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Selling non-performing loans: new evidence from Ukraine

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Content

Abstract	3
Introduction	4
Non-performing loans: Issues	4
Standard approaches to resolution of non-performing loans	5
Standard approaches to selling non-performing loans	7
International benchmarks: Results of NPL resolution around the world	8
Ukraine's strategy for resolution of non-performing loans	10
The case of electronic auction system in Ukraine	12
Auction performance in resolution of non-performing loans in Ukraine	13
Data and periods	14
Capacity of the auction to bring high revenue of the seller	14
Capacity of the auction to stimulate competition	18
Other features of the NPLs sales auctions in Ukraine	21
Discussion: Implications from Ukraine	22
Conclusions and recommendations	23

Abstract

Resolution of non-performing loans (NPL) in the banking system is an important problem in many countries. The strategies for resolution vary widely and are often complex and burdensome. This paper reviews the process of resolution of non-performing loans of the insolvent banks in Ukraine in the period from 2016 to 2018. This period of resolution followed the major macroeconomic crisis of 2014-2015 that led to insolvency of almost half of 180 commercial banks, holding 30% of total assets of the banking system. The total (estimated) value of the loans put for resolution is approximately EUR 14.7 bln. Ukraine's strategy was to resolve these assets through auction fire sales, using Ukrainian platform ProZorro.Sale. For the period from October 31, 2016 till July 25, 2018, we estimate that the auctions recovered the estimated 22% of the total loans' face value generating the average contract value to face value ratio of 30%. These estimates are likely to be a lower bound since (1) a substantive share of assets are still in the process of resolution and (2) the method of NPL face value estimation used in Ukraine inflates the face value unlike methods used in other countries. Over the period of study, Ukraine has used two types of auction: Reverse ProZorro auction and Hybrid Dutch auction. Hybrid Dutch auction was introduced in October 2017 to address the issues of inefficiency due to certain strategic behavior of the bidders and suppression of competition because of asymmetric information. Our results show that Hybrid-Dutch auction lead to higher revenues and more competition.

Introduction

This paper reviews the process of resolution of non-performing loans of the insolvent banks in Ukraine in the period from 2016 to 2018. This period of resolution followed the major macroeconomic crisis of 2014-2015 that led to insolvency of almost half of 180 commercial banks, holding 30% of total assets of the banking system. The total (estimated) value of the loans put for resolution is approximately EUR 14.7 bln.

Ukraine is a young democracy with weak political institutions, weak legal framework, and with large number of politically exposed persons among debtors. Furthermore, the property rights over the loans are frequently undefined or disputed. Ukraine's strategy was to resolve these assets through e-auction fire sales, using a hybrid multi-platform ProZorro.Sale. Electronic multi-platform implementation of the auctions has helped to insure expediency, transparency, and enforcement of the rules of the auctions and resulted in quick resolution of the loans. The strategy employed in Ukraine can be applied in other economies with similar institutional issues.

For the period from October 31, 2016 till July 25, 2018, we estimate that the auctions recovered the estimated 22% of the total loans' face value generating the average contract value to face value ratio of 30%. Using these metrics, Ukraine performed better than Thailand (1999-2003), Mexico (2007-2011), Brazil (2007-2011), Nigeria (2011-2015) and worse than Indonesia (1997-2003), Malaysia (1998-2003), and South Korea (1997-2003). Indonesia, Malaysia and South Korea established Asset Management Companies for non-performing loans that employed multiple approaches including sales and restructuring. Weak institutional environment limits the ability of the Ukrainian government to use complex approaches with diverse resolution methods.

The above estimates for Ukraine are likely to be a lower bound since (1) a substantive share of assets are still in the process of resolution and (2) the method of NPL face value estimation used in Ukraine inflates the face value unlike methods used in other countries.

Over the period of study, Ukraine has used two types of auction: Reverse ProZorro auction and Hybrid Dutch auction. Hybrid Dutch auction was introduced in October 2017 to address the issues of inefficiency due to certain strategic behavior of the bidders and suppression of competition because of asymmetric information. Our results show that Hybrid-Dutch auction lead to higher revenues and more competition.

Non-performing loans: Issues

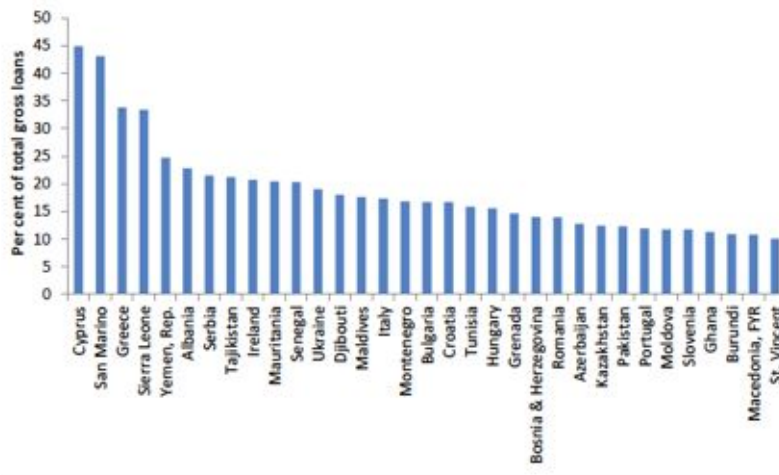
Non-performing loans (NPLs) are defaulted loans that banks are unable to profit from¹. NPLs are a problem for many countries around the globe. According to World Bank, in 2014 in at least 33 countries, the share of NPLs in total gross loans was higher than 10% reaching 45% in Cyprus and 35% in Greece² (

¹ Petersson, J., & Wadman, I. (2004). Non-performing Loans-the markets of Italy and Sweden; Balgova, M., Nies, M., & Plekhanov, A. (2016). The economic impact of reducing non-performing loans

² Balgova, M., Nies, M., & Plekhanov, A. (2016). The economic impact of reducing non-performing loans; Nkusu, M. M. (2011). Nonperforming loans and macrofinancial vulnerabilities in advanced economies (No. 11-161). International Monetary Fund.

Figure 1).

Figure 1. Countries with NPL ratio above 10% to gross total loans, 2014
NPLs to total gross loans



Source: Balgova, M., Nies, M., & Plekhanov, A. (2016). *The economic impact of reducing non-performing loans*; World Bank Development Indicators (WDI) and International Monetary Fund

NPLs affect economy by distorting allocation of credit, decreasing market confidence, which ultimately damages economic growth³.

NPL resolution is difficult. First, there is no standard strategy to timely identify and prevent a surge in NPLs. Second, a debtor is considered to be in default if payment is *past due by more than 90 days* or a fulfillment of obligation.^{4 5 6 7} Yet, this definition is legally enforced only in the EU, while being used on voluntary basis in other countries. Third, because of complementarities and systemic interdependencies the amount of NPLs can grow very quickly, triggered by various exogenous economic shocks. Financial crises, significant losses of state-owned enterprises, collapse of real estate bubbles, credit mismanagement can all trigger massive amounts of NPLs.^{8 9} Finally, NPL resolution is a very long and tedious process that involves multiple economic agents and might be subject to multiple context-specific institutional details.

³ Ibid

⁴National Bank of Ukraine, "The National Bank of Ukraine'S New Approach to Defining Non-Performing Exposures/Loans". 2017. Kyiv, May 2017.

⁵European Commission. "International Accounting Standard 39 Financial Instruments: Recognition and Measurement", 2011.

⁶European Parliament and the Council of European Union, *REGULATION (EU) No 575/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012*, 2013.

⁷European Central Bank, "Guidance to banks on non-performing loans", March 2017

⁸ Petersson, J., & Wadman, I. (2004). Non-performing Loans-the markets of Italy and Sweden.

⁹ Xu, M. (2008). Resolution of non-performing loans in China

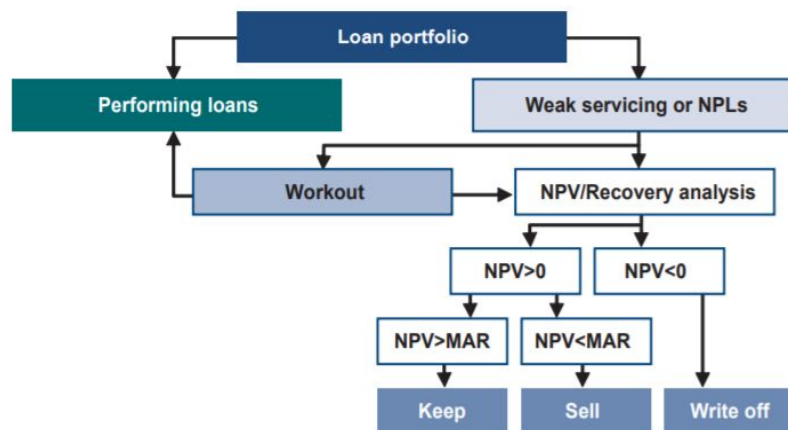
Standard approaches to resolution of non-performing loans

The process of NPL resolution is complex¹⁰. The following are the standard methods to resolve NPLs: forbearance, restructuring implementation in court, out-of-court-settlement, collateral enforcement, write-off, and sale. There is no common yardstick on how to decide whether an asset should be sold or kept. The decision can depend on a ratio between the net present value and market attractiveness (see Figure 2). In some cases, banks also follow general frameworks suggested by governments.

For illustration, we briefly consider three examples: Germany, Greece, and the US. They have different contexts of how the state and banks deal with NPLs. In all cases, however, there is a complex relationship between banks and state agencies.

Germany employs the so-called Minimum Requirements for Risk Management (MaRisk) which is a framework for the management of all significant risks based on section 25a of the German Banking Act. According to this framework, banks are requested to define their own triggers for at least two categories of loans – intensified monitoring loans and problem loans. Banks are requested to review the risk classification of their loan portfolio yearly. The treatment of problem loans is audited by external auditors. Banks are allowed to sell loans, free to use third-party companies to manage their NPLs, and they can establish Asset Management Companies together with investment firms.¹¹ In **the US**, big financial firms sell NPLs through self-organized auctions (e.g. Freddie Mac or Fannie Mae). These firms have to evaluate borrowers according to requirements set by Federal Housing Finance Agency.¹² There is no centralized mechanism, even though sales of NPLs are overseen by national financial regulatory institutions since financial crisis of 2007-2009. In **Greece**, since the second half of 2015, banks are allowed to outsource troubled asset management to credit-servicing firms and sell NPLs to Asset Management Companies.¹⁷ Moreover, Greek banks were required to design and implement an NPL management strategy by setting up a dedicated NPL management unit and implementing a detailed reporting and monitoring framework for NPLs.

Figure 2. Strategy formulation



¹⁰ Bauzeand Murina. 2017. World Bank Group, Finance & Marketing.

¹¹ European Central Bank. 2016. "Stocktake of National Supervisory Practices and Legal Frameworks Related to NPLs"

¹² Federal Housing Finance Agency. 2017. "Enterprise Non-Performing Loan Sales Report".

There is no clear evidence which strategy is better. Moreover, many countries use mixed systems.

Standard approaches to selling non-performing loans

Banks and financial institutions sell NPLs when they cannot manage them effectively in-house, need to improve liquidity of the institution, maintain rankings (S&P, Fitch etc.), control market perception, and want to free up management resources or speed the time of financial recovery. Main buyers of NPLs are investment banks, special NPL funds, financial houses, asset management companies and other financial institutions. NPLs are sold for fraction of their initial value, so if they become performing again investors can gain from that.

A typical process of a sale is illustrated below (

Figure 3). However, the method of the sale could be different. NPLs can be sold through private placement, securitization, and auction.

Private placement is considered to a fast way of selling NPLs because information is tailored for specific investor, but there is no competition. Thus, price can be lower and the highest potential investor can be not reached. Securitization is the process by which assets with generally predictable cash flow and similar features are packaged into interest-bearing securities with marketable investment characteristics. This way of sales helps to reach the widest investor base. However, it requires rating procedure, thus it bears higher cost^{14 15}.

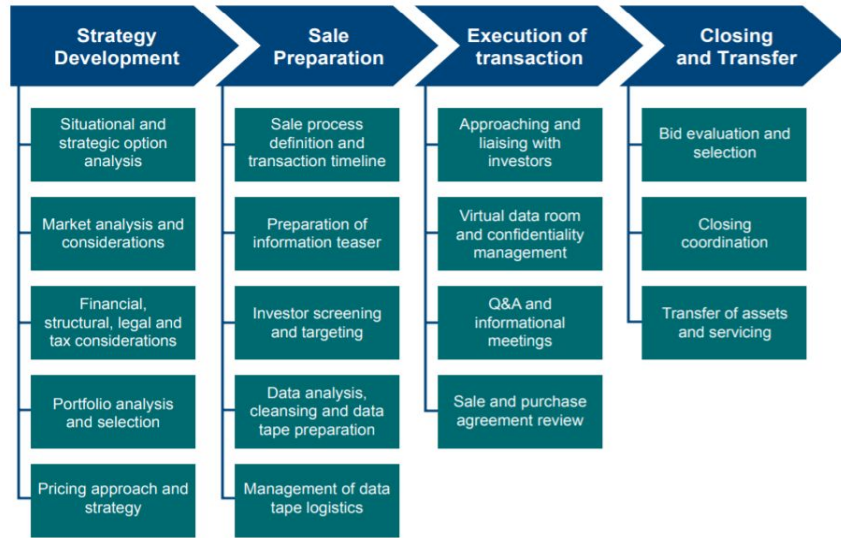
In auction process price is maximized and a wide base of investors is involved, however it is considered this process implies higher management costs.

¹³ International Finance Corporation (World Bank Group). 2018. "Distressed Asset Transfer Handbook: General Guidelines For The Purchase And Sale Of Distressed Assets In The Financial Sector"

¹⁴ Sękowski, Janusz. PriceWaterhouseCoopers. "Non-Performing Loan Sale Transactions". Presentation, Kiev, 2008.

¹⁵ Sękowski, Janusz. PriceWaterhouseCoopers. "Sale of non-performing loans". Presentation, 2009.

Figure 3. A typical sale process of an NPL



Source: International Finance Corporation (World Bank Group). 2018. Page 20.

Auction is considered to be the most efficient method to sell NPLs. Although it is sometimes associated with high costs of management and organization, as we will show further in the text, in Ukraine a convenient online platform was created to tackle this issue. This online transparent platform ProZorro.Sale was a groundbreaking achievement in Ukraine that managed to generate revenues with low costs for the state.

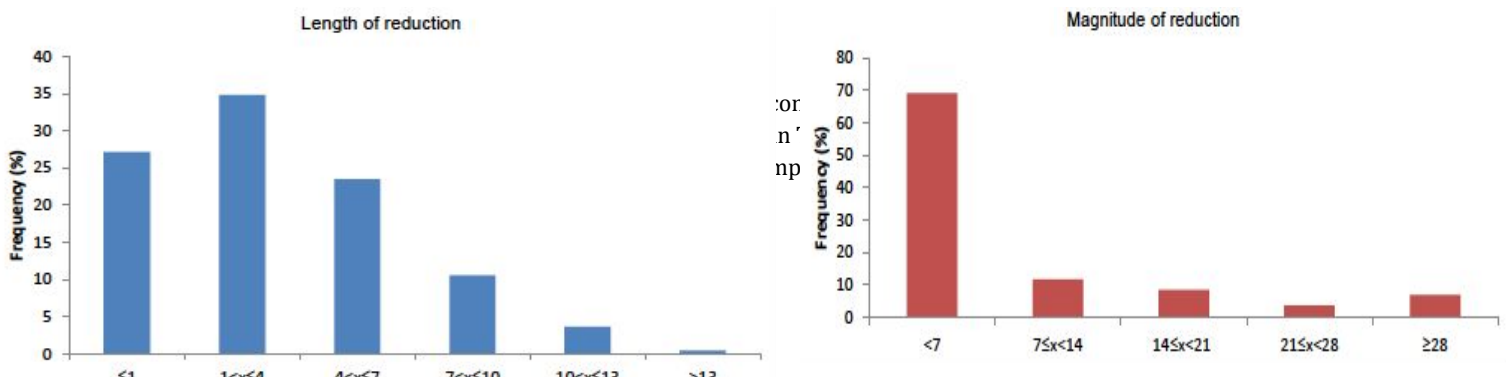
International benchmarks: Results of NPL resolution around the world

Comparing success of dealing with NPLs around the globe is quite challenging. The data are scarce, not harmonized, often incomplete, and scattered across various reports and studies with no single methodology. Most of the reports are focused on the NPL stock held by banks. Such studies tend to report isolated case studies of some transactions (e.g. sale of a particular bank or a particular asset). Most importantly, it is often the case that the reason why the stock of NPL declines or increases in a given year is not identified¹⁶.

Some research exists in terms of the *ratio of NPLs to the total stock of all depths* in the country. A research of 100 countries during the period 1997-2014 has shown that when actions of NPL reductions were taken, most often the NPL ratio to all loans and credits decreased around 7 percent. The same research has shown that shorter NPL reduction periods were more common. Around 60 percent of all episodes typically end within four years¹⁷.

In other words, the large-scale analysis shows that it takes about four years to solve about half of NPLs.

Figure 4. Magnitude and length of NPL reduction in 2014 (same data as for Figure 1)



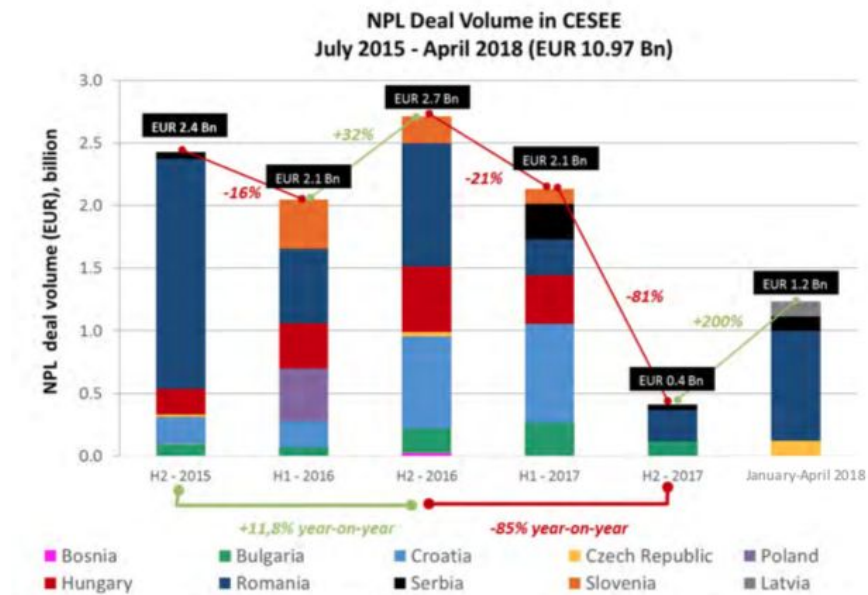
Source: Balgova, M., Nies, M., & Plekhanov, A. (2016). *The economic impact of reducing non-performing loans.*

Considering the CESEE¹⁸ region (which is a relevant point of comparison for Ukraine), in 2015 and 2017 years total NPL sales of these countries ranged from 0.4 Billion Euro to 2.4 Billion Euro. At the same time, as our data show, in Ukraine, over one year and 9 months, **from October 31, 2016 till July 25, 2018**, the auction platform ProZorro.Sale managed to sell NPLs for 194.7 mln Euro.

The comparison between these countries and Ukraine is not entirely correct. The data of Vienna Initiative presented on Figure 6 include selling toxic assets of different banks in a respective country. In Ukraine, however, toxic assets sold via auctions are assets of bankrupt banks. Had Ukraine sold toxic assets of working banks, the amount of realized NPL would have been even higher.

Figure 5. Realised NPL portfolio transactions in CESEE based on publicly available data

(July 2015 to April 2018)



Source: NPL Monitor for the CESEE region, H1 2018. By Vienna Initiative

While most of the data available in the sources are difficult to compare with the case of Ukraine, there are some exceptions. A number of Asian countries went through financial crises in the late 1990s and early 2000s.

¹⁸ NPL.Vienna Initiative Monitoring includes the following countries to the region: Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Hungary, Latvia, Poland, Romania, Serbia, Slovenia

South Korea, Indonesia, Malaysia and Thailand established special Asset Management Companies to deal with NPLs and left reasonably transparent data¹⁹. As the source of the data indicates, Korea's KAMCO and Malaysia's Danaharta are considered relatively successful. In contrast, Indonesia's IBRA and Thailand's TAMC are considered to be less successful.

Of the four, TAMC has the least cash recovery ratio. One of the reasons of that is its dependence on debt rescheduling strategy instead of sales of loans and assets as KAMCO and Danaharta have done.

Putting this information in the comparative perspective, **Ukraine put on sale approx. EUR 14.7 bln to recover 22% (EUR 194.7 mln) of the total auctioned NPLs face value and generate average price of sale of 30% (contract value to face value) over 21 months (between October 31, 2016 till July 25, 2018).**

Ukraine has followed a strategy of selling NPLs via auctions in contrast to the TAMC (Thailand). The latter followed a strategy of debt rescheduling.

KAMCO (South Korea) was established in 1997, and Danaharta (Malaysia) was established in 1998. It took about five years for them to recover 47.4% and 58.7% of NPLs' face value respectively. Considering cash recovery rate over disposed assets, Ukraine performed better than Slovakia, Czech Republic, Nigeria, and Brazil (Table 1).

Table 1. Examples of public Asset Management Companies

Name of the Asset Management Company	Assets transferred	Cash recovery rate (over face value of transferred assets)	Cash recovery rate (over amount of disposed assets)
Indonesia (IBRA, 1997-2003) *	Rp 305.77 trillion	31.4%	44.6%
Malaysia (Danaharta, 1998-2003) *	RM 52.44 billion	34.1%	58.7%
South Korea (KAMCO, 1997-2003) *	USD 91.75 billion	29.2%	47.4%
Thailand (TAMC, 1999-2003) *	Bt 784.378 billion	1.81%	2.46%

¹⁹ For example, see (1) Cerruti, Caroline, and Ruth Neyens. Public asset management companies: a toolkit. The World Bank, 2016. (2) Terada-Hagiwara, Akiko, and Gloria Pasadilla. "Experience of Asian Asset Management Companies: Do They Increase Moral Hazard?-Evidence from Thailand." (2004).

Mexico (2007-2011) **	USD 500 mln		20.0%
Brazil (2007-2011) **	USD 600 mln		15.0%
Nigeria (AMCON, 2011-2015) **	USD 27 814.6 mln		10.0%
Czech Republic (Czech Konsolidacna) **	USD 600 mln		5.0%
Slovakia (Slovak Konsolidacna) **	USD 400 mln		2.5%
Ukraine	USD 14.7 bln	22%	30%

*Source of the table: Cerruti, Caroline, and Ruth Neyens. Public asset management companies: a toolkit. The World Bank, 2016.

** Source: UST report

Ukraine's strategy for resolution of non-performing loans

While most of the issues with NPLs in the EU are connected to trade and transparency/asymmetry of information, Ukraine had bigger problems. Its NPL market is loosely defined and its regulations are far from being harmonized with the EU.

In 2015-2017, the issue of NPL increased dramatically. Due to devaluation of the national currency, economic decline, occupation of a part of Ukraine's territory, and increase in the share of insolvent debtors, the government executed the bank cleansing and the nationalization of Privatbank. This resolved a number of systemic problems. However, the cleansing brought about long-term challenges. The state became the owner of about half the assets of the banking system, 62% of the population's deposits, and four out of the top ten banks²⁰.

In 2016 the Ministry of Economic Development and Trade of Ukraine, Transparency International Ukraine, the Deposit Guarantee Fund, the National Bank of Ukraine and the Ukrainian electronic platforms launched an electronic auction system designed to sell state property. The major goal of this system is to sell Ukrainian toxic assets (including NPL) quickly while eliminating possible collusion.

²⁰ National Bank of Ukraine. (2017). Yearly report.

On Nov 10, 2017, Deposit Guarantee Fund (DGF) has changed the auction format of this system for selling property rights on loans of the dissolved banks. The new format was a hybrid Dutch auction²¹. The old format was a reversed Prozorro auction. This change has increased competition in the market. In what follows we present empirical evidence to support this claim.

The key features of the Ukrainian strategy were:

- 1) Sale of the NPLs via independent electronic hybrid multi-platform sales system, ProZorro.Sale.
- 2) Use of auctions to define the sale price.
- 3) Sale of the NPLs with frequently undefined property right for the NPLs, before the end of the litigation process.
- 4) Use of two auctions, the latest of which in terms of introduction, being designed specifically to increase the speed of sale, and tackle the comparative advantage of the insiders.

Below we outline the context in which Ukraine developed the NPLs workout strategy. We also describe some key features of this strategy in more detail.

As we discussed above, there are various strategies to deal with NPLs besides sale: forbearance, restructuring implementation in court, out-of-court-settlement, collateral enforcement, write-off, and sale. In Ukraine, there were some structural conditions that influenced a decision to create the online platform Prozorro.Sale to execute sales via auctions:

- 1) Ukrainian law (“About the system of guaranteeing deposits of individuals”) does not allow a simple write-off of the dept. Such action requires the voluntary consent of the two parties with further verification by a court. This makes the process long and not effective.
- 2) The DGF employed the “fire sale” strategy (i.e. fast and effective sale of NPLs) due to the specific legislative constraints that regulate the duration of bank liquidation. The assets that are managed by the DGF have to be sold during five years. Given the time constraints, an auction was seen as the most effective option (e.g. as opposed to the long process of litigations and write-offs).
- 3) When it comes to the sale, there are different strategies to perform it (private placement, securitization, auction). The current legislation of Ukraine “About the system of guaranteeing deposits of individuals” allows only auctions of assets.
- 4) In many countries, NPLs are going through a long and tedious court litigation before being placed for sale. This is done in order to establish and signal the market value of the asset. In contrast, in Ukraine, the strategy is to engage market players to decide on the value of the asset. In other words, in Ukraine, the auction is announced and then competitors try to establish its value. This strategy was implemented due to the uncertain legislative and political context. It was necessary to engage market

²¹ Mylovanov, Shapoval, Zapechelnuk, Huffman, Vohra, Sobolev. 2017. Selling Toxic Assets in Ukraine. Overview of the Current Situation and Suggestions for Improvement of the Auction Design.

competition quickly in order to avoid inside trading, to minimize the influence of the politically exposed persons who owned assets, and to sell faster.

Technically, the DGF is Asset Management Company because it manages the assets of insolvent banks. The DGF is responsible for organizing the sale of these assets. However, on September 2, 2016, the DGF signed an agreement with Transparency International (TI) to create an electronic trading system managed by TI. The reason to delegate the electronic trading system to TI was connected to the impeccable reputation of the latter. It was necessary to reduce potential risks from a conflict of interests when the DGF creates and manages its own sales system. The goal of this arrangement was to build a transparent and independent system which does not allow external influence on the sale of high-risk assets. A large number of the DGF debtors are politically exposed persons, and the value of their assets is difficult to assess in turbulent political and legal fields. Thus, the intervention of TI was seen as an efficient solution.

The methodology developed by Prozorro.Sale is especially suited for the context with weak political institutions; weak legal framework; and with a large number of politically exposed persons among debtors. In such a scenario a quick and transparent auction based on the online platform is an effective solution.

Moreover, there is a discussion that Prozorro.Sale could be successfully employed to sell assets of the state banks as well. At the moment, growing volume of NPLs influence state banks to use government bonds which adds pressure to the state budget. Quick online auction could help state banks to recover more value from NPLs.

The case of electronic auction system in Ukraine

Auctions could be executed in a number of different formats. Nevertheless, there are two most popular ones: the uniform-price sealed bid and ascending clock auction^{22 23}. While the first format is generally accepted as more robust to collusion, the second is considered to be better for information aggregation.

Although most of the literature about auctions assumes that revenue will be enhanced when all the possible information is revealed during the auction, this assumption does not consider a risk of collusion. For example, it is possible that “a bidding cartel will organize itself so that payments are only required from a cartel member who wins the object, with non-winning cartel members receiving payments from the cartel”²⁴.

Considering the case of Ukrainian toxic assets, at the beginning the descending clock format was established. However, it was suggested that this format did not work perfectly because the winners were likely to be insiders²⁵. Thus, the outsiders bid conservatively, if they participate at all, because they are not sure about the

²² Marshall, Robert C. and Leslie M. Marx (2007), Bidder Collusion, *Journal of Economic Theory* 133, 374-402.

²³ Hortaçsu, A., & McAdams, D. (2010). Mechanism choice and strategic bidding in divisible good auctions: An empirical analysis of the Turkish treasury auction market. *Journal of Political Economy*, 118(5), 833-865.

²⁴ Marshall, Robert C. and Leslie M. Marx (2009), The Vulnerability of Auctions to Bidder Collusion, *Quarterly Journal of Economics* 124(2), 883-910. Page 885.

²⁵ Mylovanov, Shapoval, Zapechelnyuk, Huffman, Vohra, Sobolev. 2017. Selling Toxic Assets in Ukraine. Overview of the Current Situation and Suggestions for Improvement of the Auction Design.

value of the assets. Therefore, an adjustment was suggested, i.e. to make another round of bidding after the Dutch auction stops. In this scenario, the bidders are able to update their estimates about the value of the asset after they see the stopping bid. After that, the one that stopped the clock can place one sealed-bid above the stopping bid. This design gives some advantage to weak (outside) bidders and drive prices up because it allows for an outsider to learn some information about the value of the asset in the auction.

To sum up, there are two types of Ukrainian auctions: ProZorro auction and a hybrid Dutch auction. The latter one was introduced in order to correct the former. It was designed in order to stimulate price discovery and, thus, decrease the role of insider trading and improve competition. In the case of “ProZorro” electronic auction, bidders start from the reserve price set by the Deposit Guarantee Fund, and make blind bids. After that, every bidder has a right to make 3 consecutive bids. The winner of the previous round bids the last in the current round. If the auction is not successful, it can be announced again at the 10% lower reserve price.

In the case of “Hybrid Dutch”, the downward clock starts at a balance value of an asset. Every 5 min the price decreases by 1%. When one of the bidders makes a bid equal to the price displayed, the auction stops. After this, all bidders make blind bids. The one who stopped the clock has a right to bid last. This design allows price discovery for all participants after the first round.

Why the second "Hybrid Dutch auction" is expected to generate higher revenues, improve competition, and ensure better allocation of resources? The key idea of this design is that the insider the one who knows the value of a lot. The insider, thus, is incentivized to stop the clock first in order to be the first who makes the best bid. However, then all other participants are able to see the bid (i.e. price discovery). When the price is known to all participants they can make new bids (one round). However, the one who stopped the clock has a right of the last bid. Thus, if insider wants to win the lot he/she has to pay more, thus improving the revenues of the seller.

Both of these auctions will be described further in the text in terms of their performance.

Auction performance in resolution of non-performing loans in Ukraine

Ukrainian NPLs resolution strategy performed better than the ones in Mexico (2007-2011), Brazil (2007-2011), Nigeria (AMCON, 2011-2015), Czech Republic (Czech Konsolidacna), Slovakia (Slovak Konsolidacna), in terms of average recovery rates it generated. Yet, it did worth than Asian countries. An important caveat is that the data for such benchmarks is extremely scarce.

As mentioned earlier, auctions performance can be compared in terms of their capacity to

- (1) Ensure efficient allocation of assets,
- (2) Bring high revenue of the seller
- (3) Stimulate competition,

While it is yet too early to discuss the efficiency of allocation of assets, one could analyze performance of the Ukrainian auctions in terms of revenues and competition. Below we describe the data and comparison results.

Data and periods

The data covers sales of NPLs of 88 banks closed in 2014-2017 within banking sector reform. NPLs sales in the dataset were initiated on the ProZorro platform between October, 31 2016 – July 25, 2018. The study relies on the machine-readable data of ProZorro.Sale central data base available via open API, and on manually collected data from the standard documentation (“passports”) that describe NPLs auctioned. Passports include information about the balance, also called face, value of the assets, collateral and its estimated value, estimate of the asset price by the company-estimator, and about possible litigations. Passports are available for majority of sold NPLs, yet not all. **Table 2** compares all data of auctions and the data with passports. Data with passports cover about 90 percent of all auctions in terms of their numbers.

Over October, 31 2016 – July 25, 2018, 129 159 auctions selling NPLs were announced and 4 485 completed. The first Dutch auction was announced on October, 9 2017 and completed on October, 20 2017. All in all, approximately 39,652 lots were auctioned within this period. NPLs are sold in “lots”, bundles of NPLs. The lot can be auctioned several times until it is sold. When the lot is not sold after certain threshold number of times, it can become a part of a large multi-lot bundle.

In the analysis below we sometimes divide the data into 2 periods: October 31, 2-16-October, 8 2017 (period 1) when only ProZorro auctions were run, and October, 9 2017-July, 25 2018 (period 2) when Dutch and ProZorro were run simultaneously.

Table 2. Comparison of the sample and general population, Oct,31 2016 - Jul, 25 2018, UAH mln

Indicator	Dutch	ProZorro	Dutch and ProZorro
Expected value of the NPL, UAH mln			
<i>Sample with passports available</i>	4 652	3 579	8 230
<i>General population</i>	5 551	4 389	9 940
%	84%	82%	83%
Contracted value, UAH NPL			
<i>Sample with passports available</i>	1 103	3 740	4 843
<i>General population</i>	1 367	4 576	5 942
%	81%	82%	81%
Number of auctions			
<i>Sample with passports available</i>	1 844	2 202	4 046
<i>General population</i>	1 960	2 521	4 481
%	94%	87%	90%

Source: ProZorro.Sale database. Database of assets` passports collected by the authors

Capacity of the auction to bring high revenue of the seller

Revenues of the auctioneer can be measured as a **total cash recovery rate over the face value of the NPLs put one sale**. Revenues depend on

- (i) Price at which the NPL is sold. Clearly, the higher is the price of every lot, the more the auctioneer can receive. This indicator is measured as average ration of contracted value to balance value;
- (ii) Speed at which the NPL is sold. The timing to sell the NPLs of the closed banks in Ukraine is limited to two years, which is motivated by the obligation to the depositors and high cost of NPLs administration by the DGF. In financial terms, the expected Net Present Value of the

NPLs decreases every day because of the “cost of the money” considerations. Speed, in terms, depends on:

- a. Average auction length from announcement to contract signature;
- b. Success rate of the auctions;

All in all, DGF recovered approx. 22% of NPLs sold with Dutch auctions recovering approx. 24% of the total face value of the NPLs sold, as compared to 19% for ProZorro²⁶ (Table 4).

Although the average sale price for ProZorro auction was higher, Dutch auction appeared to be much faster in selling the lots. Firstly, Dutch auction is allowed to start even when there is only one bidder, while ProZorro starts only with two. This is one of the factors why NPL-lots are sold one average from the first time on Dutch and from fifth time on ProZorro. Secondly, when the asset was of interest to more than two bidders, Dutch auction, on average generated higher competition among the bidders thus driving the price up. Thirdly, and not related to the design of the auction per se, Dutch auctions were announced in a way that allowed for more time between announcement and the auction, thus giving more time to the market to spread the information among the interested parties.

Below we look at factors that contributed to higher performance of the Dutch auction.

Price of sale.

Between Oct,31 2016 - Jul, 25 2018 Deposit Guarantee Fund put for sale UAH 464.5 bln (approx. EUR 14.7 bln) of NPLs if measured at expected value²⁷. They recovered UAH 5.9 bln in contracted value of the NPLs sold: UAH 1.4 bln for Dutch auction and UAH 4.6 bln²⁸ for ProZorro auctions (Table 3).

Table 3. Expected value and contract value of NPL-lots announced and sold, Oct,31 2016 - Jul, 25 2018, UAH mln

Period	Status	Dutch	ProZorro	Dutch and ProZorro
Oct, 31 2016 - Oct, 8 2017	Completed		2 262	2 262
	Total		117 515	117 515
Oct, 9 2017 - Jul, 25 2018	Completed	1 367	2 314	3 680
	Total	288 525	58 497	347 022
Whole period	Completed	1 367	4 576	5 942
	Total	288 525	176 012	464 537

Source: ProZorro.Sale database. Authors calculations

Average price of the NPL-lot sold was 30% of the face value: 28% for Dutch and 31% for ProZorro (Table 4).

Table 4. NPL balance value and contracted value for the auctions completed, Oct,9 2017 - Jul, 25 2018, UAH mln (based on the sample of data with passports)

²⁶ Total sum of contracts as a proportion of all the total face value of lots sold. Based on the data collected from the passports of NPLs.

²⁷ «В и с т а в л е н а в а р т і с т ь» of all the lots auctioned. Each lot is calculated only once. But if certain NPL entered different lots, this leads to double counting.

²⁸ All lots are counted either at the date of completion or, if the lot was not sold, at the first announcement date.

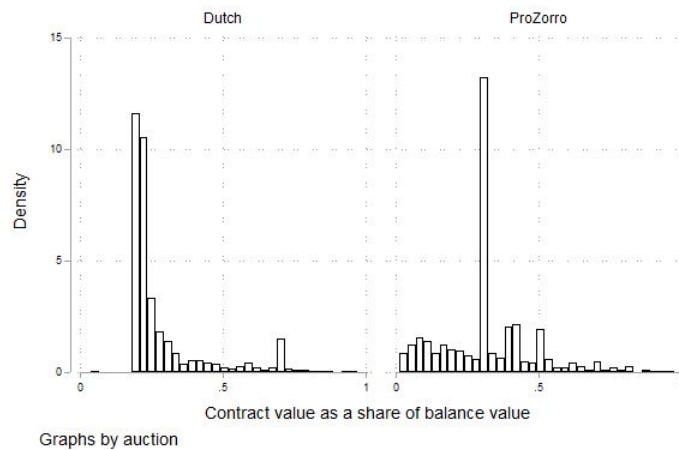
Indicator	Dutch and ProZorro		
	Dutch	ProZorro	
NPL balance value, UAH mln	4 548	18 859	23 407
NPL estimated value, UAH mln	956	2 539	3 494
Expected value of the NPL, UAH mln	4 613	3 484	8 096
Contracted value, UAH mln	1 097	3 644	4 740
<i>Contracted value/Balance value, total</i>	24%	19%	22%
<i>Contracted value/Balance value, average</i>	28%	31%	30%
<i>Contracted value/Estimated value</i>	115%	144%	136%
<i>Contracted value/Expected value</i>	24%	105%	59%
<i>Expected value/Balance value</i>	101%	18%	35%
<i>Estimated value/Balance value</i>	21%	13%	15%
<i>Estimated value/Contracted value</i>	87%	70%	74%
Sample size as compared to the dataset	94%	87%	90%

Source: Data collected from the passports of the auctions by the authors.

Although the average price is higher for ProZorro auction, total recovery is higher for Dutch. This can be explained by higher success rate of Dutch auctions: 9.5% of all Dutch auctions were completed, 2.3% of all ProZorro auctions were completed.

Furthermore, the distribution of recovery ratio points out that the Dutch auctions were more consistent. In contrast, the reversed ProZorro auction produced a wider range of outcomes. For the latter, the recovery ratio was not only smaller (Table 4) but also less consistent (Figure 6).

Figure 6. NPL recovery ratio for the auctions completed, Oct,9 2017 - Jul, 25 2018, (based on the sample of data with passports)



Source: ProZorro.Sale database. Authors calculations

Speed of sale.

Speed of selling via Dutch auction is higher than for ProZorro: it takes on average 2 months to sell the lot via the Dutch auction and 3 months to sell the lot via ProZorro auction.

Majority of lots were auctioned several times in ProZorro, thus the total period to sell them took longer. For those lots that were eventually sold, it took on average 1 time to sell it via Dutch, and 5 times to sell it via ProZorro auction. Repetitive auctioning is rather characteristic of the ProZorro auctions given that on average, each lot was auctioned 5 times (Table 5). This information is also plotted on Figure 7,

Source: ProZorro.Sale database. Authors calculations

Figure 8.

Table 5. Time to sell the lot via ProZorro and Dutch auction

Auction	Statistics	Months	Months	Number of times	
		to sell the lot	selling the lot	the lot was auctioned	
		Lot was sold	Lot was not sold	Lot was sold	Lot was not sold
Dutch	mean	2	0	1	1
	min	1	0	1	1
	max	4	3	5	8
ProZorro	mean	3	2	5	5
	min	0	0	1	1
	max	7	6	10	16
Total	mean	3	1	3	3
	min	0	0	1	1
	max	7	6	10	16

Source: ProZorro.Sale database. Authors calculations

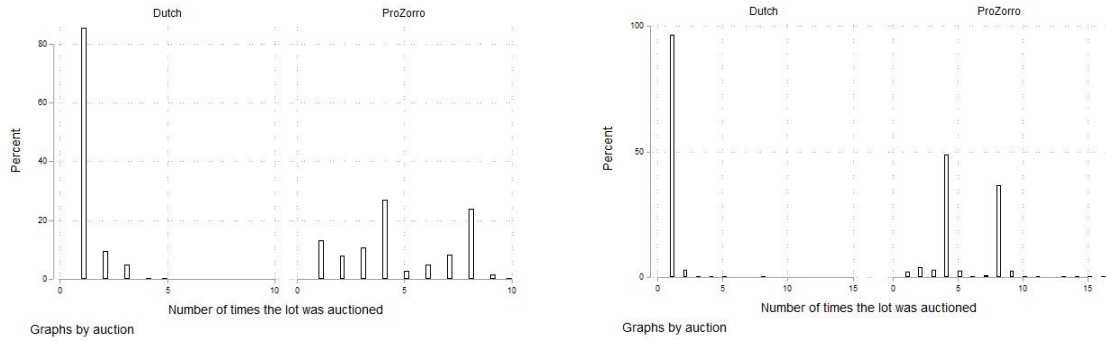
Dutch auctions had a higher success ratio than ProZorro auctions: 9.5% over 2.3% for ProZorro (Table 6).

Table 6. Number of lots auctioned and sold, Oct,31 2016 - July,25 2018

Period	Status	Dutch	ProZorro	Dutch and ProZorro
Oct, 31 2016 - Oct, 8 2017	Completed		1 257	1 257
	Total		13 993	13 993
Oct, 9 2017 - Jul, 25 2018	Completed	1 960	1 264	3 224
	Total	19 485	6 174	25 659
Whole period	Completed	1 960	2 521	4 481
	Total	19 485	20 167	39 652

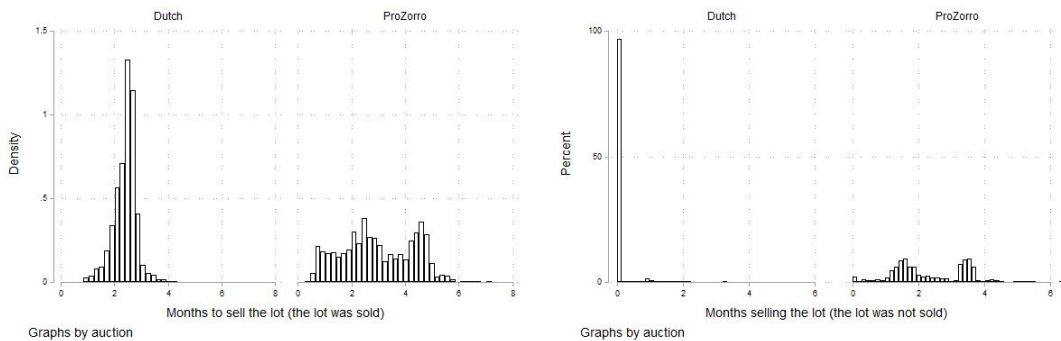
Source: ProZorro.Sale database. Authors calculations

Figure 7. Number of times the lot was auctioned (sold lots on the left, unsold – on the right)



Source: ProZorro.Sale database. Authors calculations

Figure 8. Months to sell the lot (sold lots on the left, unsold – on the right)



Source: ProZorro.Sale database. Authors calculations

It was also important for the auction results is that organizers scheduled Dutch auction in a way that allowed on average 46 days between the announcement and actual auction, while only 12 days was allowed for ProZorro (Table 7). This could have a significant impact on the results given that market could have more time to familiarize themselves with the announcement and prepare to the auction.

Table 7. Duration of an auction

Number of days	Mean		Min		Max	
	GL	P	GL	P	GL	P
Days btw auction & contract signature	22	20	2	0	63	66
Days btw announcement & contract signature	68	32	22	5	126	94
Days btw announcement & auction	46	12	2	1	93	197

Source: ProZorro.Sale database. Authors calculations

Capacity of the auction to stimulate competition
Number of bidders.

Average number of participants was lower for Dutch auction than for ProZorro: 1.7 participant per tender as compared to 2.2 for ProZorro. This was caused by design: Dutch auction was allowed to start even with only one bidder. This feature appeared important. In the Dutch auction, the bidder doesn't know that she is the only player when the auction starts. Thus, she has the motivation to put her true evaluation. ProZorro design is different: already in the sealed-bid stage, participants know the total number of bidders, thus this rule could not have been applied to ProZorro. As a result, lots that were of interest only for one bidder are sold in Dutch auction, and are reaucted endlessly in ProZorro. There is clearly a high risk that insiders bought their loans in Dutch single-bidder auctions. Yet, from the auctioned revenue perspective, it is better to sell the NPL to the insider at a true value of the NPL (as it is an optimal strategy for the insider to put his true value at the first stage of the hybrid-Dutch), than not to sell it at all.

The total number of bidders who took part in the two types of auctions was similar: there were 1,664 participants of the Dutch auction as compared to 1,520 who participated in ProZorro. Yet, the overall number of auctions announced for ProZorro was more than two times higher.

About 40 percent of all participants were firms (legal entities) (Table 13).

Table 8. Shares of participants: firms and private entrepreneurs
(based on the sample, N = 2,592)

	ProZorro, %	Dutch, %
Private entrepreneurs	60	61
Firms (legal entities)	40	39
	N=1,181	N=1,411

Source: ProZorro.Sale database. Authors calculations

Our data suggest that some participants became more active after the hybrid Dutch actions were introduced. The data suggest that the number of actors who participated only in the Dutch auctions was slightly larger than the number of those who participated only in the reversed ProZorro auctions. Table 9 shows top-15 participants that increased their activities after the Dutch auction was established.

Table 9. Shares of participants: firms and private entrepreneurs
(based on the sample)

Participant	ProZorro, N	Dutch, N	Rate of increase
-------------	-------------	----------	------------------

ФІНМАРК	49	104	55
ДНПРОФІНАНСГРУП	12	49	37
ОПТИМУМ ФАКТОР	3	13	10
ФК Авістар	1	11	10
СТРАТЕГ	1	9	8
ФІНТАЙМ КАПІТАЛ	8	13	5
Марченко Михайло Вікторович	1	5	4
ТАСКОМБАНК	1	4	3
Денис Борисович Конюшко	1	4	3
ЛОКВУД	7	9	2
ІНВЕСТ-КРЕДО	6	8	2
Ліцишин Віталій Олексійович	2	4	2
Жуков Максим Володимирович	2	4	2
Інтайм Фінанс	2	4	2
Росоха Іван Іванович	1	3	2

Source: ProZorro.Sale database. Authors calculations

Number of participants and recovery rate.

The comparison by number of participants (i.e. competition) shows that in the case when there are 3 participants and more the hybrid Dutch auction recovers more revenues. Competition among 3 bidders generated 44% recovery rates (contract value as a proportion of the face value of the NPL) in Dutch and 40% in ProZorro. Competition among 4 generated 56% vs 33% respectively (Table 10).

This statistics confirms hypothesis that Hybrid-Dutch auction design provides stronger incentives than Prozorro auction design to compete and drive the bids up for a fixed number of participants.

Table 10. Recovery rates by types of auctions

	ProZorro	Dutch
1 participant	-	22% (N=1,267)
2 participants	36% (N=1,021)	31% (N=165)
3 participants	40% (N=38)	44% (N=47)
4 participants	33% (N=24)	56% (N=16)

Other features of the NPLs sales auctions in Ukraine

Important feature of the overall NPLs sales process in Ukraine was that loans were being put on auctions before the final resolutions of the courts regarding the owner of the NPL. Specifically, approx. 43 percent of all lots in the sample were in the process of litigation (Table 11). Litigation is a complex procedure and includes many steps from preparation to the court decision. Yet, regression analysis does not suggest that there were any reluctance from the bidders to buy lots under the litigation.

Table 11. Frequency of lots in litigation
(based on the sample, N = 2,592)

Litigation stage	Frequency	Share, %
In litigation	1124	43.4
Litigation is over (a bank has won)	64	2.5
Litigation is over (a debtor has won)	15	0.6
No litigation	147	5.7
No information	1242	47.9

Source: Data collected from the passports of the auctions by the authors.

The data show that the balance value on average was higher for lots in litigation when compared to all other lots (average value of 1.18 mln versus 0.93 mln). The same was observed for contracted value. On average,

lots with litigations were sold for 2.16 mln against 1.50 mln for lots without litigations. At the same time, according to data, the share of lots with litigations was smaller in the hybrid auctions (Table 12).

Table 12. Shares of lots in litigation by types of auctions
(based on the sample, N = 2,592)

Litigation	ProZorro auctions, %	Dutch auctions, %
In litigation	37.5	33.6
Litigation is over (a bank has won)	2.3	2.6
Litigation is over (a debtor has won)	0.6	0.6
No litigation	12.7	22.9
No information	46.9	40.3

Source: Data collected from the passports of the auctions by the authors.

What kind of agents purchase toxic assets in litigation? There is no clear tendency in the data showing that certain participants prefer working with auctions associated with litigation. In contrast, this kind of behavior is quite common. Nevertheless, the data show a few outliers (Table 13). Most of these participants are legal entities²⁹. In contrast, private entrepreneurs rarely work with objects in litigation. These cases illustrate that the secondary market of NPLs (i.e. entities that purchase NPLs) in Ukraine is quite vibrant. Litigations do not prevent actors from participating in auctions. Moreover, there are some firms that are systematically engaged in buying toxic assets in litigation.

Table 13. Cases of outliers. Firms and entrepreneurs that purchase assets in litigation

	Frequency
ТОВ "Фінансова компанія Дніпрофінансгруп"	46
ТОВ "ФК ДОВІРА ТА ГАРАНТІЯ"	44
ТОВ "ФК Морган капітал"	29
ТОВ "Фінансова компанія СІТІ ФІНАНС"	19

²⁹ We selected entities bases on the key word in Cyrillic: "Т О В, т о в а р и с т в о, ф і р м а, к о м п а н і я, г о с п о д а р с т в о, п і д п р и є м с т в о".

ТОВ "Інформаційне Колекторське Бюро"	12
ТОВ "ФК Авістар"	10
Нечитайло Роман Григорович	9
Булка Сергій Євгенович	4

Discussion: Implications from Ukraine

Our analysis suggest that the Ukrainian auction ProZorr.Sale performed well in comparison to other countries that used alternative methods of dealing with NPLs. Moreover, the Ukrainian auction improved its performance over time by switching to a different format – Hybrid Dutch auction.

- Ukraine put on sale approx. EUR 14.7 bln and recovered 22% (EUR 194.7 mln) of the total auctioned NPLs face value. Average price of sale was 30% (contract value to face value) over 21 months (between October 31, 2016 till July 25, 2018). These figures are comparable with the results of some other countries which used AMC to solve NPLs.
- The format of the auction was changed over time. It was done in order to address insider trading, increase revenues, and improve competition. The recovery rate improved. The speed of sale improved. It took on average 2 months to sell the lot via the new Hybrid Dutch auction compare with 3 months to sell the lot via the original ProZorro auction.

Conclusions and recommendations

The case of Ukraine shows, when the auction is designed well it could generate high revenues with a high speed. Moreover, the issue of asymmetric information could be addressed with a special mechanism of a hybrid Dutch auction that allows precise price discovery by participants.

Our analysis shows that auctions performed well in Ukraine despite its short life span, poor previous experience, and tough economic and political context. Speed and volume of recovery is comparable to that of other countries in the region, and the specific design of a hybrid Dutch auction allows better competition. Other countries that have witnessed similar issues to Ukraine and suffer from the spread of toxic assets and NPLs may benefit from using this design.

The methodology jointly developed by Consolidated Sales Office of the DGF, KSE and Prozorro.Sale is especially suited for the context with weak political institutions; weak legal framework and with large number of politically exposed persons among debtors. In such a scenario a quick and transparent auction based on the online platform might be an effective solution as the data for Ukraine suggest.