A Remedy Framework in the Resolution of Non-performing Loans

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The aim of the paper is to stimulate the discussion around the recent increase in NPLs across several industrial countries by proposing a remedy framework for the resolution of non-performing loans (NPLs). The framework focuses on providing a reprieve to borrowers until they can recover financially and regain the ability to service their loans. In this respect, this paper proposes the establishment of a state-owned asset management company and attempts to find a balance between incentivizing the participation of banks regarding the disposal of NPLs and limiting risks to the state while avoiding moral hazard situations.

Keywords: Non-performing loans (NPLs); remedy framework; asset management company; lending behavior; moral hazards

JEL codes: G01, G21, G28, G33

I. Introduction

The COVID-19 pandemic and the resulting lockdowns and travel restrictions imposed by national governments on households and businesses alike has had an unprecedented adverse impact on income-generating ability worldwide. Several sectors have contracted, unemployment has risen, profits and incomes have sunk, and as a result, many borrowers have experienced difficulties servicing their loans (Beck and Keil, 2021).

In many sectors, liquidity has dried up, and firms and households

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have turned to the banking sector for short- and long-term loans. Many have been unable to keep up with their mortgage payments, and not necessarily because of bad financial practices. Banks are consequently facing new challenges due to the pressure imposed on their balance sheets by the escalation of NPLs. It is noted that the increase in NPLs has resulted in a corresponding increase in loss provisions. This in turn is negatively affecting capital adequacy ratios and increasing the need for recapitalization in the form of new equity or by converting deposits into equity (bail-in), as was the case with Cypriot financial institutions during the financial crisis of 2013 (Brown et al., 2018). While the monetary and fiscal emergency measures keep the real economy functional in the short-term, a long-term solution must be found for institutions facing a large number of NPLs. Considering the severity and longevity of the COVID-19 pandemic, as well as the lag effect, the banking sector is expected to sustain an extended hit. As a result, not only the ability but also the willingness of banks to provide credit is likely to be affected.

Ari et al. (2020) find that handling and settling NPLs is critical to economic recovery. Unresolved NPLs impose a heavy burden on the balance sheet of financial institutions (Ari et al., 2021). Targeted governmental credit policies for small businesses and households are generally not effective and present significant risks, as introducing more leverage can increase firms future vulnerability (Mosser, 2020). Considering the recent global financial and the European sovereign debt crises, a new wave of NPLs is anticipated due to the COVID-19 pandemic. This is expected to impose an additional burden on banks struggling to manage their NPLs.

NPLs affect financial institutions in various important ways. Berger and DeYoung (1997) conclude that increases in NPLs are directly linked to bank inefficiency. NPLs force banks to be stricter in their lending activities, leading to a decrease in their profits, an increase in funding costs, and a deterioration of their capital (Tölö and Virén, 2021; Serrano, 2021). On some occasions, NPLs trigger riskier lending behavior (moral hazards), causing further deterioration of their loan quality (Zhang et al., 2016). Moreover, NPLs prolong recovery in economies where business entities rely on bank financing (Aiyar et al., 2015).

The recent increase of the monetary base by central banks and fiscal expansion by national governments the opposite of the austerity policies imposed prior to the pandemic will likely exert inflationary pressure on

the economy, resulting in higher interest rates. Borrowers with flexible rate mortgages will face additional challenges in meeting their loan obligations. At a later stage, when interest rates return to their normal levels, real estate values will skyrocket. With the economic environment so uncertain, making predictions around key economic variables becomes a challenging endeavor. The situation is likely to be exacerbated by the foreclosure and sale of collateral properties at low prices (fire sales). Especially in the case of distressed banks or banks that want to resolve their NPLs fast, the price of collateral is driven down due to the pressure of selling. A quick disposal of these collateral properties at low prices would generate large losses and therefore increase the need for bank recapitalization. Supporting borrowers and real estate collateral prices is therefore of utmost importance for banks during periods of crises.

The literature broadly supports that NPLs create a risk of financial instability and restrict banks lending growth. Policies and frameworks must be put in place to meet the ongoing struggle of banks to reduce NPLs and withstand the current pandemic crisis, as well as any potential future crises. In this respect, governments should consider implementing a framework to ease the pressure of NPLs on the banking sector. Following the massive support packages and liquidation injections afforded to central banks, this would be a necessary next step in repairing the banking sector. In fact, without such a framework, the efforts to strengthen banks capital and lending activities may fail to have the expected effects on the real economy.

Designing a resolution framework will serve the interests of a range of stakeholders including households, businesses, taxpayers, and bank shareholders. Such a remedy framework of course requires governmental support and actions. During crises, state initiative is often necessary in the restructuring of banks balance sheets. State co-investment and rules could be highly effective in stimulating NPL sales, e.g., Fell et al. (2017). Government intervention can allow the market to rebound efficiently, improving confidence and liquidity, e.g., Tirole (2012) and Philippon and Skreta (2012). In this regard, setting up special vehicles external to banks to deal with NPLs is consistent with the view of Avgouleas and Goodhart (2017) and Enria et al. (2017), among others.

With an aim to stimulate the discussion around the recent increase in NPLs, this paper explores a remedy framework for the resolution of NPLs to support speedy and efficient recuperation for both the banking

sector and the real economy. This discussion is essential in working towards the stability of the banking sector and avoiding adverse macroeconomic consequences. It must be noted that, while the definition of NPLs may vary slightly from country to country, the paper adheres to the guidelines established by the International Monetary Fund (IMF) and other regulatory agencies, which consider NPLs as those loans which the borrower stops servicing for a period of ninety days or more.

The rest of the paper is organized as follows. Section II provides an overview of the resolution framework and the potential benefits for banks, borrowers, taxpayers, and society in general. It consists of several sub-sections, including among others, the determination of critical factors such as the loan purchase price, monthly instalments, total debt owed at maturity, expected value of collateral, and the safety margin. Section III presents the summary and conclusions, including suggestions for further research.

II. The Resolution Framework

The burden of NPLs can be relieved with the careful design of a resolution framework. This involves the establishment of a state-funded asset management company. The company could be incorporated as a limited liability company (LLC), with the state as the major shareholder initially. A small part of its capital could be placed by private investors and investment funds. Guidelines and requirements should be established for efficient and fair transactions, especially as banks may be tempted to dispose of loans with the lowest likelihood of recovery. Information asymmetry between banks and the asset management company might aggravate this situation, so procedures should be employed to improve transparency regarding the condition of the NPLs. Should circumstances permit, the asset management company could be gradually developed into a private company. This process is also beneficial for the state, as it can concurrently recover the funds initially invested in the company.

The asset management company's main goal would be to protect primary residences and commercial properties of businesses until economic conditions rebound, and at the same time to avoid further burdening taxpayers. Toward this goal, the company should maximize the recoverability of NPLs, which it can achieve by considering the key

technical aspects of the framework through a well-designed governance structure; in this regard, checks and balances (controls) should be put in place to avoid inefficiencies often observed in state-owned organizations, such as the diversion of resources to other interests.

The attributes and characteristics of the members of the board of directors are an essential element of the company. For example, top management should include technocrats with integrity, honesty, professional competence, and expertise. Run properly, the activities of the company should not present an undue burden on taxpayers. It is vital that the company be an autonomous legal and economic entity distinct from the ownership, control, and influence of banks. This independence significantly reduces the possibility of conflicts of interest relating to the purchase of NPLs from the banks. In addition, due to the concentration of a large number of NPLs and standardization of processes, the asset management company could develop economies of scale and so further reduce its operational costs.

The main source of the asset management company's revenues would be the agreed instalments paid by the borrowers of restructured NPLs. These instalments would cover a portion or the full amount of the operating costs, which include finance costs, taxes, insurance premia, and other fees of the collateral property. Should the monthly instalment be lower than the operating costs, the shortage would be capitalized and added to the purchase cost of the loan. Should it be higher, the excess would be deducted from the purchase cost of the loan. Within a reasonable period, preferably less than ten years, the borrowers, through either borrowing from commercial banks and/or raising funds from investors and/or other sources, would be obliged to repay the amount owed to the asset management company. Its revenues would be used to cover operating expenses, purchase NPLs, and pay dividends to shareholders. If necessary, the company could seek additional avenues of securing capital, such as (a) raising equity from private investors (b) borrowing from European and international banks, or (c) floating new (government-guaranteed) bonds in the market.

The asset management company would pay a purchase price to acquire an NPL and then come to an agreement with the borrower about the servicing terms of the loan. As the economic conditions improve over time, the borrower should be able to obtain a bank loan to repay the amount due. The title of the collateral would be transferred to an independent trustee with the power to sell the collateral in case the borrower defaults on the agreement. The role of liquidating restructured

loans would be best suited to a specialized trustee and not to the company. The income from the sale, up to the amount due, would go to the company. Any resulting surplus from the sale of collateral would be returned to the borrower.

Following the above procedure under the proposed framework presents a win-win situation for borrowers, banks, the state, and society in general. More specifically:

- Borrowers are offered a reprieve: They avoid eviction from their residence or commercial property and get more time to recover financially.
- By buying time for borrowers, the asset management company helps support real estate prices in a crisis or post-crisis environment. The likelihood of collateral properties being sold off in fire sales is reduced.
- By selling their NPLs, banks immediately improve their liquidity and equity positions and reduce their recapitalization needs and potential losses that could result from the sale of collateral at a price lower than the loans net book values.
- Banks can therefore focus on restoring their efficiency, profitability, lending capacity, and sustainability.
- The asset management company provides banks with an out-of-court mechanism for NPLs and enables them to avoid slow and lengthy foreclosure proceedings. Better outcomes are expected due to the expertise and specialized services of the company.
- Society benefits by avoiding the social issues and problems that are triggered by the liquidation of collateral and the loss of residential and commercial property.
- The state also sees an upside, as the cost of social benefits does not keep rising.

Having outlined the benefits, the following sections discuss the key technical aspects of the framework that must be in place to ensure its successful implementation and maximize the recoverability of NPLs while balancing the interests of the parties involved.

A. Loan purchase price

Determining the appropriate purchase price of an NPL is an important factor for the effective reduction of NPLs and the successful intervention of the asset management company. Assuming adequate information is provided in the purchase process, NPLs could be priced

fairly accurately. A highly conservative approach to NPL valuation could result in a wide spread between the prices banks are willing to accept and the prices investors are prepared to pay (Fell et al., 2017). The real economic value of NPLs (i.e., the present value of the future net cash flows from the asset) is not easily observed or estimated, especially in a greatly uncertain environment. There is a risk the price will be based on judgement, instead of economic evaluation.

The loan purchase price (*LPP*) could be set between the NPL's net book value (*NBV*) and the collateral's net disposal value (*NDVC*), minus an appropriate discount (*D*). The *NBV* is equal to the gross book value (*GBV*), minus loss provisions. The collateral's net disposal value is defined as the price received from a forced liquidation, net of disposal costs. The *NDVC* is generally lower than the sales price received in normal economic conditions, denoted by *MVC*, i.e., *NDVC* < *MVC*. In cases where *NBV* is lower than *NDVC*, the *LPP* will be greater than *NBV*, but lower than *NDVC*. That is,

Scenario A $$NBV_t < LPP_t + D_t < NDVC_t.$$

In the opposite case, where *NBV* is greater than *NDVC*, *LPP* will be greater than *NDVC* but lower than *MVC*. That is,

Scenario B $$NDVCt < LPP_t + D_t < MVC_t < NBV_t.$$

In the above inequalities the subscript *t* denotes a point in time.

The exact percentage of the discount may depend on factors considered important in mortgage loan defaults relating to borrowers data, such as loan type, tenure, purpose, original amount, interest rate, and loan-to-value ratio (Abdul Adzis et al. 2021; Blazy and Weill, 2013; Jim nez and Saurina, 2004; Moffatt 2005; Smith et al. 1996). The discount reflects the risk faced by the asset management company and should thus be determined on a case-by-case basis.

Although Scenario A presents a profit to the bank's books, the idea is not to relieve banks from all losses that are expected and have been accounted for in loss provisions. Otherwise, such losses could be borne by the asset management company and indirectly by the taxpayers. Therefore, there should be a restriction on the banks profits at the point of sale; on the other hand, this restriction must not be so strict that it discourages banks from selling. Nevertheless, the purchase price does not necessarily need to be higher compared to what a private investor

would pay. In this scenario, the burden of potentially having to liquidate the collateral through lengthy insolvency proceedings is avoided, and a profit is immediately realized for the bank, which is in turn incentivized to dispose of its NPLs. At the same time, the asset management company reduces its risk by purchasing NPLs at a price lower than the net disposal value of collateral.

In the cases where the *NBV* is higher than the *NDVC*, the loan purchase price should be set somewhere between the net disposal values under distressed sales and normal economic conditions. Although Scenario B indicates a price lower than the *NBV*, the sale would result in much lower losses compared to what a bank could potentially realize if immediately liquidating the collateral.

In addition, as the net disposal and market values of collateral are lower than the net book value of the loans, these NPLs are subject to higher risk weights with potentially higher unexpected losses, which can be eliminated through the disposal of such NPLs. In these cases, the asset management company can work as a tool to substantially decrease or even eliminate risk from a bank's balance sheet. The company provides a lid to the bank's overall potential losses, which is again incentivized to dispose of these NPLs. The difference between *LPP* and *NDVC* in our framework is essentially the support offered by the state, which should of course be considered within the restrictions imposed by applicable regulatory frameworks, e.g., the European Bank Recovery and Resolution Directive (BRRD) on the use of on the use of public funds in bank recapitalizations, so to reduce moral hazard.

The return to normal economic growth rates would prompt a considerable climb in prices, leading to an improvement in households and firms liquidity, as well as their ability to serve their loans. Soon, the asset management company would also see the benefits of the ameliorated economic conditions and disposal values of collateral, as would banks i.e., the minority shareholders in the asset management company.

Overall, the proposed pricing of NPLs provides incentives to banks to dispose of their NPLs in either scenario and balances out the risks and benefits of both parties. It is more likely that *LPP*s will be set higher than *NBV*s (Scenario A). Therefore, the profit from the sale of a loan at a price higher than its net book value would improve the bank's equity position and liquidity. The asset management company is not likely to have unexpected losses over the long-term, and banks are not expected to undergo serious capital write-offs. Under both scenarios, the purchase

price would confer an economic advantage to banks. Banks that want to reduce their exposure to NPLs through a sale would be able to do so.

B. Monthly instalments

The determination of the monthly instalments is an important aspect of the arrangement between the borrower and the asset management company. The monthly instalments should cover the financing costs of the NPL, as well as costs relating to property taxes, insurance, and municipal and other fees regarding the collateral property. The monthly finance cost (*FC*) is calculated as follows:

$$FC = k \cdot LPP, \tag{1}$$

where $k \approx K / 12$ with K being the annual cost of capital or the minimum rate of return required on the company's assets. This would be based on the government's average borrowing rate, plus a reasonable premium that accounts for the investment risk borne.

Taxes, insurance, and municipal and other fees (*TIF*) related to the collateral property tend to be annual payments spread across the year. For an average monthly estimate of these costs, the following formula is used

$$TIF = \frac{\text{Annual Tax, Insurance and Municipal fees}}{12} \tag{2}$$

Since finance costs (*FC*), taxes, insurance premia, and municipal and other fees (*TIF*) (hereafter operating costs) vary over time, the monthly instalments may be adjusted accordingly, if necessary, at the beginning of each year. Thus, the monthly instalments for year *t*, *PMT*, paid by the borrower to the asset management company up until the time of repayment would be equal to:

$$PMT_t = FC_t + TIF_t + CP_t \ , \tag{3}$$

where FC_t and TIF_t are respectively the monthly finance costs and monthly expenses related to tax, insurance, and other fees of collateral at time *t* and

$$CP_t = PMT_t - FC_t - TIF_t \ , \tag{4}$$

where CP_t represents an overpayment in month t when positive ($CP_t >$

0), or an underpayment when negative, ($CP_t < 0$). When monthly instalments exceed operating costs, the resulting overpayments would be deducted from *LLP*, reducing borrowers total debt at maturity. For borrowers who face severe financial difficulties, the arranged monthly instalments might not be sufficient to cover the operating costs in full. Therefore, the resulting monthly underpayments would be capitalized over time and added to *LPP* to reflect the borrower's total debt. Preferably, the monthly instalments can be set up so as to sufficiently cover all operating costs.

C. Capitalization of underpayment

As mentioned above, should the monthly instalments be lower than operating costs, the resulting underpayments can be capitalized and added to LPP to reflect the borrower's total debt to the asset management company at maturity. Provided that monthly instalments and operating costs remain constant during the year, the resulting monthly underpayments, or overpayments, CPt, also remain constant and represent a normal annuity of twelve payments in each year t. Their future value at the end of each year would be:

$$FVCP_t = CP_t \cdot \sum_{i=1}^{12}(1+k)^{12-i} = CP_t \cdot \ FVIFA(k,12), \tag{5}$$

where

$$FVIFA(k,12) = \sum_{i=1}^{12}(1+k)^{12-i} = \frac{(1+k)^{12}-1}{k}$$

is the future value factor of the annuity, in which $K/12$ is the monthly cost of capital or minimum rate of return required on the company's assets.

Combining Equations (4) and (5) gives:

$$\begin{aligned} FVCP_t &= (PMT_t - FC_t - TIF_t) \cdot \ FVIFA(k,12) \\ &= FVPMT_t - FVFC_t - FVTIF_t, \end{aligned} \tag{6}$$

where $FVPMT_t$, $FVFC_t$ and $FVTIF_t$ are respectively the future values of the twelve monthly instalments (PMT_t), finance costs (FC_t), and taxes, insurance premia, and other fees (TIF_t) of the collateral at the end of each year *t*.

The capitalization of the monthly underpayments CP_t, up to the time of repayment may be achieved using the following equation

$$TFVCP_T = \sum_{t=1}^{T} FVCP_t \left(1+K\right)^{T-t}$$

$$= \sum_{t=1}^{T} FVPMT_t \left(1+K\right)^{T-t} - \sum_{t=1}^{T} FVFC_t \left(1+K\right)^{T-t} - \sum_{t=1}^{T} FVTIF_t \left(1+K\right)^{T-t}$$

$$= TFVPMT_T \cdot TFVFC_T \cdot TFVTIF_T, \tag{7}$$

where $TFVPMT_T$, $TFVPMT_T$ and $TFVTIF_T$ are respectively the cumulative future values of the instalments at the end of year T, and K is the annual cost of capital of the asset management company. To account for the monthly compounding throughout the whole period, we could use the effective annual rate (*EAR*) instead.

D. Constant growth rates in taxes, insurance premia, and other fees

For simplification, we assume that (a) monthly instalments and finance costs would remain constant throughout the whole period and (b) taxes, insurance premia, and other fees would increase by a constant growth rate G, at the beginning of each year.

The first assumption implies that the future values of the twelve monthly instalments and finance costs are respectively the same in each year until the repayment of the debt. More specifically, for $t = 1, 2, \ldots, T$,

$$FVPMT_t = PMT_t \cdot \ FVIFA\left(k,12\right) = FVPMT \tag{8}$$

and

$$FVFC_t = FC_t \cdot \ FVIFA\left(k,12\right) = FVFC \ . \tag{9}$$

where $FVPMT_t$ and $FVFC_t$ are respectively the future values of the twelve monthly amounts of *PMT* and *FC* at the end of each year t.

The second assumption implies that taxes, insurance premia, and other fees would increase by a constant growth rate at the beginning of each year according to the following equation.

$$TIF_t = TIF_{t-1}\left(1+G\right) = TIF_{t-2}\left(1+G\right)^2 = \cdots = TIF_1\left(1+G\right)^{t-1} \ , \tag{10}$$

where TIF_1 is the expense for taxes, insurance premia, and fees in each of the twelve months of the first year, G is the annual growth rate of the monthly expenses, which increase once at the beginning of each year, $t = 1, 2,...,T$ and T is the time of the repayment (i.e., loan maturity). It is noted that the twelve monthly *TIF* fees remain constant during the year, only increasing once at the beginning of each year.

When *TIF* fees increase at the beginning of each year at a constant annual rate G, that is,

$$TIF_t = TIF_1 \cdot \left(1+G\right)^{t-1}$$

the future value of the twelve monthly *TIF* at the end of each year t is equal to

$$FVTIF_t = TIF_t \cdot \ FVIFA\left(k,12\right)$$

$$= TIF_1 \cdot \ FVIFA\left(k,12\right)\left(1+G\right)^{t-1} = FVTIF_1\left(1+G\right)^{t-1}, \qquad (11)$$

where $FVTIF_1$ is the future value of the twelve monthly *TIF* at the end of the first year. This annual value of $FVTIF_1$ would increase with an annual constant growth rate.

The substitution of Equations (8), (9), and (11) in Equation (6), gives the future value of *CPt* at the end of each year t as follows:

$$FVCP_t = \left[\ PMT - FC - TIF_1 \cdot \left(1+G\right)^{t-1}\right] \cdot \ FVIFA\left(k,12\right)$$

$$= FVPMT - FVFC - FVTIF_1 \cdot \left(1+G\right)^{t-1}. \qquad (12)$$

E. Total amount owed at maturity

When purchasing an NPL, the asset management company should estimate the total amount of debt owed by the borrower (Total Debt or $TDEB_T$) at maturity. Knowledge of this value is important, as at the time of maturity, the borrower is expected to pay off their debt to the asset management company. This amount could be higher or lower than *LPP*, depending on whether the agreed monthly instalments were set higher (lower) than the operating costs, resulting in monthly overpayments (underpayments). $TDEB_T$ is equal to the loan purchase price, minus (plus) the cumulative future value of the monthly overpayments

(underpayments) $FVCP_t$. More specifically, *TDEBT* at time *T* is equal to the following.

$$TDEBT_T = LPP - \sum_{t=1}^{T} FVCP_t \left(1+K\right)^{T-t} \ , \tag{13}$$

where

$$FVCP_t = CP_t \cdot \ FVIFA\left(k,12\right)$$

$$= \left(PMT_t - FC_t - TIF_t\right) \cdot \ FVIFA\left(k,12\right)$$

$$= FVPMT_t - FVFC_t - FVTIF_t$$

is the cumulative future value of the monthly overpayments or underpayments at the end of each year *t*. *K* and $k = K/12$ are the annual and monthly cost of capital, respectively.

When the monthly instalments and the cost of finance of the NPL remain constant ($FC_t = FC$ and $PMT_t = PMT$) but taxes, insurance premia, and other fees of collateral increase at the beginning of each year at a constant growth rate ($TIF_t = TIF_1 \ (1 + G)^{t-1}$), the total debt owed by the borrower at time T is given by the following equation.

$$TDEBT_T = LPP$$

$$-\sum_{t=1}^{T}\left[FVPMT - FVFC - FVTIF_1\left(1+G\right)^{t-1} \right]\left(1+K\right)^{T-t}$$

$$= LPP - \left(FVPMT - FVFC\right) \cdot \ FVIFA\left(K,T\right)$$

$$+FVTIF_1 \cdot \ FVIFG\left(K,G,T\right), \tag{14}$$

where

$$FVIFA\left(K,T\right) = \frac{\left(1+K\right)^T - 1}{K}$$

and

$$FVIFG\left(K,G,T\right) = \frac{\left(1+K\right)^T - \left(1+G\right)^T}{K-G} \ .$$

$FVIFA(K,T)$ and $FVIFG(K,G,T)$ are respectively the future value factors of an annuity with T number of constant payments and an annuity of T number of payments increasing at a constant growth rate G.

$$FVPMT = PMT \cdot FVIFA(k,12),$$

$$FVFC = FC \cdot FVIFA(k,12)$$

and

$$FVTIF_1 = TIF_1 \cdot FVIFA(k,12)$$

are respectively the future values of monthly instalments (PMT), financing costs (FC) and expenses for taxes, insurance premia and other fees of collateral (TIF_1) at the end of the first year.

F. Expected value of collateral at maturity

When purchasing an NPL, apart from estimating the $TDEBT$ at maturity, the asset management company should also estimate the value of collateral at maturity. The borrower, having had the time to rebound financially, would be expected be in a position to secure a bank loan to pay off their $TDEBT$. Estimating the expected value of collateral allows the asset management company to calculate the maximum loan amount the borrower can obtain and set a minimum required safety margin to limit downside risk. In case the borrower is unable to repay his debt through a bank loan, then the trustee will have the right to sell the collateral at its then value.

For the calculation of the expected value of collateral (either primary residence or commercial property) at time T, the estimation of its future annual growth rate is necessary. For this, the following equation can be used.

$$V_T = V_0 \prod_{t=1}^{T} \left(1 + H_t\right) = V_0 \left(1 + H_1\right)^{T_1} \left(1 + H_2\right)^{T_2} \ , \tag{15}$$

where V_0 is the current value of collateral at the time of the acquisition of the NPL, V_T is the expected annual growth rate of the value of the property. In times where property prices are falling, the annual growth rate will be negative. Otherwise, when property prices are rising, the annual growth rate is positive.

The first part of Equation (15) can be used in cases where the annual

growth rate of property values is expected to vary over time. The second part of the equation can be used in cases where during the first T_1 years the average annual growth rate is expected to be negative and denoted as H_1, and during the remaining $T - T_1$ years when the annual growth rate is expected to be positive and denoted as H_2.

G. Safety margin

The estimation of a safety margin (*SM*) is a crucial factor in the management of risk when purchasing an NPL. By setting a minimum margin of safety, the asset management company can minimize downside risk by seeking extra collateral, if required, thus keeping a lid on potential losses. The safety margin is referred to as the difference between the expected value of the collateral and the borrower's total debt to the asset management company at time T. The following equation illustrates this

$$SM_T = V_T - TDEBT_T \ , \tag{16}$$

where V_T and $TDEBT_T$ are respectively the expected value of collateral and borrower's total debt at time *T*.

Provided that the borrower satisfies the conditions for securing a bank loan, the repayment of the total debt owed to the asset management company is expected to be made by a loan acquired from a commercial bank. In this case, the maximum borrowing amount (Maximum Loan or *MLOAN*) that could be secured would be equal to

$$MLOAN_T = LTV \cdot \ V_T \geq TDEBT_T \ , \tag{17}$$

where V_T is the value of collateral at time *T*, and *LTV* is the bank-defined loan-to-value ratio. This ratio indicates how much a bank would lend against the value of collateral. It tends to range between 65% to 75% of the market value of the property.

To minimize downside risk, at the time of repayment the maximum possible borrowing amount should at least equal the total debt, i.e.,

$$MLOAN_T = LTV \cdot \ V_T \geq TDEBT_T$$

or

$$V_T \geq \frac{TDEBT_T}{LTV} \quad . \tag{18}$$

Deducting the amount of $TDEBT_T$ from the two strands of the above inequality gives

$$SM_T = V_T - TDEBT_T \geq \frac{\left(1 - LTV\right)}{LTV} TDEBT_T \equiv MSM_T \,, \tag{19}$$

where

$$MSM_T \equiv \frac{\left(1 - LTV\right)}{LTV} TDEBT_T$$

is defined as the minimum safety margin of the asset management company's investment in the NPL at the time of repayment of the debt. MSM_T is in fact the lowest margin of safety, which ensures that the company is covered for potential losses at the time of repayment.

When $SM_T > MSM_T$, the borrower should be able to borrow the amount required to repay their debt to the asset management company. However, should the safety margin of the loan fall below the minimum safety margin, $SM_T < MSM_T$, the asset management company can take steps to secure its position. For example, it could require the borrower to (a) pay higher monthly instalments, thus reducing $TDEBT_T$ and increasing the safety margin of the investment, or (b) deposit additional collateral, i.e., mortgage additional assets. In the latter case, the extra collateral (XC) required at time T is equal to

$$XC_T = MSM_T - SM_T.$$

The current value of the extra collateral would be equal to

$$XC_0 = \frac{MSM_T - SM_T}{\prod_{t=1}^{T}\left(1 + H_t\right)} \,, \tag{20}$$

where H_t is the expected increase on the total value of the extra collateral for year t. Equation (20) estimates the current value of the extra collateral required for covering downside risk.

In general, the larger the safety margin of an NPL, the lower the

downside risk assumed by the asset management company and the higher the borrower's incentive to seek financing to repay the full amount at maturity. In other words, the higher the safety margin, the more secure the asset management company. To further clarify on the above, we use the following example.

Example 1

Consider an NPL purchased for \$125,000. The collateral is valued at \$130,000. The monthly instalment is set to cover exactly the cost of financing, taxes, insurance premia, and other property fees (i.e., CP_t = 0). The borrower is expected to repay the full amount of the loan at the end of Year 8. Property prices are expected to increase at a constant annual rate of 2%. The LTV ratio set by the bank is 75%. The maximum amount of the loan, the minimum safety margin and the extra collateral, if needed, are computed as follows.

The expected value of the property at the end of Year 8 is

$$V_8 = V_0\left(1+G\right)^8 = 130{,}000 \cdot \left(1.02\right)^8 = \$152{,}315.72 .$$

So, the maximum loan that can be secured is

$$MLOAN_8 = LTV \cdot V_8 = 75\% \cdot 152{,}315.72 = \$114{,}236.79 .$$

Because the monthly instalments cover exactly the cost of financing, taxes, insurance premia, and fees, the borrower's total debt, (*TDEBT*) at the time of repayment would be equal to the *LPP*.

$$TDEBT_8 = LPP = \$125{,}000.$$

The safety margin of the investment is

$$SM_8 = V_8 - TDEBT_8$$

$$= 152{,}315.72 - 125{,}000 = \$27{,}315.72 .$$

The minimum safety margin, MSM_T is

$$MSM_8 = \frac{1 - LTV}{LTV} \cdot \ TDEBT_7$$

$$= \frac{1 - 0.75}{0.75} \cdot \ 125{,}000 = \$41{,}666.67 \ .$$

Because the safety margin, SM_8 = \$27,315.72 is less than the minimum safety margin, MSM_8 = \$41,666.67, the acquisition of the NPL is recommended only if extra collateral is available by the borrower. The current value of the extra collateral required would be

$$XC_0 = \frac{MSM_8 - SM_8}{\left(1 + H\right)^8} = \frac{41{,}666.67 - 27{,}315.72}{\left(1.02\right)^8}$$

$$= \frac{14{,}350.95}{1.1717} = \$12{,}248$$

H. Minimum required monthly instalment

As already discussed, the correct estimation of the instalment is a defining factor for the effective functioning and success of the asset management company, and consequently the proposed remedy framework. It is crucial that during the NPL purchasing process the monthly instalment is determined in such a way as to minimize downside risk.

The monthly instalment the borrower agrees to pay relates directly to total debt owed at maturity and indirectly to the safety margin of the investment, as defined above. There is a negative relationship between instalments and total debt. The higher the instalment, ceteris paribus, the lower the *TDEBT* owed by the borrower at maturity and vice versa.

The minimum required monthly instalment is defined as that amount which equals the total debt of the borrower with the maximum amount that can be borrowed at the time of repayment.

$$MLOAN = TDEBT_T, \tag{21}$$

where is the maximum amount that can be borrowed, $TDEBT_T$ is the borrower's total debt, V_T is the expected value of collateral, LTV is the bank specific loan-to-value ratio and T is the time of repayment of the

debt. Substituting Equation (14) in Equation (21) we get

$$LTV \cdot V_T = LPP - \left(FVPMT - FVFC\right) \cdot FVIFA\left(K,T\right)$$

$$+FVTIF_1 \cdot FVIFG\left(K,G,T\right),$$

where LTV is the bank-defined loan-to-value ratio and V_T is the expected value of collateral at time T. LPP is the loan purchase price. $FVPM_T = PMT \cdot FVIFA(k,12)$, $FVFC = FC \cdot FVIFA(k,12)$ and $FVTIF_1 = TIF_1 \cdot FVIFA(k,12)$ are respectively the future values of the twelve monthly instalments (PMT), finance costs (FC), and expenses for taxes, insurance premia, and other fees (TIF_1) at the end of the first year.

Rearranging the above equation and solving for PMT, we get

$$PMT = \frac{LPP + FVFC \cdot FVIFA\left(K,T\right)}{FVIFA\left(K/12,12\right) \cdot FVIFA\left(K,T\right)}$$

$$+\frac{FVTIF_1 \cdot FVIFG\left(K,G,T\right) - LTV \cdot V_T}{FVIFA\left(K/12,12\right) \cdot FVIFA\left(K,T\right)}, \qquad (22)$$

where $FVIFA(K,T)$ and $FVIFG(K,G,T)$ are respectively the future value factors of an annuity of T number of constant instalments and an annuity of T number of instalments increasing at a constant growth rate G. To better clarify on the above, we use the following example.

Example 2

Consider an NPL purchased for $222,000. The collateral is valued at $260,000. Property prices are expected to fall over the next four years by an average annual rate of -3.5% and to rise by an average annual rate of 4% the six years after that. This year's annual expenses on taxes, insurance premia, and other fees are $1,080. These expenses are expected to increase at a constant annual rate of 2% at the beginning of each year. The loan-to-value ratio is set by the bank at 75%. The total debt is estimated to be repaid within ten years of NPL acquisition. The annual rate of cost of capital of the asset management company is estimated at 6%. The minimum required monthly instalment is computed as follows.

The monthly cost of finance is

$$FC = \frac{6\%}{12} \cdot \ 222{,}000 = 0.5\% \cdot \ 222{,}000 = \$1{,}110 \ .$$

The monthly expenses for taxes, insurance premia, and other fees for the first year are

$$TIF_1 = \frac{1{,}080}{12} = \$90 \ .$$

For the following years, the monthly expenses are equal to

$$TIF_t = 90 \cdot \ \left(1.02\right)^{t-1}$$

Based on the above, the monthly instalment for the first year is equal to PMT_1 = \$1,110 + \$90 = \$1,200. The following equation gives the instalments for the nine-year period until repayment of the debt

$$PMT_t = FC + TIF_1\left(1+G\right)^{t-1} = 1{,}110 + 90 \cdot \ \left(1.02\right)^{t-1}$$

for $t = 1, 2,\ldots,10$. The future values of monthly finance costs and taxes, insurance premia, and other fees at the end of the first year are

$$FVFC = 1{,}110 \cdot \ FVIFA\left(0.5\%,12\right)$$

$$= 1{,}110 \cdot \ 12.3356 = \$13{,}692.5$$

and

$$FVTIF_1 = 90 \cdot \ FVIFA\left(0.5\%,12\right)$$

$$= 90 \cdot \ 12.3356 = \$1{,}110.2$$

where

$$FVIFA\left(0.5\%,12\right) = \frac{1.005^{12}-1}{0.005} = 12.3356.$$

The expected value of collateral in four years' time is

$$V_4 = 260{,}000 \cdot (1 - 0.035)^4$$

$$= 260{,}000 \cdot 0.8672 = \$225{,}472$$

and in ten years' time is

$$V_{10} = 225{,}472 \cdot (1 + 0.04)^6$$

$$= 225{,}472 \cdot 1.2653 = \$285{,}294.$$

Based on the estimated expected value of collateral of \$285,294, the maximum loan amount available to the borrower is

$$MLOAN_{10} = LTV \cdot V_{10} = 0.75 \cdot 285{,}294 = \$213{,}970.5 .$$

Therefore, the minimum required instalment for the borrower to secure a bank loan for their debt repayment can be calculated using Equation (22) as follows

$$PMT = \frac{222{,}000 + 13{,}692.5 \cdot FVIFA(6\%,10)}{FVIFA(0.5\%,12) \cdot FVIFA(6\%,10)}$$

$$+ \frac{1{,}110.2 \cdot FVIFG(6\%,2\%,10) - 0.75 \cdot 285{,}294}{FVIFA(0.5\%,12) \cdot FVIFA(6\%,10)}$$

$$= \frac{222{,}000 + (13{,}692.5 \cdot 13.18079)}{12.3356 \cdot 13.18079}$$

$$+ \frac{(1{,}110.2 \cdot 14.29633) - (0.75 \cdot 285{,}294)}{12.3356 \cdot 13.18079}$$

$$= \frac{222{,}000 + 180{,}477.97 + 15{,}871.79 - 213{,}970.5}{162.593}$$

$$= \frac{204{,}379{,}26}{162.593} = \$1{,}257 ,$$

where

$$FVIFA\left(0.5\%,12\right)=\frac{1.005^{12}-1}{0.005}=12.3356\,,$$

$$FVIFA\left(6\%,10\right)=\frac{1.06^{10}-1}{0.06}=13.18079$$

and

$$FVIFG\left(6\%,2\%,10\right)=\frac{1.06^{10}-1{,}02^{10}}{0.06-0.02}=14.29633\,.$$

Based on the above, we find that the minimum required instalment is \$1,257. Next, we assume that the borrower agreed to pay the amount of \$1,300 as a monthly instalment. In this case, there is a resulting monthly overpayment of \$43 (= 1,300 – 1,257). These overpayments will be deducted from the borrower's total debt at maturity.

The future values of the monthly instalments, cost of finance, taxes, insurance premia, and other mortgage fees at the end of the first year are

$$FVPMT=1{,}300\cdot\ FVIFA\left(0.5\%,12\right)$$

$$=1{,}300\cdot\ 12.3356=\$16{,}036.28\,,$$

$$FVFC=\$13{,}692{,}5$$

and

$$FVTIF=\$1{,}110.2.$$

At the end of the tenth year, the borrower s total debt is

$$TDEBT_{10}=LPP-\left(FVPMT-FVFC\right)\cdot\ FVIFA\left(6\%,10\right)$$

$$+FVTIF_1\cdot\ FVIFG\left(6\%,2\%,10\right)$$

$$=222{,}000-\left(16{,}036.28-13{,}692.5\right)\cdot\ 13.18079$$

$$+(1{,}110.2\cdot\ 14.29633)$$

$$=222{,}000-30{,}892.87+15{,}871.79=\$206{,}978.92\,.$$

The borrower's total debt divided by the expected value of collateral at maturity is equal to

$$\frac{TDEBT_T}{V_T} = \frac{206,978.92}{285,294} = 0.7255 .$$

The lower this ratio, the less risky the borrower's mortgage application appears to the bank and may improve the odds at getting a mortgage with better terms. Accordingly, the borrower should be able to obtain a bank loan to repay his debt at maturity, as the ratio of his total debt owed at maturity to the expected value of collateral at maturity of 72.55% is less than the 75% loan-to-value ratio set by the bank.

III. Summary and Conclusions

The ongoing COVID-19 pandemic has accentuated the need to adopt measures for the recovery of the real economy. The increasing number of NPLs has imposed pressure on banks balance sheets, impeded their efficiency and profitability, and delayed overall economic recovery. Therefore, it is of paramount importance to develop effective NPL-reducing strategies in a coordinated and organized manner. Toward this aim, this paper suggests that governments consider a framework to ease banks from the pressure of NPLs. This can be achieved through the establishment of an initially state-owned asset management company. Implementing such a resolution framework would serve the interests of many stakeholders, though a vital goal is the protection of primary residences and SMEs commercial property until economic conditions rebound, without burdening the taxpayers.

Under the proposed framework and in agreement with the borrowers, the asset management company would acquire ownership of the NPLs. The loan purchase price should be such as to incentivize the participation of banks, whilst limiting risks to the state and moral hazard situations. The title of collateral would be transferred to an independent trustee who would have the power to liquidate the collateral should the borrower default on the agreed terms. The borrowers would pay an agreed monthly instalment fully or partly covering operating costs. In cases where the monthly instalment would be higher than the operating costs, the resulting overpayments would be deducted from the

borrower's total debt at maturity. For a borrower facing severe financial difficulties, the arranged monthly instalments might not be sufficient to fully cover the operating costs. Therefore, at the time of loan repayment, the underpayments would be capitalized and added to the loan purchase price to reflect the borrower's total debt. At loan maturity, having had the time to rebound financially, the borrower would be expected to be able to secure a loan to pay off their debt obligations. Nevertheless, the asset management company should aim to limit downside risk by establishing a minimum margin of safety and carefully setting the instalments so that the maximum loan amount available to the borrower at maturity would equal the total debt at maturity. Where borrowers are unable to repay their debts through a bank loan, then the trustee would have the right to sell of the collateral at its then value.

The framework provides a reprieve and an opportunity for the borrowers to rebound financially after crises such as the global financial crisis, the European debt crisis, or the COVID-19 pandemic, minimizing the likelihood of collateral properties being sold off in fire sales, thus supporting real estate prices. This is essential to avoid the loss of primary residences, or SMEs commercial property, which may lead to social and other issues such as the contraction or even the disappearance of the middle class and bankruptcy of firms. Further, by selling their NPLs, banks would immediately be able to improve their liquidity position, reduce their recapitalization needs, and restore their efficiency, profitability, and lending capacity. Because of the concentration of a large number of NPLs and the standardization of processes, the asset management company could develop economies of scale thus further reducing its operational costs.

Finally, further research could be carried out on the signaling effect of banks participating in the framework. One of the main considerations of banks is what message the selling of their NPLs sends to the markets. Manz et al. (2019) and Podpiera and Weill (2008) give support to the bad management hypothesis according to which NPL disposals could be seen as a negative signal for the bank's management quality and performance. On the other hand, the disposal of NPLs could send out a positive signal regarding banks future profitability and prudent lending behavior (i.e., the opposite effect to risky lending strategies observed in banks with high levels of NPLs, otherwise known as the moral hazard hypothesis). Further investigation is required to identify whether banks that dispose of their NPLs subsequently adopt prudent and less risky lending strategies, thus sending out a good signal. Such investigation

would shed light on the signaling effect of NPL disposal, which could incentivize (or otherwise discourage) banks from participating. Another line of research could focus on the development of the legal framework that would be needed to support the asset management company whose role is explored in this paper.

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