

What is the effect of the announcement of the Basel II Accord on the competition between European banks?

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This research describes the effect of the announcement of the Basel II Accord on competition. The results show that competition between European banks increased after the announcement of the Basel II Accord and that this effect is bigger between larger banks. It also shows that the long-term interest rate and the competition level of one year earlier are important determinants of competition. Furthermore, this research gives an overview of the possible measurements of competition. An approximation of the Lerner index is used to measure competition in this research.

1. Introduction

In the years before the Global Financial Crisis the Basel Committee on Banking Supervision (BCBS) has given recommendations on banking regulation in the Basel I Accord and Basel II Accord. Although the BCBS does not have the authority to enforce these recommendations, its recommendations are most of the time implemented by countries in their national laws. Unfortunately, the recommendations of the Basel II Accord were not yet implemented in the national laws of most of the participating countries at the time of the Global Financial Crisis. According to Nout Wellink, former president of the central bank of the Netherlands (DNB), the recommendations of the Basel II Accord would not have prevented the Global Financial Crisis, but the crisis is expected to have been less fierce (Hoogendoorn, 2008). Although we will never know if the implementation had prevented the Global Financial Crisis, we are interested in the effect it had on the banking industry and especially on the competition in the banking industry. This is also interesting because nowadays the BCBS has issued a new framework, the Basel III Accord, that should be implemented on the 31th of March 2019. So with the increasing amount of regulation it is interesting to analyze the effect the Basel Accords on the competition among the participating banks.

The first Basel Accord was finished in July 1988 and it contained recommendations about capital requirements. If a bank has to retain more capital, its marginal costs will rise and causes the interest rate to rise too. However, there is at a higher interest rate a lower demand for loans and that will increase the competition between banks. The second Basel Accord was finished in June 2004 and contained recommendations about the calculation of the minimum capital requirements, the Supervisory Review Process and the Market Discipline. Especially the recommendations about the calculation of the minimum capital requirements had a big impact. The Basel II Accord offered more complex calculations for the minimum capital requirements: the standardized approach and the internal rating based approach (IRB approach). The last approach is the most complex one because the use of internal ratings of the bank and is only allowed under certain conditions and permission of the supervisor. It is possible that bigger banks have profited more from the new recommendations due to economies of scale. They often have more manpower and expertise to calculate the best outcome for the bank.

Therefore, if bigger banks are less effected by the Basel II Accord than smaller banks, competition crowds out smaller banks resulting in a higher concentration in the banking industry. A higher concentration in the banking industry has a negative effect on competition (Bikker & Groeneveld, 2000) and a less competitive banking sector stimulates banks to take on more risk if they know they are 'too big to fail' (Boyd, De Nicolo, & Jalal, 2006) and also causes higher prices for their customers. So, it could be possible that the Basel II Accord causes less financial stability instead of more financial stability. Little empirical research has been done on the effect of the Basel II Accord on the competition. This thesis will research the question:

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With the use of regression analysis, I will give an answer to this question and also to the question if there is a difference in the effect of the Basel II Accord on competition between the large and small banks. Competition is measured with Lerner index and there will be a comparison between the period before and after the announcement of the Basel II Accord. The implementation date is not important for this study, because banks already changed their behavior before this date. They start behaving different from the day of the announcement date, so it is only relevant to compare the period before and after the announcement date. This study uses individual bank data consisting of banks from 2000 till 2009 of the EU member states that were member of the EU before 2004: Belgium, France, Italy, Luxembourg, Kingdom of the Netherlands, Germany, Denmark, Ireland, United Kingdom, Greece, Portugal, Spain, Finland, Austria and Sweden.

According to this research, the announcement of the Basel II Accord had a negative effect on the competition among European banks. Although there is not a big effect, the effect is significant. The negative effect is bigger between larger banks. So the competition between large banks has declined more than the competition between small banks. The competition between large banks depends also more on the competition the year before. This might suggest that it is more difficult for a large bank to change the business strategy in the short term.

The setup of this thesis is as follows. Section 2 will discuss the existing literature about the result of competition in the banking industry, the effect of the size of a bank and the effects of the Basel II Accord. Section 3 will discuss the available data and will explain the used method in this thesis, a regression model. Section 4 presents the outcome and 5 concludes.

2. Related literature

In the existing literature competition is measured in various ways. This paper discusses first some possibilities how to measure competition and after that it will discuss other variables that affect competition.

2.1. Competition measures

2.1.1. Market concentration

A possibility to measure competition is with the use of market concentration. This approach is commonly used together with the Structure Conduct Performance paradigm (SCP). This paradigm assumes there is a causal relationship between the structure of the banking industry (Structure), the firm conduct (Conduct) and the performance (Performance). It states that bigger and more concentrated industries are less competitive. A bank with a large market share has more market power and this will result in collusive behaviour and excess profits (Gual & Neven, 1992). The market structure effects its behaviour and thus its market performance. So according to the SCP paradigm there is a negative relationship between market concentration and competition: a larger and more concentrated banking industry results in less competition.

Market concentration can be measured with the use of the Hirschman-Herfindahl Index (HHI). The HHI is calculated by squaring the market share of every firm in the market and summing them up (Hirschman, 1964). The range of the HHI is 0 till 1. A HHI of 0 indicates a perfect competition and a HHI of 1 indicates a monopoly. It's calculated by the following formula, where n is the number of firms in the market and M is the relative market share of a firm:

$$HHI = \sum_{i=1}^n M_i^2$$

A disadvantage of the usage of market concentration as a predictor of competition is that it does not account for market contestability. Firms also let their behaviour depend on the threat of entry and exit in contestable markets. Firms are forced to behave more competitive in a contestable market, so with low entry restrictions and low exit conditions, under the same market concentration conditions. A concentrated banking industry can be competitive if the threat of entry and the cost of an exit are low (Baumol, 1982). Another thing that the SCP does not take into account is the efficiency hypothesis (Demsetz, 1973). A firm with a higher level of efficiency can adapt two different strategies. The first possibility is that the firm can maintain the price level and its output and maximise profits. The second possibility is that the firm reduces the price level and gain extra market share and maximise profits. In that case efficiency contributes to the process of market concentration. The view that market concentration is not a good predictor of competition is also empirically supported by Beck, Demirguc-Kunt and Levine (2006). They conclude from their research that market concentration is not a reliable indicator of competition. Demirguc-Kunt & Peria (2010) also conclude from their case study that although the market concentration had declined, the competition decreased over time. Claessens and Laeven (2004) do not find evidence of a negative association of banking system concentration with competitiveness either. They even find some evidence for the opposite effect; more concentrated banking systems are more competitive. Their empirical research supports the contestability theory rather than the SCP paradigm.

On the other hand, Bikker & Groeneveld (2000) find some empirical evidence that supports the traditional view that concentration impairs competitiveness. They find in their research among EU countries that a higher concentration of banks is conducted by a lower degree of competition. Although they have used various models and find a weak relationship, all empirical evidence points to the conclusion of a negative relationship of concentration on competition.

2.1.2. H-statistic

A second possibility to measure competition is the use of the H-statistic of Panzar & Rosse (1987). The H-statistic is defined as the sum of elasticities of the total revenue of the bank with respect to its input prices. According to Panzar and Rosse the H-statistic says something about the competitive behaviour of the bank. The H-statistic can reflect the conduct and structure of the market in which it operates.

This means that the competitive environment in which the bank operates is not necessarily the same as the competitive environment in the country where the bank operates. The range of the H-statistic is $-\infty$ till 1. A H-statistic smaller or equal to zero gives an indication of a monopoly, where a H-statistic of 1 indicates a perfect competition. The H-statistic which is used most commonly in the literature is calculated by the following formula:

$$\log TR = \alpha + \sum_{i=1}^n \beta_i \log w_i + \sum_{j=1}^j \gamma_j \log CF_j + \varepsilon$$

where TR is the total revenue, w_i the price of the i th input factor and CF_j the j th firm specific control factor. Panzar and Rosse show that the H-statistic is the sum of input price elasticities:

$$H = \sum_{i=1}^n \beta_i$$

One way of using the H-statistic is with including a log total assets as a firm-specific control variable in the equation above (Bikker & Haaf, 2002). Bigger banks earn more revenue in ways that are not related to variation in input prices, so Bikker & Haaf state that there have to be controlled for bank size and they include $\log TA$. Another way is to change the dependent variable $\log TR$ into the log of the total revenues dividend by the total assets ($\log TR/TA$) (Shaffer, 1982).

One of the disadvantages of the usage of the H-statistic is the problems with its interpretation. As mentioned earlier, in a long-run equilibrium with a perfect competition the score of the H-statistic should be 1 (or close to 1) or in a long-run equilibrium in a monopoly the score of the H-statistic equal or smaller than 0. However, literature shows us that there are some theoretical possibilities where there can be a high H-statistic in a non-competitive market (Shaffer & Spierdijk, 2013) and a low H-statistic in a competitive market. For example, this can be the case where there are constant average costs (Bikker, Shaffer, & Spierdijk, 2012) or with a fixed number of firms (Shaffer, 1983). Shaffer (2004) also points out that the H-statistic can be misleading in the case of a monopsony issue, this can especially be the case in the banking industry. The H-statistic is not affected by any market power on the output side.

2.1.3. Lerner index

The Lerner index (or price-cost margin) can also be used to measure competition. The Lerner index is a theoretical approach of market power and is empirically approximated by the price-cost margin (PCM). The Lerner index is the output price minus the marginal costs divided by the output price (Lerner, 1934). The formula is as follows:

$$L_i = \frac{P(Q) - C'_i(q_i, \omega)}{P(Q)}$$

where $P(Q)$ is the market price and $C'_i(q_i, \omega)$ is the marginal cost of firm i (where q_i is the quantity produced by firm i and ω the vector of prices of the factors of production of firm i). A large Lerner index indicates more market power, because high profits may be an indication of a lack of competition. The range of the PCM is 0 till 1. A score of 0 indicates a perfect competition and 1 indicates a monopoly. The Lerner index focuses on individual banks and not for the market as a whole. The formula to calculate the Lerner index of the market is as follows:

$$L_j = \sum_{i \in j} \phi_{ij} L_{ij}$$

where ϕ_{ij} is the market share of firm i in market j and L_{ij} the Lerner index of firm i in market j . If the Lerner index is unweighted then ϕ_i is $1/N$, where N is the number of firms in market j .

A problem that arises with the Lerner index is that there are situations possible in which the price-cost margins are increasing while the competition is becoming fiercer (Bulow & Klemperer, 2002). It is also possible that individual Lerner indices decrease while the average level of market power increases. This can be the case when more efficient firms, with a higher price-cost margin, are gaining more market share with regard to the less efficient firms (Boone, 2008).

2.1.4. Boone's indicator

Boone's indicator is calculated as the elasticity of profits to marginal costs. The indicator is based on the idea that efficient firms are rewarded more in a competitive market than in a non-competitive market. So in other words, an efficient firm earns more profit (and/or market share) and in a competitive market the difference between efficient and inefficient firms will be bigger (Boone, 2008). The formula to calculate Boone's indicator is as follows:

$$LN\pi_i = \alpha + \beta LNc_i + \varepsilon_i$$

where π_i stands for the profit and c_i for a measurement of costs of firm i . Boone indicator (coefficient β) gives the profit elasticity. In theory this indicator is negative, an increase of a percentage in the costs of bank i results in some percentage drop of the profits of bank i . The more competitive the market, the lower Boone's indicator. So there is a negative relationship between competition and Boone's indicator. In some situations, efficient firms choose to gain more market share with lowering its output prices instead of maintaining the same output price as competitors (Van Leuvensteijn, Bikker, van Rixtel, & Sorensen, 2011). In that case the dependent variable should be replaced with the firms' market share as follows:

$$LNsi = \alpha + \beta' LNc_i + \varepsilon'_i$$

where si stands for the market share of bank i .

Boone's indicator is also an approximation of reality. For example, it does not account for the fact that firms also can invest their additional profit that they gained for being efficient in investment for being more or still efficient in the future. The same problem arises in a market with heterogeneous goods. A change in costs often relates to a different strategy to deal with the competition. There are even situations possible where the coefficient becomes positive. This is the case when firms compete in quality (Tabak, Fazio, & Cajueiro, 2012). Boone's indicator is still a very new way to measure competition and not used very often and thoroughly investigated by the existing literature.

2.2. Bank size

Bikker and Haaf (2002) investigate the relationship between competition and market structure in the international banking industry with an empirical analysis. They divide their data by defining three sub-markets in terms of banks sizes. Their research shows that there is stronger competition among large banks and weaker among small banks. The medium-sized banks are positioned in between. The large banks are mainly operating in international markets, where small banks are mainly operating in local markets. In some countries, they even find indications of a perfect competition among large banks. The competition among banks also seems to be stronger in Europe than countries like Japan, Canada and the United States. Lastly, they can confirm that a few large banks are able to restrict competition, whether or not as a cartel. So according to Bikker and Haaf the size of the bank does matter on the level of competition.

2.3. Basel II Accord

Claessens and Laeven (2004) find in their research that activity restrictions are negatively associated with competitiveness, so fewer activity restrictions have a more competitive banking sector as a result. This is in accordance with the contestability theory, see related literature paragraph 2.1.1. It can be more difficult for an entrant to enter the market or to leave the market due to the Basel II Accord. So the implementation of the Basel II Accord could cause a less competitive banking sector. This view is supported by Berger, Demirguc-Kunt, Levine and Haubrich (2004). They agree that regulatory restrictions are followed by negative effect on competition and because of that higher prices for customers.

According to Hakenes and Schnabel (2011) can the introduction of the Basel II Accord lead to fiercer competition due to the lower capital requirements for safe loans. They give a theoretical approach of the effect of the Basel II Accord on the competition between banks. Large banks opt for the IRB approach and because of that, the marginal costs of the large banks drop and they increase the deposit rates to attract more deposits. The introduction of the Basel II Accord may also lead to an increase in aggregate risk in the economy. Only large banks benefit from the lower capital requirements for safe loans, because the implementation of the IRB approach is very costly and causes high fixed costs. The marginal costs of small banks do not drop, but they also raise their deposit rates in order to recapture or hold their market

share. So the fiercer competition may result in the effect that smaller banks take more risks and destabilize the banking system. Little empirical research is done of the effect of the Basel II Accord on the competition between banks and this paper tries to contribute in that way to the existing literature.

2.4. Summary

This section gives a brief summary of the existing empirical literature. It shows which measurement for competition is used and the significant variables on competition. The sign between the parenthesis shows if the significant effect positive (+) or negative (-).

Paper	Competition measure	Significant variables
Bikker & Groeneveld (2000)	H-statistic	Concentration (-)
Bikker & Haaf (2002)	H-statistic	Bank size (+)
Claessens & Laeven (2004)	H-statistic	Activity restrictions (+) Foreign bank ownership (+) Entry restrictions (-) Concentration (+)
Casu & Girardone (2009)	Lerner index	Efficiency (little effect -)
Demirguc-Kunt & Peria (2010)	H-statistic, Lerner index	Market power (-) Concentration (+)
Van Leuvensteijn, Bikker, van Rixtel, & Sorensen (2011)	Boone's indicator	Loan rates (-)

Table 1. Summary significant variables from the discussed papers in the related literature.

2.5. Hypothesis

The introduction of the IRB approach leads to a drop of the marginal costs of bigger banks (Hakenes & Schnabel, 2011) and acts as a barrier to entry for new banks (Claessens & Laeven, 2004) and thus leads to an increase in the competition between banks. Therefore, this paper will be testing the following hypothesis: "The competition between banks increased after the announcement of the Basel II Accord." Because I use the Lerner index as a measure for competition, the hypothesized effect of the explanatory variable on the Lerner index is expected to be negative, because the Lerner index decreases if competition becomes more fierce.

Explanatory Variables	Hypothesized effect
Dummy variable Basel II	-

Table 2. Hypothesized effects of the explanatory variable on the dependent variable.

If long-term interest rates are high, the general economic conditions are usually bad and competition between banks should increase to maintain their market share. Therefore, there should be a positive effect on competition.

We also need to control for the size of banks and because of that we take the natural logarithm of the bank's total assets. According to the theory mentioned in related literature paragraph 2.2, the competition should be fiercer between bigger banks. The hypothesized effect of the bank size is expected to be positive. How bigger the banks, how bigger the competition.

The effect of bank activity on competition is expected to be positive. Most likely if the bank has only one activity, in this case giving loans, it is more difficult for the bank diversify himself from other banks. It can only compete on one market against other banks so it is more likely that the competition for the bank should be fiercer. The hypothesized effect of the control variables on the Lerner index is expected to be negative, because the Lerner index decreases if competition becomes fiercer.

Control Variables	Hypothesized effect
Long-term interest	-
Bank size	-
Bank activity	-

Table 3. Hypothesized effects of the control variables on the dependent variable.

3. Data & Methodology

3.1. Sample

Today the European Union consists of 28 member states, but at the time of the announcement of Basel II the European Union consisted of 25 member states. In May 2014, the European Union welcomed ten new members: Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovenia, Slovakia and the Czech Republic. To study the impact of the announcement of Basel II on competition between European banks, I have selected fifteen member states. These are the member states that were already member of the European Union before 2004: Belgium, France, Italy, Luxembourg, Kingdom of the Netherlands, Germany, Denmark, Ireland, United Kingdom, Greece, Portugal, Spain, Finland, Austria and

Sweden. The European countries who became a member of the EU in May 2004 were not selected to exclude external effects, because they became a member just one month before the announcement of Basel II. Only the announcement date and not the implementation date matters because banks start to change their behavior after the announcement date. They don't change their behavior after the implementation date as a result of the Basel II Accord.

The individual bank data source is Bankscope. I have selected commercial banks, savings banks, cooperative banks, investment banks and real estate/mortgage banks, only bank holdings are left out to avoid double counting. The panel dataset covers yearly bank data from the period from 2000 to 2008, 4.5 years before and after the announcement of the Basel II Accord. This leads to a dataset of 3195 European banks and 28755 observations. After the filter to create the dependent variable *pricemargin* as explained further in this research in paragraph 3.3.1, we can observe from Appendix table 8 that there are in general less observations in the years 2000 till 2004 and for the year 2008. For the years 2000-2004, this can be explained due to the fact that there is less data available via Bankscope. For the year 2008, it can be explained by the Global Financial Crisis and because of that banks did not make any profit and are filtered out as mentioned in paragraph 3.3.1. We also observe that bigger countries have more banks. Only Germany and Austria have exceptionally more banks, but that is because of the structure of the banking sector in those countries. There are many local and regional banks.

3.2. Subsamples

The sample is divided in four subsamples. I have divided the variable *Total Assets* in four subsamples to research if there is a difference of the effect of bank size on competition. The four new samples are named *smallbanks*, *mediumsmallbanks*, *mediumlargebanks* and *largebanks*, where *smallbanks* covers the smallest 25% of banks based on total assets and *largebanks* the biggest 25% of the banks. Below are the descriptive statistics of the subsamples:

Subsample	Min	Max	Average	Observations
Smallbanks	0,332	210,25	108,83	4885
Mediumsmallbanks	210,3	530	347,41	4885
Mediumlargebanks	530	1530,8	917,92	4885
Largebanks	1530,8	2.150.537	32.576,93	4886

Table 4. Descriptive statistics of the subsamples of total assets in mln EUR

3.3. Variables

3.3.1. Dependent variable

The dependent variable is competition measured by the *price-cost margin*. It is based on the measurement with the Lerner index as mentioned in related literature paragraph 2.1.3. This measurement is the most appropriate way of measuring competition with the available data. The *price-cost margin* is measured with the use of Bankscope variables in million EUR. The variable *price-cost margin* is created by dividing *Profit Before Tax* by the sum of the *Net Interest Revenue* and *Other Operating Income*. This is an approximation of the price-cost margin and because the output has to be between 0 and 1, the output is filtered. This reduces the dataset to 19541 observations.

	Observations before	Observations after
Filter price-cost margin	28755	19541

Table 5. Number of observations after output filter

3.3.2. Explanatory variable

The first explanatory variable is the dummy for years after the announcement of Basel II (*baselii*). The dummy takes the value of 1 in the years 2004-2008 and 0 in the years 2000-2003, leading to 6495 observations with the value 0 and 13046 observations with the value 1. Despite that the announcement took place in June 2004, the whole year of 2004 is included in the dummy because there was already some effect in 2004.

3.3.3. Control variables

The use of the control variable *Long-term interest rates* filters the effect of the general economic conditions. It refers to government bonds maturing in ten years. The data source is the database of the Organisation for Economic Co-operation and Development (OECD) and contains the years 2000-2008. The long-term interest rates of Belgium, France, Italy, Luxembourg, Kingdom of the Netherlands, Germany, Denmark, Ireland, United Kingdom, Greece, Portugal, Spain, Finland, Austria and Sweden are used, but data from Luxembourg in the period 2007-2008 is missing because it's unavailable. The lowest long-term interest rate is 2.4%, 2005 in Luxembourg and the highest long-term interest rate is 6.1%, 2000 in Greece. This forms the variable *interest*.

Besides the general economic conditions, we also need to control for bank size and bank activity. To control for bank size, we follow Anginer, Demirguc-Kunt and Zhu (2012) and take the natural logarithm of the total assets from Bankscope and this forms the variable *lnassets*. To control for bank activity, I use the loan ratio from Bankscope (loans/total assets). This forms the variable *loanratio*.

3.4. Methodology

This thesis uses a regression (OLS) to analyze the panel data to look for a causal effect between the introduction of the Basel II Accord on competition and follows the measurement of the Lerner index. I start with a model without fixed effects. I will also regress a fixed-effects model because there are country fixed-effects and they have to be filtered out of the model. Time fixed-effects are not taken into account because we are not interested in the variance in one year. I use EViews to do the statistical analysis to forecast the model. The models have the following form, where t=time, c=country, i=bank, α is the intercept and α_c the country specific intercept.

$$pricemargin_{itc} = \alpha + \beta_1 baselii_t + \beta_2 lnassets_{itc} + \beta_3 longterminterest_{ct} + \beta_4 loanratio_{ict} + \varepsilon_{it} \quad (1)$$

$$pricemargin_{itc} = \alpha_c + \beta_1 baselii_t + \beta_2 lnassets_{itc} + \beta_3 longterminterest_{ct} + \beta_4 loanratio_{ict} + \varepsilon_{it} \quad (2)$$

Before running the regression, the variables *lnassets*, *longterminterest* and *loanratio* are checked for multicollinearity, see Appendix table 8. I add an autoregressive term to model (2) to check if the dependent variable *pricecostmargin* is autoregressive:

$$pricecostmargin_{itc} = \alpha_c + baseli_t + \beta_2 lnassets_{itc} + \beta_3 longterminterest_{ct} + \beta_4 loanratio_{ict} + \beta_5 pricecostmargin_{ict-1} + \varepsilon_{it} \quad (3)$$

Model (3) will be used with the four subsamples, because we also want to see if there is a difference between the bank size and the effect of the Basel II Accord on competition as mentioned in paragraph 3.2. The model with the *smallbanks* sample is output (4), the model with the *mediumsmallbanks* sample is output (5), the model with the *mediumlargebanks* sample is output (6) and the model with the *largebanks* sample is output (7).

4. Results

The results of this research are described below in table 6. As we can see Model (1), the model without the country fixed effects, is not a good model. The R^2 of this model is 0,04, so we cannot conclude much. Model (2) could be a better model, but is not checked for an autoregressive dependent variable. Model (3) shows us that the dependent variable is autoregressive and is because of that the best model. The R^2 of this model is 0,62 and explains 62% of the variance.

The number of observations of Model (3) is lower than Model (2), that is because the autoregressive term. The values of the year 1999 are not in the sample, so we cannot calculate the output for the year 2000. All the variables are significant at 1%, so we can say that they differ from 0. The autoregressive term is by far the biggest coefficient and the current price-cost margin depends mostly on the price-cost margin of one year before. There is also an effect of the control variables on the price-cost margin. The effect of the control variables bank size and bank activity is very small, but significant. They both have a (small) positive effect on the price-cost margin, so a negative effect on competition. This is the opposite effect of what we had expected. The long-term interest has a bigger effect on competition. Remember that the price-cost margin lays between 0 and 1, so an increase of 1 (for example from an interest

rate of 1% to a rate of 2%) of the long-term interest rate has a negative impact of -0,0237 on the price-cost margin and thus a positive effect on competition. This meets our expectations. This is the same for the effect of the Basel II Accord. We expected a negative effect on price-cost margin and this outcome tells us that there is a negative effect on the price-cost margin, so a positive effect on competition. Although is it a quite small negative effect, the price-cost margin declines with 0.0133. The effect loanratio and the lnassets are the opposite of the effect we had expected. They are significant but their coefficients are very small and do not have a big impact on competition.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
C	0.0343** (0.0143)	0.2849*** (0.0234)	0.1464*** (0.0101)	0.1129*** (0.0271)	0.1719*** (0.0362)	0.1591*** (0.0339)	0.1719*** (0.0205)
Baselii	0.0477*** (0.0033)	-0.0101*** (0.0022)	-0.0133*** (0.0021)	-0.0048 (0.0053)	-0.0139*** (0.0039)	-0.0173*** (0.0038)	-0.0227*** (0.0045)
Lnassets	0.0137*** (0.0007)	0.0030 (0.0033)	0.0015*** (0.0005)	-0.0024 (0.0028)	-0.0031 (0.0054)	-0.0010 (0.0044)	0.0048*** (0.0013)
Longterminterest	0.0250*** (0.0028)	-0.0174*** (0.0017)	-0.0237*** (0.0021)	-0.0064 (0.0051)	-0.0236*** (0.0038)	-0.0275*** (0.0037)	-0.0371*** (0.0040)
Loanratio	-0.0008*** (6.07E-05)	-0.0002 (0.0001)	0.0002*** (4.21E-05)	-0.0001 (9.44E-05)	-0.0002* (8.77E-05)	0.0001 (8.17E-05)	0.0003*** (7.62E-05)
Pricecostmargin(-1)			0.7919*** (0.0050)	0.6816*** (0.0125)	0.7877*** (0.0102)	0.7912*** (0.0093)	0.849*** (0.0093)
Country-fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	19262	19262	15728	3510	4090	4201	3927
R ²	0.04	0.76	0.62	0.46	0.60	0.64	0.71

Table 6. Overview coefficients and standard deviations (between parentheses) of the models on the dependent variable pricecostmargin.

* Indicates statistical significance at 10%

** Indicates statistical significance at 5%

*** Indicates statistical significance at 1%

If we compare the differences between the sizes of the banks, we see of couple of interesting outcomes. First, we cannot conclude that the price-cost margin between the smallest banks changes after the announcement of the Basel II Accord, but the effect of the announcement Basel II Accord becomes bigger if the banks are larger. The effect is like the effect we had expected. The biggest effect is for the sample of the largest banks. This is the same for the effect of the long-term interest rate on the price-cost margin. The effect of the long-term interest rate is almost 1.5

times bigger for the larger banks than output for the whole sample as mentioned in Model (3). A possible explanation can be that larger banks are often international banks and are because of that more sensitive for the general economic conditions. It is also interesting to see that the price-cost margins of the larger banks depend more on the price-cost margins of the year before. The R^2 of the Models (4-7) are in the range of 0.46 of the *smallbanks* sample and 0.71 of the *largebanks* sample. This suggests that in the case of small banks that there might be are other variables that contribute to the price-cost margin.

5. Conclusion

The existing literature gives multiple measurements for competition. The most important measurements are concentration, the H-statistic, the Lerner index and Boone's indicator. There is no consensus on the best measurement of competition. This can also be concluded from the existing empirical literature. However, it seems from the existing literature that also bank size matters for the level of competition (Bikker & Haaf, 2002). This research tries to clarify the impact of the announcement of the Basel II Accord on the competition between European banks. Hakenes & Schnabel (2011) give a theoretical explanation that the competition should have increased after the announcement of the Basel II Accord.

This research supports that view. With the use of the Lerner index, the results show that the competition between European banks has increased after the announcement of the Basel II Accord. This effect seems to be fiercer between the larger banks. Furthermore, this research shows that the competition between larger banks depends more on the competition of one year before. This might suggest that it is more difficult for larger banks to change competition in the short term. This research also shows that competition between larger European banks is more sensitive for a change in the long-term interest rate than smaller banks.

Although as mentioned in the related literature paragraph 2.1.3, the Lerner index does not account for the efficiency of banks. Officially, the Lerner index determines market power. Market power definitely contributes to competition, but competition depends on more than only market power. This research tried to give the best approximation, but in reality it is way more complex. This might have effect on competition and could give other results.

The outcome of these results is in the first case important for EU policy makers. It is a signal about the effect of the Basel II Accord on the competition between banks. They can learn from the impact of the Basel II Accord and take this into consideration for future accords and regulation for the banking sector. Secondly, it is important for the community. They are the ones who might take advantage from lower prices now the competition has increased after the announcement of the Basel II Accord.

More research has to be done about the impact of the Basel II Accord on competition. This might be done with the other mentioned measurements to see if the conclusion is the same. It is also useful to do more research about the impact of the Basel II Accord for the community and see if they are better or worse off. Especially because the Basel III Accord is already announced and that accord will not be the last one.

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Appendix

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Belgium	20	20	19	22	22	26	30	27	21
France	97	96	97	99	113	165	179	194	189
Italy	1	4	5	-	5	442	464	471	465
Luxembourg	37	37	37	36	42	43	45	56	52
K. of the Netherlands	6	6	8	7	17	22	21	20	22
Germany	1164	1200	1180	1163	1183	1450	1455	1491	1456
Denmark	35	33	35	35	45	55	58	57	37
Ireland	3	2	2	4	14	20	22	18	9
UK	65	67	65	69	99	132	132	131	113
Greece	-	-	1	1	7	6	9	9	9
Portugal	3	4	2	2	3	17	24	25	19
Spain	4	3	4	4	26	98	96	88	98
Finland	-	-	-	1	4	7	8	11	12
Austria	110	115	121	160	187	195	228	224	190
Sweden	7	58	59	60	59	62	72	72	51

Table 7. Number of observations per year and country.

	<i>lnassets</i>	<i>interest</i>	<i>loanratio</i>
<i>lnassets</i>	1	-0.01771 (0.0116)	-0.00394 (0.5750)
<i>interest</i>	-0.01771 (0.0116)	1	0.0183 (0.102)
<i>loanratio</i>	-0.00394 (0.5750)	0.0183 (0.102)	1

Table 8. Correlation between control variables.