Sovereign-bank loop and the role of NPL securitisation: a European empirical investigation.

Professor Stefano Dell'Atti
Department of Economics, University of Foggia, Foggia, Italy
Via Caggese, 1 - 71100 - Foggia – Italy
Phone: +39 0881 781719
E-mail: stefano.dellatti@unifg.it

Dr. Caterina Di Tommaso (corresponding author)
Ionian Department in "Legal and Economic Systems of the Mediterranean: Society, Environment, Cultures", University of Bari "Aldo Moro", Bari, Italy
Via Lago Maggiore angolo Via Ancona, 74121, Taranto, Italy
Phone: +39 3288545661
E-mail: caterina.ditommaso@uniba.it

Professor Vincenzo Pacelli
Ionian Department in "Legal and Economic Systems of the Mediterranean: Society, Environment, Cultures", University of Bari "Aldo Moro", Bari, Italy
Via Lago Maggiore angolo Via Ancona, 74121, Taranto, Italy
Phone: +39 3387872101
E-mail: vincenzo.pacelli@uniba.it

Abstract

The paper aims at investigating the relationship between NPLs securitisation performed by EU banks and sovereign CDS spreads. By constructing an original dataset including NPLs securitisation during the period 2013-2020, our analysis shows that it exists a *sovereign-bank loop* that propagates the crises from the banking to the sovereign system through the NPLs securitisations. This loop is amplified when the NPLs securitisations are supported by State-backed guarantee. NPLs securitisation acts as propagation mechanism of financial crises in peripheral European countries whereas it acts as mitigation mechanism of financial crises in core European countries.

Keyword: Banks, Sovereign risk, NPL securitisation, CDS spreads

1. Introduction

The inception of EU sovereign debt crisis brought out the problem of large amount of non-performing loans (NPLs) for EU banks especially in countries such as Greek, Ireland, Italy, Portugal, and Spain (GIIPS countries). Regulators and policy makers have worked to maintain financial stability and avoid the distress of financial system and the transmission of the shock to the real economy. Different tools have been adopted to manage the large stocks of NPLs such as securitisation, sales, and internal workout. The ongoing debate about the potential increase in NPLs ratios due to the pandemic crisis (Kasinger et al. (2021)) brings again into focus the issue of assessing the propagation mechanisms in and out the financial system. Taking all this together, this paper aims at investigating the effectiveness of NPLs securitisation on the country risk to assess whether the systemic risk has run from banks to government.

A NPL securitisation is a particular securitisation in which the banks originator sell to a special purpose vehicle (SPV) a pool of non-performing loans[1]. SPV issues debt securities into the capital markets subscribed by institutional investors. This procedure allows banks to clean up the balance-sheet and transfer the credit risk from the financial system to the institutional investors.

Examining the impact that NPL securitisation has on sovereign risk is of paramount importance to understand the interconnection between banks and sovereign risk. The use of NPL securitisation is signal of a large stock of NPLs in banks' balance sheet that, in turn, signals a distress financial system. In this condition, the government may raise debt to recapitalise banks, but this increases sovereign risk generating potential bank losses due to the bank exposure in sovereign bond holdings. Hence, an initial shock originating in the banking sector may propagate to the sovereign sector and create a loop (Fontana & Langedijk (2019)). The European context provides a unique opportunity to evaluate the role of NPL securitisation in cleaning-up banks' balance sheets and the potential transmission mechanisms to the sovereign risk because, as underlined by European Banking Authority (EBA (2019)), EU banks are the most active players in the NPLs market. Italy, Spain and Ireland have been the pioneers in the transactions on this market but, in the last years, the recourse to this market has increased also in countries such as Greece, Cyprus and Portugal.

Our paper provides direct empirical evidence on the impact of NPL securitisation on sovereign risk. As far as we know, this is the first paper examining the relationship between NPL securitisation performed by banks and country risk. The specific focus on NPL securitisation instrument extends the very small existing empirical evidence which mainly investigates the impact of NPL securitisation on the banking system (Bolognesi, Compagno, et al. (2020); Bolognesi, Stucchi, et al. (2020); Kiesel

---

[1] A loan becomes non-performing when borrower is unlikely to repay the loan, or if more than 90 days have passed without the borrower paying the agreed instalments (EBA (2019)).

et al. (2020); Manz et al. (2019), (2020)) and the determinants of NPL in the EU banking (Ghosh (2015); Klein (2013); Louzis et al. (2012); Makri et al. (2014); among others). Our research also extends the understanding of the connection between banks and sovereign distress, the so-called *sovereign-bank loop* (Acharya et al. (2014); Böhm & Eichler (2020); Brunnermeier et al. (2016), among others). The *sovereign-bank loop* literature has shown that banks distress may cause sovereign distress through different channels: bail-out and sovereign-bond channel. The bail-out channel underlines that the cost of government bailouts induced by a distressed financial sector increases the sovereign credit risk (Acharya et al. (2014); Mäkinen et al. (2020)) whereas the sovereign-bond channel explains the link between banks and sovereign entities through the large amount of sovereign bond held by banks (Böhm & Eichler (2020)). A higher proportion of non-performing loans when bailouts cannot be excluded propagates the systemic risk from banks to government (Brůha & Kočenda (2018)). The management of NPL through securitisation may be signal of banking distress. To avoid the failure and the consequent financial instability, the government may be incentivised to undertaking public bailouts for banking system that, in turn, lead to an increase in public debt, the main mechanism through which the risk-increasing effect occurs (Pedro J. Cuadros-Solas et al. (2021)).

In this study, we adopt an event study methodology to analyse the impact of NPL resolution plans on sovereign debt risk. We use the sovereign CDS spreads to measure the riskiness of sovereign debt and the securitization of NPL to proxy the resolution plans adopted by EU banks. We focus on the effect of NPL securitisation on the country risk to shed light on the propagation mechanism of financial crises.

We analyse a sample including 93 NPL securitisations performed by 26 banks from 11 EU countries. We construct our original sample by considering EU banks of 2018 EU-wide stress testing published by the European Banking Authority (EBA)[2] performing at least one NPL securitisation during the period 2013-2020.

We document that the involvement of NPL securitisation by EU banks is positively associated with sovereign CDS spreads. Overall, these results suggest that securitisation increases country risk in the short run. The possibility of a bank to share the credit risk of impaired loans on the market amplifies and propagates the risk from the banking to the sovereign system. We find empirical evidence of a *sovereign-bank loop* that allows the propagation of crises from the banking to the sovereign system through the management of NPL. The sovereign-bank loop is even more event when banks issue NPL securitisation with a State-backed guarantee because the government, by providing a public guarantee, takes over part of the credit risk (inside the senior tranche) that,

---

[2] https://www.eba.europa.eu/risk-analysis-and-data/eu-wide-stress-testing/2018

consequently, is incorporated into the sovereign risk. This result strengthens the evidence supporting the view that securitisation undermines the financial stability by weakening the banks credit standards (loan quality deteriorates) and increasing risk taking (Di Tommaso (2020); Keys et al. (2010)).

Substantial effort in recent years (following the 2009-12 European sovereign debt crisis) to tackle the issue has been made at European level. Furthermore, the current debate on the possible effect of pandemic crisis on the stock of NPLs has increased the attention of policy makers and regulators on the increase and the consequent management of NPLs. Therefore, it is of primary interest to assess whether the multiple efforts, at central (such as ECB, EBA, EC) and country (see the Italian case with GACS and other reforms) level, have brought positive or negative effects in terms of country risk because the potential impact of NPL securitisation on the country risk may contribute to the overall financial stability. The remainder of the paper is organized as follows. In the next section, we review the relevant literature and develop our hypotheses. Section 3 presents our data and methodology. Our empirical results are in Section 4. Section 5 verifies the robustness of our empirical analysis and Section 6 concludes.

2.   Literature review and hypothesis development

Banking distress can quickly translate into sovereign distress. The increase of NPLs ratio in the year following the EU sovereign crisis (Kasinger et al. (2021)) has led policy makers and regulators to take actions for tackling this issue to help ensure the safety and soundness of the European banking system and avoid financial instability. Despite high levels of NPLs undermine country's economic growth (Bolognesi, Stucchi, et al. (2020)), the academic literature lacks rigorous studies focused on the effects of NPL management may have on the country risk.

Prior research has focused on the connection between financial and sovereign distress demonstrating that it exists a profound link between sovereign and banks risk (Acharya et al. (2014); Brůha & Kočenda (2018); Brunnermeier et al. (2016); Buch et al. (2016); de Bruyckere et al. (2013) among others) and it has argued the existence of different propagation mechanisms holding between government and banks, the so-called *sovereign-bank loop*. The *sovereign-bank loop* literature has shown that the government may incorporate the financial distress by means of different channels, such as bail-out channel (Pedro Jesús Cuadros-Solas & Muñoz (2021); Nadal De Simone (2021)) and sovereign bond channel (Böhm & Eichler (2020); Boumparis et al. (2019); Dermine (2020); Fontana & Langedijk (2019)).

The literature investigating the effect of various specific factors of the banking sector directly to sovereign risk is not extensive. The few existing studies focusing on the effect of NPL ratio to the country risk show that a higher proportion of non-performing loans is the single most influential

sector-specific variable that is associated with increased sovereign risk (Boumparis et al. (2019); Brůha & Kočenda (2018)).

Large NPLs stocks are signal of a distressed financial sector that induces government bailouts and the associated cost. This, in turn, increases the sovereign credit risk (Acharya et al. (2014)). However, if greater NPLs resolution's engagement using securitisations is related to increase banks value (Bolognesi, Stucchi, et al. (2020); Kiesel et al. (2020); Manz et al. (2020)), the probability that a financial sector is distressed, and the associated cost of government bailouts is lower. Under this perspective, investors in considering the efforts of EU banks to manage the NPLs stocks should better price the sovereign credit risk. Consistent with this view, we can formulate our first hypothesis:

H1a: An NPLs securitisation announcement performed by banks has decreased the country risk

In the aftermath of the US financial crisis, analysts, academics, and practitioners have started to question the positive role associated to securitisation and, more in general to credit derivatives in supporting financial stability (Loutskina (2011); Wagner & Marsh (2006)). The US financial crisis has highlighted that securitisation may undermine the financial stability by weakening the banks credit standards and increasing risk taking (Chiesa (2008); Di Tommaso (2020); Diamond (1984); Kara et al. (2016); Keys et al. (2010); Minton et al. (2009)), the complexity of the financial markets and reducing the monitoring role of banks (Halili et al. (2021)). Under this view, we can formulate an alternative hypothesis to our first hypothesis as follows:

H1b: An NPLs securitisation announcement performed by EU banks has increased the country risk

Fears about the increase of propagation mechanisms between banks and sovereign entities have grown after the introduction of State-backed guarantee on the NPLs securitisation (see for example GACS scheme in Italy and Hercules scheme in Greece). With the State-backed guarantee, the State provides a public guarantee to the lower-risk senior notes of NPLs securitisation scheme. The direct involvement of the State on the NPLs securitisation could have a double effect on the sovereign credit risk. From one hand, the public guarantee may be seen as a signal of greater transparency enhancing the feasibility of the operation (Bolognesi, Compagno, et al. (2020); Broccardo & Mazzuca (2017)). This could be translated into a bank lower risk from the investors point of view. From other hand, the relative cost of the public support to NPLs securitisation has a direct impact on the sovereign cost of debt implying that the use of the public guarantee may deteriorate the sovereign credit risk. In line with the above discussion, we formulate two alternative second hypotheses as following:

H2a: The State-backed guarantee decreases the sovereign credit risk

H2b: The State-backed guarantee increases the sovereign credit risk

3.   Data and methodology

3.1   Data

To test the relationship between the banks NPLs securitisations and the country risk, we construct an original dataset. First, we consider the 48 banks of 2018 EU-wide stress testing published by the European Banking Authority (EBA)[3]. Next, we check for NPL deal announcements using Debtwire's NPL Coverage database that actively reports information about NPL securitisation. We confirm the data against each bank's web site[4]. This process yields a dataset that includes 93 NPL securitisations by 26 banks based in 11 EU countries[5] over the period 2013-2020.

To measure the country risk, we use the daily CDS spreads of 5-year CDS mid-quotes on senior unsecured debt contracts extracted by Thomson Reuters Datastream.

Table 1 provides summary statistics for CDS spreads (Panel A) and NPL securitisation (Panel B). The summary statistics are provided for all countries in the sample as well as for each country (Table A1 in appendix).

Based on the statistics in Panel A of Table 1 we note that the CDS spreads range from 1.15 bps to 4262.57 bps and we document that there are some noteworthy differences between countries (for more details see Table A1 in appendix). Our sample contains both very risky countries and very safe countries. For example, the Nordic countries, such as Denmark and Norway, show low CDS spreads whereas countries such as Ireland, Italy and Spain have been on average more risky than other EU countries.

The yearly pattern of NPL securitisations both in term of number of deals and gross book value (GBV)[6] is reported in Figure 1. The annual GBV of NPL securitisations issued by banks in our sample generally increased from 2013 to 2020. Many NPL securitisations were recorded in 2015 likely due to the peak of gross impaired assets in EU banks. In 2015, EU banks in our sample completed 22 NPL securitisations with a GBV of roughly USD 2,000 million. However, in 2016, the banks in our sample completed only 3 NPL securitisations with a GBV of about USD 1.7 billion. In 2018 and 2019, the number of NPL securitisations rose sharply exceeded 20 per year and the GBV

---

[3] https://www.eba.europa.eu/risk-analysis-and-data/eu-wide-stress-testing/2018

[4] For the Italian NPLs securitisation, we apply a double check because we use a web site that collect the information about the Italian securitisations (www.securitisation.it/index.htm).

[5] Austria, Belgium, Denmark, France, Germany, Ireland, Italy, Netherlands, Norway, Spain, UK

[6] Since our sample includes countries adopting different currencies, the gross book value of NPL securitisations is measured in USD to avoid biased estimates.

exceeded USD 3,000 million annually. In 2020, the number of securitizations is low with a GBV of USD 800 million.

<center><Figure 1></center>

The distribution of NPL securitisation, reported in Figure 2, is shown to be a right-skewed distribution. The figure shows that the GBV of NPL securitisations range from 15 million to 11,000 million. The GBV of most NPL securitisations is from 15 to 1,000 million. The largest NPL securitisation has been announced by an Italian bank whereas the smallest one has been performed by a UK bank (Table A1 in appendix).

<center><Figure 2></center>

Based on the statistics in Panel B of Table 1 we document that our sample includes 26 EU banks which have performed 93 NPLs securitisations, 8 of which with a State-backed guarantee. On average, the EU banks issue NPL securitisations with a GBV of 1.34 billion. The GBV of NPL securitisation with a State-backed guarantee is higher than the GBV of those without a State-backed guarantee.

<center><Table 1></center>

3.2 Methodology

To assess the impact of bank NPLs securitisation on country risk, we apply an event study methodology by using a market model method. We opt for this methodology because it gives the possibility to focus on the short-run and because the event study approach is well-designed to investigate the effects of different types of announcements on sovereign CDS market such as the credit rating announcements (see e.g., Drago & Gallo (2016); Hull et al. (2004); Longstaff et al. (2005)) and the NPL securitisation announcements (see e.g., Kiesel et al. (2020); Manz et al. (2019), (2020)). The NPLs securitisations are gradually implemented over some years starting from 2012 and an examination of their long-term impact on country risk would require a much longer timeframe.

Employing standard event study methodology (MacKinlay (1997)), we define the announcement of a NPLs securitisation as the "event" that may have a significant and immediate impact on sovereign CDS market. To test our first hypothesis, we use a market model estimated for each country based on daily CDS returns in a variety of event windows where day 0 is the day in which the NPLs securitisation is announced. We estimate abnormal CDS returns as follows:

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt}) \qquad (1)$$

where AR_{it} is the abnormal CDS return calculated as the difference between the observed returns and the expected returns for each country over the different event windows. Specifically, R_{it} is the observed CDS return, R_{mt} is market return and $(\alpha_i + \beta_i R_{mt})$ is the expected CDS return

estimated for each event. Following the previous literature, as market index to compute the abnormal performance for all events, we use the Datastream Europe Sovereign 5-year CDS Index[7]. For each event window we carry out OLS estimates of daily abnormal returns and aggregate them to estimate the cumulative abnormal returns (CAR) in each event window. The event study is performed over an estimate window of 250 trading days, i.e. [-260; -11] where $t=0$ is the event day.

In keeping with Kiesel et al. (2020); Manz et al. (2020) and Manz et al. (2019), we consider the possibility that some rumours may have impacted the investors' choices prior to the announcement by including the five previous trading days. The effect of NPLs securitisation may persist on the financial markets and, thus, we insert event windows including the following five trading days. Therefore, we study the reaction of sovereign CDS market to an NPLs securitisation announcement in the following event windows: [-5; +5]; [-1; +1], [0; +1], [0; +5][8].

4.   Results

The impact of NPLs securitisation performed by EU banks on the sovereign risk is shown in Table 2. Panel A of Table 2 reports the results of the full sample and underlines that the announcement of an NPL securitisation by EU banks positively impacts the sovereign risk. The impact is statistically significant for all event windows. Specifically, the announcement of an NPL securitisation by EU bank produces an increase from 0.4591 to 0.4716 bps in CDS spreads in the days preceding and succeeding the announcement. Uncertainty surrounding the NPLs management is incorporated on the sovereign risk even before the official announcement day. Therefore, only rumours about the future and forthcoming NPLs securitisation are a destabilizing event on the sovereign CDS market. The need to manage the volume of NPLs on the market using securitisation is a signal of an ex-ante wrong assessment of credit risk and an excessive risk taking by EU banks.

Our results suggest that the complexity of the securitisation process and the low transparency of NPLs securitisation weaken the financial stability by creating opportunistic behaviour among EU banks (Ahmed et al. (2013); Bushman & Landsman (2010)). The possibility of a bank to share the credit risk of impaired loans on the market amplifies and propagates the risk from the banking to the sovereign system. This empirical evidence strongly supports the *sovereign-bank loop.* The management of NPLs volume through securitisation creates a propagation mechanism of crises from the banking to the sovereign system.

---

[7] As robustness, we adopt the iTraxx Europe 5- year index as proxy of the CDS market return. The iTraxx 5- year indices are a family of European, Asian and Emerging Market tradable CDS indices. The iTraxx 5-year indices are deemed to be the most liquid from a market perspective. We obtain qualitatively similar results that are available upon reasonable request.
[8] We decide to do not use larger event windows to avoid biased estimates.

To answer our second hypothesis, we split the sample in two sub-samples: one considering only the NPLs securitisations with a State-backed guarantee and one considering the NPLs securitisations without State-backed guarantee. Panel B and C of Table 2 present the results of the event study for NPLs securitisations with and without State-backed guarantee, respectively. The response of sovereign CDS market to the announcement of NPLs securitisation with State-backed guarantee is greater than the response of the sovereign CDS market to the announcement of NPLs securitisation without State-backed guarantee implying that the government guarantee acts as propagation mechanism in distressed financial systems. Despite relevant literature has underlined the positive effect of the State-backed guarantee on the banking system (Bolognesi, Compagno, et al. (2020); Broccardo & Mazzuca (2017)), measuring the impact of a State-backed guarantee on securitisation demonstrates that the cost of sovereign debt increases of around 1.5 bps. The State, by providing a public guarantee, takes over part of the credit risk (inside the senior tranche) that, consequently, is incorporated into the sovereign risk. This result strengthens the evidence supporting the view that securitisation undermines the financial stability by weakening the banks credit standards (loan quality deteriorates) and increasing risk taking (Di Tommaso (2020); Keys et al. (2010)). The public support allows the State to incorporate the credit risk of banks NPLs exposures by exerting a propagation effect of crises from financial to sovereign system by means of the bail-out channel (Acharya et al. (2014); Mäkinen et al. (2020)).

<Table 2>

4.1 Further analysis

In this section, we further investigate the relationship between country risk and banks NPLs securitisations. To our purpose, we divide our sample in different sub-samples.

First, to determine whether the introduction of International Financial Reporting Standard 9 (IFRS 9)- "Financial instruments"- changed market participants views of sovereign risk, we examine the impact of NPLs securitisations announcements that took place prior to and after the introduction of IFRS 9 (Bolognesi, Compagno, et al. (2020); Onali et al. (2021)). International Accounting Standards Board (IASB) has put banks under pressure by introducing IFRS 9 to have a harmonized approach to NPL recognition. IFRS 9 is an international standard entered into force on 1 January 2018 that replaced IAS 39. The novelty introduced by IFRS 9 is the model by which the banks evaluate the provisions. While IAS 39 adopted the Incurred Loss Model (ILM), the new international standard applies the Expected Loss Model (ELM). Specifically, the ILM accrues provisions upon the occurrence of "loss events" whereas the ELM is a forward-looking approach allowing banks to

recognize NPLs timely and to build sufficient capital buffers during good times to absorb losses (Kasinger et al. (2021)).

With this exercise, we are interested in comparing the size as well as the sign of the CARs, where larger or negative CARs in the post-IFRS 9 windows would be consistent with the sovereign CDS market viewing the international standards as reinforcing the mitigation mechanisms of banks distress and a tool to increase bank transparency and market discipline, fundamental for improving financial stability (Onali et al. (2021)).

To our purpose we identify 42 and 52 announcements of NPLs securitisations before to and after the introduction of IFRS 9, respectively. Panel A of Table 3 reports the reaction of the sovereign CDS spreads to NPLs securitisation announced before the introduction of IFRS 9. In all event windows, we observe a positive and statistically significant reaction of sovereign risk to announcements of NPLs securitisation. The announcement of a NPLs securitisation before the introduction of IFRS 9 increases the sovereign risk from 0.2196 bps to 0.2553 bps. This indicates that prior to the introduction of IFRS 9, the sovereign risk discounts the low transparency and the complexity of NPLs exposure. After the introduction of a forward-looking model to accrue the provisions, the reaction of the sovereign risk is still positive and statistically significant (Panel B of Table 3) suggesting that the introduction of IFRS 9 does not change the investors perception of sovereign risk. Observing the size of the CARs, we notice that the reaction of sovereign CDS spreads to NPLs securitisations performed in the period after the introduction of IFRS 9 is greater than that in the period prior to the introduction of IFRS 9.

Despite the introduction of IFRS 9 has had the aim to improve market discipline and financial reporting quality (Onali et al. (2021)), it has exacerbated the valuation of impaired loans leading to a tightening of NPLs dismissions because when the loans become impaired (in Stage 3 of a three stages model) the banks must evaluate against the probability of market sale scenario (Bolognesi, Compagno, et al. (2020)). In the EU context and NPLs perspective, our findings underline that the introduction of IFRS 9 has undermined the financial stability.

<Table 3>

Second, to investigate more detailed insights on the response of sovereign CDS market to NPL securitisations, we analyse two country sub-samples. The underlying rationale is to investigate the market dynamics and the possible asymmetries (Cifarelli & Paladino (2020); Foglia & Angelini (2020)) for groups of economies which experienced highest levels of NPLs during the years. Specifically, the major concern about the NPLs volume has been for GIIPS countries. For this purpose, we report results for countries in two main categories, i.e. (i) peripheral European countries; and (ii) core European countries.

Panel A of Table 4 displays the results of the event study for the estimation covering the sub-sample of peripheral European countries (defined as Ireland, Italy, and Spain). The results continue to show a positive and significant response of sovereign CDS market to the announcement of NPLs securitisations implying that the announcement of a NPLs securitisation from banks based on peripheral European countries amplifies and propagates the financial distress from financial sector to sovereign system by causing financial instability.

Panel B of Table 4 reports the results of the event study for the estimation covering the sub-sample of core European countries (defined as Austria, Belgium, Denmark, France, Germany, Netherlands, Norway, and UK). The reaction of the sovereign CDS market is negative and statistically significant in all event windows suggesting that the management of NPLs thought securitisation has the power to reduce the sovereign risk of core European countries. There is no empirical evidence of an amplification or a propagation of financial distress to sovereign system. This implies that the use of NPLs securitisations acts as mitigation mechanism in countries with a more stable financial condition.

These results highlight that the *sovereign-bank loop* holds in countries with an already precarious financial condition exacerbating the interconnection between sovereign and financial system (Cifarelli & Paladino (2020); Foglia & Angelini (2020)). The management of NPLs has exacerbated the disparities between peripheral and core European countries by increasing the transmission of crises from financial to sovereign system and undermining the financial stability of more fragile countries. Considering these results, regulators should introduce measures aimed at managing NPLs without increasing financial instability avoiding the creation of disparities between EU countries. For example, the development of a secondary NPL market could be a turning point for the creation of a more liquid market that can act as mitigation of financial crises rather than accelerator.

<Table 4>

5.   Robustness

To further investigate the effect of NPL securitisations on the sovereign risk, we adopt different measure of sovereign risk. Specifically, as in Brůha & Kočenda (2018), to assess sovereign risk from the perspective of the markets, we use bond yield spreads. The sovereign bond yield spreads are calculated as difference between a ten-year government bond and the German Bund[9].

The results of the event study adopting the bond yield spreads as dependent variable is shown in Table 5 and confirm our previous findings. The issuance of NPL securitisations increases the

---

[9] As a proxy for the risk-free rate

government bond yield spreads implying that the management of NPL by banks affects the sovereign risk. Despite the effect of NPL securitisations on the sovereign bond yield spreads is positive and statistically significant in all event windows, it is greater in the days around the announcement ([[-1; +1], [0; +1]]) in which the bond yield spreads increase more than 0.80 bps. In the event windows [-5; +5] and [0; +5], the bond yield spreads increase of around 0.78 bps.

The results hold to sovereign CDS and bond yield spreads. This implies that our results are robust to using this alternative sovereign risk measure.

We conclude that NPL securitisation amplifies the sovereign-bank loop and acts as propagation mechanism of crises from financial to sovereign system. The use of NPL securitisations is signal of large stock of NPL in the bank's balance-sheet. To avoid the failure and the consequent financial instability, the government may be incentivised to undertake public bailouts for banking system that, in turn, lead to an increase in public debt, the main mechanism through which the risk-increasing effect occurs (Pedro Jesús Cuadros-Solas & Muñoz (2021)).

<Table 5>

6.   Conclusion

The management of NPL exposures through direct sales, securitisation or other tools, may be signal of banking distress. To avoid that the banking distress comes into sovereign distress, the government may be incentivised to undertaking public bailouts for banking system that, in turn, lead to an increase in public debt, the main mechanism through which the risk-increasing effect occurs. To investigate the relationship between NPLs securitisation and sovereign CDS market, this paper adopts an event study analysis allowing to understand the short-term reaction of sovereign CDS market to an announcement of NPL securitisation.

This study analyses a sample of EU banks and countries over the period 2013–2020. To construct our sample, we consider 48 banks in 2018 EU-wide stress test. Among these banks, we find that 26 banks based in 11 EU countries have performed at least one NPL securitisation during the period 2013-2020. This yields a dataset with 93 NPLs securitisations announcements, 8 of which with a public guarantee.

The empirical evidence supports the view that the management of NPL exposures creates a propagation mechanism of banking crisis to sovereign system. The use of NPLs securitisations may undermines the financial stability by weakening monitoring role of banks and promoting the bank's risk taking. The distress of the banking system is a relevant event for the sovereign system because of the involvement of the State in the bail-out of banks. The possibility of a bank to share the credit

risk of impaired loans on the market amplifies and propagates the risk from the banking to the sovereign system. This empirical evidence strongly supports the *sovereign-bank loop.*

The public support allows the State to incorporate the credit risk of banks NPLs exposures by exerting a propagation effect of crises from financial to sovereign system by means of the bail-out channel. The direct involvement of the State into the management of NPL exposures exacerbates the propagation of the banking crisis. The State, by providing a public guarantee, takes over part of the bank's credit risk (inside the senior tranche) that, consequently, is directly incorporated into the sovereign risk. This result strengthens the evidence supporting the view that NPL securitisation undermines the financial stability and allows the propagation of banking risk into sovereign risk.

To have more detailed insights on the response of sovereign CDS market to NPL securitisations, the paper analyses the impact of the introduction of IFRS 9 on the sovereign risk. Despite the introduction of IFRS 9 has had the aim to improve market discipline and financial reporting quality, it has exacerbated the valuation of impaired loans leading to a tightening of NPLs dismissions because when the loans become impaired the banks must evaluate against the probability of market sale scenario. This tightening of NPLs dismissions has exacerbated the propagation of banking distress to sovereign distress.

The *sovereign-bank loop* holds in countries with an already precarious financial condition exacerbating the interconnection between sovereign and financial system. The management of NPLs, rather than reducing the disparities between peripheral and core European countries, increases the transmission of crises from the financial to the sovereign system and undermines the financial stability.

Our results cast some doubts about the long-run effectiveness of NPLs resolution plans, as sovereign credit risk is positively and significantly affected by the NPLs securitisations performed by EU banks. Since our results underline that the NPLs securitisation acts as transmission mechanism channel of crises from financial to sovereign system, the policy authorities should rethink to the possible viable solutions to solve the high NPLs volumes considering the ongoing debate about the possible increase of NPLs as consequence of the pandemic crisis.

This paper suffers some limitations. First, although our sample is representative of the EU context because it includes NPL securitisations of big banks, it is necessary to emphasize that the NPL securitisations is also performed by small banks. For these banks, the major concerns are the feasibility of securitisation because of the cost of the operation. In the recent years, small banks and in particular mutual banks, have accessed securitisation through multi-originator operations. Therefore, a future evolution of this paper may be the inclusion in the sample of multi-originator securitisations to assess how the business model impacts the sovereign-bank loop.

Future research can move in different directions. First, research can investigate and compare the effect of NPL securitisation on sovereign risk before and during the pandemic crisis to understand if different or substitution effects arise from the inception of the pandemic crisis. Second, as future development of this research it would also be interesting to empirically analyse the differential impact of various internal and external NPLs management techniques in the medium-long term.

References

Acharya, V., Drechsler, I., & Schnabl, P. (2014). A Pyrrhic Victory? Bank Bailouts and Sovereign Credit Risk. *Journal of Finance*, *69*(6), 2689–2739. https://doi.org/10.1111/jofi.12206

Ahmed, A. S., Neel, M., & Wang, D. (2013). Does mandatory adoption of IFRS improve accounting quality? Preliminary evidence. *Contemporary Accounting Research*, *30*(4), 1344–1372. https://doi.org/10.1111/j.1911-3846.2012.01193.x

Böhm, H., & Eichler, S. (2020). Avoiding the fall into the loop: Isolating the transmission of bank-to-sovereign distress in the Euro Area. *Journal of Financial Stability*, *51*. https://doi.org/10.1016/j.jfs.2020.100763

Bolognesi, E., Compagno, C., Miani, S., & Tasca, R. (2020). Non-performing loans and the cost of deleveraging: The Italian experience. *Journal of Accounting and Public Policy*, *In Press*. https://doi.org/10.1016/j.jaccpubpol.2020.106786

Bolognesi, E., Stucchi, P., & Miani, S. (2020). Are NPL-backed securities an investment opportunity? *Quarterly Review of Economics and Finance*, *77*, 327–339. https://doi.org/10.1016/j.qref.2019.10.007

Boumparis, P., Milas, C., & Panagiotidis, T. (2019). Non-performing loans and sovereign credit ratings. *International Review of Financial Analysis*, *64*(June), 301–314. https://doi.org/10.1016/j.irfa.2019.06.002

Broccardo, E., & Mazzuca, M. (2017). New development : Can ' public ' market-based solutions restore the banking system ? The case of non- performing loans (NPLs). *Public Money & Management*, *37*(7), 515–520. https://doi.org/10.1080/09540962.2017.1338430

Brůha, J., & Kočenda, E. (2018). Financial stability in Europe: Banking and sovereign risk. *Journal of Financial Stability*, *36*, 305–321. https://doi.org/10.1016/j.jfs.2018.03.001

Brunnermeier, M. K., Garicano, L., Lane, P. R., Pagano, M., Reis, R., Santos, T., Thesmar, D., van Nieuwerburgh, S., & Vayanos, D. (2016). The sovereign-bank diabolic loop and ESBies. *American Economic Review*, *106*(5), 508–512. https://doi.org/10.1257/aer.p20161107

Buch, C. M., Koetter, M., & Ohls, J. (2016). Banks and sovereign risk: A granular view. *Journal of Financial Stability*, *25*, 1–15. https://doi.org/10.1016/j.jfs.2016.05.002

Bushman, R., & Landsman, W. R. (2010). The pros and cons of regulating corporate reporting: A critical review of the arguments. *Accounting and Business Research*, *40*(3), 259–273. https://doi.org/10.1080/00014788.2010.9663400

Chiesa, G. (2008). Optimal credit risk transfer, monitored finance, and banks. *Journal of Financial Intermediation*, *17*(4), 464–477. https://doi.org/10.1016/j.jfi.2008.07.003

Cifarelli, G., & Paladino, G. (2020). A non-linear analysis of the sovereign bank nexus in the EU. *Journal of Economic Asymmetries*, *21*. https://doi.org/10.1016/j.jeca.2019.e00135

Cuadros-Solas, Pedro J., Salvador, C., & Suárez, N. (2021). Am I riskier if I rescue my banks? Beyond the effects of bailouts. *Journal of Financial Stability*, *56*. https://doi.org/10.1016/j.jfs.2021.100935

Cuadros-Solas, Pedro Jesús, & Muñoz, C. S. (2021). Potential spillovers from the banking sector to sovereign credit ratings. *Applied Economics Letters*, *28*(12), 1046–1052.

de Bruyckere, V., Gerhardt, M., Schepens, G., & vander Vennet, R. (2013). Bank/sovereign risk spillovers in the European debt crisis. *Journal of Banking and Finance*, *37*(12), 4793–4809. https://doi.org/10.1016/j.jbankfin.2013.08.012

Dermine, J. (2020). Banks' home bias in government bond holdings: Will banks in low-rated countries invest in European safe bonds (ESBies)? *European Financial Management*, *26*(4), 841–858. https://doi.org/10.1111/eufm.12259

Di Tommaso, C. (2020). Securitization and CDS in U.S. bank lending. *International Journal of Finance and Economics*, 1–14. https://doi.org/10.1002/ijfe.2204

Diamond, D. W. (1984). Financial Intermediation and Delegated Monitoring. *Review of Economic Studies*, *51*, 393–414.

Drago, D., & Gallo, R. (2016). The impact and the spillover effect of a sovereign rating announcement on the euro area CDS market. *Journal of International Money and Finance*, *67*, 264–286. https://doi.org/10.1016/j.jimonfin.2016.06.004

EBA. (2019). *EBA REPORT ON NPLs: PROGRESS MADE AND CHALLENGES AHEAD*.

Foglia, M., & Angelini, E. (2020). The diabolical sovereigns/banks risk loop: A VAR quantile design. *Journal of Economic Asymmetries*, *21*. https://doi.org/10.1016/j.jeca.2020.e00158

Fontana, A. 1980-, & Langedijk, S. (2019). The bank-sovereign loop and financial stability in the Euro area. *Publications Office of the European Union*.

Ghosh, A. (2015). Banking-industry specific and regional economic determinants of non-performing loans : Evidence from US states. *Journal of Financial Stability*, *20*, 93–104. https://doi.org/10.1016/j.jfs.2015.08.004

Halili, A., Fenech, J., & Contessi, S. (2021). Credit Derivatives and Bank Systemic Risk : Risk Enhancing or Reducing ? *Finance Research Letters*, *January*.

Hull, J., Predescu, M., & White, A. (2004). The relationship between credit default swap spreads, bond yields, and credit rating announcements. *Journal of Banking & Finance*, *28*, 2789–2811. https://doi.org/10.1016/j.jbankfin.2004.06.010

Kara, A., Ozkan, A., & Altunbas, Y. (2016). Securitisation and banking risk: what do we know so far? *Review of Behavioral Finance*, *8*(1), 2–16. https://doi.org/10.1108/RBF-07-2014-0039

Kasinger, J., Krahnen, J. P., Ongena, S., Pelizzon, L., Schmeling, M., & Wahrenburg, M. (2021). *Non-performing Loans - New risks and policies? NPL resolution after COVID-19* (Issue March).

Keys, B. J., Mukherjee, T., Seru, A., & Vig, Vi. (2010). Did securitization lead to lax screening? evidence from subprime loans. *Quarterly Journal of Economics*, *125*(1), 307–362.

Kiesel, F., Manz, F., & Schiereck, D. (2020). The conditional stock market response to banks ' distressed asset sales on CDS availability availability. *Applied Economics*, 1–13. https://doi.org/10.1080/00036846.2020.1784388

Klein, N. (2013). Non-Performing Loans in CESEE: Determinants and Impact on Macroeconomic Performance. *IMF Working Papers*, *13*. https://doi.org/10.5089/9781484318522.001

Longstaff, F., Mithal, S., & Neis, E. (2005). Corporate yield spreads: default risk or liquidity? New evidence from the credit default swap market. *Journal of Finance*, 2213–2253.

Loutskina, E. (2011). The role of securitization in bank liquidity and funding management. *Journal of Financial Economics*, *100*(3), 663–684. https://doi.org/10.1016/j.jfineco.2011.02.005

Louzis, D. P., Vouldis, A. T., & Metaxas, V. L. (2012). Macroeconomic and bank-specific determinants of non-performing loans in Greece : A comparative study of mortgage , business and consumer loan portfolios. *Journal of Banking and Finance*, *36*(4), 1012–1027. https://doi.org/10.1016/j.jbankfin.2011.10.012

MacKinlay, A. C. (1997). Event Studies in Economics and Finance. *Journal of Economic Literature*, *35*(1), 13–39.

Mäkinen, T., Sarno, L., & Zinna, G. (2020). Risky bank guarantees. *Journal of Financial Economics*, *136*(2), 490–522. https://doi.org/10.1016/j.jfineco.2019.10.005

Makri, V., Tsagkanos, A., & Bellas, A. (2014). Determinants of non-performing loans: The case of Eurozone. *Panoeconomicus*, *61*(2), 193–206. https://doi.org/10.2298/PAN1402193M

Manz, F., Kiesel, F., & Schiereck, D. (2019). Do NPL portfolio sales help reduce banks ' financing costs? *Economics Letters*, *182*, 93–97. https://doi.org/10.1016/j.econlet.2019.06.009

Manz, F., Müller, B., & Schiereck, D. (2020). The pricing of European non - performing real estate loan portfolios : evidence on stock market evaluation of complex asset sales. *Journal of Business Economics*, *0123456789*. https://doi.org/10.1007/s11573-020-00983-1

Minton, B. A., Stulz, R., & Williamson, R. (2009). How Much Do Banks Use Credit Derivatives to Hedge Loans? *Journal of Financial Services Research*, *35*(1), 1–31. https://doi.org/10.1007/s10693-008-0046-3

Nadal De Simone, F. (2021). Measuring the deadly embrace: Systemic and sovereign risks. *Research in International Business and Finance*, *56*. https://doi.org/10.1016/j.ribaf.2020.101348

Onali, E., Ginesti, G., Cardillo, G., & Torluccio, G. (2021). Market reaction to the expected loss model in banks. *Journal of Financial Stability*. https://doi.org/10.1016/j.jfs.2021.100884

Wagner, W., & Marsh, I. W. (2006). Credit risk transfer and financial sector stability. *Journal of Financial Stability*, *2*, 173–193. https://doi.org/10.1016/j.jfs.2005.11.001

Figure 1. *Distribution of gross book value (GBV) and number of NPL securitisations over the sample period*
The figure reports the number of deals and the GBV of NPL securitisations (in USD million) issued by EU banks during the period 2013- 2020.
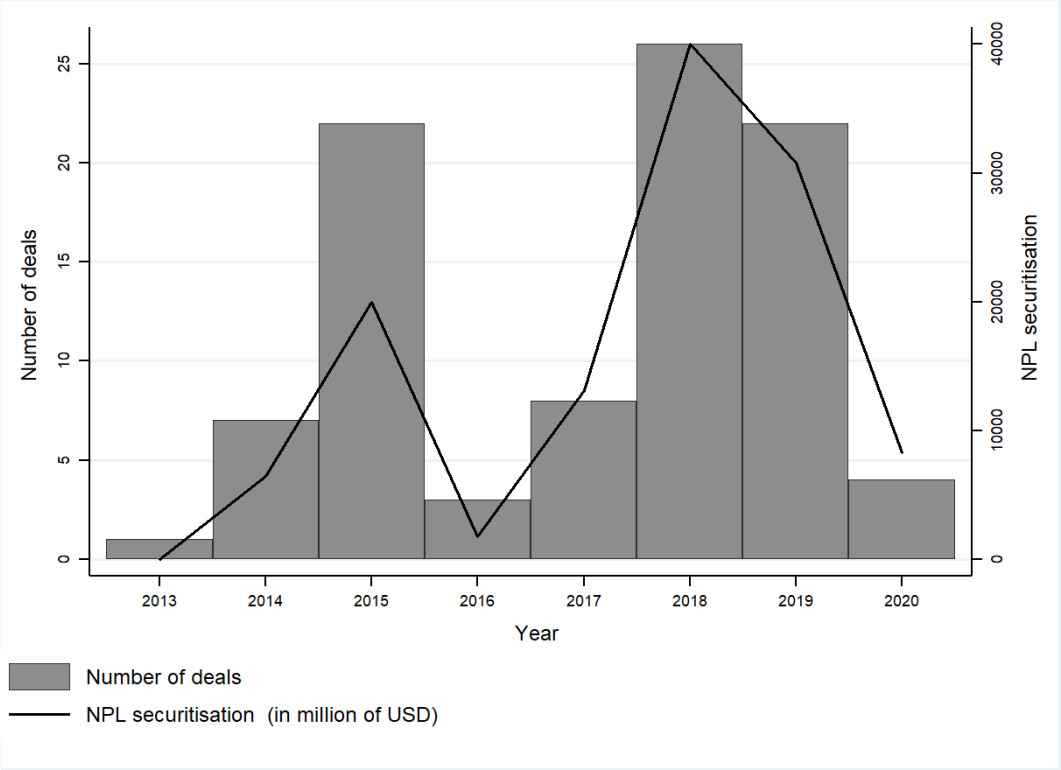
Figure 2. Histogram of NPL securitisation
The figure depicts the distribution of NPL securitisations (in USD million) issued by EU banks during the period 2013-2020.

Table 1. *Summary statistics.*

Variable	# of banks	# of announcements	Mean	Std	Min	Max
A. Dependent variables						
CDS spreads			77.02	102.03	0.00	1170.00
B. NPLs securitisations						
NPLs securitisations	26	93	1,340.00	1,600.00	15.00	11,000.00
With State-backed guarantee	5	8	1,360.00	1,260.00	370.00	4,300.00
Without State-backed guarantee	21	85	1,330.00	1,630.00	15.00	11,000.00

Description. The table reports the summary statistics of sovereign CDS spreads (Panel A) and NPLs securitisation (Panel B). The sovereign CDS spreads are reported in basis points (bps). The gross book value (GBV) of NPLs securitisations is expressed in millions of USD.

Table 2. *Event study: reaction of sovereign CDS spreads to NPLs securitisations*

A. Full sample

Event window (days)	[-5; +5]	[-1; +1]	[0; +1]	[0; +5]
CAR (bps)	0.4591	0.4716	0.4649	0.4619
Bootstrap	(0.0000)***	(0.0012)***	(0.0137)**	(0.0000)***
Wilcoxon test	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***

B. NPLs securitisations with State-backed guarantee

CAR (bps)	1.6029	1.5765	1.5681	1.6030
Bootstrap	(0.0039)***	(0.0000)***	(0.0000)***	(0.0000)***
Wilcoxon test	(0.0077)***	(0.0000)***	(0.0004)***	(0.0000)***

C. NPLs securitisations without State-backed guarantee

CAR (bps)	0.4422	0.4383	0.4139	0.4424
Bootstrap	(0.0000)***	(0.0053)***	(0.0563)*	(0.0001)***
Wilcoxon test	(0.0000)***	(0.0000)***	(0.0457)*	(0.0000)***

Description: The table reports the CARs in the CDS market (in bps) in response to the announcements of a NPLs securitisation. It shows CARs for (i) the entire sample of banks (Panel A); (ii) securitisations with State-backed guarantee (Panel B); (iii) securitisation without State-backed guarantee (Panel C).

Significance is tested according to two non-parametric tests: bootstrapped standard errors and Wilcoxon test. We report the p-value of the two tests.

Note: ***significant at the 1% level; **significant at the 5% level; *significant at the 10% level.

Table 3. *Event study results: reaction of sovereign CDS spreads to NPLs securitisations announced before and after the introduction of IFRS 9.*

A. Before the introduction of IFRS 9

Event window (days)	[-5; 0]	[-1; +1]	[0; +1]	[0; +5]
CAR (bps)	0.2480	0.2553	0.2446	0.2196
Bootstrap	(0.0514)*	(0.0273)**	(0.0091)***	(0.0794)*
Wilcoxon test	(0.0000)***	(0.0012)***	(0.0093)***	(0.0000)***

B. After the introduction of IFRS 9

CAR (bps)	0.6318	0.6446	0.6412	0.6543
Bootstrap	(0.0000)***	(0.0000)***	(0.0018)***	(0.0000)***
Wilcoxon test	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***

Description: The table reports the CARs in the CDS market (in bps) in response to the announcements of a NPLs securitisation. It shows the CARs for (i) securitisations announced before the introduction of IFRS 9 (Panel A); (ii) securitisations announced after the introduction of IFRS 9 (Panel B).

Significance is tested according to two non-parametric tests: bootstrapped standard errors and Wilcoxon test. We report the p-value of the two tests.

Note: ***significant at the 1% level; **significant at the 5% level; *significant at the 10% level.

Table 4. *Event study results: country's reaction of sovereign CDS spreads to NPLs securitisations performed by EU banks.*

A. Euro area peripheral countries

Event window (days)	[-5; 0]	[-1; +1]	[0; +1]	[0; +5]
CAR (bps)	1.0934	1.0956	1.0883	1.1010
Bootstrap	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
Wilcoxon test	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***

B. Other EU countries

CAR (bps)	-0.6078	-0.6063	-0.6119	-0.6128
Bootstrap	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
Wilcoxon test	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***

Description: The table reports the CARs in the CDS market (in bps) in response to the announcements of a NPLs securitisation. It shows the CARs for (i) Euro area peripheral countries (Panel A); (ii) Other EU countries (Panel B). Significance is tested according to two non-parametric tests: bootstrapped standard errors and Wilcoxon test. We report the p-value of the two tests.

Note: ***significant at the 1% level; **significant at the 5% level; *significant at the 10% level.

Table 5. *Event study: reaction of sovereign bond yield spreads to NPLs securitisations*

A. Full sample

Event window (days)	[-5; +5]	[-1; +1]	[0; +1]	[0; +5]
CAR (bps)	0.7913	0.8071	0.8075	0.7808
Bootstrap	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
Wilcoxon test	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***

B. NPLs securitisations with State-backed guarantee

CAR (bps)	2.3748	2.3655	2.3554	2.3783
Bootstrap	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
Wilcoxon test	(0.0000)***	(0.0000)***	(0.0004)***	(0.0000)***

C. NPLs securitisations without State-backed guarantee

CAR (bps)	0.7675	0.7600	0.7357	0.7530
Bootstrap	(0.0000)***	(0.0053)***	(0.0000)***	(0.0001)***
Wilcoxon test	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***

Description: The table reports the CARs in the sovereign bond market (in bps) in response to the announcements of a NPLs securitisation. It shows the CARs for (i) the entire sample of banks (Panel A); (ii) securitisations with State-backed guarantee (Panel B); (iii) securitisation without State-backed guarantee (Panel C).

Significance is tested according to two non-parametric tests: bootstrapped standard errors and Wilcoxon test. We report the p-value of the two tests.

Note: ***significant at the 1% level; **significant at the 5% level; *significant at the 10% level.

Appendix

Table A1. *Summary statistics on CDS spreads and NPLs securitisation divided by country.*

Country	# of banks	# of deals	Variable	Mean	Std. Dev.	Min	Max
Austria	1	2	CDS spread	42.69	39.20	0.00	238.00
			NPL securitisation	815.00	544.00	430.00	1,200.00
Belgium	1	1	CDS spread	72.11	64.28	4.85	400.00
			NPL securitisation	1900.00	-	-	-
Denmark	1	2	CDS spread	29.54	26.40	4.63	154.33
			NPL securitisation	420.00	170.00	300.00	540.00
France	2	5	CDS spread	58.23	42.19	14.00	248.00
			NPL securitisation	1,090.00	1,580.00	1600.00	3,900.00
Germany	3	9	CDS spread	27.36	20.27	7.00	116.33
			NPL securitisation	1,300.00	1,310.00	160.00	3,900.00
Ireland	2	7	CDS spread	177.39	197.99	17.17	1170.00
			NPL securitisation	847.00	637.00	200.00	2,00.00
Italy	4	29	CDS spread	198.58	91.17	80.00	602.11
			NPL securitisation	1,800.00	2,330.00	140.00	11,000.00
Netherlands	4	6	CDS spread	33.03	23.03	5.17	133.00
			NPL securitisation	928.50	1,200.00	60.00	3,200.00
Norway	1	1	CDS spread	15.99	6.66	1.15	52.67
			NPL securitisation	1,100.00	-	-	-
Spain	4	24	CDS spread	157.20	112.21	31.31	639.00
			NPL securitisation	1,170.00	1,020.00	240.00	4,000.00
UK	3	7	CDS spread	35.08	16.81	7.74	101.00
			NPL securitisation	1,410.00	1,510.00	15.00	4,100.00

Description: The table reports summary statistics on 5-year senior sovereign CDS spreads, and NPL securitisation over the period January 2013- September 2020. Mean, minimum (Min.) and maximum (Max.) of sovereign CDS spread are expressed in basis points. Mean, minimum (Min.) and maximum (Max.) of NPL securitisations are expressed in millions of USD.
Source: Datastream Database, authors' calculations.