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PUBLIC AND PRIVATE LIQUIDITY DURING CRISES TIMES: EVIDENCE FROM EMERGENCY LIQUIDITY ASSISTANCE (ELA) TO GREEK BANKS

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Abstract

In a surprise move during a crisis, the ECB excluded Greek Government Bonds from the set of eligible collateral in monetary policy operations. In turn, Greek banks turned to Emergency Liquidity Assistance (ELA) to meet their funding needs. ELA replenished losses from all funding sources, consistent with its role as LOLR. However, in anticipation to a switch to ELA, banks reduced their interbank and corporate lending as a result of its higher cost and conditionality. Although multi-lender firms compensated for the associated credit crunch, single-lender firms that were not able to establish new lending relationships experienced a reduction in their exports.

JEL-Classification: E58, G21, G28
Keywords: Central Bank Interventions, Lender of Last Resort (LOLR), Collateral Framework, Emergency Liquidity Assistance (ELA)

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1. Introduction

Central banks act as lenders of last resort (LOLR) by injecting large amounts of liquidity at low interest rates during crises times. This practice is consistent with the theory of LOLR (e.g. Antinolfi, Huybens and Keister, 2001; Rochet and Vives, 2004; Williamson, 2004; Freixas, Martin and Skeie, 2011) and recent experience from financial crises in the US, Europe and elsewhere suggest that these actions can help banks support their credit supply and the economy when private liquidity freezes.

In contrast to this, during an unprecedented bank run in early 2015 that wiped out more than 25% of bank deposits in Greece (Figure 1, top panel), the European Central Bank (ECB) excluded Greek Government Bonds (GGBs) from the set of eligible collateral in monetary policy operations. Prior to this event, GGBs were treated as eligible collateral by the ECB despite their sub-investment grade status, as long as Greece was implementing an Economic Adjustment Program. ECB's waiver provided a major lifeline for Greek banks during the Greek crisis. Its suspension, which followed skyrocketing political uncertainty, came as a surprise on February 4, and was implemented a week later (February 11). By suspending the waiver, the ECB increased the haircuts to 100%, which meant that banks could not borrow from the ECB against GGBs. Instead, they had to resort to the Bank of Greece to satisfy their funding needs via the Emergency Liquidity Assistance (ELA), a facility with stricter conditionality and 150 basis points higher cost than ECB's normal credit operations (Figure 1, bottom panel). ELA's penalty rate represented the cost imposed on banks for taking up the haircut subsidy while borrowing against GGBs (Drechsler, Drechsel, Marques-Ibanez and Schnabl, 2016).

We analyze the ECB negative shock and ELA as a haircut subsidy within ECB's monetary policy toolkit. Using several confidential datasets at the bank-day level, we explore the effects on banks' liquidity provision in the interbank market, the supply of credit to firms and the real economy.

Results Preview: We begin exploring the effects on the interbank market focusing on a four-month window before and after the unanticipated monetary policy shock. Greek banks reduced dramatically their unsecured interbank lending in response to the ECB policy swing.[1] Banks with higher reliance on ECB financing against GGBs were less likely to lend in the interbank market after the announcement of the suspension of the waiver (February 4). Despite heightened political uncertainty around the time of the policy shock, there is no evidence of

[1] We describe the structure of the interbank market later in detail. Briefly, Greek banks borrow from foreign banks on a secured basis (repos) and lend to domestic and foreign banks on an unsecured basis. Secured lending (reverse repos) is almost zero. A relatively small part of their unsecured lending supports intragroup activities.

adjustment prior to that date. The contraction was binding for banks borrowing in the interbank market, who were not able to substitute losses from less affected lenders. The collapse of unsecured borrowing as a result of the suspension of the waiver added to the overall collapse of interbank borrowing that Greek banks already began experiencing in January. In response to heightened political uncertainty, foreign banks ran on repos in January, which Greek banks replenished with ECB funding until its closure on February 11. We show that the intervention of the Bank of Greece on February 11 (when the suspension of the waiver was implemented) was quite successful, as the provision of ELA allowed banks, especially the most vulnerable, to fully replenish their losses from the interbank market and the closure of the ECB window. However, as the ELA was more expensive, bank funding costs increased immediately after February 11. We find no evidence of changes in bank funding costs to that date, despite the political turmoil, which helps explain banks' reaction to cut interbank lending on February 4 in response to an unanticipated increase in their funding costs due to ELA a week later. Next, we turn to the asset side of banks' balance sheets and explore corporate lending in response to higher funding costs. We find that affected banks reduced their corporate lending relatively more after the shock, with the effect being more pronounced among banks with lower capital ratios and less stable funding consistent with ELA conditionalities. Affected banks, especially the undercapitalized ones, reallocated their portfolios towards domestic T-bills in February and March when the government needed to roll over a relatively large amount of maturing debt. We find no evidence of search for yield (i.e. lending to riskier firms) or regulatory compliance (i.e. similar rebalancing to other sovereigns with zero risk-weight). Large firms exposed to the liquidity shock through their banks suffered a credit squeeze. However, this effect was driven exclusively by relatively smaller firms with a single banking relationship. In contrast, firms with multiple banking relationships were able to compensate for the supply-driven shock by borrowing from less affected banks. Finally, we explore real effects of the credit squeeze on exports. In the sample of single-lender firms, which experienced a reduction in their overall credit, firms more exposed to the liquidity shock were more likely to reduce their exports by terminating export relationships. Multi-lender firms, which did not experience a reduction in their overall credit, experienced neither a decrease in export volume nor a termination of export relationships.

There are two, not necessarily contradictory, readings of the chain linking the unexpected ECB policy shock and the LOLR intervention of the Bank of Greece to corporate lending and firm exports. The first suggests that the Greek central bank's liquidity provision, even at higher costs, helped contain the crisis. Second, although the switch to ELA allowed banks to fully

replenish their funding, following the adverse liquidity shock triggered by the ECB's change of policy, its higher cost and conditionality had adverse effects on the economy, as even when looking at large corporates, we find that the relatively smaller ones depending on impacted banks experienced a funding loss and cut their exports.

Related Literature: Our findings relate to three strands of research in monetary and financial economics. First, we contribute to the literature on LOLR interventions. Theory suggests that central banks provide ample liquidity at low interest rates when confronted with a crisis (e.g. Antinolfi, Huybens and Keister, 2001; Rochet and Vives, 2004; Freixas, Rochet and Parigi, 2004; Williamson, 2004; Freixas, Martin and Skeie, 2011). By expanding its collateral eligibility requirements (e.g., Nyborg, 2017; van Bekkum, Gabarro and Irani, 2018) or increasing the maturity of its loans (e.g. Carpinelli and Crosignani, 2021; Jasova, Mendicino and Supera; 2021), LOLR interventions can have positive effects for the economy. Yet, these actions may lead to more bank risk taking (Drechsler, Drechsel, Marques-Ibanez and Schnabl, 2016), an exacerbation of the bank-sovereign nexus (Crosignani, Faria-e-Castro and Fonseca, 2020) and systemic interconnectedness (Jasova, Laeven, Mendicino, Peydro and Supera, 2021). We contribute to this literature by studying the role of Emergence Liquidity Assistance (ELA). Although ELA's macroeconomic impact on the euro area as a whole may be limited, empirical evidence on its importance for the stability of the banking system and macroeconomic performance in the broad set of euro-area recipient countries are scant (see Appendix Table 1 for the full set of recipient countries).[2] There are at least two reasons for this. First, detailed data on the provision of ELA are highly confidential. Second, ELA liquidity is provided on a case-by-case basis (e.g. two Irish banks received 180 billion Euros in 2009-2013, one French bank received 30 billion Euros in 2012-2013), which inhibits the identification of its overall effects. Our study of Greek banks, which have been the recipient of most ELA over the past 15 years (both in terms of number of recipient banks and loan amounts received), uncovers that ELA was successful in stabilizing the banking system following the liquidity shock of ECB's unexpected policy to suspend the waiver of GGBs from its refinancing operations. But banks responded to ELA's higher cost and conditionality cutting interbank and corporate lending.

Second, we add to the literature that focuses on the importance of interbank markets for the transmission of monetary policy. Theory shows that distortions in the interbank markets

[2] Gibson, Hall, Petroulas, Spiliotopoulos, and Tavlas (2020) examine the impact of ELA on bank lending and real GDP in an unbalanced panel using semi-annual data from eleven euro-area countries.

can generate aggregate real effects (e.g. De Fiore, Hoerova and Uhlig, 2021; Bianchi and Bigio, 2022) and monetary policy can help improve liquidity conditions in the interbank market (e.g. Freixas, Martin, and Skeie, 2011; Allen, Carletti, and Gale, 2014). On the empirical front, results are mixed. On the one hand, Garcia-de-Andoain, Heider, Hoerova and Manganelli (2016) and Abbassi, Brauning, Fecht and Peydro (2022) show that monetary policy improves euro-area interbank liquidity during crises times. On the other hand, Brunetti, di Filippo and Harris (2011) shows that monetary policy did not improve interbank liquidity during the subprime crisis. The mixed results may be explained by a difficult identification problem: the endogenous relationship between monetary policy and liquidity conditions in the interbank market. Our contribution is to identify the effects of an unanticipated LOLR intervention (in the spirit of Bagehot, that is lend freely to solvent institutions at a penalty rate) on the supply of interbank liquidity during a crisis. The evidence in our study of the Greek interbank market suggests that banks hoarded interbank liquidity in response to more expensive central bank liquidity provision during the crisis.

Finally, we add to the voluminous literature examining how shocks in bank funding transmit to the economy, mostly via lending (e.g., Peek and Rosengren, 2000; Khwaja and Mian, 2008; Paravisini, 2008; Schnabl, 2012; Iyer, Peydro, da Rocha-Lopes and Schoar, 2013; Chodorow-Reich, 2014; Paravisini, Rappoport, Schnabl and Wolfenzon, 2015, among others). Our contribution to this literature is to quantify how bank funding *costs* affect lending, while keeping bank funding *volume* stable. Our setup addresses two empirical challenges. First, identifying exogenous variation in funding costs without concurrent changes in total funding is difficult. Second, banks' marginal costs of funding are not observable. Close to our paper is Duquerroy, Matray and Saidi (2022), which shows that banks reduced their lending in response to an increase in bank funding costs in France and less affected banks did not compensate for the supply-driven shock. Similar to their paper, we also find that banks cut lending in response to an increase in funding costs due to ELA's higher cost. However, in contrast to their paper, we find that less affected banks compensated for the reduction in credit supply if they had a pre-existing relationship with affected firms but did not extend new loans to firms with which they had no prior relationship. As such, the effect on the real economy was more subdued and restricted to those firms with a single banking relationship. Our findings are thus related to the importance of established bank-firm relationships for firm employment, profits, and sales (e.g., Ashcraft, 2005; Chodorow-Reich, 2014).

2. Background

By the end of 2014, the Greek economy had stabilized following the implementation of two economic adjustment programs since the onset of the Greek sovereign debt crisis in 2009-10. At that time, the second economic adjustment program agreed between the Greek government and its international lenders (the European Central Bank, the International Monetary Fund, and the European Commission) in 2012 was due to expire. However, there was no agreement between the administration and the troika of international lenders on the fiscal measures necessary to complete the program at the end of 2014. The coalition government between center-right New Democracy and center-left Pan-National Socialist Movement that had ruled Greece since its transition to democracy from military rule in 1974 decided to bring forward the election of the President of the Hellenic Republic (from spring of 2015 to December 2014) to tame rising uncertainty. However, as none of the opposition parties supported the move and the ruling parties did not have the necessary 3/5 majority in the Parliament, the candidate for the Presidency did not secure the necessary votes. Following the Constitutional mandate, the Parliament was dissolved on December 30, triggering parliamentary elections on January 25, 2015. As opinion polls overwhelmingly predicted that the anti-austerity, anti-MoU, radical-left SYRIZA will secure a victory, alongside considerable gains for other anti-European parties from the far right, discussions on Greece leaving the euro area, GREXIT, resurfaced. The political uncertainty generated a bank run (Figure 1, top panel) alongside a run on repos by foreign banks (Figure 2, black line in top panel), which Greek banks replenished with ECB liquidity (Figure 2, black line in bottom panel). Deposits and repo losses accounted for approximately 28 billion Euros in January 2015, while Eurosystem funding increased by an approximately equal amount, from 56 billion Euros in December 2014 to 82 billion Euros in January 2015. In terms of collateral, banks obtained additional ECB liquidity pledging bank bonds and supranational bonds, while GGBs remained at levels similar to the pre-political uncertainty period (i.e. November 2014).

The Parliamentary elections brought into power an ex-ante hard-to-imagine coalition government of radical-left SYRIZA with the smaller nationalistic right populist party of "Independent Greeks". During the campaign and the past four years, the two parties, despite their very different origins, were promising to wipe out a big part of the national debt, coined as odious, and renegotiate the austerity measures. The two parties had even argued that if the troika was not to accept a massive renegotiation of the terms of the MoU, they were ready to "pull the trigger", believing that such a move will destabilize the euro area and force the troika

to accept more favorable to the Greek side terms. Having fiercely opposed the implementation of economic adjustment programs, the new administration took a polemic stance with official creditors. While there was little, if any, actual renegotiation, Greek officials vocally attacked EU policymakers, politicians, and international institutions.

Amidst this political turmoil, in a surprise move on February 4, 2015, the ECB Governing Council decided to lift the waiver of minimum credit rating requirements for marketable instruments issued or guaranteed by the Hellenic Republic to be implemented a week later.[3] The press release stated that the suspension of the waiver was in line with Eurosystem rules, given that it was not possible to assume a successful conclusion of the Greek program review. Practically, ECB's decision to suspend the waiver meant that Greek banks could not borrow any more from its Main Refinancing Operations (MROs) posting as collateral Greek Government Bonds (GGBs).[4] Instead, Greek banks had to resort to the Emergency Liquidity Assistance (ELA) facility, provided by the Bank of Greece, which came at a higher cost (155 bps compared to 5 bps for Eurosystem funding) and strict conditionality, as banks had to present a detailed plan on how to achieve repayment of ELA funds within two years. Funding plans were monitored by the supervisors and Greek banks had to update them on a quarterly basis along with the submission of regulatory ratios submitted monthly. Appendix Table 2 provides a summary description of the ELA facility.

3. Effects on the interbank market

We commence the analysis by examining the impact of ECB's decision to suspend the waiver for GGBs on the interbank market.

3.1. Data and specification

We obtain confidential data on the share of GGBs each major Greek bank pledged as collateral with the ECB as of November 2014. The data cover seven Greek banks, four systemic and three non-systemic, which jointly represent more than 95% of total assets in the Greek banking system (and 100% of ECB funding). We merge these data with bank's interbank transactions in the period December 2014 – March 2015. These supervisory data record all unsecured and repo trades (lending and borrowing) on a daily basis for each bank, providing a

[3] The suspension of the waiver affected both Greek Government Bonds (GGBs) and Greek Government Guaranteed bank bonds (GGGBBs). Since the decision to exclude GGGBBs from the set of eligible collateral was part of a broader policy applied to all banks in the Euro Area (Directive ECB/2013/6), we focus only on GGBs. Our results and conclusions remain unchanged when we consider both GGBs and GGGBBs in our analysis.
[4] The suspension of the waiver affected Greek banks through MROs, not LTROs (see Figure 1, bottom panel).

comprehensive overview of the Greek interbank market.[5] The seven banks represent about 95% of all interbank transactions, both in terms of number and volume. In terms of market structure, Greek banks borrow from foreign banks on a secured basis (repos). GGBs support approximately 5% of their total repo borrowing, while the rest is foreign government bonds (40%), corporate bonds (25%), bank bonds (15%), while loans, supranational bonds and ABS account for the rest (15%). In terms of lending, Greek banks lend to domestic and foreign banks on an unsecured basis, a small part of which supports intragroup activities. Secured lending (or reverse repo) is almost zero.

Since our goal is to study interbank lending by banks with different exposure to the shock, we focus on the unsecured segment of the market (i.e. unsecured lending). We aggregate the transaction data at the lender-borrower-day level and estimate with LS the following event-study specification:

$$Y_{lbt} = \beta_1 \times Bank's\ Direct\ Exposure_{\ l} \times Post\ Waiver_t + a_l + a_{bt} + \varepsilon_{lbt} \qquad (1)$$

We use four outcomes (Y_{lbt}). *Access* is an indicator that takes the value one if a lender *l* grants a new loan to borrower *b* on day *t*, and zero otherwise. *Lending* is the natural logarithm of unsecured lending of lender *l* to borrower *b* on day *t*. *Rate* denotes the average rate a lender *l* charges borrower *b* on day *t*. *Maturity* denotes the logarithm of the average loan maturity (in days) of all interbank loans lender *l* extends to borrower *b* on day *t*.[6]

The variable of interest, *Bank's Direct Exposure,* denotes the share of GGBs in total collateral lender *l* pledged with the ECB as of November 2014.[7] *Post Waiver* is an indicator that takes the value one after February 4, zero otherwise. The specification includes borrower*day fixed effects that absorb all features related to a bank's demand for interbank liquidity on a given day. The specification also includes lender fixed effects that capture all time-invariant characteristics of lenders, related to their health, size, liquidity, etc. Standard errors are three-way clustered at the lender, borrower, and day level.

[5] Because data are supervisory, we do not have to rely on a matching algorithm along the lines of Furfine (1999) in order to isolate interbank market trades from other trades as is the case when Target2 or Fedwire data are used. As such, our analysis does not suffer from type I and type II errors (i.e. analyze transactions that are not interbank transactions or discard transactions that are interbank transactions respectively) which the literature has shown can be quite large (Armantier and Copeland, 2012). A downside of our data is that we do not observe repo haircuts.

[6] While transactions are reported at the subsidiary level, we aggregate at the group level.

[7] Our preferred measure is after haircuts. We also consider a measure before haircuts which does not impact our analysis.

3.2. Results

Direct Exposure. Table 1 reports the results from the difference-in-differences specifications. Columns (1)-(3) explore the extensive margin of interbank market adjustment. Banks more affected by the liquidity shock were less likely to lend in the interbank market. The estimate on the interaction of bank's exposure and the post waiver is not much affected with the control for bank exposure to the deposit or repo run (interacted with the post waiver dummy), which started well before February 4 and were unrelated to the suspension of the waiver (column (2)). Our estimates suggest that a bank with one standard deviation higher exposure to the liquidity shock triggered by ECB's unexpected policy move was 4.7% less likely to lend in the interbank market. Column (3) decomposes the post-policy window into the announcement week (February 4 – February 10) and the implementation phase (February 11 – March 31). Banks were less likely to lend in both periods with the effect being more pronounced immediately after the policy announcement. Conditional on lending (intensive margin, columns (4)-(12)), we find no changes in lending volumes (columns (4)-(6)), but banks charged a higher rate to counterparties after the policy announcement (column (9)). However, the effect appears short-lived, as it dissipates during the implementation phase. The specifications in (10)-(12) show that loan maturity adjustments did not occur. Overall, the results indicate that the adjustments by banks more affected by the shock led to a contraction of liquidity in the unsecured segment of the interbank market, which is consistent with theories of liquidity hoarding (Allen, Carletti and Gale, 2009; Diamond and Rajan, 2011; Acharya and Merrouche, 2013).

Robustness Tests. In this section, we perform two robustness tests. First, we check for the parallel trends assumption, which is central to our empirical analysis. Due to skyrocketing political uncertainty around the time of the ECB policy reversal, it is important to check whether banks reduced interbank lending prior to February 4. To do so, we restrict our analysis to the *pre*-period (i.e., December 1 – February 3) and estimate before-after specifications using alternative dates for the event. First, we use the day the government announced that it will bring forward the elections in parliament for the President of the Hellenic Republic that initiated the two months of political instability (December 8). Second, we use the actual dates of the failed attempts of the administration in parliament to elect the President of the Republic (December 17 and December 23). Third, we use December 30, when the Parliament was dissolved triggering national elections on January 25. The results, reported in Appendix Table 3, indicate that banks did not cut their interbank lending prior to February 4. Second, we consider alternative measures of direct exposure to the shock. In panel A of Appendix Table 4, we proxy direct exposure with the share of GGBs in total ECB collateral as of January 2015 (instead of

November 2014), while in panel B we proxy direct exposure with the share of both GGBs and government guaranteed bank bonds in total ECB collateral. The results confirm our previous findings.

Counterparty Risk. In Appendix Table 5, we examine the role of counterparty risk in interbank lending adjustments which earlier works emphasized in different settings (e.g., Flannery, 1996; Freixas and Jorge, 2008; Afonso, Kovner, and Schoar, 2011). To do so, we run our baseline regressions and control for lender*time (instead of borrower*time) fixed effects, thereby exploiting variation across borrower's exposure to the shock (i.e. counterparty risk). The estimates suggest no adjustment due to counterparty risk.

Indirect Exposure. Our main result so far is that banks with higher ex-ante financing against GGBs cut unsecured interbank lending relatively more after the announcement of the suspension of the waiver on February 4. The next step is to examine the extent to which borrowers in the interbank market substituted losses after the shock. If borrowers were able to substitute losses one-for-one from less affected banks, they would not experience a reduction in their total unsecured interbank borrowing. In contrast, if borrowers were able to substitute losses less than one-for-one or were not able to substitute losses at all, then this would put additional pressure to their overall interbank borrowing, which had already began evaporating in January due to the repo run. To test for this, we construct a measure of interbank borrowers' indirect exposure to the shock through their interbank lenders' direct exposure and associate it with their total unsecured interbank borrowing before and after the shock. We define a borrower's indirect exposure as the weighted average of its interbank lenders' share of GGBs in total ECB collateral.[8] As weights, we use the share of borrower-lender interbank loan volume in a borrower's total interbank borrowing before the shock. Table 2 reports the estimates. Borrowers with higher indirect exposure to the shock borrowed less in the interbank market. This result holds for all banks – foreign and domestic (column 1), as well as more narrowly, in the subset of domestic banks (column 2). In terms of economic significance, we find that a Greek bank with one standard deviation higher indirect exposure suffered a 58% drop in its unsecured interbank borrowing. It is worth noting that the number of observations drops dramatically when we focus only on domestic banks (from 10,043 in column 1 to 498 column 2), which suggests that most of Greek banks' unsecured interbank lending is out-of-group and results are unlikely to be driven by intragroup lending motives.

[8] This is a standard way to examine substitution of lending losses in the empirical banking literature (see, for example, Khwaja and Mian, 2008; Iyer, Peydro, Da-Rocha-Lopes and Schoar, 2014; Paravisini, Rappoport, Schnabl and Wolfenzon, 2015 among others).

Summary. The results in Tables 1-2 (combined with Figure 2) reveal the impact of the unexpected ECB decision to suspend the waiver on Greek Government Bonds on the contraction of unsecured interbank liquidity. In other words, the policy, triggered by animosity and attacks of Greek officials on the ECB and the EU more generally, drastically reduced Greek banks' access to private funding.

4. Provision of Emergency Liquidity Assistance (ELA)

In this Section, we explore the impact of the Bank of Greece's intervention to assist Greek banks with the ELA facility. First, we discuss data and specification. Second, we present the empirical estimates.

4.1. Data and specification

We complement the data on banks' interbank transactions with data on borrowing from the ECB and the ELA. These confidential supervisory datasets are available at a daily frequency. Merging the data on ECB and ELA borrowing with bank's positions (borrowing and lending) in the secured and unsecured interbank market uncovers a complete overview of banks' daily funding from both private and public sources. As the ELA was not available to foreign banks, our sample consists of seven Greek banks. While the cross-sectional units (and variation) are limited, ELA liquidity is by design provided on a case-by-case basis and Greek banks have been the recipient of most ELA over the past 15 years.[9]

We explore the provision of ELA by estimating the following LS regression:

$$\left(\frac{ELA}{Liabilities}\right)_{bt} = \beta_1 \times Bank's\ Exposure_b \times Post\ Waiver_t + a_b + a_t + \varepsilon_{bt} \qquad (2)$$

The dependent variable, *ELA/Liabilities* is the share of ELA funding in bank's total liabilities. As discussed above, banks' exposure to the liquidity shock stemming from the suspension of the waiver for GGBs by the ECB was both direct and indirect. We thus use three explanatory variables to proxy for $Bank's\ Exposure_b$. First, we zoom into banks' direct exposure, as their capacity to borrow from the ECB pledging GGBs as collateral shut down following the suspension of the waiver. A bank's *Direct Exposure* is the share of GGBs in total liabilities. Second, we look at banks' *Indirect Exposure*, the weighted average of its interbank

[9] For example, as we mentioned earlier, two Irish banks received 180 billion Euros between 2009 and 2013, one French bank received almost 30 billion Euros in 2012-2013, two Belgian banks and one German bank received 51 and 38 billion Euros in 2008, respectively (for more details, see Appendix Table 1 and Cadamuro and Papadia (2021)). Because of the limited cross-sectional variation, the identification of ELA's overall effects is challenging.

lenders' share of GGBs in total ECB collateral, whereas weights are the share of borrower-lender interbank loan volume in a bank's total liabilities. Third, we aggregate direct and indirect exposure to measure a bank's *Total Exposure*. Put differently, a Greek bank was exposed to the suspension of the waiver (i) as a direct borrower from the ECB and (ii) as an indirect borrower from lenders in the interbank market, which were themselves direct borrowers from the ECB. Therefore, its total exposure was the sum of direct and indirect exposure.[10] *Post Waiver* is a dummy that takes the value one after February 4, and zero otherwise; we also split the post period into the announcement and the implementation phase.

4.2. Results

Baseline Estimates. Table 3 reports the baseline estimates linking exposure to the ECB shock and the ELA. We begin studying separately banks' direct and indirect exposure (columns (1)-(4)) and then look at total exposure (in columns (5)-(6)). A bank's direct exposure to the ECB waiver shock is positively associated with its borrowing from ELA. Not surprisingly, the correlation strengthens when we look at the post-implementation window. A bank with a one standard deviation higher direct exposure received 3.6% more ELA after the policy implementation on February 11. Specifications (3)-(4) reveal that the ELA also assisted banks indirectly exposed to the shock, as there is a significantly positive correlation between banks' indirect exposure to the waiver shock and borrowing via the ELA after the policy implementation. A bank with a one standard deviation higher indirect exposure to the shock received 8.1% more ELA after February 11. This result spotlights the importance of the interbank market as a source of funding and transmission channel for monetary policy. In other words, the shock is transmitted through interbank market and banks experience losses for which they compensate from ELA, even in the absence of a direct exposure. Given the significance of both direct and indirect exposure to the shock, the estimates in columns (5)-(6) show that banks with sizable total exposure to the shock, direct and indirect, turned into the ELA for liquidity when the ECB refinancing window closed. Economically, a bank with a one standard deviation higher total exposure received 9.4% more ELA after February 11. Note that all regressions control for banks' exposure to the repo and deposits run (interacted with the post waiver dummy), since by design ELA is meant to replenish losses from all funding sources (see Figure 3, top panel). Taken together, these findings point to the importance of ELA as a

[10] The reason we normalize both ratios by total liabilities is to facilitate the calculation.

lender of last resort (LOLR) at a time when both private (deposits and interbank funding) *and* public (ECB) liquidity was evaporating.[11]

Terms of ELA Funding. As we discussed earlier, the ELA was a more costly facility, entailing a higher interest rate cost, conditionalities posed by the Bank of Greece, and arguably a stigma. We thus examine two related inquiries. Did ELA fully or only partially replenish bank funding losses? How did the terms of bank funding change in response? Table 4 reports LS difference-in-differences estimates shedding light on these issues. In columns (1)-(2) we look at the link between ELA and banks' *total* borrowing (unsecured, repo, ECB and ELA as a share of total liabilities).[12] The estimates on total exposure are small and statistically indistinguishable from zero, telling of the full substitution of ELA funds for the lost liquidity and ELA's role as LOLR. The estimates are not much affected when we add an interaction of the exposure measure with indicators capturing political uncertainty prior to February 4 (parallel trends). In columns (3)-(4) we examine the link between exposure to the waiver shock and the total cost of borrowing, calculated as the weighted average of unsecured, repo, ECB and ELA borrowing in total liabilities with the associated cost of finance. The cost increases post-policy implementation, telling of ELA higher costs. The estimates suggest that a bank with a one standard deviation higher exposure to the shock saw its funding costs increasing by 7 basis points after February 11. Importantly, we find no association of a bank's total exposure with changes in the cost of funding *before* February 11. This helps explain banks' reaction to cut unsecured interbank lending on February 4, and not earlier despite the political turmoil, in response to an unanticipated increase in their funding costs due to ELA a week later.[13] This also suggests that the small increase in ELA in January (Figure 2, bottom panel; Figure 3 top panel) was not sufficient to cause an interbank liquidity crunch, because at the time ELA provision (and as such an increase in bank funding costs) did not seem permanent. Finally, in columns (5)-(6) we examine the impact of the shock on the average maturity of banks' borrowing, using as dependent variable the weighted average of the maturity of unsecured, repo, ECB, and ELA

[11] Note that the number of observations in ELA regressions (Table 3) is 581. This is because all seven Greek banks were borrowing from ELA based on their exposure, direct or indirect (581 = 7 banks *83 trading days in our sample). In contrast, the number of observations in unsecured borrowing regressions (Table 2) is 498. One Greek bank is not borrowing on an unsecured basis from the interbank market, therefore 498 observations (498 = 6 banks * 83 trading days in our sample). For this bank, direct exposure is positive, but indirect exposure is zero. Its total exposure equals its direct exposure.

[12] In the absence of daily data on bank deposits, we check whether our results are affected by controlling (or not) for banks' ex-ante exposure to the deposits run. They do not.

[13] We also split the *Post Political Uncertainty* period {December 30 – February 3} into two subperiods, *Pre-Syriza* (i.e. {December 30 – January 24}) and *Post-Syriza* (i.e. {January 25 – February 3}) and find no evidence of changes in bank funding costs before and after Syriza winning the general elections.

borrowing in banks' total liabilities. Bank's exposure is not systematically linked to the maturity of borrowing, a non-surprising pattern as all these types of financing are short-term.

Summary. The analysis shows that banks with significant exposure to the shock compensated for the termination of ECB borrowing with ELA. Banks did not adjust their unsecured interbank lending prior to the ECB announcement on February 4. In anticipation to a switch to ELA a week later and an unexpected permanent increase in their borrowing costs (in line with the surprise move by the ECB to suspend the waiver), banks cut lending in the interbank market starting on February 4. Despite the change in the composition of bank funding in February (from ECB to ELA), the size of bank balance sheets remained stable, showing that ELA fully replenished banks' funding losses, in line with its role as LOLR.

5. Effects on corporate lending

In this Section, we explore the impact of higher funding costs that resulted from the liquidity shock on corporate lending. First, we discuss the matched bank-firm data and lay down the econometric framework. Second, we report the estimates.

5.1. Data and specification

We obtain loan-level data from the Greek credit registry. The four systemic banks report on a quarterly basis all outstanding loans exceeding 1 million euros to individual firms.[14] Given the high threshold, the firms are considerably larger than the mean-median Greek corporate. Although they represent less than 1% in the total number of Greek firms, they account for almost 40% of total corporate lending. As such, our analysis moving forward should be seen as providing lower bound estimates. We merge the credit registry data with information on bank and firm balance sheets from the Bank of Greece and ICAP (a Greek business information provider), respectively. Bank balance sheets are available at a monthly frequency, while firm balance sheets are obtained as a snapshot as of December 2014.

Our estimation framework compares lending to the same firm by banks facing different changes in their funding costs because of their exposure to the liquidity shock. Zooming into firms with multiple lenders, allows isolating the credit supply shock from a demand-driven change in lending.[15] We estimate the following specification:

[14] A similar reporting threshold applies to other credit registries, e.g., Germany.

[15] This approach has been used by Gan (2007), Khwaja and Mian (2008), Paravisini (2008), Schnabl (2012), Jimenez, Ongena, Peydro and Saurina (2012) and Paravisini, Rappoport, Schnabl and Wolfenzon (2015) among others.

$$\Delta \log(Lending)_{bf} = \beta \times Banks' \; Total \; Exposure_{b} + a_f + \varepsilon_{bf} \qquad (3)$$

$\Delta \log(Lending)_{bf}$ denotes the log change in lending from bank b to firm f between March 2015 and December 2014. *Bank's Total Exposure* is the sum of bank's direct and indirect exposure to the shock. The specification includes firm fixed effects that absorb demand-driven swings in bank lending. We cluster standard errors at the bank level to account for commonality of the exposure variables across firms with the same lender and at the sectoral level to deal with unobserved correlation across industries.

5.2. Results

Baseline Estimates. Table 5 gives the LS estimates. Column (1) reports cross-sectional estimates across all firms (5,143) with loans more than 1 million euros from at least one bank. Column (2) restricts estimation to firms with loans from two or more banks, 1,575 corporates. The cross-sectional specification reveals that banks with higher exposure to the shock reduced their lending. The estimate in the smaller sample of firms with multiple borrowers is similar to the wider one. Column (3) gives firm fixed effects estimates that allow us to zoom into the credit supply shock. The within-firm estimate is at least two standard errors below zero, telling of the prominence of credit supply -than demand- during the short time window of our analysis. The estimate implies that a bank with a one standard deviation higher exposure to the shock reduced its lending by approximately 2 percentage points. It is important to note that these results are likely a lower bound of the true estimate, since our sample includes very large firms (less than 1% in total number of corporates) that are responsible for a large share in total corporate debt (between 30% and 40%).

The assumption behind these results is that in the absence of the shock and an increase in bank funding costs, lending from banks with different exposure would follow similar trends. We explore the validity of this assumption in two ways. First, we expand the credit registry data backwards by one quarter and study adjustments in lending between September 2014 and December 2014. The results, reported for brevity in columns (1)-(3) of Appendix Table 6, do not reveal much lending adjustments in the fourth quarter of 2014. Second, we use bank-industry loan-level data, available at a monthly (not quarterly) frequency, and examine changes in lending between January 2015 and December 2014. The idea behind this test is that banks might have cut lending to industries more exposed to January's heightened political uncertainty. Then, our baseline results (i.e. comparing March 2015 to December 2014) would merely capture the impact of political uncertainty rather than higher bank funding costs. The

estimates, reported in columns (4)-(5) of Appendix Table 6, show no lending adjustments in January, when political uncertainty increased.

ELA Conditionalities. In Table 6, we zoom into the strict conditionality of ELA in terms of bank solvency ratios and a long-term funding plan regarding its repayment. ELA rules require for bank eligibility a Common Equity Tier 1 (CET1) capital ratio above 4.5%, a Tier1 capital ratio above 6%, and total capital ratio above 8%. We exploit banks' ex-ante distance from these thresholds to proxy for ELA eligibility and then interact them with total bank's exposure to the shock. Before discussing the results, we need to stress that there is little cross-sectional variation on these aspects, due to the small number of banks. Columns (1)-(3) report the within-firm estimates that quantify the role of bank's exposure and ELA's conditionality on corporate lending on multi-bank firms. The estimate on bank's exposure retains its significance in all three specifications, telling of the transmission of the liquidity shock to the economy. The interaction terms with all three measures of bank solvency enter with a positive coefficient suggesting that the closer banks were to the cutoff the more adverse the reduction on firm lending. In columns (4)-(6) we look at ELA's requirement to participating banks having detailed and constantly updated exit plans, using three proxies of bank's dependence on long-term funding:[16] i) the share of time to total deposits; ii) the share of time deposits with maturity more than one year to total deposits; and iii) the share of time deposits with maturity more than one year to total liabilities. Intuitively, a bank more reliant on long-term funding will be more likely to have a plan for ELA repayment and, as such, will be less likely to cut lending. The estimates suggest that bank's reliance on long-term funding mitigates the adversity of the liquidity shock. In Appendix Table 7, we also consider the interaction of a bank's size with its exposure measure. The bank size is likely associated with its capital ratio and dependence on long-term funding. If our previous results are not related to ELA conditionality, then we would still observe a positive association between bank size and lending. In other words, by relating a bank's size to its decision to lend, we explore the extent in which our results are driven by factors other than ELA's stricter conditionalities. We detect no such association, which provides additional support to our previous findings.

[16] While savings and checking deposits are demandable and can be withdrawn at any time, time deposits are locked in for term. Consistent with previous literature (e.g. Flannery and James, 1984; Drechsler, Savov and Schnabl, 2017; Supera, 2021), we use time deposits to proxy for bank dependence on long-term and relatively illiquid funding.

Although we believe that stricter conditionalities in emergency liquidity programs play a role in bank lending decisions (see, for example, IMF programs and their conditionalities[17]), we acknowledge that disentangling the effects on lending due to bank solvency/dependence on long-term funding and ELA's stricter conditionalities is inherently difficult. Our analysis is subject to this important caveat.

Portfolio reallocation. We showed that while banks reduced lending following the suspension of the waiver, the size of bank balance sheets remained stable (columns 1 and 2 in Table 4 and Figure 3 for graphical evidence). This raises the question: what did banks do with the ELA funding? Did they risk-shift or search for yield in response to higher funding costs? We tackle these questions in this section. In the absence of detailed securities registry data, we rely on bank balance sheet information that report bank assets at a monthly frequency. We begin exploring risk-shifting using government debt. We motivate our analysis by the fact that in February and March 2015, the Greek Government had to roll over about 5.7 billion Euros of Treasury Bills.[18] We relate a bank's exposure measure to its share of T-bills in total assets before (i.e. December 2014 and January 2015) and after (i.e. February and March 2015) the shock. Our results – reported in column (1) of Table 7 – indicate that banks more exposed to the liquidity shock (and, as such, banks that cut lending relatively more due to an increase in their funding costs) purchased more T-bills in February and March. This effect was more pronounced among undercapitalized banks (columns 2-4), which is consistent with a risk-shifting channel and theory (e.g. Crosignani, 2021). However, the economic effect was rather small: a bank with a one standard deviation higher exposure increased its T-bills holdings by 0.06%. This is consistent with the 15 billion Euros cap the ECB put to Greek banks to absorb T-bills after the suspension of the waiver (see Figure 3, bottom panel for graphical evidence).[19] As a placebo, we consider purchases of longer-dated government debt (columns 5-6), but find no evidence of such reallocation. Taken together, our results indicate that in response to higher funding costs due to ELA, banks (especially the undercapitalized ones) purchased government debt in months when the government needed to roll over a relatively large amount of maturing T-bills.

[17] For example, the IMF provided financing of different forms to 81 countries during the COVID-19 crisis, of which 75 have been in the form of emergency financing which does not have conditionalities that typically come with IMF programs (Gita Gopinath, Financial Times interview https://www.ft.com/content/9dd38ca3-a07b-4905-813d-39261dbc3c91).

[18] T-Bills amounted to 14.5 billion Euros in total for 2015 and were mostly held by domestic banks. Because of the political situation in early 2015, foreign banks were unwilling to roll over Greek debt.

[19] The limit put by the ECB was also in popular press (https://sports.yahoo.com/news/ecb-tells-greek-banks-not-194349681.html).

We also explore alternative channels. In columns (9)-(12), we explore regulatory compliance, but find no evidence of similar rebalancing to other sovereigns with zero risk-weight. Finally, we find no evidence of search for yield. Exploiting variation across firms' risk profiles (proxied by a firm's size, age, sales growth, available collateral and non-performing loans), our results indicate that banks did not reallocate towards riskier lending.

Credit Substitution. We then explore whether firms that faced a credit supply reduction from affected banks were able to substitute credit from other, less affected, banks. A firm can compensate by either creating a relationship with a less-affected bank (extensive margin) or expanding on an existing relationship if such relationship exists (intensive margin). We construct two variables to study credit substitution. *New Lending Relationship* is a dummy variable equal to one if a firm establishes a lending relationship in March 2015, which did not exist in December 2014; *Δlog(Total Borrowing)* is the log change in a firm's borrowing from all banks in the period March 2015 - December 2014.[20] If a multi-lender firm facing a reduction in lending by bank A substitutes borrowing from bank B, then its total bank borrowing in March 2015 would remain at similar levels to December 2014. We associate these variables with the weighted average of a firm's banks' total exposure. Table 8 reports the LS estimates. Column (1) shows that firms with higher exposure were not necessarily more likely to establish a new bank relationship. In column (2) we expand the explanatory variables set interacting the firm-level exposure measure with a binary variable that indicates whether a firm had multiple banking relationships before the shock or not.[21] There is not much heterogeneity on the association between new lending relationships and exposure to the shock for single and multi-bank firms. These results hold when we control for firm's size and compare firms in the same industry and province (columns (3) and (4)). In columns (5)-(8) we look at changes in a firm's total borrowing. The coefficient on banks' exposure is negative and highly significant. However, the interaction of the bank's exposure with the identifier for multi-lender firms is insignificant, suggesting that the baseline negative correlation (in column (5)) is exclusively driven by single-lender firms. In other words, firms with multiple banking relationships were able to compensate for the supply-driven shock by borrowing from less affected banks. The heterogeneous association between bank's exposure to the liquidity shock and corporate lending between single and multi-bank firms holds when we condition on firm's size, sectoral and provincial features (columns (7)-(8)).

[20] As we discussed earlier, we observe loans from the four systemic banks in the credit registry.
[21] Multi-lender firms are generally than single-lender firms (see Appendix Table 9).

Summary. The analysis of the impact of the adverse liquidity shock in the interbank market that Bank of Greece's ELA tried to mitigate on the economy yields two main regularities. First, more impacted by the liquidity squeeze banks decreased their corporate lending. While there is limited bank variation, there is also evidence that the liquidity squeeze - reduction in corporate lending nexus was more pronounced for weaker banks, likely to be hit harder by ELA's conditionalities. Consistent with a risk-shifting mechanism, weaker (or undercapitalized) banks increased their holdings of T-bills when the government needed to roll over a relatively large amount of maturing debt. Second, firms with relationships with more than one banks were able to compensate falling credit, borrowing more from relatively healthier banks. This credit substitution effect appears instrumental into the "success" of the ELA into shielding the adverse liquidity shock of ECB's policy to remove the waiver of Greek government bonds from its refinancing operations in early February.

6. Trade effects

In this Section, we connect the bank liquidity shock to international trade. Our focus on firms' trade activities is motivated, on the one hand, by the literature that connects external financing to international trade (e.g. Amiti and Weinstein, 2011; Manova, 2013; Paravisini, Rappoport, Schnabl and Wolfenzon, 2015) and, on the other hand, by high-frequency micro-data that allow us to carefully identify the effects. We proceed in two steps: first, we discuss our data and specification, and second, we present the results.

6.1. Data and specification

We match the loan-level information with administrative data on firm exports, collected by the Greek custom authorities at the product-destination level (products are at the 5-digit SITC level). We collapse the monthly data into two two-month periods, before and after the suspension of waiver. To deal with seasonality in exports, the *pre* period corresponds to February 2014 – March 2014 and the *post* period corresponds to February 2015 - March 2015. We estimate with LS the following empirical specification:

$$Y_{fpd} = \beta_1 \times Firm's\ Banks'\ Total\ Exposure_f + a_{pd} + \varepsilon_{fpd} \qquad (4)$$

The dependent variable denotes exports (volume, value, and exit) of product *p* to destination country *d* by firm *f*. To study the extensive margin, we define an *Exit* indicator that equals one if firm *f* terminates in the *post* period an export flow (of product *p* to destination *d*),

active in the *pre* period. For the intensive margin, we look at $\Delta\log(Exports)$, the change in the logarithm of export flows over the two periods. As the specification includes product-destination fixed effects, the estimates compare changes in exports of the same product to the same destination by firms with different exposure to the shock through their banking network. Similar to the approach in Paravisini, Rappoport, Schnabl and Wolfenzon (2015), our inclusion of product-destination fixed effects helps control for changes in exports' demand, thereby isolating a supply-side effect.

6.2. Results

Table 9 reports the results. Firm's exposure to the shock is not associated with a higher probability to terminate an export flow (column 1). In column (2) we distinguish between single- and multi-lender firms. Among single-lender firms, a firm with one standard deviation higher exposure was 1.3% more likely to terminate an export flow after the shock.[22] This is intuitive as it was single-lender firms that experienced credit losses after the shock. The effect is absent among multi-lender firms, which compensate for credit losses from less affected banks. These effects likely reflect a lower bound of the true effect as our sample includes relatively large exporters (i.e. 6% of all exporters in Greece who are responsible for more than 60% of total exports). In contrast, we do not find any statistically significant differences in export volumes and values among single- or multi-lender firms with different levels of exposure to the shock (columns (3)-(6)). Taken together, our results indicate that in response to higher bank funding costs due to ELA and the associated credit crunch, single-lender firms were more likely to terminate their flows of exports.

7. Conclusion

This paper exploits an unusual policy event: at the time when private liquidity was evaporating, the ECB excluded Greek Government Bonds (GGBs) from the set of eligible collateral from its monetary policy operations. We explore the impact of the ECB shock on the banking system and the economy, exploiting a rich set of confidential supervisory data of banks' funding from the interbank market and the central bank, merged with bank-firm loan-level data and firm-product-destination export data. We find that, after the ECB shock, ELA replenished losses from all funding sources, consistent with its role as LOLR. However, in anticipation to a switch to ELA, more affected banks hoarded more liquidity, cutting interbank

[22] Out of 11,519 flows, single-lender firms do 3,865 of them, of which 1,415 terminate (or 37%). Multi-lender firms do the remaining 7,654 of them, of which 2,414 terminate (or 32%).

loans and supply of credit to firms as a result of ELA's higher cost and stricter conditionality. Larger firms that had multiple lending relationships were able to compensate for the associated credit crunch. However, smaller single-lender firms that were not able to establish new lending relationships and compensate for falling bank credit experienced a reduction in their exports.

Our results have implications on the design of emergency liquidity facilities. On the one hand, the central bank's liquidity provision, even at higher costs, helps contain the crisis. On the other hand, although ELA allows banks to fully replenish their funding, its higher cost and conditionality has adverse effects on the economy, as even when focusing on large firms, we find that the relatively smaller ones depending on impacted banks experience a funding loss and cut their exports.

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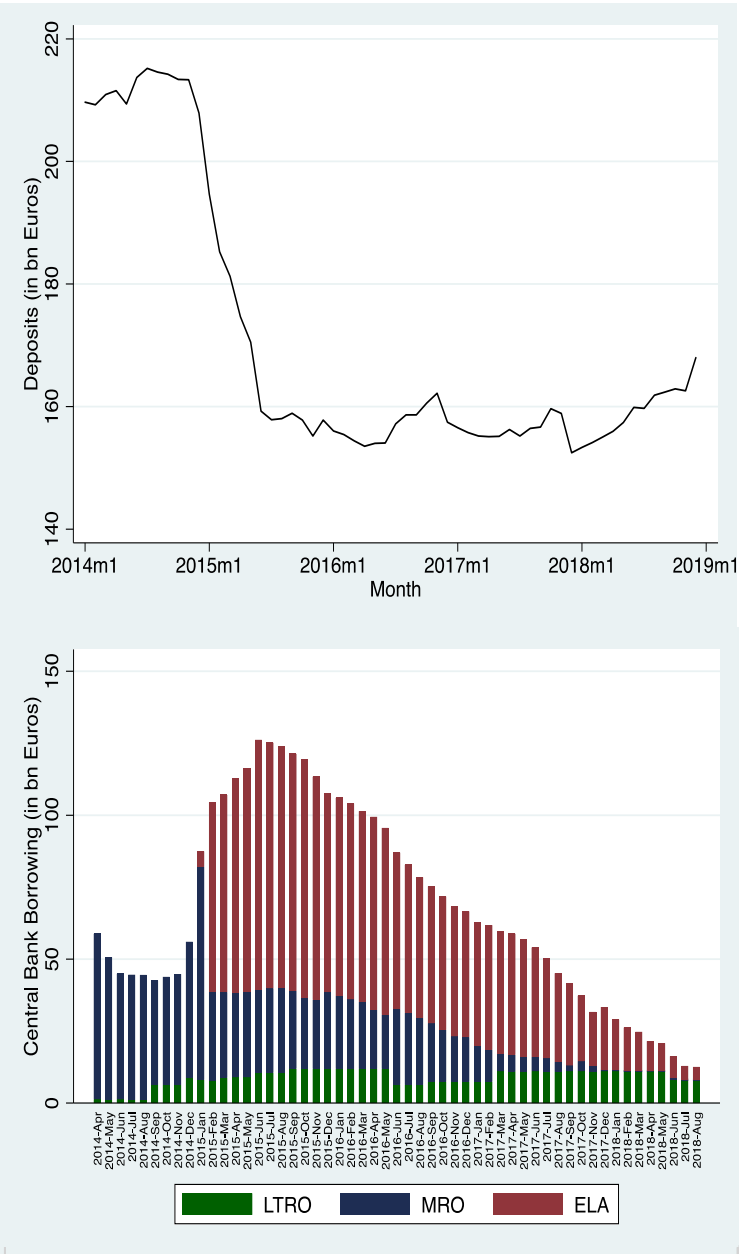
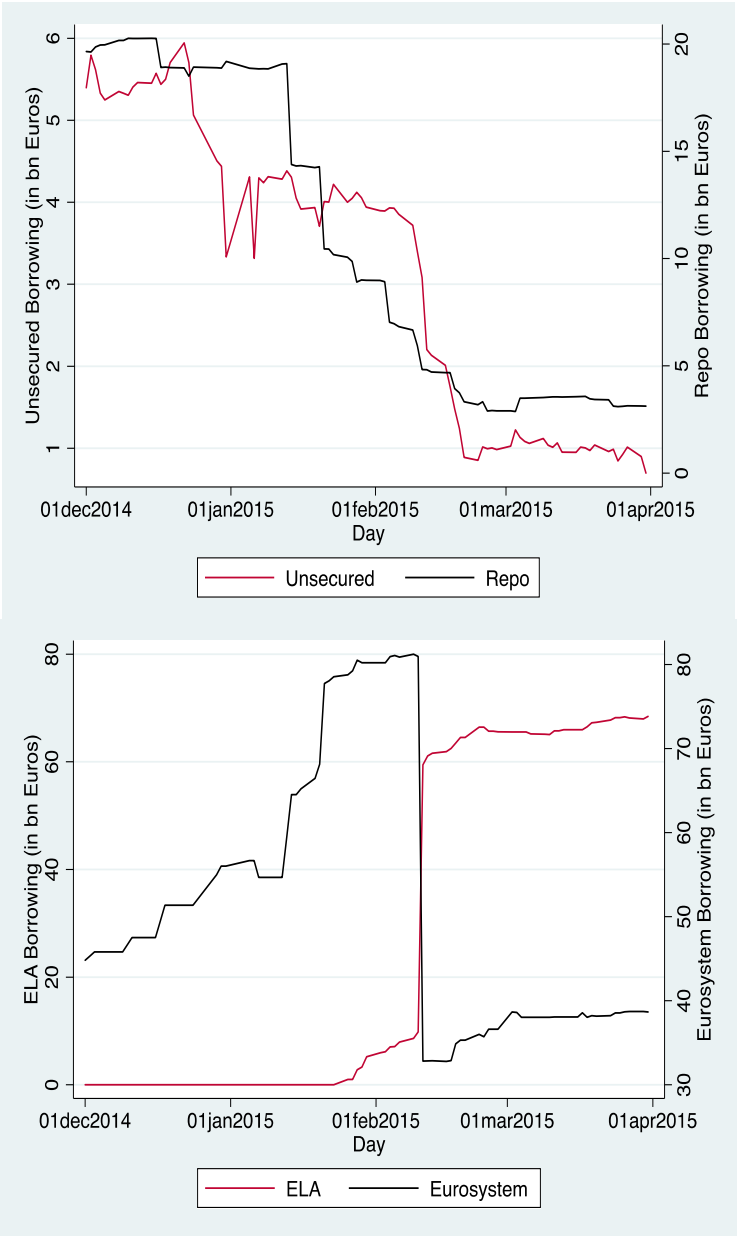
Figure 1: Deposits and Central Bank Funding



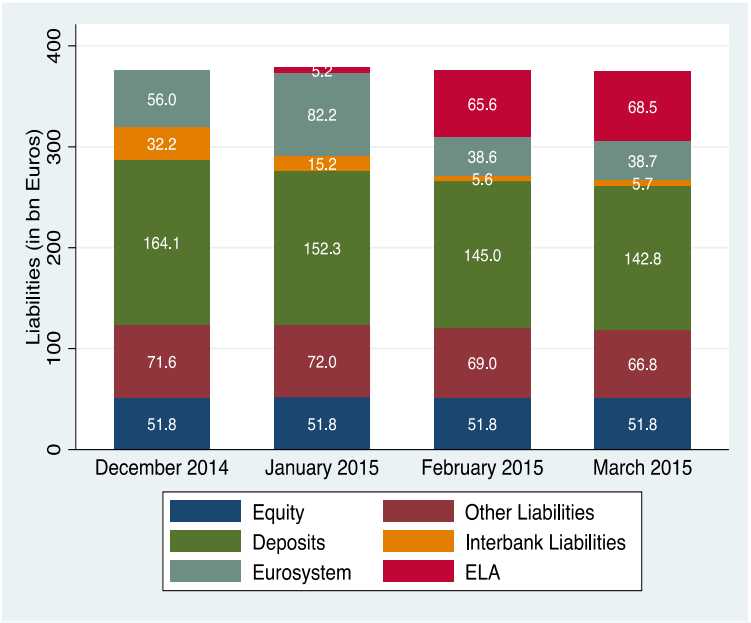
Note: The figure plots total deposits and central bank borrowing.

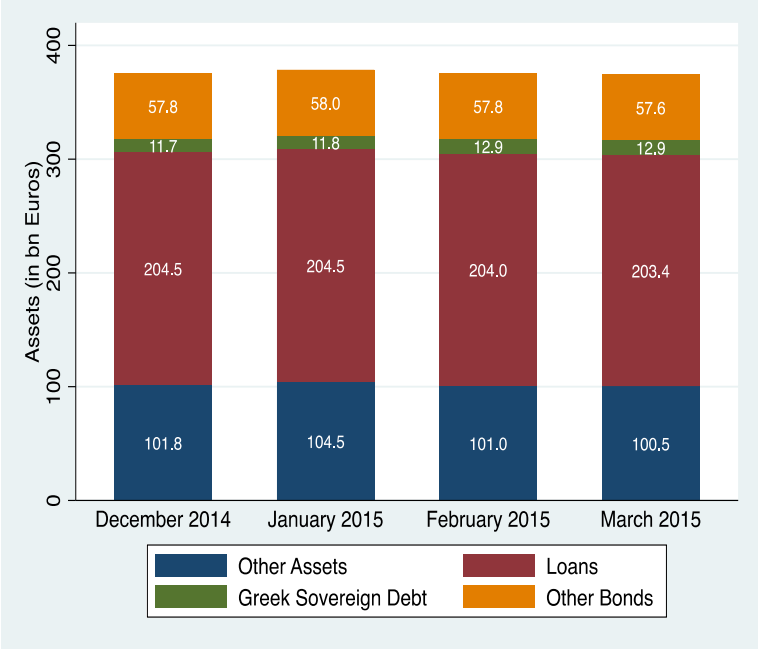
Figure 2: Daily Interbank and Central Bank Borrowing



Note: The top figure plots daily interbank borrowing in period December 2014 - March 2015. The bottom figure plots daily central bank borrowing in period December 2014 - March 2015.

Figure 3: Composition of Bank Liabilities and Assets





Note: The figure plots bank liabilities and assets broken down by type in period December 2014 - March 2015.

Table 1: Impact of the Suspension of the Waiver on Interbank Market

	Access			log(Lending)			Rate			log(Maturity)		
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
Bank's Direct Exposure *	-0.116**	-0.111**		2.603	0.265		0.008	0.012		-1.046	0.443	
Post Waiver	(0.036)	(0.038)		(2.047)	(1.995)		(0.009)	(0.009)		(1.617)	(1.734)	
Bank's Direct Exposure *			-0.137*			-5.476			0.040**			3.385
Post Waiver Announcement			(0.059)			(3.219)			(0.015)			(2.112)
Bank's Direct Exposure *			-0.108**			0.810			0.009			0.164
Post Waiver Implementation			(0.036)			(1.853)			(0.009)			(1.859)
Fixed Effects												
Lender FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Borrower x Day FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Additional Controls												
Repo share * Post Waiver	no	yes	yes	no	yes	yes	no	yes	yes	no	yes	yes
Deposits share * Post Waiver	no	yes	yes	no	yes	yes	no	yes	yes	no	yes	yes
N	10790	10790	10790	3408	3408	3408	3408	3408	3408	3408	3408	3408
R^2	0.451	0.452	0.452	0.479	0.481	0.481	0.952	0.952	0.952	0.538	0.539	0.539

Note: Access is a dummy variable equal to one if lender grants a new loan to borrower on day t, zero otherwise. Log(Lending) is the log of unsecured interbank lending. Rate is the unsecured interbank rate. Log(Maturity) is the log maturity of unsecured interbank lending, in days. Bank's Direct Exposure is a lender's share of Greek Government bonds pledged as collateral with the ECB in total ECB collateral as of November 2014. Post Waiver is a dummy variable equal to one after February 04, 2015. Post Waiver Announcement is a dummy variable equal to one in period {February 04, 2015 - February 10, 2015}. Post Waiver Implementation is a dummy variable equal to one in period {February 11, 2015 - March 31, 2015}. Deposits share is the share of bank deposits in total liabilities. Repo share is the share of repos in total liabilities. Standard errors are three-way clustered at the lender, borrower and day level. Statistical significance is denoted as *p<0.1, **p<0.05, ***p<0.01.

Table 2: Exposure to the Shock and Interbank Liquidity Crunch

	log(Unsecured Borrowing)	
	All banks	Greek banks
	1	*2*
Bank's Indirect Exposure through Interbank Lenders * Post Waiver	-9.936**	-4.468**
	(4.060)	(1.220)
Fixed Effects		
Borrower FE	yes	yes
Day FE	yes	yes
N	10043	498
R^2	0.649	0.904

Note: Log(Unsecured Borrowing) is the log of unsecured interbank borrowing. Bank's Indirect Exposure through Interbank Lenders is the weighted average of a borrower's interbank lenders' share of Greek Government bonds in total ECB collateral as of November 2014. As weights, we use the share of borrower-lender interbank loan volume in a borrower's total interbank borrowing before February 04, 2015. Post Waiver is a dummy variable equal to one after February 04, 2015. Standard errors are two-way clustered at the borrower and day level. Statistical significance is denoted as *p<0.1, **p<0.05, ***p<0.01.

Table 3: Provision of ELA

	ELA/Liabilities					
	Direct Exposure		Indirect Exposure		Total Exposure	
	1	*2*	*3*	*4*	*5*	*6*
Bank's Exposure *	1.741**		0.550**		0.637**	
Post Waiver	(0.540)		(0.212)		(0.184)	
Bank's Exposure *		0.536		0.253		0.317
Post Waiver Announcement		(0.559)		(0.171)		(0.196)
Bank's Exposure *		1.913**		0.592**		0.683**
Post Waiver Implementation		(0.659)		(0.220)		(0.189)
Fixed Effects						
Bank FE	yes	yes	yes	yes	yes	yes
Day FE	yes	yes	yes	yes	yes	yes
Additional Controls						
Repo share * Post Waiver	yes	yes	yes	yes	yes	yes
Deposits share * Post Waiver	yes	yes	yes	yes	yes	yes
N	581	581	581	581	581	581
R^2	0.941	0.946	0.932	0.947	0.950	0.967

Note: ELA/Liabilities is the share of Emergency Liquidity Assistance in total liabilities. Bank's Direct Exposure is a bank's share of Greek Government bonds pledged as collateral with the ECB in total liabilities. Bank's Indirect Exposure through Interbank Lenders is the weighted average of a bank's interbank lenders' share of Greek Government bonds in total ECB collateral. As weights, we use the bank-interbank lender loan volume to total liabilities. Bank's Total Exposure is the sum of direct and indirect exposure. Post Waiver is a dummy variable equal to one after February 04, 2015. Post Waiver Announcement is a dummy variable equal to one in period {February 04, 2015 - February 10, 2015}. Post Waiver Implementation is a dummy variable equal to one in period {February 11, 2015 - March 31, 2015}. Deposits share is the share of bank deposits in total liabilities. Repo share is the share of repos in total liabilities. Standard errors are two-way clustered at the bank and day level. Statistical significance is denoted as *p<0.1, **p<0.05, ***p<0.01.

Table 4: Terms of Borrowing

	Volume of Total Borrowing		Cost of Total Borrowing		Maturity of Total Borrowing	
	1	*2*	*3*	*4*	*5*	*6*
Bank's Total Exposure *	0.055	0.055	5.983	7.295	-15.984	-18.567
Post Waiver Announcement	(0.061)	(0.105)	(7.194)	(9.639)	(9.025)	(9.866)
Bank's Total Exposure *	0.100	0.101	52.011**	53.323**	-28.395	-30.978
Post Waiver Implementation	(0.082)	(0.122)	(16.984)	(17.497)	(16.092)	(17.202)
Bank's Total Exposure *		0.006		1.504		0.670
Post Announcement of Presidential Elections		(0.014)		(1.311)		(1.171)
Bank's Total Exposure *		0.019		-0.076		0.053
Post First Parliament Ballot		(0.011)		(1.863)		(1.204)
Bank's Total Exposure *		0.003		-0.594		1.928
Post Second Parliament Ballot		(0.011)		(1.832)		(2.222)
Bank's Total Exposure *		-0.003		1.974		-4.993**
Post Political Uncertainty		(0.081)		(3.652)		(1.716)
Fixed Effects						
Bank FE	yes	yes	yes	yes	yes	yes
Day FE	yes	yes	yes	yes	yes	yes
N	581	581	581	581	581	581
R^2	0.975	0.975	0.882	0.883	0.886	0.888

Note: The volume of total borrowing is defined as: (unsecured borrowing/liabilities) + (repo borrowing/liabilities) + (ECB borrowing/liabilities) + (ELA borrowing/liabilities). The cost of total borrowing is defined as: unsecured rate * (unsecured borrowing/liabilities) + repo rate * (repo borrowing/liabilities) + ECB rate * (ECB borrowing/liabilities) + ELA rate * (ELA borrowing/liabilities). The maturity of total borrowing is defined as: maturity of unsecured borrowing * (unsecured borrowing/liabilities) + maturity of repo borrowing * (repo borrowing/liabilities) + maturity of ECB borrowing * (ECB borrowing/liabilities) + maturity of ELA borrowing * (ELA borrowing/liabilities). Bank's Total Exposure is the sum of direct and indirect exposure. Post Announcement of Presidential Elections is a dummy variable equal to one in period {December 08, 2014 - December 16, 2014}. Post First Parliament Ballot is a dummy variable equal to one in period {December 17, 2014 - December 22, 2014}. Post Second Parliament Ballot is a dummy variable equal to one in period {December 23, 2014 - December 29, 2014}. Post Political Uncertainty is a dummy variable equal to one in period {December 30, 2014 - February 03, 2015}. Post Waiver Announcement is a dummy variable equal to one in period {February 04, 2015 - February 10, 2015}. Post Waiver Implementation is a dummy variable equal to one in period {February 11, 2015 - March 31, 2015}. Post Political Uncertainty is a dummy variable equal to one in period {December 30, 2014 - February 03, 2015}. Standard errors are two-way clustered at the bank and day level. Statistical significance is denoted as *p<0.1, **p<0.05, ***p<0.01.

Table 5: Lending to the Real Economy

	Δlog(Lending)		
	1	*2*	*3*
Bank's Total Exposure	-0.113***	-0.109*	-0.159**
	(0.038)	(0.059)	(0.062)
Fixed Effects			
Firm FE	no	no	yes
Firm with >1 Bank Relationship	no	yes	yes
Number of Firms	5143	1575	1575
Coverage in total number of firms	0.62%	0.19%	0.19%
Coverage in total corporate debt	38.5%	29%	29%
N	7541	3973	3973
R^2	0.001	0.001	0.457

Note: Δlog(Lending) is the log change in lending in period March 2015 - December 2014. Bank's Total Exposure is the sum of direct and indirect exposure. Standard errors are two-way clustered at the bank and firm industry level. Statistical significance is denoted as *p<0.1, **p<0.05, ***p<0.01.

Table 6: Conditionalities of ELA

	Δlog(Lending)					
	1	*2*	*3*	*4*	*5*	*6*
	Solvency ratios			*Exit plans*		
	CET1	*Tier1*	*Total Capital Ratio*	*Time Deposits/Total deposits*	*Time deposits > 1 year/Total deposits*	*Time deposits > 1 year/Total liabilities*
Bank's Total Exposure	-1.361**	-1.150**	-0.829**	-3.553**	-0.847**	-3.407**
	(0.289)	(0.242)	(0.189)	(0.814)	(0.208)	(0.791)
Bank balance sheet measure	1.117**	1.119*	0.979	1.122*	1.845**	13.985**
	(0.342)	(0.357)	(0.457)	(0.356)	(0.471)	(3.246)
Bank's Total Exposure *	13.963**	13.955**	12.882**	0.000**	16.633**	136.246**
Bank balance sheet measure	(3.269)	(3.277)	(3.220)	(0.000)	(4.265)	(32.584)
Fixed Effects						
Firm FE	yes	yes	yes	yes	yes	yes
Firm with >1 Bank Relationship	yes	yes	yes	yes	yes	yes
Number of Firms	1575	1575	1575	1575	1575	1575
Coverage in total number of firms	0.19%	0.19%	0.19%	0.19%	0.19%	0.19%
Coverage in total corporate debt	29%	29%	29%	29%	29%	29%
N	3973	3973	3973	3973	3973	3973
R^2	0.460	0.460	0.460	0.460	0.460	0.460

Note: Δlog(Lending) is the log change in lending in period March 2015 - December 2014. Bank's Total Exposure is the sum of direct and indirect exposure. Bank balance sheet measure is a continuous variable to proxy for ELA conditionalities. In the case of solvency ratios (columns 1-3), it measures the distance from capital ratio thresholds (4.5% for CET1, 6% for Tier1 and 8% for Total Capital Ratio). In the case of exit plans, it measures reliance on stable funding which is proxied by the ratio of time deposits to total deposits, time deposits maturity more than one year to total deposits and time deposits with maturity more than one year to total liabilities. Balance sheet measures are as of December 2014. Standard errors are two-way clustered at the bank and firm industry level. Statistical significance is denoted as *p<0.1, **p<0.05, ***p<0.01.

Table 7: Portfolio Rebalancing

	Greek Sovereign Debt								Foreign Sovereigns Debt			
	T-Bills/Assets				Bonds/Assets				Bonds/Assets			
		CET1	*Tier1*	*Total Capital Ratio*		*CET1*	*Tier1*	*Total Capital Ratio*		*CET1*	*Tier1*	*Total Capital Ratio*
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
Bank's Total Exposure *	0.004*	0.090**	0.094**	0.087*	0.001	0.009	0.010	0.013	-0.001	-0.006	-0.006	-0.007
Post Waiver	(0.002)	(0.035)	(0.038)	(0.044)	(0.001)	(0.006)	(0.006)	(0.009)	(0.001)	(0.005)	(0.006)	(0.007)
Bank balance sheet measure *		-0.075**	-0.078**	-0.072*		-0.007	-0.007	-0.010		0.003	0.004	0.005
Post Waiver		(0.029)	(0.031)	(0.035)		(0.005)	(0.005)	(0.007)		(0.003)	(0.004)	(0.004)
Bank's Total Exposure *		-0.716**	-0.746**	-0.679*		-0.066	-0.075	-0.099		0.035	0.039	0.049
Bank balance sheet measure * Post Waiver		(0.302)	(0.325)	(0.369)		(0.054)	(0.056)	(0.058)		(0.035)	(0.038)	(0.046)
Fixed Effects												
Bank FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Month FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
N	28	28	28	28	28	28	28	28	28	28	28	28
R^2	0.969	0.982	0.982	0.979	0.999	0.999	0.999	0.999	0.933	0.938	0.939	0.941

Note: In columns 1-4, T-Bills/Assets is the share of Greek sovereign bills (maturity less than one year) to total assets. In columns 4-8, Bonds/Assets is the share of Greek sovereign bonds (maturity more than one year) to total assets. In columns 9-12, Bonds/Assets is the share of foreign sovereigns bonds (maturity more than one year) to total assets. CET1, Tier1 and Total Capital Ratio are measured for each bank as of December 2014. Post Waiver is a dummy variable equal to one in months February and March 2015, zero otherwise. Robust standard errors are reported in parenthesis. Statistical significance is denoted as *p<0.1, **p<0.05, ***p<0.01.

Table 8: Firm Credit Supply Reduction

	New Lending Relationship				Δlog(Total Borrowing)			
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Firm's Banks' Total Exposure	0.004	-0.000	-0.007	-0.004	-0.100**	-0.120**	-0.134***	-0.151***
	(0.007)	(0.005)	(0.008)	(0.007)	(0.045)	(0.051)	(0.051)	(0.054)
Firm's Banks' Total Exposure *		0.006		-0.008		0.160		0.165
Multi-Lender Firm		(0.038)		(0.038)		(0.113)		(0.125)
Multi-Lender Firm		0.007		-0.005		-0.038*		-0.054*
		(0.008)		(0.007)		(0.023)		(0.028)
Firm Size			0.009***	0.010***			0.006	0.009*
			(0.002)	(0.002)			(0.005)	(0.006)
Fixed Effects								
Firm Industry FE	no	no	yes	yes	no	no	yes	yes
Firm Province FE	no	no	yes	yes	no	no	yes	yes
N (number of firms)	5143	5143	4545	4545	5143	5143	4545	4545
R^2	0.000	0.002	0.096	0.097	0.001	0.002	0.104	0.105

Note: New Lending Relationship is a dummy variable equal to one if a firm establishes a new lending relationship in March 2015. Δlog(Total Borrowing) is the log change in firm's total borrowing in period March 2015 - December 2014. Firm's Banks' Total Exposure is the weighted average of firm's banks' total exposure. As weights, we use the share of firm-bank loan volume in firm's total borrowing before the policy change. Multi-lender firm is a dummy variable equal to one if a firm has more than one banking relationships. Standard errors are clustered at the firm industry level. Statistical significance is denoted as *p<0.1, **p<0.05, ***p<0.01.

Table 9: Trade Effects

	Exit		Δlog(Export Volume)		Δlog(Export Value)	
	1	*2*	*3*	*4*	*5*	*6*
Firm's Banks' Total Exposure	-0.036	0.125*	-0.283	0.037	-0.248	-0.089
	(0.048)	(0.073)	(0.247)	(0.336)	(0.173)	(0.228)
Firm's Banks' Total Exposure *		-0.434**		-0.883		-0.605
Multi-Lender Firm		(0.186)		(0.633)		(0.512)
Multi-Lender Firm		0.089*		0.217		0.229*
		(0.050)		(0.138)		(0.119)
Firm Size	-0.030***	-0.030***	0.013	0.005	0.022	0.004
	(0.005)	(0.007)	(0.018)	(0.021)	(0.019)	(0.022)
Fixed Effects						
Product x Destination FE	yes	yes	yes	yes	yes	yes
Number of firms	1161	1161	921	921	921	921
Coverage in total number of exporters	6%	6%	5%	5%	5%	5%
Coverage in total exports	67%	67%	64%	64%	64%	64%
N	11519	11519	6716	6716	6716	6716
R^2	0.368	0.369	0.325	0.326	0.335	0.336

Note: Exit is a dummy variable equal to one if an active export flow in the Pre period (February 2014-March 2014) terminates in the Post period (February 2015-March 2015), zero otherwise. Δlog(Export Volume) is the log change in firm's export volume in the Pre period (February 2014-March 2014) relative to the Post period (February 2015-March 2015). Δlog(Export Value) is the log change in firm's export value in the Pre period (February 2014-March 2014) relative to the Post period (February 2015-March 2015). Firm's Banks' Total Exposure is the weighted average of firm's banks' total exposure. As weights, we use the share of firm-bank loan volume in firm's total borrowing before the policy change. Multi-lender firm is a dummy variable equal to one if a firm has more than one banking relationships. Standard errors are two-way clustered at the product and destination. Statistical significance is denoted as *p<0.1, **p<0.05, ***p<0.01.

Appendix Table 1: Estimates of ELA granted by Eurosystem NCBs, 2008-2019

Country	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Belgium	51.3	0.0	0.0	6.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ireland	0.0	11.5	49.5	42.4	40.4	39.5	0.0	0.0	0.0	0.0	0.0	0.0
Greece	0.0	0.0	0.0	52.0	101.8	9.8	0.0	68.9	43.7	21.6	0.9	0.0
Spain	0.0	2.4	1.0	1.0	1.0	0.0	0.0	0.0	0.0	3.5	0.0	0.0
France	0.0	0.0	0.0	18.7	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Germany	38.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Italy	0.0	0.0	0.0	0.0	n.a.	n.a.	n.a.	n.a.	n.a.	0.0	0.0	0.0
Cyprus	0.0	0.0	0.0	3.5	9.4	9.6	7.4	3.8	0.2	0.0	0.0	0.0
Latvia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Portugal	0.0	1.2	1.0	0.0	0.0	0.0	3.5	0.5	0.0	0.0	0.0	0.0
Slovenia	0.0	0.0	0.0	0.0	0.0	0.4	0.3	0.0	0.0	0.0	0.0	0.0
Total	89.3	15.1	51.5	124.0	162.6	59.2	11.2	73.2	43.9	25.1	1.0	0.0

Note: The table shows estimates of outstanding amounts of ELA (in bn Euros) granted by National Central Banks of the Eurosystem in period 2008-2019. Source: Papadia and Cadamuro, 2021

Appendix Table 2: Description of Central Bank Liquidity Facilities

	Eurosystem funding	Emergency Liquidity Assistance
Cost of funding	0.05%	1.55%
Eligible collateral	at least BBB	unspecified
Conditionalities on banks	none	1) solvency criteria and monthly reporting of regulatory capital ratios; 2) quarterly funding plans outlining exit strategy
Conditionalities on National Central Bank	none	In case ELA provision exceeds 6 months: Letter of the Governor of the NCB to the President of the ECB outlining the intended exit strategy from ELA. In case ELA provision exceeds 12 months: Letter of the Governor of the NCB to the President of the ECB justifying the further provision of ELA.
Form of provision	open market operation	decision by ECB Governing Council
Maturity	one week (MRO) to four years (LTRO)	weekly

Note: The table describes the main characteristics of regular Eurosystem funding and Emergency Liquidity Assistance (ELA) of Greek banks.

Appendix Table 3: Parallel Trends

	Access	log(Lending)	Rate	log(Maturity)
	1	*2*	*3*	*4*
Bank's Direct Exposure *	-0.115	0.673	-0.002	-0.454
Post Announcement of Presidential Elections	(0.077)	(0.521)	(0.003)	(0.292)
Bank's Direct Exposure *	-0.079	0.953	-0.006	-0.860**
Post First Parliament Ballot	(0.060)	(0.668)	(0.003)	(0.300)
Bank's Direct Exposure *	-0.001	1.757	0.002	-0.215
Post Second Parliament Ballot	(0.127)	(1.511)	(0.003)	(0.682)
Bank's Direct Exposure *	-0.118	1.260	0.001	-0.330
Post Political Uncertainty	(0.084)	(0.858)	(0.001)	(0.550)
Fixed Effects				
Lender FE	yes	yes	yes	yes
Borrower x Day FE	yes	yes	yes	yes
Additional Controls				
Repo share * Post Waiver	yes	yes	yes	yes
Deposits share * Post Waiver	yes	yes	yes	yes
N	4515	1776	1776	1776
R^2	0.449	0.482	0.921	0.546

Note: Access is a dummy variable equal to one if lender grants a new loan to borrower on day t, zero otherwise. Log(Lending) is the log of unsecured interbank lending. Rate is the unsecured interbank rate. Log(Maturity) is the log maturity of unsecured interbank lending, in days. Bank's Direct Exposure is a lender's share of Greek Government bonds in total ECB collateral as of November 2014. Post Announcement of Presidential Elections is a dummy variable equal to one in period {December 08, 2014 - December 16, 2014}. Post First Parliament Ballot is a dummy variable equal to one in period {December 17, 2014 - December 22, 2014}. Post Second Parliament Ballot is a dummy variable equal to one in period {December 23, 2014 - December 29, 2014}. Post Political Uncertainty is a dummy variable equal to one in period {December 30, 2014 - February 03, 2015}. Deposits Share is the share of bank deposits in total liabilities. Repo Share is the share of repos in total liabilities. Standard errors are three-way clustered at the lender, borrower and day level. Statistical significance is denoted as *p<0.1, **p<0.05, ***p<0.01.

Appendix Table 4: Alternative Measures of Direct Exposure

Panel A: GGBs as of January 2015	**Access**	**log(Lending)**	**Rate**	**log(Maturity)**
	1	*2*	*3*	*4*
Bank's Direct Exposure *	-0.134**	-6.388	0.024	0.468
Post Waiver Announcement	(0.053)	(4.93)	(0.015)	(1.467)
Bank's Direct Exposure *	-0.116**	0.693	0.010	0.450
Post Waiver Implementation	(0.033)	(1.959)	(0.010)	(1.969)
Panel B: GGBs and Bank Bonds	**Access**	**log(Lending)**	**Rate**	**log(Maturity)**
	5	*6*	*7*	*8*
Bank's Direct Exposure *	-0.298**	-3.510	0.004	0.082
Post Waiver Announcement	(0.119)	(2.662)	(0.007)	(0.633)
Bank's Direct Exposure *	-0.261***	-2.381	0.007	-0.586
Post Waiver Implementation	(0.027)	(2.252)	(0.013)	(0.395)
Fixed Effects				
Lender FE	yes	yes	yes	yes
Borrower x Day FE	yes	yes	yes	yes
Additional Controls				
Repo share * Post Waiver	yes	yes	yes	yes
Deposits share * Post Waiver	yes	yes	yes	yes
N	10790	3408	3408	3408
R^2	0.452	0.481	0.952	0.539

Note: In Panel A, Bank's Direct Exposure is a lender's share of Greek Government bonds pledged as collateral with the ECB in total ECB collateral as of January 2015. In panel B, Bank's Direct Exposure is a lender's share of Greek Government bonds and Greek Government Guaranteed bank bonds (GGGBBs) pledged as collateral with the ECB in total ECB collateral. The rest of the variables are defined as in Table 1. Standard errors are three-way clustered at the lender, borrower and day level. Statistical significance is denoted as *p<0.1, **p<0.05, ***p<0.01.

Appendix Table 5: Counterparty Risk Channel

	Access		log(Lending)		Rate		log(Maturity)	
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Bank's Direct Exposure *	-0.006		3.853		0.011		2.397	
Post Waiver	(0.017)		(4.383)		(0.012)		(3.991)	
Bank's Direct Exposure *		0.082		-0.526		0.001		-0.556
Post Waiver Announcement		(0.088)		(1.806)		(0.006)		(0.952)
Bank's Direct Exposure *		-0.019		7.797		0.021		5.057
Post Waiver Implementation		(0.032)		(6.861)		(0.014)		(6.375)
Fixed Effects								
Borrower FE	yes	yes	yes	yes	yes	yes	yes	yes
Lender x Day FE	yes	yes	yes	yes	yes	yes	yes	yes
N	2407	2407	1175	1175	1175	1175	1175	1175
R^2	0.288	0.288	0.481	0.484	0.561	0.562	0.265	0.267

Note: Access is a dummy variable equal to one if lender grants a new loan to borrower on day t, zero otherwise. Log(Lending) is the log of unsecured interbank lending. Rate is the unsecured interbank rate. Log(Maturity) is the log maturity of unsecured interbank lending, in days. Bank's Direct Exposure is a borrower's share of Greek Government bonds pledged as collateral with the ECB in total ECB collateral as of November 2014. Post Waiver is a dummy variable equal to one after February 04, 2015. Post Waiver Announcement is a dummy variable equal to one in period {February 04, 2015 - February 10, 2015}. Post Waiver Implementation is a dummy variable equal to one in period {February 11, 2015 - March 31, 2015}. Standard errors are three-way clustered at the lender, borrower and day level. Statistical significance is denoted as *p<0.1, **p<0.05, ***p<0.01.

Appendix Table 6: Placebo Test - Lending to the Real Economy

	Firm-Level			*Industry-Level*	
	Δlog(Lending)				
	1	*2*	*3*	*4*	*5*
Bank's Total Exposure	-0.061	-0.087	-0.077	-0.595	-0.595
	(0.042)	(0.061)	(0.068)	(0.360)	(0.413)
Fixed Effects					
Firm FE	no	no	yes	-	-
Industry FE	-	-	-	no	yes
Firm with >1 Bank Relationship	no	yes	yes	-	-
N	7549	3949	3949	48	48
R^2	0.000	0.000	0.462	0.062	0.289

Note: In columns 1-3, Δlog(Lending) is the log change in lending in period December 2014 - September 2014. In columns 4-5, Δlog(Lending) is the log change in lending in period January 2015 - December 2014. Bank's Total Exposure is the sum of direct and indirect exposure. Standard errors are two-way clustered at the bank and firm industry level in columns 1-3 and at the bank level in columns 4-5. Statistical significance is denoted as *p<0.1, **p<0.05, ***p<0.01.

Appendix Table 7: Bank Size for ELA Eligibility

	Δlog(Lending)
Bank's Total Exposure	-15.238
	(18.943)
Size	-0.069
	(0.368)
Bank's Total Exposure * Size	1.332
	(1.628)
Fixed Effects	
Firm FE	yes
Observations	3973
R^2	0.460

Note: Δlog(Lending) is the log change in lending in period March 2015 - December 2014. *Bank's Total Exposure* is the (demeaned) sum of direct and indirect exposure. *Size* is a bank's total liabilities as of December 2014. Standard errors are clustered at the firm's parent company level. Statistical significance is denoted as *p<0.1, **p<0.05, ***p<0.01.

Appendix Table 8: Search for Yield

	Δlog(Lending)				
	1	*2*	*3*	*4*	*5*
Bank's Total Exposure * Small Firm	-0.078				
	(0.120)				
Bank's Total Exposure * Young Firm		-0.163			
		(0.131)			
Bank's Total Exposure * Low Sales Growth Firm			-0.026		
			(0.159)		
Bank's Total Exposure * Low Collateral Firm				0.177	
				(0.218)	
Bank's Total Exposure * High NPLs Firm					0.216
					(0.129)
Fixed Effects					
Bank FE	yes	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes	yes
N	3973	3973	3973	3973	3973
R^2	0.461	0.461	0.461	0.461	0.461

Note: Δlog(Lending) is the log change in lending in period March 2015 - December 2014. Bank's Total Exposure is the sum of direct and indirect exposure. In column 1, small firm is a dummy variable equal to one if a firm is below the median size in the sample. In column 2, young firm is a dummy varable equal to one if a firm is below the median age in the sample. In column 3, low sales growth firm is a dummy variable equal to one if a firm is below the median sales growth in the sample. In column 4, low collateral firm is a dummy variable equal to one if a firm is below the median fixed assets (defined as the sum of buildings, machines and land) in the sample. In column 5, high NPLs firm is a dummy variable equal to one if a firm is above the median non-performing loans in the sample. Standard errors are two-way clustered at the bank and firm industry level. Statistical significance is denoted as *p<0.1, **p<0.05, ***p<0.01.

Appendix Table 9: Balance Sheet Characteristics for Single- and Multi-Lender Firms

Firm	*N*	*Size (mn Euros)*	*Sales ratio (%)*	*Liquidity ratio (%)*	*Debt ratio (%)*	*Fixed Assets ratio (%)*	*Age (in years)*
Single-Lender	3568	20	71	8	25	94	22
Multi-Lender	1575	77	79	5	31	76	28

Note: The table presents balance sheet characteristics for the average single- and multi-lender firm in our sample. Size is defined as log of total assets. Sales ratio is defined as sales to total assets. Liquidity ratio is defined as cash holdings to total assets. Debt ratio is defined as debt to total assets. Fixed Assets ratio is defined as buildings, land and machines to total assets. Age is defined as 2014 minus the year of establishment of the firm.

Appendix Table 10: Summary Statistics

Variables	*N*	*mean*	*median*	*sd*
Bank's Direct Exposure (in total ECB collateral)	7	0.384	0.187	0.426
Bank's Direct Exposure (in total liabilities)	7	0.024	0.021	0.019
Bank's Indirect Exposure (in total liabilities)	7	0.124	0.093	0.138
Bank's Total Exposure (in total liabilities)	7	0.148	0.114	0.138
Bank's Total Exposure (in total liabilities)	4	0.208	0.208	0.156
Firm's Banks' Total Exposure (all firms)	5143	0.184	0.149	0.120
Firm's Banks' Total Exposure (single-lender firms)	3568	0.174	0.114	0.133
Firm's Banks' Total Exposure (multi-lender firms)	1575	0.208	0.210	0.080
Firm's Banks' Total Exposure (sample of firms in exports extensive margin)	1161	0.208	0.213	0.106
Firm's Banks' Total Exposure (sample of firms in exports intensive margin)	921	0.209	0.216	0.103
Access	10790	-0.095	0	0.352
Log(Lending)	3408	16.712	16.459	1.938
Rate	3408	0.009	0.002	0.026
Log(Maturity)	3408	2.249	1.946	1.995
ELA/Liabilities	581	0.059	0.000	0.081
Volume of Interbank Borrowing	581	0.023	0.010	0.034
Volume of Central Bank Borrowing	581	0.147	0.132	0.102
Volume of Total Borrowing	581	0.170	0.181	0.114
Cost of Interbank Borrowing	581	2.949	1.185	4.124
Cost of Central Bank Borrowing	581	9.551	1.089	12.502
Cost of Total Borrowing	581	12.5	8.223	12.380
Maturity of Interbank Borrowing	581	2.446	0.450	5.321
Maturity of Central Bank Borrowing	581	1.026	0.922	0.714
Maturity of Total Borrowing	581	3.471	2.042	5.510
Δlog(Lending)	3973	-0.025	0	0.517
Exit	11519	0.332	0	0.471
Δlog(Export Volume)	6716	0.037	0.009	1.319
Δlog(Export Value)	6716	0.060	0.025	1.262

Note: The table presents summary statistics of the main variables used in our analysis.

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