



**Study in relation to the updating of  
the reference rates of interest ap-  
plied in State aid control in the EU**

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## List of abbreviations

bp	Basis points
CAD III	Capital Adequacy Directive III
CU	Currency unit
EAD	Exposure at default
ECB	European Central Bank
EC	European Commission
DGC	Directorate General Competition
EL	Expected loss
EMU	European monetary union
EURIBOR	Euro inter-bank offered rate
IAS	International Accounting Standards
IBOR	Inter-bank offered rate
IFRS	International Financial Reporting Standards
IRS	Interest rate statistics
LGD	Loss given default
LIBOR	London inter-bank offered rate
MFI	Monetary financial institution
NGE	Net grant equivalent
OR	Operational risk
PD	Probability of default
PPP	Private public partnership
RA	Recoverable amount
RoE	Return on equity
RR	Recovery rate
SME	Small and medium sized enterprise
T-bill	Treasury bill

## 1 Management Summary

The EC Treaty recognises the principle that State aid is in general incompatible with the common market since it may distort competition. To some extent, however, the Commission encourages Member States and regions to support actions that strengthen the competitiveness of regional economies. Although State aid to individual companies can obviously play an important role in this respect, such measures also may introduce discrimination between those companies that receive aid and those who do not. In balancing between those two principles, EU law permits exemptions to granting of State aid in exceptional circumstances. The Treaty stipulates that the Commission has the task to control State aid. In order to put these State aid rules into practice, a reference interest rate system was introduced. In particular, a reference rate is applied in three core calculations:

1. A *benchmark* was needed to determine whether or not a loan granted by the government can be considered as State aid. The European Commission presumes that there is no State aid prevalent if the interest rate of the loan is above the reference rate. Below the reference rate the amount of the aid and its purpose are crucial factors in deciding about its legality.
2. A *discount rate* was needed to determine the present value of the State aid granted. In order to make the future cash flows associated with the different forms of aid across different countries comparable, the so-called grant equivalent is calculated. The gross grant equivalent is the present value of future aid elements. The cash flows are discounted at the reference rate.
3. An interest rate was needed to calculate the (future) value of unlawfully granted aid at the time of the recovery. If State aid was granted unlawfully, the European Commission will demand the beneficiary to repay the aid to the granting State in order to restore the situation as it would have been without aid being granted. The amount to be repaid has to take into account the time value of money in that aid elements disbursed over time are *compounded* by the reference rate up to the date when the aid is repaid.

The reference rate should reflect the average market interest rates charged in the various Member States on normally collateralised medium and long-term bank loans. It consists of two components: a reference basis rate (inter-bank rate) and a reference (credit) margin mirroring credit risk. Currently, the reference rate is defined as the 5-year swap rate that is based on market rates observable before the applicable year plus 75 basis points (with a possible risk adjustment up to 400 basis points or exceptionally even more).

The current system, however, exhibits several shortcomings, which are partly due to changes in the loan market environment, but are also caused by the system's one-size-fits-all premise, rendering the system too inflexible for being extended to the new Member States and Candidates. In particular, the current system

1. does not recognise the shape of the yield curve, i.e. the changes of interest rates for different maturities;
2. lacks timeliness and, thus, does not appropriately reflect actual interest rates;
3. uses a one-size-fits-all approach to credit risk, thereby failing to properly reflect the beneficiaries' individual credit risk.

The Commission aims at refining the reference rate system through the installation of an automatic or self-reporting system, which is easily applicable, fair, transparent and easy to understand. The new system has to achieve a balance between simplicity and practicability on one side and accurateness and fairness on the other.

In order to put such a balance into practice, a new **two-pillar system** is proposed comprising a standard approach and an advanced approach.

## **Standard Approach**

According to the proposed standard approach, the Commission publishes on a quarterly basis the basis rate for maturities of three months, one year, five years and ten years. Inter-bank offered rates (IBOR) serve as basis rate for maturities up to and including one year, while swap rates are used as basis rate for maturities in excess of one year. In case no IBOR or swap rate is available, government yields should be used. The reference basis rate should be derived as an (arithmetic) average rate of daily observations over the second month of the preceding quarter.

On top of the reference basis rate the reference margin is added. This margin incorporates the debtor's rating category ("strong", "good", "satisfactory", "weak" and "bad") and the level of collateralisation ("low", "normal" or "high"). The appropriate combination of rating category and collateral level can be found in a matrix disclosed in this study.

In order to foster simplicity, a **default case** is applied, if the credit and/or the collateralisation quality cannot be determined. This default case assumes a satisfactory rating and normal collateralisation for loans and guarantees as well as a satisfactory rating and low collateralisation for other forms of aid.

Furthermore, **subordinated or junior debt** is assumed to be lowly collateralised.

**Mezzanine or tier debt** receives a rating downgrade of one step compared to senior debt and is also assumed to be lowly collateralised.

The **reference for guarantee fees** coincides with loan margins less a discount of 20 basis points.

**Large aid exceeding EUR 5 mill.** receives a discount of 10 basis points, while **amounts below EUR 1 mill.** lead to a premium of 10 basis points.

**Discounting** recognises the **maturity** or the **future timing** of aid.

**Compounding** for the purpose of determining the recovery of unlawful aid occurs on a **year-by-year basis recognising credit risk.**

## Advanced Approach

The advanced approach offers the option that a State or a calculation agent (e.g. a bank) assigned by a State conducts more intricate calculations, in order to achieve a more refined reference rate. A more fine-tuned reference rate can take into account the timing of redemptions/cash flows and evolving creditworthiness can be derived by interpolating and/or weighting the standard reference rates. Depending on certain criteria, Member States may mandate a calculation agent, who derives and publishes only the reference basis rate or the complete reference rate including the applicable credit spreads. The mandated agent can publish basis rates and discount rates more timely and for more maturities and can derive case-specific reference rates by employing internal pricing systems. The processes and calculations necessary to implement such an approach have to be approved by the EC and an independent external auditor.

Both, the standard and the advanced approach are largely embeddable into the current practice of the Commission. This is facilitated by outlining possible new procedures and by providing examples. The transition from the old to the new reference rate system can be easily performed by scheduling a cut-off date after which the new system is applicable.

## 2 Introduction

The authors of the EC Treaty recognised the principle that State aid is in general incompatible with the common market since it may distort competition<sup>1</sup>. Still, in its guidelines for the Structural Fund programmes (**Error! Reference source not found.**, 1999), the Commission encourages Member States and regions to support actions that strengthen the competitiveness of regional economies. Although State aid to individual companies can obviously play an important role in this respect, such measures also may introduce discrimination between those companies that receive aid and those who do not. In balancing between those two principles, EU law permits exemptions to granting of State aid in exceptional circumstances. The Treaty stipulates that the Commission has the task to control State aid. Member States must notify the Commission of any plan to grant State aid before the plan is carried out (ex ante authorisation). The Commission has the (discretionary) power to decide whether the aid plan qualifies for an exception or whether the State concerned shall abolish or alter the aid. Before the authorisation by the Commission, States are not allowed to put the planned aid into effect (standstill-principle). In order to exercise this power in a transparent way, the Commission has published the criteria it uses when deciding on possible exemptions. Any aid which is granted in absence of the Commission's approval is automatically classified as "unlawful aid". In that case the Commission will have to recover the unlawful aid from the beneficiaries.

The Commission has modernised the State aid procedures in the second half of the nineties and adopted several block exemption regulations. With these regulations, the Commission can declare certain forms of State aid that fulfil certain criteria compatible with the common market. This implies that no prior notification and approval is necessary. The Commission has created three block exemption rules:

- Exemptions for aid to small and medium-sized companies,
- Employment aid,
- Training aid.

In addition, grants to a company that are below a threshold of EUR 100 000 over a period of three years and that respect certain conditions are not regarded as State aid ("de minimis" rule).

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<sup>1</sup> In principle, distorting State aid is present if proceedings under official control imply a transfer of a State's resources to an entity's economic advantage in a discriminating way and potentially affecting competition and trade between Member States.

In order to put these State aid rules into practice, a reference interest rate system was introduced. In particular, a reference rate is applied in three core calculations<sup>2</sup>:

1. A *benchmark* was needed to determine whether or not a loan granted by the government can be considered as State aid. The European Commission presumes that there is no State aid prevalent if the interest rate of the loan is above the reference rate. Below the reference rate the amount of the aid and its purpose are crucial factors in deciding about its legality.
2. A *discount rate* was needed to determine the present value of the State aid granted. In order to make the future cash flows associated with the different forms of aid across different countries comparable, the so-called grant equivalent is calculated. The gross grant equivalent is the present value of future aid elements. The cash flows are discounted at the reference rate.
3. An interest rate was needed to calculate the (future) value of unlawfully granted aid at the time of the recovery. If State aid was granted unlawfully, the European Commission will demand the beneficiary to repay the aid to the granting State in order to restore the situation as it would have been without aid being granted. The amount to be repaid has to take into account the time value of money in that aid elements disbursed over time are *compounded* by the reference rate up to the date when the aid is repaid.

The reference rate is defined in order to reflect the *average* market interest rates that are charged in the various Member States on medium and long-term loans (five to ten years) backed by normal security (see European Commission (1997**Error! Reference source not found.**)). Therefore, the benchmark for the reference rate should be based on an *average interest rate* a debtor can agree on with banks under *normal market conditions and the arm's length principle*.<sup>3</sup> The reference rate can be understood as the summation of two components, a *reference basis rate* and a *reference (credit) margin*, which both will be determined in the following.

The **current system** is based on a loan of EUR 5 mill. backed by normal security with a five-year repayment schedule.<sup>4</sup> The reference rate is the 5-year inter-bank swap rate in the relevant currency plus 75 basis points as a uniform credit margin. The reference rate is derived by taking the average of the rates recorded in the months September, October and November of the previous year.

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<sup>2</sup> For a more detailed discussion of the functions of the reference rate it is referred to chapter 9 *Functions of the Reference Rate*.

<sup>3</sup> It is referred to the definition of the term „fair value” under IFRS, see IAS 39.9 (IASB, **Error! Reference source not found.** a). For a discussion about the appropriateness of average rates see chapter 8 *The Market-Based Benchmark for the Reference Rate*.

<sup>4</sup> See chapter 3 *Review of the Current System for details*.

Because significant changes, such as the introduction of the euro, the *enlargement of the European Union*, the ongoing implementation of the new Basel Capital Accord<sup>5</sup> (Basel II) and the evolution of credit markets have taken place since the legal implementation of the current system, a revision of this system seems to be necessary in order to continue an effective measurement of State aid.<sup>6</sup> Therefore, the European Commission (EC) Directorate General Competition has assigned Deloitte to conduct a study, in which the feasibility of the current system for the future is examined and if necessary a new system is proposed.<sup>7</sup> In particular, the study at hand should serve as a substantial basis for setting up a reference interest rate system for the control of State aid in the old Member States<sup>8</sup>, the new Member States<sup>9</sup> acceded in May 2004 and the Candidate States<sup>10</sup> (see European Commission, **Error! Reference source not found.**).

The study has a heading part and an appendix. The subdivision has been chosen in order to enhance the readability for all addressees as it is brief and less complex. The heading part summarises the main results while it proceeds with chapter 3 *Review of the Current System* followed by the recommended *The New Reference Rate System* (chapter 4) and ending with chapter 4.5 *Summary*.

However, the appendix is an integral part of the study as it serves as foundation for the findings presented in the heading part. The *empirical results* are paramount to the study. These comprise a *survey* among European banks about their risk-adjusted margins, a comparison of the margins to the bond market and to the margins derived by a credit pricing tool (chapter **Error! Reference source not found. Error! Reference source not found.**), an analysis of the credit spreads revealed by the interest rate statistics the national central banks convey (see chapter **Error! Reference source not found. Error! Reference source not found.**), as well as an investigation about the availability of swap rates (see chapter **Error! Reference source not found. Error! Reference source not found.**).

The importance of the other appendices becomes evident by the context and the cross-references therein.

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<sup>5</sup> In the forth following it is referred to Basel II (**Error! Reference source not found.**, 2004) since at the time the study has been compiled the implementation of Basel II into the Union's law by CAD III was a work in progress.

<sup>6</sup> A more detailed discussion of the developments since the implementation of the current system can be found in chapter 5 *Important Developments since the Implementation of the Current System*.

<sup>7</sup> For further details concerning the assignment please see chapter 6 *Assignment*.

<sup>8</sup> Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Portugal, Spain, Sweden, the Netherlands, and the United Kingdom.

<sup>9</sup> Cyprus, Czech Republic, Estonia, Lithuania, Latvia, Hungary, Malta, Poland, Slovakia, and Slovenia.

<sup>10</sup> Romania, Bulgaria and Turkey; Croatia, to which the Candidate status was awarded as recently as June 18, 2004, could only partially be considered.

The authors' gratitude is expressed in chapter **Error! Reference source not found.** *Error! Reference source not found.* towards those institutions, especially European banks, and persons, who significantly contributed to the study with data, effort and reasoning.

## 3 Review of the Current System

### 3.1 Origin and level of the current reference rate

In 1996, the EC assigned to KPMG the mandate to find a fair and transparent as well as representative system of reporting reference interest rates for the Member States of the European Union for the purpose of evaluating aid systems for enterprises. To assess the reference interest rates to be reported, KPMG (**Error! Reference source not found.**) conducted a survey about loan and funding interest rates among major European commercial banks, central banks and other institutions involved in this issue. Since the system was intended to be an automatic reporting system, KPMG suggested that the system should consist of two parts: a basis rate such as a key money market rate, which can be updated on a *daily basis* and which is readily *available through information providers* such as Reuters or Bloomberg, and *an appropriate margin* added on top of the basis rate. Swap rates and government bond yields seemed to be suitable as basis rates. As far as large companies were concerned, KPMG proposed, based on their survey, to adopt a uniform margin for all countries (except for Greece, Italy and Portugal) between 75 and 100 basis points over government bond yields. Because large companies usually have access to the competitive international bank loan markets, margins were found to be in a very narrow range for all countries with the exception of Greece, Italy and Portugal. Concerning small and medium sized enterprises (SMEs), diversity appeared to be too great to allow the use of a unified margin. This diversity was reported to result from different risks covered and a lack of transparency and competition on the relevant markets.

The EC postulated that the reference rate should be based on a normally collateralised loan with a notional amount of EUR 5 mill. and a 5-year repayment schedule.<sup>11</sup> Based on the above described study the EC (**Error! Reference source not found.**) decided that a single adjustment premium of 0.75% on top of the 5-year swap rate should be applied to all Member States except Greece, Italy and Portugal. For these three countries different premiums were applied: 3% over the 1-year ATHIBOR rate for Greece, 2% over the 5-year inter-bank swap rate for Italy and Portugal. As of 1 August 1999 these reference rates were adjusted to the premium applicable in the other Member Countries in the course of the introduction of the euro in these countries.

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<sup>11</sup> See European Commission, **Error! Reference source not found.**

Summarising, the current reference rate is the 5-year inter-bank swap rate in the relevant currency plus 75 basis points. If there is no appropriate swap rate available, the yield of 5-year treasury notes plus 25 basis points is used as basis rate. For the countries of the euro zone the 5-year euro inter-bank swap rate is applicable since August 1999. The reference rate is derived by taking the average of the rates recorded in the months of September, October and November of the previous year. It is revised yearly and becomes applicable from January 1 of each year. It is adjusted again in the course of the year if it differs by more than 15% from the average of the relevant rates recorded over the last three months.

## 3.2 Expressed criticisms

Apart from the fact that for several new Member States a 5-year swap rate does not exist, significant political and economic changes (see chapter 5 *Important Developments since the Implementation of the Current System*), which affect loan markets and loan pricing, have taken place in Europe. The current system can be criticised as being unsuitable for the future as the current reference rate does not closely reflect market conditions over time.<sup>12</sup> This claim is based on the three following main reasons:

- The current system does not recognise the shape of the yield curve.
- The current system lacks timeliness.
- The current system uses a one-size-fits-all approach to credit risk.

### 3.2.1 The current system does not recognise the shape of the yield curve

The basis rate at which banks are able to re-fund their lending is assumed to be the 5-year swap rate (or the 5-year treasury yield plus 25 basis points instead). However, in practice banks grant loans with an underlying basis rate that is fixed for typical terms such as three or six months and one up to about 20 years. Hence, the 5-year swap rate does not constitute a good proxy for other re-pricing terms. Therefore, **the basis rate should be more flexible regarding the entire yield curve.**

The following chart justifies this critique. A significant difference between long and short term interest rates can be observed. Moreover, bank lending as well as State aid is undertaken with regard to maturities spanning large parts of the yield curve.

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<sup>12</sup> Three European financial institutions with a public mandate, ALMI Företagspartner AB, Banque Du Développement des PME (BdPME) and Kreditanstalt für Wiederaufbau (KfW), have put forward a brief critique on the current system, see ALMI, BdPME and KfW, **Error! Reference source not found.**

As the reference rate should be applicable to all countries, the UK and Germany are taken as examples. The following chart shows the difference between the 3-month money market rate and the 10-year swap rate with regard to the 5-year swap rate, respectively. Deviations by more than 60 basis points are very likely, which amounts to quite an essential share of the regular margin of 75 basis points.

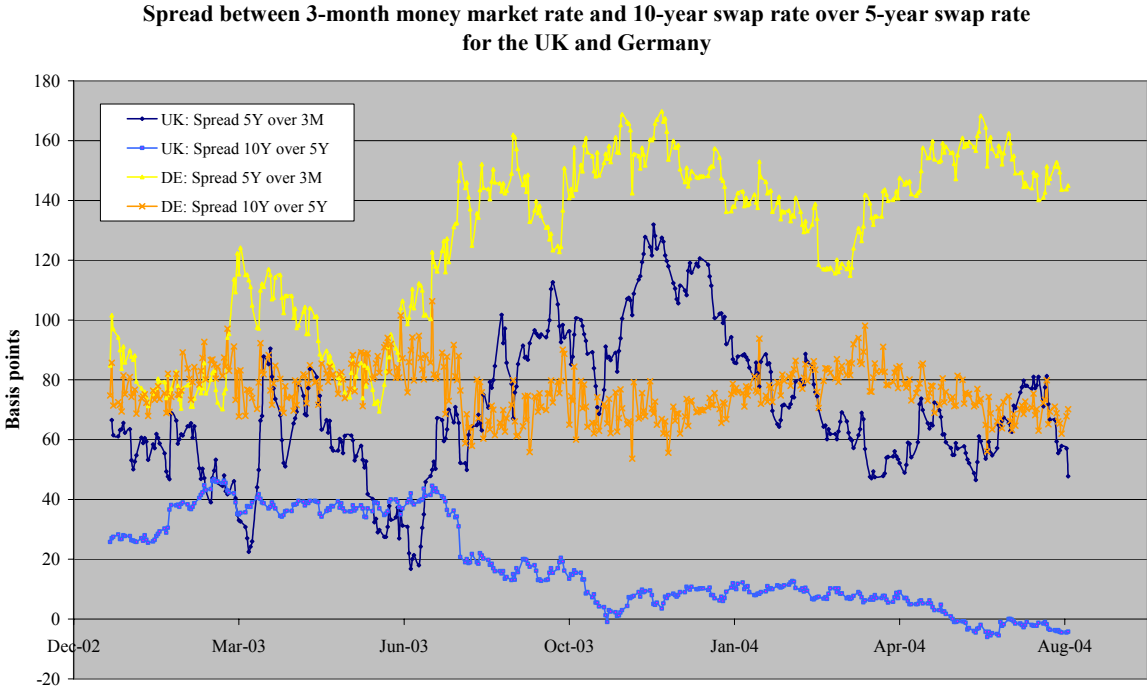


Figure 3-1

Data source: Bloomberg, authors' computation

The following chart compares the maximum spreads between the 1-year and the 10-year swap rates over the horizon January 2002 to July 2004 for the UK, Germany, the Czech Republic, Poland, Slovakia and Hungary. The differences would be considerable if loans with these maturities were compared.

Maximum spread between 1-year and 10-year swap rates January 2002 - July 2004

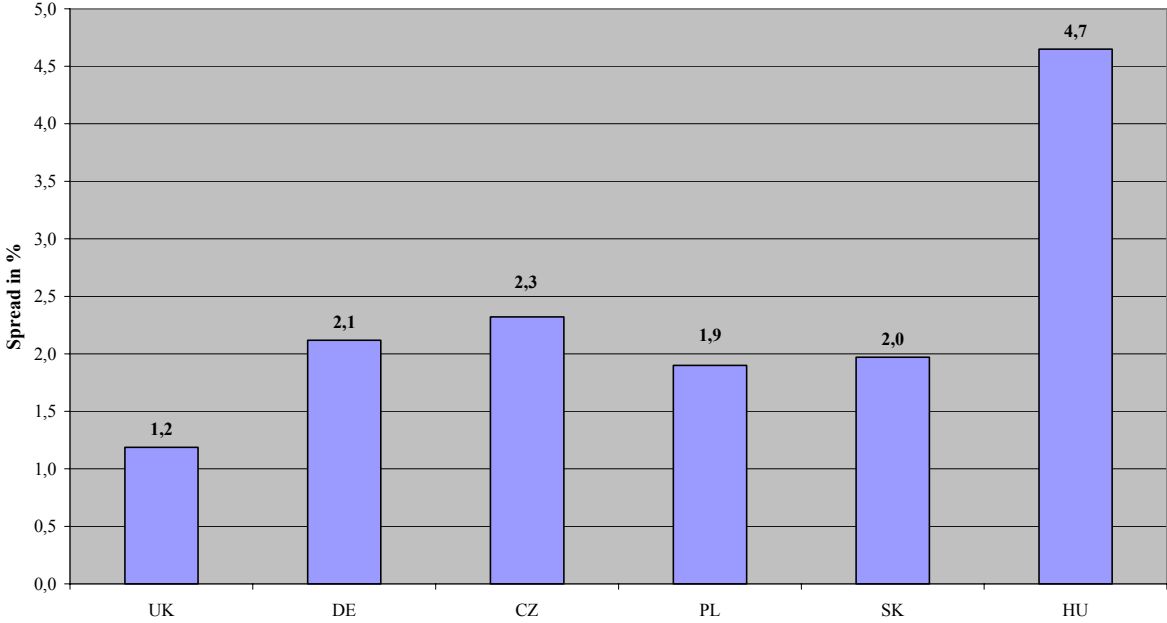


Figure 3-2

Data source: Bloomberg, authors' computation

The next chart shows short term lending as share of the total amount of newly granted loans. The figures reveal a remarkably strong position for short-term lending in some selected countries. Especially for new Member States this observation may also indicate the preferred re-pricing periods for loans granted by States.

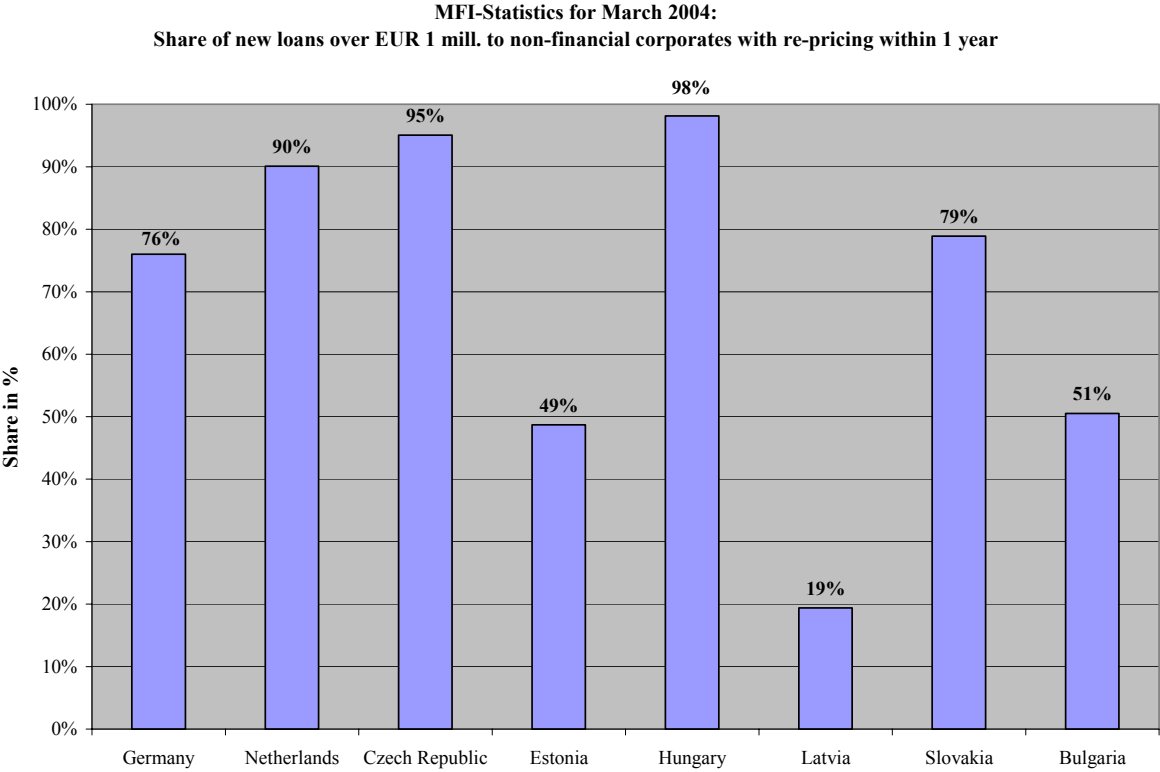


Figure 3-3

Data source: Interest rate statistics of national central banks, authors' computation

**3.2.2 The current system lacks timeliness**

For each year the reference rate relies on a history of market observations and is valid throughout the year. Only if the average over the past three months deviates by more than 15%, it is adjusted. When banks calculate minimum margins for loans they rest upon the *most recent* market rates, which may be very volatile over the averaging period. Consider for example a 15% deviation of the current interest rates from a reference rate of 5%, which results in a remarkable difference of 75 basis points amounting to 100% of the currently implemented credit margin of 75 basis points. Therefore, **the basis rate should be based on more recent market observations.**

The validity of this critique can be scrutinised by inspecting the movements of the 5-year swap rate. This is shown for Poland in the chart below. The chart shows the 5-year swap rate and its 3-month moving average<sup>13</sup> according to the left axis and the difference between both in percent according to the right axis. The red ellipse marks those dates at which the actual 5-year swap rate exceeds the moving average by more than 15%. A historical average would deviate even more.

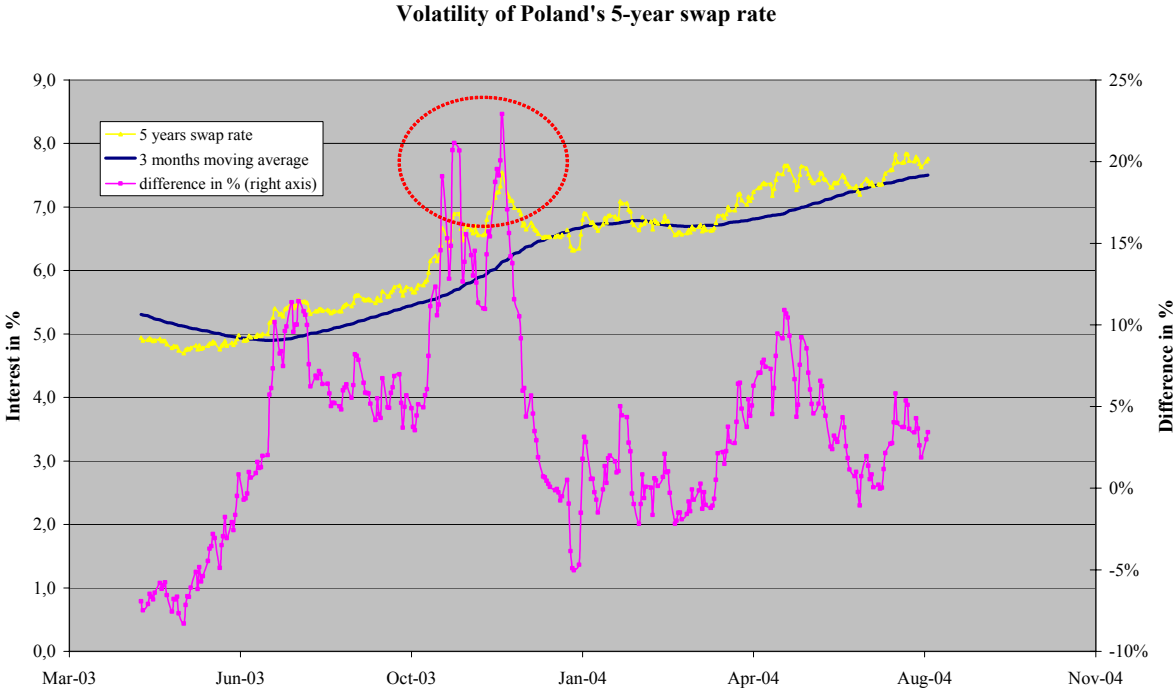


Figure 3-4

Data source: Bloomberg, authors' computation

**3.2.3 The current system uses a one-size-fits-all approach to credit risk**

The credit margin is generally fixed at 75 basis points apart from specific adjustments up to 400 basis points, or even more in exceptional cases. Although this development is not yet completed, in loan markets the credit margin has become much more risk-adjusted in the last few years. Therefore, **credit margins should reflect the debtor's creditworthiness and collaterals appropriately.**

<sup>13</sup> The moving average at each date is the average over the past three months, which reflects even closer the actual development than the historical average, which is currently the basis for the reference rate.

This assertion is quite obvious and is confirmed by the results of the survey (see chapter **Error! Reference source not found.** *Error! Reference source not found.* for detailed numbers). Respondents of the survey state that the margin difference between a strong and a weak creditworthiness is, for instance, about 400 basis points for a 5-year medium collateralised loan. The impact of collateral can amount up to 240 basis points between low and high collateralisation for a debtor with a satisfactory credit standing receiving a 5-year loan.

Changes in the loan market environment<sup>14</sup> are not the main causes for the aforementioned shortcomings of the current system. The most serious weakness results from the fact that the current system was implemented under a one-size-fits-it-all premise. The achieved standardisation – one single rate for nearly all Member States – turns out to be too general and too inflexible for adequately reflecting market conditions for corporate loans in a growing EU (see chapter **Error! Reference source not found.** *Error! Reference source not found.*).

### 3.3 Conclusion

Although the circumstances prevailing in 1997 might have justified a system based on a single, moderate premium in order to reduce the risk of dispute or discrimination (European Commission, **Error! Reference source not found.**a), the changes in the market environment have resulted in flaws in the current system. At the time that the EU launched the reference rate system, there were only 15 Member States that were more homogeneous in terms of economic conditions than the enlarged EU is at the moment. Even though the current system might have reflected the circumstances of loan markets years ago when the system was originally introduced, its suitability for the future appears to be questionable in view of the above mentioned shortfalls. Therefore, a new system will be proposed in the remainder of this study.

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<sup>14</sup> See chapter 5 *Important Developments since the Implementation of the Current System.*

## 4 The New Reference Rate System

The EC has not been insensitive to the aforementioned critiques. Its primary goal in setting the reference rate remains to approximate - as closely as possible - the average rate a debtor can agree with banks under normal market conditions. The EC aims at refining the reference rate system through the installation of an automatic or self-reporting system, which is easily applicable, fair, transparent and easy to understand.

A trade-off between, on one hand, **simplicity and practicability** and, on the other hand, **accurateness and fairness** needs to be made. An accurate system will be very complex in order to appropriately mirror all circumstances (country, currency, etc.) and aid features (payout schemes, combinations of risk factors, etc.). A simple and easily administrable system will be incapable to account for the broad variety of specific characteristics (e.g. loan types and markets).

In order to achieve both goals, an easily administrable automatic reporting system and an accurately calibrated self-reporting system, it is proposed to consider a two pillar system.

1. The **first pillar** advances a **standard approach**. In this standard approach, the EC will disclose on a quarterly basis the basis rate over several maturities and currencies. In order to compute the reference rate, a credit margin has to be added. A table of credit margins that depends on only a few risk drivers (creditworthiness and collateralisation) and that can remain valid for a couple of years was constructed based on the results of the survey (see chapter **Error! Reference source not found. Error! Reference source not found.**). In order to acknowledge the impact of loan size and guarantees margin discounts are provided.

The survey also showed that within this table the average loan had a normal collateralisation and a satisfactory rating resulting in a credit margin of 220 bp. It is suggested to use this normal collateralised loan of a satisfactory credit quality as the **“default” case** or **normal case** for loans and guarantees. This means that for all State-granted loans and guarantees, where the credit and/or the collateralisation quality cannot be determined, the satisfactory rating spread and/or the normal collateralised spread will be used. However, the normal case for other forms of aid assumes satisfactory credit quality and “low” collateralisation, because these aid measures typically exhibit higher risk (see examples forth following).

2. The **second pillar** suggests an **advanced approach** that utilises the principle of subsidiarity. It allows States to consult calculation agents in order to determine a fair reference interest rate.

## 4.1 Standard approach

The standard approach ascribes a high weight to the goal of simplicity and practicability. Issues of the basis rate, the credit margin, the margin discount for guarantees and the adjustment for small and large aid, are addressed separately. As the standard approach preserves to a large extent the applicability of current procedures, the implementation appears manageable.

### 4.1.1 Reference basis rate

#### Setting the reference basis rate

In order to remedy the critique that the current system ignores the shape of the term structure, the EC has two options. In case the EC should opt for a very accurate system, it should publish the whole term structure curve for all the currencies of the Member States. Alternatively, an easily applicable system would choose a number of points on the term structure curve. It is proposed that the EC would publish **at the beginning of each calendar quarter** and for each currency of the Member States the reference basis rates for **three months, one year, five years and ten years**.

The basis reference rate should reflect the benchmark rate to which banks usually measure their loan margins. In general **inter-bank offered rates (IBOR)** and **swap ask rates** serve as that benchmark. While the IBOR reflects the money market situation up to and including one year, the swap rates mirror conditions on the capital market above a maturity of one year. For currencies where no IBOR or swap rates are observable for particular maturities, the EC shall derive the basis rate by **yields on government debt** instead. Yields of government debt can be obtained from (auctions of) treasury bills for maturities up to one year and from the implicitly calculated yield-to-maturity of government bonds for longer terms to maturity. The EC may rely only on data which is readily obtainable from information providers. For instance, government yields-to-maturity<sup>15</sup> cannot be derived from bond coupons and market prices by the EC itself if yields are not directly obtainable as this involves a financial evaluation.

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<sup>15</sup> The yield-to-maturity is the internal rate of return, which discounts all future proceeds including coupon payments and redemptions to the current market price of the bond.

Since banks exhibit higher default risk than Member States for money market operations, **rates of government T-bills maturing within 1 year are shifted upwards by 15 basis points**. However, the lower risk exposure of swaps<sup>16</sup> in contrast to bonds seemingly outweighs banks' higher credit risk for the new Member States so that **yields-to-maturity of government bonds are not shifted** in order to derive the appropriate basis rate.<sup>17</sup> Thus, where neither IBOR nor swap rates are observable, the appropriate government debt yield is applicable.

The reference basis rate shall be derived consistently over time<sup>18</sup> as **an (arithmetic) average rate of daily observations over the second month of the preceding quarter**. For example, the average interest rate for November 2004 would be the valid reference basis rate for the quarter January to March in 2005.

This approach takes into account the EC's current procedures, which require this time lag in order to carry out a due process. If in future the disclosing procedures and the availability of market data allow for an even more timely measurement and disclosure, the averaging period (example: November) should be closer to the disclosure period (e.g. the first two weeks of December) which itself (example: January to March) may be shortened (e.g. to one month, i.e. January in the example).

As there are **no rates observable for certain, especially longer terms to maturity** for some currencies of the new Member States, the EC may choose a readily observable rate whose maturity comes closest to the above-mentioned maturities in order to complete the table. However, it may occur that there is no suitable reference basis rate for a particular maturity at all.

It should be noted that the disclosure of rates for different maturities is much more important for aid in form of loans than for the purpose of discounting. To make that point evident, consider a loan of EUR 100 mill. maturing in ten years. The loan bears a coupon of 5% (swap rate of 4.25% plus a margin of 0.75%), which is assumed to be equal to the 5-year loan rate while the 10-year loan rate is 6% (swap rate of 5.25% plus a margin of 0.75%). Consequently, the aid element is EUR 1 mill. per annum, i.e. 1% of the loan amount.

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<sup>16</sup> Swaps exhibit lower absolute market values as the notionals are not exchanged. This exposes the counterparty of a swap transaction to a lower risk of default than for bonds.

<sup>17</sup> The shift of government yields is empirically motivated in chapter **Error! Reference source not found. Error! Reference source not found.**

<sup>18</sup> Chapter **Error! Reference source not found. Error! Reference source not found.** contains the sources for the basis rate which have been identified by the study.

This loan is compared to an aid settled in cash as annual instalments of EUR 1 mill. over ten years. *Ceteris paribus* the gross grant equivalent coincides for the loan and the cash aid.

If only the 5-year swap rate were published, the aid element of the loan would completely “disappear”. The gross grant equivalent of the cash aid increases due to a lower discount rate from EUR 7.36 mill. to EUR 7.72 mill. as some basic calculations show. However, the increase of about EUR 0.36 mill. or 4.9% might be regarded as negligible in view of the effort needed to derive and disclose more than one reference basis rate.

The bias obviously depends on the shape of the yield curve. If the discount rate was taken to be equal to 4% for the 5-year rate instead of 9% for the 10-year rate the bias would amount to about 26%.<sup>19</sup> Hence, under the two conditions that States were able to *report reliable margins* for aid in form of loans<sup>20</sup> and that the risk of a considerable *discounting bias for steep yield curves is accepted* the disclosure of, for instance, just the 1-year reference basis rate<sup>21</sup> would be sufficiently fair.

Just as well, it would be conceivable to disclose only the 3-months IBOR rate as the sole reference basis rate, since it is available for nearly all relevant currencies. Under normal market circumstances the 3-months IBOR rate can be expected to be lower than the interest rates for longer maturities, which implies lower recovery amounts in case of unlawfully granted aid and lower grant equivalents for loans and guarantees but higher grant equivalents for other kinds of aid disbursed in instalments. However, this simplification would entail that the 3-months rate would apply to all maturities alike. As a result, the new system would not recognise the shape of the yield curve, which is seen as one of the major shortcomings of the current system.<sup>22</sup>

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<sup>19</sup> It is referred to Figure 3-2 for the maximum spread since January 2002 between the 1- and 10-year swap rates for six countries, of which Hungary exhibited a maximum spread of 4.7% while the other countries were around 2%.

<sup>20</sup> In order to report reliable margins the State had to derive the effective interest rate and the effective funding rate, see chapter **Error! Reference source not found. Error! Reference source not found.** and chapter **Error! Reference source not found. Error! Reference source not found.**

<sup>21</sup> 1-year rates are readily available for most Member States and are proposed for the purpose of compounding unlawful aid.

<sup>22</sup> See chapter 3.2.1 *The current system does not recognise the shape of the yield curve.*

**Example**

If the outlined principles were applied to determine the basis rate of Polish Zloty for the 3<sup>rd</sup> quarter of 2004 the following Table 4-1 results. The table includes also the rates of July 30, 2004 to which some subsequent example will refer.

<b>Maturity:</b>	<b>3 months</b>	<b>1 year</b>	<b>5 years</b>	<b>10 years</b>
<b>Average rate of May</b> (published by EC)	<b>5.90%</b>	<b>6.70%</b>	<b>7.47%</b>	<b>7.32%</b>
Actual rate of July 30 (for comparison only)	6.32%	7.17%	7.63%	7.27%

Table 4-1

Data source: Bloomberg, Polish money market and swap rates as of July 30

**Using the reference basis rate**

A distinction has to be made between fixed and floating rate loans. For fixed rate loans, the *applicable reference basis rate* is the basis rate of the maturity which comes closest (or is lesser for maturities in between) to the maturity of a loan<sup>23</sup>. If the Member State grants a loan with a variable interest rate, the term to maturity is equal to the term to the re-pricing period.<sup>24</sup>

For other forms of State aid the period of time the single aid element is expected to be received by the beneficiary is relevant. If, for instance, aid is disbursed in several instalments each particular date determines the respective applicable reference basis rate (i.e. the 1-year rate for aid elements occurring from over 9 months up to 2.5 years).

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<sup>23</sup> The interpolation of rates is proposed under the advanced approach, see chapter 4.2.2 *Recognising the exact timing of cash flows*.

<sup>24</sup> If the EC chooses to require different margins for different maturities, the margin would be determined by the maturity and not the re-pricing of the loan.

**4.1.2 Risk grading and loan margins**

In order to complete the calculation of the reference rate, the EC has to publish a table of loan margins as well. Aiming to reduce complexity it is recommended to publish this credit margins for just a few combinations of risk factors, which are covered by the two dimensions of the following table: rating category and collateralisation (measured by the so-called loss given default (LGD)). Different credit margins over the various maturities are not suggested. The reason for this is the lack of correlation that was found between credit spreads and maturities in the results of the survey in relation to the complexity that would be introduced by taking maturity-dependent spreads into account.<sup>25</sup>

<b>Loan margins in basis points for a 5-year loan</b>			
<b>Rating category</b> (Ranges of agencies' rating grades)	<b>Collateralisation</b> (LGD-range and LGD base point)		
	<b>High</b> (LGD ≤ 30) 15%	<b>Normal</b> (31% ≤ LGD ≤ 59%) 45%	<b>Low</b> (LGD ≥ 60%) 75%
<b>Strong</b> (AAA – A)	45	60	75
<b>Good</b> (BBB)	60	100	150
<b>Satisfactory</b> (BB)	100	220	340
<b>Weak</b> (B)	180	465	750
<b>Bad</b> (CCC – C)	360	1000	1650

Table 4-2

Data source: Survey results and authors' computation

<sup>25</sup> The complete tables of average reported margins for the maturities of one, three, five and ten years can be found in chapter **Error! Reference source not found. Error! Reference source not found.**

These loan margins shall be applied according to the beneficiary's creditworthiness and the collateralisation level of the loan<sup>26</sup>. In case a classification is doubtful (e.g. a split rating case, which means that there is a disagreement about the rating), the average of the respective credit margins could be allowed to be applied. For those cases where the credit risk essentially depends on the success of a certain investment and not on the debtor's general creditworthiness (so-called project financing), the credit standing of the project itself is decisive. However, if the classification is impossible, the "grey coloured" default or normal cases apply for loans and guarantees.

#### 4.1.2.1 Debtors' creditworthiness

On average over the entire survey the *normal case* turned out to be the **rating category "satisfactory"**.<sup>27</sup> Since this should apply as the default scenario for loans and guarantees in case no rating is available, a large number of loans and guarantees would fall into this category. Loan-granting Member States can even be expected to try to achieve a lower reference margin by proving better collateralisation and credit quality. This intention is, however, limited by the requirement that a bank's internal risk grading has to be applied, if a bank is involved in the granting of the loan. In other cases the State needs at least to objectify a better credit standing.

The analysis of macro data draws a different picture than just the average does. The MFI-statistics show that States exhibit very different levels of loan margins. In order to recognise such divergences, an alternative classification that includes a higher level of differentiation and that is based on a stronger application of the entire rating scale has been developed.

The normal case could be further extended in order to *differentiate between States* as well as *small and larger loans*. According to this refined differentiation larger loans above EUR 1 mill. would be classified as "strong" under the *normal case* for most of the old Member States for example. It is recommended to consider such an advanced differentiation as well (see chapter **Error! Reference source not found. Error! Reference source not found.**). As loan markets develop, these classifications have to be validated over time by the then actual MFI-statistics. For a detailed discussion it is referred to chapter **Error! Reference source not found. Error! Reference source not found.**

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<sup>26</sup> Application to other forms of aid is discussed below.

<sup>27</sup> See **Error! Reference source not found. Error! Reference source not found.** for the distribution of rating grades.

If the loan, guarantee or the risk of aid being regarded is comparable to the risk borne by *mezzanine or equity debt*<sup>28</sup>, the default rating category is deemed to be one grade below the grade applicable to senior debt except if senior debt falls in the “bad” category.

States may also take a position as an ordinary shareholder in a company. In this case the benchmark for the pre-tax return on *ordinary equity capital* is considered to be 15%.<sup>29</sup>

If the beneficiary is a *distressed firm* it is assumed by default to be of “weak” creditworthiness as this is the worst risk category banks would usually grant loans to (apart from fully collateralised loans). A distressed firm is defined as having considerable problems to raise debt capital.

In Table 4-2 margins for “bad” loans are also provided. A debtor, who already defaulted, has a rating that is below the “bad” rating category. Hence, the reference margin would not be lower than for the “bad” rating. As there is no market for granting new loans to debtors of bad creditworthiness, the disclosed margins are hypothetical in nature. However, the EC may choose to apply the higher margins to those debtors in order to reflect the highest level of default risk.

#### 4.1.2.2 Collateralisation

Collateralisation for loans and guarantees is measured in terms of the so-called loss given default (LGD), i.e. the expected loss to be incurred in case of the debtor’s default.<sup>30</sup> As a proxy the measurement may rely on the conservatively estimated fair market values of pledged assets in relation to the notional amount at the time the loan is contracted with the debtor or in a short and limited time thereafter (e.g. three months), i.e.

$$\text{LGD} = 1 - (\text{value of pledged assets} \div \text{notional amount}).$$

On average over the entire survey the *normal case* for loans and guarantees turns out to be “**normal collateralisation**”. For the purpose of discounting and compounding other forms of aid the normal case is, however, assumed to be “**low collateralisation**”. The reason for this distinction is that in contrast to a loan a beneficiary cannot expect a recovery of aid from the State if it goes bankrupt.

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<sup>28</sup> The term equity debt comprises a variety of mezzanine capital. Typically, the contractual terms require a fixed interest and participation in losses and possibly participation in increases in value or in profit. Mezzanine capital is subordinated to senior (and junior) debt and ranks prior to ordinary equity capital.

<sup>29</sup> See results of the survey, i.e. **Error! Reference source not found. Error! Reference source not found.**

<sup>30</sup> See the definition of loss given default in Basel II, paragraphs 297 and 446 et seq.

If a loan is subordinated to senior debt, the collateralisation is deemed to be “low”. Subordination is presumed if the loan amount ranks virtually among the 40% of the first-loss range of pledged collateral or the firm’s total capital. If a loan can virtually be regarded as equity (mezzanine/tier debt), the collateralisation cannot be better than “low”. To prevent a miss-classification the loan can be split up by Member States into a senior, a subordinated and an equity part.

#### 4.1.2.3 Currency differentiation

As turns out from survey question E 13 (chapter **Error! Reference source not found. Error! Reference source not found.**), the differences among margins for different currencies are not very pronounced. Half of the banks report not to differentiate between currencies regarding the pricing of loans at all. The average difference indicated by participants, who differentiate between currencies, is about 20 basis points. Consequently, it seems to be reasonable to apply the same margins for all currencies. However, it has to be noted that, in contrast to the margin, the basis rate strongly depends on the currency, in which the aid is granted (chapter 4.1.1 *Reference basis rate*).

#### 4.1.2.4 Application by the EC and Member States

Whenever the EC has to derive a reference rate or a reference discount rate *retrospectively* it applies in principle the normal cases outlined above. Adjustments to higher or lower risk *may* take place according to the EC’s investigations for obvious cases or for large cases, say above EUR 25 mill. A historical risk analysis pro forma for all cases would be inadequate.

Whenever State aid is granted through banks or similar financial institutions (i.e. loans and guarantees) that possess a rating system, it is the banks’ rating systems which should be utilised in order to determine debtor’s credit quality.<sup>31</sup>

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<sup>31</sup> Reasonably, banks’ risk grading outperforms on average that of States since it is the banks’ core business to assess the creditworthiness of loan applicants. If States possess additional information valuable for grading a debtor they may provide these data to the respective bank.

States may categorise beneficiaries by own assessment when aid is not granted through banks.<sup>32</sup> The categorisation of beneficiaries into risk grades must be performed and documented *before* granting a possible State aid. The categorisation must be based on objective evidence following *basic* bank standards and own guidelines available to the EC and being intuitively understandable. For aid schemes addressing larger groups of smaller beneficiaries the categorisation can be applied to the whole group as a forecast of the average creditworthiness or average collateralisation. The normal case has to be presumed if prior knowledge is not sufficient to derive a proper estimate.

If Member States employ an own grading they should have guidelines about to which cases they intend to apply their own grading system or the default cases. Under no circumstances Member States may exploit this option in order to achieve advantageous reference rates for particular cases (“cherry-picking”). Moreover, for risk grading being applied over a longer time horizon (i.e. for a 5-year loan scheme) the realisations of debtors’ ability to redeem loans should be monitored in order to prove the reliability of the grading system in time and to take actions if the grading system appears to be biased. The EC should have the right to refuse Member States’ grading in part or as a whole if it does not comply with *basic* banking standards<sup>33</sup> or if it exploits the grading option unduly.

## Guarantee fees

The credit spread also reflects the appropriate fee for guarantees. However, since guarantees involve less administrative costs than loans the **reference guarantee fee receives a 20 basis point discount**<sup>34</sup> in comparison to the aforementioned loan margins.

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<sup>32</sup> By own risk grading Member States shall observe the mapping provided in **Error! Reference source not found. Error! Reference source not found.** and may also consult rating descriptions of public rating agencies, the guidelines of Basel II (**Error! Reference source not found.**, 2004), Annex 4, regarding supervisory slotting criteria for specialised lending, which can apply accordingly, and rating grades of comparable competitors.

<sup>33</sup> Under the term *basic banking standard* an intuitively derived scoring of credit risk can be understood for example.

<sup>34</sup> The discount is motivated in chapter **Error! Reference source not found. Error! Reference source not found.**

**Loan amount**

The loan amount determines the translation of fix costs into a margin on accrual basis. Moreover, for large loans competition seems to be more pronounced. This leads to an adjustment of the reference margins for different loan amounts according to the following table:

Notional in EUR mill.	Adjustment in basis points		
	< 1	1 - 5	> 5
Loans and guarantees	+ 10	0	- 10

Table 4-3

Empirical findings and theoretical considerations lead to the educated guess that smaller loans are afflicted with relatively higher margins on average than revealed by the survey.<sup>35</sup> This can be taken into account by assuming a different default level for debtors’ credit standings applying for small rather than large loan amounts. This alternative approach is discussed in chapter **Error! Reference source not found.** *Error! Reference source not found.*

The reference rate is built by the sum of the applicable basis rate and the applicable loan margin including the adjustment for the amount of the loan (possibly secured by a State-guarantee). If State aid is not granted as a loan or a guarantee, the adjustment does not apply.

**4.1.3 Intermediate examples to the standard approach**

The following examples illustrate the components of the standard approach.

**Example 1**

Let a State grant a 10-year loan of an amount equivalent to more than EUR 0.5 mill. in Polish Zloty to a firm. The loan admits a variable interest rate of 6-month IBOR. The first coupon is 6.53%. According to the standard approach, a basis rate is chosen the re-pricing term of which comes closest to 6 months. This is the 3-month EURIBOR reference basis rate standing at 5.9% (actual rate according to Table 4-1: 6.32%). The actual loan margin is considered to be 63 basis points, which is 6.53% minus 5.9%.

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<sup>35</sup> The survey revealed a lower margin differentiation between small and large loans than the MFI-statistics. An explanation could be lower risk for larger debtors (“too big to fail”, diversification) and lower bargaining power for smaller debtors in loan markets with large frictions (transaction, search and monitoring costs, limited competition in local markets).

However, the satisfactory creditworthiness and the high collateralisation yield a reference margin of 100 basis points according to Table 4-2. Moreover, small loan amounts up to EUR 1 mill. receive an add-on of 10 basis points, which accounts for a higher cost margin. In total, the aid element turns out to be 100 plus 10 minus 63 basis points, i.e. 47 basis points. As the loan is granted over ten years, the aid elements occurring as interest payments every six months are discounted by the 10-year reference swap rate, which is 7.32% for example (see Table 4-2). This calculation leads to the gross grant equivalent.

**Example 2**

Consider a guarantee for a distressed company over a large amount in Polish Zloty and for a period of seven years. The guaranteed loan is highly secured by pledged assets. The guarantee fee is 1%. These characteristics yield the following calculation:

Loan margin for weak creditworthiness and high collateralisation	180 bp
less discount for guarantees	- 20 bp
less discount for large amounts	- 10 bp
is equal to the reference guarantee fee	= 150 bp

Table 4-4

The aid element is 0.5% p.a., i.e. 1.5% less 1%. The discount rate is the 5-year reference basis rate, 7.47% in the aforementioned example, as it comes closest to the maturity of seven years. Discounting the aid element for 7 years by the reference basis rate results in the gross grant equivalent.

**4.1.4 Application to State aid**

This section describes the general application of the reference rate by Member States and the EC. It is beyond the scope of the study to provide an extensive classification of aid and a specific application of the reference rate thereto because the universe of aid is too widespread. Like it has turned out for the current system the concrete procedures evolve over time with the occurrence and experience of new cases, which then culminates into new guidelines. For this purpose it might be helpful to collect and categorise each new aid form according to risk grades and some basic classes in order to establish a casebook for future investigations.

Notwithstanding the outline of the general application, chapter **Error! Reference source not found.**

*Error! Reference source not found.* in the appendix contains short case studies based on the Commission's actual decisions to which the approaches have been exemplarily applied.

#### 4.1.4.1 Application to discounting

In principle, the appropriate discount rate of a cash flow should be the zero coupon discount rate that reflects the timing of cash flows and the indentured party's creditworthiness because zero rates implicitly account for interest on interest. The grant equivalent however, is currently determined by discounting the future cash flows at the reference rate (see chapter 9 *Functions of the Reference Rate*), which is a par rate rather than a zero discount rate. Par rates and zero discount rates coincide only if no intermediate interest payment is scheduled due to market conventions, because compound interest is not relevant.

Several cases can be considered:

- For (non-zero coupon) standard loans and guarantees, the use of the (par) reference rate for discounting results in a precise approximation of the calculation based on zero discount rates.
- For loans with variable interest rates the discount rate to be applied to the aid element of the loan should be based on the entire maturity in contrast to the term to re-pricing as the discounting takes into account the entire duration of the aid.
- For aid cases where the cash flow pattern differs from that generated by standard loans, the approximation of the discounted value might be less accurate while using the reference rate instead of the zero rates. Still, if one observes that for each receipt of aid a different maturity can apply, one ends up by and large in a portfolio of situations where no intermediary cash flows occur and where the reference rate is a suitable discount rate. For example, if the aid is disbursed in two instalments of 5 and 10 years the reference rates for both maturities apply accordingly, not just the reference rate for the longest time to maturity.<sup>36</sup>

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<sup>36</sup> A similar effect results from a precise derivation of the interest rate of a loan with several redemptions; see chapter 4.2 *Advanced approaches*.

The appropriate risk grading depends on the kind of specific aid granted. Consider the following examples:

- If the State aid is granted in instalments<sup>37</sup> it is the State who is the “debtor”.<sup>38</sup> Payments made by the State irrespective of the beneficiary’s possible bankruptcy shall rather be discounted at a “riskless” discount rate. Therefore the basis rate (possibly less the add-on of 15 basis points, which is applicable for deriving the basis rate according to T-bill rates) constitutes an appropriate reference rate.

In contrast, the discount rate would be the regular reference rate if the State aid is only granted when the beneficiary is not insolvent, because the conditionality exactly reflects the beneficiary’s credit risk.

- Some kinds of aid are virtually terminated if the firm goes bankrupt. This may supposedly be the case for rent reliefs, discounts on social security, free utilisation of otherwise payable services, etc. In these situations the regular reference rate is applicable for discounting. On the other hand, when aid can still be accessed by firms under insolvency proceedings, the riskless discount rate is better applicable.
- For expiring tax reliefs on gains it is the beneficiary who pays less tax and needs fewer funding. A reference rate is appropriate in this case as well. However, the risk incurred by the beneficiary is much higher than the risk of insolvency as it is more likely to bear losses, to which tax reliefs do usually not apply, than to go bankrupt. Hence, the risk would be similar to equity debt, which participates in losses, and demands a higher risk premium than the normal loan margin.
- For loans and guarantees the debt is typically collateralised. The contrary has to be assumed for other forms of aid as the beneficiary “will not receive any recovery from outstanding aid when he/she goes bankrupt him/herself”. Hence, for the purpose of discounting other forms of aid than aid elements of loans and guarantees, the margins according to “low” collateralisation have to be applied.

Summarising, for each case the particular form of aid (e.g. tax relief, discount on social security) needs to be considered in order to derive the appropriate discount rate.

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<sup>37</sup> For example, cash subsidies over a longer period.

<sup>38</sup> Accordingly for aid settled on a future date, e.g. a forward loan.

#### 4.1.4.2 Application to compounding unlawful State aid

If State aid is granted illegally with regard to the European Union's State aid rules, it has to be repaid to the State. The general principle is to economically restore the situation before the aid was granted. In order to achieve an appropriate compensation for the time value of money and for the default risk not only the illegally granted aid has to be repaid but the beneficiary will have to pay a compound interest on the recalled State aid as well.

There is no substantial difference between a loan and a reclaimed aid. Hence, a payment of interest is justified. If regular payments of interest are not scheduled, the interest should be compounded until the date of redemption or to the date a market based interest is charged regularly (i.e. conversion to a loan). The compound interest can be calculated based on past reference rates as the breach of aid law is usually discovered afterwards.

In principle, compounding is the reciprocal to discounting. The remarks on the appropriateness of the reference rate as a par rate in contrast to a zero discount rate apply accordingly if compounding is conducted over a period in which the convention underlying the reference rate would envisage interest payments. The bias can be expected to increase the longer the horizon is. For a couple of money markets the conventions underlying 1-year rates do not require intermediate interest payments. Even if the conventions demand intermediate interest payments, the bias can be expected to be small in comparison to compounding by a 5-year interest par rate.

As outlined (see chapter 3 *Review of the Current System*) the *currently* applicable interest rate is the reference rate for periods of five years because the basis rate is the 5-year swap rate due to considerations of practicability. In banking, however, it is common to demand a *short-term* basis rate plus a credit margin and in addition a *penalty margin* on amounts which are overdue stemming from *debtor's violations* of contractual obligations. A penalty margin also serves as a cushion against deterioration of credit quality since further adjustments to the interest margin are not always possible. Short-term basis rates are justified by the fact that the date of repayment is not known in advance and that compounding of interest is taken into account thereby. Since the responsibility for violating State aid rules is supposedly not only with the debtor, the applicability of a penalty margin is questionable.

Taking into account the issue of compounded interest and considerations of practicality as well, it is recommended to iteratively use the *1-year reference rate* for compounding. Since it is cumbersome to identify iteratively the appropriate reference rate for many aid elements and over a long horizon, the EC can apply the reference rate which was valid on the day when the beneficiary received the first aid element to all aid elements of the respective calendar year. All aid elements of a year are compounded to the year end exactly according to their occurrence. From the year end onwards the due amount is compounded by the respective reference rates valid at the beginning of a year. A further simplification would be just to apply as the first rate the reference rate valid at the beginning of the year the aid elements appeared first and to aggregate all aid elements of a calendar quarter to the quarter ultimo.

Rather than using a penalty margin the reference rate should be adjusted to the actual creditworthiness of the beneficiary and the collateral underlying the receivable at the beginning of each year. Thereby, the relevant creditworthiness is the beneficiary's creditworthiness at the point in time the aid was granted. In fact, the collateralisation would typically be "low" for all aid except loans. However, a beneficiary may provide collateral in order to secure the reclaim and to reduce the reference rate thereby. Since the compounding procedure is based on the reference rate valid at the beginning of each year, it is possible to reassess the margin on a yearly basis. Nevertheless, a reassessment of the credit risk should proceed only exceptionally, if rather significant and obvious changes with respect to creditworthiness or collateral have taken place during the foregone compounding period (e.g. when the beneficiary voluntarily provided collateral to secure the claim until the lawsuit is decided and signified this action to the EC).

If a 1-year rate is not on hand, the available reference rate of the next shorter maturity shall be applicable. In this case the compounding period must be abridged to the next shortest maturity of which a reference rate is available, e.g. from one quarter to the next if only the 3-month rate is available.

Let, for example, a beneficiary illegally receive aid elements every week starting in July of 2004 until July 2006. To derive the reclaimable amount as of December 2006, all cash flows of 2004 are compounded by the 1-year reference rate valid in July 2004. The resulting amount and all aid in 2005 are compounded by the 1-year reference rate valid as of January 2005 taking into account changes in credit standing. The same applies to 2006 while the amount is compounded to the date the re-payment is received by the State.

For beneficiaries with poor creditworthiness it may nevertheless be advantageous to bear the risk of reclaim according to the reference rate if the reference rate is lower than the firm's funding costs or if the firm is too weak to get credit from banks at all. Demanding them to pay a risk-appropriate margin<sup>39</sup> on a compounding basis could mean exposing the firm to bankruptcy. Notwithstanding this possibility, there is no market for new loans to distressed firms. Though one may regard *yields* on "bad" loans to be applicable, the problem is that a new loan dilutes the possible recovery in case of default. A *market based solution* to this issue, as the underlying principle of the reference rate, cannot be found by an appropriate application of the reference rate. However, the loan margin of Table 4-2 for the category of "bad" creditworthiness as outlined in the aforementioned margin table is applicable as a non-market based surrogate.

Summarising, the reference rate for the purpose of compounding interest should be based on a short term basis rate and should contain the credit margin, which is appropriate for the debtor.

#### 4.1.4.3 Aid elements of loans and guarantees

The aid element of a standard fixed rate loan is the positive difference between the loan amount and future cash flows discounted at the reference rate. This reflects a lower *effective interest rate*<sup>40</sup> of the loan compared to the reference rate. For a guarantee the aid element is the positive difference between the reference loan margin and the actually charged guarantee fee. In both cases the reference basis rate for purposes of discounting is chosen according to the *total maturity* of the contract. This is especially important to observe for variable interest loans, for which the aid element is determined according to the reference rate for the term to re-pricing while the discounting utilises the reference rate regarding the total maturity. The maturity of a contract is defined as the date when redemptions are scheduled or when the loan margin is adjusted to the then valid market conditions and debtor's creditworthiness.

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<sup>39</sup> In some countries excessively high interest rates could be limited by usury laws.

<sup>40</sup> The coupon of a loan is not an accurate measure as loan discounts increase the interest charge; see chapter **Error! Reference source not found.** *Error! Reference source not found.*

## 4.2 Advanced approaches

It is beyond the scope of the study to develop an approach which can fit all circumstances. Accounting for all imaginable scenarios cannot be achieved through market surveys or macro economic analysis. Admittedly, important issues might be disregarded by a standard approach that suits an automatic reporting. Therefore, States may wish to rely on much more refined reference rates that are especially calibrated to the markets concerned. In the authors' view, the European Commission is not a suitable body to timely conduct more intricate calculations because it does not have the required proximity to loan markets.

In order to derive more precise reference rates a State should have the possibility to conduct more intricate calculations or to consult a calculation agent<sup>41</sup>, who determines the reference rate and documents the calculation for further approval by the EC. Such a calculation agent should apply a well accepted, calibrated and perhaps audited financial model. The agent must assure neutrality and that the calculation is performed appropriately according to market standards. The methodology and the particular calculations should be documented in a way that a non-technical expert is readily able to understand the procedures and the derivation of the results.

This approach offers the advantages of utilising local banking knowledge and of achieving higher precision as well as of a self-reporting process in that the derivations of the reference rates are documented for each case or group of cases (such as public loan promotion schemes) without EC's further legwork beside the approval.

In all cases where the Member States or third parties carry out the specific task of deriving the reference rate, the EC should be entitled to require an independent and external audit of a particular case, scheme, or system on a regular and ongoing basis and at Member States' cost.

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<sup>41</sup> The appropriateness of certain institutions and their compensation for conducting this task is not discussed though larger commercial, development, and central banks (domestic or European) should be able to perform the empirical foundation and the calculations adequately.

## 4.2.1 Large cases of State aid

For all single large cases of aid granted in the major currencies EUR, GBP, USD, CHF, YEN and for all single cases beyond small size, where the beneficiary has issued a tradable bond, the reference rate should take into account the credit spreads, which are actually traded on bond markets. The survey did not reveal that credit spreads of corporate *bonds* have a considerable direct impact on *loan* margins for the majority of participants. However, for amounts over EUR 100 mill. the bond market can be seen as the relevant reference.

Since an automatic reporting system would be rather complex to implement with regard to credit spreads of bonds, the concrete analysis needs to be carried out manually. Each single case would require special attention. Hence, within this study it would only be possible to outline the general idea:

If there were traded bonds of the beneficiary these would be the first choices of comparison. Relevant credit spreads of other corporate bonds in major currencies can be obtained from Merrill Lynch via Bloomberg, for instance. The beneficiary and the aid need to be mapped to the risk factors (rating, sector, subordination, branch, etc.) considered by the data provider. In this way it is possible to derive an average credit spread over swap. For loans and guarantees these spreads need to be adjusted for the provided collateralisation and the administrative costs.<sup>42</sup>

## 4.2.2 Recognising the exact timing of cash flows

In *all cases of aid*, where cash flows appear at future dates, the relevant maturity does supposedly not coincide with a maturity for which a reference rate is disclosed. If the market yield curve is very steep, it may matter a lot which particular basis rate does apply. In order to prevent frictions in that States chose the timing of cash flows so that always the lowest or highest rate applies States should be allowed (or required for large cases above EUR 25 mill.) to linearly interpolate the relevant reference rates.<sup>43</sup>

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<sup>42</sup> Further details of corporate bond spreads can be obtained from chapter **Error! Reference source not found. Error! Reference source not found.** and **Error! Reference source not found. Error! Reference source not found.**

<sup>43</sup> Interpolation is explained in chapter **Error! Reference source not found. Error! Reference source not found.**

For *loans* with several redemptions the whole life of the loan is only a mediocre approximation for the maturity of the applicable basis rate. In terms of market proximity it would be advantageous to allow (or require for large cases above EUR 25 mill.) the particular reference rate to be derived according to a weighted average of the reference rate applicable to each redemption.<sup>44</sup> Several redemptions might be aggregated to one if they appear in close sequence, e.g. for each quarter to the quarter ultimo.

If the full value of collateral for a loan or a guarantee is pledged not at once but in progression or diminishes over time, e.g. due to depreciations, and the changes in values of the collateral can be forecasted reliably the State may choose (or be required for large cases above EUR 25 mill.) to derive different credit margins taking future changes of collateral into account. The averaging outlined in the previous paragraph is then necessary in order to determine the reference rate including the margin.

These options shall only be applicable *prospectively* before the aid is granted. For aid schemes the options can be applied by considering representative cases covering most of the population. The State proves its result to the EC by a properly documented electronic spread sheet.

### 4.2.3 Opting-out option for the basis rates

Member States (and the EC itself) may mandate on their own cost an independent calculation agent (for example a central bank) who derives and publishes the reference basis rates for a particular currency and country or for a country group according to the basic principle for the basis rate outlined above. The agent assures a timely data feed to the EC via electronic data transfer and to the users via the internet. The published rates are binding for all users including the EC, provided they were correctly derived according to common banking standards.<sup>45</sup>

The agent may publish reference basis rates for more maturities and in a higher frequency than envisaged above. Moreover, the agent may additionally disclose discount rates rather than only par rates for the same maturities. However, the number of reference rates and the frequency should stay manageable for the EC (e.g. disclosure updates at most on a daily basis and disclosed maturities at the maximum for monthly money market rates and yearly swap rates up to 30 years). The agent also assures the availability of historical rates and quarterly averages.

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<sup>44</sup> The weighted average rate is explained in chapter **Error! Reference source not found. Error! Reference source not found.**

<sup>45</sup> It is indeed the authors' conviction that Member States wishing to grant aid are themselves responsible for deriving and providing the relevant data of their local markets rather than it would be the Commission's duty.

The EC may retrospectively apply quarterly averages for those particular maturities, which were regarded by the standard approach, whenever there is doubt about the respective daily rate or if the additional research would cause undue cost.

#### 4.2.4 Opting-out option for the entire reference rate

Only in cases where

- possible State aid in form of loans or guarantees is *granted through banks* or
- the discounting of a single *big State aid* above EUR 25 mill. or of big aid schemes above EUR 500 mill. is accomplished before the granting takes place,

Member States may mandate banks as calculation agents in order to derive market-based interest par rates and margin grids to be *prospectively* applied to loans and guarantees or discount rates for purposes of discounting aid.<sup>46</sup> For aid schemes the option can be applied by considering representative cases covering most of the population. Mandated banks shall apply their own calculation and rating tools. Member States shall utilise this option in a coherent way according to own guidelines in that similar kinds of aid are treated likewise.

The applied tools must comply with commercial banks' standards and must yield a better approximation of local market rates than the basic approach outlined before. For example, finer granularities for rating grades and levels of collateralisation are typical for banks' pricing software. Both the reference basis rate and the reference loan margin should be compatible with the methodology and the principles outlined in this study.<sup>47</sup> I.e. the margin shall at least comprise the components expected loss on the exposure at default, regular up-front and accruing administrative costs, and an appropriate return on the supposed commercial banks' regulatory equity capital.<sup>48</sup> It is expected that an internal pricing model includes a minimum margin for all costs incurred but standard risk costs and cost of equity capital. The empirical results of the survey evidence a **minimum margin of 40 basis points** (apart from adjustments regarding the loan amount according to Table 4-3).

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<sup>46</sup> State aid is granted through banks, for example, if the State guarantees a part of a bank loan at a below market guarantee fee.

<sup>47</sup> See chapter 4.1 *Standard approach* and chapter **Error! Reference source not found. Error! Reference source not found.**

<sup>48</sup> It is referred to chapter **Error! Reference source not found. Error! Reference source not found.**, where the definitions and a methodology of loan pricing are outlined.

Potentially, it would be desirable to agree upon a uniform model for the EU and a single tool or a uniform set of model assumptions for the purpose of deriving the reference rate. However, the proposed model of the study notwithstanding an unanimous market standard can only arise through a broader discussion between affected and knowledgeable institutions such as development banks.

#### **4.3 The new reference rate system's treatment of SMEs**

Since the proposed reference rate system does not differentiate for firm size, the regulations and procedures emanating from the new system are applied to SMEs and larger corporates alike. The new system is based on loan markets that do not provide advantageous conditions for SMEs. The contrary is true. Because banks require higher margins for smaller loan amounts<sup>49</sup>, funding for SMEs, which tend to demand smaller loans, is more expensive than for larger companies. A major factor behind this "SME premium" is the higher risk associated with SMEs (and thus smaller loan amounts). Consequently, the system does not allow for a favourable treatment of SMEs. Notwithstanding the logic of the proposed system, it remains a political question indeed, whether SMEs should be awarded an advantageous treatment, for example by permitting higher aid intensities for SMEs. The reference rate, however, would be the wrong instrument to advance SMEs.

#### **4.4 Transition from the current system to the new system**

The transition from the current to the new system is proposed to take place in form of a cut-off transition date, in order to ensure a practical procedure. This means that the change-over should proceed at a specified and previously announced cut-off date. After this date, the new reference rate system is exclusively valid and has to be applied to all **State aid decisions concerning aid granted after the cut-off date**. Discounting of aid granted before the cut-off date shall take into account the old reference rate system. Compounding of unlawful aid may utilise the old reference rate until the year end after the cut-off date and the new reference rate for the time thereafter.

#### **4.5 Summary**

The above rules have outlined the application of a standard and an advanced approach to determine the reference rate for particular cases. The standard approach constitutes a slight extension to the proce-

dures that are currently in force. Hence, the concrete translation into guidelines appears to be manageable. The advanced approach is, at least to a partial extent, already in use as in some cases Member States suggest to the EC the application of risk sensitive grid pricings and the utilisation of banks' rating systems. The advanced approach should therefore be expected to be embeddable into the Commission's procedures. The transition from the old to the new reference rate system can easily be managed via a cut-off transition.

In comparison to the current system, both proposed approaches would boost the market-proximity of the reference rate and enhance fairness of State aid control thereby. In case the European Commission considers the adjustment of the current reference rate regime in the direction outlined in this study, the authors recommend submitting the study for consultation to the Member States, which may themselves pass the study to development and central banks for inquiring professional feedback.

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<sup>49</sup> One reason is that fixed costs imply a higher margin for small loan amounts. For further explanations see chapter **Error! Reference source not found.** *Error! Reference source not found.*

## Appendix

## 5 Important Developments since the Implementation of the Current System

Credit markets in Europe have experienced significant changes driven in part by modifications in financial supervisory regulations.

During the last couple of years, especially since the introduction of the euro, the European economies have become increasingly integrated. The development of the Economic and Monetary Union (EMU) as laid down in the Maastricht Treaty has led to a convergence of interest rates in the EMU countries as well as in the new Member countries. However, the interest rate differential vis-à-vis old and new Member States as well as potential Candidate States is still substantial (**Error! Reference source not found.** et al., 2004) and is even bigger than among old Member States. This raises the question whether a uniform margin for the reference rate would be suitable for all Member States.

The development of the new Basel Capital Accord (Basel II) and of the implementation efforts by the EU for revising the capital adequacy directives for banks and investment firms respectively<sup>50</sup> have led to a stronger orientation of credit risk management and of credit conditions towards credit ratings of borrowers. Consequently, the majority of banks is extending and refining its credit calculation methods and systems (**Error! Reference source not found.** et al., 2004; PricewaterhouseCoopers, **Error! Reference source not found.**).

The importance of international accounting standards, especially of the International Financial Reporting Standards (IFRS), has increased considerably. As of 2005 all listed firms have to disclose their consolidated financial statements based on IFRS (EU Parliament, EU Council, **Error! Reference source not found.**). The IFRS require the disclosure of fair values of loans in the notes to the consolidated financial statements. Furthermore, they specify much more detailed regulations than are demanded by local law of most European States for calculating depreciation of a receivable. Especially credit institutions face the challenge to find a risk adjusted valuation for each individual loan (Merrill Lynch, **Error! Reference source not found.**). Hence, the sensitivity with regard to a considerably precise estimation of default risk has been heightened and will further heighten.

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<sup>50</sup> See European Commission (2003**Error! Reference source not found.**).

Another important development is the growing utilisation of capital markets and the increasing liquidity of interest rate derivatives and interest rate currency derivatives. In order to finance their operations, companies make increasingly use of bonds, which leads to higher price transparency. However, the volumes for liquid corporate bonds usually amount to at least EUR 50 mill. So the pricing information inherent in bonds cannot simply be transferred to loans of smaller volume. Moreover, there are only a few issuers from the new Member and Candidate Countries. Liquidity of swap markets in the old Member States has improved further whereas swap markets in the new Member and Candidate States are still in the development phase. For these countries deriving the reference rate based on the swap market might be difficult.

**Merrill Lynch bond index volume**

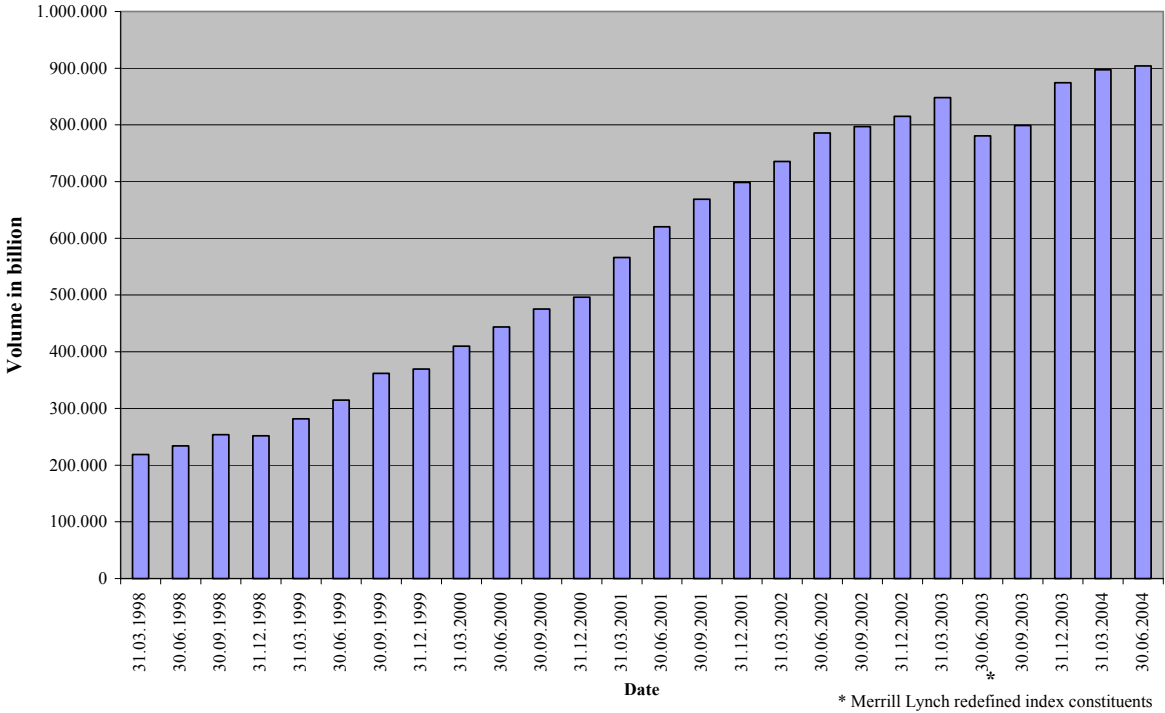


Figure 5-1

Source: Bloomberg; Merrill Lynch, Corporate Bond Investment Grade and High Yield Indices; authors' computation.

Credit defaults and significant quality deteriorations over the past few years have been accompanied by a temporary increase of risk premiums. As a consequence, the sensitivity for changing estimates of borrowers' respectively issuers' creditworthiness has increased leading to a higher volatility of credit spreads between risk free government bonds on one side and corporate loans and bonds, respectively, on the other side.

**Average credit spreads of corporate bonds in Merrill Lynch's bond indices over government yields**

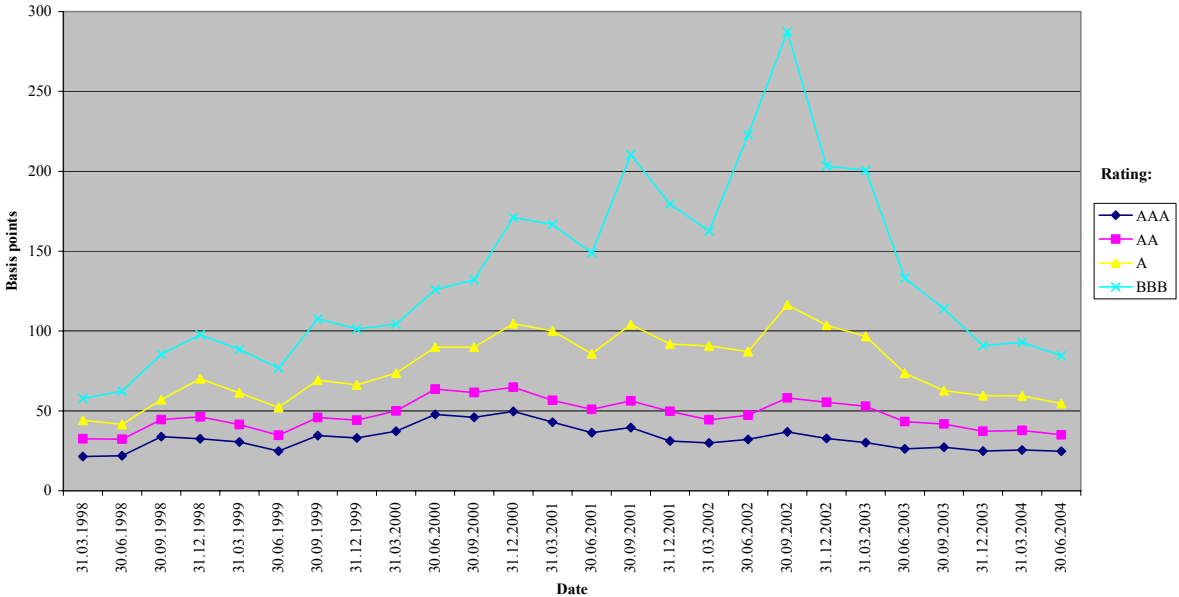


Figure 5-2

Source: Bloomberg: Merrill Lynch, Corporate Bond Investment Grade and High Yield Indices; authors' computation.

Through the growth of secondary markets for credit products and the subsequent higher tradability of loans credit markets have become more transparent. The securitisation of loans as well as the acquisition of loan portfolios requires a risk adjusted valuation of loans, which has - for example to determine a rating for a securitisation - to be executed based on more uniform standards than those applied in past practice.

Against the background of the above described developments certain trends indicating how to conduct a precise loan valuation have been solidified. Nevertheless, it is too early to refer to them as common and consistent banking standards. The credit markets within the EU States as well as in the Candidate States are still very heterogeneous and are currently more heterogeneous than it has been the case when the current system was implemented in 1997 for the old EU Member States.

Even though transparency of credit markets and risk orientation of credit calculation have increased during the last years, comparability of credit conditions has been achieved only to a small degree because of the heterogeneity of the relevant countries especially in low volume loans. In addition, setting up a common standardised system is complicated due to the different currencies under consideration. Here heterogeneity compared to 1997 has increased as well.

## 6 Assignment

Due to the developments described in chapter 5 *Important Developments since the Implementation of the Current System*, it has to be examined if the current system is still appropriate in a growing European Union. The objectives of a modern reference rate system for the EU accruing from the above developments and the resulting requirements for this study as laid down in the general invitation tender of the European Commission No COMP/2003/G/SAC21 ([http://europa.eu.int/comm/competition/state\\_aid/legislation/interest\\_rates/call\\_for\\_tender.pdf](http://europa.eu.int/comm/competition/state_aid/legislation/interest_rates/call_for_tender.pdf)), the awarded procurement contract for the study (signed on 1 April 2004) and in the Brussels meeting of 2 April 2004 between Deloitte team members and members of the DG Competition will be illustrated in the following chapter.

The study at hand should serve as a substantial basis for setting up a reference interest rate system for the control of State aid in the old Member States (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Portugal, Spain, Sweden, the Netherlands and the United Kingdom), the new Member States acceded in May 2004 (Cyprus, Czech Republic, Estonia, Lithuania, Latvia, Hungary, Malta, Poland, Slovakia and Slovenia) and the Candidate States (Romania, Bulgaria and Turkey) (European Commission, **Error! Reference source not found.**). Croatia, to which the Candidate status was awarded as recently as June 18, 2004, could be considered only partially. However, the reference rates should be applied not only after the accession of future Members but also in State aid control conducted by national State aid monitoring authorities before the accession. In this context it is important to mention that the proposed system should lend itself to possible extension to future Candidate countries (see chapter **Error! Reference source not found. Error! Reference source not found.**).

The objective of the reference rate system is to provide a common and generally binding benchmark for the evaluation of State aid measures throughout Europe. Therefore, the system has to be representative in the sense that it seeks to mirror the individual practices of interest rate fixing in the European Member States (see chapter **Error! Reference source not found. Error! Reference source not found.**). In order to achieve strong acceptance and efficient practicability the system has to be easily applicable, fair, transparent and easy to understand (see chapter 4 *The New Reference Rate System*). It should ensure ease of implementation and administration and should provide an efficient system of data collection (see chapter **Error! Reference source not found. Error! Reference source not found.**). Moreover, the system should be designed as an automatic or self-reporting system, in which updates are executed within defined intervals (see chapter 4.1 *Standard approach*). In this context it has to be examined to which extent a simplified approach would deviate from a more market-based calculation of the reference rate.

The study should be based on interest rate data gathered from the relevant banking markets throughout Europe. It should focus on interest rates actually paid for corporate loans taking into account core features such as maturity and reimbursement profile (see chapter **Error! Reference source not found. Error! Reference source not found.**). The study should come up with rates that are representative and, as far as possible, homogeneous in terms of average maturity and average credit risk (see chapter **Error! Reference source not found. Error! Reference source not found.**). Moreover, the rates should include commissions and banking fees.

Besides identifying a basic methodology for calculating a single reference rate for both current and new Members, the study should examine the need for a separate methodology, which meets the same conditions of simplicity, transparency and ease of administration, for large cases exceeding a certain threshold (see chapter 4.2.1 *Large cases of State aid*). In this context a comparison of the method to be developed and credit spreads measured on bond markets should be performed (see chapter **Error! Reference source not found. Error! Reference source not found.**). Additionally, the study should verify whether the basic methodology is also suitable for discounting purposes calculating the present value of aid spreading over a longer time period (see chapter 4.1.4.1 *Application to discounting*).

Furthermore, the study should explore the feasibility of developing a similar system to calculate the aid element of State guarantees (see chapter 4.1.4.3 *Aid elements of loans and guarantees*). Such a system should differentiate between guarantees for amounts up to EUR 5 mill. and above, whereby for the latter a more market-based approach based on the risk profile of the beneficiaries should be examined. The results should reflect risk premiums actually paid by enterprises for guarantees and/or unse-

cured loans in the respective credit markets, thereby taking into account the key variables determining the risk level and thus the risk premium.

In order to meet the above described objectives, the study has to examine whether the current system based on the five-year inter-bank swap rate plus 75 basis points is still appropriate for fixing the reference rate or whether a new system should be applied (see chapter 3 *Review of the Current System*). The study should take into account the availability of the relevant parameters in both the current Member States and the Candidate States. As a starting point, the study should make use of the current system based on a loan of EUR 5 mill. backed by normal security with a five-year repayment schedule for a company which is not a “firm in difficulties” in the meaning of the communities guidelines on State aid for rescuing and restructuring firms in difficulties (European Commission, **Error! Reference source not found.**a). In addition, the study should clarify which extra premium should be added in case a loan is backed insufficiently or not at all, as in the current practice there is no standardised method to adapt the reference rate to situations involving above-normal risk (see chapter 4.1.2 *Risk grading and loan margins*).

## 7 Approaches for the Study

In the following, a short overview of alternative approaches considered towards developing the new reference rate system will be given. The survey among banks turned out to be the core foundation of the results. However, other approaches served for supportive analysis or validation.

### 7.1 Survey among credit institutions about credit margins based on risk factors

Naturally, the credit institutions in the individual European Countries have the most relevant knowledge about their credit calculation and the credit margins demanded by them. Therefore, it would be obvious to approach these institutions and ask them about their lending conditions.

However, the actual conditions agreed upon depend on very different factors like the level of funding rates, pledged security, term to maturity, competition and customer relation. It cannot be expected that banks disclose in detail the whole spectrum of their credit conditions and their practice of measuring price influencing factors. In addition, there might be adverse incentives for banks, if they benefit by their function as intermediaries from State-granted loans or guarantees or if they fear competition by the State as a loan provider.

Against the background of the required homogeneity of data, a detailed survey about actual credit conditions seems to be difficult to conduct. However, since the reference rate should meet those criteria such as applicability to a relatively large number of countries and loans, homogeneity in terms of maturity and lending risk, and being a market-based interest rate (see chapter 6 *Assignment*), average credit margins based on banks' actual conditions seem to be much more relevant for the purpose at hand rather than detailed data on individual credit margins of loans. Therefore, a survey that assesses credit institutions' average margins within a certain bandwidth for predefined standard loans should be possible to conduct within the scope of this study.

The survey and its results are discussed in chapter **Error! Reference source not found. Error! Reference source not found.**

## 7.2 Survey among credit institutions about risk premiums based on individual loans

Empirically the pricing behaviour is expressed through actually negotiated interest rates on loans. Consequently, assessing credit institutions' interest rates on actually granted individual loans would yield a quite precise overview of actual credit conditions common among European banks.

However, each credit institution has its own way of collecting data on credit conditions. When granting new loans, the characteristics taken into account are not necessarily included completely in the data record for the portfolio. For example, some banks record only the nominal interest rate but not the internal rate of return, which reflects more accurately the profitability of the engagement by taking into account fees and discounts. Additionally, all price determining factors explaining the amount of the credit margin should be recorded. In order to ensure homogeneity and thus comparability, it is necessary to take into consideration the special systems and methods of the supplying credit institutions. Aside from an excessively high effort, usually legal problems, particularly regarding confidentiality, arise from this kind of survey.

Accordingly, the acquisition of EU-wide representative micro credit data within the project's time horizon is very demanding. Notwithstanding, the survey will include an inquiry about some micro data on loans. Unfortunately, the data turned out to be less suitable for a supportive analysis in appropriate time.

## 7.3 Analysis of credit spreads derived from corporate bond markets

Markets for corporate bonds have grown considerably. In the euro area a significant number of corporate bonds covering a large spectrum of price determining factors is listed. From the daily market prices risk premiums consistent with the market can be derived. Due to opportunity considerations, loans with equal characteristics provided to the same borrowers should have a similar credit margin, whereby small deviations can be explained with the fungibility and the specific costs of the transaction. Additionally, market prices for real and synthetic securitisations of loan portfolios as well as for credit derivatives could be used.

This approach has some advantages. Bond prices are available on a daily basis. Market movements are reflected immediately. Prices are fixed on a marked-to-market basis thereby reflecting the market equilibrium. Bonds are relatively homogeneous in terms of their structure (bullet and constant interest or margin).

However, with regard to the benchmarking of loan margins it appears disadvantageous that corporate bonds are generally issued in large amounts for major currencies. Moreover, in contrast to corporate loans, bonds are very liquid instruments. Usually bonds are not backed by securities and the volatility of their (traded) returns is high. In comparison to exchange quotations credit market prices are found through search and negotiation processes. These factors restrict the applicability of bond spreads to loans.

Because of their disadvantages the usefulness of corporate bond returns for deriving a reference rate for credit markets is limited. Only for large volume loans (at least EUR 50 mill.) in major currencies the capital market might serve as an adequate measure. Yet, corporate bond returns are helpful for empirically verifying certain qualitative effects. Through a regression of the risk premium by the risk factors interrelationships can be explained in order to derive a complete credit spread matrix. A possible regression could examine the relationship between the risk premium on the one side and rating, industry, term to re-pricing and volume on the other side. In this study data on bond markets will be used to validate the survey results (see chapter **Error! Reference source not found. Error! Reference source not found.**).

#### 7.4 Collecting and analysing macro data on banks' loan allocation conditions

National central banks publish credit market statistics in regular intervals. Depending on the country, these statistics are more or less detailed. The main advantage is that macro data is publicly accessible and relatively quickly available. Hence, integrating macro data into the analysis would be straightforward.

Nevertheless, macro data consists of average values or other aggregates. The effect of price determining factors such as rating grades, security and term-to-maturity can hardly be isolated because the basic population of new loans for an individual country is heterogeneous and differs from country to country in terms of structure. Moreover, the national data collection requirements are not completely harmonised yet. Consequently, availability and comparability is limited.

It can be concluded that macro data is unsuitable to serve as basis for deriving a reference rate itself. Nonetheless, macro data will be used for the purpose of validating the results of the study (see chapter **Error! Reference source not found. Error! Reference source not found.**). Macro data is especially useful in order to differentiate on average between high margin and low margin countries.

## 7.5 **Deriving a reference rate based on a mathematical model used in banking**

Most credit institutions employ mathematical models which, based on all relevant factors, determine the risk and market adjusted margin and the associated funding rate. The universe of available models reaches from simple approaches to models including very demanding stochastic processes. They indicate which nominal interest rates or margins, respectively, are appropriate. However, depending on the market environment, lending departments might deviate to a certain degree from these indications.

A major advantage of applying a model for deriving a reference rate is that a model can be better objectified than an empirical approach depending very much on the quality of utilised data. Financial experts should be able to assess if the derivation of reference rates is based on reasonable assumptions and data input, and if the necessary simplifications meet the conditions of capital markets better than an empirical approach. Furthermore, models are more flexible by a suitable parameterisation and can be adjusted to changing conditions.

On the other side, mathematical models are not always comprehensible for non-experts. Moreover, the parameters of the model have to be estimated empirically, which raises the same questions about availability, homogeneity and representativeness of the data. Consequently, a compromise between precise adjustment to market conditions and simplification has to be found.

Since a model is objective as well as flexible regarding specific market conditions and, if sufficiently simplified, can be imparted comprehensibly, it was the *preferred approach* for this study. Contrary to the authors' expectations, a simple model did not turn out to reflect the average surveyed margins in all circumstances. However, it remained a valuable tool in order to validate the general level of reported margins (see chapter **Error! Reference source not found. Error! Reference source not found.**). Furthermore, the authors' recommendation about utilising bank internal models is strongly driven by this perception.

## 7.6 Surveying credit institutions about their credit calculation and valuation methods

In addition to developing a mathematical model, the validity of the model and its parameters should be verified. This can be achieved through a survey among credit institutions.

The advantage of surveying market participants is that the models and input parameters employed in the banking industry can be identified and, in addition, the proposed model (see chapter **Error! Reference source not found. Error! Reference source not found.**) can be assessed by practitioners. From data collection problems with respect to micro credit data will be abstracted, i.e. typical standard parameters like the return on equity are surveyed instead.

Nonetheless, even though there is a convergence towards certain credit calculation methods due to methodological and systems-technological progress, the universe of different approaches is substantial. Within the planned project period a survey can be realised only to a quite limited extend.

Consequently, because of the large number of alternative calculation methods a basic model reflecting common calculation techniques will be outlined for the study at hand. This model and its parameters will be verified through the survey (see chapter **Error! Reference source not found. Error! Reference source not found.**). Thus, selected commercial banks, central banks and supervisory authorities are able to comment on the model.

## 7.7 Summary

Accordingly, the study will combine most of the approaches described above. In particular the four central empirical approaches of this study are:

1. Conducting a survey among relevant market participants to derive average loan margins,
2. Inquiring for parameters and for comments on a pricing model and calibrating this model in order to validate reported margins,
3. Adjusting credit spreads of corporate bonds to loan market conditions to supply further evidence for loan margins, and
4. Analyse macro data so as to discover country-specific differences.

All four key aspects intend to achieve confidence about the finally compiled margins.

## 8 The Market-Based Benchmark for the Reference Rate

This section develops an understanding of the underlying principle of the reference rate and how it can suitably be compared to the interest on loans.

### 8.1 Definition of the reference rate

The reference rate is defined by its core function of determining State aid:

The **reference rate is the critical value below which an interest rate** for a loan granted by a European Member State **is considered as being subsidised**, so that the corresponding loan is supposed to imply State aid.

Interest rates are deemed to be subsidised if they are favourable for the debtor in comparison to market conditions. A benchmark for the reference rate should therefore be market-based:

The benchmark for the reference rate is the **average interest rate a debtor can agree on with banks** (or other loan providers) **under normal market conditions and at the arm's length principle**.<sup>51</sup>

Since loan markets are not fully information efficient the existence of a unique benchmark cannot be expected. Moreover, a single benchmark for every special circumstance regarding the debtor's characteristics and the contractual terms cannot feasibly be determined.

That raises the question which kind of approximation is appropriate for various debtors and loan structures; for example, whether the reference rate should be based on an average interest rate, on a lower bound or an upper bound of interest rates on loans.<sup>52</sup> The answer should be seen in the light of the purposes the reference rate suits and the Member States' and EC's possibly competing interest.

As the reference rate serves as a floor for interest rates on loans below which State aid is presumed, Member States granting loans (or guarantees) are interested in a lower reference rate (reference margin, respectively) being easier to exceed. The same is true for compounding of unlawful State aid since a State having granted the aid will supposedly not be interested in re-claiming too large amounts.

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<sup>51</sup> It is referred to the definition of the term „fair value” under IFRS, see IAS 39.9 (IASB, **Error! Reference source not found.** a).

<sup>52</sup> The lower/upper bound can be measured by a x%-quantile of a distribution properly fitted to reported margins (or by the n-lowest or largest reported margin of a sample). The empirical estimation of quantiles is less stable than the sample average.

However, the reverse attitude can be expected with regard to discounting purposes as a high reference rate would result in lower present values and grant equivalents thereby. Hence, States granting aid not in form of loans and guarantees but in instalments can be expected to desire a high reference rate. On the other hand, all those Member States strongly fostering the principle of free markets might wish to have a reference rate that aggravates State aid in general.

In principle, rules admitting leeway for interpretations should be construed in favour of the affected entity.<sup>53</sup> The consequence of applying this principle to the reference rate would be twofold since granting loans and compounding unlawful aid compete with discounting aid regarding affected entities' interests. To meet both goals for a broader group of debtors and types of loan contracts the reference rate would need to differentiate according to the case it is applied to, i.e. a minimum rate would be applicable to compounding unlawful State aid and serves as a benchmark for loans and guarantees while the maximum rate would be applicable to discounting aid, which is not granted in form of a loan or a guarantee.

Though such a twofold approach might favour affected entities it is more complex to derive and to implement and thereby impractical.<sup>54</sup> It is also stressed by the European Commission (1997b) that the reference rate shall be based on the *average* interest rates on loans.

The study will consider the **average margin** to be the relevant measure.<sup>55</sup>

However, it is also recommended by the study to allow States to mandate calculation agents or to apply own models, because it is recognised by the study that the variety of countries, markets, debtors, and loan types cannot be closely approximated by a uniform approach (see chapter 4.2 *Advanced approaches*).

The reference rate would be regarded as fair if it coincides with the benchmark for the respective lending markets. Interest rates of loans can be decomposed into the basis rate and the loan margin, which also includes a non-liquidity premium (credit margin and credit spread are used synonymously).

**Interest rate = basis rate + reference margin**

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<sup>53</sup> The legal consideration is not part of the study.

<sup>54</sup> It would indeed not be reasonable to apply two different reference rates to the same beneficiary receiving aid in different forms.

<sup>55</sup> Considering the average does not preclude making adjustments in direction of a lower or an upper bound according to *political* considerations.

The basis rate is applicable to debtors without or with low credit risk. Since good rated banks have a low credit risk and have to re-finance loans, the inter-bank offered rate (like EURIBOR or LIBOR) and swap rates would be a natural choice for the basis rate. Actual yields on government debt are reasonable substitutes for IBO-rates and swap rates if the latter are not available from quotes of a liquid market. Government yields have to be adjusted in order to reflect banks' funding costs.<sup>56</sup>

Once the basis rate is appropriately chosen, it remains to be checked whether the credit spread is below a "reference credit spread" for the particular loan and debtor. Thus, it has to be shown how an appropriate basis rate and a fair benchmark for the credit spread, both adding up to the particular reference rate, can be derived.

## 8.2 Comparison to the interest rate of a loan

Notwithstanding the derivation of the reference rate, it is likewise not straightforward to determine the margin of a loan. This, however, might be necessary if a State wishes to report margins rather than the entire interest rate in order to determine the aid element under an advanced approach. For the case of a standard loan<sup>57</sup> it is straightforward to determine the basis rate and the credit spread as the basis rate would be directly observable from inter-banking markets<sup>58</sup> while the credit spreads is the residual. However, only a portion of loans to corporate enterprises have these characteristics.

Interest basis rates are not observable for all contractual possibilities regarding payouts and the payment of interest and redemption. For instance, a loan may exhibit a loan discount or a provision that no interest is charged for the first two years. Interest basis rates are par-rates in the inter-bank market according to regular interest payments and a final redemption.

If a loan contract deviates substantially from typical products of the inter-bank market, it is necessary to derive a basis rate by a formula rather than by assigning a basis rate for a similar product. Some simple calculations show that the basis rate of a loan can be approximated by a weighted average of the par-rates that are valid for maturities of the respective redemptions (see **Error! Reference source not found. Error! Reference source not found.** for the formula).

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<sup>56</sup> Under the current reference rate regime the adjustment is an add-on of 25 basis points, see chapter 3 *Review of the Current System*. The proposed adjustment is outlined in chapter 4.1.1 *Reference basis rate* and motivated in chapter **Error! Reference source not found. Error! Reference source not found.**

<sup>57</sup> A standard receivable can be defined by the following characteristics: Single payout of the notional at the date when interest is fixed the first time, redemption of the notional at maturity a number of complete years in the future, and annual payments of interest on the notional amount.

<sup>58</sup> Inter-bank rates may require other day counting and compounding conventions, which should be observed for large cases of State aid (say above EUR 50 mill.) under the advanced approach.

The same complexity arises with the interest rate of the loan. The nominal interest rate is not the true measure of financing costs whenever the payments deviate substantially from the inter-banking conventions. A better measure is the effective interest rate or, in other terms, the “internal rate of return” or the “yield-to-maturity”. The effective interest rate discounts all future payments to the cost of acquisition of the loan (see chapter **Error! Reference source not found. Error! Reference source not found.** for the formula).<sup>59</sup>

After having determined the appropriate basis rate and the effective interest rate it is possible to derive the implied credit spread by:

$$\text{Credit spread} = \text{effective interest rate} - \text{basis rate}$$

And there is not supposed to be evidence for State aid if:

$$\text{Credit spread} \geq \text{reference margin}$$

Chapter **Error! Reference source not found. Error! Reference source not found.** deals with the problem of deriving the basis rate and the loan margin if the loan admits more complex redemption structures than a single final redemption.

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<sup>59</sup> See also the definition in IAS 39.9 (IASB, **Error! Reference source not found.a**) and the corresponding application guidelines.

## 9 Functions of the Reference Rate

According to article 87 of the EC Treaty (**Error! Reference source not found.**), any aid granted by a Member State or through State resources, which distorts or threatens to distort competition, should, as far as it affects trade between Member States, be incompatible with the common market. However, articles 87 (2) and 87 (3) contain a list of measures which are or may be considered compatible with the common market. The difference between the two articles is that for the measures listed in article 87 (2) the Commission enjoys no discretion, while for article 87 (3) the Commission enjoys a wide discretion. Thus, if the conditions mentioned in article 87 (2) are fulfilled, the State aid is automatically compatible. For the measures listed in article 87 (3) the Commission has adopted a series of guidelines, communications etc. which lay down the criteria the Commission uses in assessing these aids. Examples of these include the framework for research and development (96/C 45/06), the environmental aid guidelines (2001/C 37/03), the rescue and restructuring guidelines (1999/C 288/02) and the regional aid guidelines (98/C 74/06). In addition to article 87, article 89 gives the Council the power to adopt regulations for the application of articles 87 and 88. Based on this article, the Council adopted the so-called enabling regulation (994/98), which enables the Commission to adopt series of regulations like those covering de minimis aid (69/2001), and block exemption regulations on training aid (68/2001), aid for SMEs (70/2001) and employment aid (2204/2002). According to these block exemption regulations, aid meeting all the conditions laid down in these regulations is considered compatible and does not need to be notified to the Commission.

In order to apply the above-mentioned regulations and to monitor compliance, the Commission has implemented the reference rate system subject to this study. The system identifies State aid and classifies identified grants as legal respectively illegal aid. Within the system the reference rate has three core functions:

1. Indicator for unlawfully granted State aid,
2. Discount rate for calculating grant equivalents and tax charges,
3. Compound rate for calculating the recovery of unlawful aid.

In its function as indicator the reference rate serves as a threshold to determine whether loans should be classified as State aid or not. For this purpose the reference rate is compared to the interest rates for loans granted by the State and close-by institutions or backed by a guarantee. A loan interest rate below the reference rate might indicate State aid. Consequently, the Commission has to verify whether this aid complies with the relevant regulations and can thus be classified as being lawfully or whether it is granted in violation of the regulations and must be classified as illegal State aid.

As discount rate the reference rate is mainly used to calculate the net grant equivalent (NGE). In order to evaluate and classify different forms of State aid measures in favour of different purposes and across different Member States the various manifestations of State aid have to be comparable. Therefore, a standardised aid element has to be derived from the individual aid measures. Hence, the EC converts aid notified by Member States into aid expressed in the NGE.

The NGE of aid is the benefit accruing to the recipient after payment of taxes on company profits, i.e. the net gain from the grant. It is expressed in percent of the investment and constitutes the basis on which grants are classified. In all cases of State aid, in which aid and/or investment expenditure is staggered or written off over time (which applies for virtually all grants), the reference rate is an important component of the calculations of the NGE. The rationale here is that all relevant monetary amounts set over several time periods have to be discounted back to the period in which aid was granted the first time. In the corresponding regulations (Commission Regulation 68/2001, 69/2001, 70/2001) the European Commission (2001**Error! Reference source not found.,Error! Reference source not found.,Error! Reference source not found.**) States that calculating the grant equivalent requires the use of market interest rates prevailing at the time of the grant. The market rates for the purpose of these regulations should be deemed to be the reference rates (provided that, in the case of a subsidised loan, the loan is backed by normal security and does not involve abnormal risk).

Among other forms, State aid can be granted as a cash grant paid out at once or in several instalments, as a subsidised loan or as a guarantee for a loan. In all three forms discounting the relevant series of amounts is usually a considerable part of the calculations to determine the NGE. The reason is that cash grants are typically written off over more than one year or are disbursed in several instalments and that for loans interest and redemption is commonly paid over a couple of years. Within this context discounting is used to determine the present value of a grant or an investment disbursed in several instalments, to calculate the present value of benefits obtained on repayment of a subsidised loan and to compute the additional tax burden resulting from a grant (see chapter 9.5 *Calculating the aid element resulting from interest subsidy schemes for loans*).

If a grant or an investment is staggered over several periods, the individual cash flows have to be discounted back to the end of the year, in which the enterprise makes its first depreciation write-off. The resulting present values enter the subsequent NGE calculations.

In case of a subsidised loan or a guarantee for a loan (leading to a lower interest rate) the reference rate serves to discount the benefits obtained on repayment of the loan (the percentage rebate due to the subsidy or guarantee multiplied by the loan balance outstanding).

As the NGE is the benefit of a grant after taxes, determining the NGE requires the calculation of the additional tax charge due to the grant. According to the Guidelines on National Regional Aid (EU Commission, **Error! Reference source not found.**) in most cases, grants are not taxable in themselves. However, they are deducted from the value of the depreciable investment. Therefore, the investor would have depreciated a smaller amount each year than if he had not received the grant. Since depreciation amounts are deductible from taxable profits, a grant increases taxable profits and thus annual tax payments. The higher tax payments mean a sort of partial reimbursement of the grant. Consequently, corporate taxes play a substantial role in determining the net benefit from State aid. Because investments are usually written off over time, the grant reduces depreciable investments over several years by a certain fraction of the grant (depending on the depreciation method applied). Thus, the yearly grant fractions have to be discounted back to the end of the year, in which the enterprise makes its first depreciation write-off. Based on these present values the additional tax charge is calculated. Similarly, the tax burden for aid paid out in instalments and for subsidised loans or loan guarantees can be determined in this way.

Other forms of State aid comprise tax exemptions, tax incentives, social security exemptions, provision of goods and services, sale of land at below-market prices, purchase of goods and services at above-market prices, capital injections, accelerated depreciation allowances, aid for the renting of a building, aid for the renting of land and aid to finance leasing.

A special case is the calculation of recovery of aid granted unlawfully. The European Commission (2003**Error! Reference source not found.**) has specified that for the recovery of unlawfully granted aid the reference rate, which is used for calculating the NGE of regional aids, shall be applied on a compound basis. Thus, the reference rate is used for compounding payments rather than discounting them. Compounding shall take place on an annual basis.

## 9.1 Applications of the reference rate within the European Union

In order to make the various forms of aid comparable with one another and the aid intensities comparable from one Member State to another, the Commission converts aid notified by Member States into aid expressed in the NGE. The NGE of aid is the benefit accruing to the recipient after payment of taxes on company profits (EU Commission, **Error! Reference source not found.**).

Among others, determining the NGE might be required for payments in the context of the following regulations: Training aid (EU Commission, 2001**Error! Reference source not found.**), de minimis (EU Commission, 2001**Error! Reference source not found.**), State aid to SMEs (EU Commission, 2001**Error! Reference source not found.**) and State aid for employment (EU Commission, **Error! Reference source not found.**). In the above mentioned regulations the EC states that calculation of the grant equivalent requires the use of market interest rates prevailing at the time of grant. The market rates for the purpose of these regulations should be deemed to be the *reference rates* (provided that, in the case of a soft loan, the loan is backed by normal security and does not involve abnormal risk).

Furthermore, the *reference rate* shows to be important in the context of State aid in the form of guarantees (EU Commission, **Error! Reference source not found.**), recovery of unlawfully granted aid (EU Commission, 2003**Error! Reference source not found.**) and rescue aid (EU Commission, **Error! Reference source not found.**a).

## 9.2 Discounting the additional tax charge due to a grant

Usually, grants are not taxable in themselves. However, they are deducted from the value of the depreciable investment. Therefore, the investor would have depreciated a smaller amount each year than if he had not received the grant. Since depreciation amounts are deductible from taxable profits, a grant increases taxable profits and thus annual tax payments.

When aid and/or investment expenditure is staggered or written off over time, the investment expenditure and aid payments have to be discounted back to the end of the year, in which the enterprise makes its first depreciation write-off (EU Commission, **Error! Reference source not found.**). The discount rate used in such cases is the *reference rate* determined by the EU Commission.

Consider the case, in which the grant, which is subject to tax on a straight-line basis over five years, is disbursed in one single payment. One fifth of the aid will thus be added to corporate profits each year for five years.

Investment: 100

Nominal grant: 20

Corporate tax rate: 40%

Discount rate (reference rate): 8%

<b>Period</b>	<b>Annual fraction of grant reducing depreciation (1)</b>	<b>Discount factor: 8% (2)</b>	<b>Discounted payments (1)*(2)</b>	<b>Corporate tax rate (3)</b>	<b>Discounted annual taxes (1)*(2)*(3)</b>
<b>End of 1st year</b>	4.00	100.00%	4.00	40%	1.60
<b>End of 2nd year</b>	4.00	92.59%	3.70	40%	1.48
<b>End of 3rd year</b>	4.00	85.73%	3.43	40%	1.37
<b>End of 4th year</b>	4.00	79.38%	3.18	40%	1.27
<b>End of 5th year</b>	4.00	73.50%	2.94	40%	1.18
<b>Nominal grant</b>	20.00	Total discounted payments	17.25	Total tax charges	6.90

Table 9-1

$(\text{Nominal grant} - \text{Total tax charge}) / \text{Investment} = \text{NGE}$

$$\text{NGE} = (20 - 6.9) \div 100 = 13.1\% \text{ of the investment}$$

In this case the *reference rate* is important for calculating the discount factor, which is used to discount the additional tax payments corresponding to the grant amount accruing each year. Thus, the *reference rate* is employed as discount rate.

**9.3 Measuring the grant equivalent of aid that is disbursed in several instalments**

In cases in which the aid does not take the form of a single payment rather than a series of several payments it is necessary to determine the single payment grant equivalent of aid disbursed in several instalments.

In order to determine the grant equivalent in case of a grant paid out in several instalments the individual instalments have to be discounted back to the end of the period, in which the first payment is written off. The discounted payments add up to the gross grant equivalent.

To determine the NGE, the individual discounted payments have to be multiplied with the respective corporate tax rate. The resulting periodical tax payments add up to the total tax charge, which has to be subtracted from the gross grant equivalent to yield the NGE.

Consider a case similar to the one above. However, the grant is paid out in five equal instalments over five years.

- Investment: 100
- Nominal grant: 20
- Corporate tax rate: 40%
- Discount rate (*reference rate*): 8%

<b>Period</b>	<b>Yearly Instalments (1)</b>	<b>Discount factor: 8% (2)</b>	<b>Discounted pay- ments (1)*(2)</b>	<b>Corporate tax rate (3)</b>	<b>Annual taxes (1)*(2)*(3)</b>
<b>End of 1st year</b>	4.00	100.00%	4.00	40%	1.60
<b>End of 2nd year</b>	4.00	92.59%	3.70	40%	1.48
<b>End of 3rd year</b>	4.00	85.73%	3.43	40%	1.37
<b>End of 4th year</b>	4.00	79.38%	3.18	40%	1.27
<b>End of 5th year</b>	4.00	73.50%	2.94	40%	1.18
		Total discounted payments	17.25	Total tax charges	6.90

Table 9-2

(Present Value of nominal grant – Total tax charge)/Investment = NGE

$$NGE = (17.25 - 6.9) \div 100 = 10.35\% \text{ of the investment}$$

In this case the *reference rate* is important for calculating the discount factor, which is used to discount the additional tax payments corresponding to the grant amount accruing each year and the present value of the total grant amount. Thus, the *reference rate* serves as discount rate.

## 9.4 Determining the present value of the grant and the investment

When in addition to the grant payments the investment is also staggered over several periods, the individual investment expenditures have to be discounted back to the first write-off period as well.

Consider the following case similar to the first one. However, the investment is made in five equal amounts over five years.

Investment: 100

Nominal grant: 20

Corporate tax rate: 40%

Discount rate (*reference rate*): 8%

Period	Annual investment (1)	Annual grant instalments (2)	Discount factor: 8%) (3)	Discounted investment expenditure (1)*(3)	Discounted payments (2)*(3)	Corporate tax rate (4)	Annual taxes (2)*(3)* (4)
End of 1st year	20.00	4.00	100.00%	20.00	4.00	40%	1.60
End of 2nd year	20.00	4.00	92.59%	18.52	3.70	40%	1.48
End of 3rd year	20.00	4.00	85.73%	17.15	3.43	40%	1.37
End of 4th year	20.00	4.00	79.38%	15.88	3.18	40%	1.27
End of 5th year	20.00	4.00	73.50%	14.70	2.94	40%	1.18
<b>Total</b>				86.24	17.25		6.90

Table 9-3

(Present value of nominal grant – Total tax charge)/Present value of investment = NGE

$$NGE = (17.25 - 6.9) \div 86.24 = 12\% \text{ of the investment}$$

Apart from calculating the additional tax charge and the present value of the grant, the *reference rate* is used to determine the discounted value of the individual investment expenditures summing up to the present value of the investment, which is part of the NGE formula.

## 9.5 Calculating the aid element resulting from interest subsidy schemes for loans

This point might be especially important for the definition of rescue aid. The corresponding Community Guideline (EU Commission, **Error! Reference source not found.**a) states that when a liquidity support is provided in form of a loan guarantee or a loan, the loan must be granted at an interest rate at least comparable to those observed for loans to healthy firms and in particular to the reference rates adopted by the EU Commission.

Investment aid given to an enterprise in the form of a subsidised loan is expressed first as the number of percentage points of the rebate, i.e. the difference between the reference rate and the rate charged by the lender.

As in the case of capital grants, the NGE is expressed as a percentage of the investment. Since interest charges are deductible from taxable profits, an interest subsidy means an increase of profits and consequently higher tax payments.

### 9.5.1 Discounting the interest benefit in case of a straight-line loan repayment

Consider the following case:

10-year loan with straight-line repayment and no grace period

Rebate of three percentage points throughout the period of the loan

The discount (*reference*) rate is  $i = 8\%$ , i.e. nominal interest rate  $i' = 5\%$

The loan covers 40% of the investment

Tax rate: 35%

Calculating the unit gift element (the nominal grant equivalent of a one-point interest rebate on a loan of 100% of the investment, taking account of the characteristics of the aid used as parameters):

<b>End of year No</b>	<b>Loan: balance outstanding</b> <b>(1)</b>	<b>1-point rebate</b> <b>(2)</b>	<b>Benefit obtained</b> <b>(1)*(2)</b>	<b>Discount factor: 8%</b> <b>(3)</b>	<b>Discounted benefit</b> <b>(1)*(2)*(3)</b>
<b>1</b>	100.00	1%	1.00	92.59%	0.93

2	90.00	1%	0.90	85.73%	0.77
3	80.00	1%	0.80	79.38%	0.64
4	70.00	1%	0.70	73.50%	0.51
5	60.00	1%	0.60	68.06%	0.41
6	50.00	1%	0.50	63.02%	0.32
7	40.00	1%	0.40	58.35%	0.23
8	30.00	1%	0.30	54.03%	0.16
9	20.00	1%	0.20	50.02%	0.10
10	10.00	1%	0.10	46.32%	0.05
				Unit aid element	4.11

Table 9-4

The NGE is obtained by multiplying the unit aid element by the characteristics of the aid:

$$NGE = 4.11 \times 3 \times 40\% \times (1 - 35\%) = 3.21\% \text{ of the investment}$$

The *reference rate* is employed to determine the discounted values of the benefits obtained and the corresponding tax disadvantages resulting from the interest rebate.

**9.5.2 Discounting the interest benefit in case of constant annual instalments (annuity)**

When the loan is repaid in constant annual instalments, the reference rate is used to calculate the instalments and the corresponding rebated instalments as well.

Consider the following case of a loan with the same parameters as described above. However, the loan is repaid in constant annual instalments and there is a grace period of two years.

- Rebate of three percentage points throughout the period of the loan
- The discount (*reference*) rate is  $i = 8\%$ , i.e.  $i' = 5\%$
- The loan covers 40% of the investment
- Tax rate: 35%

Year	Normal instalment $=i/(1-r^n)$ $r=1/(1+i)$	Rebated instalment $=i'/(1-r'^n)$ $r'=1/(1+i')$	Benefit obtained	Discount factor: 8%	Discounted benefit
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	(1)	(2)	(3)	(4)	(3)*(4)
<b>1</b>	8.00	5.00	3.00	92.59%	2.78
<b>2</b>	8.00	5.00	3.00	85.73%	2.57
<b>3</b>	17.40	15.47	1.93	79.38%	1.53
<b>4</b>	17.40	15.47	1.93	73.50%	1.42
<b>5</b>	17.40	15.47	1.93	68.06%	1.31
<b>6</b>	17.40	15.47	1.93	63.02%	1.22
<b>7</b>	17.40	15.47	1.93	58.35%	1.13
<b>8</b>	17.40	15.47	1.93	54.03%	1.04
<b>9</b>	17.40	15.47	1.93	50.02%	0.97
<b>10</b>	17.40	15.47	1.93	46.32%	0.89
				Grant equivalent	14.86

Table 9-5

The NGE is obtained by multiplying the unit aid element by the characteristics of the aid:

$$NGE = 14.86 \times 40\% \times (1 - 35\%) = 3.86\% \text{ of the investment}$$

Besides determining the discounted values of the benefits obtained through a 3-point rebate and the corresponding tax disadvantage, the *reference rate* is employed to determine the annual regular instalments and the rebated instalments.

**9.5.3 Formulas for calculating the NGE of a subsidised loan**

The NGE calculations for both types of loan, with straight-line repayment and with repayment in constant annual instalments, can be summarised in two formulas:

Straight-line repayment:

$$NGE = (1 - T) \times Q \times \left(1 - \frac{i^t}{i}\right) \times \left(1 + \frac{r^P - r^F}{i \times (P - F)}\right)$$

Repayment in constant annual instalments:

$$NGE = (1 - T) \times Q \times \left[ 1 - \left( \frac{i'}{i} \right) \times \left( 1 - r^F + \frac{r^F - r^P}{(1 - r')^{P-F}} \right) \right]$$

Terms:

i: the reference rate per interval and  $r = 1/(1+i)$

i': the subsidised rate per maturity interval and  $r' = 1/(1+i')$

P: the period (in number of maturity intervals) of the loan

Q: the proportion of investment covered by the loan

T: the tax rate

F: the period, in number of intervals, of any grace period from repayment of principal

## 9.6 Calculating the grant equivalent of a loan guarantee

The Commission Notice on the application of articles 87 and 88 of the EC Treaty to State aid in the form of guarantees (EU Commission, **Error! Reference source not found.**) states that there are two common ways to calculate the cash grant equivalent of a loan guarantee in a given year:

1. The difference between the market rate (reference rate) and the rate obtained through the State guarantee (usually lower than the market rate because of higher security provided through the guarantee) after any premiums paid have been deducted multiplied by the outstanding sum guaranteed.
2. The difference between the outstanding sum guaranteed, multiplied by the risk factor (probability of default) and any premiums paid, i.e. guaranteed sum \* risk factor – premiums.

For individual guarantees, the first method should in principle be the standard form of calculation, while for guarantee schemes the second one should prevail.

The yearly cash grant equivalents should be discounted to their present value using the reference rate. The sum of the individual present values yields the total cash grant equivalent.

Consider the following case of a guarantee safeguarding a corporate loan:

10-year loan with straight-line repayment and no grace period

Rebate of three percentage points throughout the period of the loan

The discount (*reference*) rate is  $i = 8\%$ , i.e. nominal interest rate  $i' = 5\%$

The guarantee covers 100% of the loan and 100% of the investment

Tax rate: 35%

End of year No	Loan: outstanding sum guaranteed (1)	1-point rebate due to guarantee (2)	Cash benefit obtained (1)*(2)	Discount factor: 8% (3)	Discounted benefit (1)*(2)*(3)
1	100.00	1%	1.00	92.59%	0.93
2	90.00	1%	0.90	85.73%	0.77
3	80.00	1%	0.80	79.38%	0.64
4	70.00	1%	0.70	73.50%	0.51
5	60.00	1%	0.60	68.06%	0.41
6	50.00	1%	0.50	63.02%	0.32
7	40.00	1%	0.40	58.35%	0.23
8	30.00	1%	0.30	54.03%	0.16
9	20.00	1%	0.20	50.02%	0.10
10	10.00	1%	0.10	46.32%	0.05
Unit cash grant equivalent					4.11

Table 9-6

The cash grant equivalent is:  $4.11 \times 3 = 12.34$

Since, the NGE is expressed as a percentage of the investment rather than as the difference between two interest rates, it has to be calculated as described in chapter 9.5 *Calculating the aid element resulting from interest subsidy schemes for loans* thereby making use of the *reference rate* as well. Consequently, the NGE is equal to:

$$4.11 \times 3 \times (1 - 35\%) = 8.02\% \text{ of the investment}$$

As in the case of the subsidised loan, the *reference rate* is used to determine the discounted cash benefit as well as the tax disadvantage of the interest rate rebate.

## 9.7 Calculating the recovery of aid granted unlawfully

In the case of the recovery of unlawfully granted aid, the EC will apply the *reference rate* used for calculating the NGE of regional aids on a compound basis. Compounding should take place on an annual basis (EU Commission, 2003 **Error! Reference source not found.**).

The interest rate (*reference rate*) to be applied shall be the rate applicable on the date on which unlawful aid was first put at the disposal of the beneficiary.

The interest rate (*reference rate*) shall be applied on a compound basis until the recovery of the aid.

Consider the case where a company has received an unlawful aid five years before the date of recovery. The *reference rate* is 8% and the aid amount paid out was 100.

$$\text{Then the recovery is: } 100 \times (1 + 0.08)^5 = 146.93$$

The interest rate (*reference rate*) shall be applied throughout the whole period until the date of recovery. However, if more than five years have elapsed between the date on which the unlawful aid was first put at the disposal of the beneficiary and the date of recovery of the aid, the interest rate shall be recalculated for intervals of five years, taking as a basis the rate in force at the time the rate is recalculated.