A fair value model for the Pfandbrief spread

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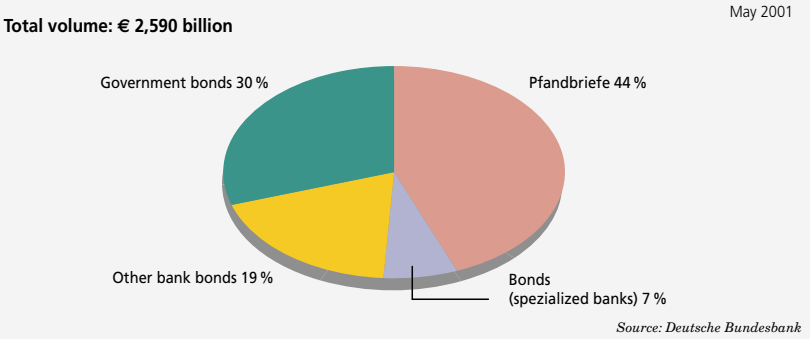
The yield differential between Pfandbriefe and Bunds (Pfandbrief spread) has risen in the trend since mid-1999. Are fundamental influencing factors at the root of this development, or coincidental occurrences? In this article, a fair value model for the Pfandbrief spread (10 years) will be introduced that may be used for forecasting purposes. Important fundamental determinants proved to be the interest rate pattern, the amount of the interest on Bunds, the US swap spread and the development of the DAX.

Private and institutional investors are increasingly focusing their gaze on ***spreads*** (yield differentials) between government paper and Pfandbriefe. The shift in importance has not come out of the blue, triggered as it was by the launch of the euro, resulting in a structural change on the European bond market. Prior to the start of EMU, currency risk still played an important part in investors' portfolio decisions. The currency component having ceased to exist since the beginning of 1999, the significance of credit risk has grown. Today, Pfandbriefe are already the largest segment on the German bond market ahead of government bonds. The share accounted for by Pfandbriefe of all debt instruments outstanding in Germany is 44%, with public-sector bonds accounting for 30%.

The yield gap between Pfandbriefe and Bunds is of relevance not just for investors but for economic policy-makers as well. Spreads reflect the liquidity of the financial markets and how investors assess risk. Economic policy-makers receive important information on the stability of the (international) financial system by observing the yield gaps, enabling them to intervene if need be. The development since mid-1999 appears to give cause for concern, the spread between Pfandbriefe and Bunds having risen in the trend.

Chart 1 **Pfandbriefe: the largest segment on the German bond market (in % of paper outstanding)**



Source: Deutsche Bundesbank

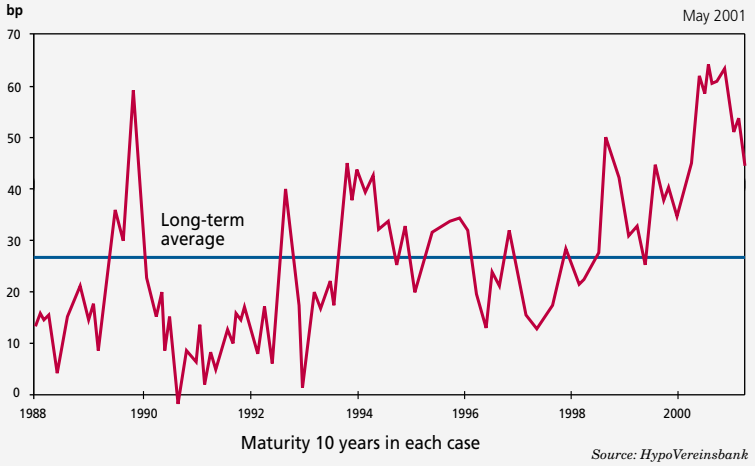
The theory: Factors influencing Pfandbrief spreads

An adequate interpretation of the above-average spread by economic policy-makers and investors ("warning sign or opportunity") presupposes knowledge of the underlying causes. Four fundamental influencing factors stand out:

1. Interest rate pattern

The interest rate pattern probably has a major effect on the maturity transformation by banks. When the interest rate pattern is flat or even inverse, raising funds on the money market is a costly exercise for the banks; it is hardly worth their while extending longer-term loans any more (maturity transformation). The consequence is likely to be a widening spread due to a risk mark-up for holding Pfandbriefe. Thus, the correlation between interest rate pattern and spread should be negative.

Chart 2 **Yield gap between Pfandbriefe and Bunds clearly above average**



Source: HypoVereinsbank

2. Issuing activity and interest rates

Issuing activity in the case of Pfandbriefe on the one hand and government bonds on the other is also likely to be a factor of significance. If, for example, banks issue Pfandbriefe on a large scale, the oversupply leads to rising yields and so to a widening of the spread. A wider interest rate gap can also have its causes in financial policy. Government efforts to save trigger a shortening of government paper supply in the trend and a lower interest rate level. In Germany, the federal government aims to reduce its net indebtedness to zero by the year 2006.

3. Impact of the US capital market

No analysis of interest rates at the long end is possible today without considering the impact of the international capital markets – in particular the US capital market. Nor is the situation likely to be any different with regard to spreads: a rising aversion to risk in the USA spills over the Atlantic and causes the yield differential between Pfandbriefe and Bunds to rise.

4. Liquidity premiums

The change of liquidity premiums is a further explanation for a variation of the Pfandbrief spread. The liquidity premium can rise or fall depending on the market situation. In autumn 1998, for example, the flight into quality predominated (safe government bonds). Trading in risk-inherent paper, on the other hand, petered out, causing the liquidity premium demanded of the investor to rise.

The following table summarizes once again the fundamental factors and how – in theory – they may be expected to correlate to the spread. A decline in government bond issuance, for example, ought to result in a rising spread (negative correlation); a greater risk aversion in the US, on the other hand, in a widening of the spread (positive correlation).

Basically speaking, it is also conceivable that spreads defy prognostication with the help of fundamentals. Investors instantaneously price all the relevant information into Pfandbrief and government paper prices. Only unforeseen events (white noise) drive a wedge between expectations and realization. Like tossing a coin ("heads or tails") the Pfandbrief spread would then follow a random walk pattern. A widening of the yield gap would be just as likely in the future as a narrowing. The most accurate prediction for the Pfandbrief spread in the next period ($PFANDSPREAD_{t+1}$) would be equivalent to the spread at the present point in time ($PFANDSPREAD_t$). If a random walk pattern were to be empirically affirmed, it would not be possible to determine a fair value towards which the spread would gradually move.

(1) $PFANDSPREAD_{t+1} = PFANDSPREAD_t + \epsilon_t$

with ϵ_t = white noise

Table 1 Correlation between Pfandbrief spread and influencing factors (theory)

	Pfandbrief spread (–/+ correlation)
Interest rate pattern	**–**
Interest rates*	**–**
International spill-overs (USA)	**+**
Risk aversion (general)	**+**

* *government bonds*

In practice: Random walk or fair value?

In a first step towards settling the issue of ***random walk*** versus ***fair value***, the relationship between Pfandbrief and Bund yields (maturity 10 years) was estimated with the help of the Johansen procedure. Under this model, both variables move in a stable relationship towards each other in the medium term (cointegration relationship). A 100 bp rise in the Bund yield results in an increase of the Pfandbrief yield by 94 bp. This correlation is a first important confirmation of the theory components presented. A rising interest rate level in the case of government bonds (+ 100 bp) results in a less pronounced reaction in the case of Pfandbriefe (+ 94 bp) and so to a reduction of the Pfandbrief spread (– 6 bp).

(2) PEX10Y = 0.7 + 0.94∗BUND10Y
(14.1) (127.3)

with PEX10Y = Pfandbrief yield (10Y), in %
BUND10Y = yield Bund (10Y), in %
t variables in parentheses

The – in the medium term – stable relationship between Bund and Pfandbrief yields is confirmed by the estimate of an error correction model. An overshooting of the Bund yield by 10 bp is, on average, eliminated comparatively quickly. The "error" (10 bp) is corrected by more than half (5.35 bp) after only two months. These market-inherent counter-reactions are probably driven by arbitrage movements. If the Pfandbrief spread slips below the risk premium demanded of investors, it is attractive to sell Pfandbriefe; the yield gap between the two bonds rises again to the fair value level as a result. This "mechanism" is a clear indication that the Pfandbrief spread does not follow a random walk pattern!

The return to the fair value applies only, however, as an average for the past years. In the short term the Pfandbrief spread is repeatedly impacted by shocks, preventing an immediate return to a state of equilibrium. What are the variables behind these shocks? To answer this question, in a second step a fair value model was developed for the Pfandbrief spread for the short term.

Chart 3 **Balanced relationship in the medium term between Bund and Pfandbrief yields**

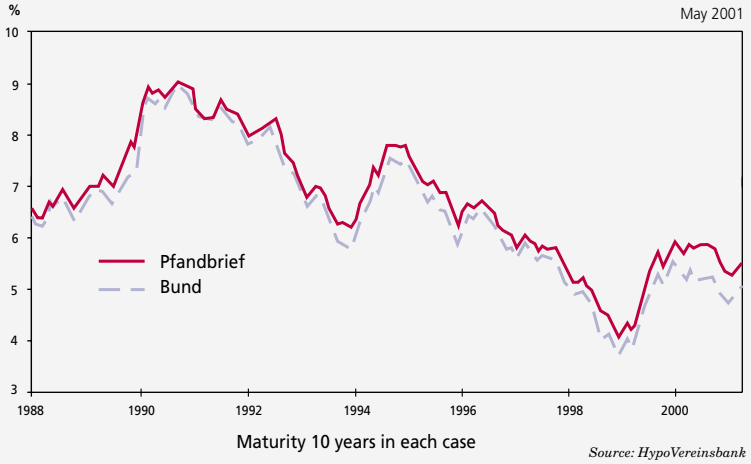
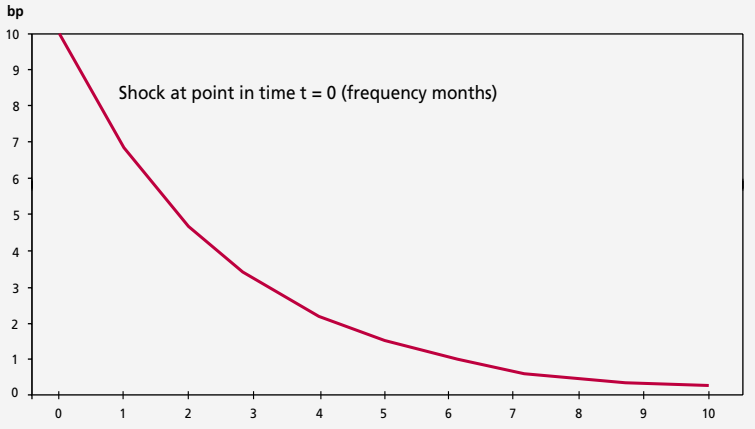


Chart 4 **Elimination of the overshooting of the Bund spread by 10 bp over time**



Source: HypoVereinsbank

A fair value model for the short term

The theory components mentioned above served as the basis in estimating the model. For the interest rate the yield on 10-year Bunds was used, and for the interest rate pattern the yield gap between 10-year Bunds and the 3-month rate was used. Risk aversion in the US (spill-over effects) was approximated with the help of the swap spread in the case of 10-year US Treasuries. As an additional indicator, the relative change of the DAX against the previous month was used to represent the market psychology/willingness to incur risk in Germany. This is because investors are likely to be subject to fluctuations in mood; phases of general optimism alternate with a more pessimistic risk assessment. Seen from a theoretical viewpoint, a negative correlation is to be expected between the trend of the DAX (e.g. bullish sentiment) and the Bund spread (narrowing). However, this operationalization is merely a second-best solution. Besides market psychology, fundamental factors such as the development of company profits and interest rates also have an important bearing on the DAX.

The model was estimated without taking issuing activity of banks and the government into account as the correlations towards the Pfandbrief spread did not show themselves to be sufficiently stable. Central to this – at first glance, surprising – result was probably the temporary obscuring by other influencing factors. For besides the issuing activity, securities investments are at the same time regrouped within investors' portfolios; these may be prompted by other motives. What is more, it could be argued that government issuing activity was allowed for, at least indirectly, through the inclusion of the Bund yield in the estimated equation. If there is a drop in issuance, Bunds would have to profit from price gains; the Pfandbrief spread rises.

The variables were each conceived as a change against the previous month (e.g. rising or falling Pfandbrief spread). In this way a fair value model for the short term is ensured. The differences can be easily transformed back to level variables later. The estimate period ran from February 1988 to May 2001. All coefficients have the theoretically expected +/– algebraic sign and prove to be highly significant; only the US swap spread

Table 2 Correlation between Pfandbrief spread and influencing factors (empirical results)

	Pfandbrief spread (+/– correlation) *
Interest rate pattern	–
Interest rates	–
US swap spread	+
DAX	–

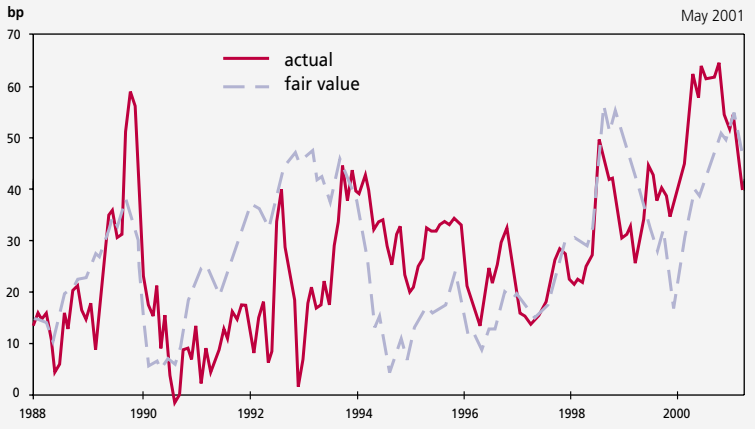
** estimated*

has an error probability of 15%. Estimates for shorter periods revealed that the significance of the swap spread has increased appreciably in recent years, for which reason the variable was not omitted from the equation. If, say, the swap spread in the US rises by 10 bp, the yield gap between Pfandbriefe and Bunds increases by one basis point. The impact of 10-year Bunds proves to be similar. A 10 bp interest rate increase causes the spread to narrow by roughly one basis point.

The corrected degree of certainty of the estimate is 30%. Thus, the influencing factors can explain almost one-third of the deviations of the Pfandbrief spread from its mean. In light of the substantial fluctuations of the spread this may be seen as a good "fit" of the regression function in terms of the data. The deviations not explained by the estimated equation – close to 70% – are likely to be determined by two factors. First, the regression coefficients represent the average influence the variables exercised on the Pfandbrief spread in the period from February 1988 to May 2001. However, investors are likely to overweight or underweight factors depending on the market and risk situation. Immediately before and after an interest rate cut by the ECB, for example, the interest rate pattern should wield a greater impact than the US swap spread. Second, particularly in the short term, "soft news" (psychology) is likely to be of major – if not outstanding – significance. As has already been pointed out, the operationalization of market sentiment via the DAX is merely an approximation.

To gain an additional impression of the instructive nature of the model the Pfandbrief spread and its fair value were plotted against each other in a graph. Both variables move towards each other in a stable relationship; in the short term, however, there are repeated phases in which the spread is below or above the value justified by fundamentals. At the current edge, the yield gap and its fair value are almost perfectly concurrent. Thus, the above-average Pfandbrief spread is wholly justified in terms of fundamentals, and so is no irrational exaggeration. Two developments in particular are key to this result: first, the declining, in the trend, of capital market rates in Germany (up to the time of the estimate) and second, the decline of the DAX.

Chart 5 **Yield gap between Pfandbriefe and Bunds actual and fair value**



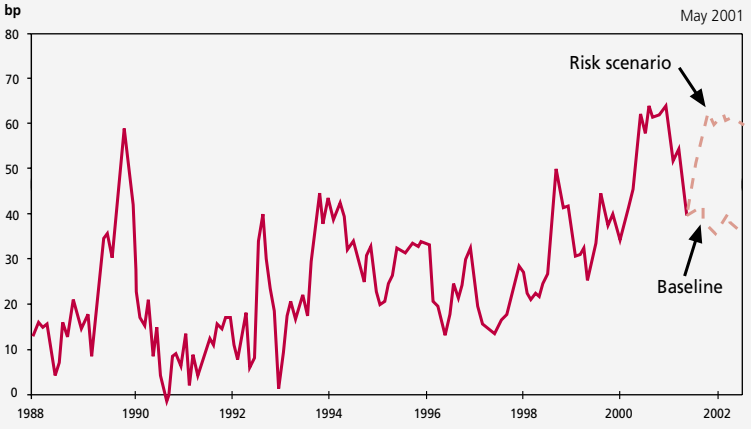
Outlook until mid-2002

In a final step, the fair value model was used to forecast the Pfandbrief spread until mid-2002. Two scenarios were developed:

1. A ***baseline scenario*** in which the Bund yield (10 years) for the most part moves sideways at the 4¾% to 5% mark. The US economy is stabilizing, the US swap spread is approx. 80 bp. No further burdens emanate from the stock markets.
2. A ***risk scenario*** in which economic activity nosedives worldwide and the Bund yield tends towards 4%. The ECB "falls back behind the curve", the interest rate pattern becomes inverse. The US swap spread moves within a range of 140 to 160 bp; the stock markets again drift considerably lower.

The following graph shows the development of the Pfandbrief spread computed with the help of the fair value model. Under the risk scenario it would rise further to approx. 60 bp. Under the baseline scenario there is a largely sideways movement at around 35 to 40 bp.

Chart 6 **With the baseline, sideways movement, with the risk scenario, rise continues**



Source: HypoVereinsbank

Summary: Implications for investors and economic policy-makers

For investors, both scenarios produce one decisive implication: don't count on a lasting narrowing of the Pfandbrief spread! The reference to the persistent deviation of the yield gap from its long-term average is misleading. As the estimate of the fair value demonstrated, the Pfandbrief spread is completely justified by fundamentals despite its high level. Even assuming a favorable fundamental environment it would probably still be clearly above its historical average. Consequently, there is no immediate need for action by economic policy-makers. The current yield differential is not an irrational exaggeration.