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# Role of deposit insurance schemes on financial markets

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**Abstract:** In the paper, 109 deposit insurance schemes have been evaluated in terms of their investment policies designed for funds collected from banks. Almost half of them develop investment strategies involving the activity on the financial markets. Nevertheless, the strategies have to be compliant with the applicable local regulations. The aim of the paper is to evaluate the impact that deposit guarantors may have on the financial markets, mainly on the sovereign debt market. In this regard at least two mechanisms negatively influencing the stability of national sovereign debt market have been identified. The research confirmed that the activity of deposit guarantee funds may have destabilising effects but they have not been addressed so far in legal framework for deposit insurance schemes.

**Keywords:** deposit guarantee scheme; deposit insurance fund; investment policy; capital markets; sovereign debt markets; financial stability; banking crisis; bank contributions; public policy, moral hazard.

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## 1 Introduction

In the contemporary world, the entities operating on the financial market can be divided into two groups. The first one includes commercial institutions that, by making transactions on the financial markets, strive to maximise profits – theirs or their clients. The second group consists of institutions supporting the activities of commercial entities,

creating the infrastructure of the financial system and monitoring the behaviour of market participants. Among them, the financial safety net institutions should be distinguished, which comprise, e.g., central banks, supervisors or deposit guarantee schemes. Their aim is to seek to ensure the stability of the whole financial system. However, it should be noted that none of the mentioned institutions (including deposit guarantee scheme) is able to deal with every type of financial crisis, especially systemic ones.<sup>1</sup> Nevertheless, it is expected that their activities should have only positive impact on the functioning of the financial markets.<sup>2</sup> Nevertheless, as the economists teach us, the operations of every entity on the market may be accompanied by economic externalities, both positive and negative (Begg et al., 2014). Available literature offers the long array of researches on the external effects of the existence of the financial safety net institutions, in particular of central banks (as the monetary policy implementer and the lender of last resort), supervisors (as the controller and market regulator) and guarantee and compensation schemes, including the deposit guarantee systems for banks. The latter stays at the centre of the paper interest.

Researches in the field of deposit guarantee schemes focus on an attempt to explicitly determine mainly the impact of the existence of the deposit insurance on the banks' risk and the depositors' behaviour. Moreover, such studies are usually popular only during periods of relative destabilisation of the banking market, when there is a real threat that the deposit guarantee scheme will have to be utilised. During periods of stability the tendency of scientists to undertake this type of research is however much smaller. Nowadays, i.e., more than 10 years after the outbreak of the global financial crisis, the tendency of scientists to study deposit guarantors should be considered as too low.

Meanwhile, the role of deposit guarantors in the financial system is constantly growing. This is corroborated by the data of the International Association of Deposit Insurers (IADI), according to which in 1974 there were only 12 deposit guarantors in the world, while in 2019 they were present in 143 countries (IADI, 2019). Consequently, the deposit guarantees become an increasingly essential element of the financial system (higher and higher funds that they manage could be among factors that decide about their rising importance), but often it is 'silenced' and 'forgotten' by researchers. This is even more alarming when taking into account that evidently not all banking sectors in are stable and are endangered with potential crisis (Kočíšová and Stavárek, 2018).

The cited evidence and arguments affirm that it is necessary to extend the global scope of the survey on the deposit guarantors in order to determine potential impact of their activities within more broadly defined categories. The first step in this new direction of research is the assessment of the impact of deposit guarantee schemes on the financial markets in the European Union (EU),<sup>3</sup> which is the main subject of this paper. The ultimate goal of the paper is to evaluate the impact that deposit guarantors may have on the financial markets, mainly on the sovereign debt market. Alternatively, the aim of the research is to establish possible destabilising channels that deposit insurance schemes may have of the financial market. To this end, the consequences of the guarantor's activity on money and capital markets were estimated using the data on the sources and scale of deposit guarantors' financing, as well as trade volumes on the markets where deposit guarantors are investing in selected EU Member States. The applied research methods comprise document and statistical analysis. As a research hypothesis it is assumed that the activity of deposit guarantors may have a direct negative impact on the financial markets (not only indirect through affecting the behaviour of banks and their clients, which are typical participants of the financial markets).

The first part of the paper provides the literature review regarding the impact of deposit guarantee activities on financial institutions. The most important studies on estimating the influence of the functioning of other institutions on financial markets, as well as researches on the financing of deposit guarantee schemes were also summarised in order to identify potential criteria for assessing guarantors. Additionally, legal framework regarding the financial side of the guarantors' activity in the EU has been summarised. In the second part of the paper, based on the characteristics of deposit guarantee activities, possible theoretical channels of impact of the guarantors' activities on financial markets were indicated. The third part is the presentation of the results of empirical research regarding the direct impact of transactions conducted by the deposit guarantors on the financial markets (especially government bond market). The paper ends with a summary in which the conclusions from the study were determined.

## **2 Activity of deposit guarantors: literature review**

The literature on the activity of deposit guarantors focuses mainly on the impact of the existence of the insurance (provided by the external institution) of deposits accumulated in banks on the level of risk in the banking sector and changes in the behaviour of banks and their stakeholders (including clients, mainly deponents).

With regard to the risk taken by the banks, Thomson (1986) has already argued that the introduction of deposit guarantees is accompanied by an increase in the level of risk among banks. White (1995) and Mac Donald (1996) explained this feature by an increase in the moral hazard, which has its roots in limiting, and in principle, relieving banks from responsibility for the actions taken (at least against depositors who are the main providers of funds for banking operations) (Węclawski, 2013). Other researchers who estimated the influence of guarantees on banks in subsequent years also reached similar conclusions. Hooks and Robinson (2002) verified that banks covered by the guarantee system are characterised by a higher level of risk. Carapella and Di Giorgio (2004) proved that the presence of the deposit guarantee system means that banks are characterised by the higher interest margin. Nevertheless, it is not caused by lowering the cost of deposits (due to the lowering of their risk level from the point of view of depositors), but due to the increased risk level on the active side of the bank's balance sheet (i.e., due to lending). It seems that such a phenomenon may be related to the fact that the banks have to bear the costs of the deposit guarantee scheme. Consequently, they are trying to compensate it by a higher rate of return (and therefore a higher level of risk) generated on the core business, that is credit activity. Such conclusions are also delivered by Keiding (2015). The works of Duan et al. (1992), as well as Duran and Lozano-Vivas (2014) confirmed the existence of the so-called risk-shifting, which involves moving the risk to depositors (and thereupon the guarantor of deposits) as a result of joining the deposit guarantee scheme by the bank. In turn, Ioannidou and Dreu (2006) argued that deposit guarantees are also conducive to lowering market discipline.

It should be pointed out that not all studies on the impact of deposit insurance indicate its negative bearing on banks – for example, the Gropp and Vesala (1992) showed a drop in the level of risk in banks covered by guarantees. Analyses carried out by Anginer et al. (2013) point to the stabilising effect of guarantors on the banking system during the crisis. Similarly, Prean and Stix (2011) noted that deposit guarantee activities during the crisis prevented the spread of instability.

Another important trend of research in the field of deposit guarantee activity is its financing. Researches in this area focus on the determination of the optimum amount of the guarantee fund (for systems financed on an *ex ante* basis). Most of the available studies prove that the fund should be at least equal to the amount of expected losses or even higher (Leaven, 2008; Bernet and Walter, 2009; Pennacchi, 2009). A growing group of researchers also points to the legitimacy of calculating bank contributions for financing the deposit guarantee fund depending on the banks' risk profile. In this respect, the work of Gospodarowicz (2015) should be distinguished, who also verified the measures that can be used to determine the bank's risk profile (including systemic risk component) for the purpose of calculating the premiums.

Available studies, however, are not related to the impact of deposit guarantee schemes on the financial markets. In this respect, the considerations presented in the further parts of the paper have pioneer character. At the same time, it should be emphasised that the literature is quite rich in the researches regarding the impact of other institutions on the financial markets, which usually embrace banks, insurers and investment firms. Especially numerous are studies on the relations between banks and financial markets, since these two intermediaries are often assessed as competing sources of financing for the real economy, e.g., Jacklin (1987), Jacklin and Bhattacharya (1988) or Diamond (1997).

### **3 Legal framework for the financial activity of the deposit guarantors in the EU and the practice**

The common basis for the deposit guarantors' financial activity is laid by the Directive of the European Parliament and the Council 2014/49/EU (so-called DGS Directive or DGSD). According to the Directive's provisions, the functioning of the guarantors is financed by the banks' contributions, which are transferred on an *ex-ante* basis and can be supplemented by the *ex-post* payments (in case of the lack of funds for the usage of the deposit guarantee fund), as well as other, external sources of financing (e.g., market financing). It should be stressed that the contributions are calculated in accordance with the rule 'polluter pays' – the biggest banks running the riskiest policies are the most essential contributors to the fund. The rules for risk-adjusting the banks' contributions were elaborated in the DGSD (Article 13) and in EBA Guidelines (EBA/GL/2015/10).

Paid contributions constitute fund's 'available financial resources' which are cash, deposits and low-risk assets, as well as irrevocable payment commitments (Article 2(1) point 12). At the same time, DGSD describes low risk assets as debt securities, to which risk weights at the level of 0, 20 or 50% are attributed in the standard approach to the calculation of the capital requirement for credit risk (Article 2(1) point 14). Moreover, DGSD introduces an obligation to invest deposit guarantee funds in a diversified manner and in low risk assets (Article 10(7)).

Such legal framework implies that deposit guarantors should prepare and follow investment policies, which provide orderly basis for the management of the collected financial resources according to the DGSD's rules (diversification and low risk). In fact, out of 28 EU Member States,<sup>4</sup> only eight Member States (28,6%) publicly admit to active management of funds (the review of guarantors from all over the world shows that the analogous ratio amounts to 38.5% – 42 guarantors out of 109 reviewed schemes). This may flag the first danger in the financial activity of deposit guarantors, which is the lack

of the detailed and deliberate investment policy. In such a situation, the absence of the debate on adequate structuring of guarantors' portfolio may also denote the lack of the awareness what consequences the investment activity of deposit guarantors could have.

The even more alarming issue is that the deposit guarantors tend not to diversify the structure of the portfolio. Most of deposit guarantee funds are invested in cash (deposits, not always at central banks) or national debt securities. There are countries where treasury bonds constitute well above the half of the total value of deposit guarantee funds and treasuries organise special public placements aimed at absorbing banks' contributions to the deposit guarantee funds (e.g., Poland).<sup>5,6</sup> Such trend signals the next pitfall in the functioning of the deposit guarantee funds, since by the high concentration of investments on one type of financial instrument and with the growing volume of deposit guarantee funds deposit guarantors may distort the equilibrium on the markets. This aspect constitute the main point of interest and will be tested in this paper.

It should also be noted that the DGSD introduces the timeframe for the guarantors, according to which they have to organise the process of deposit payout, when it is declared that the deposits in the bank are unavailable for its depositors. In such a case, the deposit guarantee schemes have 7 working days to establish a list of depositors and begin the physical payout of funds.

#### **4 Deposit insurance scheme and financial markets: impact channels**

Two types of influence channels of the deposit guarantee schemes on financial markets can be distinguished:

- indirect
- direct.

As part of the indirect channel, the main way of influencing the markets is communication of actions taken towards banks. In particular, if they are a significant player on the financial market, the information published by the guarantor regarding (directly or indirectly) a given bank may also affect financial markets. In this way, information on:

- the commencement of payment of deposits (related to the bank's bankruptcy)
- the exclusion of the bank from the guarantee system due to non-performance of the obligations resulting from its participation in the system (e.g., reporting obligations) or
- setting a significantly higher premium for a deposit guarantee fund

may have an adverse effect on the assessment of a given bank on the market and at the same time deteriorate the investors' sentiment. In deposit insurance systems that operate under the risk minimiser formula, the information published by the guarantor on, for example, granting financial support whose purpose is to solve the bank's financial problems may have a similar effect on the financial market.

The next channel of indirect impact of deposit guarantors on financial markets is their supervisory activity towards banks (i.e., control of banks within the scope related to deposit guarantee) and analytical activity (i.e., the analysis of information obligatorily

reported by banks to the guarantors). First of all, these functions are conducive to increasing the level of market discipline – banks are aware that all financial information about their transactions will have to be transferred to the guarantor and this may refrain them from taking risky actions. Owing to such a channel, the risk of operating in the financial markets of entities that take excessive risk is reduced. Secondly, the effective guarantor, by analysing the financial situation of banks on an ongoing basis can quickly identify banks facing financial problems. Owing to such preventive activity, it can take quick actions to reduce the risk level of a given institution. In this way, such additional tasks performed by the guarantors reduce the risk of operating on the market of, e.g., zombie banks.

It should be emphasised that the above-mentioned channels of indirect impact of deposit guarantors on the financial markets are difficult to empirically verify – they refer to the activities of the banks themselves (and not the rules of the entire financial market's operations) and only through them it is possible to have impact on the markets (it should however be expected that not every bank will act in the same way as a 'relay' of impulses to the financial market). For this reason, the direct channel gains importance in evaluating the possible influence of the deposit insurers on the functioning of the financial markets.

When identifying the direct impact channel of deposit insurers on the financial markets, one should first and foremost point out how the deposit guarantee funds are financed. Empirical studies conducted on a sample of 109 deposit guarantee schemes all over the world indicate that approx. 94% of them are financed on an *ex ante* basis. In the EU, all deposit guarantee schemes are financed on an *ax-ante* basis. This means that the guarantors have to invest funds transferred by banks in the form of contributions. This requires an orderly approach to the allocation of the assigned funds, but, as mentioned, only 42 systems (41% of insurers financed on an *ex ante* basis in the world comparison) have a formally defined investment policy. Their key element is investing the bank contributions in government securities. However, this means that if there is a need to use the deposit guarantee fund, these systems must quickly liquidate significant amounts of government debt, which may have a negative impact on the functioning of sovereign debt markets (and consequently the other financial markets, as the sentiment on them usually is connected with the situation of the sovereign markets).

There is also the second side of the problem between the deposit guarantee funds and sovereigns, which fits into the issue of the co-called sovereign-bank nexus. This, another link between banks and sovereigns consists in a situation that the government fails and due to the high exposure of banks towards sovereigns, also banking sector may suffer. Such systemic problems might, however, not be dealt with by the deposit guarantor itself. This issue will not be analysed in this paper.

## **5 Investment activity of DGSs on financial markets: empirical results**

In order to examine the potential impact of the deposit guarantee scheme on the financial markets, the size of domestic deposit guarantee funds was compared with the average daily turnover in the secondary government debt market (including transactions on both bonds and bills, where available). The assumption was made that the form of allocating contributions paid by banks to the deposit guarantee fund is the purchase of government debt securities (which is supported by the empirical observations). This means that the deposit guarantee funds may be used after the sale of securities held by the guarantor,

which means direct activity on the financial markets. Moreover, a conservative approach has been taken that the available portfolio has to be sold within one day (in practice deposit guarantors in the EU are to pay out deposits within eventually seven working days, which includes preparation of the deponents' list, sale of the portfolio and preparation of the physical payout).<sup>7</sup>

Such a research is an attempt to verify what impact on the functioning of financial markets (of which the market of government debt instruments is an important component) has the bankruptcy or resolution of a large bank or several smaller banks, in the case of the so-called systemic crisis, in which deposit guarantee schemes also have to intervene and which were more frequent in recent years (Laeven and Valencia, 2018; Reinhart and Rogoff, 2008).

Table 1 presents data on the amount of the fund and the volume of transactions on the secondary markets of public debt, as well as the relation between the two volumes.

**Table 1** The amount of the deposit guarantee fund and the daily turnover on the government debt markets

<i>Country</i>	<i>Level of the deposit insurance fund at the end of 2018 (A)</i>	<i>Average daily turnover on the sovereign debt market in 2017 (B)</i>	<i>A/B</i>
Belgium	3,657,912,000,00	2,400,000,000,00	152.41%
Denmark	1,165,080,000,00	401,711,000,00	290.03%
Finland	1,146,040,000,00	500,000,000,00	229.21%
France	4,050,400,000,00	13,000,000,000,00	31.16%
Germany	8,204,840,000,00	19,000,000,000,00	43.18%
Great Britain	9,502,197,000,00	36,960,300,000,00	25.71%
Greece	1,491,100,000,00	47,000,000,00	3172.55%
Hungary	65,490,000,00	1,386,480,000,00	4.72%
Ireland	316,000,000,00	700,000,000,00	45.14%
Italy	1,668,790,000,00	5,000,000,000,00	33.38%
Netherlands	1,397,900,000,00	1,950,000,000,00	71.69%
Poland	3,295,751,000,00	3,050,300,000,00	108.05%
Portugal	1,543,000,000,00	900,000,000,00	171.44%
Spain	2,038,000,000,00	12,000,000,000,00	16.98%
Sweden	4,074,870,000,00	1,408,930,000,00	289.22%

*Source:* Own work

The analysis was carried out only for some EU Member States due to limitations in the access to data. Data on guarantee schemes are published every year since 2016 by the European Banking Authority. The data used in the analysis concern the amount of funds at the end of 2018. To measure the size of the secondary market for sovereign debt it was decided to use average daily turnover, since such data would smooth the volatility that could occur on the markets<sup>8</sup> and at the same time the published (already few) data do not provide medians. Data on the average daily turnover on the secondary government debt markets were obtained from the parties of government agencies dealing with debt servicing, central banks or ministries of finance. However, not all countries decide to reveal such data. The data on the average daily turnover values in 2017 was used for the

calculations due to the lack of availability of full data for 2018 during the study. However, taking into account that the sentiments in the financial markets in 2017 and 2018 were similar, the assumption was made that the average turnovers in 2018 are similar to those from 2017. That justifies the comparison of data about the deposit insurance funds' sizes and the scales of sovereign financial markets.

The presented comparison suggests that if the intervention in the banking sector required the use of the entire deposit guarantee fund located in government securities, then the amount of debt sold on the secondary market would amount to on average three times the daily market turnover (312.32%).<sup>9</sup> This amount should be considered significant and it is doubtful whether deposit guarantee funds could carry out this type of transaction without affecting the whole debt market. Such activity will, with high probability, lead to distortions in the valuation of government debt (lower prices, higher profitability), what contradicts the basic principle of effective deposit guarantee scheme laid by Basel Committee on Banking Supervision (mentioned in the introductory part of this paper). This phenomenon has at least two negative consequences:

- increase in government debt yield will have a negative impact on investors' perception of the country (it will be assessed as an increase in the insolvency risk of a given country), thus it will make it difficult to find investors willing to buy next debt issuances
- decline in debt prices (as a result of a sudden increase in market supply) means that having a given amount of securities, the deposit guarantee fund will be able to obtain a smaller amount of cash to pay deposits or support the resolution process, and will therefore have a negative impact on its ability to perform its guarantee function.

The problem seems to affect a relatively wide range of countries – the analysed ratio exceeded 100% in 7 out of 15 surveyed EU Member States. It turns out to be particularly significant in the case of countries that experienced crises that had worsened their reputation and discouraged the purchase of government debt by the investors. Such a situation occurred in Greece, where the secondary market after 2011 became frozen (turnover was reduced to amounts close to zero). In this situation, the possibility of liquidating the debt by the guarantor is limited, which undermines its ability to perform its basic function, i.e., the protection of guaranteed deposits.

Geographically, the problem seems to be the most relevant for southern European countries, where the relations between the size of the fund and the daily turnover on sovereign debt market equals on average to almost 850%. However, it results mainly from the situation of Greece – excluding it from the probe, the average falls to around 74%. Then, the Scandinavian countries are characterised by the highest relation between the level of the deposit guarantee fund and the average daily turnover on the government debt markets – amounting to almost 270% (median at the level of 289.22%). It results from relatively high amounts accumulated in DGS funds, with which high coverage ratios (relations between the deposit insurance funds and the size of guaranteed deposits) correspond. In the Nordic countries, one of the highest coverage ratios in the EU are observed (especially in Sweden) with relatively smaller secondary debt markets. Data on this subject are presented in Table 2. The data show another problem of deposit guarantee funds, namely that their resources in comparison to the deposits collected in the banking sector are still low. This confirms that the schemes are not able to deal with big bank failures and systemic crises.

**Table 2** Coverage indicators for deposit guarantee schemes

<i>Country</i>	<i>Coverage ratio</i>
Belgium	1.2489%
Denmark	0.4520%
Finland	0.8858%
France	0.3467%
Germany	0.4520%
Great Britain	0.7120%
Greece	1.4292%
Hungary	0.2010%
Ireland	0.2978%
Italy	0.2387%
Netherlands	0.2802%
Poland	1.7782%
Portugal	1.2538%
Spain	0.2806%
Sweden	2.5668%

*Source:* Own work

The above-presented analyses, as indicated, were carried out with the assumption of the collapse of the largest bank or systemic crisis, which would make it necessary to use the entire deposit guarantee fund. However, the conclusions from the surveys remain the same, assuming that deposits are paid out for a bank of a medium size. In each country, the average bank's assets in a given sector exceeded the value of the deposit guarantee fund.

It is also worth to consider what is the average share of the government debt securities in the total amount of the deposit guarantee fund, for which the amount of liquidated securities would be less than the average daily turnover. The analysis shows that this relation stands around 47% (depending on the country, ranging from 3% in Greece to 93% in Poland).

The analysis of the size of the deposit guarantee fund and average daily turnover in the secondary government debt market suggests that only if about 34% of the deposit insurance fund would be invested in the form of government debt instruments, their immediate sale would be lower than the average daily turnover in the debt market in all countries except Greece.

## 6 Conclusion

Deposit guarantee schemes are an increasingly important element of the financial safety net around the world. This is evidenced by the fact that in a growing number of countries, higher and higher requirements for its operations are being introduced. The countries that previously had not in place any guarantee schemes, such as China (Jia, 2019) or New Zealand (SNL, 2019), also decide to introduce deposit insurance systems. The

literature also offers wide range of conclusions in the field of determining the optimal parameters of the contributions to the insurance system and the impact of its functioning on banks and their environment. Nevertheless, no attempts have been made to systemise the potential impact of deposit guarantees on the functioning of financial markets. Meanwhile, such a research seems to be justified for at least the following reasons:

- the growing role of guarantors in the financial systems in the world
- the dominance of the *ex ante* financing model resulting in the need to accumulate and manage bank contributions
- increasing amount of funds at the disposal of deposit guarantors, which must be invested on the markets
- low level of diversification of guarantors' investment portfolios, often resulting from imposed investment policies leading to the dominance in their portfolios of government debt securities.

Observing the current dangerous trend, according to which deposit guarantee schemes eagerly invest in national sovereign debt securities, it was decided to test the potential implications of such an investment policy for the capital markets. For that purpose, it was assumed that the whole amount of deposit guarantee funds in the selected EU Member States (the choice was hindered by the limitations in the data) are invested in the treasury bonds and then, in order to fulfil guarantors obligation (e.g., pay-out of deposits) they have to be sold affecting thus capital markets. The aim of such an exercise is to mark potential pitfalls connected with the spreading policy of investing deposit guarantee funds in national sovereign bonds by showing potential impact of an extreme situation, in which all funds are invested in the national public debt and must be liquidated within one day.

The conducted research confirms the thesis put forward at the beginning of the paper that the activity of guarantors may negatively affect financial markets (and not only indirectly by affecting the behaviour of banks and their clients).

The analysis of operating models of guarantors allowed to indicate two channels of their impact on the financial markets:

- indirect
- direct.

Quantification of the indirect channel of impact on the markets is difficult to estimate (which is associated with the simultaneous overlap of many factors and difficulties in distinguishing the impact of the guarantor on a given entity and, consequently, on the financial market). Nevertheless, an attempt was made to estimate the direct impact of the insurer's activities on financial markets by comparing the amount of funds accumulated by guarantors in deposit guarantee funds with the average daily turnover in the secondary government debt market. This approach to the study results from the assumption that funds are invested in debt securities (what is confirmed by the empirical observations), and it is necessary to liquidate them on the secondary market if at least medium-sized banks go bankrupt and there is the need to pay out deposits.

The research has shown that the amount of debt sold on the secondary market amounts to three times the daily market turnover (312.32%). This amount should be considered significant and it is doubtful that deposit guarantee funds could carry out this

type of transaction without affecting the debt market. It should therefore be concluded that deposit guarantee schemes can have a destabilising effect on the functioning of financial markets. This phenomenon can be considered as a type of negative externalities of deposit guarantors, which has not yet been identified and which may become more acute as the role of deposit guarantors in the world continues to grow.

In order to prevent this kind of phenomena, a strong diversification of deposit guarantee investments is therefore recommended, as they grow up to a role of significant public investment funds. In this regard the idea of creating European safe assets may prove to be very helpful, as it could deliver the next type of relatively stable and liquid assets, in which deposit guarantors could invest. Moreover, in order to minimise the identified negative externalities, it is recommended to strengthen the analytical divisions of guarantors that identify entities at risk of bankruptcy. Effective early warning systems should generate signals about the threat of the bankruptcy of a given bank in a timely manner, which ought to provide the guarantors with a sign to prepare funds for possible intervention. This preparation should include gradual liquidation of assets until the amount of the estimated intervention for the bank is reached.

The alternative ways to ease the potential negative impact of the investment activity of deposit insurance funds on the markets is to develop substitute solutions, which would support the liquidity of deposit guarantee funds. Such alternatives could at least embrace central bank facilities, which would ensure the liquidity to pay out deposits and, at the same time, allow guarantors to stagger the necessity to liquidate its assets. In this regard also assets swaps with central banks could be developed.

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## Notes

<sup>1</sup>The fact, that deposit guarantors are not able to deal with systemic crises is also highlighted by Basel Committee on Banking Supervision (2009).

<sup>2</sup>Which was also indicated by Basel Committee on Banking Supervision (2009).

<sup>3</sup>Geographic limitation results from the availability of data.

<sup>4</sup>Including Great Britain, which at the moment of writing the paper is still the member of EU and its withdrawal from EU is being constantly postponed.

<sup>5</sup>Source: Bank Guarantee Fund, Annual Report (2018) and <https://forsal.pl/artykuly/1053792,emisja-obligacji-skarbowych-dla-bfg-obnizanie-deficytu-budzetowego.html>.

<sup>6</sup>In the world there are also countries where deposit guarantors are obliged by law to invest bank contributions only in national debt securities (e.g., Ukraine).

<sup>7</sup>It could be assumed that the guarantor has longer period to liquidate assets – assuming that not all depositors would like to pay out their deposits first day and that the guarantors could estimate the total amount of deposits in the failed bank – but it is the legal obligation for deposit insurance scheme to be ready to pay out deposits within very short period and the aim of the study was to critically assess the potential negative consequences of the guarantors investment activity. Therefore, it was decided to assume that the assets of deposit fund should be sold within one day.

<sup>8</sup>More about prices on government bonds could be found in Tampakoudis *et al.* (2018).

<sup>9</sup>At the same time, it should be noted that the median amounted to 71.69% what shows disturbing effect of Greek situation on the sovereign market.

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