

Article

# Impact of high non-performing loan ratios on bank lending trends and profitability

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**Abstract:** The goal of this paper is to explore the relationship between the specific non-performing loan ratio (NPL) and the corresponding impact on the bank's profitability and lending behavior. It also seeks to investigate the macroeconomic impacts of economies with excessively high NPL ratios as well as the efficacy and impact of alleviation measures used by banks and governments around the world to help facilitate a decrease in high NPL ratios. The possible implications and effects of the COVID-19 pandemic on NPL ratios is also addressed in this paper. It is found that when excessively high NPL ratios go unaddressed, the economy tends to suffer. On the other hand, this study shows that when measures are taken to reduce or eliminate the high NPL ratios, economic performance improves, and the reduction has a clear positive impact on the economy.

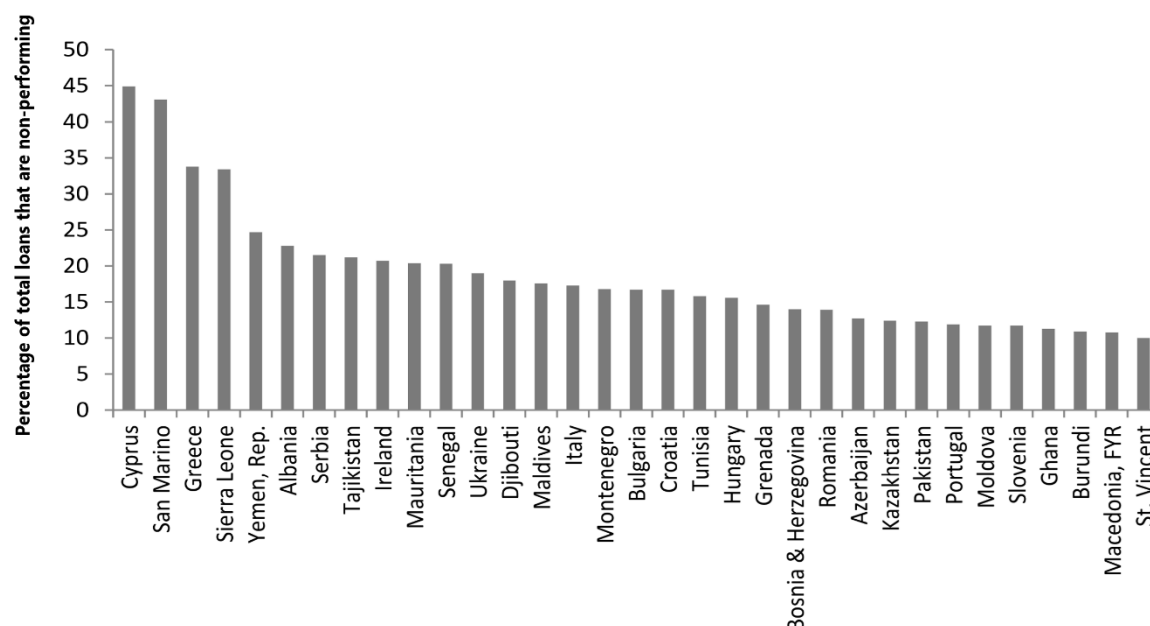
**Keywords:** NPL Ratio, non-performing loans, economic recovery

**JEL Classification:** G10, G21, G28

## 1. Introduction

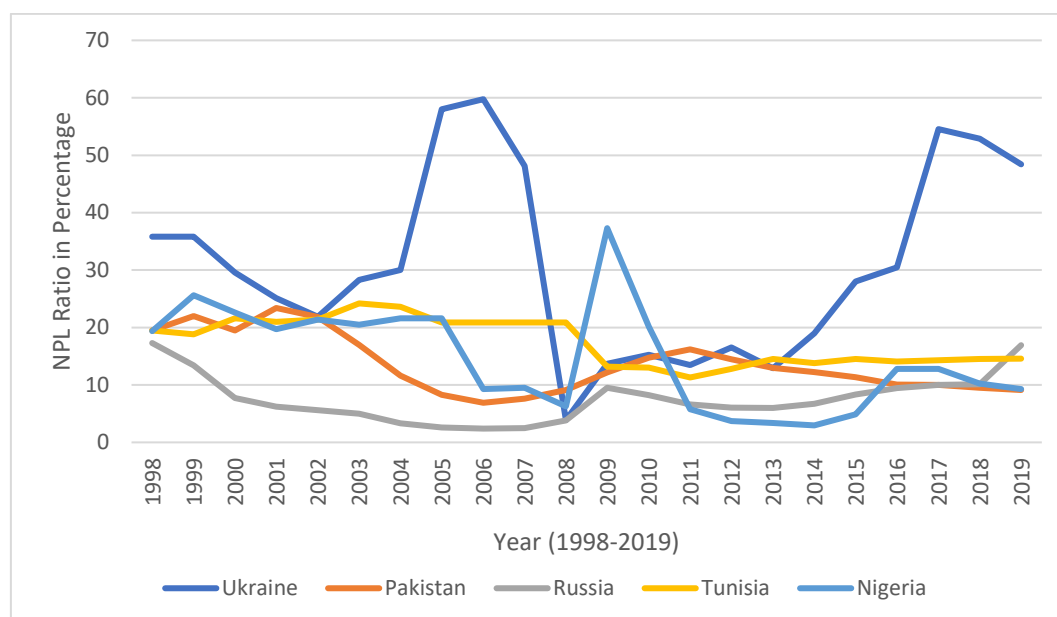
A non-performing commercial bank loan is a loan in which the borrower has defaulted or has not made any scheduled loan payments for 90 days or more. The NPL ratio of a bank is a percentage measure of loans already at or at risk of becoming non-performing out of the total amount of loans at the bank. As research suggests, an excessively high NPL ratio causes bank to limit their credit supply to borrowers, often causing a credit supply contraction in the immediate aftermath. Banks also risk profit loss and even bankruptcy if no measures are taken to reduce high levels of NPL ratios. At the macroeconomic level, countries with economies characterized by banks with high NPL-ratios often experience sluggish economic growth, a dramatic decrease in market confidence, increased distortion of credit allocation, sustained or increased demand of loans from borrowers, and a large contraction in available credit supply. To that end, both bank administrations as well as national governments take measures to ensure NPL ratios are kept at healthy levels. However, not all instances of high NPL ratios in modern economic history are addressed properly, and many of the NPL ratio crisis are accompanied by recessionary periods in the economy. At the start of 2015, there were 33 countries with an NPL ratio of above 10%. Out of those 33 countries, 20 had an NPL ratio of over 15% and 11 had an NPL ratio of over 20% (refer to Figure 1 below).





**Figure 1.:** All countries with an NPL ratio of 10% or higher as of the start of 2015 fiscal reporting year.

A close examination of these economies reveals many startling details, the first of which is that Italy and Greece—both of which are members of the O.E.C.D. and are considered developed economies—are ranked high on this list and both have excessively high NPL ratios. This is especially concerning not only for the European Union but also the world economy as it exemplifies the fragile financial system that is present in many countries—even developed economies—in the wake of the 2008-09 financial crisis and the subsequent recession and credit contraction period that followed. As legislators and policymakers around the world seek to build stronger economies and fully recover from the recession a decade ago, decreasing and maintaining a low level of non-performing loans and NPL ratio is of utmost importance. Particular economies, like that of Ukraine and Nigeria, experienced drastic fallout at the onset of the 2008-09 financial crisis, exemplified by the statistically significant uptick in their national NPL ratios (refer to Figure 2). The Nigerian economy, however, quickly recovered from the financial crisis and its NPL ratio subsequently dropped back to normal. Although Nigeria is indeed seeing a new increase in its NPL ratio starting in 2015, the current NPL value of 9.300% (as of Dec. 2019) is not nearly as high as the 37.300% that was reached at the peak of the financial crisis in 2009. The Ukrainian economy, on the other hand, never fully recovered from the financial fallout in 2009, and their NPL ratio drastically increased since then. The current value of 48.400% is nearly four times as high as the 13.700% peak reached during the 2008-09 financial crisis. The stark contrast between the effect of the financial crisis and the subsequent NPL recovery provides valuable insight into the effectiveness of different types of approaches used by national governments to recover from financial crisis and, more importantly, decrease the national average NPL ratio so that banks are minimally impacted afterwards.



**Figure 2.:** Chart of NPL ratio trends of five selected countries from 1998 to 2019. Some economies recovered better from the 2008-2009 financial crisis better than others. Sourced from data released by various national governments.

There are also economies of interest for researchers because the average of their NPL ratio has been steadily decreasing or has taken on a significant downwards trend. The reason for these trends may be natural—no governmental actions were taken—or the result of legislative action. The Pakistani economy is an excellent example. During 1998-2003, the average NPL ratio hovered around 20% with a high of 23.400% in 2001 and a low of 17.000% in 2003. Comparing this to the 2015-2019 data, there is a significant decrease and the NPL ratio now hovers at only about 10% (refer to Figure 3) with a high of 11.359% in 2015 and a low of 9.100% in 2019. The Russian economy experienced a similar trend when the average NPL ratio from the 1990s (about 15%) decreased significantly to about only 3% in the early to mid-2000s before going back up. Indeed, however, when data for 2020 is eventually released by nations, the impact of COVID-19 may have significant impacts on these numbers like the 2008-09 financial crisis did. In all, the trend of NPL ratios and how governments address fluctuations in their national NPL ratios is an area of intense interest and debate. In the aftermath of the 2008-09 and heading into the new world after COVID-19, the NPL ratio of banks will be crucial to maintaining both financial stability and investment growth in countries.

## 2. Methods and Methodology

The methodology used in this paper seeks to use mathematical relations to investigate. In this section, many of the mathematical definitions and processes used in the results and findings section will be proved and explained, if necessary. This paper sets the loans that have already defaulted as the  $\phi$  variable. Thus, by definition, the total amount of

nonperforming loans at a specific bank, represented by  $\alpha$ , would be all the non-performing loans of that bank summed. This is represented by the equation:

$$\alpha = \varphi_1 + \varphi_2 + \varphi_3 + \cdots + \varphi_n$$

However, NPL ratios include performing loans that are close to or at risk of defaulting, as well as reperforming loans that are close to or at risk of re-defaulting. Thus, the equation for the NPL ratios explored in this study also has to include that variable. If the variable  $\varepsilon$  is set to represent a performing or reperforming loan that is at risk of becoming non-performing, then the total amount of these loans, represented by the variable  $\beta$  can be expressed by the following equation below:

$$\beta = \varepsilon_1 + \varepsilon_2 + \varepsilon_3 + \cdots + \varepsilon_n$$

All performing loans, as well as reperforming loans not at risk of defaulting and non-performing loans that are expected to become reperforming in the near future, can be represented by  $\rho$  and the  $\gamma$  variable representing the total amount. Thus:

$$\gamma = \rho_1 + \rho_2 + \rho_3 + \cdots + \rho_n$$

To make the mathematical calculations later in this paper easier to understand, the variable  $\omega$  is set to represent the total amount (both non-performing and performing) of loans at a given bank (or in a given economy) at any given time. Thus:

$$\omega = \alpha + \beta + \gamma$$

With these equations and variables above defined, it can be derived that  $\partial = \frac{\alpha + \beta}{\omega}$  where  $\partial$  is the NPL ratio of the bank and where  $0 \leq \partial \leq 1$ , which means that  $\alpha + \beta \leq \omega$ .

A simple calculation of the a NPL ratio of a bank is given here: Support that a bank has a portfolio of \$600 million. The bank has \$80 million worth of non-performing loans and an additional \$25 million worth of performing loans that are at risk of becoming non-performing. Its simple NPL ratio would be:

$$\text{Simple NPL Ratio} = \frac{\$80,000,000 + \$25,000,000}{\$600,000,000} = \frac{\$105,000,000}{\$600,000,000} = 0.175 = 17.5\%$$

The main calculation done in this paper will include or choose to not include units per the situation revolving the problem at hand. If the problems does call for it, it will do.

This method of calculation will be used to derive all NPL ratios in this paper unless another method is otherwise stated. Mathematical reasoning and work may be grouped into one step as repeating the same work complicates the mathematics in the paper.

### 3. Results

The results and findings of this study is separated into two major sections. The first of which summarizes the findings based on data presented in the Introduction, methods introduced in afterwards, as well as data that has yet been presented (but will be introduced late in this section). The second section introduces supporting graphics and data which backs up claims made not only in this section but in previous ones as well.

### 3.1. Impact of high NPL ratios on individual banks

Using the data provided in the initial introduction to this paper, as well as other sources and original findings, a conclusion of the following impact of high NPL ratios can have on an individual bank's lending trends and profitability is below (in no specific order):

- i. High NPL ratios cause a contraction in bank credit supply.
- ii. Short-term loans are significantly favored over long-term loans.
- iii. Increased risk of bank shutdown or failure.
- iv. Distorted credit allocation; imbalance of credit spread in the bank.
- v. Decreased number of loaners and customers registering at the bank.

A high NPL ratio also has impacts on the national economy, through data presented above as well as graphs and logistics presented below, the impact of high NPL ratios can have on an entire national economy is given below (in no specific order):

- i. Drastic decrease in market confidence.
- ii. Significant decrease in total amount of loans given out in the aftermath.
- iii. A significant contraction in national loan supply.
- iv. Slows economic growth and impacts rate of nominal GDP growth.
- v. National banks and treasuries have heightened responsibility to not only support local banks but also actively decrease the high NPL ratios present.

### 3.2. Impact of high NPL ratios on national economies

With the impact of high NPL ratios summarized, this study also found (from data and experts) that the main impact of national governments decreasing high NPL ratios has a significant impact on the national economy—almost always a positive impact for that (refer to data in Table 1 and Table 2).

- i. Economies experience an influx of new credit supply.
- ii. Previously distorted credit allocation becomes undistorted.
- iii. Significant uptick in the rate of credit growth.
- iv. Improved confidence in the overall health of the national economy.
- v. Significantly improved

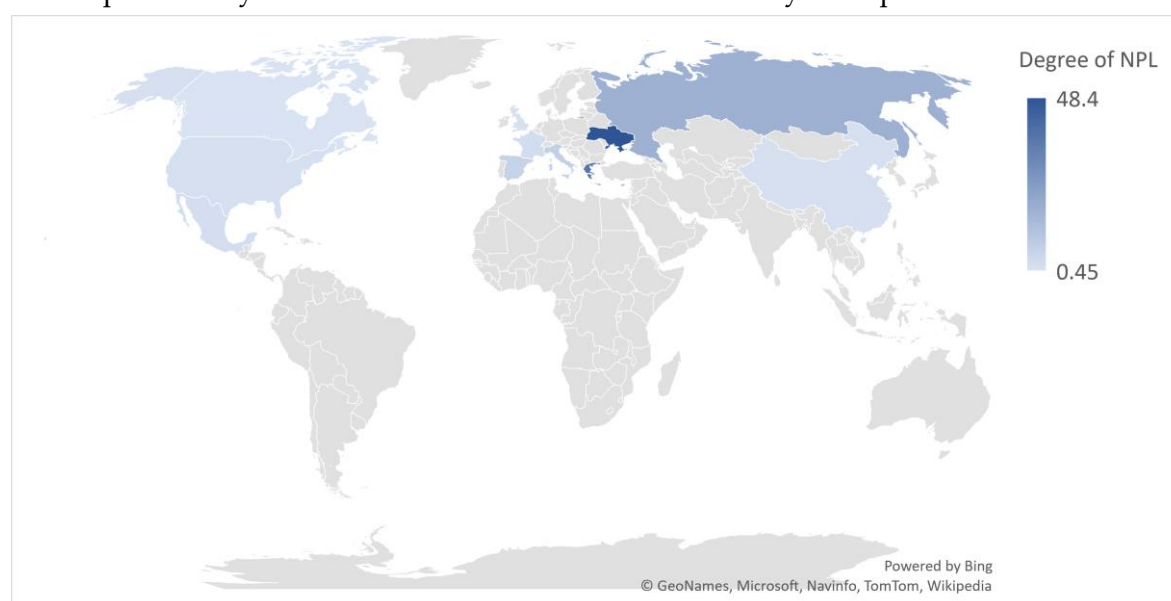
**Table 1.** Numeric data of NPL ratios for five selected countries from 1998 to 2007. These trends of the ratios represent that of the pre-financial crisis data.

	Ukraine	Pakistan	Russia	Tunisia	Nigeria
1998	35.800	19.500	17.300	19.500	19.400
1999	35.800	22.000	13.400	18.800	25.600
2000	29.600	19.500	7.700	21.600	22.600
2001	25.100	23.400	6.200	21.000	19.700
2002	21.900	21.800	5.600	21.400	21.400
2003	28.300	17.000	5.000	24.200	20.500
2004	30.000	11.600	3.300	23.600	21.600
2005	57.990	8.300	2.600	20.900	21.600
2006	59.760	6.900	2.400	20.900	9.300
2007	48.120	7.600	2.500	20.900	9.5000

**Table 2.** Numeric data of NPL ratios for five selected countries from 2008 to 2019. These trends of the ratios represent that of the post-financial crisis data.

	Ukraine	Pakistan	Russia	Tunisia	Nigeria
2008	3.880	9.100	3.800	20.900	6.300
2009	13.700	12.200	9.530	13..200	37.300
2010	15.270	14.748	8.230	13.000	20.143
2011	13.470	16.207	6.590	11.300	5.772
2012	16.540	14.471	6.030	12.800	3.705
2013	12.890	12.987	6.000	14.500	3.393
2014	18.980	12.266	6.730	13.800	2.960
2015	28.030	11.359	8.350	14.500	4.861
2016	30.470	10.056	9.440	14.100	12.815
2017	54.540	10.000	10.000	14.300	12.820
2018	52.850	9.500	10.120	14.500	10.210
2019	48.400	9.100	16.900	14.600	9.300

The paper found a statistically significant relationship between changed lending trends of a bank and high NPL ratios. Specifically, banks tended to decrease the total amount of loans as well as switch types of loans to make loaning safer for their profits. It is also found that a bank's profitability suffers when their NPL ratios increase beyond a point.



**Figure 3.:** Table 1 & 2 numeric data of NPL ratios for five selected data from 1998 to 2019 visualized.

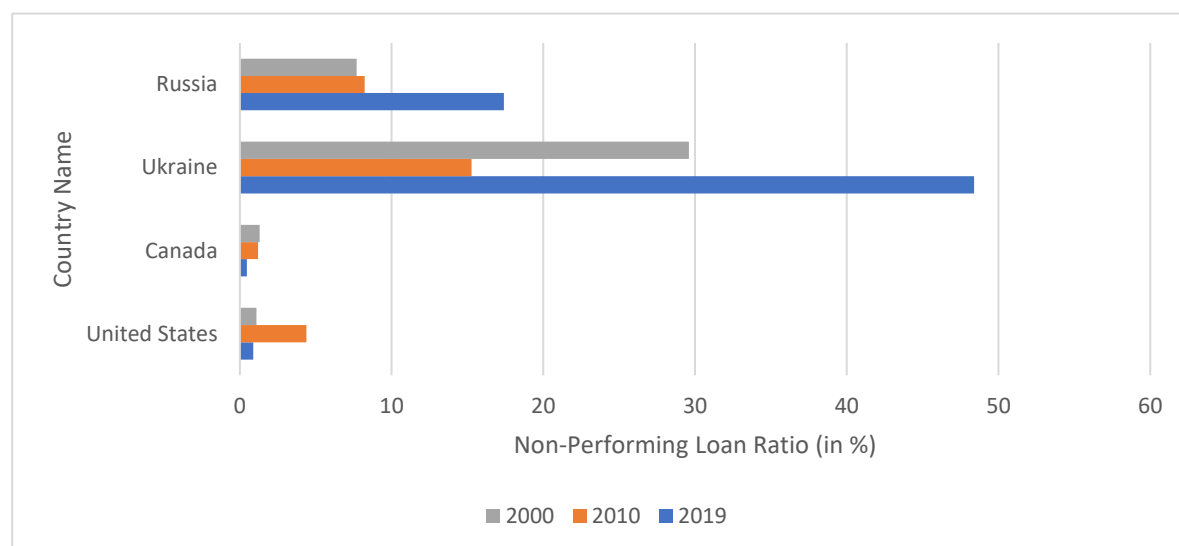
### 3.3. Recovery from ratios

An interesting phenomenon occurs when countries with fallacies in their economic policies are compared with countries with strong backing of economic policies or plans to reduce NPL ratios and keep them under control.

**Table 3.** Numeric data of NPL ratios for four selected countries in the year 2000, 2010, and 2019. Sourced from individual government data released on those respective years.

	United States	Canada	Ukraine	Russia
2000	1.09	1.30	29.60	7.70
2010	4.39	1.19	15.26	8.23
2019	0.89	0.45	48.40	17.40

The information from this data graph is more easily visualized when plotted on a graph (refer to Figure 4). OCED economies that previously had low levels of NPL ratios saw minor spikes during the financial crisis but quickly recovered due to strong government policies and backing of the federal reserve system in the U.S.. In less-developed economies, such as the Ukrainian one, the damage suffered from the 2008-09 financial crisis continued into the decade after, and some of these economies still have not yet to recover to date. They all still have high levels of NPL ratios.



**Figure 4.:** Chart of NPL ratio trends of five selected countries from 1998 to 2019. Some economies recovered better from the 2008-2009 financial crisis better than others. Sourced from data released by various national governments.

Indeed, the recovery of various economies to an external pressure that induces a large spike in the NPL ratio gives many clues into how healthy the economic policies of that nation are and how prepared the economy is for another possible recessional period. It also gives insight into market confidence there.

The topic of high NPL ratios in national economies has been the focus of many research projects across the world in recent years. The relationship between NPL ratios and the overall health of a national economy is well-established; a meta-analysis by a team of researchers in 2019 led by Professor Shihadeh, Gamage, and Hannon clearly showed the relationship between the increasing NPL ratios in select countries and the impact they had. In addition to that study, multiple studies conducted at universities around the world point to the fact that a high NPL ratio is a primary indicator for bank failure. If taken at the



macroscopic view, a national economy that has a high NPL amount when compared to the total loan or even nominal GDP has been shown through research to indicate a weaker economy that is at greater risk to a recession than normal economies.

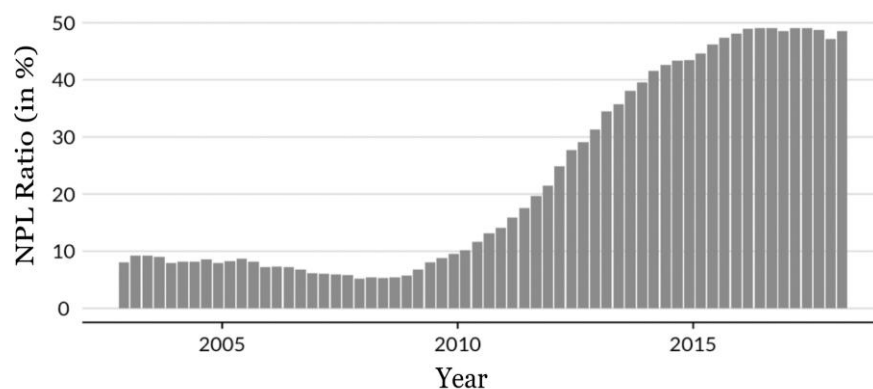
#### 4. Discussion

As seen in this Results section and the preceding sections and data presentation, the national economic policy, combined with adequate plans to reduce NPL ratios when it becomes too high or becomes out of control, is essential to keeping a healthy level of NPL ratio in the economy. If the NPL ratio becomes too high, there are many consequences (as discussed in this section). The high NPL countries will need to adopt economic policies that can properly lower the national NPL ratio, otherwise both their economic growth as well as the commercial banking sector will be damaged. Many of these countries' problems originated at the end of the 2008-09 financial crisis and have not recovered. Even countries like the US experienced an upsurge in its NPL ratio, but some countries recovered better from the surge than others. This was mainly due to a combination of plans to decrease the NPL ratio as well as control over the commercial banking sector to allow recoveries to occur quickly yet naturally over the course of years.

It is important to note the potential impact of the COVID-19 pandemic and how that may impact the NPL ratios of not only banks in pandemic breakout regions but as well as countries suffering from the economic and social reel back of the pandemic. The responses to COVID-19 has varied from country to country, but the general expected trend is for NPL ratios to go up in COVID-19 impacted regions. This follows the logic that loaners are not able to pay back their loans with the COVID-19 induced financial stress. If loaners are not able to pay back, the loans become non-performing—thus causing the rate to rise. If nations are able to effectively hand out a plan that gives stimulus incentives to banks, loaners, or both, the NPL ratio may be maintained at a healthy level that does not involve the national NPL ratio to rise significantly after COVID-19. This, however, may not necessarily solve the issue of at the local bank level.

The COVID-19 pandemic may also exacerbate already high NPL ratios in economies like Russia, Ukraine, and the like. These consequences combined with the leftover high ratios from the 2008 to 2009 financial crisis may make it even more difficult to recover. These governments will need smart planning and sensible economic policies in order to facilitate a partial or full recovery from not only the COVID-19 pandemic socially, but also in their non-performing loan amount and how much they can make in profits. It should be noted that the Ukrainian economy has seen a recent downtick in their NPL ratios, which may suggest an end to the decade-long high levels of NPL ratios there.





**Figure 5.:** Greek economy non-performing loan ratio from Year 2000 to Year 2019 (as a percentage).

It is also important to mention findings about the effectiveness of government regulations. It is found that handing out incentives for banks during recessionary periods allows the ratio to stay down by ensuring the banks are still able to keep an even spread on their loan types. It also helps to decrease the ratio if national governments give incentives to their citizens to take out loans. This includes tax cuts or even cash incentives that allow citizens to take out loans and get a reward for that action. The paper found that the more effective government comes from giving incentives.

## 5. Conclusion

This study has shown that the economies with higher NPL ratios are more prone to economic consequences and repercussions that economies with lower NPL ratios are less at risk of. It has also shown that high NPL ratios damage both individual banks as well as the national economy if too many banks in a country have unnaturally high ratios. Non-performing loans play a key role in not only bank functioning but also maintaining confidence in the market, how credit is allocated in the country, all the loans given out, the total amount of loans available, as well as the risk of possible credit distortion. Countries that can maintain low levels of NPL ratios receive benefits such as increased market confidence, an even spread of credit supply, and large supply of loans. Nations that work actively to decrease a high NPL have been shown to have significant positive long-term results that includes boosting bank loaning and lending behavior to increase the total amount of loans. Indeed, a low non-performing loan ratio is beneficial to not only the bank but also to the citizens and governments and the overall economy. Governments and lawmakers around the world draft different ways to maintain low NPL ratios as well as bring them down when needed to.

**Research Funding:** This research received no external funding.

**Acknowledgments:** I would like thank the dedicated reviewers of this paper prior to publishing.

**Potential Conflicts of Interest:** The author declares no conflict of interest in this research.

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