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## A note of caution on quantifying banks' recapitalization effects

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# Non-technical summary

## Research Question

Recent years are characterized by the extended use of unconventional monetary policy including asset purchase programs to stimulate economic activity and achieve the inflation target. Such measures can put upward pressure on security prices, thus generating gains by increasing the value of securities held by banks. We ask whether and to what extent the resulting gains (and consequent recapitalization effect) depend on the security valuation method chosen by banks and capital regulation applied at the country level. We also consider the implications of securities' maturity on how long-lasting the recapitalization effect will be.

## Contribution

An expanding amount of studies analyzes the effectiveness of unconventional monetary policy measures. If such measures affect security prices, banks holding these securities benefit from price increases. Resulting gains improve capital positions, which in turn can positively affect banks' willingness to provide credit to the real sector. This paper shows that the security valuation method matters crucially for banks' recapitalization gains, such that these features should be accounted for by related studies.

## Results

Our analysis is based on data on banks' sovereign bond holdings across EU countries obtained from the European Banking Authority. Accounting for the valuation method, it turns out that only around 60% of banks' sovereign exposures are fair valued, which could thus potentially benefit from price increases, while the remainder is held to maturity. Using the ECB's Outright Monetary Transactions announcements in 2012, which significantly affected sovereign bond prices, we show that the recapitalization gain of banks previously assumed in the literature declines by 20% to 98% when differences in security valuation and national capital regulation in the form of prudential filters are accounted for.

# Nichttechnische Zusammenfassung

## Fragestellung

Mit dem Ziel, die Konjunktur zu stimulieren und das Inflationsziel zu erreichen, waren die vergangenen Jahre von einem kontinuierlichem Einsatz unkonventioneller Geldpolitik geprägt. Diese umfasst auch Wertpapierankaufprogramme, welche einen positiven Einfluss auf Wertpapierkurse haben können. Banken, die die entsprechenden Wertpapiere halten, profitieren dabei von einer Wertsteigerung. Das Papier untersucht, ob und in welchem Umfang die daraus resultierenden Gewinne (und der sich daraus ergebende Rekapitalisierungseffekt) von der Bewertungsmethode der Wertpapiere, länderspezifischer Kapitalregulierung und der verbliebenen Laufzeit abhängen.

## Beitrag

Die Wirksamkeit der unkonventionellen Geldpolitik sowie der kurssteigernde Effekt der geldpolitischen Maßnahmen auf Wertpapiere und die damit verbundenen Rekapitalisierungsgewinne der Banken sind Forschungsgegenstand in zahlreichen Studien. Die Analyse zeigt, dass bei der Berechnung der Gewinne die Bewertungsmethode der Wertpapiere von entscheidender Bedeutung ist. Folglich sollte diese für die Bewertung der geldpolitischen Maßnahme entsprechend von den jeweiligen Studien berücksichtigt werden.

## Ergebnisse

Die Analyse basiert auf Daten der Europäischen Bankenaufsichtsbehörde zu den Staatsanleihebeständen von europäischen Banken. Diese zeigen, dass nur etwa 60 % der gehaltenen Staatsanleihen zum aktuellen Marktwert bewertet werden und somit von potentiellen Preissteigerungen profitieren können. Anhand der Ankündigung des Outright Monetary Transactions-Programms der Europäischen Zentralbank im Jahr 2012, welches die Kurse von Staatsanleihen deutlich beeinflusste, zeigt die Analyse, dass der bisher in der Literatur angenommene Rekapitalisierungsgewinn der Banken um 20 bis 98 % sinkt, wenn Unterschiede in der Bewertung von Wertpapieren und der nationalen Kapitalregulierung in Form von *Prudential Filter* berücksichtigt werden.

# A Note of Caution on Quantifying Banks' Recapitalization Effects\*

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## Abstract

Unconventional monetary policy measures like asset purchase programs aim to reduce certain securities' yield and alter financial institutions' investment behavior. These measures increase the institutions' market value of securities and add to their equity positions. We show that the extent of this recapitalization effect crucially depends on the securities' accounting and valuation methods, country-level regulation, and maturity structure. We argue that future research needs to consider these factors when quantifying banks' recapitalization effects and consequent changes in banks' lending decisions to the real sector.

**Keywords:** Unconventional monetary policy, security valuation, capital regulation

**JEL classification:** G21; G28; E52; E58.

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# 1 Introduction

Since the recent financial crisis and the ongoing Covid-19 pandemic, central banks have introduced unconventional monetary policy measures like asset purchase programs to counter the economy's corresponding downturn and overcome the zero lower bound issue. These measures put upward pressure on security prices and affect financial institutions in two ways. First, they make targeted securities less profitable investments by reducing their yield.<sup>1</sup> Second, they generate gains by increasing the value of securities already held by them. However, as we put forward in this short note, the resulting gain depends crucially on the security valuation method chosen by banks and capital regulation applied at the country level.

Importantly, the gain in the value of securities held by financial institutions adds to these institutions' capitalization. Therefore, it is also referred to as "stealth recapitalization" ([Brunnermeier and Sannikov, 2016](#)). Empirical evidence for the recapitalization effect is provided for example by [Chakraborty et al. \(2020\)](#), [Chodorow-Reich \(2014\)](#), [Rodnyansky and Darmouni \(2017\)](#) for the United States, and by [Acharya et al. \(2019\)](#) and [Andrade et al. \(2016\)](#) for the European Union (EU). These studies often investigate the transmission of the effect to the real economy as banks might be more inclined to expand lending following an increase in capital positions.

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This short note focuses on the recapitalization effect of the European Cen-

<sup>1</sup>The reduction in the yield of high-quality securities puts downward pressure on interest rates, thereby improving borrowing and financing conditions for the real economy. This channel of unconventional monetary policy is investigated among others by [Cycon and Koetter \(2015\)](#), [Gagnon et al. \(2011\)](#), [Grosse-Rueschkamp et al. \(2019\)](#), and [Koetter \(2019\)](#).

tral Bank's (ECB) Outright Monetary Transactions (OMT) announcements in 2012, which strongly impacted EU countries' sovereign bond prices. We estimate banks' gains following a change in sovereign bond prices. We base these estimations once on banks' total amount of sovereign debt holdings across EU countries. At the same time, alternatively, we account for security valuation, country-specific prudential filters, and maturity structure. The latter aspect is essential as it can determine how far price changes spill over to banks' capital positions. Depending on security valuation, banks have (not) to mark assets to market following price changes, while prudential filters regulate how far unrealized gains and losses of securities add to banks' capital positions. The maturity structure might have implications for how long-lasting the recapitalization effect will be.

Our results clearly show that the recapitalization gain previously assumed in the literature is reduced by 20 to 98% when differences in security valuation and national capital regulation in the form of prudential filters are accounted for. Following these estimates, studies on the recapitalization effects of unconventional monetary policy measures should consider such differences. Otherwise, the recapitalization gain tends to be systematically overestimated, and subsequent analyses on, for example, potential effects on banks' lending decisions to the real economy are subject to measurement error. We additionally show that, in the longer term, the recapitalization gain declines due to maturing securities. In the following, we describe the regulatory setting, the data, and the underlying calculation method used to reach these results.

## 2 Security valuation and prudential filters

When measuring the value of securities on banks' balance sheets, the security valuation method depends on the security and accounting class's purpose. If a security is bought to be held until it matures, it is classified into the held-to-maturity (HtM) portfolio and assessed at amortized cost. If a security is meant to be traded in the short term, it is sorted into the held-for-trading (HfT) class and measured at fair value. In case the purpose is not clear yet, the bank can choose the hybrid category available-for-sale (AfS) whose assets are also evaluated at fair value. Following this taxonomy, only securities categorized as HfT or AfS mirror an increase in the security price.<sup>2</sup>

Table 1 provides an overview of the accounting categories and the corresponding valuation methods. For simplicity, the category "designated at fair value through profit or loss" (dFV) is not listed separately in the table. It usually includes derivatives and shares all relevant features with the HfT class. In the following calculation of recapitalization gains, assets considered as dFV are included in the HfT category. As Figure 1 shows, the dFV category constitutes only a small fraction of fair valued securities. Combining it with the HfT class eases the interpretation of effects later on.

Two important considerations have to be made when estimating the recapitalization effect due to price changes of securities. First, banks might want to reclassify securities from HtM to other classes to benefit from price increases. However, in practice, such reclassification is limited to insignifi-

<sup>2</sup>On the one hand, the historic cost regime is inefficient because it ignores price signals. On the other hand, fair value measurement can distort prices' informational content by adding a non-fundamental component to price fluctuations (Laux and Leuz, 2009; Plantin et al., 2008).

Table 1: Security accounting, valuation, and gains and losses recognition

Accounting category	Subsequent measurement	Recognition of unrealized gains and losses
Held to maturity (HtM)	Amortized cost	Income statement
Held for trading (HfT)	Fair value	Income statement
Available for sale (AfS)	Fair value	Other comprehensive income

cant amounts.<sup>3</sup> In case of a violation, the bank taints its HtM portfolio on the group level for two financial years. It is bound to fair value accounting during that period. This step exposes the bank to market developments like a rise in interest rates and can be considered a credible threat.

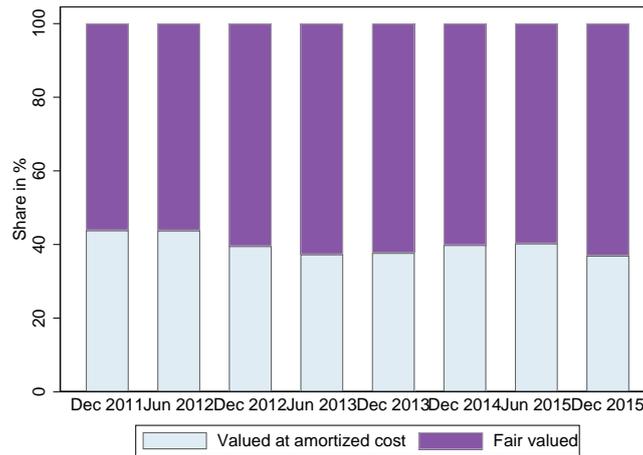
Second, even if banks hold AfS securities that are continuously valued, they might not benefit from price increases. The reason is that prudential filters remove unrealized gains and losses of AfS securities from banks' other comprehensive income (OCI). Under Basel II, this was meant to reduce volatility and uncertainty from the bank's regulatory capital, including OCI (Allen and Carletti, 2008; Argimón et al., 2017; Chisnall, 2001; Heaton et al., 2010). Following the CEBS<sup>4</sup> guidelines, EU countries could opt between two approaches. The asymmetric approach fully subtracts unrealized losses of AfS debt securities from the banks' capital position. It adds unrealized gains only partially to Tier2 capital. The neutralization approach recognizes neither unrealized gains nor unrealized losses (CEBS, 2007). Hence, depending

<sup>3</sup>In rare circumstances like the financial crisis, banks are allowed to reclassify more massive amounts (Fiechter, 2011; Bischof et al., 2012).

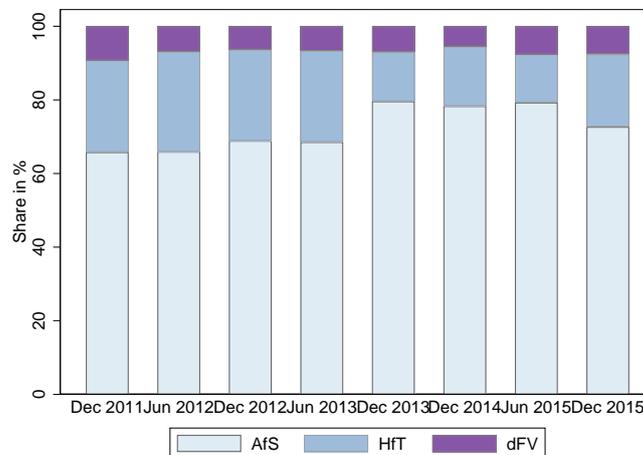
<sup>4</sup>The Committee of European Banking Supervisors (CEBS) preceded the European Banking Authority (EBA).

on the country-specific approach, banks can not or only partially benefit from unrealized gains originating from AfS securities.

Figure 1: Banks' sovereign debt holdings in EU countries over time



(a) Sovereign debt holdings by security valuation method



(b) Fair valued sovereign debt holdings by accounting class

Notes: Figure 1(a) shows banks' sovereign debt holdings in EU countries by security valuation method. Figure 1(b) shows the share of fair valued sovereign debt holdings by accounting category (Available for sale (AfS); held for trading (HFT); designated at fair value through profit or loss (dFV)). Both figures are based on data of the banks considered in the capital exercise 2011 (61 banks), the transparency exercise 2013 (64 banks), the stress test 2014 (123 banks), the transparency exercise 2015 (105 banks), and the stress test 2016 (51 banks) as provided by the European Banking Authority (EBA).

For a sample of large European banks participating in the EBA’s assessments conducted over the period from 2011 to 2016, Figure 1 sheds light on the relevance of differences in the valuation of sovereign bond holdings. Figure 1(a) shows that around 60% of banks’ sovereign debt holdings in EU countries are continuously valued, representing an upper bound of securities out of which banks can benefit from price increases. However, Figure 1(b) shows that up to 80% of fair valued sovereign debt held by banks in EU countries is categorized as AfS, which implies that the existence of prudential filters can counteract potential gains due to increasing security prices. Even though Basel III/ Capital Requirements Regulation (CRR) removes national prudential filters step by step from 2014 onwards, prudential filters remain relevant because countries have the option to keep the prudential filter in place for central government debt.<sup>5</sup>

### 3 Data and methodology

To provide further evidence on how valuation methods matter for recapitalization effects, we follow [Acharya et al. \(2019\)](#) and use the OMT program as a laboratory to calculate banks’ recapitalization effect following changes in prices of sovereign bonds of EU countries. The ECB’s OMT announcement took place in 2012. We base our calculations on the detailed breakdown of banks’ sovereign debt holdings from the preceding EBA’s 2011 capital exercise. Besides, we employ sovereign bond price data from [Datastream](#) and

<sup>5</sup><http://www.eba.europa.eu/supervisory-convergence/supervisory-disclosure/options-and-national-discretions>

bank-level information from Bureau van Dijk’s Bankscope.<sup>6</sup> We estimate the OMT windfall gain, which is the recapitalization effect of the OMT announcement, using banks’ sovereign debt holdings across EU countries.<sup>7</sup> The analysis is based on the three dates July 26, August 2, and September 6 of 2012, which relate to Mario Draghi’s speech, the OMT announcement, and the announcement of further details (Acharya et al., 2019; Krishnamurthy et al., 2018).<sup>8</sup>

We accumulate the bond price changes of the three OMT announcement days (Acc. Bond Price Changes<sub>cm</sub>)<sup>9</sup> and multiply them for each maturity,  $m$ , and country,  $c$ , with the respective bank’s  $b$  sovereign debt holdings (Sovereign Debt<sub>bcm</sub>). Summing the country-specific gains from all EU sovereigns and dividing the total by the bank’s total equity (Total Equity<sub>b</sub>) results in the bank-level OMT windfall gain:

$$\text{OMT Windfall Gain}_b = \frac{\sum_{cm} \text{Sovereign Debt}_{bcm} * \text{Acc. Bond Price Changes}_{cm}}{\text{Total Equity}_b} \quad (1)$$

<sup>6</sup>In contrast, Acharya et al. (2019) use bank-level data from SNL.

<sup>7</sup>The EBA data contain sovereign exposures to countries of the European Economic Area (EEA), whereas we only keep exposures to EU sovereigns.

<sup>8</sup>In summer 2012, ECB president Mario Draghi announced the introduction of the OMT program. With the program being activated by a specific country, the ECB can buy a potentially unlimited amount of sovereign bonds from the respective country in the secondary market. In connection with the announcement, Draghi also stated, “[...] the ECB is ready to do whatever it takes to preserve the euro. And believe me, it will be enough”. This and following statements had significant effects on sovereign bond prices as shown by Altavilla et al. (2016), Krishnamurthy and Vissing-Jorgensen (2011), and Szczerbowicz (2015).

<sup>9</sup>The price change is calculated from the day preceding ( $t - 1$ ) to the day following the respective OMT announcement ( $t + 1$ ).

To evaluate the valuation method’s importance for the recapitalization effect, we repeat the calculation using only banks’ sovereign debt holdings measured at fair value. The role of prudential filters is considered by reviewing the effect separately for AfS and HfT securities. While the two former aspects are relevant for calculating windfall gains instantaneously, there might also be a decaying trend over time, depending on the maturity structure of bonds that benefit from price increases. Thus, we also calculate recapitalization effects taking this factor into account.

## 4 Results

We use Equation (1) to estimate the OMT windfall gains for all EU banks participating in the EBA’s 2011 capital exercise, which are also part of the analysis in [Acharya et al. \(2019\)](#). Results can be found in Panel A of Table 2.<sup>10</sup> We also conduct the estimations separately for banks’ subsets located in non-GIIPS countries and GIIPS countries. In contrast, the latter sample includes only banks located in Italy, Portugal, and Spain.<sup>11</sup>

Column (1) shows the OMT windfall gains’ estimates using a bank’s total sovereign debt holdings irrespective of the valuation method. For non-GIIPS banks, we estimate a slightly negative recapitalization effect of -0.43% of equity. For GIIPS banks, we measure a gain of 8.80% of equity. The nega-

<sup>10</sup>The EBA reports sovereign bond holdings for 61 banks out of which 49 are part of the sample. See also <https://eba.europa.eu/risk-analysis-and-data/eu-capital-exercise/final-results> as well as Table A10 in [Acharya et al. \(2017\)](#).

<sup>11</sup>Irish and Greek banks are dropped by [Acharya et al. \(2019\)](#) because their local sovereign bonds were not actively traded at the time of the OMT announcement and local sovereign bonds made up the majority of the banks’ sovereign debt holdings. Therefore, the calculation of an OMT windfall gain is not possible.

tive effect for non-GIIPS banks originates mostly from German and British banks and the fact that Bund and Gilt prices slightly decreased after the announcement. The difference in the windfall gain between banks located in non-GIIPS and GIIPS countries is extensive and likely due to the substantial difference in the amount of total and fair valued GIIPS sovereign holdings of banks (Panel B). Banks located in GIIPS countries have a much higher share of GIIPS sovereign bonds in their balance sheet regarding the total amount (9.13 versus 0.66) and the sovereign bonds held at fair value (6.20 versus 0.24).

The remaining columns of Table 2 show the recapitalization estimates considering only fair valued securities and the two fair value categories AfS and HfT. We indicate significant differences to Column (1) by the conventional asterisks. Column (2) records the recapitalization estimates considering only fair valued securities. The gain for non-GIIPS banks increases slightly to 0.02% of equity. This is most likely because banks, including German and British banks, hold large shares of their home sovereign debt exposure in their HtM portfolios. Notably, for GIIPS banks, the windfall gain decreases significantly by nearly a third to 6.04% of equity than the previously estimated effect of 8.80% in Column (1).

Prudential filters can also reduce the recapitalization effect if unrealized gains are irrelevant for the calculation of regulatory capital. Given that the estimated windfall gain is concentrated within GIIPS banks, their case is of particular interest for evaluating the role of prudential filters. All three countries covered by GIIPS (Italy, Portugal, and Spain) employ the neutralization approach, which means that neither unrealized losses nor unrealized gains of

AfS debt securities are included in regulatory capital. The last two columns of Panel A of Table 2 disentangle the fair value-windfall gain reported in Column (2) into the two fair value categories AfS and HfT. We show that the estimated (fair value) windfall gain originates for around 93% (5.63/6.04) in the GIIPS banks' AfS portfolio. This is because most sovereign debt is categorized as AfS, rather than HfT, as shown in Figure 1(b).

Table 2: OMT windfall gains depending on valuation of sovereign bond holdings

	(1)	(2)	(3)	(4)
Panel A: OMT windfall gain (in %)	All sovereign debt holdings	Fair value only	AfS only	HfT only
All banks	2.02 (0.89)	1.62 (0.68)	1.58 (0.66)	0.04** (0.06)
Non-GIIPS banks	-0.43 (0.37)	0.02 (0.12)	0.11* (0.10)	-0.10 (0.06)
GIIPS banks	8.80 (2.39)	6.04*** (2.14)	5.63*** (2.14)	0.41*** (0.14)
Panel B: GIIPS sovereign bonds to assets (in %)	All sovereign debt holdings	Fair value only	AfS only	HfT only
All banks	2.91 (0.61)	1.82*** (0.46)	1.60*** (0.41)	0.22*** (0.08)
Non-GIIPS banks	0.66 (0.19)	0.24** (0.09)	0.21*** (0.09)	0.03*** (0.01)
GIIPS banks	9.13 (0.94)	6.20*** (1.01)	5.46*** (0.89)	0.74*** (0.25)

Notes: Panel A reports the OMT windfall gain estimates based on Equation (1). In Column (1), we use the total amount of bank-level sovereign debt holdings across EU countries. Column (2) is based on banks' sovereign debt held at fair value. Columns (3) and (4) use banks' sovereign debt classified as AfS and HfT. The HfT class also includes holdings from assets categorized as dFV. The sample includes 36 non-GIIPS and 13 GIIPS banks. Standard errors are reported in parentheses. \*\*\*, \*\*, and \* indicate significant differences at the 1, 5, and 10% level of each column's mean values concerning Column (1). Panel B shows the share of banks' sovereign bond holdings across GIIPS countries in total assets (in %), again for the total amount of sovereign bond holdings and the valuation method.

This result is crucial. It implies that, if these banks do not sell AfS securities, the windfall gain will not materialize due to the prudential filter applied to AfS securities. However, prudential filters only apply to unrealized gains and losses. If the bank decides to realize the accumulated gain/loss of a specific AfS security, it can sell the individual AfS security. In this case, the realized gain/loss is recognized via the income statement and affects regulatory capital. Because of this possibility, and given that countries using the asymmetrical approach partially include unrealized gains from AfS debt securities, one cannot entirely exclude a recapitalization effect via AfS securities.<sup>12</sup> Hence, the actual recapitalization effect lies somewhere between the HfT only effect (Column (4)) and the effect measured for all fair valued securities (Column (2)).

Additionally, it could well be that equity and (unsecured) debt investors adjust bank valuation when prices of sovereign bonds held by banks increase (Acharya et al., 2018; Krishnamurthy et al., 2018). Such an adjustment might even be observed, although these securities are not marked-to-market by a bank or prudential filters prevent the unrealized gains to show up in the equity statement of the bank. These hidden reserves can nevertheless have a positive impact on the credit valuation of a bank and therefore on the share and bond prices as well as the refinancing options of a bank. However, in contrast to the immediate recapitalization effect as stressed above, the positive impact of reduced refinancing costs on the equity position of a bank is only accumulated over time and therefore should be considered a different

<sup>12</sup>In our sample, Austria, Denmark, Finland, and Sweden use the asymmetric approach. In contrast to Belgium, France, Germany, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Spain, and the United Kingdom using the neutralization approach.

channel. In addition, it has the prerequisite that market participants are informed about the composition of banks' security holdings.

Table 3: OMT windfall gains depending on maturity of sovereign bond holdings

	(1)	(2)	(3)	(4)
Panel A: Share of securities (in % of total)	Total	1year	3year	5year
All sovereign debt holdings	100.00	74.12	55.47	41.92
Fair value	100.00	75.77	50.16	35.64
AfS	100.00	83.34	58.39	42.89
HfT	100.00	54.24	24.86	17.05
Panel B: Share of windfall gain (in % of total)	Total	1year	3year	5year
All sovereign debt holdings	100.00	99.32	80.66	66.18
Fair value	100.00	98.72	80.57	69.12
AfS	100.00	96.71	88.60	70.83
HfT	100.00	115.43	56.39	40.56

Notes: Panel A shows the average share of banks' sovereign bond holdings by maturity class in total assets (in %), for the total amount of sovereign bond holdings and across valuation methods. Panel B reports the shares of the OMT windfall gain estimates based on Equation (1) in the total gain (in %). In Column (1), we use the total amount of bank-level sovereign debt holdings across EU countries. Column (2) is based on subtracting securities with a maturity smaller than one year from the total amount. Columns (3) and (4) use banks' sovereign debt, excluding all securities with a maturity smaller than or equal to three years, and five years, respectively. The HfT class also includes holdings from assets categorized as dFV.

A third important aspect when it comes to the calculation of recapitalization effects is the maturity of securities. In contrast to the two previous points, which matter on impact, the maturity structure affects windfall gains in the longer run. The reason is that the closer the maturity date of a fixed-income security, the closer will be the market value of this security to its face value. This bears the implication that the recapitalization effect is only going to be transitory and decaying over time.

To evaluate the relevance of the maturity structure for the OMT's recapitalization effects, we first show in Panel A of Table 3 the share of securities by maturity in the total amount of securities held in the respective valuation class. It can be seen that after three years, across all valuation classes, at least 40% of securities have matured. For HfT securities, the remaining share is lowest with 25% after three years and around 17% after five years. Second, we compute windfall gains across valuation classes but gradually exclude securities depending on their maturity (Panel B, Table 3). In line with results in Panel A, the recapitalization effects are decaying strongly over time for HfT securities. For the other asset classes, around 10 to 20% of the initial windfall gain becomes irrelevant after three years.<sup>13</sup>

## 5 Conclusion

This paper highlights two relevant factors affecting the immediate magnitude of the recapitalization effect of unconventional monetary policy measures that affect security prices. Only securities mirroring the market price transmit the increase in security prices to financial institutions' balance sheets. Therefore, the valuation method of securities determined by the accounting category must be considered when estimating the recapitalization effect's magnitude. The recapitalization effect can be further reduced by prudential filters, which (partly) exclude unrealized gains/losses of fair valued AfS security holdings

<sup>13</sup>The shares decay to a weaker extent in Panel B compared to Panel A, which reveals that when it comes to the calculation of windfall gains, the interaction between quantity and prices is essential. In the extreme, when price changes are negative (which we observe for some short-term maturities), the share of windfall gains grows larger than 100% as we document for the windfall gains of short-term HfT securities.

from banks' regulatory capital.

Due to this taxonomy, the actual magnitude of the recapitalization effect is not apparent. To avoid a systematic overestimation of the potential recapitalization gain following an increase in security prices due to purchase programs, future studies should consider the valuation method chosen by a bank and the effect of prudential filters, which vary at the country level. This is especially important for a clean assessment of unconventional monetary policy's effects on banks' lending decisions to the real economy resulting from recapitalization effects. When it comes to evaluating the longer-run effects of unconventional monetary policy, targeted securities' maturity structure is crucial, too. The longer-term they are, the longer the potential recapitalization effects of unconventional monetary policy might last.

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