

# The Impact of Basel III on the fair Pricing of Bank Guarantee Facilities

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**Reutlinger Diskussionsbeiträge zu Finanz & Rechnungswesen**  
**Reutlingen Working Papers on Finance & Accounting**

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Nr. 2012 – 2

## Abstract

This study analyses the impact of Basel III on the fair pricing of bank guarantee facilities. Guarantees are an important risk mitigation instrument between exporters and importers in international trade and regularly a prerequisite for cross border sales contracts to be closed. Basel III – which shall be introduced from 2013 onwards - is a new regulation stipulating higher capital requirements for banks compared to the predecessor Basel II. It will therefore have an impact on the pricing of guarantee facilities which banks provide to exporting companies, making it also a crucial regulation for the cost of exportation overall.

The study compares those contents of Basel III and Basel II which are particularly relevant for guarantees in order to identify and crystallize pricing-relevant changes in the regulations and their respective impact potential. The Basel frameworks are analyzed part by part and reviewed in terms of relevance for guarantees. In case of ambiguity the analysis is verified by complementary expert interviews. References and examples are mainly focusing on the German banking system but the basic conclusions can be generalized for those countries adopting Basel III.<sup>1</sup>

As the result, a case study expresses the quantitative outcomes of different scenarios and the impact of the different price determining factors on the overall fair pricing of bank guarantee facilities.

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<sup>1</sup> 27 countries are members of the Basel Committee on Banking Supervision (BCBS), developing the Basel standards: Argentina, Australia, Belgium, Brazil, Canada, China, France, Germany, Hong Kong SAR, India, Indonesia, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, Russia, Saudi Arabia, Singapore, South Africa, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States. Not all of the member states adopt the Basel framework in total. On the other hand additional countries apply the Basel standards as best practice.

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## List of abbreviations

AG	Aktiengesellschaft
AIRB	Advanced Internal Ratings Based Approach
AMA	Advanced Measurement Approach
BCBS	Basel Committee on Banking Supervision
BIA	Basic Indicator Approach
CAGR	Compound Annual Growth Rate
CCF	Credit Conversion Factor
CRD	Capital Requirements Directive
CRM	Credit Risk Mitigation
CRSA	Credit Risk Standardized Approach
Diff	Difference
EAD	Exposure at Default
ECA	Export Credit Agency
EL	Expected Loss
EUR	Euro
EVA	Economic Value Added
FI	Financial Institution
FIRB	Foundation Internal Ratings Based Approach
IRB	Internal Ratings Based Approach
LCR	Liquidity Cover Ratio
LGD	Loss Given Default
L/G	Letter of Guarantee
M	Maturity
mn	Million
NSFR	Net Stable Funding Ratio
PD	Probability of Default
PwC	PricewaterhouseCoopers
RWA	Risk Weighted Assets
SA	Standardized Approach
SME	Small and medium sized enterprises
UL	Unexpected Loss
USD	United States Dollar (here: United States of America)
VaR	Value-at-Risk

## 1 Introduction

Trade finance activities are a substantial component for companies in the global marketplace, most often supported by bank intermediaries. Best-estimates suggest an extent of around 30% of world trade underpinned by banks.<sup>2</sup> One essential aspect is the mitigation of risks for the contracting parties in a trade agreement. Letters of guarantee (L/G) are of special importance in this context as they typically provide a security for several types of risk an importer is exposed to and accordingly are a requirement for closing contracts in many cases. According to a study published by the International Chamber of Commerce, it can be estimated that around 11% of bank supported trade transactions represent L/Gs.<sup>3</sup>

However, in the aftermath of the financial crisis the new Basel III regulation imposes stronger capital and liquidity obligations on banks, which may cause financial institutions to increase the pricing or to be reluctant of granting guarantee volumes to individual exporting companies at all.

This study provides an insight on the impact of Basel III on the L/G pricing and specifies leverages for exporters to mitigate pricing impacts.

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<sup>2</sup> cf. International Chamber of Commerce, 2010a, p. 1.

<sup>3</sup> cf. International Chamber of Commerce, 2010b, pp. 5, 12.

## 2 Letters of guarantee

### 2.1 Overview and importance

Within the framework of different risk mitigation instruments letters of guarantee are one element that is important, especially for large international contracts. Usually it mitigates the risk of non-contractual delivery by the exporter to the benefit of the importer. "Guarantees provide the beneficiary with access to a sum of money should the principal (applicant) fail to fulfill contractual or other obligations in respect of an underlying transaction contract or order."<sup>4</sup>

Bank guarantees provide a high security for the beneficiary as they are established internationally as unconditional, meaning payable 'on first demand' without any possibility of objection by the applicant, which is usually the exporter.<sup>5</sup> Moreover the guarantee obligation exists separately from the underlying sales contract. It constitutes an individual contract separated from the sales contract.<sup>6</sup>

Banks provide export guarantees by granting special guarantee facilities to exporters. The guarantee facility is a loan that a financial institution provides without giving liquidity but by offering its credit standing. Guarantees are considered as contingent liability from a bank point of view. Therefore guarantee facilities qualify as off-balance-sheet positions – this is a very important fact for the consideration within the Basel accords.<sup>7</sup> Within a guarantee facility three principal portions are differentiated: The unutilized portion, which is at the disposal of the exporter to issue additional guarantees, the utilized portion, which is the amount of already issued guarantees and the called amount, referring to those guarantees that have actually been called by the beneficiary.

### 2.2 Pricing approaches and definition of fair pricing

The terms and conditions that banks can offer in the market are predominantly dependent on the price elasticity of demand. The elasticity is determined by the effectiveness of marketing, the general interest rate level, market transparency and the situation of the customer.<sup>8</sup>

Despite the negotiating power of their customers and the resulting price, banks determine a lowest price level that is acceptable from a bank point of view as follows. Schierenbeck's (1999) so called minimum margin three for the banking sector will serve as definition of this

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<sup>4</sup> Branch (2006) pp. 316-317.

<sup>5</sup> cf. Möller (2008) p. 93.

<sup>6</sup> cf. Ehrlich, Zahn, & Eberding (1986) p. 347.

<sup>7</sup> cf. Grill, Perczynski, Int-Veen, & Platz (2007) pp. 407-408.

<sup>8</sup> cf. Schierenbeck (1999) p. 492.



prohibitive price. The minimum margin three includes the variable as well as the fixed cost of banks and additionally covers the capital cost of banks and therefore reflects a price that additionally captures the bank's profitability aspiration.<sup>9</sup> This definition is important when the Basel accords are considered, as they force banks to hold a certain amount of capital in their balance sheets.

Referring to residual income approaches, e.g. the Economic Value Added (EVA) concept, earnings / return need to cover all cost, including all cost of capital, to avoid negative residual income and the destruction of value.<sup>10</sup> As capital in this context not only equity instruments but also debt capital count into the measure. Transferred to the prohibitive pricing approach, the bank has to charge a price that just equals the return on equity sufficient to attract enough investors to satisfy the Basel capital requirements and additionally covers the refinancing cost for the debt instruments.

Therefore, fair pricing of guarantee facilities in this context is defined as taking all cost elements including the required return for the banks' capital into consideration but without adding an additional premium – or, from a residual income perspective, generating additional income or value over and above earning all cost of capital. The following figure describes the principle pricing components to be taken into consideration by banks.

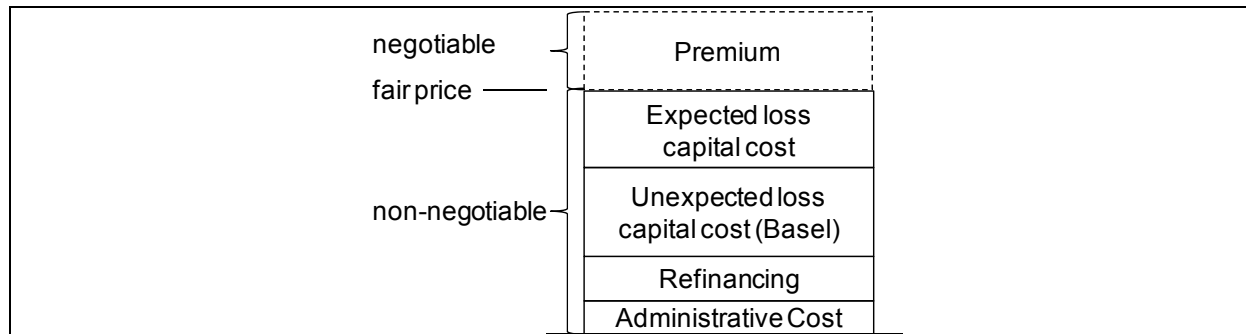


Figure 1: Pricing components. Own figure referring to Reichling (2003) p. 30.

Subject of this study shall not be to determine an appropriate return on capital but to examine the impact of Basel III on the pricing of guarantee facilities at a given return on capital aspiration (compare chapter 3.2 for the determination of the return on capital figure).

<sup>9</sup> cf. Schierenbeck (1999) pp. 479-480.

<sup>10</sup> For residual income and economic value added (EVA) concepts cf. e.g. Fernandez (2008), Stewart (1991), Sharma & Kumar (2010), Moyer, McGuigan, & Kretlow (2009) p. 84.

### **2.3 Non Basel related pricing components**

As figure 1 shows and in line with the definition of a fair price above, there are certain pricing elements to be taken into account outside of the Basel framework as follows.

#### **Refinancing**

Refinancing is considered as the provision of financing to fund the assets of the bank. Sources can be equity or debt capital. However, specifically the banking sector is highly financed by means of debt capital. Equity predominantly serves for the satisfaction of regulatory purposes. The low relevance of equity for financing purposes is also empirically proofed.<sup>11</sup> Hence, it can be considered as fair, if banks finance guarantee facilities with debt capital.

In order to quantify the impact of refinancing cost on the pricing of a guarantee facility firstly, the relevant extent that necessitates refinancing needs to be identified. Guarantee facilities can be divided into three parts. The unutilized portion, the utilized portion and the drawn amount. The first two components are considered as contingent liabilities (for further details refer to chapter 3.3). The called guarantees or the drawn amount of the guarantee facility finally constitutes that portion, which needs to be refinanced by the bank, as the bank actually pays money. Statistics say that only a portion of 2-3% of guarantees is actually called.<sup>12</sup>

In a second step the cost that banks incur for the refinancing need to be quantified. As the fair pricing of guarantee facilities is defined as the prohibitive price a bank has to demand to cover its cost (and its required return on equity), the refinancing cost should be oriented on the cheapest refinancing opportunity for banks, which is the prime rate of the European Central Bank, currently at 1%.

Hence the bank incur refinancing cost of 1% for the called guarantee amount, which is 2-3% of the issued guarantees.

#### **Administrative cost**

Banks demand for each issued guarantee an additional fee covering the administrative costs. This fee can amount from EUR 127.50 to EUR 375.00 per guarantee, depending on the bank's terms and conditions.<sup>13</sup>

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<sup>11</sup> cf. Hofmann (2007) pp. 5-7.

<sup>12</sup> cf. International Chamber of Commerce (2010b) p. 13.

<sup>13</sup> cf. Möller (2008) p. 109.

However, as the fees are due for each single issued guarantee this pricing component cannot be integrated into an overall interest rate on the basis of the guarantee facility. Additionally, there are no bank external benchmarks that allow approximating appropriate fees from outside. For these reasons, administrative fees are not considered as a pricing component in this study.

### 3 Basel related pricing components

#### 3.1 Introduction to the Basel accords

In 2009 the G20 summit in Pittsburgh mandated the Basel Committee on Banking Supervision (BCBS) to develop reforms of the existing Basel framework to address the lessons learned from the financial and economical crisis. The revised accords are referred to as Basel III, published in December 2010 by the BCBS. Basel III shall be introduced following a phasing in period starting in 2013. All measures shall be fully implemented at the beginning of 2019.<sup>14</sup>

The Basel III accords adhere to the three pillar concept of Basel II but add additional elements to the regulation. Stricter guidelines are especially applied to the capital quality, quantity and flexibility. Basel III furthermore introduces the leverage ratio, which should serve as maximum debt ceiling in addition to the pillar one capital requirements. New is also the consideration of liquidity. Basel III introduces two ratios to the regulative spectrum that cover the field of sufficient and stable liquidity for banks in case of disturbances. The following figure illustrates the components of the Basel framework.

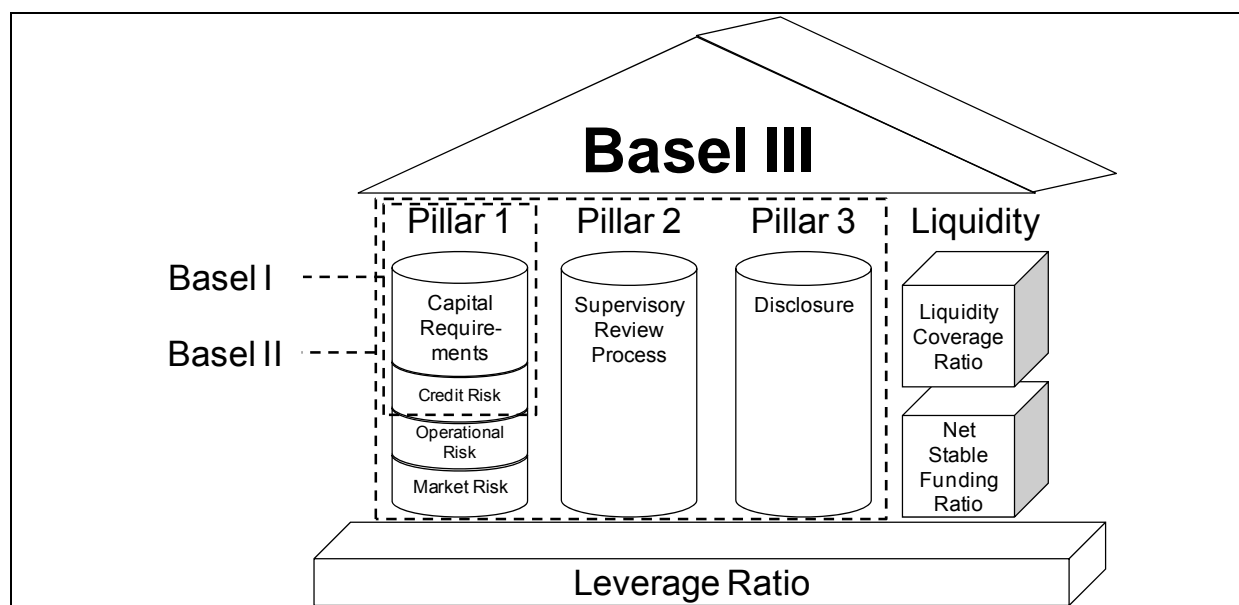


Figure 2: Basel framework - overview. Own figure.

<sup>14</sup> cf. Basel Committee on Banking Supervision (2011) p. 69.

### 3.2 First pillar: Minimum capital requirements

The core concept of pillar one can be described with the following figure.

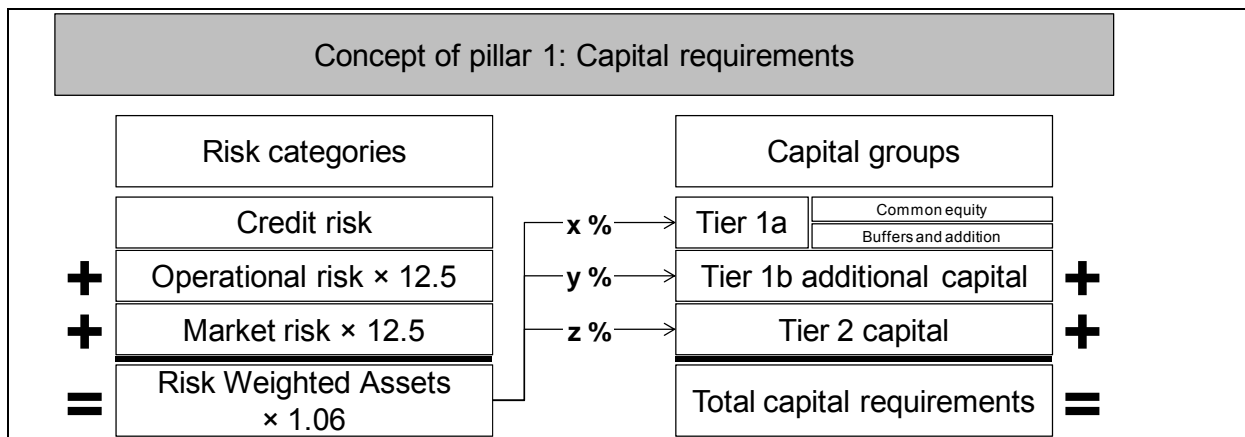


Figure 3: Basic concept of pillar 1 - capital requirements based on risk. Own figure.

Pillar one requires banks to quantify the risk of their business as shown on the left side of figure 3 and covers it with precisely defined capital instruments as referred to on the right side of figure 3.

Focusing on the left side of figure 3, Basel differentiates between three basic risk categories. For each of them, different calculation standards and procedures apply to quantify the considered risk.

The capital components (right side of the figure above) that are eligible under Basel II and III are divided into three principle groups: tier 1a common equity, tier 1b additional capital and tier 2 capital. The following figure illustrates the capital levels and their change during the transition period for the Basel III introduction.

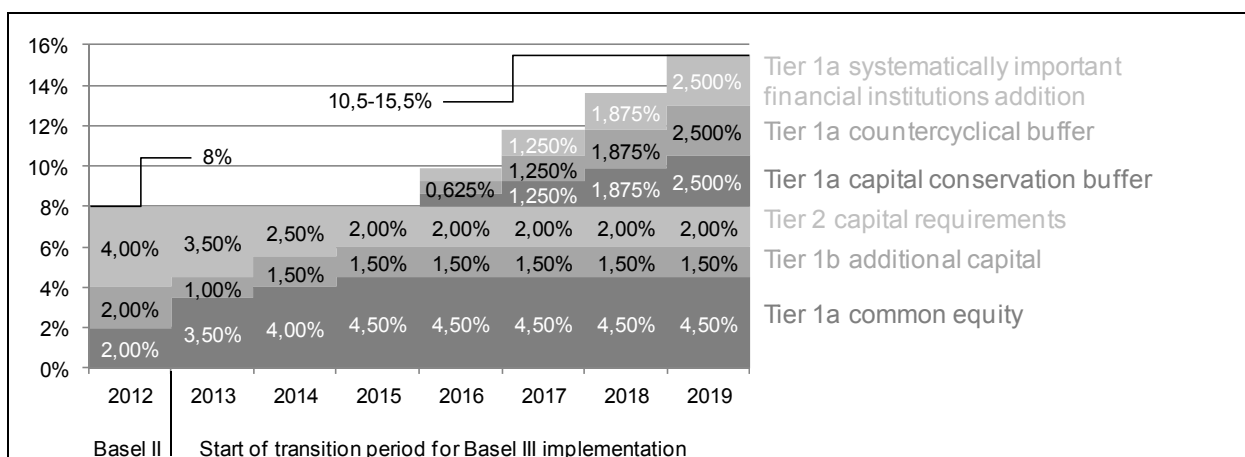


Figure 4: Capital components and ratios under Basel II and Basel III. Own figure referring to Deutsche Bundesbank (2011) p. 19 and Bank for International Settlements (2011).

The illustration makes obvious, that on the one hand new capital buffers are introduced, comprised of tier 1a capital instruments, and on the other hand the composition of the existing capital requirements changes. As for banking products in general, those changes impact also bank guarantee facilities.

### **Tier 1a common equity and buffers**

The *common equity* element already existed in the Basel II framework. However, its level is considerably strengthened with Basel III to 4.5%. This capital element applies to all banks and must be met at all times.<sup>15</sup>

The *capital conservation buffer* is a new tier 1a capital element under Basel III. The element should serve as flexible buffer that has to be built up during economic boom periods. In downturns, banks are allowed to decrease the buffer to cover losses incurred from the operative business. However, banks are restricted concerning dividends and bonus payments, if the buffer is under run, with the purpose to refill the buffer with the retained earnings. Alternatively banks can raise additional capital to refill the buffer.<sup>16</sup>

The *countercyclical buffer*, as the third tier 1a capital element, can be determined within a range from 0% to 2.5%. Its level is specified by the national supervisory authorities based on the economic situation and level of credit volume within the economy.<sup>17</sup> The purpose is to address the risk of a vicious circle arising from excess aggregate credit growth within boom periods, which back fires on the real economy and the banking sector during recessions, as the risk arise that large amounts of the excess credit volume have to be written off.<sup>18</sup>

The *systematically important financial institutions addition* is the fourth tier 1a capital element. It addresses banks that are globally active and systematically important depending on size, interconnectedness, lack of substitutability, global activity and complexity. Depending on the bank's individual systemic importance the addition for each single bank is determined within a range from 1 to 2.5% by supervisors. The addition shall serve as an incentive for banks to reduce their systemic importance over time.<sup>19</sup> The buffer will apply to approximately 28 banks worldwide.

Summarized, the quantitative tier 1a capital requirements including all four elements can amount within a range from 7 to 13% under the Basel III regulations.

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<sup>15</sup> cf. Deutsche Bundesbank (2011) p. 11.

<sup>16</sup> cf. Basel Committee on Banking Supervision (2011) pp. 54-56.

<sup>17</sup> cf. Basel Committee on Banking Supervision (2011) pp. 57-58.

<sup>18</sup> cf. Basel Committee on Banking Supervision (2010a) p. 1.

<sup>19</sup> cf. Bank for International Settlements (2011).

As mentioned also qualitative targets, besides the above described quantitative target have to be met. Basel III strictly defines the requirements for tier 1a capital according to 14 criteria. Summarized the criteria demand that the capital is

- issued and paid in,
- perpetually available,
- represent the most subordinated claim in case of liquidation,
- is not subject to obligatory payouts and
- fully participates in losses.<sup>20</sup>

Specific instruments meeting these requirements are for example:

- "Common shares issued by the bank [...],
- Stock surplus (share premium) resulting from the issue of instruments included in common equity tier 1a,
- Retained earnings,
- Accumulated other comprehensive income and other disclosed reserves,
- Regulatory adjustments applied in the calculation of common equity tier 1a."<sup>21</sup>

Comparing the Basel III regulations with Basel II there is one specific tier 1a capital instrument that will no longer be eligible as tier 1a instrument and that is preferred stock.<sup>22</sup>

### **Tier 1b additional capital**

Tier 1b capital is an additional element of the core capital of a bank. Basel III reduces its permitted quantity from 2% under Basel II to 1.5% under Basel III. This ratio is fixed and must be complied with at all times.<sup>23</sup>

The quality is similar to the tier 1a capital. The difference concerns mainly the perpetuity, which must be unlimited at time of issuance, but the issuer can buy back or terminate tier 1b capital instruments after a period of at least five years, given the agreement of national supervisory authorities.

Comparing Basel II with Basel III, tier 1b now includes the preferred stock including its share premium, both of which was formerly (Basel II) eligible as tier 1a capital instrument, as mentioned above.<sup>24</sup>

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<sup>20</sup> cf. Deutsche Bundesbank (2011) p. 11.

<sup>21</sup> Basel Committee on Banking Supervision (2011) p. 13.

<sup>22</sup> cf. Die Familienunternehmer - ASU e.V. (2011) p. 13.

<sup>23</sup> cf. Deutsche Bundesbank (2011) p. 19.

<sup>24</sup> cf. Deutsche Bundesbank (2011) pp. 12-13.

Taken together the tier 1 capital instruments (tier 1a and tier 1b) represent the most subordinated capital of banks. It follows the going concern principle, which means that its primary purpose is to cover losses from the ongoing business activities of the bank.<sup>25</sup>

### **Tier 2 capital**

With Basel III the tier 2 capital shall cover the claims in case of a default of the bank (gone concern). Thereby, the gone concern case not only refers to a liquidation of the bank but already applies, if a bank is saved from insolvency with the help of public aid.<sup>26</sup> The ratio declines to 2%, which means a reduction by half.

Tier 2 instruments must have a maturity of at least five years, but again the supervisory authority has to approve redemption. Examples for tier 2 instruments are

- Long-term subordinated debt
- Free/excess loan loss reserves<sup>27</sup>

Compared to Basel II the main difference of Basel III will be that participation/profit sharing rights ("Genußrechte") will no longer qualify as tier 2 capital instruments. This is because "Genußrechte" are not necessarily available to satisfy the bank's claimants in case of insolvency (gone concern).<sup>28</sup>

### **Return on Capital**

As mentioned in chapter 2.2, banks include their capital costs into the calculation for the pricing of their products. Therefore, it is necessary to apply return on capital figures in order to quantify the pricing impact of the Basel related capital requirements.<sup>29</sup>

Generally, the return on capital requirements are heterogeneous among different banks in Germany. Sparkassen (savings banks) and Genossenschaftsbanken (cooperative banks) with their business model tied to the real economy have lower return on capital measures than the banks with high portions of investment business like Deutsche Bank. This is also due to differences in the risk abundance of the business models. Investors providing capital for banks pursuing a business model with higher risk, demand higher returns. Additionally, the form of capital influences the return. Common shares for example, which are part of tier 1a capital, represent the most subordinate form of capital. Hence, an investor of common shares would be the last claimant considered, when a bank is wound up. Therefore, he

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<sup>25</sup> cf. Deutsche Bundesbank (2011) p. 10.

<sup>26</sup> cf. Deutsche Bundesbank (2011) p. 10.

<sup>27</sup> cf. Deutsche Bundesbank (2011) p. 15.

<sup>28</sup> cf. Deutsche Bundesbank (2011) p. 15.

<sup>29</sup> cf. Schierenbeck (1999) p. 480.



would demand a higher return on his investment than an investor in a tier 2 capital instrument. A third aspect influencing the return on investment, are strategic decisions. A high return on capital increases the attractiveness for investors. Hence, banks that strategically want to attract investors will offer comparably high returns on capital.

The Deutsche Bank for example issued the target of 25% return on capital.<sup>30</sup> This target can be considered as being meant for tier 1 capital instruments, bearing the highest risk. The Sparkassen pursued a return on capital target of 15%, which they now cancelled due to the financial crisis.<sup>31</sup> The actual figure in 2010 amounted to 11.5%.<sup>32</sup> The third bank category, the Landesbanken (federal state banks), can be considered as close to the Sparkassen as their business objective is similar. Hence, a return on capital of 15% would also be a good estimation for them. The Landesbank Berlin confirmed this target however, before the financial crisis began.<sup>33</sup> The actual figure in 2010 amounted to 11.8%.<sup>34</sup> This heterogeneity implies that a general assumption concerning the return on capital is not possible. Instead the different banks pursue different objectives. Moreover, it is questionable which return on capital can be considered as fair. Even the Deutsche Bank with its 25% return on capital requirement could have well founded reasons for pursuing this goal.

Hence, for the course of this study the level of return on capital will be considered as given according to the strategic goals of the banks. The subject of this study is not to question the rationales for the bank's decisions. As the level of return on capital is an important factor influencing the guarantee pricing, its effect will be reflected in the pricing and therefore influence the conditions a bank is able to offer its customers. For the case study in the second part a tier 1 return on capital of 15% will be applied and a tier 2 return on capital of 8%.

After having explained the capital quantity and quality for each capital tier, in the following the basis for applying the ratios is discussed in detail (compare left side of figure 3).

### 3.3 Credit risk

The credit risk, which is the first of the three risk components, refers to the threat that a borrower is partly or completely unable to settle its obligations with the bank.<sup>35</sup>

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<sup>30</sup> cf. Manager Magazin (2009).

<sup>31</sup> cf. Handelsblatt (2009).

<sup>32</sup> cf. Deutscher Sparkassen und Giroverband (2010) p. 25.

<sup>33</sup> cf. Wirtschaftswoche (2007).

<sup>34</sup> cf. Landesbank Berlin (2010) p. 2.

<sup>35</sup> cf. Schierenbeck (1999) p. 5.

"The BCBS permits banks a choice between two broad methodologies for calculating their capital requirements for credit risk. The most basic alternative, the Standardized Approach, is based on external credit assessments. The advanced alternative, the Internal Ratings-Based Approach, which is subject to the explicit approval of the national supervisors, would allow banks to use their internal rating systems to determine credit risk."<sup>36</sup>

**The Standardized approach**

When applied to guarantee facilities there are two basic steps under the credit risk standardized approach (CRSA) in order to calculate the risk weighted assets (RWA). A third step concern credit risk mitigation techniques, which can be applied in order to reduce the RWA. The three steps are:

- 1. Transition from off-balance-sheet claims into on-balance-sheet equivalents.
- 2. Determination of the RWA with rating-dependent risk weights.
- 3. Consideration of risk mitigation techniques.

In the **first step** the guarantee facilities have to be transferred from off-balance-sheet items into on-balance-sheet equivalents. The Basel framework specifies multipliers, which are called credit conversion factors (CCF). They are applied to the off-balance sheet items, resulting in the credit exposure equivalents that are comparable to on-balance-sheet exposures.<sup>37</sup> To properly allocate the CCFs, the guarantee facilities have to be separated into different components regarding the unutilized facility, which reflects the limit that the companies can utilize to order additional L/Gs for their business and secondly the actually utilized facility amount, which means the cumulated volume of ordered guarantees, like bid bonds and performance guarantees.

	Basel II	Basel III
<b>Unutilized facility</b>	0% - 50%	0% - 50%
<b>Utilized facility</b>	50% - 100%	50% - 100%

**Table 1: Credit risk standardized approach: CCF for unutilized facility. Basel Committee on Banking Supervision (2006) p. 26 and Basel Committee on Banking Supervision (2011) p. 63.**

A third component is the part of the facility that the beneficiaries of the guarantees have actually called, meaning that the beneficiaries have exercised their right to receive payment. The third part qualifies as on balance-sheet item. Hence, there is no CCF applicable for that portion, meaning they are considered with 100%.

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<sup>36</sup> Basel Committee on Banking Supervision (2006) p. 19.  
<sup>37</sup> cf. Basel Committee on Banking Supervision (2006) p. 26.

After application of the CCFs, the **second step** is to assign the specified risk weights to the converted on-balance-sheet amounts. Thereby, the rating of the borrower company, provided by an external rating agency, is used under the CRSA. To make the rating results of the agencies useful for the CRSA, the rating categories are mapped to risk weights. The following table shows the provided risk weights mapping.

<b>Credit assessment</b>	AAA to AA-	A+ to A-	BBB+ to BB-	Below BB-	unrated
<b>Risk weight</b>	20%	50%	100%	150%	≥ 100%

**Table 2: Credit risk standard approach: risk weights for claims on corporates. Basel Committee on Banking Supervision (2006) pp. 23-26.**

The **third step** of determining the risk weighted assets is the consideration of credit risk mitigation (CRM). Basel determines several specific CRM techniques i.e. collaterals, on-balance sheet netting and counter-guarantees<sup>38</sup>

Collaterals are for example cash, gold or equity that are posted by the borrower to the bank in order to hedge the exposure.<sup>39</sup>

For guarantee facilities this type of CRM is not appropriate as it contradicts the purposes of bank guarantees. This is to enable the exporter providing a security to the importer without having to suffer from liquidity impacts or being constraint in available securities for other financings like loans.

On-balance sheet netting refers to assets and liabilities of the same counterparty that represent on-balance sheet positions.<sup>40</sup> Referring to guarantees a considerable portion of a guarantee facility cannot be included into a potential netting agreement as only the drawn portion of the facility is regarded on-balance sheet, while the rest is off-balance sheet. Statistically only a very small portion of 2-3% of the actually issued guarantees is drawn.<sup>41</sup> Hence a potential netting agreement would only have a very limited impact on a guarantee facility.

Counter guarantees are provided by third parties guaranteeing for the borrower to step in for the case that the borrower is not able to repay its obligation. This is a useful instrument to lower the risk attached to a guarantee facility from a regulatory point of view. In Germany, the Export Credit Agency (ECA) of the Federal Republic of Germany offers such a counter

<sup>38</sup> cf. Basel Committee on Banking Supervision (2006) pp. 32, 35.

<sup>39</sup> cf. Basel Committee on Banking Supervision (2006) p. 32.

<sup>40</sup> cf. Basel Committee on Banking Supervision (2006) pp. 45-46.

<sup>41</sup> cf. International Chamber of Commerce (2010b) p. 13.

guarantee. The covered portion of the guarantee can be assigned the risk weight of the counter guarantee provider.<sup>42</sup> As the counter guarantee provider is the Federal Republic of Germany the risk weight regulations for sovereigns apply. For AAA rated countries, Basel determines a risk weight of 0%. According to the terms of the German export credit agency the covered portion can be 80% of the total exposure.<sup>43</sup> Ultimately, this means that a portion of 80% of those guarantees that are covered with a counter guarantee of the German ECA do not have an impact on the capital base of banks. The remaining 20% are treated with the appropriate risk weight assigned to the borrower.

After the determination of the credit exposure equivalents (step one) and the applicable risk weight (step two) as well as risk mitigation opportunities (step three), the risk weighted assets can be determined. For doing so, the credit exposure equivalent (step one) is multiplied with the applicable risk weight (step two), after both components have been adjusted for CRM techniques. The result are the risk weighted assets, which serve as basis for the determination of the capital requirements.

### **The internal rating-based approach**

In contrast to the CRSA, the internal ratings based approach (IRB) leaves more room for bank internal assessment to determine the credit risk. The IRB is based on risk components that serve as inputs for mathematical risk weight functions for the determination of the appropriate risk weighted assets. Both the risk components and risk weight functions are explicitly determined in the Basel framework.<sup>44</sup> The IRB approach is subdivided into the foundation IRB approach (FIRB) and the advanced IRB (AIRB) approach. The FIRB allows banks to internally determine the probability of default (PD) of its exposures, which is one of the risk components. The remaining risk components, which are loss given default (LGD), the exposure at default (EAD) and the maturity (M) are provided by the Basel accords. The AIRB allows banks to estimate the full range of risk components internally. Banks need the explicit approval by the national supervisory authorities in order to use either the FIRB or the AIRB.<sup>45</sup>

The probability of default (**PD**) is measured according to the number of borrowers that default within a specified rating category over a specified time horizon expressed as percentage. It can be considered as the quantitative oriented risk component as it measures the defaulted number of borrowers.<sup>46</sup>

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<sup>42</sup> cf. Basel Committee on Banking Supervision (2006) p. 48.

<sup>43</sup> cf. Euler Hermes Kreditversicherungs-AG (2011).

<sup>44</sup> cf. Basel Committee on Banking Supervision (2006) p. 52.

<sup>45</sup> cf. Basel Committee on Banking Supervision (2006) pp. 60-61.

<sup>46</sup> cf. Daldrup (2006) p. 15.

The loss given default (**LGD**) is a volume oriented risk component. It measures the quota of the average defaulted amount within a specified rating category over a specified time horizon.<sup>47</sup> If banks use the FIRB, they have to apply LGDs that are determined by the Basel framework. For guarantees a LGD of 45% has to be applied. The AIRB allows banks to internally determine the appropriate LGD.<sup>48</sup>

The exposure at default (**EAD**) is the value of the asset at that point in time when it might default. To determine the EAD, it is again necessary to transfer the off-balance sheet guarantee facility into on-balance sheet equivalents with CCFs. For the unutilized portion of the facility a CCF of 0 - 75% applies, while the utilized portion of the facility as well as the drawn portion can be considered equal as with the standardized approach (compare table 1). The sum of all three components makes up the total EAD under the FIRB.<sup>49</sup> With the AIRB banks are allowed to use their own estimates for the CCFs.<sup>50</sup>

For the last risk component, which is the maturity **M**, Basel defines a value of 2.5 years for corporate exposures under the FIRB approach. For the AIRB, M is defined as the nominal maturity of the guarantee, while a maximum of five years has to be applied. For small companies that have an annual consolidated turnover and consolidated assets of less or equal to Euro (EUR) 500 million a maturity of 2.5 years has to be applied for the AIRB in Germany.<sup>51</sup>

The above defined risk components enter into specifically determined mathematical formulas that have to be used by banks for the FIRB as well as for the AIRB approach. The results of the calculations are the risk weighted assets, which build the foundation for the determination of the capital requirements.

The IRB approach distinguishes between the so called expected loss (EL) and unexpected loss (UL). Hence, each portion is calculated differently. The expected loss is based on the experiences of banks concerning the portion of credits that default, based on historical data. It is calculated with the above explained risk components as follows:<sup>52</sup>

$$EL = LGD * EAD * PD$$

Banks consider the expected loss as provisions in the balance sheet. Therefore, it is already covered from a risk point of view. Hence, as the EL is that portion of the credit volume that is expected to default and already covered by provisions, it is not considered as a native credit

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<sup>47</sup> cf. Daldrup (2006) p. 16.

<sup>48</sup> cf. Basel Committee on Banking Supervision (2006) pp. 67-73.

<sup>49</sup> cf. Daldrup (2006) p. 92.

<sup>50</sup> cf. Basel Committee on Banking Supervision (2006) p. 74.

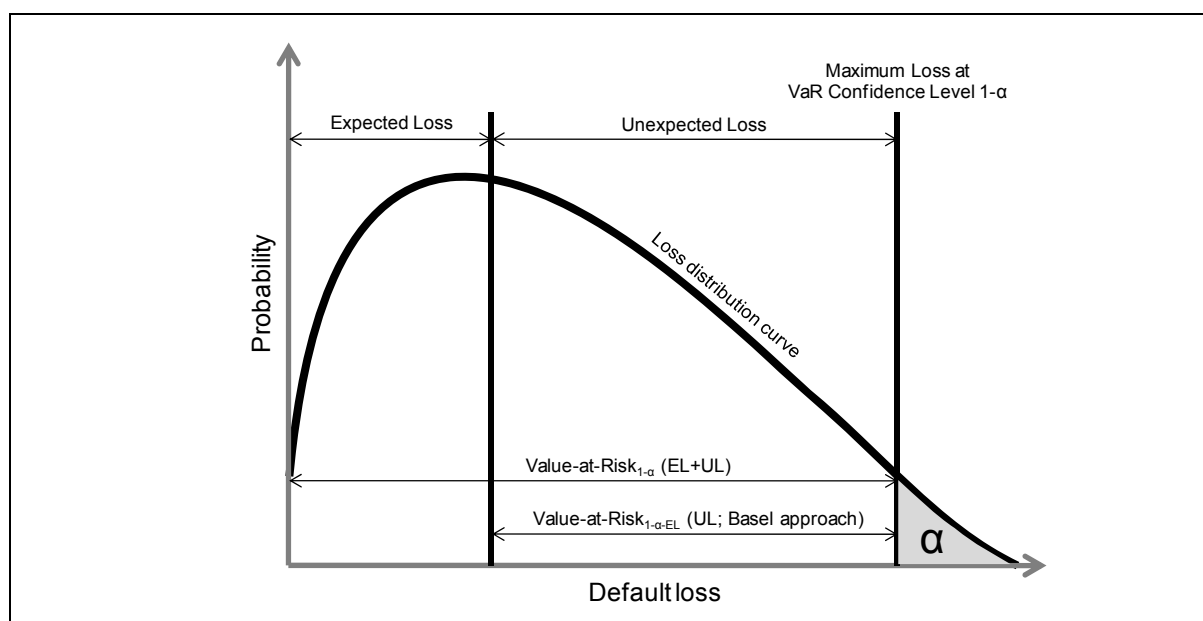
<sup>51</sup> cf. Bundesministerium der Finanzen (2006) p. 106.

<sup>52</sup> cf. Emse (2005) p. 311.

risk in the Basel frameworks.<sup>53</sup> Referring back to the credit risk standardized approach it is important to mention that the credit risk standardized approach (CRSA) does not distinguish between EL and UL.<sup>54</sup>

However, concerning the IRB approach the UL is the component that is paid particular attention to in the sense of credit risk as it carries particular risk for banks. due to its characteristic as being unexpected.

The calculation of the UL adheres to the Value-at-Risk (VaR) concept. The VaR is defined as the maximum loss of a single asset or a portfolio within a defined time horizon and at a defined confidence level  $(1-\alpha)$ .<sup>55</sup> Basel determines the required period with one year and the confidence level with 99.9%.<sup>56</sup> The following figure illustrates the EL and UL as well as the VaR concept.



**Figure 5: Loss distribution curve, Expected & Unexpected Loss, Value-at-Risk. Own figure referring to Daldrup (2005a) pp. 4,17.**

The VaR calculations are precisely defined in the Basel accords. The final results of the calculations are the risk weighted assets (RWA), which can be considered as the unexpected loss and therefore the basis for the determination of the capital requirements. Exposures against unregulated companies of the financial sector or regulated institutions of the financial sector with total assets of more than USD 100 billion are subject to a factor, leading to higher

<sup>53</sup> cf. Daldrup (2005a) p. 3.

<sup>54</sup> cf. Basel Committee on Banking Supervision (2006) p. 18.

<sup>55</sup> cf. Daldrup (2005a) p. 16.

<sup>56</sup> cf. Daldrup (2005b) pp. 28-29.

capital requirements.<sup>57</sup> The multiplier reflects the increased dependence and interconnectedness of the financial sector on the global economy as could be observed with the recent financial crisis.

### 3.4 Operational risk

Additionally to the credit risk Basel requires banks to hold capital for operational risks (compare figure 3). "Operational risk is defined as the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. This definition includes legal risk, but excludes strategic and reputational risk. Legal risk includes, but is not limited to, exposure to fines, penalties, or punitive damages resulting from supervisory actions, as well as private settlements."<sup>58</sup> Banks can choose between three broad methodologies for the calculation of the capital requirements for operational risk:

- The basic indicator approach (BIA),
- the standardized approach (SA) and
- the advanced measurement approach (AMA)

The **basic indicator approach** is the most basic of the three approaches and not subject to any minimum criteria for its use. Banks using the BIA must hold capital for operational risk that equals the average positive annual gross income over the previous three years multiplied with a fixed percentage of 15%. Years with negative income or zero are completely excluded from the calculation.<sup>59</sup>

For the second approach, the **standardized approach**, the activities of the bank are differentiated into eight lines of business.<sup>60</sup> The activity groups export finance, trade finance and namely guarantees are explicitly classified into the business line commercial banking. To determine the capital charge under the SA, again the three year average of the gross income for each separate business line is used and multiplied by a factor ( $\beta$ ). For commercial banking  $\beta$  equals again 15%,<sup>61</sup> meaning that BIA and SA result in the same amount for guarantees.

The third and most sophisticated and risk sensitive method for calculating operational risk, is the **advanced measurement approach**. Basel allows banks that are approved for the AMA to calculate the capital charge for operational risk according to internal systems rather than

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<sup>57</sup> cf. Basel Committee on Banking Supervision (2011) p. 39.

<sup>58</sup> Basel Committee on Banking Supervision (2006) p. 144.

<sup>59</sup> cf. Basel Committee on Banking Supervision (2006) pp. 144-145.

<sup>60</sup> cf. Basel Committee on Banking Supervision (2006) p. 146.

<sup>61</sup> cf. Basel Committee on Banking Supervision (2006) pp. 146-147.

predetermined calculation approaches and factors. However, the AMA is subject to strict requirements that banks have to meet in order to use this approach.<sup>62</sup>

Hence, depending on the gross income a bank generates with its guarantee facilities it has to hold a certain amount of capital in the balance sheet, backing the operational risk attached to the facilities. This in turn also affects the pricing of the guarantee facilities.

### 3.5 Market risk

Market risk is the third risk component that banks have to consider for the capital requirements under the Basel framework (compare figure 3). "Market risk is defined as the risk of losses in on- and off-balance-sheet positions arising from movements in market prices. The risks subject to this requirement are:

- The risk pertaining to interest rate related instruments and equities in the trading book;
- Foreign exchange risk and commodities risk throughout the bank."<sup>63</sup>

According to this definition, which explicitly also includes off-balance-sheet positions, banks have to consider market risks for guarantee facilities, too. However, not all of the stated risks apply to guarantees. Interest rate and equities refer to the trading book. However, guarantees are not instruments that are attributable to the trading book, so this element is not relevant for the subject matter of this study. Guarantees also do not reflect positions in commodities, like crude oil, soybeans or wheat, but are subject to exchange rate risk if they are denoted in currencies other than the domestic or functional currency of the guaranteeing bank.

The Basel framework explicitly defines, which positions a bank should take into account for calculating the exposure. Guarantees are explicitly stated: "The bank's net open position in each currency should be calculated by summing [...] guarantees (and similar instruments) that are certain to be called and are likely to be irrecoverable"<sup>64</sup> This wording leaves room for interpretation concerning the certainty of calling and the likelihood of being irrecoverable.

Concluding, the impact on the pricing of guarantee facilities from the market risk regulations can be considered as marginal, if any. Certain aspects lead to this assessment. Firstly, the only market risk that is applicable for guarantee facilities is exchange rate risk. However, only that part of guarantee facilities that are certain to be called and likely to be irrecoverable needs to be considered for exchange rate risk. According to conducted expert interview this

<sup>62</sup> cf. Basel Committee on Banking Supervision (2006) pp. 147-148.

<sup>63</sup> Basel Committee on Banking Supervision (2006) p. 157.

<sup>64</sup> Basel Committee on Banking Supervision (2006) pp. 179-180.



attribute already qualifies, to consider guarantee facilities as subordinate in terms of market risk.<sup>65</sup> Guarantees, by their nature, are a risk mitigation instrument. Hence, it is only certain that they are called when the risk materializes. As an importer and an exporter would refuse to close a contract including risks that are certain to materialize, the portion of guarantees that are certain to be called can be considered as close to zero. A third aspect that decreases the market risk aspect for guarantee facilities is that banks can consider exchange rate risk on a consolidated basis. Hence, only the net figure of exposure needs to be included.<sup>66</sup>

Summarized, pillar one of the Basel framework leads to quantitatively as well as qualitatively increased capital requirements for banks under Basel III. The accords allow banks to choose between different calculation approaches for all three captured risks: credit risk, operational risk and market risk. The third risk component, which is the market risk, can be regarded as insignificant for the capital requirements of banks when guarantees are regarded.

### **3.6 Second and third pillar: The supervisory review process and disclosure**

The supervisory review process recognizes the responsibility of bank management in developing an internal capital assessment process and setting capital targets that are commensurate with the bank's risk profile and control environment. In the framework, bank management continues to bear responsibility for ensuring that the bank has adequate capital to support its risks beyond the core minimum requirements."<sup>67</sup>

The last aspect of the previous paragraph that requires the management to accumulate more capital than the minimum requirements of pillar one, is also important for the pricing of guarantee facilities. Additional capital levels can be enforced by supervisory authorities. This can be the case, if banks do not adequately monitor their risk profiles. However, in terms of a fair pricing it has to be argued that the responsibility for the bank's risk profile, processes and risk strategy lies at the bank itself. Hence, additional risk premiums that are not relying on the customer's risk profile, need to be excluded from a fair pricing point of view.

The third pillar governs disclosure requirements. "[...] The committee aims to encourage market discipline by developing a set of disclosure requirements which will allow market participants to assess key pieces of information on the scope of application, capital, risk

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<sup>65</sup> Expert Interview with Tim Brücken (PwC, Manager Assurance Financial Services), Friedemann Loch (PwC, Director Assurance Financial Services), Gerhard Heubeck (Siemens Financial Services, Head of Trade Finance and Transaction Services) and Stephan Faulhaber (Siemens Financial Services, Project Export Finance).

<sup>66</sup> cf. Basel Committee on Banking Supervision (2006) p. 157.

<sup>67</sup> Basel Committee on Banking Supervision (2006) p. 204.

exposures, risk assessment processes and hence the capital adequacy of the institution. It is not intended that additional capital requirements would be a response to non-disclosure.<sup>68</sup>

The very last sentence specifically states that pillar three does not have an impact on the capital requirements a bank is exposed to. Therefore an impact from pillar three (disclosure) on the fair pricing of guarantee facilities is not considered within this study.

Summarized, the importance of pillar two and three reveals to be of minor importance for guarantees, which leads to the conclusion that it can also be excluded for the determination of a fair guarantee pricing.

### **3.7 Liquidity requirements**

Basel III introduces new requirements including specific regulations concerning the liquidity. Those requirements are an answer to the financial crisis where many banks experienced liquidity shortfalls despite of sufficient capital levels.<sup>69</sup>

#### **Liquidity coverage ratio (LCR)**

The LCR, as the short-term component of the liquidity requirements, demands that banks have enough high quality liquid assets in stock to cover the liquidity outflow of a 30-day stress scenario determined by supervisors. The stress scenario derives from the experiences of the financial crisis and specifies several stress factors.<sup>70</sup> The LCR is scheduled to become active on 1<sup>st</sup> of January 2015. The systematic of the LCR stipulates a proportion of at least 100% of high-quality liquid assets over the net cash outflow of the 30-day stress scenario.<sup>71</sup>

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<sup>68</sup> Basel Committee on Banking Supervision (2006) p. 226.

<sup>69</sup> cf. Basel Committee on Banking Supervision (2010b) p. 1.

<sup>70</sup> cf. Basel Committee on Banking Supervision (2010b) pp. 3-4.

<sup>71</sup> cf. Basel Committee on Banking Supervision (2010b) p. 3.

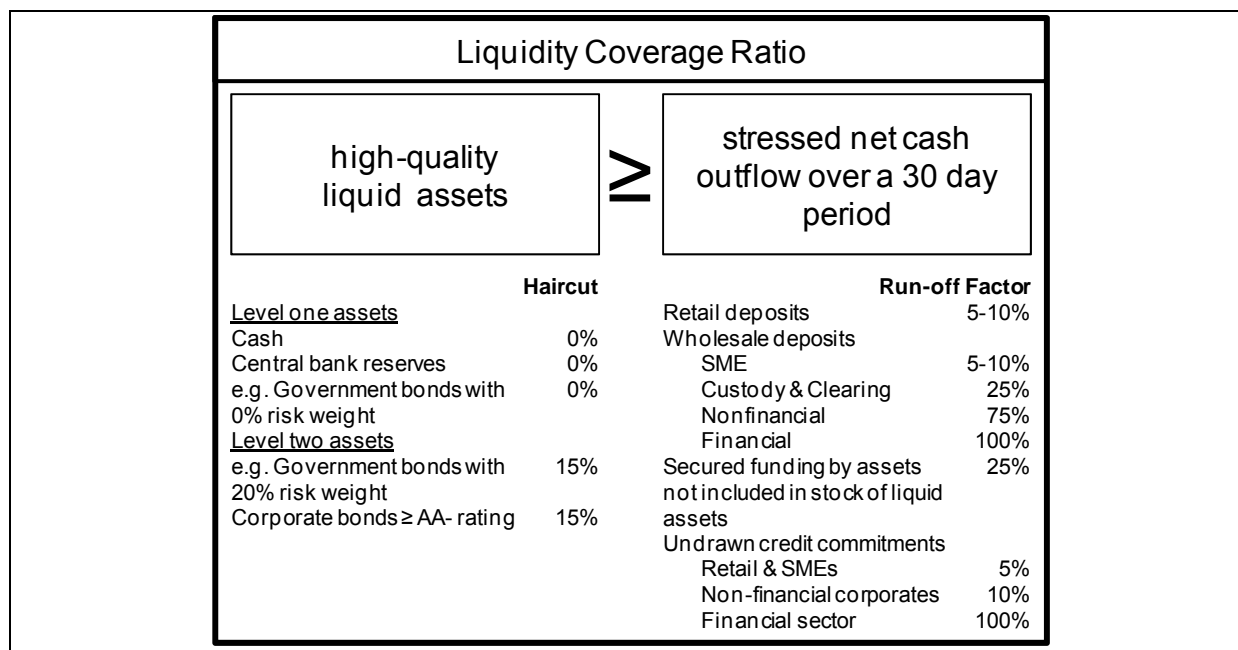


Figure 6: Systematic of the liquidity coverage ratio (Own figure).

The definition of the **high quality liquid assets** is divided into two groups, the level one and level two assets. Level one assets are considered to be especially liquid in case of stress. Level two assets are regarded to be less liquid in case of stress than the level one assets. Level two assets are subject to a haircut of 15% of its market value. They must not comprise more than 40% of the overall considered liquidity stock after the haircuts have been applied. Guarantees cannot be considered as high liquid assets, neither as level one nor level two. This appears to be obvious as guarantees represent a contingent payment obligation rather than stock of liquidity.

The stressed net **cash outflow** over a 30-day time horizon is measured net of cash inflows, however only to a maximum extent of 75% of cash outflows.<sup>72</sup> The outflows are defined by allocating run-off factors to different types of liquidity adhering to a stress scenario. Guarantee facilities are specifically addressed in the scenario, saying that the run-off factors for guarantees have to be defined at national supervisor's discretion.<sup>73</sup> At present the Basel III regulations have been translated into a European directive, the Capital Requirements Directive (CRD) that was published in July 2011.<sup>74</sup> However, the directive does not include a specification concerning the run-off factor for guarantees, yet, making the assessment of a pricing impact speculative.

<sup>72</sup> cf. Basel Committee on Banking Supervision (2010b) p. 23.

<sup>73</sup> cf. Basel Committee on Banking Supervision (2010b) p. 21.

<sup>74</sup> cf. European Commission, 2011.

Inflows are treated similar, meaning that inflows from different sources are weighted with a specific inflow-factor. Credit facilities, liquidity facilities and other contingent facilities that the bank holds to the benefit of the bank itself are assigned a 0% inflow factor.

Summarizing the effects from guarantee facilities on the LCR, it can be concluded that the impact will be marginal. Certain is, that guarantee facilities do not represent stock of high quality liquid assets. Concerning the stressed net cash outflows it remains to be seen which run-off factor the national supervisors attach to guarantee facilities. Considering that Basel defines a run-off factor for undrawn committed credit facilities of 5-10%, depending on company size, the expected run-off factor for export guarantee facilities can be expected to be lower or the same. This is due to the fact that a stress scenario that impacts the bank, for example a downgrade, does not trigger the calling of an export guarantee. Rather would a beneficiary (importer) of the guarantee require the exporter to shift the guarantee to another more stable bank. In fact many importers demand so called triggered guarantees, meaning that the exporter has to shift the guarantee to another bank, if the original bank falls below a certain rating. This would mean that the "threat" of actually paying a guarantee amount to the beneficiary decreases as guarantee volumes are shifted away from the stressed bank.

Thus, an impact of the LCR on the pricing of guarantee facilities is very uncertain. Rather it can be expected that an impact can be neglected. Hence, for the course of this study the LCR will not be considered to have an impact on the fair pricing for guarantee facilities.

### **The Net stable funding ratio (NSFR)**

The NSFR, as the structural medium to long term component of the liquidity requirements, demands that banks establish a minimum level of stable funding in relation to the liquidity characteristics of the bank's assets over a one year time horizon. This shall lead the banks to a more stable long-term oriented funding. Ultimately the NSFR will lead to a maturity congruent funding of the bank's assets. The systematic of the NSFR is to stipulate a minimum proportion of 100% of stable funding over the required amount of stable funding as illustrated in the following figure.

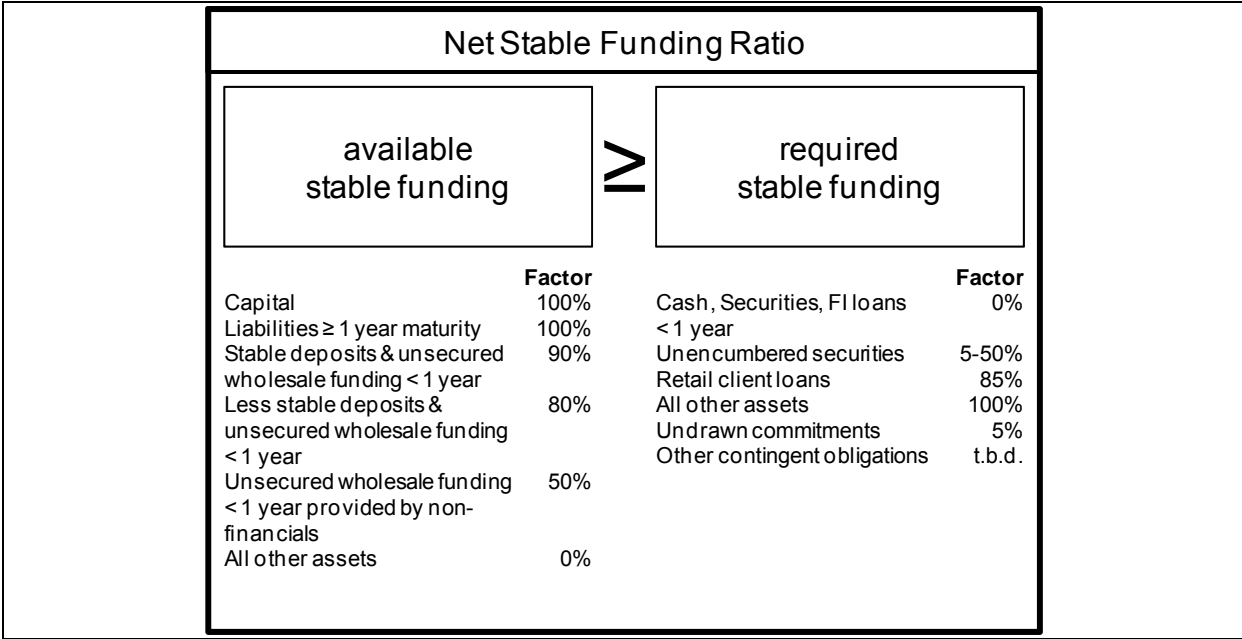


Figure 7: Systematic of the net stable funding ratio (Own figure)

The available stable funding components are assigned factors from 0-100%. As with the LCR, guarantees are obviously not part of available funding for the NSFR, as they represent a (contingent) liability.

The portion of required stable funding is the weighted sum of the bank's assets. Thereby, the weighting factor intends to approximate the portion of assets that cannot be transferred into cash (e.g. through sale) during the one year stress scenario. Therefore, cash and cash similar instruments with a maturity of less than one year are assigned a 0% weight, as they are expected to be fully at the banks disposal and therefore easily to be transferred into cash. As with the LCR guarantees are again specifically addressed by saying that the weighting factor has to be defined by national supervisors. Again no weighting figure has been published yet. However, for the NSFR the same argumentation as for the LCR can be considered. Hence, for the course of this study the NSFR will not be considered in terms of a fair pricing for guarantee facilities.

**3.8 Leverage ratio**

The leverage ratio, as the third newly introduced component besides the two liquidity requirements, has the objective to stipulate a maximum leverage level for banks, regardless of risk weights. The leverage ratio is a direct answer to the financial crisis where many banks built up excessive leverage. When the crisis began, banks were forced by the markets to

reduce their leverage, which lead to immense pressure on asset prices and a contraction in credit availability. Therefore the leverage ratio has two objectives.<sup>75</sup>

1. "Constrain the build-up of leverage in the banking sector, helping avoid destabilizing deleveraging processes which can damage the broader financial system and the economy; and
2. Reinforce the risk based requirements with a simple, non-risk based backstop measure."<sup>76</sup>

To achieve these objectives the new leverage ratio stipulates a proportion of at least 3% of tier 1 capital over total exposure.

$$3\% \geq \frac{\text{tier 1a/b capital}}{\text{total exposure}}$$

The *capital measure* is based on the tier 1 capital definition meaning that it is comprised of tier 1a and tier 1b capital instruments. The *exposure measure* basically follows accounting principles and can be regarded as the banks' total on- and off-balance-sheet exposure. However, there is one exception: facilities that are unconditionally cancellable at any time without prior notice are considered with 10%.<sup>77</sup> That regards the revocable unutilized portion of a guarantee facility.

The impact of the leverage ratio on a fair pricing of letters of guarantee is questionable. In fact, statistics show that trade finance instruments, like letters of guarantee, carry low risk.<sup>78</sup> However they are regarded with 100% of its book value (exception revocable facilities: 10%) as are also high risk assets. Hence, the low risk nature of guarantee facilities is not reflected within the leverage ratio. This leads to an over proportional weighting of trade finance instruments for the leverage ratio compared to other assets as many experts argue<sup>79</sup>, to which Banks might react in two ways. Either the banks reduce the volume of trade finance instruments and increase their investment in more risky and therefore higher-margin assets. Or banks increase the pricing for trade finance products in order to reach their overall return on capital goals.<sup>80</sup> The following analysis shall provide an insight on whether the leverage ratio might impact the pricing of guarantees from a fair pricing point of view.

The precondition for both above stated bank reactions to happen is that the leverage ratio becomes a limiting factor for the banks when the total assets are regarded. That is doubtful

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<sup>75</sup> cf. Basel Committee on Banking Supervision (2011) p. 61.

<sup>76</sup> Basel Committee on Banking Supervision (2011) p. 61.

<sup>77</sup> cf. Basel Committee on Banking Supervision (2011) pp. 61-63.

<sup>78</sup> cf. International Chamber of Commerce, 2010b, p. 12.

<sup>79</sup> Compare among others Meenen (2011), Broens (2011), Business Europe a.i.s.b.l. (2011) p. 5 & International Chamber of Commerce (2010a) p. 2.

<sup>80</sup> cf. Meenen (2011) p. 17.

as the existing risk related capital requirements of pillar one already constrain banks in issuing assets that exceed a certain capital-backing. Hence the leverage ratio introduces a second component that requires banks to hold a certain capital in their books additionally to the already existing capital requirements of pillar one. Therefore, to find out if the leverage ratio influences a fair price of guarantee facilities, both capital requirements have to be compared.

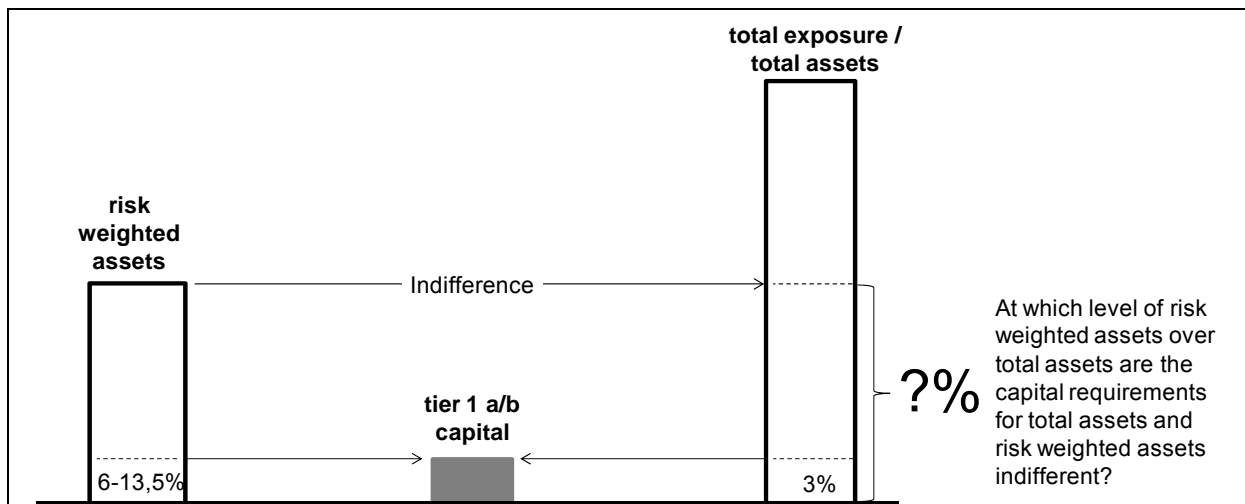
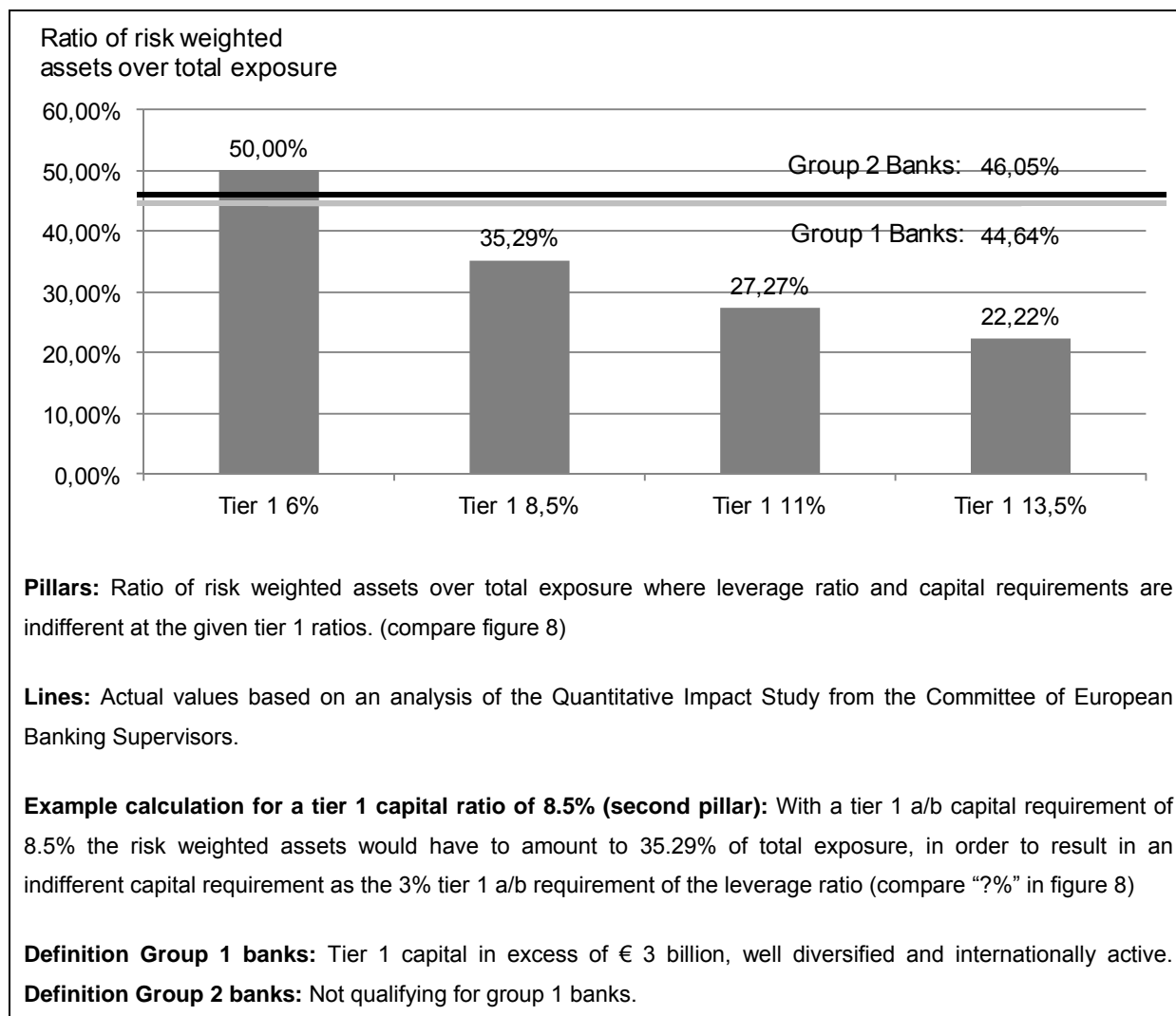


Figure 8: Pillar one capital requirements versus leverage ratio (own figure)

As figure 8 shows on the left hand side, the risk weighted assets as basis for the pillar one capital requirements are comparably lower than the total assets basis for the leverage ratio on the right hand side. However, the relative portion of capital requirements at 6% to 13.5% of tier 1a/b capital is significantly higher than the leverage ratio demands at 3% tier 1a/b capital.

Hence, at a certain level of risk weighted assets expressed as percentage of total assets, both capital requirements are indifferent and the capital requirements are balanced. If this threshold is exceeded, banks would be constrained by the leverage ratio. Otherwise the capital requirements of pillar one would be the constraining factor.

The following figure shows this indifference point for the capital levels from 6% to 13.5% and the actual average indifference figure of small (group 2) and large (group 1) banks in Europe.



**Figure 9: Indifference ratio of risk weighted assets over total exposure. Own figure.**

A tier 1 ratio of 8.5% is a realistic value because it includes the capital conservation buffer. If banks underrun this buffer, they are constrained in paying out dividends and bonuses as explained above. Therefore they have a strong incentive to maintain the buffer. In that case the leverage ratio would only constrain banks, if they manage to reduce the risk weighted assets below 35% of total assets. Taking a look at the actual values of the banks in Europe (> 44%) there is a considerable buffer until the leverage ratio would become a constraint and therefore might have an impact on the availability or pricing of trade finance products. Considering higher capital levels the buffer even increases.

Concluding, the leverage ratio need not be considered when calculating a fair pricing of guarantee facilities, as it does not constrain banks on average.



## 4 Case study: Exemplary calculation and impact analysis

For the illustration of the impacts that Basel III will have on the pricing of guarantee facilities, this chapter presents the pricing according to a case study. For this purpose several scenarios will be contrasted to highlight the impacts of the most important price impacting factors. In all scenarios an exemplary exporting company called Toolmaker Aktiengesellschaft (AG) will be the guarantee portfolio holder. The scenarios will be built as deviation from a base case that is defined as follows.

<b>1. Company data</b>				
<b>Rating</b>	BBB (Standard & Poor's)			
<b>Turnover</b>	EUR 1 billion (no consideration as small- or medium sized)			
<b>2. Guarantee portfolio - total facility</b>				
	<b>Revocable facilities</b>	<b>Non-revocable facilities &lt;=1 year</b>	<b>Non-revocable facilities &gt;1 year</b>	<b>Total facility</b>
In mn. Euros				
Landesbank	45	60	30	135
Sparkasse	45	60	30	135
<b>3. Guarantee portfolio - facility utilization</b>				
	<b>Non-financial guarantees</b>	<b>Financial guarantees</b>	<b>Total utilization</b>	<b>Averagely drawn portion</b>
In mn. Euros				
Landesbank	90	0	90	2.5%
Sparkasse	90	0	90	2.5%
<b>4. Bank data</b>				
	<b>Return on capital tier 1a</b>	<b>Return on capital tier 1b</b>	<b>Return on capital tier 2</b>	<b>Credit risk measurement approach</b>
Landesbank	15%	15%	8%	Foundation IRB
Sparkasse	15%	15%	8%	Standardized appr.
<b>5. Basel III - buffer level</b>				
	<b>Capital conservation buffer</b>		<b>Countercyclical buffer</b>	
Buffer Level	2.5%		0%	

Table 3: Case study - base case. Own table.

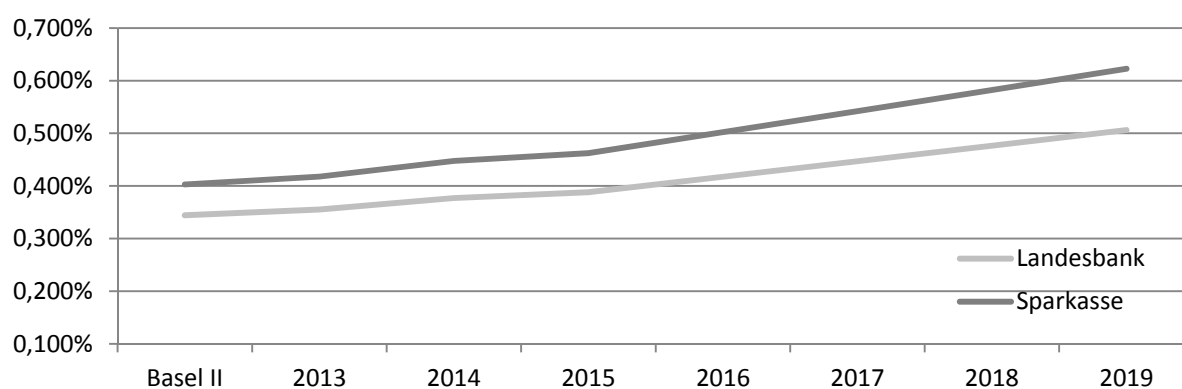
The drawn amount is assumed to be 2.5%. According to this base case that includes all parameters and factors, which were intensively discussed in the previous chapters, the first pricing calculation will be conducted. To illustrate how several factors influence the pricing, certain deviations from this base case are defined as scenarios as follows, while all other factors from the base case remain unchanged (*ceteris paribus*).

<b>Rating scenario</b>	The company rating changes to A			
<b>Buffer scenario</b>	The countercyclical buffer is activated with the maximum of 2.5%			
<b>Maturity scenario</b>	The orientation of the guarantee portfolio shifts from short-term to long term as follows.			
	<b>Revocable facilities</b>	<b>Non-revocable facilities &lt;=1 year</b>	<b>Non-revocable facilities &gt;1 year</b>	<b>Total facility</b>
In mn. Euros				
<b>Landesbank</b>	15	20	100	<b>135</b>
<b>Sparkasse</b>	15	20	100	<b>135</b>

Table 4: Case study - deviations from base case. Own table.

### Interpretation of results

The following graph and data table shows the pricing for the base case.



In %	Basel II	Basel III							CAGR
		2013	2014	2015	2016	2017	2018	2019	
<b>Total facility</b>	0.374	0.386	0.412	0.425	0.460	0.495	0.529	0.564	6.069
<b>Landesbank</b>	0.344	0.355	0.377	0.388	0.417	0.447	0.476	0.506	5.661
<b>Sparkasse</b>	0.403	0.418	0.447	0.462	0.502	0.542	0.582	0.623	6.411

Table 5: Case study - pricing base case. Own table.

As the data table and the graph show, the facilities at the Landesbank and Sparkasse are priced differently, although both facilities have the same amount and maturity structure. The reason for the difference is the credit risk measurement approach. The case assumes that the Sparkasse uses the standardized approach whereas the Landesbank uses the foundation IRB approach. Banks have an incentive to use the more advanced approach, because they tend to lead to lower risk weights and therefore to lower capital requirements leading to better conditions. However, the advanced approaches are more sensitive to the credit worthiness than the standardized approach. Taking this finding into account the above made statement that banks with more advanced credit risk measurement approaches can

offer better conditions needs to be specified. This only counts for customers with good credit worthiness. As soon as the rating slips, the higher risk sensitivity of the more advanced approaches lead to higher capital charges than the less advanced approaches.

The graph and the table also show the impact that the introduction of Basel III will have on the pricing of guarantee facilities. The compound annual growth rate (CAGR) of the facility pricing amounts to 6.1% for the total facility. Thereby, the pricing increase for the Sparkasse will be higher than for the Landesbank. The reason is again the higher risk weight of the standardized credit risk measurement approach.

In total the Toolmaker AG has to pay EUR 840,453 for the facility at the Sparkasse when Basel III is fully implemented in 2019. The Basel II pricing was EUR 544,023 which are EUR 296,429 less. The main pricing component are the costs for covering credit risk, which is also the main pricing driver for the Basel III pricing increase. 96% of the pricing increase comes from credit risk coverage. The following table provides the details for the pricing of the Sparkassen guarantee facility.

In EUR, %	Basel II		Basel III (2019)		Difference	
	Amount	%	Amount	%	Amount	%
<b>Credit Risk</b>	507,150	0.3757	791,044	0.5860	283,894	0.2103
<b>Operational risk</b>	8,748	0.0065	21,284	0.0158	12,536	0.0093
<b>Refinancing</b>	28,125	0.0208	28,125	0.0208	0	0.0000
<b>Total</b>	544,023	0.4030	840,453	0.6226	296,429	0.2196

**Table 6: Case study - base case results Sparkasse. Own table.**

For the Landesbank facility the proportions of the different pricing components are similar. However, as the Landesbank uses the foundation IRB approach an additional pricing component, the expected loss, comes into play. Nevertheless, the total pricing is less than that of the Sparkasse, due to the different credit risk measurement approaches.

In EUR, %	Basel II		Basel III (2019)		Difference	
	Amount	%	Amount	%	Amount	%
<b>Credit Risk (UL)</b>	373,944	0.2770	583,271	0.4321	209,327	0.1551
<b>Credit Risk (EL)</b>	56,271	0.0417	56,271	0.0417	0	0
<b>Operational risk</b>	6,451	0.0048	15,694	0.0116	9,243	0.0068
<b>Refinancing</b>	28,125	0.0208	28,125	0.0208	0	0
<b>Total</b>	464,790	0.3443	683,361	0.5062	218,570	0.1619

Table 7: Case study - base case results Landesbank. Own table.

After the results of the base case have been discussed in detail, now scenarios and its impact on the result will be the subject. To start with a rating improvement will be discussed. Obviously, the pricing will decrease when the company receives a better rating by three notches (to A up from BBB). This is the case as the following table shows.

In %	Basel II			Basel III (2019)		
	BBB	A	Diff.	BBB	A	Diff.
<b>Total facility</b>	0.374	0.172	0.202	0.564	0.256	0.308
<b>Landesbank</b>	0.344	0.132	0.212	0.506	0.191	0.315
<b>Sparkasse</b>	0.403	0.212	0.191	0.623	0.322	0.301

Table 8: Case study - rating scenario results. Own table.

The results again underpin, that a good rating affects the pricing more positively at banks that use the advanced credit risk measurement approaches. The better rating would save Toolmaker AG EUR 286,200 per year for the facility at the Landesbank and EUR 257,850 at the Sparkasse under Basel II. The effect increases with Basel III, where the saving amounts to EUR 425,250 at Landesbank and EUR 406,350 at Sparkasse. Hence, the importance of a good rating increases considerably when Basel III is introduced, while the effect is greater at banks that use advanced credit risk measurement approaches.

The second scenario simulates that the supervisory authorities decide to activate the countercyclical buffer and set it to maximum, which means an additional 2.5% requirement of tier 1a capital. The effects are included in the following table 9.

In %	Basel II			Basel III (2019)		
	no buffer	with buffer	Diff.	no buffer	with buffer	Diff.
<b>Total facility</b>	0.374	0.374	0	0.564	0.705	0.141
<b>Landesbank</b>	0.344	0.344	0	0.506	0.626	0.120
<b>Sparkasse</b>	0.403	0.403	0	0.623	0.785	0.162

Table 9: Case study - buffer scenario results. Own table.

With Basel II there is no effect. This is because the countercyclical buffer is newly introduced with Basel III. There the effect is visible. The additional capital requirements increase the pricing by 0.141% (EUR 380,700). Again differences between the two banks occur due to the different credit risk measurement approaches. Compared to the simulated rating improvement in the first scenario, this impact is more moderate.

The third scenario simulates a change in the maturity structure of the guarantee portfolio. Toolmaker AG shifts from a rather short-term oriented facility structure to a long-term oriented facility structure. The following table shows the impact of the maturity change on the pricing.

In %	Basel II			Basel III (2019)		
	base case	scenario	Diff.	base case	scenario	Diff.
<b>Total facility</b>	0.374	0.423	0.049	0.564	0.640	0.076
<b>Landesbank</b>	0.344	0.380	0.036	0.506	0.559	0.053
<b>Sparkasse</b>	0.403	0.465	0.062	0.623	0.721	0.098

Table 10: Case study - maturity scenario results. Own table.

The pricing for a long-term oriented maturity structure increases. This is due to the CCFs, which increase for the long-term portions of the facility. Hence, the credit exposure equivalents increase and lead to increased risk weighted assets and finally to increased capital requirements. The impact on the pricing is less than 0.1% if the base case is compared with the defined scenario. The impact under Basel II for the total facility amounts to EUR 132,300. With Basel III the spread increases to EUR 205,200. Again the facility at the Landesbank is less impacted than that at the Sparkasse.

Summarizing the impacts, Toolmaker AG has four basic levers to influence the costs for its guarantee facility.

1. Improve the rating. The case study revealed that an improved rating leads to decreased capital requirements and therefore to better conditions that banks can offer. However, this effect needs to be considered in conjunction with the credit risk measurement approach that the banks use.
2. Choose banks with advanced credit risk measurement approaches. The analysis revealed that banks using more advanced credit risk measurement approaches are faced with decreased capital requirements. As a consequence they can offer better conditions. However, this effect only holds for well rated companies.
3. Optimize maturity structure: The case study showed that a short-term oriented guarantee portfolio improves the conditions a bank can offer. However, companies have to bear in mind that short-term orientation comes with instability and the threat that banks withdraw facilities at short-notice. Therefore companies should balance the maturity structure according to the nature of their business, the macro economic situation, the stability of the banking sector and by taking their banking portfolio into account.
4. Increase negotiation power: Transparency concerning the pricing approach of banks and an own knowledge basis improve the position of Toolmaker AG in negotiations. The transparency gain can help to agree on more favorable terms and conditions for the bank guarantee facilities.

Besides these factors that the company can actively influence, there are further endogenous factors. The level of the countercyclical buffer is determined by supervisors and not within the control of the company. Moreover, the buffer for systematically important banks impacts the pricing of the considered institutes. Another factor are reliefs for small and medium sized enterprises in the IRB approaches.

In all cases companies will be faced with increasing costs for their guarantee facilities under Basel III. The active management of the bank portfolio as well as the facility itself will become more important in order to keep the costs at a low level.

## 5 Conclusion

Bank guarantee facilities are an important factor in international trade. Exporters rely on this source of financing to provide securities to their international customers. The analysis of the Basel accords showed that companies will be faced with increasing costs for their guarantee facilities.

Basel III forces banks to increase their capital base during the introduction period till 2019. Fully implemented Basel III requires banks to maintain a ratio of up to 15.5% capital over risk weighted assets. This means a steep increase of the capital requirements compared to Basel II where the ratio amounted to 8%. Moreover the composition of the capital tiers shifts to capital instruments of higher quality. From a fair pricing point of view banks will pass this development on to their customers.

Taking the case study, Toolmaker AG would have to deal with a CAGR of 6% for its total facility costs. However, the study revealed that companies have certain levers to react on the pricing increase. The most important factors are the company rating, the risk measurement approach of the bank partners, the maturity structure of the facility, transparency over the pricing components and its impact on the overall pricing and negotiation power. However there are also some factors lying beyond the influence of the companies.

Additionally, not all impacts can be quantified yet. Especially the impacts of the newly introduced liquidity ratios remain to be seen. Still Basel III is in a discussion stage where the final national legislation is uncertain in some aspects.

The analysis concerning the new leverage ratio does not result in impacts for the pricing of guarantee facilities, as banks would usually not be constrained by the leverage ratio.

Banks are already reacting on the expected impact of Basel III by offering new products like the bank payment obligation to promote open payment transactions as an alternative to documentary payments. This development might also spread to the guarantee area in order to find ways for alleviating the Basel III impacts and encourage international trade to grow further.

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**Reutlinger Diskussionsbeiträge zu Finanz- & Rechnungswesen –  
Reutlingen Working Papers on Finance & Accounting**

**Impressum**

Herausgeber:

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