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A Note of Caution on Quantifying Banks' Recapitalization Effects

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.

JEL codes: E52, E58, G21, G28

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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

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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.¹ 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, Goldstein, and MacKinlay (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.

This short note focuses on the recapitalization effect of the European Central 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 is reduced by 20–98% 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.

1. 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, Steffen, and Streitz (2019), and Koetter (2020).

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

1. 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.²

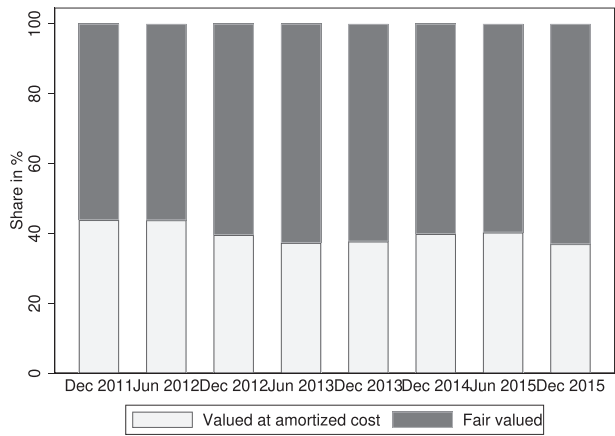
Table 1 provides an overview of the accounting categories and the corresponding valuation methods. For simplicity, the category "designated at fair value through profit or loss" (dFV) is not listed separately in the table. It usually includes derivatives and shares all relevant features with the HfT 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 insignificant amounts.³ 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.

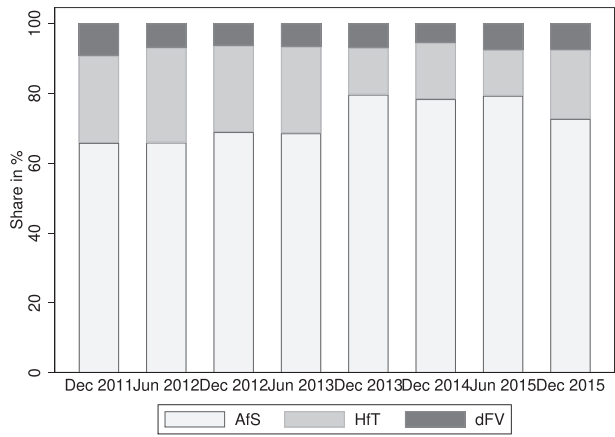
Second, even if banks hold AfS securities that are continuously valued, they might not benefit from price increases. The reason is that prudential filters remove unrealized gains and losses of AfS securities from banks' other comprehensive income (OCI). Under Basel II, this was meant to reduce volatility and uncertainty from the

2. 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 nonfundamental component to price fluctuations (Plantin, Sapra, and Shin 2008, Laux and Leuz 2009).

3. In rare circumstances like the financial crisis, banks are allowed to reclassify more massive amounts (Fiechter 2011, Bischof, Brüggemann, and Daske 2012).



(a) Sovereign debt holdings by security valuation method



(b) Fair valued sovereign debt holdings by accounting class

Fig 1. Banks' Sovereign Debt Holdings in EU Countries over Time.

NOTES: (a) shows banks' sovereign debt holdings in EU countries by security valuation method. (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).

bank's regulatory capital, including OCI (Chisnall 2001, Allen and Carletti 2008, Heaton, Lucas, and McDonald 2010, Argimón, Dietsch, and Estrada 2017). Following the CEBS⁴ 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 on the country-specific approach, banks cannot or only partially benefit from unrealized gains originating from AfS securities.⁵

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 onward, prudential filters remain relevant because countries have the option to keep the prudential filter in place for central government debt.⁶

2. 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 bank-level information from Bureau van Dijk's Bankscope.⁷ We estimate the OMT windfall gain, which is the recapitalization effect of the OMT announcement, using banks'

4. The Committee of European Banking Supervisors (CEBS) preceded the European Banking Authority (EBA).

5. Since 2018, prudential filters have lost in relevance due to application of the International Financial Reporting Standard (IFRS) 9.

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

7. In contrast, Acharya et al. (2019) use bank-level data from SNL.

sovereign debt holdings across EU countries.⁸ 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 (Krishnamurthy, Nagel, and Vissing-Jorgensen 2018, Acharya et al. 2019).⁹

We accumulate the bond price changes of the three OMT announcement days (Acc. Bond Price Changes_{cm})¹⁰ and multiply them for each maturity, m , and country, c , with the respective bank's b sovereign debt holdings (Sovereign Debt_{bcm}). Summing the country-specific gains from all EU sovereigns and dividing the total by the bank's total equity (Total Equity_b) results in the bank-level OMT windfall gain:

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

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.

3. 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 2.¹¹ We also conduct the estimations separately for banks' subsets located in non-GIIPS countries and

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

9. 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, Giannone, and Lenza (2016), Krishnamurthy and Vissing-Jorgensen (2011), and Szczerbowicz (2015).

10. The price change is calculated from the day preceding ($t - 1$) to the day following the respective OMT announcement ($t + 1$).

11. 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).

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/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)

NOTE: 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.

GIIPS countries. In contrast, the latter sample includes only banks located in Italy, Portugal, and Spain.¹²

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 negative 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 vs. 0.66) and the sovereign bonds held at fair value (6.20 vs. 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

12. 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.

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).

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.¹³ 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 investors adjust bank valuation when prices of sovereign bonds held by banks increase (Acharya et al. 2019). Such an adjustment might even be observed, although these securities are not marked-to-market by a bank. This effect on banks' share prices can positively affect the refinancing options of a bank. However, it has the prerequisite that market participants are informed about the composition of banks' security holdings. This is only true for individual banks included in regulatory exercises (e.g., the capital exercise). In general, bank asset holdings are considered mostly opaque (Flannery, Kwan, and Nimalendran 2013).

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.

13. 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.

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	1 year	3 years	5 years
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	1 year	3 years	5 years
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

NOTE: 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 1 year from the total amount. Columns (3)–(4) use banks' sovereign debt, excluding all securities with a maturity smaller than or equal to 3 and 5 years, respectively. The HfT class also includes holdings from assets categorized as dFV.

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 3 years, across all valuation classes, at least 40% of securities have matured. For HfT securities, the remaining share is lowest with 25% after 3 years and around 17% after 5 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 10–20% of the initial windfall gain becomes irrelevant after 3 years.¹⁴

4. 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

14. 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.

reduced by prudential filters, which (partly) exclude unrealized gains/losses of fair valued AfS security holdings 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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