Note: This working paper is a substantially revised version of an older working paper published under the reference: Steinkamp, Sven, Aaron Tornell and Frank Westermann, "The Euro Area's Common Pool Problem Revisited: Has the Single Supervisory Mechanism Ameliorated Forbearance and Evergreening?" IEW Working Paper No. 107, 09/2017.

EVERGREENING IN THE EURO AREA: FACTS AND EXPLANATION

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Working Paper No. 113
July 2018

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EVERGREENING IN THE EURO AREA: FACTS AND EXPLANATION[1]

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ABSTRACT

Since the beginning of the financial crisis in 2007/8, new lending in the Euro-Area has slowed sharply and the old loans experienced "evergreening," i.e. bad loans have been rolled over rather than being liquidated. Even though ameliorating evergreening is key to promote lending for new investment projects and growth, no systematic evergreening measures exist. In this paper, we propose a new cross-country evergreening index and develop a model to explain why evergreening may reflect the incentives of regulators to forebear. Our evergreening index is based on a survey we designed, and was administered by the ifo institute to about 1,000 experts in over 80 countries. We bring the model to the data using a heteroscedastic probit model and find that evergreening is higher in: (i) Euro-Area countries than in the rest of the world; (ii) in countries facing bank distress; and (iii) is highest in countries which experience banking distress *and* are members of the Euro Area. These results are consistent with our theoretical model.

KEYWORDS: Evergreening; Central bank credit; Survey data.

JEL CLASSIFICATION: F33; F55; E58

[1] We thank the ifo Institute for Economic Research for adding questions to their World Economic Survey and their support in the evaluation of the results. We are further thankful to the German Bundesbank Regional Office in Bremen, Lower Saxony and Saxony-Anhalt for its financial support. Michael Bordo, Valeriya Dinger, Jeffrey Frieden, Philip Middleton, Joe Ostroy, and Andreas Pfingsten provided helpful comments and suggestions.

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1 Introduction

In the aftermath of the 2008 financial crisis, there was a large increase in loan "evergreening" in the Euro Area relative to the rest of the world. Evergreening describes a situation whereby existing loans of near-insolvent borrower are rolled over, instead of being liquidated. When banks engage in systematic evergreening, they have a lower capacity to grant new loans to potentially more productive projects. Thus, in the aggregate, evergreening may reduce investment and long run growth.

Evergreening is not directly observable as firms and banks do their best not to disclose such information. Furthermore, there is no off-the-self data that can be used to capture the evolution of evergreening. To measure it, we construct a proxy based on a survey we designed, and was administered by the Munich-based *ifo* institute to about 1,000 economic and financial experts in over 80 countries. From the responses we construct an evergreening index that takes into account the difficulties of obtaining loans and the ability to roll over existing loans. This index exhibits a sharp increase after 2008 across most countries of the 80 countries in the sample, but it is more pronounced in Euro Area countries. To our knowledge, this evergreening index is a novel contribution and complements the literature focused on subsidized interest rates and their effect on productivity, such as Caballero et al. (2008).

To understand why evergreening may arise in the aftermath of a financial crisis and why it may be more acute in a monetary union, such as the Euro Area, we present a model that focuses on the incentives of regulators. In our model economy, national banking regulators have the power to determine whether bank loans are nonperforming, in which case the bank has to use its equity to cover the expected losses. If expected losses exceed equity, the regulator has to bail out the bank's depositors and creditors[1]. It follows that if the banking system is in distress, then banking regulators have incentives to forbear and declare that some de facto non-performing loans (NPLs) are performing. If she forbears a share of NPLs, then this share, ϕ, is declared performing and eligible as collateral for central bank's refinancing operations. When the central bank accepts such de facto NPLs as collateral in exchange for cash, it allows the bank to repay its creditors, who in turn can convert at-par their de facto worthless bank assets into liquid assets. The central bank ends up with assets that have a low repayment probability, and it faces contingent future losses, but the immediate bailout costs associated with bankruptcy are avoided. The result of this forbearance is that instead of writing off the bad loans, banks may extend them over and over again.

In a monetary union such as the Eurozone, this "forbearance trade-off" is more acute. This is because under the current institutional framework, a national central bank (NCB) – with support of their respective government – has ample leeway to mint Euros and lend them to domestic banks. In this way the contingent losses on these de facto NPLs are shared with the other NCBs in the Eurozone. If the domestic regulator were to reduce the forbearance rate ϕ, then the entire fiscal cost associated with the larger bank bailout would be borne by the country, not shared with the other countries in the Eurozone[2].

At the macroeconomic level, the newly minted Euros received by banks allow them to repay their creditors and to roll over a share of their NPLs. As a byproduct, however, banks issue fewer

[1] The relevance of this setup has been highlighted, for instance, by Daniel Gros ("Liquidate or liquefy?," CEPS Commentary, 25 October 2010) in the early stages of the Euro Crisis.

[2] In a parallel paper, Steinkamp, Tornell and Westermann (2017) comprehensively document mechanisms through which NCBs in the Euro Area have the ability to grant refinancing credit to distressed banks in their jurisdiction.

new loans. Thus, forbearance results in more evergreening. In the aggregate, evergreening is positively correlated with the NCB's domestic credit creation, but negatively correlated with output growth as there is less credit available for new (profitable) projects. Furthermore, evergreening may lead to greater Target2 liabilities as bank creditors transfer the funds they receive to other countries.

We bring the model to the data using a heteroscedastic probit model.[3] We regress our evergreening index on a Euro Area dummy, a variable capturing the degree of distress in the banking system, and the interaction of both.

We find that evergreening is higher in (i) Euro Area countries than in the rest of the world; (ii) in countries facing bank distress; and (iii) is highest in countries which experience banking distress *and* are members of the Euro Area. All three results are consistent with our theoretical model.[4] The observed differences in evergreening cannot be explained by bank-specific factors, expected interest rates, the general economic situation and a number of other variables we controlled for. Rather, the unobserved degree of regulatory forbearance appears to be a plausible explanation for this empirical finding.

Furthermore, these results are not only statistically significant but also of economically important size. The estimated marginal effects indicate that respondents are on average 9.9 percentage points (pp) more likely to observe evergreening if they are residents of the Euro Area and 8.1pp more likely if they perceive their country's banking system to be in distress. Evergreening is exceptionally high where incentives to forbear are strongest, i.e., in Euro Area countries experiencing severe banking distress. In this subset, the predicted probability to observe evergreening is 17.8pp higher than in non-Euro Area countries with no banking distress.

Finally, we investigate the link between evergreening and macroeconomic variables. The model predicts that an increase in evergreening should be correlated with an increase of monetary refinancing operations (MROs) and Target2 liabilities. We show that groups of countries with high evergreening indeed are by far the largest providers of refinancing credit within the Euro Area. Furthermore, countries displaying a strong increase in evergreening have indeed also witnessed the largest increase in Target2 liabilities.

The paper proceeds as follows. Section 2 contains the model of the forbearance trade-off. Section 3 presents the construction of our evergreening indexes and tests of the model's implications. Section 4 discusses our results in the context of the literature. Section 5 concludes.

[3] While confidential, the *ifo* institute allowed us to analyze the data and run regressions in their Munich headquarters. It is available there to be replicated by other researchers.

[4] We ask the experts about their perception of the change in nonperforming loans in their country. Unlike the credit questions, this concept is unobservable to the experts, but signals their general assessment about the true state of banking distress.

2 Model

We present a minimal model that focuses on the rent-seeking aspects of banking supervision in a monetary union such as the Eurozone. In our model economy, national banking regulators have the power to determine whether bank loans are nonperforming, in which case the bank has to use its equity to cover the expected losses. If expected losses exceed equity, the regulator has to bail out the bank's depositors and creditors. Because the national central bank (NCB) has the power to mint Euros and lend them to domestic banks, the domestic regulator faces the following "forbearance trade-off".

If the regulator forbears a share, ϕ, of NPLs, then this share, ϕ, is declared performing and eligible for central bank's refinancing operations (MROs). When the NCB accepts such de facto NPLs as collateral in exchange for cash, it allows the bank to repay its creditors, who in turn can convert at-par their de facto worthless bank assets into liquid assets. The NCB ends up with assets that have a low repayment probability. The contingent losses on these de facto NPLs will be shared with the other NCBs in the Eurozone. The forbearance trade-off arises because if the domestic regulator were to reduce the forbearance rate, ϕ, then 100% of the fiscal costs associated with the bank bailout would be borne by the country, not shared with the other countries in the Eurozone. In other words, the NCB has open access to the fiscal resources of the other countries in the monetary union, and so there is a common-pool problem.[5]

The above process generates an increase in the degree of evergreening, which is the share of loans granted by a bank to old debtors that have de facto NPLs. In equilibrium, evergreening is positively correlated with the NCB's domestic credit creation, and negatively correlated with the output growth gap as there is less credit available for new (profitable) projects. Furthermore, in the model, evergreening is positively correlated with Target2 liabilities to the Eurosystem. This is because if bank creditors transfer the funds they receive to another country, the Target2 liabilities of this country go up.

2.1 Setup

We consider a one-good economy that lasts three periods. The economy is populated by bankers, depositors/investors, a banking regulator and a NCB.

There is a continuum of banks of measure one. Each bank is managed by a risk-neutral banker that may finance a project. A new project requires investment of one unit of the good. The following period, the project may succeed with probability $1-\eta$, or it may fail. At a given time, a banker may undertake only one project. Banks fund themselves by issuing deposits to depositors, who are risk-neutral agents with an opportunity cost $1+r$.

The banking regulator has two functions. First, it has the power to designate a loan as either nonperforming or performing regardless of whether the underlying project has succeeded or failed. This decision is key because if a loan is designated as performing, then it can be pledged as collateral at the NCB even if the project has failed. Second, the regulator provides a bailout

[5] The model does not consider the bail-in clauses that require creditors of banks to incur losses before government aid kicks in. An implicit assumption is that both taxpayers and bondholders are voters and so the government cares about both groups. Furthermore, the recent experience of Italy suggests that such bail-in clauses may not be effective.

guarantee: It pays bank creditors their promised repayment whenever a bank is unable to meet its obligations.

The timing is the following. At time 0, each banker obtains funds from investors/depositors, and promises an unconditional return $1 + r$. They then use these funds to finance a project. In Period 1, a time-0 project succeeds with probability $1 - \eta$, in which case it converts one unit of the good into $1 + R$. With probability η, a time-0 project fails and pays out zero. In case the project fails at time 1, and the project is kept alive, the project may succeed in Period 2 with probability σ and return $1+R$ at $t = 2$. Meanwhile, it may fail with probability $1 - \sigma$ and return zero.

At time 1, a banker with a successful time-0 project or one whose project went bust, may undertake a new project provided it can find financing. In contrast, a banker with an old failed project, may not undertake a new project.

The time-1 payoffs are as follows. If the project is successful, the bank gets $1 + R$, it pays depositors their promised repayment $1 + r$ and the banker gets the remainder: $(1 + R) - (1 + r) = R - r$. If the project fails, the banker gets zero. Meanwhile, the regulator pays depositors their promised repayment $1 + r$. The time-2 payoffs are as follows. Payoffs for banks with new time-1 projects are the same as the payoffs at time 1. For banks that kept alive failed projects at time 1, payoffs are the following. Since no deposits were taken at time 1, the banker gets $1 + R$ if the project succeeds, while she gets zero if the project fails.

It follows that the expected profit for the representative banker that undertakes a new project is

$$E_t(\pi_{t+1}^{new}) = [1 - \eta][R - r], \qquad t = \{0,1\}.$$

Meanwhile, the expected profit for the representative banker that keeps alive an old, unsuccessful, project at time 1 is

$$E_1(\pi_2^{old}) = \sigma[1 + R].$$

We assume that a successful project's return is high enough so as to repay depositors if the project succeeds

$$R > r. \tag{1}$$

Furthermore, we assume that a new project's probability of failure is low enough so as to generate a positive net present value for the banker. Meanwhile, the net present value of unsuccessful projects is negative:

$$\eta < 1 - \tfrac{(1+r)}{(R-r)}, \qquad \sigma < \tfrac{(1+r)}{(1+R)}. \tag{2}$$

2.2 The Regulator's Problem

If a bank's project fails at time 1, the regulator needs to ensure that depositors get their promised repayment $1 + r$. Since the regulator has the power to designate a project as either performing or nonperforming, this bailout can be done in two different ways. First, a bank whose project is designated by the regulator as nonperforming, must liquidate its project, and it loses all proceeds in bankruptcy procedures, so it receives a zero return. Thus, in this case, the regulator needs to pay

depositors their promised repayment. Second, a bank whose project is designated by the regulator as performing–at time 1–can pledge its assets at the NCB, up to the promised amount to depositors. Such bank commits to repay next period to the NCB this amount plus an interest rate r. This bank then must use the funds received from the NCB to pay depositors their promised repayment.

The regulator must balance its budget intertemporally. To finance the fiscal cost associated with the bailouts, the regulator imposes taxes on successful banks. In the first case, the entire cost of the bailout must be borne directly by the regulator. In the second case, the regulator does not incur any cost at time 1, but at time 2 the regulator will have to reimburse the NCB for the loses it has incurred if the bank's project fails.

The key point we wish to make is that in a monetary union like the Eurozone, the losses of an NCB may be shared with the other NCBs in the union. Thus, we assume that there are J countries in the monetary union and the NCB of each country will incur a share $(1/J)$ of the losses incurred by the monetary union.

Recall that ϕ denotes the share of banks whose projects are designated by the regulator as performing, and so have the right to pledge at the NCB their old time-0 projects as collateral. In the simple setup we are considering, ϕ may be identified with the degree of forbearance.

The regulator chooses the forbearance rate in order to minimize the net present value of taxes. Forbearance has a convex cost for the economy, which we capture by $(x/2)\phi^2$. This cost is meant to capture the loss to the economy of having more nonperforming projects, as well as the higher probability that the monetary union will vote to take retaliatory actions, like curtailing the NCB's ability to accept collateral from domestic banks:

$$\min_{\phi\in[0,1]}\{\tau_1 + \tfrac{1}{1+r}E_1(\tau_2) + \tfrac{x}{2}\phi^2\}.$$

To compute the payoff, notice that since a share $1-\eta$ of projects succeed, banks' time-1 aggregate returns are

$$Y_1 = [1-\eta][1+R]. \tag{3}$$

Since a share η of banks end up with failed projects, the required depositors' bailout is $\eta[1+r]$. For a given forbearance rate, ϕ, the time-1 fiscal cost to the regulator is

$$\tau_1 = [1-\phi]\eta[1+r]. \tag{4}$$

At time 2, a share $1-\eta$ of new time-1 projects will succeed, while only a share σ of old defective projects, that were kept alive, will succeed. Since only a share $1-\phi$ of banks will start new projects at time 1, we have that banks' time-2 expected aggregate returns are

$$E_1(Y_2) = \{[1-\phi][1-\eta] + \phi\sigma\}\{1+R\}. \tag{5}$$

Because a share ϕ of the failed projects were designated as performing and banks instructed to keep them alive, banks borrowed from the NCB at time 1 an amount $\phi\eta[1+r]$ and promised to repay the NCB at time 2 $\phi\eta[1+r]^2$. Since only a share σ of these failed projects will succeed, the expected time-2 loss of the NCB is $[1-\sigma]\phi\eta[1+r]^2$. However, because the loses of the NCB are shared with the other countries of the monetary union, we have that the expected fiscal transfer that the regulator will have to make to the NCB is just a share $1/J$ of the total loss:

$$E_1(\tau_2) = \tfrac{1}{J}[1-\sigma]\phi\eta[1+r]^2. \tag{6}$$

It follows that the regulator's problem can be rewritten as

$$\min_{\phi\in[0,1]}\{\eta[1+r]([1-\phi]+\tfrac{1}{J}[1-\sigma]\phi)+\tfrac{x}{2}\phi^2\}.$$

The term $\eta[1+r]$ is the bailout that has to be given to depositors at time 1. The first term in parenthesis represent the share of the fiscal burden incurred at time 1 and the second term is the expected fiscal transfer to the NCB to cover losses due to forbearance. It follows that the optimal forbearance rate chosen by the regulator is

$$\phi^* = (\tfrac{1}{J}[1-\sigma]-1)\tfrac{(1+r)\eta}{x}. \tag{7}$$

The term with $\frac{1}{J}$ reflects the open access that the regulator has to the resources of the monetary union via the NCB's rediscounting window. The greater the number of countries in the union (J), the lower the marginal cost to the regulator of forbearing, as it will only have to pay a share $\frac{1}{J}$ of the total cost.

If J were one, the forbearance rate would not be zero because the regulator takes into account the fact that a share σ of η-projects may be successful. If $J = 1$ and $\sigma = 0$, then ϕ^* would be zero.

2.3 Evergreening

The term evergreening refers to loans that cannot be repaid, but a bank continues to roll over such loans to avoid recognizing the loss and having to inject equity. In our model, we can identify evergreening with the loans to projects that fail at time 1 but are allowed to survive. The share of bad projects at time 1 is η, and the regulator forbears on a share ϕ of these nonperforming projects. Thus, in our model economy, the degree of evergreening is

$$\Psi = \eta\phi. \tag{8}$$

Replacing the optimal forbearance rate (7) in (8) we arrive at Proposition 1.

Proposition 1. In a monetary union where national central banks have the power to mint currency and to rediscount bank loans, there are incentives for banking regulators to forbear. The resulting degree of evergreening is

$$\Psi^* = (\tfrac{1}{J}[1-\sigma]-1)\tfrac{(1+r)\eta^2}{x}. \tag{9}$$

Evergreening is increasing in the share of contingent losses that can be shifted to other members of the monetary union (indexed by J) and in the degree of distress in the economy (indexed by η).

We can link evergreening and output growth by noting that, in our model economy, the mean growth in output between time 2 and time 1 is given by

$$\frac{E_1(Y_2)}{Y_1} = 1 - \phi + \phi\sigma[1-\eta]. \tag{10}$$

Because there is no trend growth in our model economy, we can interpret this expression as the deviation from growth trend.

Since the forbearance rate, ϕ, equals the ratio of the degree of evergreening to the proportion of unsuccessful projects, we have

$$\frac{E_1(Y_2)}{Y_1} = 1 - \Psi\left[\frac{1-\sigma[1-\eta]}{\eta}\right]. \tag{11}$$

That is, greater evergreening, leads to a larger negative gap of output growth from its trend.

2.4 Price of Securities

Consider an equity-like security that confers the right to the time-2 profits of a bank that starts a fresh project at time 1– call it an N-security. Since agents are risk-neutral, the time-1 price of this N-security is

$$P_1^{new} = \frac{[1-\eta][R-r]}{1+r}.$$

Similarly, the time-1 price of a security (call it an O-security) that confers the right to the time-2 profits of a bank that keeps alive an unsuccessful project at time 1 is

$$P_1^{old} = \frac{\sigma[1+R]}{1+r}.$$

Clearly, $P_1^{old} < P_1^{new}$ because old projects have a negative net present value, by (2). Consider now a hybrid security that combines N-securities and O-securities, in proportions $1-\phi$ and ϕ, respectively. The price of such hybrid security is

$$P_1^{hybrid} = [1-\phi]\frac{[1-\eta][R-r]}{(1+r)} + \phi\frac{\sigma[1+R]}{1+r}. \tag{12}$$

One could bring the simple formulas in (11) and (12) to the data and determine the implied forbearance rate or the degree of evergreening.

2.5 The National Central Bank

As we have seen, the balance sheet of the NCB is the vehicle via which the banking regulator may transfer to the Eurozone the future contingent costs of regulatory forbearance. This is because potentially bad bank loans are pledged as collateral to the NCB via the monetary rediscounting operations. By virtue of being part of the Eurosystem of central banks, each NCB can mint fresh Euros in exchange for the collateral it receives. Because any losses on the collateral will be shared

with the Eurosystem, we say that the NCB has "open access" to the resources of other countries in the Eurozone.[6]

As in standard models, the assets of the NCB are domestic credit to banks (D) and international reserves (IR), while the liabilities of the NCB are the currency it prints plus the excess reserves of the banking system deposited at the NCB (ER). In the Eurozone, we should also include the NCB's so-called Target2 claims and liabilities with the Eurosystem ($Tg2$):

$$D + IR = M + ER + Tg2.$$

Domestic credit to banks is the sum over all loans (MROs) to banks–discussed above–plus the initial domestic credit:

$$D = D_0[1 + r] + \int \gamma_i d_i.$$

We will assume that IR, M, and ER are constant, and so the NCB budget constraint is

$$\Delta D = \Delta Tg2.$$

In our simple economy, the change in the NCB's domestic credit at time 1 is $\phi\eta[1 + r]$, where ϕ is the share of failed projects η that are designated as performing, so that banks could borrow $\phi\eta[1 + r]$ from the NCB.
Combining this equation with the evergreening index (8), we arrive at Proposition 2.

Proposition 2. In our model economy, the degree of evergreening is equal to the increase in the NCB's domestic credit

$$\Delta D = \Delta Tg2 = \Psi.$$

We would like to note that in a more complicated setup, the increase in NCB domestic credit in the model economy would include other elements in addition to evergreening. Such an economy would be populated by several power holders with the power to appropriate fiscal resources and thus have open access to the NCB's rediscounting window. Power holders relevant in the Eurozone context are the banking regulator, the fiscal authorities, and provincial governments. The fiscal authorities may be a group of agents, whose decisions determine the fiscal deficit, which has to be financed by issuing government debt, which is then purchased by banks. Banks in turn would pledge as collateral these government bonds to the NCB. Similarly, provincial governments in many countries can issue debt, which is then purchased by banks that in turn pledge them at the NCB (Spain today is a prime example; Brazil and Argentina in the 1970s and 1980s suffered this problem; Mexico, starting in year 2000).

[6] Note that in the Euro Area part of the credit claims are accepted by explicit loss sharing, while others are de jure without loss sharing. The two exceptions from the loss-sharing rule are (i) items accepted under the national eligibility criteria, following the ECB Council's decision on December 8th, 2011, and (ii) emergency liquidity assistance (ELA).

3 Empirical Implications of the Model

The equilibrium of the model implies that in a monetary union with a common pool problem such as the Euro Area, if the banking system is in distress, then banking regulators have incentives to forbear and declare that some NPLs are performing. In this way, the potential cost of bank failure can be shifted to the Euro Area via the Eurosystem of central banks. The result of this forbearance is that instead of writing off the bad loans, banks extend them over and over again, and so can make fewer new loans. Thus, there is an increase in evergreening, i.e. banks roll-over existing loans to near-insolvent borrower to avoid writing them off.

Here we test the null hypothesis that countries in the Euro Area are more likely to exhibit evergreening than other countries. Furthermore, within the Euro Area, our hypothesis is that countries with poorly capitalized banking systems are more likely to exhibit evergreening than other countries.

The challenge of this empirical exercise is that there exists no off-the-shelf evergreening data. To obtain a proxy for the changes in evergreening, we designed a set of questions to be added to the quarterly World Economic Survey (WES) of the Munich-based *ifo* Institute for Economic Research. The questionnaire was sent to more than 1,000 experts in 80 countries in January 2017.[7]

A unique feature of this dataset is the very well-informed group of participants. Currently, 31.33% of the panelists work in high-level positions for international corporations (9.86% financial, 21.47% nonfinancial); 34.82% in universities, research institutes, and think tanks; 12.83% in national ministries or agencies; 7.59% in associations or chambers; 3.93% in embassies and consulates; 2.97% in central banks; 2.36% in multilateral organizations (such as OECD and IMF); and the remaining 4.19% in medium or small enterprises.[8] We ask the experts four questions:

(i) Since 2008, how has the share of nonperforming loans changed in your country?

(ii) Since 2008, how have banks' attitudes to approving a new business loan changed?

(iii) Since 2008, how have banks' attitudes to rolling over or extending the maturity on existing loans changed?

(iv) Since 2012, how has the supervision of banks changed the ability to roll nonperforming loans over?

[7] While the data is not available online, it is possible to access it in Munich, where we also produced our descriptive statistics and the regression results.

[8] More information about the dataset can be found on the *ifo* website (doi: 10.7805/ebdc-wes-2014).

3.1 Nonperforming Loans

The first question on our survey addresses the NPL problem in each country. This generates a proxy for the true underlying state of the banking system. Unlike evergreening, NPLs do have an official recording and we can compare the survey participants' assessment to each country's official NPL record.[9]

Panel A of Figure 1 shows that officially recognized NPLs have been increasing considerably in the Euro Area. In Greece, Italy, Portugal and Spain (GIPS), on average 18.4% of loans were nonperforming in 2016, compared to only 5% in 2008. This is a very large increase compared to the Euro Area average, which currently stands at 5.4% (up from 2.5% in 2008), and in particular when compared to more stable countries within the Euro Area, like Germany, the Netherlands, Finland, and Luxembourg (DNFL), with 2.5% (up from 1.7% in 2008). But even in DNFL, NPLs are high when compared to those in the United States, where nonperforming loans have been falling since 2009 and currently make up only 1.5% of total gross loans.

Panel B of Figure 1 displays a similar pattern in the survey data. It shows the percentage of survey participants noticing an increase in the level of NPLs since 2008 in their country. A large share (70.2%) of the GIPS respondents confirms the increase in NPLs. This figure is considerably larger than in the rest of the world (41.5%), as well as in DNFL (21.7%), and it is far above the value in the United States (8.7%).

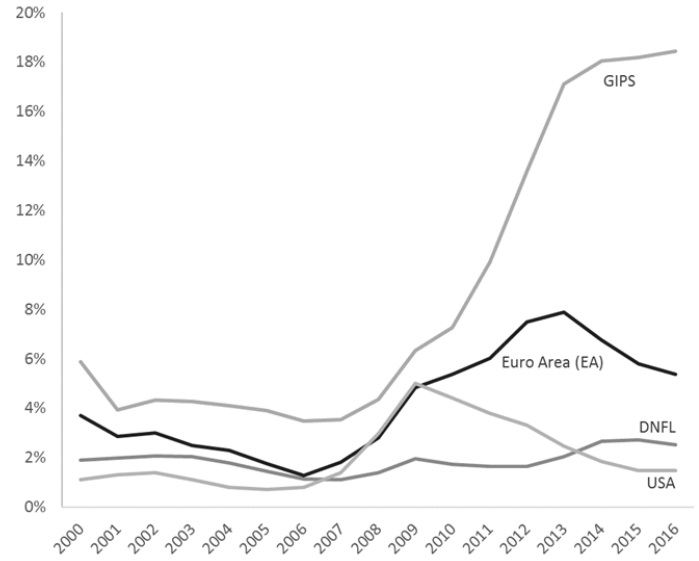
Note that the survey participants do not observe NPLs directly. They only receive a noisy signal of true underlying levels non-performing loans. Nevertheless, the dynamics of NPLs in both the survey and the official data are quite similar, thus validating the expertise of our survey-respondents.

The GIPS are countries that are running low on capital and some banks have required multiple recapitalizations. That is, the high share of NPLs is correlated with a poor capital base. Thus, regulators are facing the trade-off that forms the core of the theoretical model: Forbearing allows a bank with high NPLs and low capital to survive the next stress test.

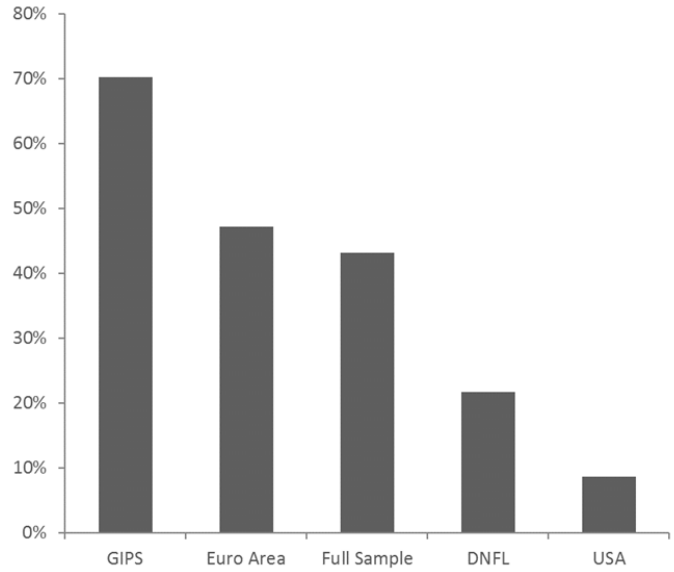
[9] The survey participants, unlike regulators, however, are not subject to the political pressure and institutional incentives for underreporting.

Figure 1: Nonperforming loans

A) NPLs – official data [% of gross loans]



B) NPLs – survey data [% respondents noticing an increase in NPLs]



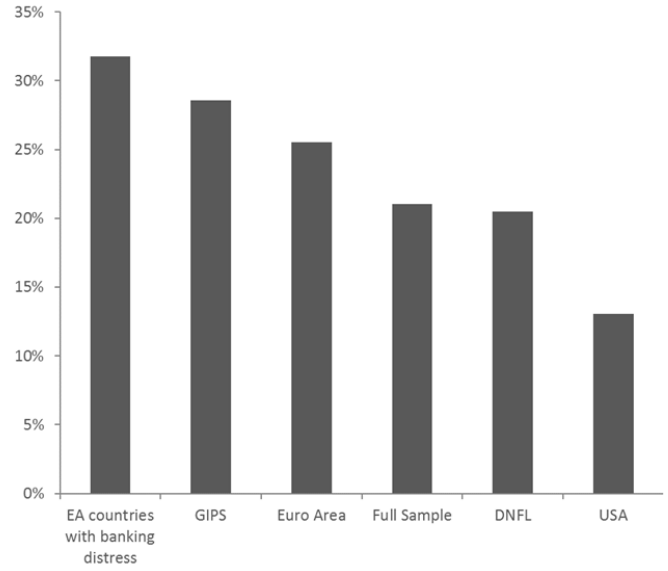
Sources: World Bank WDI (FB.AST.NPER.ZS), World Economic Survey 01/2017.

3.2 Proxies for Evergreening

We construct an evergreening index (EG index) using Questions 2 and 3, regarding the banks' credit policies. If banks and regulators indeed adhere to an evergreening strategy, it should have become relatively easier to roll an existing (potentially nonperforming) loan over than to receive a new one. We therefore take the differences in the answers to these two questions as our evergreening proxy.

Figure 2 shows that there are notable differences between different subgroups of countries. In the Euro Area, we see a larger increase (25.5%) than in the rest of the world (19.2%).[10] This difference is particularly striking when comparing the Euro Area to the United States (13.9%). We also observe an asymmetry within the Euro Area: The phenomenon of evergreening is more pronounced in Greece, Italy, Portugal and Spain (28.6%) than in Germany, Netherlands, Finland and Luxembourg (20.5%). The clearest difference is observable when using our banking-distress index, generated from Question 1 of the survey. Experts within the Euro Area observing high banking distress, also observe the largest increase in evergreening (31.7%).

Figure 2: Micro Evergreening Proxy



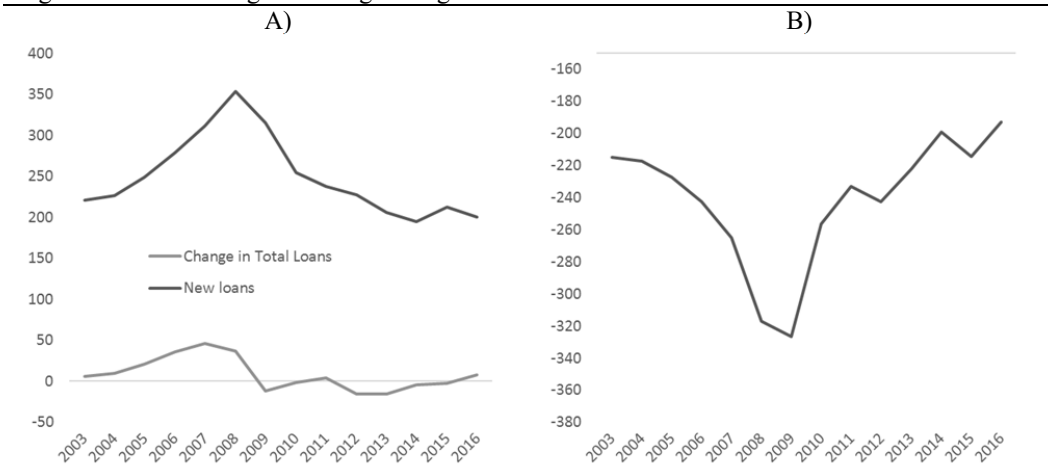
Notes: The figure shows the micro index of evergreening. The construction is discussed in the text. Data source: World Economic Survey 01/2017, authors' calculations.

[10] We assume that each expert receives a noisy signal of the evergreening change, with different previsions. A greater evergreening increase suggests a higher mean of the noisy signal, making the expert more likely to give responses to the credit questions that imply evergreening.

To validate our survey-based EG index, we construct a second proxy, based on bank-balance-sheet data from the ECB. The idea is to compare the data on new loans with the changes in total loans. This is feasible because, in 2003, the member countries of the Eurosystem established a new common database on new loans to enterprises.[11]

As illustrated in Panel A of Figure 3, this data shows that new lending in the Euro Area has dried up since the onset of the crisis. Remarkably, however, total outstanding loans have not fallen substantially. This suggests that some of the existing loans must have been extended or rolled over. The gap between the two series, the change in total loans minus new loans, is therefore our evergreening proxy.

Figure 3: New Lending and Evergreening in the Euro Area

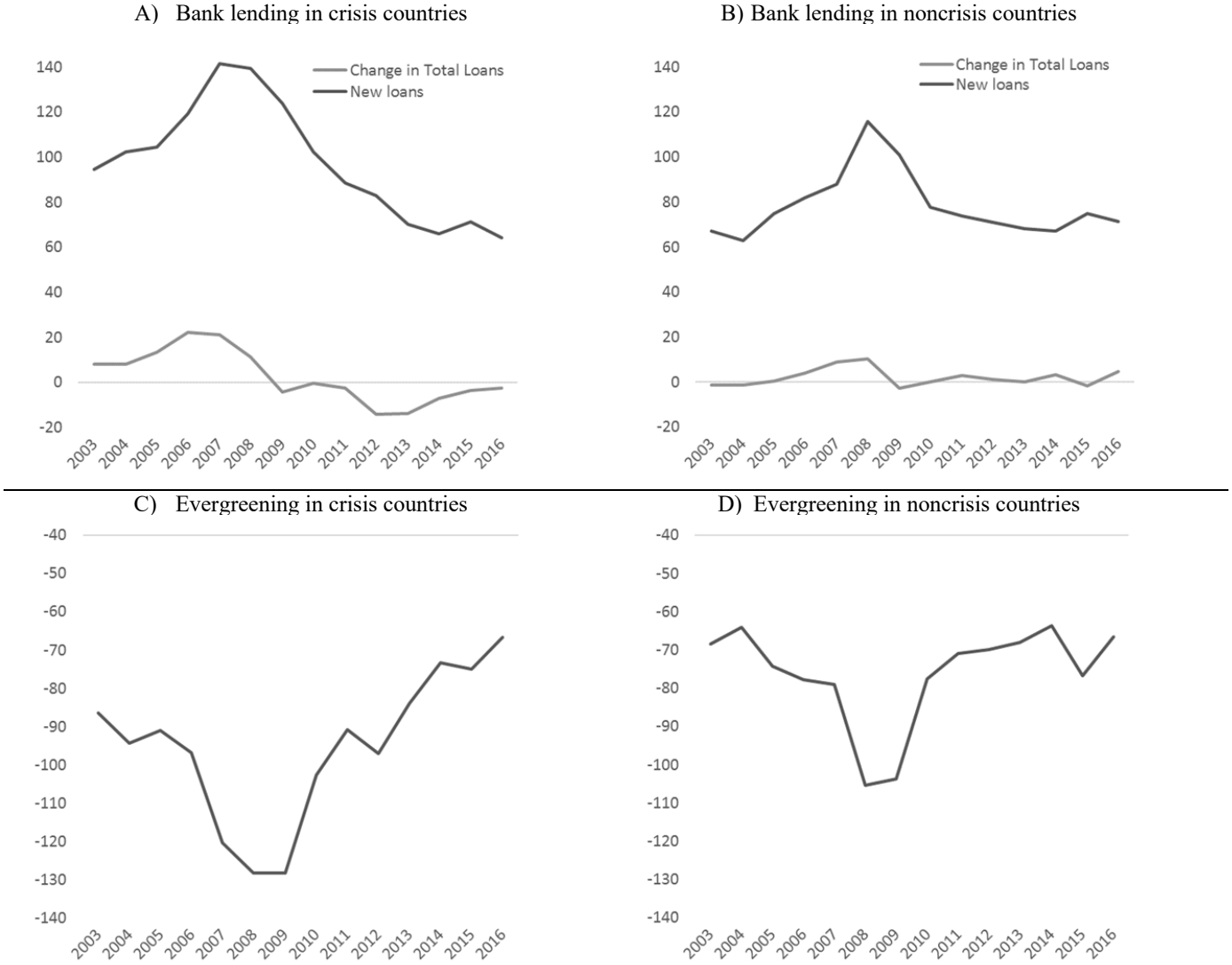


Notes: The light grey line in Panel A shows the change in total loans ($D(TL)$) of the banking sector [M€]. The darker grey line shows the banks' new business loans (NL), [M€]. Panel B shows our macro evergreening proxy (i.e., $EG = D(TL) - NL$, in M). Data sources: Statistical Data Warehouse of the ECB (BSI.M….N.A.A20.A.1. U2.2240.Z01.E; MIR.M….B.A2A.A.B.0.2240.EUR.N; MIR.M….B.A2A.A.B.1.2240.EUR.N), authors' calculations.

The trend reversal that occurred around 2008/9 is certainly striking. Prior to the crisis, new loans were increasing more rapidly than the change in total loans; since the crisis, this relationship has been reversed. Our evergreening proxy, depicted in Panel B of Figure 3, displays a clear trend-break, which interestingly coincides with the beginning of the ECB's full-allotment policy.

[11] When this dataset was established in 2003, it included about 1,800 institutions, more than 80% of the total business volume (see the ECB's inaugural press release, 10 December 2003, and the accompanying presentation by Steven Keuning, Director General, Statistics). It is important to note that the two concepts, "new loans" and "total loans," are not from a common database. The total loans are a comprehensive statistical recording, while new loans are an estimate based on a sample of banks.

Figure 4: Evergreening—Differences within the Euro Area



Notes: Panel A shows banks' new loans (NL) and the change in total loans ($D(TL)$) for the crisis countries (Italy, Portugal, and Spain). Panel B shows the same for Germany, Finland, and the Netherlands. Panel C depicts our macro index of evergreening ($EG = D(TL) - NL$) for Italy, Portugal and Spain. Panel D shows the same index for Germany, Finland, and the Netherlands. Data are unavailable for Greece and Luxembourg. All data in M€. Data sources: Statistical Data Warehouse of the ECB (BSI.M….N.A.A20.A.1.U2.2240.Z01.E; MIR.M….B.A2A.A.B.0.2240.EUR.N; MIR.M….B.A2A.A.B.1.22 40.EUR.N), authors' calculations.

We now compare subgroups of countries in the Euro Area to see where evergreening has been increasing most strongly since the beginning of the financial crisis in 2008. Our survey-based index showed that in the GIPS there was a stronger increase in evergreening than in the rest of the Euro Area.

Panels A and B of Figure 4 document that a similar pattern is also observable in the balance sheet data: New lending has declined in both crisis and noncrisis countries in the Euro Area, but the decline in the crisis countries is considerably more pronounced. Panels C and D of Figure 4 show that the gap between new loans and the change in total loans has also increased more rapidly in the crisis countries since 2008. Furthermore, it continuously increased up to 2016 (with only a small correction in 2011–2012), while in noncrisis countries, most of the adjustment was complete by 2010.

A shortcoming of this index is that we can only construct it for Euro Area countries, not for the rest of the world. The new-loan data set is comparable only within the Euro Area and has been recorded only since 2003. At the country level, the data are quite incomplete and unbalanced. Nevertheless, the index is helpful to do the validation exercise of our survey-based proxy, as rigorously as possible.

3.3 Regression analysis

To test whether the differences between subgroups of countries that we observed in Figure 2 are statistically significant, after controlling for other factors, we analyze the survey data in a cross-section multivariate probit regression. The full empirical specification of our model is given by

$$EG_i \;=\; \alpha \;+\; \lambda_1 EA_i \;+ \lambda_2 BD_i + \lambda_3 (EA_i \times BD_i) + \beta_1 C_i + \beta_2 X_i + \varepsilon_i, \tag{13}$$

where EG_i takes the value 1 if a respondent, i, believes the banks' attitudes towards giving new business loans has become more restrictive since 2008 than their attitudes towards rolling over existing loans;[12] EA_i is a dummy variable capturing membership in the Euro Area; Banking Distress (BD_i) captures whether the respondent perceived an increase in NPLs in her country since 2008; C_i is a vector of control variables including the short-term interest rate, banking-sector-specific credit constraints, present economic situation and perceived capital shortages[13] and the vector X_i contains a set of extended control variables capturing the respondents' evaluation of different potential obstacles for lending growth in their country (including government policy, competitiveness, inflation, foreign debt, etc.). These control variables also come from the WES survey and are regularly asked of all participants.

In our model economy, forbearance and evergreening arise in economies that have open access to the fiscal resources of other countries in a monetary union. Furthermore, the degree of evergreening depends on both the true share of underlying unsuccessful projects in the economy—which in turn determines the capital base of the banking system—and the rate of forbearance

[12] Technically, the probit model links our binary variable EG_i to an unobserved continuous variable EG_i^* by an index function $EG_i = 1[EG_i^* > c]$. In order to standardize the threshold value to be zero, $c = 0$, we include a constant in equation (10). Furthermore, the error term is assumed to follow a normal distribution, $\varepsilon_i \sim N(0, \sigma)$, accounting for country-specific standard errors, $\sigma = \sigma(country)$. The homoscedasticity-tests reported in Table 2 confirm the standard errors to vary across countries. Parameters are estimated using Maximum-Likelihood.

[13] See, for instance, Louzis et al. (2012) and references therein.

chosen by the regulator. In our regression, the Euro Area dummy variable (EA) proxies for the existence of open access at the ECB and the BD dummy variable is a proxy for banking distress and the true share of bad projects in the economy.

The model predicts a positive correlation between evergreening and the EA dummy, and a positive correlation between evergreening and banking distress interacted with the EA dummy, even when controlling for other factors, such as the interest rate. As we can see in Table 2, both hypotheses are not rejected in the regressions. Respondents from the Euro Area are 11.0% percentage points (pp) more likely to recognize an increase in evergreening compared to non-Euro Area respondents (Column 1) and experts in countries with high banking distress are also more likely to report evergreening (Column 2). These differences are statistically significant at the 1% level. Looking at the interaction between our BD and EA dummy variables, we also find a statistically significant difference between BD countries in the Euro Area and BD countries in the rest of the world (Column 3). This difference is economically important and statistically significant. Respondents from BD countries in the Euro Area are 19.7pp more likely to report evergreening than respondents from the rest of the world.

In Columns 4–6, we add several other control variables. The interaction between high BD and EA, however, remains statistically significant at the 1% level in all the regressions. In Column 4, we include bank-specific credit constraints, evaluations about the countries' present economic situation, expected changes in the short-term interest rate, and the severity of capital shortages. In Column 5, we further add expected long-term interest rates, and assessments of the severity of different factors for the respondent's country: competitiveness, government policies in general, insufficient demand, and inflation. Including all variables at once, none of these controls seems to be of great importance in explaining evergreening.

As a robustness check and in the absence of clear theoretical predictions about some of the control variables, we estimate equation (10) following a stepwise-regression strategy. The interaction term capturing respondents of high-BD Euro Area countries remains positive and statistically significant at the 1% level, albeit with a slightly lower coefficient: Being a respondent of this group increases the probability of acknowledging evergreening by 17.8pp. Another important determinant of evergreening seems to be the short-term interest rate. It may be more attractive for banks to roll old loans over than to give new ones when a decrease of the interest rate can be foreseen. The coefficient of short-term interest expectations is consistent with this reasoning. Respondents expecting a decrease in interest rates, have a 4.5pp higher probability of experiencing evergreening. Interestingly, long-term interest rate (i.e. 10-year government bonds) expectations are inversely related to evergreening. Respondent expecting a decrease in government bond rates, also are 4.7pp less likely to observe evergreening. Lastly, respondents evaluating the present economic situation as "bad" are also more likely to observe evergreening (5.1pp). This is plausible, as evergreening is a crisis phenomenon.

In sum, evergreening in the Euro Area, in particular in countries with high banking distress, cannot fully be explained by standard variables such as the present economic situation, expected interest rate changes, or country-specific credit constraints. Our results are thus consistent with evergreening being a rather distinct problem of the Euro Area. The unobserved degree of regulatory forbearance appears to be a plausible explanation for this empirical finding.

Table 2: Determinants of Evergreening in Survey Data

Dependent variable: Micro-level evergreening index						
Variables	(1)	(2)	(3)	(4)	(5)	Stepwise-regression
EA	0.110***	0.092***	0.093***	0.115***	0.109**	0.099***
	(3.50)	(2.91)	(2.92)	(3.24)	(2.55)	(3.14)
BD		0.105***	0.105***	0.067**	0.089**	0.081***
		(3.79)	(3.81)	(2.02)	(2.48)	(2.76)
EA × BD			0.197***	0.186***	0.210***	0.178***
(full effect)			(22.24)	(14.92)	(13.53)	(18.71)
Standard controls:						
Credit constraints				-0.002	-0.002	
				(0.10)	(0.09)	
Present economic situation				0.053**	0.059*	0.051**
				(2.19)	(1.94)	(2.48)
Short-term interest rates				0.034	0.044	0.045*
				(1.36)	(1.35)	(1.68)
Perceived capital shortage				0.023	-0.008	
				(1.06)	(0.31)	
Extended controls:						
Problem: Competitiveness					0.009	
					(0.39)	
Long-term interest rates					-0.042	-0.047*
					(1.43)	(1.93)
Problem: Government policy					-0.026	
					(1.11)	
Problem: Insufficient demand					-0.028	
					(0.32)	
Problem: Inflation					-0.001	
					(0.37)	
Further controls (foreign debt, deficits, corruption, trade policy, expected growth, from WES survey)	No	No	No	No	Yes	No
Null: Homoscedasticity (p-value)	0.006	0.023	0.022	0.010	0.007	0.004
Observations	939	939	939	736	660	913

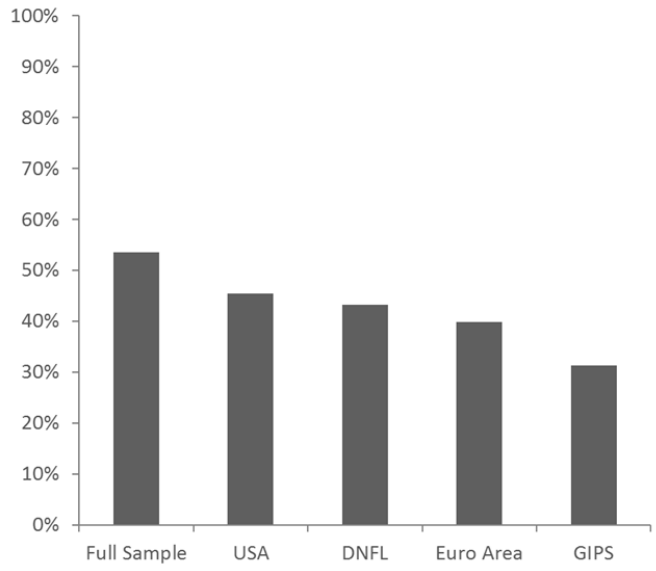
Notes: Estimated values are marginal effects at the variables' means except for dummy variables, where the change in the predicted probability for a discrete change from zero to one is reported. Absolute Z-statistics are reported in parentheses, except for the (EA × BD) interaction, where the appropriate test-statistic follows a χ^2-distribution. The last line reports the results of a homoscedasticity-test on whether standard errors are similar across countries. Statistical significance is indicated by * p<0.1, ** p<0.05, and *** p<0.01. Data sources and variable construction: see Section 7.1 of the data appendix.

3.4 The Impact of Reforms

Finally, we asked the survey participants whether they think that supervision has changed the ability to roll NPLs over in their country. Their responses are summarized in Figure 5 below. While there seems to be some effect of recent changes in banking supervision, roughly 40% of respondents in the Euro Area believe those changes have not prevented evergreening (or even facilitated it).

Again, we observe differences across countries. The share of experts who believe the supervision reforms were ineffective was smallest in the GIPS. Also in DNFL, the share was smaller than in the rest of the world.

Figure 5: Were Supervisory Reforms Effective?



Note: The graphs shows the portion of respondents saying it is less difficult or unchanged to roll nonperforming loans over. Source: World Economic Survey 01/2017.

4 Literature Review

The most well-known example of evergreening comes from Japan (see Peek and Rosengren, 2005). It is often argued that it played a major role in explaining the Japanese economic slowdown after the early 1990s' asset-price collapse. This is demonstrated in an early contribution by Caballero et al. (2008), which used the term "zombie lending." In a creative destruction model, they show how zombie lending keeps unproductive firms alive, creates credit constraints on healthy firms and, thus, slows economic growth. The results are empirically validated in industry-

level dataset explaining sectoral productivity, investment, and unemployment. For an application of their approach to the Euro Area, see Acharya et al. (2017).

While Caballero et al. (2008) focus on evergreening's macro implications, we aim to construct a direct proxy of evergreening during the Euro crisis. Caballero et al. (2008) measure evergreening using implicit interest rate subsidies to unproductive firms. We define evergreening as the degree to which banks roll existing loans over rather than giving out fresh ones. To our knowledge this is the first attempt to create a direct proxy of evergreening for a large set (80) of countries.

Sinn (2003) models externalities among regulators with regard to capital requirements. He argues that the same reasons for regulating the banking system in the first place arise again when regulators compete with each other. In a domestic economy, banks have an incentive to hold too little capital because of the asymmetric information on the quality of their assets. Regulators, in turn, have an incentive to regulate the domestic banking system too little, when competing with other regulators. While the two models have in common that national regulators can generate negative externalities for others, they differ in the sense that neither the institutional aspects of the currency union, the link to money creation, nor the political economy aspects are included in Sinn's model.

Externalities in currency unions have also been modeled by Aizenman (1992), who focuses on the distribution of seigniorage, with special reference to the former Yugoslavia. In Yugoslavia, regional branches of the central banking system could divert seigniorage profits for their region. Aizenman models the inefficiency of this institutional setting, which has similarities to the European setting. Unlike Sinn (2003), Aizenman (1992) actually models the competition among decision makers within a monetary union and the associated losses in welfare. Compared to our model, he does not consider the link to regulatory forbearance and the specific institutional aspects of the Euro Area.

Casella (1992) argues that small open economies would not join a monetary union unless there was an asymmetric distribution of power. The small countries in her model anticipate a disproportional influence, compared to their size, which helps to transfer seigniorage revenues in their favor. This effect is present in the institutional arrangements of the Euro Area and it is implicitly present in our model where any countries can use regulatory forbearance to shift costs to the ECB.

In Alesina and Drazen (1991), distortionary taxation creates a bias to not balance the budget and place the burden on others. The cost of bank resolution in our model can be interpreted abstractly to have a similar role as the distortionary taxation in their model. Policymakers try to avoid this cost by delaying stabilizations, generating an inefficient solution compared to a unitary decision maker.

Finally, some papers have theoretically modeled the impact of voting power on long-term inflation, starting from a Barro–Gordon-type setting on inflation bias. An early paper that pointed out that regional interests may lead to inefficient monetary policies, by analyzing the voting power of the ECB council, was von Hagen and Süppel (1994). Dinger et al (2014) take their model as a motivation to illustrate the inflation bias in the Euro Area arising from the fact that the long-term consequences of inflation—in an integrated economy—will be spread across countries.

This analysis is not limited to Europe; the US Federal Reserve system has been analyzed in a similar context (see Friedman and Schwartz, 1963; Eichengreen, 1990). The authors analyzed the great depression in the early 1930s and found that the regional Federal Reserve branches had the ability to pursue regional policies, prolonging the great depression. It is argued in their papers that the introduction of the Federal Open Market Committee in 1935 was important to shifting the power back to the center. Bordo and Schwarz (1999) provide an overview of monetary policy regimes and their economic performance in economic history.

5 Macroeconomic Implications

The model predicts that within a monetary union, after an adverse external shock, countries facing a forbearance trade-off should experience a larger increase in refinancing credit and should have larger Target2 deficits. As we document below, these patterns are exhibited in the Euro Area, a group of countries that all experienced an adverse external shock to their banking systems, have a common monetary policy, but differ in their degree of banking distress due to different initial capital bases.

Panel A of Figure 6 illustrates the evolution of MROs since the introduction of the monetary union. They have been increasing since the introduction of the full-allotment policy. And as collateral requirements were reduced and NCBs decided to accept additional credit claims in 2011, they have been growing at a fast pace. After 2012, MROs initially reverted to a declining path. But more recently, following the financial turmoil in Greece 2014/15 and more recently in Italy 2016/17, they have been increasing again. In 2015, Greek banks had borrowed €90 bn—about half of GDP—from its central bank. In 2016/17, Italian banks have borrowed more than €100 bn, 5.9% of GDP, and Spanish banks had borrowed more than €40 bn, 3.5% of GDP. At the time of this writing, MROs in both Italy and Spain are again growing.

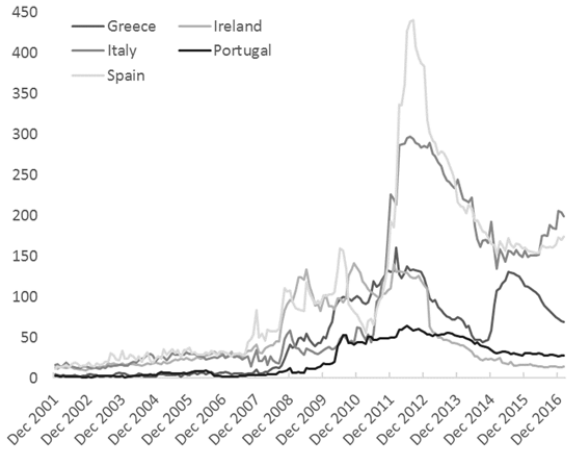
Panel C of Figure 6 shows that shortly after MROs started to decline, the ECB initiated its expanded asset-purchase program, also known as QE. Thus, at the same time that banks were repaying their central-bank loans, the ECB purchased assets from them, which in part gave banks the liquidity that was needed to repay the LTROs to the NCBs, without touching the NPLs and evergreened loans on their balance sheets. In the last two years, the QE program has been the strongest driver of the total expansion of the ECB balance sheet. As Panel B shows, MROs and QE purchases taken together display an increase of about €1 trillion since the introduction of the monetary union—about 10% of GDP in the Euro Area's member countries.

Confirming the prediction of our model, the cumulative Target2 balances,[14] displayed in Panel D, were highly correlated with the total monetary expansion (MROs plus QE purchases). The total value of the Target2 liabilities of the GIIPS has also increased by about €1 trillion and displays a nearly identical time path. The correlation between the two time series is 0.978. Thus, nearly none of the monetary expansion during the crisis was directed to finance domestic investment. Instead it was used for either financing current account deficits, repayments of international loans, or outright capital flight within the Euro Area.

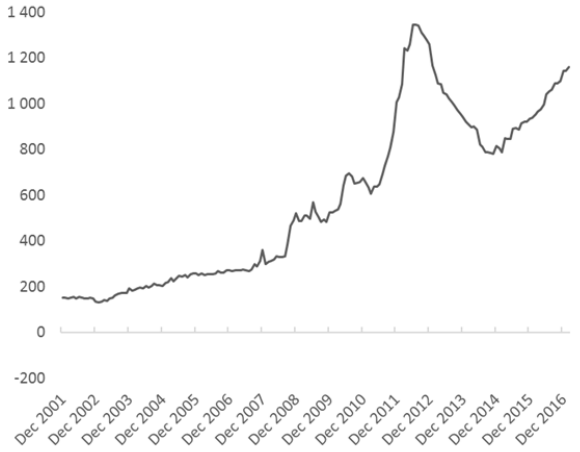
[14] See Sinn and Wollmershäuser (2012) for this interpretation.

Figure 6: Target2-balances are driven by central bank credit and QE

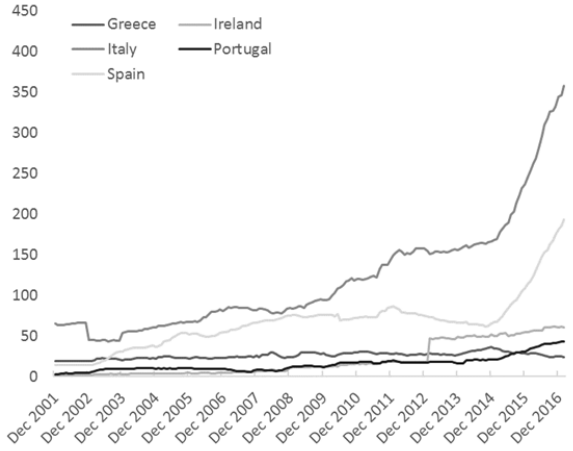
A) Central bank claims on MFIs (excl. ELA)



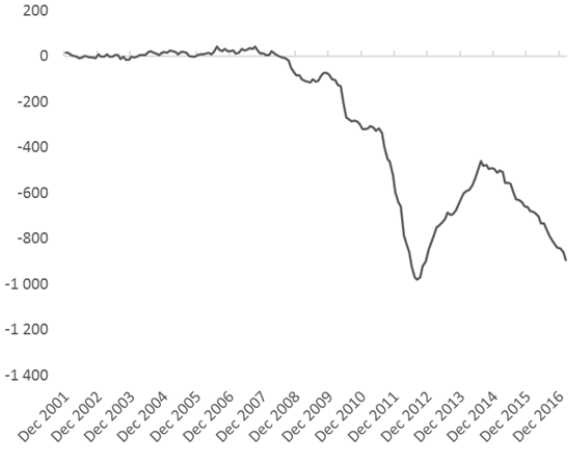
B) Total monetary expansion (GIIPS)



C) Central bank claims on General Government (bond purchases)



D) Target2-Balances (GIIPS)



Notes: Total discretionary expansion is the sum of central bank's claims on MFIs and general governments of the crisis countries. Data source: ECB Statistical Data Warehouse (Codes: BSI.M.…N.N.A20.A.1.U2.1000. Z01.E; BSI.M.…N.N.A30.A.1.U2.2100.Z01.E; TGB.M.…N.A094T.U2.EUR.A), authors' calculations.

6 Conclusions

We have argued that a reduction of loan evergreening may help reignite economic growth across the Euro Area by allowing banks to issue more fresh loans to new profitable projects. When evergreening is acute – i.e., a significant share of loans to near-insolvent borrowers are rolled over, instead of being liquidated – banks have a lower capacity to grant new loans to potentially more productive projects. Thus, expansions in central bank credit to banks may not lead to greater productive investment.

We presented a model where national authorities may shift the fiscal burden associated with the resolution of non-performing loans to the monetary union by declaring bad loans as officially performing. In this way de facto non-performing loans may be rolled over. The incentives to forbear are especially high when the banking system is in distress, like in the wake of a financial crisis.

We bring the model to the data by constructing a new evergreening index based on a questionnaire administered by the ifo Institute for Economic Research in January 2017. Regressions using this index indicate that evergreening is more acute in the Euro Area than in other countries. Furthermore, within the Euro Area, evergreening is larger where banks are in greater distress. These differences are statistically significant when controlling for other factors, such as inflation, interest rate, and business-cycle expectations. At the macro level, we find that evergreening is positively correlated with national central bank credit to domestic banks and with Target2 liabilities to the Eurosystem.

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7. Appendix

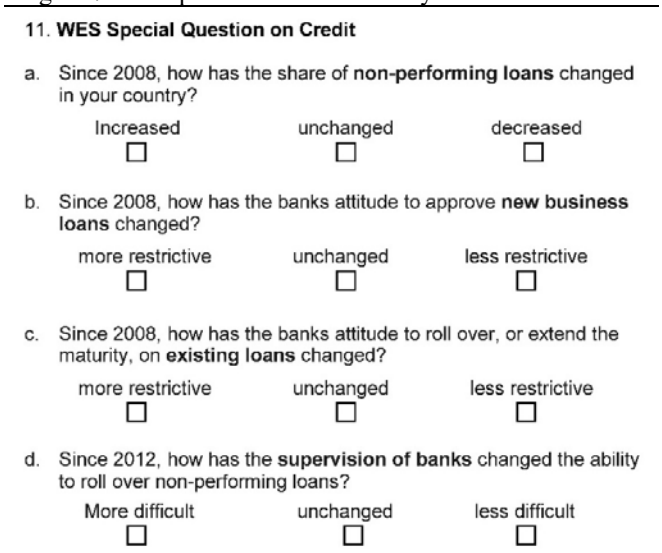
7.1 Data Used in the Regression Analysis

Variable	Definition / Question	Source & Code
EG (Micro-level evergreening index)	A dummy variable, taking the value 1 if credit constraints for new loans got more restrictive than for old loans, zero otherwise ($EG_i = 1[NL_i > OL_i]$).	WES 01/2017
NL (New loans)	See question 11b of subsection 7.2 of the data appendix.	WES 01/2017 (sq_201701_2)
OL (Old loans)	See question 11c of subsection 7.2 of the data appendix.	WES 01/2017 (sq_201701_3)
EA (Euro Area dummy)	A dummy variable, taking the value 1 if respondent is lives in a Euro Area member country, zero otherwise.	
BD (Banking Distress dummy)	A dummy variable, taking the value 1 if NPLs increased according to respondents, zero otherwise. See question 11a of subsection 7.2 of the data appendix.	WES 01/2017 (sq_201701_1)
Credit constraints	"At present, to what extent is the supply of bank credit to firms in this country constrained by bank-specific factors (for example banks' health or banking regulation)?" [not constrained, moderately constrained, strongly constrained]	WES 01/2017 (cstrcred)
Present Economic Situation	"The country's general situation regarding the overall economy (present judgment)" [good/satisfactory/bad]	WES 01/2017 (gson)
Interest rates, short-term	"Expected interest rates by the end of the next six months (short-term rates / three-month money market rates)" [higher, about the same, lower]	WES 01/2017 (irst)
Interest rates, long- term	"Expected interest rates by the end of the next six months (long-term rates / government bonds with 10 and more years of maturity)" [higher, about the same, lower]	WES 01/2017 (irlt)
Expected growth	"The country's general situation regarding the overall economy (from now on: expected situation by the end of the next six months)" [good, satisfactory, bad]	WES 01/2017 (gsof)
Problem variables on competitiveness, government policy, insufficient demand, inflation, foreign debts, public deficits, corruption, trade policy, capital shortage	"Please try to assess the importance of the following problems the economy of your country is facing at present" [very important, important, not so important]	WES 04/2016 (ep01-ep11)

Notes: All data were from the January 2017 wave of the World Economic Survey (WES) conducted by the *ifo* Institute for Economic Research, except for the answers for variables ep01 to ep11. Those were taken from the April 2016 wave as these types of questions are only asked once a year.

7.2 WES Questionnaire

Figure 7: Excerpt from the WES-survey



11. **WES Special Question on Credit**

a. Since 2008, how has the share of **non-performing loans** changed in your country?

Increased ☐ unchanged ☐ decreased ☐

b. Since 2008, how has the banks attitude to approve **new business loans** changed?

more restrictive ☐ unchanged ☐ less restrictive ☐

c. Since 2008, how has the banks attitude to roll over, or extend the maturity, on **existing loans** changed?

more restrictive ☐ unchanged ☐ less restrictive ☐

d. Since 2012, how has the **supervision of banks** changed the ability to roll over non-performing loans?

More difficult ☐ unchanged ☐ less difficult ☐

Source: World Economic Survey, *ifo* Institute for Economic Research, January 2017.