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Higher Bank Capital Requirements and Mortgage Pricing: Evidence from the Counter-Cyclical Capital Buffer

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We examine mortgage pricing before and after Switzerland was the first country to activate the Counter-Cyclical Capital Buffer of Basel III. Observing multiple mortgage offers per request, we obtain three core findings. First, capital-constrained and mortgage-specialized banks raise their rates relatively more. Second, risk-weighting schemes supposed to discriminate against more risky borrowers do not amplify the effect of higher capital requirements. Third, CCB-subjected banks and CCB-exempt insurers raise mortgage rates, but insurers raise rates by on average 8.8 bp more. To conclude, lenders welcome the opportunity to increase mortgage rates, but stricter capital requirements do not discourage banks from risky mortgage lending.

Keywords: Bank Lending, Mortgage Market;
JEL-Codes: G21; E51

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1. Introduction

In February 2013 Switzerland became the first country to activate the *Counter-Cyclical Capital Buffer (CCB)* as the macro-prudential tool of Basel III. Its first Swiss activation required banks to hold extra equity capital worth 1% of their issued risk-weighted residential mortgages.

This paper investigates the impact of the CCB's increased capital requirements on mortgage pricing. We shed light on different bank balance sheet characteristics including capitalization, business model, portfolio and funding structure that might render banks more sensitive to the effects of the CCB. As risk-weighting schemes tied to loan-to-value (LTV) ratios link the riskiness of individual borrowers to the regulatory capital requirements of banks, we also examine whether these threshold LTV ratios amplify the CCB effects. We exploit a comprehensive dataset of a Swiss online mortgage broker, which allows us to separate mortgage demand from mortgage supply. Customers provide detailed information on their financial situation and the real estate property they intend to buy. Then, each mortgage request receives several binding but independent offers by banks and insurance companies. As we observe responses from both banks and insurers, we can also analyze the effect on insurers which do not need to comply with the CCB's capital requirements.

Our study yields three core findings. First, capital-constrained banks and banks that are specialized in the mortgage business raise their offered mortgage rates relatively more. Hence, banks do not only charge more on new mortgages after the CCB, but also do specialized banks recover the costs of higher capital requirements for mortgages already on their balance sheets. Indeed, these specialized banks pass higher costs on to new mortgage customers. Second, banks in general charge more on very risk mortgages with critical LTV ratios above respectively 66% and 80%, but these threshold LTVs do not amplify the CCB effects. Risk-weighting schemes put an extra equity levy in terms of equity capital requirements on mortgages with LTV ratios above

66% and again with LTV ratios above 80%. One might hence anticipate that banks claim extra compensation for granting these more equity capital-intensive mortgages in general and even more so after the CCB imposes higher capital standards. However, we find that banks price these LTV thresholds, but risk-weighting schemes do not amplify the CCB effect. In this light, we might interpret LTV thresholds as signals for very risky mortgages inducing all lenders to charge a risk premium. Apparently, the existing risk-weighting schemes create only a relatively weak link between LTV ratios and capital requirements. Our third finding suggests that banks and insurers increase their average mortgage rates after the CCB's activation, but insurers raise rates by on average 8.8 bp more than banks. For this reason we infer that in the Swiss mortgage market there has been little "policy leakage" in the sense of CCB-exempt insurers seeking to underbid CCB—subjected banks. By contrast, we find that insurers aim for higher profits rather than seeking to expand their market share. We interpret this as the insurers' attempt to reap additional profits in a low interest rate environment with scarce profitable investment opportunities. Generally speaking, the CCB activation raises mortgage rates but neither banks nor insurers become more reluctant to offer mortgages.

To conclude, both types of mortgage lenders welcome the opportunity of higher capital requirements on banks to raise mortgage rates and potentially expand their profits. Yet, common risk-weighting schemes associated with the Basel capital standards do not amplify the CCB effect and thus do not prevent banks from offering very risky mortgages.

Our unique setup and dataset allow us to advance the understanding of the effects of the CCB as the macro-prudential policy tool of Basel III in a number of ways. First, Switzerland was the first country worldwide to activate the CCB. This allows us to assess how higher bank capital requirements affect the willingness of banks to make a mortgage and the explicit pricing of mortgages. Second, our dataset allows us to disentangle mortgage supply and mortgage demand

as several banks submit independent offers for each anonymized mortgage request. We can thus attribute differences in the pricing of banks to their idiosyncratic balance sheet characteristics that might strengthen a bank's sensitivity to higher capital requirements. As banks cannot observe their competitors' offers and participation, we put forward that individual offers are not distorted by superior knowledge, private information or aspects of competition. Third, we study the effectiveness of risk-weighting schemes on the pricing of returns to a specific asset class. In general, risk-weighting schemes specify how risk characteristics of a certain asset class translate into bank-specific regulatory capital requirements. We examine how a positive shock to capital requirements on an asset class that is possibly amplified by risk-weighting schemes shapes a bank's pricing of that assets class. Our results hence also inform the debate on the appropriate design of the risk-weights to exercise incentive effects that might contribute to make asset portfolios more resilient towards shocks. Fourth, our comparison of banks with insurers allows us to track possible leakage effects of a regulatory measure that targets some market participants but may also have an indirect effect on other market participants.

The remainder of the paper is structured as follows. The next section sketches the regulatory background of Basel III, the specific tool of the CCB as well as its implementation and activation in Switzerland. It also outlines the relevant literature. Section 3 presents our dataset and Section 4 our empirical approach with regression specifications and results. Section 5 concludes and discusses potential policy implications as well as possible avenues for future research.

2. The CCB and its Higher Capital Requirements

2.1 Switzerland as the first country to activate the CCB

The Counter-Cyclical Capital Buffer (CCB) is the macro-prudential component of the Basel III banking regulation published by the Basel Committee on Banking Supervision (BCBS, 2010a). In Switzerland, Basel III entered into force on January 1, 2013. The purpose of the CCB is to address the *pro-cyclicality* of bank capital requirements implied by earlier sets of the Basel regulation. In that previous regulation, risk weights were tied to the estimated probability of default which however tended to fall in periods of high credit growth.[1] Thus lending was made less expensive in periods in which growth was already high and vice-versa, thus *reinforcing* the credit cycle. In response, the Basel Committee developed the CCB (BCBS, 2010b).

The CCB comes on top of the *minimum capital requirement* (MCR) already in place under Basel II and the *capital conservation buffer* also introduced by Basel III. The minimum requirement amounts to 8% of risk-weighted assets (RWA) and its violation will automatically trigger regulatory action. The *capital conservation buffer* acts as a cushion when equity capital temporarily falls in times of financial market turmoil. Its size depends on regulators' assessment of a bank's systemic importance. In Switzerland it ranges from 2.5% to 6.4% of RWA, depending on which out of 5 risk groups a bank has been assigned to. FINMA (2011) and Jans & Passardi (2013) provide more details on the implementation of the minimum capital requirement and the capital conservation buffer in Switzerland.

In contrast to these permanent requirements, Swiss national authorities can impose the CCB as an additional temporary capital requirement whenever they deem credit growth excessive. The Basel Committee (BCBS, 2010b) stated two official objectives for doing so. First, by requiring

[1] See for instance Gordy and Howells (2006) or Aikman et al (2014), as well as the relevant papers cited therein.

the build-up of additional equity capital in periods of high credit growth, the aim was to *strengthen lenders' resilience* to potential loan losses when the risk of such losses increases.[2] Second, under the common assumption that internal finance is more expensive than external finance (which often enjoys tax privileges), higher capital requirements should also make lending more expensive and thus slow down credit growth when the buffer is activated.

The Basel III accords in general and the CCB in particular have been and are being implemented in different countries at different points in time. In Switzerland, Basel III has in general entered into force on 1 January 2013, with phase-in periods for some requirements. By contrast, in view of a potential real estate bubble, national authorities' ability to activate the CCB was already implemented into Swiss law in July 2012. According to the general Basel III framework, the CCB applies to all risk-weighted assets. In deviation from this, the Swiss setup allows the authorities to activate the CCB only for part of banks' portfolios. In this light, Swiss authorities decided to restrict the first activation of the CCB to risk-weighted *domestic residential mortgages* in order to address a potential housing bubble without risking to cause a credit crunch in other bank lending activities. Upon recommendation by the Swiss National Bank (SNB) and after consultation of the supervisor FINMA, the Swiss government activated the CCB on 13 February 2013. It required banks to raise additional CET 1 capital worth 1% of their risk-weighted domestic residential mortgages by September 2013.[3] [4]

To disentangle the effects of the CCB's activation, one must also pay attention to other changes in regulation affecting the Swiss mortgage market. As common in Switzerland during the past years, the Swiss Bankers Association has published such sets of regulatory standards as so-called

[2] There has also been a lively discussion of which indicators would be suitable to time activation and release of the CCB. See Drehmann et al. (2010), Drehmann et al. (2011), Repullo & Saurina (2011), Edge & Meisenzahl (2011), Hahm & Shin (2013), BOE (2014).

[3] About a year later, in January 2014, that requirement was furthermore raised to 2%, to be fulfilled by July 2014, but that increase is not investigated here for lack of data on the subsequent period.

[4] For further details on the first activation of the CCB, see SNB (2013a) and SNB (2013b).

self-regulation guidelines. The supervisor FINMA has recognized them as universal standards and broadened their scope to all banks. First qualitative guidelines on mortgage lending were published in Swiss Bankers Association (2011). After pressure from the authorities, these were complemented by additional requirements in Swiss Bankers Association (2012), which entered into force in July 2012. Since then, households must provide at least 10% of the house value as "hard" equity not taken from pension assets. Furthermore, new borrowers are required to reduce their LTV ratio to a maximum of two-thirds within 20 years, countering Swiss tax incentives to keep debt high as long as allowed by the mortgage contract. To ensure that we disentangle effects of the CCB activation from these regulatory changes, our sample starts in July 2012, so that the same customer guidelines apply throughout our sample period. Figure 1 illustrates the different periods of our sample. Finally, note that both the CCB and the self-regulation apply to all banks contained in our sample, including subsidiaries of foreign banks, but neither applies to insurers. As outlined in FINMA (2014), insurers account for about 4% of Swiss residential mortgage lending. We elaborate on the role of insurers in Subsection 4.4.

2.2 By how much might the CCB increase mortgage rates?

This section develops a back of the envelope estimate for the anticipated increase in mortgage rates that banks charge after the CCB's activation. Initially we gauge the additional cost that a bank incurs when funding 1% of a risk-weighted mortgage with equity rather than debt. Figure 2 computes the cost differential for a bank that intends to make a mortgage worth CHF 1mn. As published in the most recent report by the Swiss National Bank (see SNB, 2012), we draw on the Swiss market-wide average risk-weight of 40% and hence assume a corresponding loan-to-value (LTV) ratio of about 77%. This implies a *risk-weighted* mortgage amount of CHF 400'000. Hence, the 1% CCB implies an additional equity capital requirement worth CHF 4'000. As the

bank has to replace debt by equity capital funding, we have to multiply those CHF 4'000 with the cost differential between equity and debt finance. Based on the public annual reports of the banks in our sample, we compute an average cost differential of 3.84%. To proxy this cost differential we take the difference between the average reported return on equity and the average ratio of interest expenses to external funding by deposits and bonds. Ultimately we arrive at an extra cost worth CHF 154, or 1.54 bp when set in relation to the mortgage amount.

Indeed, a bank has 3 options to comply with the CCB's stricter capital requirement when offering a mortgage. First, it can add less than those 1.54 bp to its previous mortgage rates and incur part of this cost itself in an attempt to underbid competitors. Second, it can pass on exactly this amount and thereby pass on the additional cost of the respected mortgage to the customer. Third, it can add more than this amount to its previously charged mortgage rates for two reasons. On the one hand, a bank might welcome this opportunity to boost its profits as customers know that mortgages will become more expensive because of the CCB for each given bank refinancing interest rate. On the other hand, if a bank is very specialized in mortgage lending, it carries a balance sheet burden as the CCB applies to existing and new mortgages. In this sense, a bank might pass on not only the additional cost for the new mortgage, but it might attempt to roll over part of its imposed cost burden that ensues from issued mortgages with mortgage rates having been contracted in the past. Section 4.2 provides more details on which balance sheet characteristics render a bank particularly sensitive to the CCB's effects.

To sum up, one might expect the CCB to generate extra cost of about 1.54 bp for an average mortgage and a bank might incur part of this cost itself, add exactly this amount to its previous mortgage rates or raise mortgage rates by even more.

2.3 Existing Literature

While there has been some work on the need for more counter-cyclical instruments as well as on possible conditioning variables, work on the effects of a CCB once implemented is very limited. As Switzerland was the first country to activate a CCB in February 2013, empirical evaluations of the CCB as included in Basel III do to the best of our knowledge not yet exist. Yet several strands of the literature relate to our paper.

First, there is a literature on how actual bank capitalization affects bank lending. On the theory side, Boot et al. (1993), Sharpe (1990), Diamond and Rajan (2000) develop models that examine how equity capital should affect bank lending. Gersbach and Rochet (2012) build a simple model of bank lending and show that the volatility of lending can be reduced by requiring higher capital ratios in boom times. With respect to the regulatory framework, Repullo and Suarez (2004) investigate how the transition from Basel I to Basel II translates into changes in a theoretical loan pricing equation. On the empirical side, Hubbard et al. (2002) find that banks with low capital demand higher rates from borrowers with high switching costs. Steffen and Wahrenburg (2008) find support for this result in their analysis of UK loans. Santos and Winton (2010) point out that less well capitalized banks are more sensitive to their customers' characteristics than better capitalized ones. Kashyap and Stein (2000) find that banks with less liquid balance sheets exhibit a stronger lending effect in response to a monetary policy shock. Kishan and Opiela (2000) stress that the degree of capitalization matters in that small and less well capitalized banks respond most strongly to monetary policy. Based on Italian data, Gambacorta and Mistrulli (2004 and 2014) measure capitalization not simply as the absolute capital to assets ratio, but as the percentage deviation of that ratio from its regulatory minimum. We borrow this measure of capitalization to proxy the sensitivity of banks towards a regulatory capital shock.

More specifically on the effects of regulatory capital requirements, several papers conduct mostly accounting-based quantitative impact studies (QIS) on the effect of capital requirements on loan pricing. These include Cournède and Slovik (2000), Elliot (2009), King (2010), Cosimano and Hakura (2011) and Hanson et al. (2011).

While assuming that the costs of equity and debt remain unchanged, Cournède and Slovik (2000) draw on a balance sheet identity and apply it to aggregate data of different industrialized countries. This approach implicitly corresponds to our back of the envelope concept as we draw on the same set of assumptions and let the analogous ratios enter our compution. To put our back of the envelope estimate of 1.54 bp into perspective, it is important to recognize that estimates crucially hinge on the assumed average risk-weight applied to the mortgage as well as on the difference between the cost of debt and equity funding. The cost differential used in the studies cited above ranges from 7.7% for Japan to 12.7% for the US as opposed to 3.84% in our sample of Swiss banks. Their average risk-weight applied to all assets ranges from 53.9% for the Euro area and 76.4% for the US as opposed to the average risk weight of 40% based on the Swiss mortgages market. This might explain why their estimated impact of a 1% increase in equity capital applying to all risk-weighted assets ranges from 8.4 bp for Japan, 14.3 bp for the Euro area and 20.5 bp for the US, respectively and thus considerably exceeds our back of the envelope estimate applied to risk-weighted mortgages only and a much lower cost differential.

More specifically on the CCB, Drehmann and Gambacorta (2012) run a simulation of the CCB effects on bank lending and find that the buffer can indeed slow down credit growth during booms and moderate a credit contraction once it is released.

The closest to an empirical evaluation of the Basel III CCB by use of micro-level data is the work by respectively Aiyar et al (2012) and Jiménez et al. (2012). Aiyar et al (2012) evaluate the effects of bank-specific capital requirements in the UK that, while not being part of an explicit

"macro-prudential policy", used to vary counter-cyclically already since Basel I. On the theory side, they point out that for counter-cyclical capital requirements to affect mortgage lending, banks must not be too over-capitalized relative to regulatory requirements from the outset. Our analysis pays special attention to the issue of excess capitalization against the background of Swiss banks during the phase-in period of Basel III[5]. Aiyar et al (2012) also emphasize that the purpose of counter-cyclical capital requirements may be defeated when there exists a set of lenders to whom the requirements do not apply.[6] This motivates our analysis of the lending response of insurers in Switzerland.

Jiménez et al. (2012) by contrast evaluate the effects of "dynamic provisioning" introduced by Spain already in 2000. The policy required provisioning conditional also on system-wide indicators rather than only bank-specific losses. As Crowe et al. (2011) point out, counter-cyclical provisioning differs from counter-cyclical capital requirements along the important dimension that the requirements are binding also when banks are already better capitalized than required by regulators. Jiménez et al. (2012) use bank, loan and firm level data to analyze the impact of these provisions on bank lending to firms. They find that the countercyclical provisioning rules did indeed help to smooth the Spanish credit cycle.

2.4 Defining the scope of our paper

Our paper differs in several respects from the above-cited work. First, we empirically analyze the specific CCB as the macro-prudential tool of Basel III. Second, we focus on mortgages and hence bank lending to private households rather than bank lending to firms as mostly analyzed in the literature (see i.e. Cornett et al., 2011, Jiménez et al., 2012, Gambacorta and Mistrulli, 2014).

[5] Swiss banks must attain the capital conservation buffer requirements mentioned in Section (2.1) between 2013 and 2019.

[6] This potential weakness is also mentioned in European Systemic Risk Board (2014)

Third, we do not only analyse the propensity of banks to make a loan (like for instance Jiménez et al., 2012), but also do we explicitly investigate the pricing of independent offers per individual mortgage request. In doing so, we exploit data on binding mortgage offers submitted by banks with specified mortgage rates and conditions. To examine mortgage supply, we can take request fixed effects to switch off any aspects of borrower risk in order to analyze how a bank's portfolio structure, capitalization and business affect mortgage pricing before and after the CCB's activation. To examine mortgage demand, we can take lender fixed effects to analyze how borrower risk translates into mortgage pricing before and after the CCB. This allows us to go beyond merely assessing the aggregate rise in lending spreads. To examine possible leakage effects, we compare the mortgage pricing of insurers to that of banks.

As indicated above, the Basel Committee explicitly lists two goals of the counter-cyclical capital buffer. First, banks are to hold more equity capital to bear potential losses and thus become more resilient to potential credit losses. Our paper abstains from analyzing whether banks have indeed strengthened their capital base after the CCB's activation. But it assesses whether better capitalized banks, banks with more corporate or reserve capital and banks which have just increased their equity capital respond differently to the CCB. Second, the CCB is to slow down lending growth during booms by making lending more expensive. This paper examines whether banks become indeed more or less reluctant to make new mortgages, how the effect of the CCB on pricing depends on bank characteristics, and whether banks charge extra for very risky mortgages before and after the CCB's activation.

3. Data

The online platform Comparis intermediates many financial services for private households and it provides us with the data of their mortgage platform. Customers pay CHF 148 (about USD 160 as of 2014) and submit comprehensive information on the real estate property to be bought, their household finances and the requested mortgage amount and maturity model. Comparis sends the anonymized customer request to different mortgage lenders. As common in Switzerland, banks and big insurance companies constitute the supply side on the Swiss mortgage market. Having screened the customers, mortgage lenders then decide whether to make a binding offer and at which mortgage rate and conditions. Indeed, lenders have an incentive to submit competitive offers while knowing that customers will most likely have a choice among on average almost five independent offers from banks and insurers. These offers vary across mortgage interest rates, while lenders cannot deviate from the requested mortgage amount.

This dataset forms the backbone of our paper and it has several remarkable features that suit our empirical analysis. First, it allows us to distinguish between mortgage demand and supply. In particular, we observe several distinct offers by lenders on the supply curve for each mortgage demand request instead of a market outcome. Second, all lenders receive exactly the same set of anonymized information on the customer and the underlying real estate property. For our analysis, we can draw on exactly the same set of borrower information as banks do, plus all details on offers and conditions subsequently received by applicants. Third, lenders do neither know which competitors participate nor do they observe the details of their competitors' offers. These features assure that lenders submit binding offers that truly reflect their eagerness to bid for the mortgage without distorting aspects of competition or superior knowledge. Fourth, since the request is costly and since offers are binding conditional on verifiable information, customers have an incentive to submit correct information.

To avoid any distortions, we restrict our view to 10 year fixed rate mortgages which account for the lion's share of requested mortgage models (see our companion paper Basten and Koch, 2014).[7] While some offers carry only a single rate for the entire mortgage, others carry different rates for different tranches. In that case we compute the tranche-weighted average mortgage rate for each offer.

Table 1 presents our database in terms of demand and supply participation. Column (1) refers to the period CCB=0. That period starts on July 1, 2012 when the new lending standards came into force and the CCB becomes a legal option for the Swiss authorities. It ends on February 12, 2013, the day before the CCB was actually activated. Column (2) ranges from the activation of the CCB on February 13, 2012 until the end of our sample on October 24, 2013 (CCB=1). Figure 1 illustrates both time periods. Our data on mortgage demand show that the number of requests declines slightly over time. We attribute this to the fact that initially Comparis was the only major online mortgage platform in Switzerland, whereas later other platforms went online, too. However, the average LTV remains at about 65%, such that the composition of applicants appears to be stable over time[8]. Furthermore, in our empirical analysis below month fixed effects are to absorb any aggregate changes that might affect all lenders.

Turning to mortgage supply, Table 1 exhibits a declining total number of answers for both lenders in total as well as individually. Customers receive on average 5.9 (=3873/661) answers in the period before the CCB shock and 4.8 (=2461/516) answers after it. Most importantly, the shares of offers and rejections relative to the total number of answers are fairly stable over time. On average, 85.54% of received answers are offers before the activation of the CCB and 87.2%

[7] We repeat our analyses with the 2nd most frequent category of 5 year fixed rate mortgages yields the same conclusions as detailed in Section 4.5.

[8] We also run a difference in means test to check whether the LTV ratios of customers that banks and insurers send offers to change over time. We do not find a significant difference between both periods.

after it. Table 1 also displays a rise in offered interest rates over time. Both banks and insurance companies charge higher rates in later periods. Cross-sectionally, insurance companies generally seem to offer cheaper rates.

Indeed, our sample's raising interest rates in later periods reflect a general trend starting at the beginning of 2013. Figure 3 shows the average offered mortgage interest rate in the sample and contrasts it with the evolution of the Swiss 10 year swap rates and the Swiss 10 year government bond yield. In our analysis we account for this upward trend in interest rates by including the Swiss 10 year swap rate as a refinancing control variable and further add monthly time dummies to absorb any other general economic developments.

To investigate how representative our sample is of the Swiss mortgage market overall, we can compare it to the data from the most recent report by the Swiss National Bank (see SNB, 2012), which contains information on the distribution of mortgage lending across cantons and across LTV buckets. Table 2 shows the comparison. Following the SNB statistics, we compute the share of all extended mortgages in Switzerland by locational canton of the real estate property in Column (1a) and sort the cantons by rank order of the entire Swiss market. Column (2a) gives the share of requested mortgage volumes by locational canton and Column (2b) gives the share's rank according to our sample. The last two columns replicate the share and its rank in our sample but draw on the un-weighted average of requests instead of weighting by requested mortgage amounts as in previous columns. Overall, the canton of Zurich ranks first, followed in both samples by Berne, Aargau and Vaud. For this reason, we conclude that our sample adequately represents the Swiss mortgage market in terms of geographical distribution of mortgages.

To assess whether our sample is also representative in terms of customer risk characteristics, we construct three categories of loan to value (LTV buckets) given in the SNB statistics. In the

entire Swiss mortgage market, about 92.4% of all issued mortgages fall into the lowest LTV bucket below 67%. This compares well with our sample, in which 91% of all requested mortgages fall into this bucket. As to more risky mortgages in the medium category of LTV ratios above 67% but below 80%, data on the entire Swiss market say that 5.7% populate this bucket. In our sample, 8.2% of all mortgages populate that medium bucket. The top bucket ranges from LTVs above 80% to 100% and is filled by 1.9% of the entire Swiss market, whereas only 0.8% of our sample fill this bucket. These small differences between both samples in the most risky buckets derive from the fact, that the entire Swiss sample considers all issued mortgages over the past years. By contrast, our sample focuses on mortgage requests submitted after July 2012 when stricter rules on LTV ratios above 80% and tighter rules on household equity became effective.

We infer from these figures, that our sample's composition in terms of charged interest rates, borrower characteristics and geographical distribution proves relatively stable and representative.

4 Empirical Analysis

This section presents both our empirical approach and our results, structured by three questions of interest. After presenting a decomposition of mortgage interest rates as a conceptual basis in Subsection 4.1, we analyze whether specific balance-sheet characteristics render a bank more sensitive to the CCB's regulatory design in Subsection 4.2. To assess the effectiveness of risk-weighting schemes that might amplify the CCB's effects we provide a detailed analysis in Subsection 4.3. Then, Subsection 4.4 compares the responses of respectively banks and insurers and Subsection 4.5 summarizes our robustness checks.

4.1 Decomposing the Mortgage Interest Rate

To structure our ideas about how the additional capital requirements imposed by the CCB affect mortgage lending rates, we resort to the interest rate decomposition used in Button et al. (2010) tailored to our mortgage setup in Equation (1).

$$rate_{ijt} = funding\ cost_{jt} + credit\ risk_{ijt} + residual_{jt} \quad (1)$$

The rate offered by bank *j* to customer *i* comprises the *funding cost* of bank *j* at point in time *t*, the *credit risk* that bank *j* associates with the riskiness of the borrower *i* and a *residual*. We follow Button et al. (2010) and ascribe funding cost to external funding which should remain unaffected by the CCB. The *credit risk* features two cost components: first, the *cost of the expected loss (EL)* linked to the new loan and second the *cost of holding equity capital* that absorbs the *unexpected*

losses linked to the new loan. To compute the *cost of the expected* loss, Button et al. (2010) define the *loss given default (LGD)* as an increasing function of the LTV ratio. To compute the *cost of holding equity capital*, Button et al. (2010) refer to regulatory capital requirements. At this point, the CCB's higher capital requirements come into play such that extra equity capital worth 1% of risk-weighted mortgages translates into higher *cost of equity capital* in Equation (1). As the average risk weight increases with higher LTV ratios, risk-weighting schemes might amplify the CCB effect. Subsection 4.3 elaborates on this mechanism of LTV threshold effects. The residual in Equation (1) captures bank *j*'s operating costs as well as a targeted mark-up over marginal costs. The CCB requires banks to hold extra equity capital worth 1% of all previously issued, risk-weighted mortgages on its balance sheet. However, these mortgage contracts have been contracted in the past. Hence, the CCB ceteris paribus squeezes mark-ups, especially for banks with a mortgage-concentrated asset portfolio. In parallel with Button et al. (2010), we call this a "back-book" effect as the CCB lowers the return on existing assets. In an attempt to restore its mark-up, a bank can raise its mortgage interest rate. Section 4.2 features a bank's degree of business specialization in mortgage lending as one sensitivity measure that interacts with the CCB's effect and thus drives the mortgage rate. Further, banks might also increase their mortgage rates to rebuild their profit margins to compensate for the current environment of scarce profitable investment opportunities. Finally, a bank might expect further increases of the CCB's requirements. It might then feel inclined to build up additional capital by boosting current profits and retain more of these earnings.

4.2 Sensitivity Measures linked to a Bank's Balance Sheet Characteristics

In this subsection, we restrict our focus to banks and zoom in on how balance sheet characteristics drive their individual pricing of mortgages. We can thereby analyze whether certain balance sheet characteristics render a bank particularly sensitive to the CCB's regulatory design. To tackle potential endogeneity concerns, we exploit bank-level data from public annual reports lagged by one year, i.e. of the years 2011 and 2012.

Our sensitivity indicator assigns banks to two groups depending on whether a bank's sensitivity level as indicated by the past year's balance sheet lies below or above the median of all participating banks in that current year. The sensitivity indicator itself enters our estimations and we further interact it with a CCB activation indicator to investigate to what extent the sensitivity measures reinforce the CCB effect.

4.2.1 Definition of Sensitivity Measures

Excess Capitalization as a Measure of Being Capital Constrained

Here we distinguish between ***constrained*** and unconstrained banks, where the former are defined as banks whose excess capitalization was below the median excess capitalization of all participating banks. Banks must ensure not only that they remain solvent, but also that they do not violate regulatory capital requirements, because violations will trigger regulatory action and having to raise additional equity at short notice can be very expensive. On these grounds, we follow Gambacorta and Mistrulli (2004 and 2014) in focusing on "excess capitalization" defined as actual capitalization minus regulatory requirements relative to the regulatory requirements. As explained in Jans and Passardi (2013), the supervisor FINMA has assigned Swiss banks to five target and intervention threshold groups depending inter alia on their balance sheet size. Hence, two banks with the same equity ratio may have different levels of excess capitalization if FINMA

has put them into different groups with different regulatory equity capital requirements. We proxy excess capitalization as the percentage deviation of the equity ratio from this regulatory intervention threshold. In their quantitative impact study, Cournède and Slovik (2011) state that for banks maintaining a discretionary capital buffer, the impact of higher capital requirements on lending spreads might be lower. Based on empirical evidence, Gambacorta and Mistrulli (2014) find that banks with higher excess capitalization shield their customers during financial crises. This is because banks with comfortable excess capitalization have more degrees of freedom. They can still freely conduct their mortgage business and do not need to worry about violating the regulatory intervention threshold. Yet, banks which are close to the intervention threshold calibrate the mortgage rate to the tradeoff between approaching the threshold and reaping additional profits. We therefore anticipate that banks with little excess capitalization deemed ***constrained*** in our framework on average charge higher rates. When the CCB was activated, these banks became even more constrained charging even higher rates as a compensation for granting a mortgage.

Specialization and Business Focus

Mortgage-focused banks, defined as banks whose ratio of mortgages to equity capital lies above the median of all banks, might be more sensitive to the CCB's particular design in Switzerland. In general, we put forward that banks with a higher share of mortgages on their balance sheets benefit from specialization in the mortgage business. These banks can pass their gains from economies of scale on to their customers by charging lower mortgage rates. Furthermore, against the background on relationship lending, Gambacorta and Mistrulli (2014) find that banks with a business focus on retail lending protect their corporate customers during financial crises. However, the CCB as designed in the Swiss context applies exclusively to residential mortgage lending while sparing other bank businesses. As it applies to all residential

mortgages on balance sheets, the CCB bites even more into the equity of banks reporting a high share of mortgages in their asset portfolio. Yet, the rates on mortgage contracts concluded in the past cannot easily be adjusted to the CCB's increased capital requirements. For this reason, we expect that banks with a very mortgage intensive portfolio per unit of equity and a business focus on mortgage lending respond more strongly to the CCB's activation.

Capitalization

Capitalization considers whether a bank is better capitalized than the median of all banks in terms of its equity capital to total assets (*Equity Capital/TA*) ratio. We further decompose the capitalization measure into indicators of whether the corporate capital ratio (*Corporate Capital/TA*) and the capital reserves ratio (*Capital Reserves/TA*) exceed the median of all banks. This measure complements the previously presented *Constrained* indicator, and our argument runs in parallel. Banks with low capital ratios should be willing to expand their mortgage lending only in return for higher mortgage rates.

The expenses or figurative price of raising different kinds of equity capital motivates our distinction between corporate capital and capital reserves. Banks might find it easier to increase their equity capital by retaining more of their earnings instead of annoying shareholders by diluting the value of their shares upon issuing new corporate capital. For this reason we hypothesize that banks which have relatively more corporate capital as opposed to retained earnings might feel pressured to generate higher profits to cater to their shareholders and thus charge higher rates. As the CCB imposes even higher capital requirements, we assume that the CCB reinforces this mechanism.

Equity Capital and Mortgage Growth Rates

To analyze how banks that have preemptively strengthened their capital base or cut mortgage growth respond to the CCB, we use indicators of whether the ***growth rates*** of equity capital

(Δ*Equity Capital*) and mortgages (Δ*Mortgages*) lie above the median among all offering banks in our sample. We assume that banks which have recently increased their CET1 capital feel relatively freer to follow a profit maximizing strategy. Expected effects depend on how profitable banks deem the mortgage business. After the CCB shock, banks which have recently increased their equity ratio should be able to cushion the extra equity levy on mortgages. By contrast, banks which have recently experienced substantial mortgage growth might follow a strategy to expand their market share. For this reason we expect these banks to offer cheaper mortgage rates to their customers before the CCB's activation. As the CCB's regulatory design exercises a stronger effect on banks with a lot of mortgages on their balance sheets, one might expect that these banks might revise their strategy and increase mortgage rates relative to the pre CCB period.

Retail Banks

In an attempt to proxy the ***business model of retail banking***, we resort to the ratio of customer funds to mortgages (*Customer Funds/Mortgages*) and construct an above median indicator on whether the banks funding of mortgages is higher than the median among all banks. We hypothesize that banks in the retail business have more local expertise and can thus charge lower rates in general. As taking deposits usually goes hand in hand with mortgage lending, these banks are usually highly exposed to the mortgage market and thus carry a lot of mortgages on their balance sheets. We thus assume that these banks raise their mortgage rates after the CCB's activation to pass on the additional costs to their customers,

Return on Equity

Finally, we study the ***return on equity (ROE)*** which has a twofold interpretation. On the one hand, it should proxy for a bank's profitability, on the other hand it might proxy for the cost of equity capital. We hypothesize that ***profitable banks*** also have more degrees of freedom to act and exhibit lower sensitivity to the CCB effects. Jiménez et al. (2012) find a positive effect of

bank profitability on interest rates which might stem from the fact that more profitable banks charge higher rates as they can select among borrowers and are not forced into less profitable deals. Yet, ROE also serves as cost of equity proxy. If the Modigliani-Miller Theorem (1958) holds and the marginal cost of capital equals the marginal cost of debt finance, then a change in the equity-debt finance structure imposed by regulation should not affect banks' total refinancing cost and should hence not affect their mortgage pricing. If by contrast equity finance is more expensive than debt finance, as contended by many bankers, then an imposed increase in the equity finance share should increase banks' funding costs and, to the extent to which this is passed on, lead to higher mortgage rates. Banks with high costs of equity funding should be more reluctant to make mortgages. In particular, banks whose cost of equity finance exceeds the median of all banks should be more restrictive as mortgage lending requires banks to hold relatively more equity relative to other asset categories. As the CCB affects the equity capital requirements, we assume that banks with higher or relatively higher equity funding costs demand extra compensation by charging relatively higher mortgage rates.

4.2.1 Estimation Approach

Equation (2) describes our estimation procedure with the tranche-weighted mortgage rate $rate_{ijt}$ offered by bank *j* to requesting customer *i* at point in time *t* as left-hand side variable.

$$rate_{ijt} = \alpha_1 + \beta_{11} sens_{j,201x} + \beta_{12} ccb_t * sens_{j,201x} + FE\_request_i + FE\_lender_j + \varepsilon_{ijt} \quad (2)$$

To study the general impact and particular effects that unfold after the CCB shock materializes, we let the bank-level sensitivity indicator $sens_{j,201x}$ and its interaction with the CCB shock dummy ccb_t enter our estimation. These time-varying sensitivity measures originate from the respective bank's annual public report of the previous year, i.e. of 2011 or 2012. To absorb

customer characteristics including its financial situation, mortgage risk, location related effects and the real estate property type, we add request fixed effects $(FE\_request_i)$ to our specification. This allows us to zoom into the within request variation and to compare the pricing of different sets of banks. To absorb *time-invariant* heterogeneity among lenders, we also add lender fixed effects[9]. We compute heteroskedasticity robust standard errors, but do not cluster them by bank as the number of clusters would be too low and as cluster size differs considerably across lenders.

4.2.2 Descriptive Statistics

Table 3 shows our descriptive statistics on the sample of bank offers only. In the upper panel, it gives customer characteristics of the requests to which banks respond with an offer. The mean offered mortgage rate amounts to 208 bp and the mean indicated LTV ratio by the customer lies at 65%. One caveat applies to the first panel: the indicated request characteristics are by construction of our sample artificially inflated as this sample draws on multiple offers per individual request. The second panel gives the bank sensitivity dummies, while the third panel refers to the underlying levels. To highlight some sensitivity measures, Table 3 indicates that banks report an excess capitalization of 40.58% above the regulatory capital coverage ratio. Banks further invest 974.40 CHF into mortgage lending per 1 CHF of equity. The equity capital ratio (un-weighted CET1 ratio) lies at 7.3% with the capital reserve ratio exceeding the corporate capital ratio. Equity has grown annually by on average 6.64% between 2010 and 2012, whereas mortgage volumes have grown by on average 8.6%. The average ROE lies at 4.69% which ensues from our sample of rather small banks, retail banks and cantonal banks.

[9] We run two robustness checks for the sensitivity analysis which are exhibited in the Online Appendix. First, we drop the lender fixed effects in Table A, but our core results remain virtually unaffected. Second, we define the median indicator for the set of banks offering for each specific request instead of all participating banks in our sample. Again our results shown in Table B remain intact.

4.2.3 Results

Table 4 displays our estimation results from a regression of the offered mortgage rate on the different sensitivity measures and their interactions with the CCB dummy (*CCB*) indicating that its tighter capital requirements enter into force.

Different columns relate to the inclusion of a sensitivity dummy indicating whether the respective sensitivity measure lies above (or below in case of being *Constrained*) the median among all participating banks and the interaction of this sensitivity dummy with the CCB activation indicator. As evidenced by Table 4, most of our results broadly align with our expectations on sensitivity concepts, but some results related to capitalization establish a contrast.

Excess Capitalization as a Measure of Being Capital Constrained

Results in Column (3) point out that *capital-constrained* banks charge on average 6.3 bp more after the CCB's regulatory shock to capital requirements. This positive estimate on the interaction term reflects that banks which are close to the intervention threshold become even more constrained once the CCB is activated. Indeed, the CCB raises the intervention threshold while squeezing excess capitalization. Banks now charge an even higher mortgage rate that reflects their tradeoff between approaching the now even closer threshold and forgoing additional profits. The simple *Constrained* indicator is insignificant. Apparently before the CCB's activation, banks that are closer to the intervention threshold still enjoy sufficiently many degrees of freedom to make mortgages whose pricing does not reflect their low excess capitalization.

Specialization and Business Focus

Results on the ratio of *Mortgages/Equity Capital* in Column (2) reveal that banks that specialize in the mortgage business submit offers which are on average 7.7 bp cheaper than those of their competitors. After the CCB activation, however, these banks increase their mortgage rates by on average 6.5 bp. The higher capital requirements force banks to hold more equity

capital for each mortgage unit already on their balance sheets. Some of that additional cost on their existing portfolio is hence passed on to new customers.

We highlight these results on constrained and mortgage specialized banks as the first core finding of our paper which matches common expectations in that the CCB's design rationalizes this outcome.

Capitalization

Results in Columns (3) to (5) show that well capitalized banks charge on average lower rates after the CCB activation but the equity capital's split into corporate capital and capital reserves reveals that capital reserves drive this finding. Banks with *Equity Capital/TA* above the median charge on average 8.9 bp less than their competitors after higher capital requirements come into force. Interestingly, our estimate on the CCB's interaction with corporate capital points into the opposite direction. Banks with above median *Corporate Capital/TA*, charge almost 5 bp less before the CCB's activation, but 8.3 bp more after it. Our estimate on the CCB's interaction with capital reserves matches the result on the equity capital composite. Banks with above median *Capital Reserves/TA* charge 8.7 bp less after the CCB became effective. One might interpret this in light of the efforts or the figurative price associated with holding or raising both types of equity capital. Banks might face less opposition from existing shareholders when strengthening their capital base by retained earnings than by diluting the value of their shares by issuing new corporate capital. Further, a higher share of corporate capital means that shareholders demand relatively more compensation, whereas capital reserves do not. For this reason banks that report higher levels of corporate capital might feel under pressure to generate higher profits after the CCB's activation by charging higher mortgage rates to pay higher dividends. One of our robustness checks incorporates the equity capital ratio and its components instead of the median indicators, but comes to the same conclusions.

Equity Capital and Mortgage Growth Rates

Columns (6) and (7) examine the growth rates of equity and mortgages. The negative coefficient on Δ*Equity Capital* shows that banks which have strengthened their equity capital more than below median competitors generally charge 4.8 bp less. One might think of these banks as disposing of more "free capital" to seize investment opportunities. The CCB's activation now utilizes some of these degrees of freedom which might explain the positive and significant interaction terms. In other words, banks that have recently strengthened their equity capital become more reluctant to make mortgages after the CCB by charging on average 2.6 bp more. Public annual reports show that most of the banks in our sample have increased their equity capital by retained earnings while only some banks have issued more corporate capital.

The negative but significant coefficient on Δ*Mortgages* in Column (7) reveals that banks exhibiting above median growth rates of mortgages entering their balance sheet are cheaper. Yet, the interaction with the CCB is insignificant. For this reason we infer that banks seeking to expand their market shares do so by submitting cheaper offers and continue to do so after the CCB imposes stricter capital requirements. Apparently, the banks with high *recent* mortgage growth rates are not necessarily the same as those with already very mortgage intensive balance sheets.

Retail Banks

Column (8) relates to how banks refinance their mortgage issuance. Our results on *Customer Funds/ Mortgages* point out that banks which refinance relatively more mortgages through customer funds charge on average 22.3 bp less than their competitors with below median refinancing ratios. We attribute this finding to retail banks feeling more confident in the mortgage business with a lot of expertise on the local market. The interaction with the CCB turns out to be insignificant. Apparently these specialized banks continue making good offers also after the CCB

activation. This finding complements our previous result on Δ*Mortgages* and *Mortgages/Equity Capital*. We infer that banks with a standard retail business model based on deposits and mortgages submit in general cheaper offers. After the CCB, however, banks pass on higher costs ensuing from their balance sheet burden of mortgages to customers. Whether or not these banks have recently expanded their mortgage portfolio and the refinancing of these mortgages does not shape their response to tighter capital requirements.

Return on Equity

The estimate on the interaction of *ROE* and the CCB in column (9) carries a negative coefficient while the ROE coefficient itself is insignificant. In light of this result, we prefer to interpret ROE as a profitability measure rather than as a measure of equity cost. Thus, more profitable banks charge less after the CCB imposes stricter capital requirements. This finding fits with our results on *Capital Reserves/TA* as higher retained profits feed into capital reserves. Jointly considered, we conclude that very profitable banks that build up equity capital through retained earnings do not curb their lending after the CCB but offer cheaper rates instead. A robustness check using the return on assets (ROA) instead of ROE draws the same inferences.

To sum up, we find that capital-constrained banks and banks which carry a lot of mortgages on their balance sheet pass the costs of higher capital requirements on to their customers. By contrast, very profitable banks or banks with substantial shares of retained earnings as equity capital lower their rates and continue mortgage issuance independently from their recent mortgage growth and their refinancing model.

4.3 Do LTV Threshold Effects amplify the CCB effect?

This subsection unfolds the request-level dimension to study whether LTV thresholds that are associated with risk-weighting schemes of a bank's assets amplify the effect of tighter capital requirements imposed by the CCB.

The CCB shock increases a bank's equity requirements per unit of risk-weighted mortgage lending. This design applies to all mortgages issued in the past that form part of a bank's balance sheet and it applies to all new mortgages that a bank intends to make. Facing new mortgage demand, banks that are close to or below the regulatory equity requirement, can either raise their equity or restrict mortgage lending. In the latter case they can either reject more customers or demand higher rates. As the bank-specific CCB effect ensues from its composite of risk-weighted residential mortgages, the distinct LTV ratios of individual mortgages on bank balance sheets matter.

Figure 4 illustrates how risk-weighting schemes translate the individual customer's loan-to-value (LTV) ratios into capital requirements for the offering bank and thereby link the riskiness of the mortgage to the capitalization of a bank. The tranche of a mortgage above a customer's LTV ratio of two-thirds (66%) receives a risk weight of 75%, while the mortgage tranche with LTV ratios below two thirds receive a risk weight of just 35% (see FINMA, 2013a). The top tranche above the LTV ratio of 80% receives a risk weight of 100%. Therefore, one may expect banks to pay special attention to the LTV ratios of new customers.

4.3.1 Estimation Approach

Equation (3) describes our regression specification that we run on our sample of banks.

$$\begin{aligned} & rate_{ijt} \\ & = \alpha_1 + \beta_{21} ltv_{it} + \beta_{22} ltv67_{it} + \beta_{23} ltv80_{it} + \beta_{24} ccb_t * ltv67_{it} + \beta_{25} ccb_t ltv80_{it} \\ & + \gamma_{20} refin_t + \gamma_{21}' CUSTOM_{it} + FE + \varepsilon_{ijt} \end{aligned} \tag{3}$$

We regress the tranche-weighted mortgage rate $rate_{ijt}$ offered by bank *j* to requesting customer *i* at point in time *t* on the customer-specific LTV ratio, two dummies *ltv67* and *ltv80* indicating whether this LTV ratio equals or exceeds respectively 67% or 80%, as well as the interactions of these dummies with CCB activation indicator. To control for aggregate supply effects such as refinancing conditions, we include the Swiss 10-year swap rate ($refin$). To control for the individual traits of non-repeated requests, we add individual customer characteristics such as income, wealth, an indicator of other debt and age. We further again include lender fixed effects. And, to control for aggregate demand effects across individual requests, we add month[10], property type and domiciled canton fixed effects. Standard errors are robust for the same reasons as previously specified.

Due to the higher risk as well as higher risk weights, we anticipate that generally banks put an extra levy on LTV ratios above 66% ($\beta_{22} > 0, \beta_{23} > 0$). After the activation of the CCB, very high LTV mortgages bite even more into the equity capital. We hence assume that banks charge higher mortgage rates after the CCB shock, as they require extra compensation for the additional equity capital that they have to hold ($\beta_{24} > 0, \beta_{25} > 0$) for the bank sample. If however these threshold LTV ratios merely reflect a risk premium instead of the risk-weighting schemes, the amplification effect of β_{24} and β_{25} is probably muted.

4.3.2 Results

Table 5 presents our results on banks. It points out that LTV per se is insignificant, but banks charge on average more than 2 bp extra on the entire mortgage for LTV ratios exceeding 67% and on top of that another 1.5 to 1.8 bp on LTV ratios exceeding 80%. However both interactions of the CCB with the high LTV dummies turn out to be insignificant. Thus the risk-weighting

[10] We use monthly time fixed effects while splitting the event month February 2013 into two parts.

scheme does not amplify the CCB effect. We stress this as the second core finding of our paper. One likely reason for this result is the fact that escalating risk weights apply only to the mortgage tranche in excess of the 66% or 80% LTV threshold and not to the entire mortgage. Our alternative hypothesis suggests that LTV threshold indictors just signal very risky mortgages inducing lenders to charge a risk premium. In that case, risk-weighting schemes might indeed prove to be ineffective when capital requirements on behalf of the bank become stricter but lending standards with respect to the customer characteristics remain.

We briefly discuss our results on control variables to assess whether our regression specification yields reasonable results. The estimated coefficient on the swap rate states that a 100 bp increase in the swap rate translates into an increase of the average mortgage rate of about 74 bp. A hint at the fact that many of our participating banks substantially draw on retail instead of wholesale funding can rationalize this number. We further find that a 100 bp increase in the specified income or wealth (entering our regression in logs) of the customers reduces her mortgage rate by on average 3 or 0.8 bp, respectively. Coefficients on the indicator of other private debt or the customer's age do not yield significant estimates. This leads us to use the regression specification of column (3) as our preferred set of control variables which incorporates income and wealth but ignores insignificant customer characteristics.

We conclude from this experiment that LTV thresholds most likely signal very risky mortgages which induce banks to charge a risk premium. Indeed, LTV thresholds do not amplify the CCB effects for banks which hints at the weak nexus between risk-weighting schemes and capital requirements as commonly applied in the framework of Basel III.

4.4 Banks and Insurers as Competitors on the Mortgage Market

Two different types of mortgage lenders provide their services on the Comparis mortgage platform: banks and insurers. As insurers are exempt from the regulatory framework of Basel III, the CCB applies exclusively to banks, but not insurers. However, the CCB might affect insurers indirectly, as the CCB changes the costs of their competitors. If insurers expect this to lead to higher prices on the bank side, they may see this as an opportunity either to underbid banks and hence increase their market shares ("policy leakage") or to also raise prices and thereby to increase their profits per unit of mortgage lending. After three simple comparison of mean tests in Table 7 a to c, we run regressions including both types of lenders to compare the lending behavior of banks and insurers before and after the CCB's stricter capital requirements became effective in Table 7 d.

Acceptance Rates

Table 7 a compares the acceptance rates of banks and insurers before and after the CCB's activation. Its last column shows that banks are more likely to respond with an offer in both periods and this difference in acceptance rates does not significantly change over time. Its last row states that, if anything, banks and insurers become slightly more likely to submit offers after the CCB was activated. We infer from this comparison of means that any CCB on the willingness to make loans operates through pricing rather than through the propensity to offer.

That said, we can analyze the pricing of offers without having to worry that offers may be selective. This focus on loan pricing as opposed to the decision whether or not to make an offer also aligns with the arguments of Hanson et al. (2011) and the literature based on quantitative impact studies (see for instance Elliott, 2009, Cosimano and Hakura, 2011 or Cournède and Slovik, 2011).

For this reason, we resort to standard regressions below, using the mortgage rate as independent variable instead of further investigating the approval rates of lenders.

Changes in the composition of demand?

One might object however that the CCB implicitly alters mortgage demand and its composition. In this sense, households might anticipate that banks become more reluctant to lend and shy making very risky mortgages. To address this concern, we refer again to Table 1. It shows that despite the lower number of requests during the CCB=1 period, the average applicant's LTV has not changed much. This runs counter to households fearing to be declined for requesting high LTV ratios. To further check whether changes in the composition of mortgage demand do not distort our results, we run a difference in means test on the LTV ratios requested by the customers. Results in Table 7 c show that these LTV ratios do not change over time and there is no significant difference between banks and insurers as to which LTV ratios they reject. We first conclude that banks and insurers do not exhibit different preferences for LTV ratios in terms of their willingness to lend. Later, however, we will show that they price the very risky mortgages differently.

Mortgage Rates

Table 7 b compares the offered mortgage interest rates of banks and insurers before and after the CCB activation. The last column points out that banks charge higher mortgage rates in both periods with no significant change in this difference over time. The last row of Table 7 b states that banks and insurers have significantly raised their mortgage rates by on average 30 bp after the CCB came into force. Two caveats are in order. First, this plain comparison of means does neither control for individual customer characteristics and the associated riskiness of a mortgage, nor does it control for changes in the aggregate interest rate level or any concomitant macroeconomic development. It simply motivates our baseline specification including individual

mortgage characteristics and customer controls on the individual level as well as including a refinancing control variable and a host of fixed effects to absorb potentially common driving factors.

4.4.1 Estimation Approach

In order to test for the differences in mortgage pricing of banks and insurers after the CCB's activation we run the following regression.

$$spread_{ijt} = \alpha_1 + \beta_{31} ccb_t bank_j + \beta_{32} ccb_t nonb_j + \gamma_{30} refin_t + \gamma_{32}' MORTG_{it} + \gamma_{33}' CUSTOM_{it} + FE + \varepsilon_{ijt} \quad (4)$$

Equation (4) now specifies our estimation equation while referring to the full sample of banks and insurers. This time, we regress the tranche-weighted offered mortgage rate $rate_{ijt}$ on an indicator whether the offering lender *j* is a bank $(bank_j)$ or an insurer $(nonb_j)$ interacted with the CCB indicator. We further control for aggregate refinancing conditions, mortgage and customer characteristics as well as a host of monthly time, lender, property type and locational canton fixed effects. The interactions here capture the price increase after the CCB was activated, whereas the general price increase was entirely absorbed by time fixed effects in the previous estimation equations.

It is important to recall that insurers are exempt from the CCB and any Basel III regulation. Instead they must follow their own regulation as specified in FINMA (2013b). This regulation states that -- as long as the portion above an LTV ratio of two-thirds is being amortized, the same requirement that became obligatory for banks in July 2012 – any mortgage lending until an LTV of 80% can be fully counted for tied computing tied assets. Hence for insurers we would not expect the same discontinuity in costs at the two-thirds LTV as for banks, but we would expect a discontinuity at the 80% LTV. However, as these rules do not change during our sample, it is

important to control for these LTV effects, we can draw a comparison between banks and insurers with respect to the CCB.

4.4.2 Descriptive Statistics

Table 6 repeats mortgage demand statistics. The first panel refers to the full sample, the second panel isolates banks and the third panel isolates insurers. As the observational unit is the offer and Table 6 features statistics based on multiple offers per individual requests, descriptive statistics are inflated by the number of offers per request. For this reason, we abstain from presenting further details as Table 2 gives un-weighted and more informative details differentiated by banks and insurers.

4.4.3 Results

Table 7 d shows our results on the joint sample of banks and insurers. We sequentially add mortgage characteristics and request controls while the main focus lays on the interaction of the CCB dummy with an indicator of whether the offering lender is a bank (BANK) or an insurer (NONB). This procedure has two advantages. First, we can individually test whether banks and/or insurers have raised or cut their mortgage rates after the CCB's stricter capital requirement for banks came into force. Second, we can run a Wald test as displayed in the last two lines to find out whether the difference between banks and insurers after the CCB activation is significant. We borrow this procedure from Puri et al. (2011) in order to simultaneously include lender and monthly time fixed effects. To control for aggregate demand effects, we include a full set of fixed effects referring to the underlying real estate type and its domiciled canton, using robust standard errors for the previously cited reasons.

Table 7 d accommodates our previous findings that banks and insurers charge higher mortgage rates after the CCB's activation. Banks charge on average 17-18 bp more while insurers charge on average 26-28 bp more. The last two lines exhibit our result that insurers have raised rates by on

average 8.8 bp more than banks. We highlight this finding as the third core result of our paper. One might as well have expected no impact on the insurers (given no direct CCB applicability) or even an attempt to underbid banks (given the existing literature on leakage). Indeed, after the activation many banks and newspapers complained publicly that the CCB would disadvantage them vis-à-vis insurers. [11]

This finding that banks add less to the CCB`s surcharge relative to insurers survives the inclusion of mortgage characteristics with threshold LTV effects as well as control variables on the individual request level. Column (4) displays our preferred specification to contrast the responses of banks and insurers, controlling for an extensive set of request and mortgage characteristics. As opposed to that, Column (7) distinguishes between different banking groups but abstains from running multiple Wald tests. We find that cantonal banks (KANTONALBANK; plus 14 bp), most of which are endowed with an explicit government guarantee, raise mortgage rates less than subsidiaries[12] of foreign banks (FOREIGNBANK; plus 19.5 bp) while other retail banks (OTHERBANK capturing for instance the banks owned by supermarket chains as well as very small savings banks or cooperatives, plus 20.7 bp) lead the price increase. These numbers align well with the estimated range of an 4.8 to 28 bp increase in lending rates as suggested by the literature on quantitative impact studies (see e.g. Elliott 2009, Cournède and Slovik 2011, Cosimano 2011).These quantitative impact studies however deal with simulations and balance sheet identities to gauge the impact of capital requirements more generally and not specifically with the CCB or the Swiss context.

[11] E.g. bank analysts predicted: „Now [insurers] have the potential to … increase their market share". See Wacker (2013).

[12] In Switzerland, the subsidiaries included in our sample are also subject to the CCB's increased capital requirements.

Our results on banks and insurers however hint at an indirect effect. Insurers apparently expect banks as their competitors to pass on higher costs to their customer. A priori that leaves insurers two possible responses: Either to bid more aggressively for customers than banks and hence to increase their market share, or to bid less aggressively than banks in order to reap more profits. Our results provide tentative evidence that insurers opt for higher profits. The low interest rate environment and scarce profitable, but moderately risky investment prospects on financial markets might explain this finding. Insurers hence anticipate banks to raise offered mortgage rates after the CCB's activation, but apparently insurers increase rates even stronger. In general our findings on insurers bear analogy to the results in Aiyar et al (2012). They show that in the UK higher capital requirements for UK banks have led to a response in the lending also by foreign banks who were not directly affected by the rate increase. The setting differs from ours in that the UK lenders who were not directly affected responded with a more aggressive market stance, i.e. they seized the opportunity to increase their market share. Such a response would have defeated a large part of the purpose of the CCB: It would still have improved the loss absorption capacity of banks, but would have increased the exposure of insurers without improving their loss absorption capacity, and might then have had no effect at all on equilibrium interest rates and mortgage volume growth.

To summarize, our comparison of banks and insurers shows that both charge more after the CCB's shock to capital requirements which actually only affect banks but not insurers. Indeed, banks contribute less to the surcharge after the CCB.

4.5 Robustness Checks

To check the robustness of our results, we repeat the previous estimations with different subsamples and specifications.

First, we restrict the estimation sample to a window covering only three months before and three months after the CCB activation. Our findings on sensitivity measures remain mainly unaffected except for two results. First, we find that banks that have recently increased their equity capital now cut their rates after the CCB. We interpret this as an effect of relief in the most recent period after the activation, which waters out once banks realize that the capital increase might not have been sufficient. Second, we find that banks with higher return on equity also raise their rates immediately after it. We interpret this as banks trying to maintain higher levels of profitability immediately after the shock. Either difference may reflect that over a number of months banks' response to the CCB is likely to depend also on how their competitors turn out to respond and on how stable mortgage demand will develop turns out to be.

Our findings on the ineffectiveness of risk-weighting schemes and LTV thresholds remain intact. When rerunning the comparison between banks and insurers on the shorter window and hence with significantly fewer observations, we cannot estimate all fixed effects included in our baseline regressions, so we focus on the simple comparison of means here. That suggests that both lenders raise mortgage rates after the CCB, and insurers seem to charge even more than banks.

As an alternative control for the refinancing rate, we use the Swiss 10-year government bond rate instead of the Swiss 10-year swap rate. All findings remain almost entirely unaffected.

Finally, using different sets of fixed effects and clustering does not harm our findings, either.

5 Conclusions

This paper examines how Swiss lenders price mortgages before and after the activated *Counter-Cyclical Capital Buffer (CCB)* imposes higher capital requirements on banks. Since Switzerland was the first country to activate the CCB as the macro-prudential policy tool of Basel III, this is, to the best of our knowledge, its first empirical evaluation.

Our dataset on multiple independent offers per individual mortgage request allows us to separate mortgage demand and mortgage supply. To shed light on how a bank's capitalization, business model, portfolio and funding structure shape its pricing before and after the shock to capital requirements, we add bank-level data from public annual reports. We further analyze critical loan-to-value (LTV) ratios, as risk-weighting schemes link the riskiness of individual borrowers to regulatory bank capital requirements. Indeed, these risk-weighting schemes may be expected to amplify the CCB effects. To put our results into perspective, we contrast banks that are subject to higher capital requirements with insurers that are exempt from it but compete with banks as suppliers in the Swiss mortgage market. This enables us to compare the responses of banks experiencing the capital requirement shock to the behavior of insurers beyond the realm of Basel III.

Three core findings emerge. First, the CCB's higher capital requirements significantly interact with bank sensitivity measures. Capital-constrained banks with little *excess capitalization* relative to the regulatory intervention threshold raise their rates relatively more after the CCB's activation. This reflects a bank's tradeoff between approaching the now even closer intervention threshold and reaping additional profits. Banks which are very *specialized* in mortgage lending do also increase their offered mortgage rates relatively more. Thus, as higher capital requirements apply both to new mortgages and to the stock of issued mortgages on balance sheets, banks seem to roll over the extra costs of previously issued mortgages to their new customers.

Our second finding relates to the pricing of very risky mortgages. Risk-weighting schemes put an extra equity levy in terms of equity capital requirements on very risky mortgages with LTV ratios above 66% and 80%. We find that banks generally charge more on very risk mortgages, but these risk-weighting schemes do not amplify the CCB effects. This suggests that the nexus between the customer's leverage and regulatory risk weights may still be weaker than would be optimal. We provide two possible explanations for this finding. On the one hand, higher risk weights apply only to the tranche of lending above the respective LTV threshold rather than to the entire mortgage amount. This weakens the average risk-weight effect for the whole mortgage. On the other hand, we might interpret LTV thresholds as the signals for very risky mortgages inducing lenders to charge a risk premium. In this light, LTV thresholds linked to regulatory risk-weighting schemes prove ineffective when interacted with the CCB's shock to capital requirements.

Third, both banks and insurers as their competitors *increase* their average mortgage rates after the CCB has been activated. Yet insurers raise rates by on average 8.8 bp more than banks despite being exempt from the CCB and any Basel III capital standards. Hence, policy leakage, in the sense of underbidding by insurers exempt from the CCB, does not seem to be an issue in the Swiss mortgage market. While a priori it was not clear whether banks' higher costs and consequently higher mortgage rates would induce insurers to either expand their market shares or to expand of their profits per unit of mortgage lending, we provide evidence that insurers opt for higher profits. The low interest rate environment and scarce profitable, but moderately risky investment prospects might rationalize our finding. Against this background, we interpret the increase of insurers' rates as an implicit side effect. This adds a very interesting twist to the discussion and literature on possible leakage of economic policy in general and macro-prudential policy in particular. It provides an example where actors not subjected to the policy themselves

are indeed affected indirectly through market forces, but in a direction different from what may have been expected. Such indirect effects can be a very important issue, so we expect our findings to constitute a starting point for further work to better understand such side effects.

We conclude that lenders welcome the opportunity of this regulatory capital shock to increase mortgage prices, but higher capital standards do not discourage banks from offering very risky mortgages.

Our paper informs the debate on macro- and micro-prudential regulation. We find that the CCB does not impinge on the willingness of banks to issue loans, only the pricing of mortgages shows significant effects. In terms of balance sheet characteristics, the CCB seems to exercise the incentive effects envisioned by the regulator. Yet, our study reveals that the CCB does not make lending to very risky customers more expensive. Regulators might have anticipated an increase of the extra levy on the most leveraged households, but our analysis demonstrates that risk-weighting schemes seem to be ineffective in light of the higher capital requirements imposed by the CCB. Finally, our analysis has shown some side effects on insurers. These findings might invite regulators to pay special attention to the competitors of banks that are beyond the realm of capital standards as suggested by Basel III.

Bibliography

Aikman, D., Haldane, A., & Nelson, B. (2014). Curbing the Credit Cycle. *The Economic Journal*.

Aiyar, S., Calomiris, C., & Wieladek, T. (2012). Does Macro-Pru Policy Leak? Evidence from a UK Policy Experiment. *NBER Working Paper 17822*.

Basten, C., & Koch, C. (2014). The Causal Effect of House Prices on Mortgage Demand and Mortgage Supply. *University of Zurich Working Paper, 140*.

BCBS. (2010a). *Basel III: A Global Regulatory Framework for More Resilient Banks and Banking Systems.* Basel Committee on Banking Supervision.

BCBS. (2010b). *Countercyclical Capital Buffer Proposal. Consultative Document.* Basel Committee on Banking Supervision.

BCBS. (2010c). *Guidance for National Authorities Operating the Countercyclical Capital Buffer*. Basel Committee on Banking Supervision.

Bernanke, B., & Blinder, A. (1992). The Federal Funds Rate and the Channels of Monetary Transmission. *American Economic Review, 82*, 901-922.

BOE. (2014). *The Financial Policy Committee's powers to supplement capital requirements. A Policy Statement.* Bank of England.

Boot, A., Greenbaum, S., & Thakor, A. (1993). Reputation and discretion in financial contracting. *American Economic Review, 83*(5), 1165-1183.

Button, R., Pezzini, S., & Rossiter, N. (2010). Understanding the price of new lending to households. *Bank of England Quarterly Bulletin, 50*(3), 172-182.

Calomiris, C., & Pornrojnangkool, T. (2009). Relationship Banking and the Pricing of Financial Services. *Journal of Financial Services Research, 35*(3), 189-224.

Cecchin, I. (2011). Mortgage Rate Pass-Through in Switzerland. *Swiss National Bank Working Papers, 8*.

Cornett, M., McNutt, J., Strahan, P., & Tehranain, H. (2011). Liquidity risk management and credit supply in the financial crisis. *Journal of Financial Economics, 101*(2), 297-312.

Cosimano, T., & Hakura, D. (2011). Bank behavior in response to Basel III: A cross-country analysis. *IMF Working Paper 11/119*.

Cournède, P., & Slovik, B. (2000). Macroeconomic Impact of Basel III. *OECD Economics Departement Working Paper, no 844*.

Crowe, C., Dell'Ariccia, G., Rabanal, P., & Igan, D. (2013). How to Deal with real estate Booms: Lessons from country experiences. *Journal of Financial Stability, 9*(3), 300-319.

Diamond, D., & Rajan, R. (2000). A theory of bank capital. *Journal of Finance 55(6)*, 2431-2465.

Drehmann, M., & Gambacorta, L. (2012). The effects of countercyclical capital buffers on bank lending. *Applied Economics Letters, 19*(7), 603-608.

Drehmann, M., Borio, C., & Tsatsaronis, K. (2011). Anchoring Countercyclical Capital Buffers: The Role of Credit Aggregates. *International Journal of Central Banking, 7*(4), 189-240.

Drehmann, M., Borio, C., Gambacorta, L., Jiménez, G., & Trucharte, C. (2010). Countercyclical Capital Buffers: Exploring Options. *BIS Working Paper 317*.

Edge, R., & Meisenzahl, R. (2011). The unreliability of credit-to-GDP ratio gaps in real-time and the implications for countercyclical capital buffers. *International Journal of Central Banking, 7*(4), 261-298.

Elliott, D. (2009). Quantifying the effects on lending of increase capital requirements." The Brookings Institutions. *The Brookings Institutions*.

FINMA. (2011). *Circular 2011/2: Capital Buffer and Capital Planning*. Berne.

FINMA. (2013a). *Swiss Federal Ordinance of 29 September 2006 on Capital Adequacy and Risk Diversification for Banks and Securities Dealers (Capital Adequacy Ordinance, CAO).* Berne: Swiss Financial Market Supervisory Authority FINMA.

FINMA. (2013b). *Rundschreiben 2008/18: Anlagerichtlinien Versicherer*. Berne: Swiss Financial Market Supervisory Authority FINMA.

FINMA. (2014). *Annual Report 2013*. Berne: Swiss Financial Market Supervisory Authority FINMA.

Gambacorta, L., & Mistrulli, P. (2004). Does bank capital affect lending behavior? *Journal of Financial Intermediation, 13*(4), 436-457.

Gambacorta, L., & Mistrulli, P. (2014). Bank Heterogeneity and Interest Rate Setting: What Lessons Have We Learned since Lehman Brothers? *Journal of Money, Credit and Banking, 46*(4), 753-778.

Gersbach, H., & Rochet, J.-C. (2012). Capital Regulation and Credit Cycles. *Zurich University Mimeo*.

Gordy, M., & Howells, B. (2006). Procyclicality in Basel II: Can We Treat the Disease Without Killing the Patient? *Journal of Financial Intermediation.*

Gropp, R., & Heider, F. (2010). The Determinants of Bank Capital Structure. *Review of Finance, 14*(4), 587-622.

Hahm, J.-H., & Shin, H. (2013). Non-Core Bank Liabilities and Financial Vulnerability. *Journal of Money, Credit and Banking, 45*(s1), 3-36.

Hanson, S., Kashyap, A., & Stein, J. (2011). A Macroprudential Approach to Financial Regulation. *Journal of Economic Perspectives*, 3-28.

Hubbard, G., Kuttner, K., & Palia, D. (2002). Are There Bank Effects in Borrowers' Costs of Funds? Evidence from a Matched Sample of Borrowers and Banks. *Journal of Business, 75*(4), 559-581.

Jans, A., & Passardi, M. (2013). Die neuen Eigenkapitalregeln für Schweizer Banken. In C. Meyer, & D. Pfaff, *Finanz- und Rechnungswesen - Jahrbuch 2013* (pp. 225-264). Zurich: WEKA.

Jiménez, G., Ongena, S., Peydró, J.-L., & Saurina, J. (2012). Macroprudential Policy, Countercyclical Bank Capital Buffers and Credit Supply: Evidence from the Spanish Dynamic Provisioning Experiments. *National Bank of Belgium Working Paper 231*.

Kashyap, A., & Stein, J. (2000). What do a million observations on banks say about the transmission of monetary policy? *American Economic Review, 90*(3), 407-428.

King, M. R. (2010). Mapping capital and liquidity requirements to bank lending spreads. *BIS Working Paper 324*.

Kishan, R., & Opiela, T. (2000). Bank size, bank capital, and the bank lending channel. *Journal of Money, Credit and Banking, 32*(1), 121-141.

Kuttner, K., & Shim, I. (2013). Can non-interest rate policies stabilise housing markets? Evidence from a panel of 57 economies. *BIS Working Paper 433*.

Mattes, J., Steffen, S., & Wahrenburg, M. (2012). Do Information Rents in Loan Spreads Persist over the Business Cycles? *Journal of Financial Services Research, 43*(2), 175-195.

Modigliano, F., & Miller, M. (1958). The cost of capital, corporation finance and the theory of investment. *American Economic Review, 48*(3), 261-297.

Puri, M., Rocholl, J., & Steffen, S. (2011). Global Retail Lending in the Aftermath of the US Financial Crisis: Distinguishing between Demand and Supply Effects. *Journal of Financial Economics, 100*(3), 556-578.

Repullo, R., & Saurina, J. (2011). The Countercyclical Capital Buffer of Basel III: A Critical Assessment. *CEMFI Working Paper 1102*.

Repullo, R., & Suarez, J. (2004). Loan pricing under Basel capital requirements. *Journal of Financial Intermediation, 13*(4), 496-521.

Ruthenberg, D., & Landskroner, Y. (2008). Loan pricing under Basel II in an imperfectly competitive banking market. *Journal of Banking and Finance, 32*(12), 2725-2733.

Santos, J., & Winton, A. (2009). Bank capital, borrower power, and loan rates. *Federal Reserve Bank of New York, mimeo*.

Sharpe, S. A. (1990). Asymmetric information, bank lending, and implicit contracts: A stylized model of customer relationships. *The Journal of Finance, 45*(4), 1069-1087.

SNB. (2012). *Die Banken in der Schweiz.* Berne: Swiss National Bank.

SNB. (2013a). *Countercyclical Capital Buffer: Proposal of the Swiss National Bank and Decision of the Federal Council.* Swiss National Bank.

SNB. (2013b). *Implementing the countercyclical capital buffer in Switzerland: concretising the Swiss National Bank's role.* Berne: Swiss National Bank.

Steffen, S., & Wahrenburg, M. (2008). Syndicated loans, lending relationships and the business cycle. *Working paper, Geothe University Frankfurt*.

Swiss Bankers Association. (2011). *Richtlinien für die Prüfung, Bewertung und Abwicklung grundpfandgesicherter Kredite.* Basel.

Swiss Bankers Association. (2012). *Richtlinien betreffend Mindestanforderungen bei Hypothekarfinanzierungen.* Basel.

Wacker, M. (2013, 2 17). Versicherungen bauen vor. Dank dem Kapitalpuffer kann die Branche im Hypomarkt durchstarten. 53.

DEFINITIONS OF VARIABLES

Dependent Variable	
Offered Mortgage Rate	Tranche-weighted offered mortgage interest rate measured in basis points and winsorized at the 1st and 99th percentile.
Refinancing Control	
Swap Rate 10y	10 year Swiss interbank swap rate.
Mortgage Characteristics	
LTV	Loan to value ratio as specified by the customer.
LTV67	Indicator of whether the LTV equals or exceeds the value of 67%.
LTV80	Indicator of whether the LTV equals or exceeds the value of 80%.
Bank Sensitivity Measures	
Excess Capitalization	Excess capitalization is measured as the distance between the bank's capital coverage ratio and the target ratio relative to the target ratio.
Constrained (0/1)	Indicator equal to one if Excess Capitalization is *below* the median.
Capital Coverage Ratio	Actual Capitalization as defined in FINMA (2011).
Mortgages/Equity Capital	Ratio of mortgages to Equity Capital. Equity Capital is defined as CET1 capital and can be decomposed into corporate capital and capital reserves.
Mortgages/Equity Capital (0/1)	Indicator equal to one if Mortgages/Equity Capital is above the median.
ΔEquity Capital	Annual growth rate of Equity Capital.
ΔEquity Capital (0/1)	Indicator equal to one if ΔEquity Capital is above the median.
ΔMortgages	Annual growth rate of mortgage volume on a bank's balance sheet.
ΔMortgages (0/1)	Indicator equal to one if ΔMortgages is above the median.
Customer Funds	The due to customers such as deposits as well as cash bonds.
Customer Funds (0/1)	Indicator equal to one if Customer Funds is above the median.
ROE	Return on equity.
ROE (0/1)	Indicator equal to one if ROE is above the median.
Customer Controls	
Income	Annual household income as specified by the customer expressed in ln.
Wealth	Wealth including retirement savings as specified by the customer expressed in ln.
Debt	Indicator of whether the customer reports any kind of debt.
Age	Age of the customer.

APPENDIX

Figure 1: Sample and Shock Periods

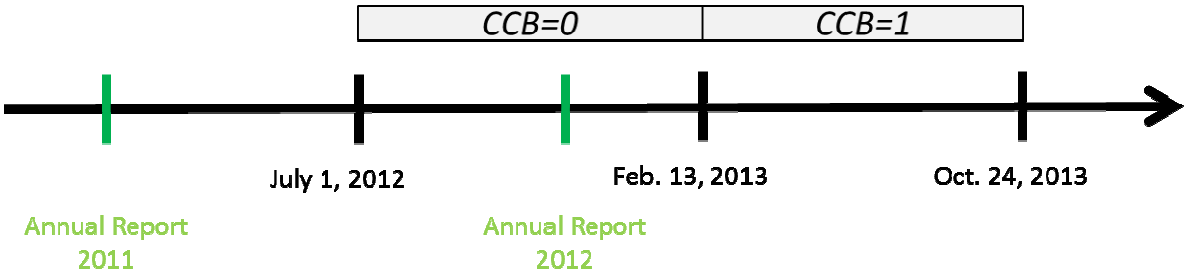
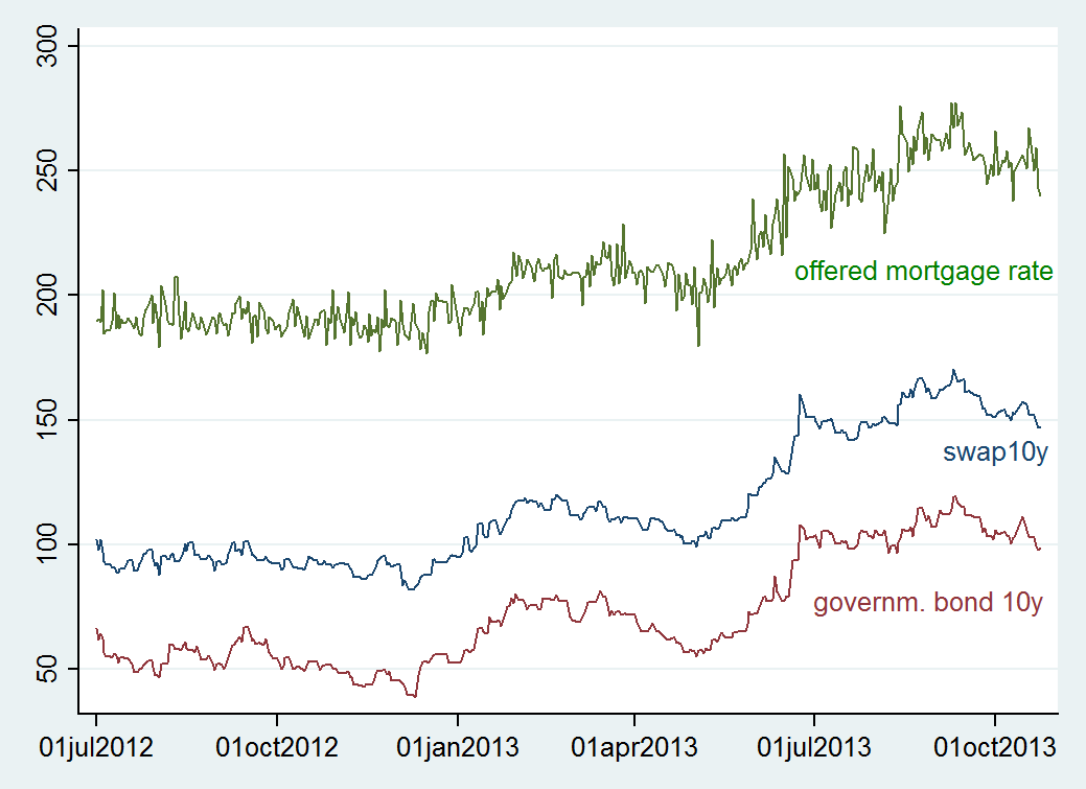


Figure 2: Back of the Envelope Computation of a bank's expected additional cost

By how much does the CCB raise an average bank's costs per mortgage?

Mortgage Amount	CHF	1'000'000
Risk-Weighted Mortgage (RWM) using average risk weight of 40%	CHF	400'000
Additional Equity Capital Requirement of the CCB set to 1% of RWM	CHF	4'000
Cost Differential Substitute Equity Capital for Debt Assuming Cost of Equity – Cost of Debt= 3.84%	CHF	154
Extra costs relative to the mortgage amount	bp	1.54

Figure 3: Sample Averages of all 10 Year Offered Mortgage Rates, 10 Year Swiss Swap Rates and Government Bonds



Sources: Bloomberg, Comparis and authors' calculations

Figure 4: Mortgage Tranche and Mortgage Total Average Risk Weights as Functions of the Loan to Value (LTV) Ratio

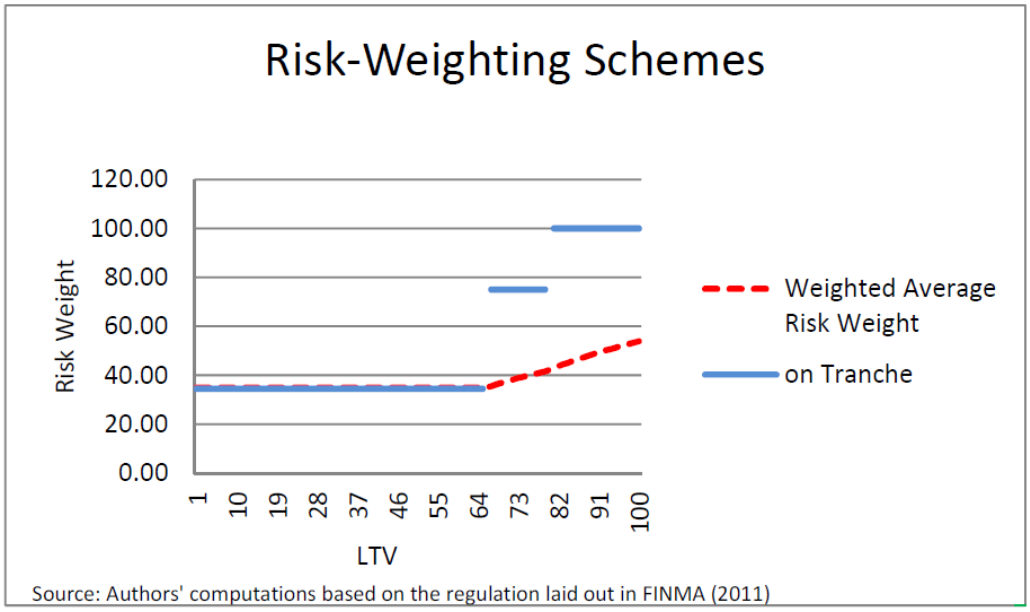


Table 1: Mortgage Demand and Supply Participation

		CCB=0	CCB=1
Mortgage Demand			
Number of Requests		661	516
Applicant's LTV		65.66	65.42
Mortgage Supply			
Number of Answers	all	3'873	2'461
	by banks	2'744	1'865
	by insurers	1'129	596
Number of Offers	all	3'313	2'146
	by banks	2'390	1'655
	by insurers	923	491
Number of Rejections	all	560	315
	by banks	354	210
	by insurers	206	105
Offered Mortgage Rate	all	192.26	223.59
	by banks	195.39	226.36
	by insurers	184.18	214.24

Notes: This table presents our database in terms of mortgage demand and supply participation. It focuses on requested 10-year fixed rate mortgages only. The underlying average offered mortgage interest rates result from the tranche-weighted offered mortgage interest rates.

Table 2: Our Sample and the Swiss Mortgage Market

Locational Canton of the real estate property	Switzerland 2012: Share of Issued Mortgages		Estimation Sample: Share of Requested Mortgage Volumes		Estimation Sample: Share of Requests	
	in % (1a)	Rank (1b)	in % (2a)	Rank (2b)	in % (3a)	Rank (3b)
Zurich	19.19	1	25.59	1	22.51	1
Berne	10.77	2	11.69	3	13.25	2
Aargau	8.73	3	10.26	4	11.47	3
Vaud	8.07	4	11.73	2	10.96	4
St.Gallen	5.73	5	4.61	5	5.52	5
Geneva	5.06	6	2.70	12	1.78	15
Ticino	4.73	7	2.52	13	2.21	13
Lucerne	4.64	8	4.42	6	4.33	6
Basel Land	3.86	9	2.94	9	2.80	10
Valais	3.59	10	1.77	15	2.29	12
Thurgau	3.48	11	3.81	7	3.91	7
Solothurn	3.37	12	2.93	10	3.31	9
Graubünden	3.33	13	1.56	17	1.87	14
Fribourg	3.23	14	3.13	8	3.82	8
Schwyz	2.37	15	2.74	11	2.46	11
Zug	2.04	16	1.82	14	1.27	17
Basel Stadt	1.92	17	1.64	16	1.53	16
Neuchatel	1.53	18	1.03	18	1.19	18
Schaffhausen	0.94	19	0.41	23	0.68	19
Jura	0.75	20	0.41	22	0.59	20
Appenzell AR	0.62	21	0.36	24	0.59	21
Nidwalden	0.54	22	0.61	20	0.42	23
Obwalden	0.47	23	0.75	19	0.59	22
Glarus	0.44	24	0.43	21	0.42	24
Uri	0.40	25	0.16	25	0.17	25
Appenzell IR	0.18	26	0.00	26	0.00	26

Notes: This table compares the entire Swiss mortgage market in Columns (1a) and (1b) with our sample in Columns (2a) to (3b). We compute the share of all mortgages by locational canton of the associated real estate property for the stock of all issued mortgages in Switzerland in Column (1a). By analogy, Column (2a) gives the share of requested mortgage volumes by locational canton and Column (3a) indicates the share of requests per locational canton while giving equal weight to each request instead of weighting by mortgage volume. Source: SNB (2012) and Comparis.

Table 3: Descriptive Statistics of Offered Mortgage Rate Regressions including Sensitivity Measures with Banks only

	mean	p50	sd	min	max	N
1120 requests; 22 bank						
offered mortgage rate (in bp)	208.08	201.20	24.68	159	277.5	4'045
Swap Rate 10y (in %)	1.09	1.03	0.21	0.82	1.70	4'045
CCB (0/1)	0.41	0.00	0.49	0	1	4'045
LTV (in%)	65.17	70.00	15.73	7	100	4'045
LTV67 (0/1)	0.56	1.00	0.50	0	1	4'045
LTV80 (0/1)	0.20	0.00	0.40	0	1	4'045
Income (in CHF tsd)	176.71	155.00	92.65	15.00	1400.00	4'045
Wealth (in CHF tsd)	521.40	313.00	967.57	5.00	20000.00	4'045
Income (ln)	11.98	11.95	0.44	9.62	14.15	4'045
Wealth (ln)	12.64	12.65	1.01	8.52	16.81	4'045
Debt (0/1)	0.16	0.00	0.37	0	1	4'045
Age	44.60	44.00	9.36	20	79	4'045
Bank Sensitivity (above/below median)						
Constrained (0/1)	0.61	1	0.49	0	1	4'045
Mortgages/Equity Capital (0/1)	0.47	0	0.50	0	1	4'045
Equity Capital/TA (0/1)	0.34	0	0.47	0	1	4'045
Corporate Capital/TA (0/1)	0.56	1	0.50	0	1	4'045
Capital Reserves/TA (0/1)	0.37	0	0.48	0	1	4'045
ΔEquity Capital (0/1)	0.60	1	0.49	0	1	4'045
ΔMortgages (0/1)	0.57	1	0.50	0	1	4'045
Customer Funds/Mortgages (0/1)	0.78	1	0.41	0	1	4'045
ROE (0/1)	0.61	1	0.49	0	1	4'045
Bank Sensitivity (levels)						
Excess Capitalization (in %)	40.58	44.79	21.82	8.29	119.61	3'129
Mortgages/Equity Capital (in %)	974.40	902.60	220.30	379.73	1785.48	4'045
Equity Capital/TA (in %)	7.30	7.36	1.19	4.91	13.96	4'045
Corporate Capital/TA (in %)	1.59	1.28	1.13	0.00	3.72	4'045
Capital Reserves/TA (in %)	5.40	5.07	1.84	2.57	12.91	4'045
ΔEquity Capital (in %)	6.64	4.39	11.75	0.17	146.48	4'045
ΔMortgages (in %)	8.59	8.35	7.33	1.57	94.42	4'045
Customer Funds/Mortgages (in %)	115.87	110.68	32.90	37.14	202.95	4'045
ROE (in %)	4.69	6.10	2.56	0.17	9.54	4'045

Notes: This table exhibits descriptive statistics of our regressions with banks only. We express the dependent variable offered mortgage interest rate in basis points and winsorize it at the 1st and 99th percentile. LTV67 [LTV80] stands for an indicator of whether this LTV exceeds the value of 67 [80]. All Bank Sensitivity measures (above/below median) in the second panel feature (0/1) indicators of whether the bank is above the median among all participating banks in a given year (except for Constrained which refers to Excess Capitalization being *below* the median). All Bank Sensitivity measures in the third panel feature levels. Constrained draws on excess capitalization measured as the distance between the bank's capital coverage ratio and the target ratio relative to the target ratio. Mortgages/Equity Capital refers to the ratio of mortgages to equity capital. Equity capital is defined as CET1 capital and can be decomposed into corporate capital and capital reserves. ΔEquity Capital and ΔMortgages represents the growth rates of Equity Capital and the stock of mortgages on balance sheets, respectively. Customer Funds capture the due to customers such as deposits as well as cash bonds while ROE stands for the Return on Equity. Please refer to the Descriptions of Main Variables for more details.

Table 4: Mortgage Rate Regression with Sensitivity Measures for Banks only

Offered Mortgage Rate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sensitivity Measures									
Constrained	6.8883								
	(5.9641)								
CCB*Constrained	6.2789***								
	(0.9325)								
Mortgages/Equity Capital		-7.6884***							
		(0.8925)							
CCB*Mortgages/Equity Capital		6.5307***							
		(0.9604)							
Equity Capital/TA			1.0708						
			(3.4065)						
CCB*Equity Capital/TA			-8.8509***						
			(0.9922)						
Corporate Capital/TA				-4.9685**					
				(2.3202)					
CCB*Corporate Capital/TA				8.3259***					
				(0.8766)					
Capital Reserves/TA					-11.5118				
					(12.4785)				
CCB*Capital Reserves/TA					-8.7294***				
					(0.9274)				
ΔEquity Capital						-4.7533***			
						(0.7278)			
CCB*ΔEquity Capital						2.5683**			
						(1.2662)			
ΔMortgages							-2.2854***		
							(0.7056)		
CCB*ΔMortgages							0.8470		
							(1.1763)		
Customer Funds/Mortgages								-22.3350**	
								(11.3287)	
CCB*Customer Funds/Mortgages								-0.1036	
								(1.1002)	
ROE									-1.1818
									(2.0306)
CCB*ROE									-1.8902**
									(0.8741)
Constant	242.7159***	246.7853***	199.6107***	242.9582***	249.4647***	200.9042***	219.6279***	252.3132***	243.3556***
	(7.3538)	(6.1920)	(6.5295)	(5.3274)	(3.5127)	(6.2541)	(5.4697)	(4.0835)	(5.8023)
Observations	4,045	4,045	4,045	4,045	4,045	4,045	4,045	4,045	4,045
R-squared	0.8281	0.8297	0.8306	0.8305	0.8309	0.8277	0.8255	0.8248	0.8252

Notes: This table shows the results of an OLS regression with the offered mortgage rate. The offered mortgage rate is measured in basis points and winsorized at the 1st and 99th percentile. All bank sensitivity measures feature a (0/1) indicator of whether the bank is above the median among all participating banks in a given year (except for Constrained which refers to excess capitalization being *below* the median). Please refer to Table 3 and the Descriptions of Main Variables for more details. All regressions include fixed effects for each request and for each offering bank. Heteroskedasticity consistent standard errors in parentheses with ***, ** and * denoting significance at the 1%, 5% and 10% level.

Table 5: Mortgage Rate Regression with Threshold LTVs for Banks only

Offered Mortgage Rate	(1)	(2)	(3)	(4)	(5)
Mortgage Characteristics					
LTV	0.0282	0.0261	0.0264	0.0267	0.0251
	(0.0206)	(0.0205)	(0.0204)	(0.0205)	(0.0207)
LTV67 (0/1)	2.1329***	2.5814***	2.3856***	2.3825***	2.3527***
	(0.6950)	(0.6923)	(0.6954)	(0.6960)	(0.6966)
LTV80 (0/1)	1.8084**	1.8488**	1.5700**	1.5591**	1.5391**
	(0.7500)	(0.7441)	(0.7462)	(0.7476)	(0.7476)
CCB*LTV67 (0/1)	-1.4976	-1.4916	-1.4856	-1.4931	-1.5161*
	(0.9193)	(0.9122)	(0.9111)	(0.9108)	(0.9115)
CCB*LTV80 (0/1)	0.8679	1.3353	1.4530	1.4593	1.4828
	(1.1688)	(1.1508)	(1.1509)	(1.1516)	(1.1516)
Refinancing Control					
Swap Rate 10y	73.6928***	75.1129***	74.4085***	74.3725***	74.2675***
	(4.6923)	(4.6574)	(4.6616)	(4.6695)	(4.6725)
Request Controls					
Income		-3.9127***	-3.1353***	-3.1514***	-3.2027***
		(0.4673)	(0.5086)	(0.5114)	(0.5191)
Wealth			-0.8430***	-0.8406***	-0.8085***
			(0.2241)	(0.2240)	(0.2278)
Debt (0/1)				0.1442	0.1768
				(0.5425)	(0.5434)
Age					-0.0158
					(0.0227)
Constant	120.4573***	166.4232***	168.8237***	185.1407***	186.3524***
	(8.7060)	(9.8368)	(9.8425)	(9.9337)	(10.0654)
Observations	4,045	4,045	4,045	4,045	4,045
R-squared	0.7593	0.7635	0.7643	0.7644	0.7644

Notes: This table shows the results of an OLS regression with the offered mortgage rate as left-hand side variable. The offered mortgage rate is measured in basis points and winsorized at the 1st and 99th percentile. LTV67 [LTV80] stands for an indicator of whether this LTV exceeds the value of 67 [80]. CCB*LTV67 [CCB*LTV80] refers to the interaction of the CCB with the LTV67 [LTV80] variable. To control for the general level of refinancing costs, we add the 10-year interest swap rate. Please refer to Table 3 and the Descriptions of Main Variables for more details. All regressions include fixed effects for the offering bank, the month of submission (while February 2013 is split into a pre and post February 2013 dummy), the request's property type and domiciled canton. Heteroskedasticity consistent standard errors in parentheses with ***, ** and * denoting significance at the 1%, 5% and 10% level.

Table 6: Descriptive Statistics for the Full Sample as well as Banks and Insurers, separately

	mean	p50	sd	min	max	N
1129 requests; 22 banks and 3 insurers						
offered mortgage rate (in bp)	204.62	200	25.09	159	277.5	5'459
CCB (0/1)	0.39	0	0.49	0	1	5'459
LTV (in%)	65.30	70	15.40	7	100	5'459
LTV67 (0/1)	0.56	1	0.50	0	1	5'459
LTV80 (0/1)	0.20	0	0.40	0	1	5'459
Income (in CHF tsd)	178.60	157.5	94.24	15	1'400	5'459
Wealth (in CHF tsd)	527.23	320	946.54	5	20'000	5'459
Income (ln)	11.99	11.97	0.44	9.62	14.15	5'459
Wealth (ln)	12.66	12.68	1.01	8.52	16.81	5'459
Debt (0/1)	0.17	0	0.37	0	1	5'459
Age	44.58	44	9.33	20	79	5'459
1126 requests; 22 banks						
offered mortgage rate (in bp)	208.08	201.2	24.68	159	277.5	4'045
CCB (0/1)	0.41	0	0.49	0	1	4'045
LTV (in%)	65.17	70	15.73	7	100	4'045
LTV67 (0/1)	0.56	1	0.50	0	1	4'045
LTV80 (0/1)	0.20	0	0.40	0	1	4'045
Income (in CHF tsd)	176.70	155	92.66	15	1'400	4'045
Wealth (in CHF tsd)	521.40	313	967.57	5	20'000	4'045
Income (ln)	11.98	11.95	0.44	9.62	14.15	4'045
Wealth (ln)	12.64	12.65	1.01	8.52	16.81	4'045
Debt (0/1)	0.16	0	0.37	0	1	4'045
Age	44.60	44	9.36	20	79	4'045
851 requests; 3 insurers						
offered mortgage rate (in bp)	194.71	191.17	23.59	159	277.5	1'414
CCB (0/1)	0.35	0	0.48	0	1	1'414
LTV (in%)	65.66	69	14.40	7	81	1'414
LTV67 (0/1)	0.55	1	0.50	0	1	1'414
LTV80 (0/1)	0.19	0	0.39	0	1	1'414
Income (in CHF tsd)	184.00	160	98.46	35	1400	1'414
Wealth (in CHF tsd)	543.89	335	883.74	5	20'000	1'414
Income (ln)	12.02	11.98	0.44	10.46	14.15	1'414
Wealth (ln)	12.71	12.72	1.01	8.52	16.81	1'414
Debt (0/1)	0.17	0	0.37	0	1	1'414
Age	44.51	43	9.24	24	79	1'414

Notes: This table exhibits descriptive statistics of our regressions with banks and insurers. We express the dependent variable offered mortgage rate in basis points and winsorize it at the 1st and 99th percentile. LTV67 [LTV80] stands for an indicator of whether this LTV exceeds the value of 67 [80]. Please refer to the Descriptions of Main Variables for more details.

Table 7 a: Comparison of Means: Acceptance Rates

OFFER(0/1)

	Banks (1)	Insurers (2)	Difference (1)-(2)
CCB=0	0.871***	0.818***	0.053***
	(0.006)	(0.011)	(0.013)
CCB=1	0.887***	0.824***	0.064***
	(0.007)	(0.016)	(0.017)
Difference	0.016*	0.006	0.010
	(0.010)	(0.019)	(0.022)

Notes: This table shows comparison of means estimates of loan acceptance rates. Heteroskedasticity consistent standard errors in parentheses with ***, **, and * denoting significance at the 1%, 5%, and 10% level.

Table 7 b: Comparison of Means: Offered Mortgage Rates

Offered Mortgage Rate

	Banks (1)	Insurers (2)	Difference (1)-(2)
CCB=0	195.647***	184.324***	11.323***
	(0.294)	(0.538)	(0.613)
CCB=1	226.033***	214.274***	11.786***
	(0.624)	(1.024)	(1.200)
Difference	30.386***	29.924***	0.463
	(0.690)	(1.157)	(1.347)

Notes: This table showscomparison of means estimates of the CCB's effect on the offered mortgage interest rate for respectively banks and insurers. The offered mortgage rate is measured in basis points and winsorized at the 1st and 99th percentile. Robust standard errors in parentheses with ***, **, and * denoting significance at the 1%, 5%, and 10% level.

Table 7 c: Comparison of Means: Requested LTV Ratios

Requested LTV

	Banks (1)	Insurers (2)	Difference (1)-(2)
CCB=0	64.983***	65.791***	-0.8080
	(0.329)	(0.473)	(0.576)
CCB=1	65.451***	65.418***	0.0330
	(0.374)	(0.653)	(0.752)
Difference	0.4670	-0.3730	0.8410
	(0.498)	(0.806)	(0.947)

Notes: This table shows mean Difference-in-Difference (DID) estimates of the loan-to-value (LTV) ratio as indicated in the customer's request. Heteroskedasticity consistent standard errors in parentheses with ***, **, and * denoting significance at the 1%, 5%, and 10% level.

Table 7 d: Offered Mortgage Rate Regression Comparing Banks, Banking Groups and Insurers

Offered Mortgage Rate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(a) CCB*BANK	18.1311***	18.7369***	18.0803***	17.7655***	17.8320***	17.9357***	
	(2.9282)	(2.9042)	(2.8706)	(2.8755)	(2.8842)	(2.8860)	
(a) CCB*KANTONALBANK							14.0554***
							(2.9824)
(a) CCB*FOREIGNBANK							19.5148***
							(2.9216)
(a) CCB*OTHERBANK							20.6944***
							(2.8853)
(b) CCB*NONB	26.9625***	27.5509***	26.8791***	26.5553***	26.6166***	26.7209***	26.8837***
	(3.0176)	(2.9943)	(2.9620)	(2.9652)	(2.9725)	(2.9763)	(2.9617)
Refinancing Control							
Swap Rate 10y	72.5580***	71.9349***	72.9096***	71.9478***	71.8929***	71.8162***	72.1620***
	(4.1694)	(4.1393)	(4.1210)	(4.1210)	(4.1282)	(4.1309)	(4.0720)
Mortgage Characteristics							
LTV	0.1600***	0.0476***	0.0458**	0.0459**	0.0463**	0.0449**	0.0449**
	(0.0113)	(0.0183)	(0.0181)	(0.0181)	(0.0181)	(0.0182)	(0.0179)
		3.1308***	3.5347***	3.2709***	3.2630***	3.2274***	3.3118***
		(0.5445)	(0.5424)	(0.5448)	(0.5450)	(0.5480)	(0.5425)
LTV80 (0/1)		2.6726***	2.9084***	2.6146***	2.6032***	2.5909***	2.6349***
		(0.5138)	(0.5082)	(0.5103)	(0.5108)	(0.5111)	(0.5081)
Request Controls							
Income			-3.4705***	-2.4471***	-2.4696***	-2.5118***	-2.4437***
			(0.4118)	(0.4494)	(0.4530)	(0.4586)	(0.4494)
Wealth				-1.0885***	-1.0860***	-1.0598***	-1.0799***
				(0.1969)	(0.1969)	(0.2000)	(0.1954)
Debt (0/1)					0.2066	0.2359	
					(0.4682)	(0.4686)	
Age						-0.0136	
						(0.0199)	
Constant	118.6651***	122.6677***	162.3979***	165.5466***	165.6442***	166.5243***	166.5272***
	(12.3072)	(12.5125)	(13.5326)	(13.5074)	(13.4919)	(13.5910)	(14.0626)
Observations	5,459	5,459	5,459	5,459	5,459	5,459	5,459
R-squared	0.7602	0.7632	0.7664	0.7678	0.7678	0.7678	0.7702
DID estimate (a)-(b)	-8.831	-8.814	-8.799	-8.790	-8.785	-8.785	
Wald test (a)-(b) p-value	0	0	0	0	0	0	

Notes: This table shows the results of an OLS regression with the offered mortgage rate as left-hand side variable. This offered rate is measured in basis points and winsorized at the 1st and 99th percentile. CCB*BANK [CCB*NONB] refers to the interaction of the CCB with an indicator BANK [NONB] of whether the offering institution is a bank [insurer]. KANTONALBANK, FOREIGNBANK and OTHERBANK are dummy variables indicating the banking group in which a bank can be classified according to the standars of the Swiss National Bank. To control for the general level of refinancing costs, we add the 10-year interest swap rate. LTV67 [LTV80] stands for indicator of whether this LTV exceeds the value of 67 [80]. The diagnostic section reports the DID estimate and its p-value from the Wald test under the H0 that the difference between banks and insurers equals zero. All regressions include fixed effects for the offering bank, the month of submission (while February 2013 is split into a pre and post February 2013 dummy), the request's property type and domiciled canton. Heteroskedasticity consistent standard errors in parentheses with ***, ** and * denoting significance at the 1%, 5% and 10% level.

ONLINE APPENDIX

Table A: Mortgage Rate Regression with Sensitivity Measures for Banks only (dropping lender fixed effects)

Offered Mortgage Rate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sensitivity Measures									
Constrained	-1.3034**								
	(0.5715)								
CCB*Constrained	6.5410***								
	(1.0078)								
Mortgages/Equity Capital		-3.7413***							
		(0.5432)							
CCB*Mortgages/Equity Capital		6.8657***							
		(0.9672)							
Equity Capital/TA			1.8843***						
			(0.6325)						
CCB*Equity Capital/TA			-10.4998***						
			(1.0641)						
Corporate Capital/TA				-2.5858***					
				(0.5566)					
CCB*Corporate Capital/TA				8.3608***					
				(0.9354)					
Capital Reserves/TA					2.9878***				
					(0.6078)				
CCB*Capital Reserves/TA					-9.8486***				
					(1.0050)				
ΔEquity Capital						-4.2074***			
						(0.5551)			
CCB*ΔEquity Capital						-1.1350			
						(1.2034)			
ΔMortgages							1.0233*		
							(0.5447)		
CCB*ΔMortgages							-5.9851***		
							(1.1462)		
Customer Funds/Mortgages								-2.6399***	
								(0.6578)	
CCB*Customer Funds/Mortgages								-1.8787	
								(1.1721)	
ROE									-2.4163***
									(0.5184)
CCB*ROE									-2.6871***
									(0.9181)
Constant	188.8034***	199.0756***	223.1157***	271.7250***	222.0122***	229.2074***	223.9767***	234.5185***	227.4163***
	(0.5715)	(0.8003)	(0.6325)	(0.7518)	(0.6078)	(0.5551)	(0.5447)	(0.9701)	(0.5184)
Observations	4,045	4,045	4,045	4,045	4,045	4,045	4,045	4,045	4,045
R-squared	0.7990	0.7989	0.8050	0.8009	0.8031	0.8009	0.7975	0.7976	0.7995

Notes: This table shows the results of an OLS regression with the offered mortgage rate. The offered mortgage rate is measured in basis points and winsorized at the 1st and 99th percentile. All bank sensitivity measures feature a (0/1) indicator of whether the bank is above the median among all participating banks in a given year (except for Constrained which refers to excess capitalization being below the median). Please refer to Table 3 and the Descriptions of Main Variables for more details. All regressions include fixed effects for each request. Heteroskedasticity consistent standard errors in parentheses with ***, ** and * denoting significance at the 1%, 5% and 10% level.

Table B: Mortgage Rate Regression with Sensitivity Measures for Banks only (median defined by request)

Offered Mortgage Rate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sensitivity Measures									
Constrained	-4.4477***								
	(0.7415)								
CCB*Constrained	4.9998***								
	(0.9769)								
Mortgages/Equity Capital		-0.9983							
		(0.8613)							
CCB*Mortgages/Equity Capital		5.2898***							
		(0.8490)							
Equity Capital/TA			6.0687***						
			(0.8036)						
CCB*Equity Capital/TA			-5.3629***						
			(0.8125)						
Corporate Capital/TA				-1.8063*					
				(0.9895)					
CCB*Corporate Capital/TA				4.9641***					
				(0.8452)					
Capital Reserves/TA					6.5858***				
					(0.8422)				
CCB*Capital Reserves/TA					-5.5689***				
					(0.8070)				
ΔEquity Capital						-3.4667***			
						(0.5955)			
CCB*ΔEquity Capital						4.3064***			
						(0.9476)			
ΔMortgages							-4.5582***		
							(0.5924)		
CCB*ΔMortgages							1.9115**		
							(0.8787)		
Customer Funds/Mortgages								3.1210***	
								(0.6048)	
CCB*Customer Funds/Mortgages								-2.8956***	
								(0.8868)	
ROE									0.3603
									(0.9652)
CCB*ROE									-0.9884
									(0.8199)
Constant	191.8106***	191.9504***	188.1387***	194.8207***	187.6749***	194.8675***	193.9656***	192.3980***	192.6553***
	(6.5472)	(6.3357)	(5.7286)	(5.5800)	(5.7184)	(6.9342)	(6.3859)	(6.1538)	(6.1903)
Observations	3,955	3,955	3,955	3,955	3,955	3,955	3,955	3,955	3,955
R-squared	0.8202	0.8203	0.8219	0.8198	0.8222	0.8197	0.8214	0.8190	0.8176

Notes: This table shows the results of an OLS regression with the offered mortgage rate. The offered mortgage rate is measured in basis points and winsorized at the 1st and 99th percentile. All bank sensitivity measures feature a (0/1) indicator of whether the bank is above the median among all participating banks for a given request (except for Constrained which refers to excess capitalization being below the median). Please refer to Table 3 and the Descriptions of Main Variables for more details. All regressions include fixed effects for each request and for each offering bank. Heteroskedasticity consistent standard errors in parentheses with ***, ** and * denoting significance at the 1%, 5% and 10% level.