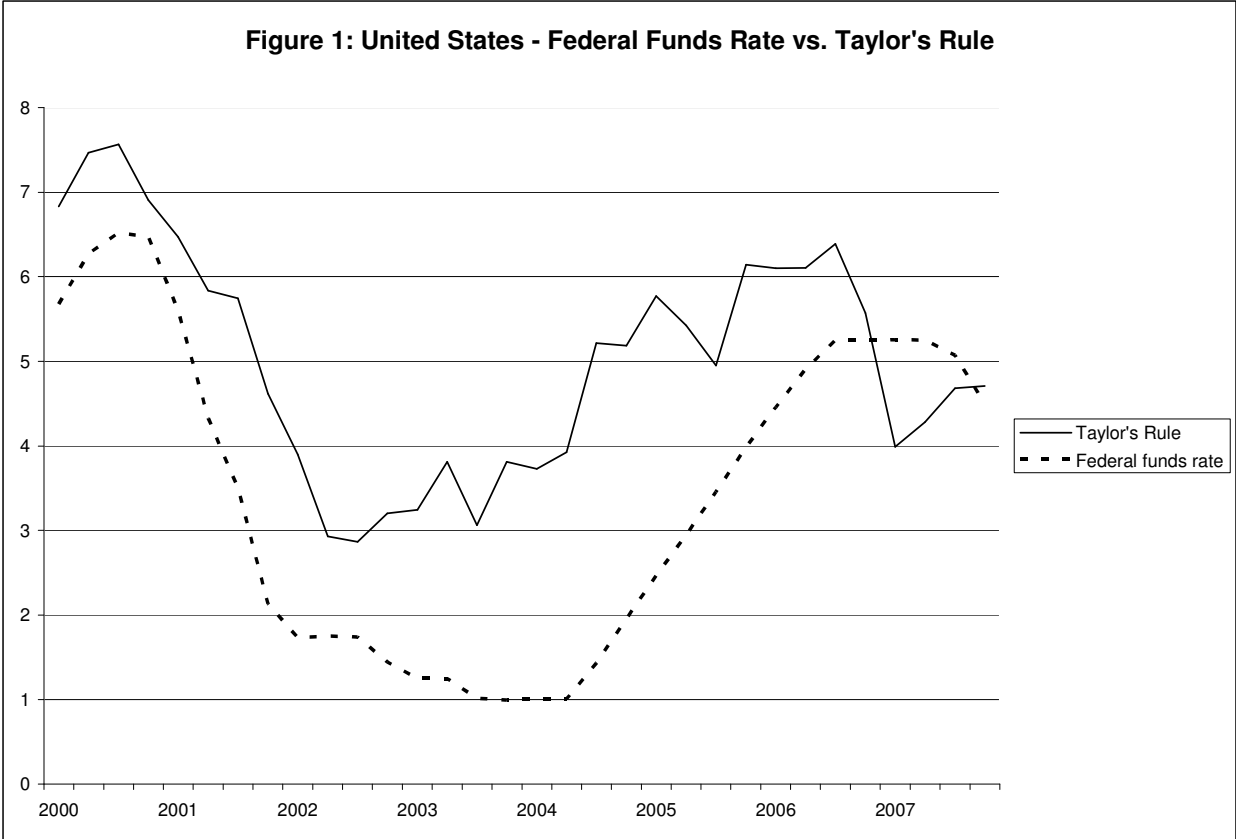
- Aso, Pier Francesco, George A. Kahn and Robert Leeson (2007). The Taylor Rule and Transformation of Monetary Policy. *Research Working Paper 07-11, Federal Reserve Bank of Kansas City*. <http://www.kansascityfed.org/Publicat/Reswkpap/RWP07-11.htm>
- Blinder, Alan (2009). Six Errors on the Path to the Financial Crisis. *New York Times*, January 24, 2009.
- “Federal Funds Rates and Inflation Targets”, *Saint Louis Federal Reserve Monetary Trends*, May 2009. <http://research.stlouisfed.org/publications/mt/page10.pdf>
- Greenspan, Alan (2009). The Fed Didn’t Cause the Housing Bubble. *Wall Street Journal*, March 11, 2009.
- Greenspan, Alan (2005). Opening Remarks. The Greenspan Era: Lessons for the Future. Kansas City Federal Reserve Symposium. August 25-27, 2005.  
<http://www.kc.frb.org/publicat/sympos/2005/PDF/Green-opening2005.pdf>
- Higgins, M., C. Osler and A. Sridhar (1999). Second District Housing Prices: Why So Weak in the 1990s? *Federal Reserve Bank of New York Current Issues in Economics and Finance*, 5. [http://www.newyorkfed.org/research/current\\_issues/ci5-2.pdf](http://www.newyorkfed.org/research/current_issues/ci5-2.pdf)
- Issing, Otmar (2000). No Fixed Policy Rules for the Monetary Policy of the ECB: An Interview with Otmar Issing. <http://www.stanford.edu/~johntayl/Papers/Issing+article+on+Taylor+rule.pdf>
- Kennedy, Peter (1998). *A Guide to Econometrics*. Cambridge, MA: MIT Press.
- Malzubris, Janis (2008). Ireland’s Housing Market: Bubble Trouble. *ECFIN Country Focus* 5 (9).
- Mayer, Christopher and R. Glenn Hubbard (2009). House Prices, Interest Rates and the Mortgage Market Meltdown.  
[https://www4.gsb.columbia.edu/null/download?&exclusive=filemgr.download&file\\_id=3549](https://www4.gsb.columbia.edu/null/download?&exclusive=filemgr.download&file_id=3549)
- McQuinn, Kieran and Gerard O’Reilly (2006). Assessing the Role of Income and Interest Rates in Determining Irish House Prices. *Financial Stability Report*, Central Bank and Financial Services Authority of Ireland.
- Martinez Pages, Jorge and Luis Angel Marza (2003). Analysis of House Prices in Spain. *Bank of Spain, Working Paper # 0307*. <http://www.bde.es/informes/be/docs/dt0307e.pdf>
- Orphanides, Athanasios (2007). Taylor Rules. *Board of Governors of the Federal Reserve System*. <http://www.athanasiosorphanides.com/taylor22f.pdf>

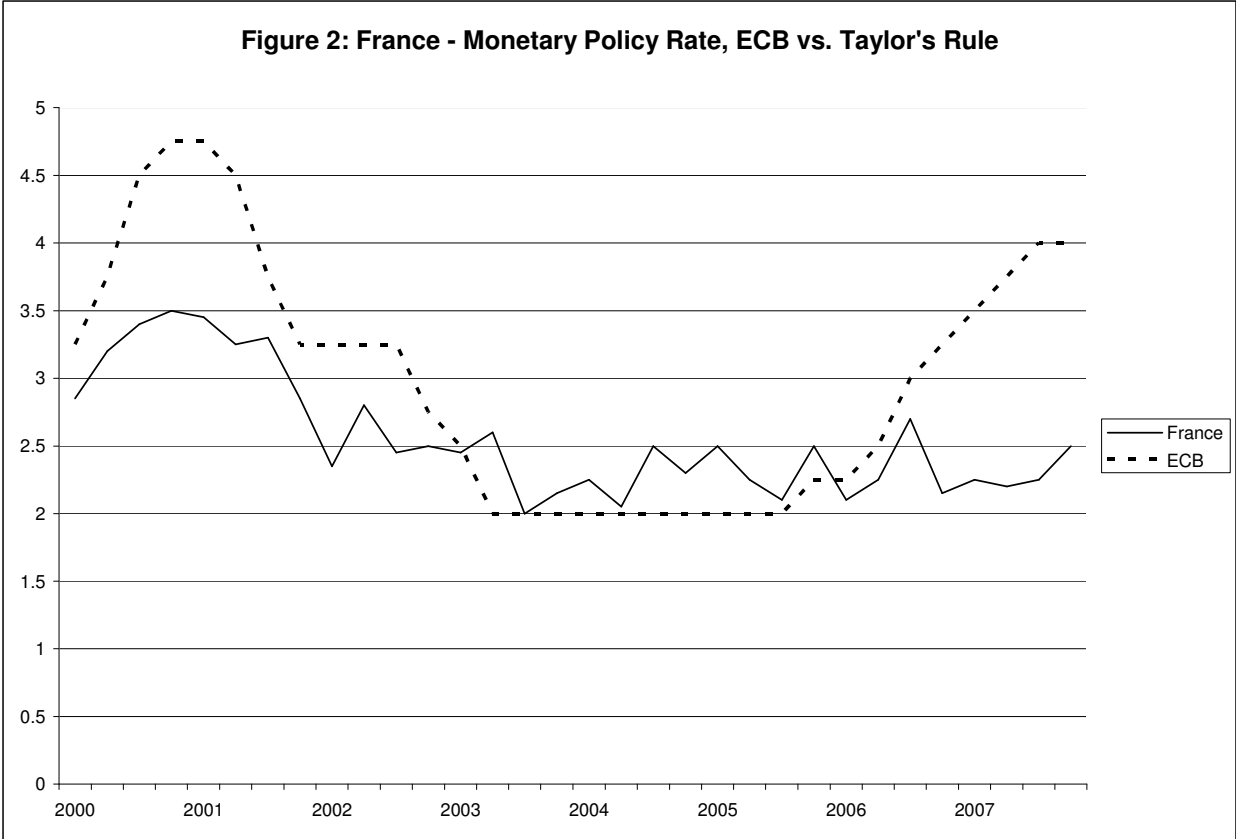
Rodrik, Dana (2008). Who Killed Wall Street? *Korea Times*, October 12, 2008.

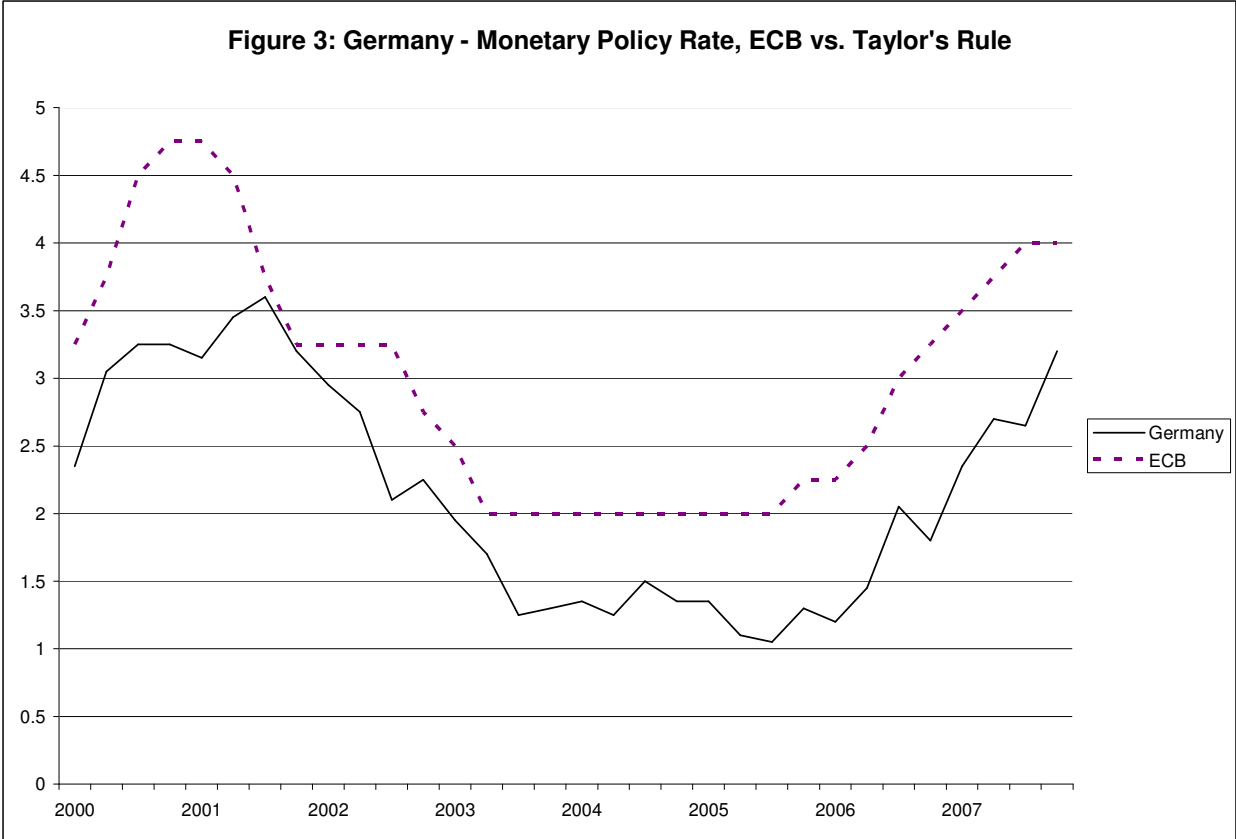
Stein, J.C. (1995). Prices and Trading Volume in the Housing Market: A Model with Down Payment Effects. *Quarterly Journal of Economics* 110: 379-406.

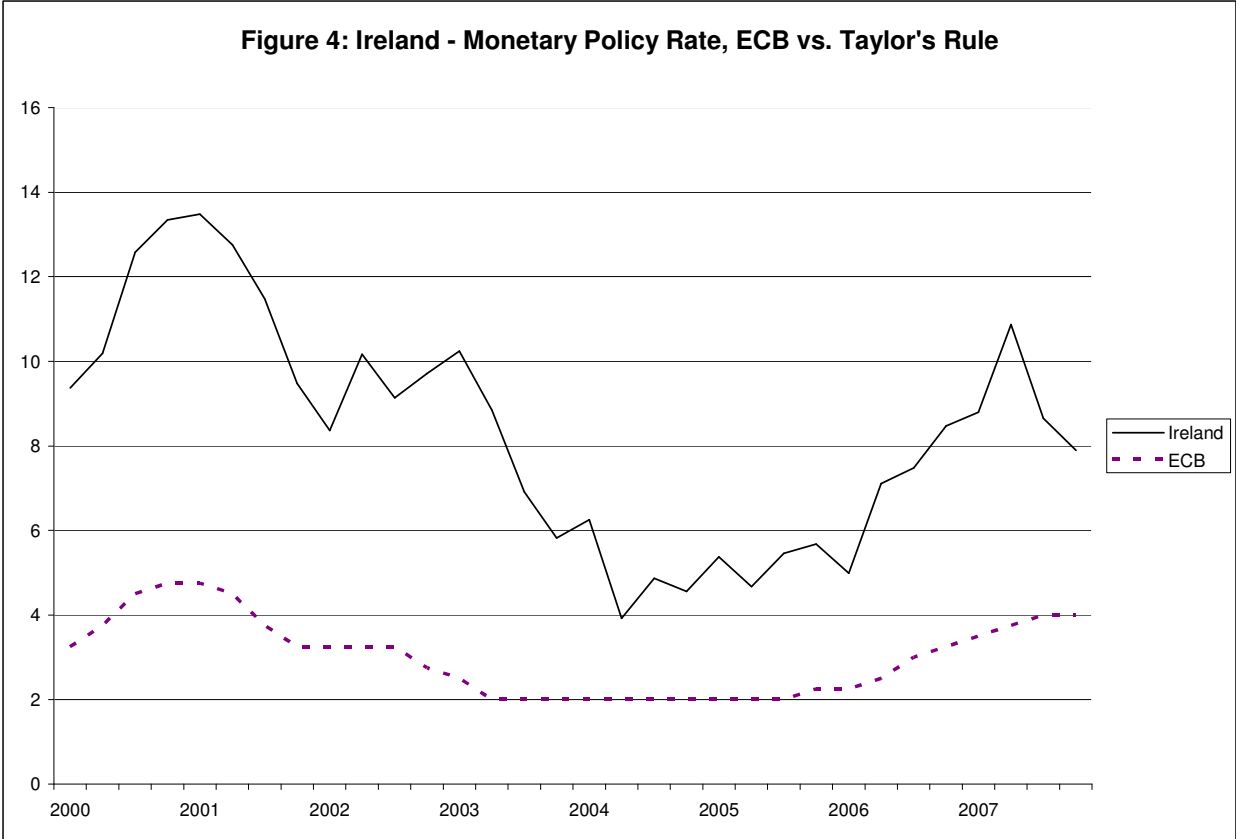
Taylor, John (1993). Discretion versus Policy Rules in Practice. *Carnegie-Rochester Conference Series on Public Policy* 39:195-214.

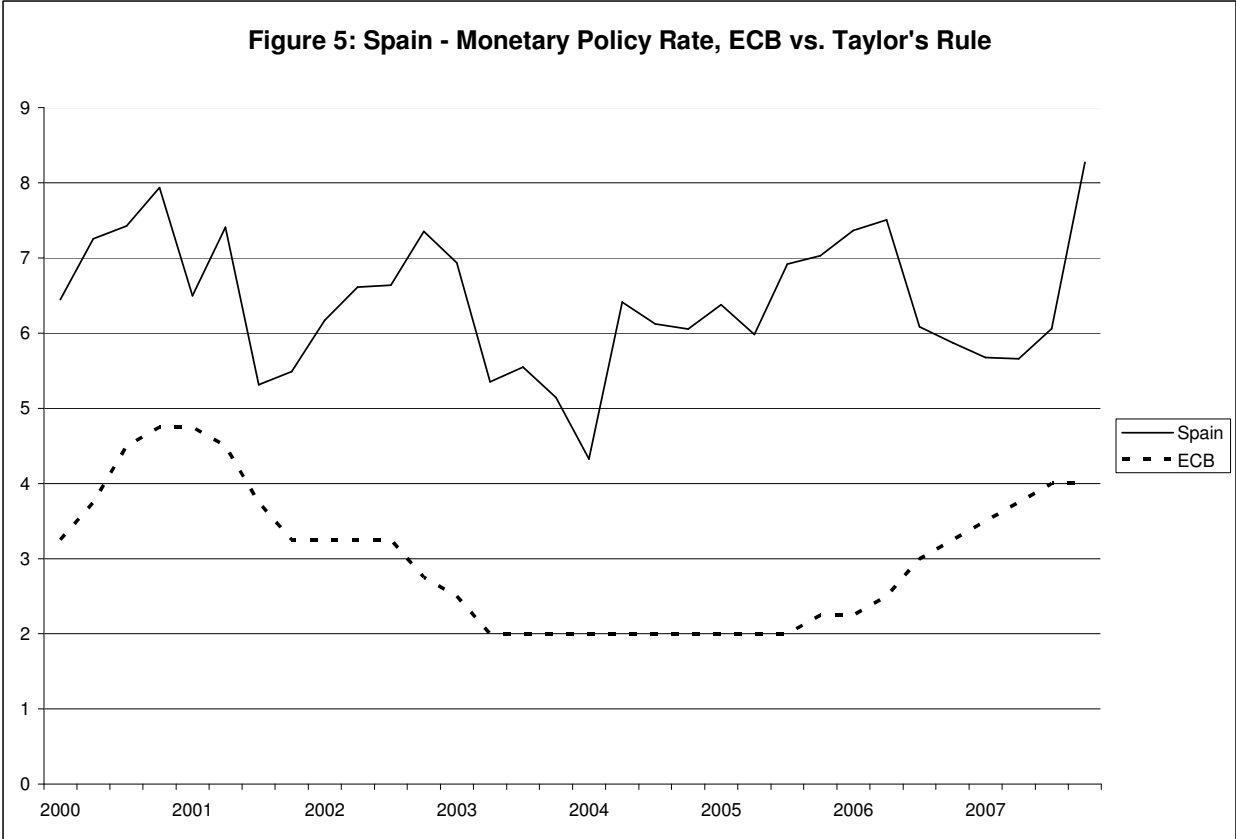
Taylor, John (2007). Housing and Monetary Policy. *Federal Reserve Bank of Kansas City's Symposium on Housing, Housing Finance and Monetary Policy*, Jackson Hole, Wyoming.

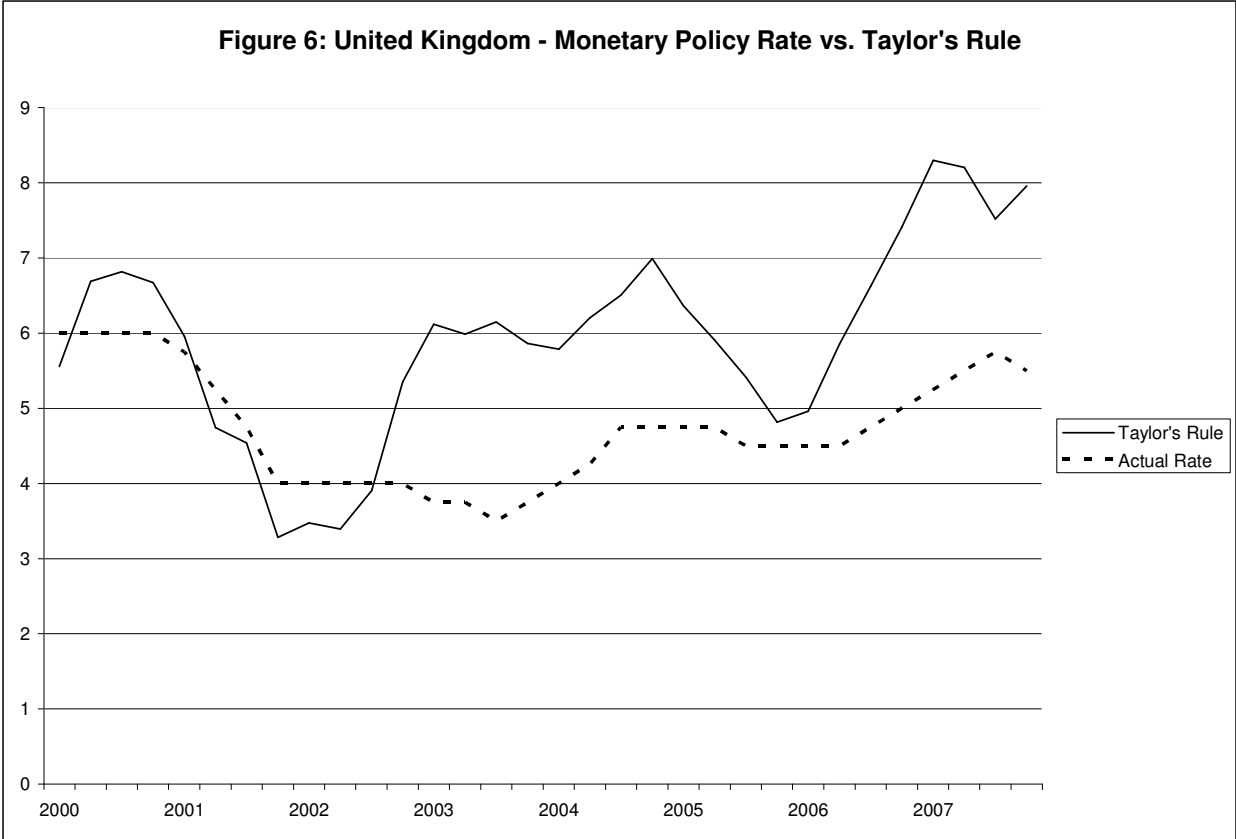




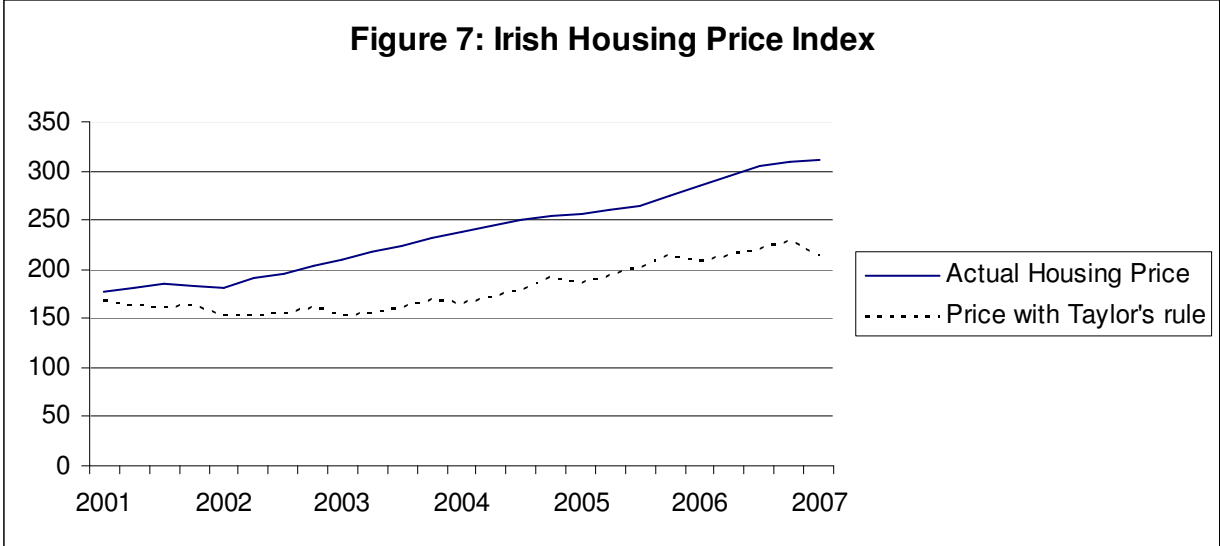


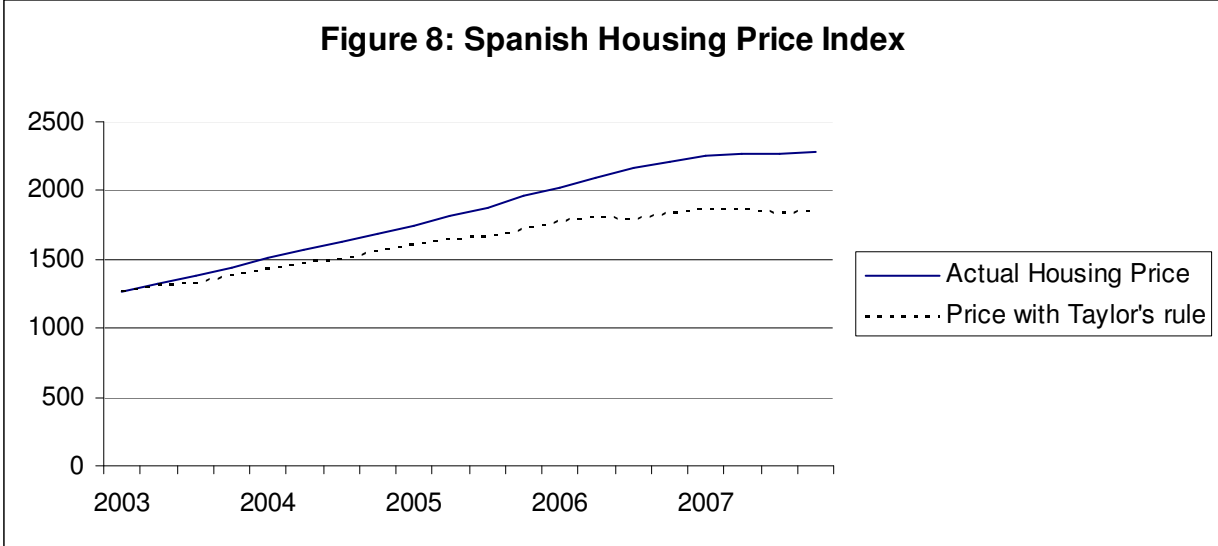


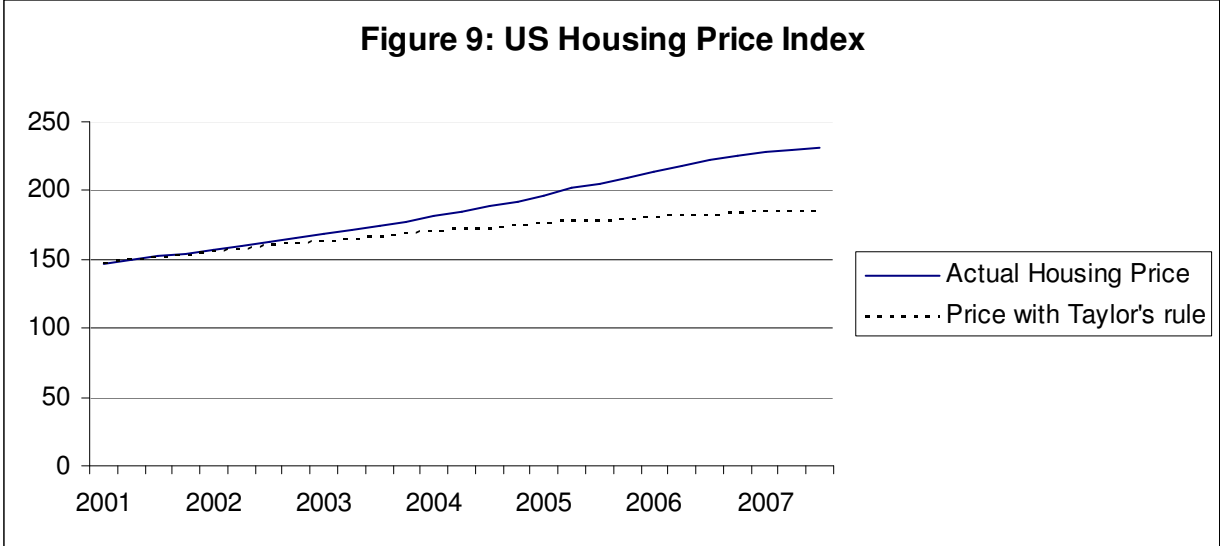












**Table 1: Gap between Monetary Policy Rate and Rate Suggested by Taylor's Rule**

Country	Average Gap	Portion of Positive Gaps	Correlation
France	-0.46	32%	0.71
Germany	-0.87	0%	0.90
Ireland	5.17	100%	0.85
Spain	3.38	100%	0.38
United Kingdom	1.18	79%	0.52
United States	1.58	91%	0.78

**Table 2: Empirical Results**

Country	Constant	$\% \Delta Ph_{t-1}$	$\text{Log } Ph_{t-1}$	$\text{Log } RDI_{t-1}$	$\text{Mortgage}_{t-i}$	$\text{Gap}_{t-i}$	$R^2$	Period
USA	-157.722 <sup>**</sup> (2.12)	1.132 <sup>***</sup> (31.44)	-8.654 <sup>***</sup> (4.66)	19.909 <sup>**</sup> (2.46)	-0.282 <sup>**</sup> (1.97)	0.141 <sup>**</sup> (2.12)	0.99	2001-2008
Ireland	59.643 <sup>***</sup> (5.24)	0.699 <sup>***</sup> (11.67)	-8.023 <sup>***</sup> (4.02)		-4.000 <sup>***</sup> (7.888)	0.629 <sup>**</sup> (2.09)	0.85	2001-2008
Spain	46.700 <sup>***</sup> (3.66)	0.696 <sup>***</sup> (4.42)	-5.371 <sup>***</sup> (3.34)		-1.709 <sup>**</sup> (2.26)	0.556 <sup>**</sup> (2.14)	0.97	2002-2008
United Kingdom	120.093 <sup>***</sup> (5.22)	0.663 <sup>***</sup> (7.24)	-8.693 <sup>***</sup> (4.67)		-2.098 <sup>***</sup> (2.28)	0.993 <sup>**</sup> (2.10)	0.73	2000-2008

t-statistics (OLS) or z-statistics (Garch) in parentheses; \*\*\*significant at 1% level, \*\*5%