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Final Analytical Report

MAKING DEPOSIT INSURANCE WORK FOR TRANSITION: FORM, SUBSTANCE, AND IMPLEMENTATION

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INTRODUCTION

Financial intermediation has become a pervasive feature of all developed market economies worldwide. A sophisticated financial system makes a vital contribution to the economy by providing liquidity and thus facilitating market transactions, providing payment and clearance services, as well as transforming the quantitative and temporal structure of multilateral financial claims. In addition, banks and other financial institutions in a well-developed economic environment may act as information producers for other market agents primarily acting on the savings side of financial flows, as well as undertake duties of monitoring economic entities situated at the investment side¹. The latter especially holds true for developed market economies with sophisticated financial infrastructure.

In transition countries of Eastern Europe and the CIS as well, consistent steps to build a secure, well-balanced and active financial system constitute an integral part of long-term economic development trends. In Armenia, for example, where, in the initial stages of economic reform, emphasis rested mainly on the banking sector, the latter has reported significant advances in development. Thus, it is broadly recognized that Armenia's financial sector has demonstrated and will continue to demonstrate heavy reliance on banking structures, as opposed to other non-bank financial intermediaries. This makes bank regulation a central component of public policy in the financial sector.

The presence of government regulation in the financial system is an imperative both in developed and transition countries. The health of the financial sector is objectively a matter of public policy concern, and significant rationale exists both in theory and practice for government involvement in financial regulation. Literature on this topic identifies various objectives of financial regulation, which generally center around the following concepts:

- Safeguarding the financial system against systemic risk;
- Protecting consumers from opportunistic behavior and economic uncertainty;
- Enhancing the efficiency of financial intermediation;
- Achieving broader social objectives (e.g. increasing home ownership, combating organized crime, etc.)².

Numerous examples can be brought of government-initiated measures to achieve one or more of these objectives in combination. Governments and delegated state agencies employ a

¹ See, e.g. *Gorton G., Winton A.* Financial Intermediation. The Wharton School, University of Pennsylvania, March 2002.

² *Herring R. J., Santomero A. M.* What is Optimal Financial Regulation? The Wharton School, University of Pennsylvania, May 1999; p. 3.

wide range of regulatory instruments, which uniquely address these issues (see Table 1). Evidently, some regulatory measures effectively serve multiple purposes, but it should also be noted that in some cases an instrument defined for a specific purpose may negatively affect other objectives.³

Table 1. Financial regulation measures and regulatory objectives

Regulatory Measure	Systemic Risk	Consumer Protection	Efficiency Enhancement	Social Objectives
Antitrust enforcement / competition policy		✓	✓	✓
Asset restrictions	✓			✓
Capital adequacy standards	✓	✓		
Conduct of business rules		✓	✓	✓
Conflict of interest rules		✓	✓	
Disclosure standards	✓	✓	✓	
Investment requirements				✓
Liquidity requirements	✓	✓		
Reporting requirements (large transactions)				✓
Reserve requirements	✓	✓		
Deposit insurance	✓	✓		

Adapted from *Herring R. J., Santomero A. M. What is Optimal Financial Regulation? The Wharton School, University of Pennsylvania, May 1999.*

Often viewed as a supplementary instrument of financial regulation, deposit insurance or explicit (official) deposit guarantees successfully serve the purposes of containing systemic risk inherent to the banking sector and protecting bank depositors from the risk of adverse losses. According to various sources, some 90-110 countries are at present known to have established formal schemes of deposit insurance⁴. Nevertheless, significant controversy still exists in worldwide academia and policy-making circles on how necessary and effective deposit insurance can be, and how significant the drawbacks of implementing it are.

Departing from the existing scholarly debate on the international practice of deposit protection and based on the specifics of economic transition, this paper endeavors to suggest possible solutions to the problem of organizing a deposit protection scheme which would protect the interests of depositors, provide additional financial stability and yet mitigate the drawbacks of policy intervention in the form of explicit deposit protection. The paper will address issues of preferred choice among various organizational forms and implementation mechanisms of deposit insurance. The rest of the paper is organized as follows: we first provide the theoretical background of deposit insurance, discuss various forms of organizing and implementing DI and their comparative efficiency. In a separate section, we address one

³ This topic is beyond the subject of our research. Further detail on this can be found in: *Herring R. J., Santomero A. M. What is Optimal Financial Regulation? The Wharton School, University of Pennsylvania, May 1999.*

⁴ Theory and practice of financial regulation distinguish between deposit insurance and official deposit guarantee schemes. The two concepts will be used interchangeably throughout this article and shall imply the same economic content from the regulatory standpoint.

of the key issues in DI policy: pricing alternatives. We conclude with a set of policy recommendations aimed at the improvement of the deposit protection scheme in Armenia.

THE THEORY AND ORGANIZATION OF DEPOSIT INSURANCE

The direct rationale for deposit insurance is consumer protection. “Depositors, as users of banking products and services, are just as much consumers as are the purchasers of other products or services, and the same social and political pressures exist to ensure that they are protected from loss”.⁵ Moreover, it is more difficult for potential depositors to assess the quality of goods they “purchase” than it is for purchasers of consumer goods to verify quality before committing themselves. The quality of goods depositors purchase is conditioned by the financial stability and liquidity of the bank, whereas usually a very limited portion of the information necessary to make an effective up-to-date assessment of a bank is publicly available. Further, even where such information is available, the general public may have difficulty interpreting such information. This is viewed as a market imperfection, and as with any other market imperfection, should be addressed by public policy measures, such as banking supervision and deposit insurance.

Another, though indirect, rationale for deposit insurance is that it reduces systemic risk, making banking crises less likely and less adverse as a result of, for example, panic withdrawals of deposits from sound banks and breakdown of the payments system. It is argued that, if depositors know that their money is safe by virtue of deposit insurance, they will have little reason to withdraw it from banks, even in times of economic uncertainty, which is when the banking system is most threatened with the possibility of crises. One should also note here that, given the logic of this argument, deposit insurance schemes can definitely be more effective in reducing systemic risks if the concerned public is well informed about them. Thus, public awareness becomes another important prerequisite for and a key task of public policy.

Both consumer protection and systemic risk considerations significantly explain the historical trend of numerous countries adopting deposit insurance as a means to promote public confidence in the banking system. This has been the case in numerous developing economies worldwide, including Armenia, as well as many developed countries such as Canada and the United States. The US was the first country to adopt deposit insurance at a national level in 1934, very soon after the Great Depression and the resulting loss of

⁵ *MacDonald R.* Deposit Insurance. Handbooks in Central Banking, Bank of England Centre for Central Banking Studies, August 1996; p. 8.

confidence towards the banking sector. Similarly, in Canada, where compulsory deposit insurance was introduced in 1967, the adoption of deposit insurance was also in reaction to a loss in confidence in the sound practice of deposit-taking institutions.⁶

And even though, as international practice shows, deposit insurance does successfully serve its purposes of protecting consumers and mitigating systemic risk, it has its downside as well. As with any other type of insurance, deposit insurance schemes can create “moral hazard” by freeing economic agents from the consequences of their actions. Again, this holds true both for official deposit insurance schemes and so-called implicit deposit protection mechanisms, where government provides *post hoc* guarantees to deposit holders. Insurance may promote irresponsible action on the part of insured depositors and banking institutions, since even in case of unwise disposal of deposited funds insurance provides reimbursement guarantees. Thus, depositors may be less motivated to make an optimal choice when allocating their savings, whereas bank management may be more motivated to engage in riskier activities using depositors’ funds.

Deposit insurance means, practically, that depositors no longer feel obliged to assess the credit risk associated with depositing money with a particular bank. Given this, depositors may choose banks without reference to their financial condition, solely attracted by higher interest rates. Consequently, the normal impact of market forces in promoting prudent economic behavior is reduced, and unsound banks may attract additional deposits.⁷ This type of “moral hazard” occurs when the presence of insurance reduces the incentives for depositors to monitor the safety of their savings. Depositors stop monitoring the behavior of banks, and no longer bother to move deposits from worse to better managed institutions.

A second type of “moral hazard” involves excess risk-taking among insured banks. Such mismanagement especially proliferates when the compensation provided to depositors is rather generous. The understanding that depositors will not suffer in the event of bank failure can incline bank management to adopt riskier business strategies than they otherwise would. The relationship at issue here is that between managers and regulators, who indirectly underwrite gambles gone bad by “zombie banks”⁸. It should be noted here that, as empirical studies show⁹, moral hazard problems associated with deposit insurance tend to exacerbate in

⁶ *Laeven L.* The Political Economy of Deposit Insurance. Conference Papers Series, FDIC Center for Financial Research, May 2003; p. 3.

⁷ *MacDonald R.* Deposit Insurance. Handbooks in Central Banking, Bank of England Centre for Central Banking Studies, August 1996; p. 9.

⁸ *Richardson G.* A Comment Concerning Deposit Insurance and Moral Hazard. Working Paper Series, National Bureau of Economic Research, December 2006; p. 4.

⁹ See, for example, *Laeven L.* The Political Economy of Deposit Insurance. Conference Papers Series, FDIC Center for Financial Research, May 2003.

countries with weak institutional environments, which especially concerns transition economies of the former Soviet Union, including Armenia.

Variations in the organization of deposit insurance, including coverage limitations, address these issues, trying to alleviate possible moral hazard effects. Adverse effects of such imprudent behavior have forced deposit insurance schemes to provide only partial compensation for any depositor, thus leaving depositors to carry part of the risk. For example, the co-insurance scheme adopted in the United Kingdom provides for the compensation of only 90% of deposit amounts exceeding 2000 pounds sterling¹⁰. Another measure to limit the extent of risk-taking by insured banks is the exclusion of certain types of deposits (e.g. deposits of bank management or shareholders and connected parties, inter-bank deposits, etc.) from the benefits of insurance. It is common for deposit insurance arrangements around the globe to exclude (or limit coverage to) inter-bank deposits, connected party deposits, or foreign exchange deposits. The Armenian deposit guarantee scheme excludes inter-bank and connected party (including bank management) deposits from coverage and provides limited coverage to deposits denominated in foreign currency. It should also be noted here that, according to the Armenian law on deposit protection, the latter extends to bank accounts and deposits of individuals (“natural persons”) only, whereas corporate accounts and deposits are not covered under the scheme.

An important issue concerning the effectiveness of deposit insurance schemes is their organizational structure. There is an ongoing debate on whether deposit insurance requires direct involvement of public regulators or it should be handled by private insurance companies. In theory, deposit insurance could be provided by private insurance companies, and the law would only require all banks to purchase such insurance. An advantage of private insurance is that insurers would assess the risk of individual banks and could charge risk-based premiums directly reflecting those assessments. Tying insurance obligations to the extent of risk taken could *ceteris paribus* also provide financial incentives to banks to operate more prudently and thus alleviate moral hazard effects. However, completely private deposit insurance is unlikely to become a reality, at least in the near future, for a number of reasons. First, in many countries the insurance industry is less developed than the banking sector and does not have sufficient capital to insure all banks’ deposits. This is especially true for many transition economies and particularly for Armenia, where total assets of all insurance

¹⁰ Kyurumyan A., Sahakyan V. Assessment of the Maximum Size of Guaranteed Deposits in Armenia. // “Banber” Journal of Yerevan State Economic University, No. 3, 2006.

companies comprised less than 2% of total assets of the banking sector in 2005¹¹. Moreover, because bank failures tend not to be isolated events, private insurers would most likely be unwilling to provide insurance and to be exposed to the risk of having to cover widespread bank runs in an event of systemic crisis. Lastly, transferring deposit insurance to the private sector may undermine the confidence of banks and depositors alike.

With the above in mind, it is not surprising that the spectrum of organizational structures for deposit insurance schemes utilized in international practice today mostly covers the first two (in some cases three) of the following models:

- Governments provide unconditional deposit guarantees (though limitations apply), mainly through legally enforced mechanisms and formal procedures of compensation. The entire cost of providing compensation falls on the government, with no pre-arranged funding available.
- Governments establish a publicly owned and publicly administered deposit insurance agency, which is financed (at least in part) by contributions from commercial banks.
- A public deposit insurance scheme is established and administered jointly by banking supervisory authorities and commercial banks, financed fully by the latter.
- The deposit insurance scheme may also be organized by commercial banks alone, on an entirely private contractual basis, without any government involvement.

Countries around the world generally follow one of these models (more often the first two), with certain locale-specific alterations of the organizational or financing mechanisms. In practice, the third and fourth options require a strong commercial banking system with sufficient capital to self-absorb losses as a system. That is why such privately funded schemes are mostly utilized in Western European countries¹², while developing and transition countries tend to prefer greater organizational or financial involvement of the government or regulatory agencies.

As stated above, not always do deposit insurance schemes assume the existence of special funds, especially in the case of implicit deposit protection provided by government. In these cases, the entire cost of providing compensation lies on the shoulders of government,

¹¹ Contemporary socio-economic problems of the Republic of Armenia. Collection of scientific articles, Institute of Economic Research of the Ministry of Finance and Economy of RA, Yerevan, 2005; p. 143.

¹² An example of a deposit guarantee scheme established and administered fully by the private sector is the deposit protection system for German commercial banks, which is run by German commercial banks and their association, the *Bundesverband deutscher Banken*.

specifically current state budget. However, this is obviously not the optimal choice, especially for developing and transition countries, where existing budget expenditure commitments and the insufficiency of unallocated budget resources may make it difficult for the government to react accordingly.

Another key feature of effective deposit insurance schemes is the limitations on the maximum amount of deposits subject to reimbursement. As discussed above, deposit insurance schemes generally provide less than 100% coverage in order to counter moral hazard, as well as to be able to secure sufficient resources to cover all insured deposits. The specific approaches to limiting deposit insurance coverage vary from country to country. For instance, as an earlier paper on deposit insurance details, Norway covers deposits as large as 260800 USD, while in Switzerland deposits are protected only up to 19700 USD.¹³ Certain countries employ, or are considering to employ, coverage indexing mechanisms; in others the debate is still open whether or not coverage limits are to be increased. This raises an issue of determining the optimal limit of insured deposits, which remains a matter of ongoing discussion among academics and practitioners. The answer to this question requires a complex analysis of not only quantitative indicators such as per capita GDP or average deposit amounts, but also various qualitative characteristics such as the overall structure of the banking system and associated risks, the effectiveness of other regulatory measures employed, the structure of incomes and savings, etc. If we look at the ratio of the maximum insured deposit amount to per capita GDP, Armenia with a ratio of 3.3 was third when compared to EU countries behind Italy and Poland. Even if we consider that this is largely attributable to Armenia's low per capita GDP compared to EU countries, such an indicator still allows for sufficient protection of depositors in the country. Furthermore, the maximum limit surpasses the size of an average deposit in Armenia 5.7 times. Calculations show that, as of 2004, the number of depositors whose deposits were fully covered under the established limit was over 95% of total depositors, whereas the total amount of such deposits comprised over 60% of all deposits in the Armenian banking system¹⁴. These figures come to indicate that the maximum limit of insured deposits set at 2 million AMD¹⁵ in Armenia is optimal or close to such, in that it provides protection to a sufficient portion of depositors, yet does not exacerbate moral

¹³ *Demirguc-Kunt A., Detragiache E.* Does Deposit Insurance Increase Banking System Stability? IMF Working Papers, January 2000; p. 9.

¹⁴ *Kyurumyan A., Sahakyan V.* Assessment of the Maximum Size of Guaranteed Deposits in Armenia. // "Banber" Journal of Yerevan State Economic University, No. 3, 2006.

¹⁵ Roughly 6500 USD at the current USD/AMD exchange rate. The actual amount per depositor may be less due to the fact that deposits in foreign currency are reimbursed in smaller maximum amounts.

hazard behavior. Further, calculations show that, should this limit be increased, it may result in financial instability of the deposit insurance system.

SPECIAL TOPIC: DEPOSIT INSURANCE PRICING

An issue of utmost importance when discussing deposit insurance schemes – pricing for such protection – yet remains to be tackled. Strong controversy still exists in worldwide academia¹⁶ and policy circles on whether deposit insurance should be priced based on principles of equity or efficiency. The issue at stake here is a trade-off between distorting market behavior through equitable treatment of all agents on one hand, and the fact that risks associated with deposit protection can hardly be treated as typical (commercial) insurable risks – on the other. Traditionally, the uniform approach to pricing deposit insurance in most countries has been to set uniform premiums insured banks had to pay regardless of the extent of risk they pose to the scheme – or, put it in insurance terms – regardless of the likelihood of a policy event occurring. However, it has proven that such an equity-based approach triggers reduced market discipline and aggravates problems related to moral hazard.

The Deposit Guarantee Fund of Armenia has determined a uniform rate of contributions from commercial banks as a means of financing the fund – 0.05% of all attracted deposits from natural persons, calculated and paid quarterly¹⁷. Banks' contributions are calculated according to the amount of deposits they attract, but do not reflect the extent of risk a particular bank poses for the system and the deposit guarantee fund. However, international practice and theory of financial regulation suggest that deposit insurance schemes would be more effective if insured banks were obliged to measure their contribution according to risk. This would provide additional stimulus for banks to maintain acceptable risk levels and create a more market-based relationship between the parties, where economic incentive mitigates the shortcomings of uniform insurance coverage.

Existing literature on the topic suggests numerous approaches to differential (risk-based) pricing of deposit insurance, which generally center around the logic of expected-loss pricing. This approach assumes that an insured bank should pay an amount equal to the expected loss the insurer faces from providing deposit insurance to the bank. Contributions

¹⁶ See, for example: *Laeven L.* Pricing of Deposit Insurance. World Bank Policy Research Working Paper, July 2002 (with subsequent references); FDIC Deposit Insurance Options Paper, August 2000 (www.fdic.gov).

¹⁷ The law also sets one-time entry contributions and additional contributions where funds shall be insufficient to cover compensation expenses in the event of a bank failure. For purposes of this section, we disregard those components as unimportant in terms of the economic effect of pricing. We address the desirability of additional contributions in the context of system stability further in the paper.

based on the expected loss should most likely provide sufficient revenue to cover the costs of deposit insurance, as well as duly account for differences in risk across banks.

The mechanics of expected loss pricing can be represented by the following equation:

$$\textit{Expected loss} = (\textit{Expected default probability}) \times (\textit{Exposure}) \times (\textit{Loss given default})$$

Here, *loss given default* (LGD) is a number between 0 and 1 which indicates the severity of the possible loss, or the size of loss incurred by the insurer as a result of default. Basically, it is the portion of insured deposits that will have to be reimbursed by the insurer, as opposed to the portion of insured deposits which can be reimbursed from the funds of the defaulted bank. The Armenian law on deposit protection states that, where a relevant event has occurred, the Deposit Guarantee Fund reimburses all due amounts and retains the right to claim these losses from the defaulted bank. Thus, "Loss given default" in the above equation can be assumed to be equal to 1, since it is likely that, at least in the initial stage of the process, all reimbursements will have to be made by the Fund.¹⁸

The term "*exposure*" in the above equation is more straightforward, and can generally set to be equal to the amount of insured deposits.

The most important and problematic issue one has to deal with in utilizing the proposed expected loss pricing approach is estimating the *expected default probability* (EDP) of a bank. Expected default probability is "the most significant of the expected loss building blocks,"¹⁹ and the one that provides the element of risk-based differentiation among banks in any DI pricing model. Thus, any methodology of risk-based deposit insurance pricing largely centers around approaches of estimating EDP.

Several methods suggest using a combination of market-based and accounting-based indicators of bank risk taking to estimate default probabilities. Existing methods of default prediction can be classified into two main categories:

- market-based approaches (Merton's put-option pricing model, Ronn and Verma model, etc.)
- accounting-based approaches (fundamental analysis)

¹⁸ Given that the law provides the Fund with a right to claim at least a portion of losses from the defaulted bank, it has yet to be measured whether or not this ratio can be adjusted downward based on future compensation the Fund may receive from the defaulted bank. Such assessments, however, will be possible only if sufficient statistical data is available on reimbursements as a result of defaults and subsequent compensations. Additionally, the fact that the right of the Fund to claim compensation from the defaulted bank arises only after the Fund has made reimbursements, supports our assumption that LGD can be assumed to be equal to 1.

¹⁹ FDIC Deposit Insurance Options Paper, August 2000 (www.fdic.gov).

Academic literature offers biased evidence on the comparative efficiency of these models. For transition economies, however, there is widespread agreement that most market-based approaches are of limited use. Market analysis is usually based on interest rates or yields of uninsured bank debt, such as subordinated debt or certificates of deposit, and utilizes market indicators typical for developed financial markets, which is not the case for most transition economies. Thus, as L. Laeven states:

...[I]n countries with well-developed capital markets, market-based models are to be preferred over accounting-based models of deposit insurance. However, the application of market-based models of deposit insurance is limited. First, market-based models may give poor estimates of asset risk in countries with underdeveloped (illiquid) capital markets. Second, market-based information is not available for all banks.²⁰

This statement holds especially true for Armenia, where only two of the twenty-two banks have yet issued market debt, where the capital market in general is strongly mal-developed and cannot serve as a reliable source of market-based information such as yields, interest rates and other risk indicators. One of the most attractive (from the academic point of view) market-based approaches for deposit insurance pricing, Merton's option-pricing model, establishes direct links between a bank's deposit insurance price and the *market* value of the bank's assets. We believe that reliable estimations of the market value of a bank's assets and equity are unaccomplishable at this stage of capital market development and due to the virtual absence of market activity by Armenian banks.

Thus, our practical exercise in default prediction for Armenian banks is constrained to methods of fundamental analysis, which use accounting-based indicators (figures from financial reporting, CAMELS indicators, other financial and risk-measurement ratios) to predict bank failure. Variations of fundamental analysis approaches are used by deposit insurance authorities in the US, Canada and elsewhere to price deposit insurance. In this case, numerous financial indicators characterizing risk-taking by banks (loan quality, asset liquidity, capitalization, concentration and profitability ratios, etc.) are plugged into regression models to estimate the relationship between these indicators and the probability of a bank defaulting. Most authors use different modifications of the logit model to estimate bank default probability.²¹ These models use large samples of banks (both defaulted and surviving)

²⁰ Laeven L. Pricing of Deposit Insurance. World Bank Policy Research Working Paper 2871, July 2002; p. 6.

²¹ Existing literature provides mixed evidence of the efficiency of logit models in default prediction over other regression models. However, a clear advantage of logit models is that results can be directly interpreted as default probabilities. Furthermore, various authors point out the comparative accuracy of logit models and their practical usability.

to establish a relationship between a set of risk-measure indicators and the probability of bank default. A general logit model of bank default can be presented as follows:

$$p(L = 1) = \frac{e^z}{1 + e^z}, \text{ with } z = a + \sum_{j=1}^J \delta_j X_{ij} + \varepsilon_i$$

where L is a binary variable, taking the value of one if a bank defaulted and zero otherwise. The probability function is described by $p(L)$. For estimating $p(L)$ an empirically not observable latent variable z is introduced that is determined by the independent variables X_{ij} . Thus, a linear relationship is assumed for the determination of z , however, not for the estimation of $p(L)$. Here, i indexes the bank year observations and j the accounting measures which determine the default probability.

In order to use a logit model to predict default probabilities of Armenian banks, we would have to construct a sizeable sample of Armenian banks over a certain period of time, which would include both failing and surviving banks. It should be noted, however, that no such sample could be constructed from among Armenian banks for a number of reasons. First, the time span of any possible sampling would be limited to the last 6-8 years: the time period when the Armenian banking system left behind all post-transition cataclysms, underwent significant market clean-up and started a new phase of development. Secondly, bank failure and survival statistics for this time period do not seem to be sufficient for a viable regression sample. Any sample underlying a logit analysis would require a certain fraction of banks that have actually defaulted, whereas in the case of Armenia both overall system numbers and failure cases are very limited. Lastly, our assessments show that there is no sufficient database of financial information for those banks which have failed at any point in time during this period.

In this paper, we use a logit model constructed by Haselmann and Wachtel²² for a large sample of banks in the transition countries. Based on a total of 631 observations (of which 36 observed defaults, or approximately 6%) of banks in the Czech Republic, Hungary, Slovakia and Poland from the period of 1994-2002, Haselmann and Wachtel derive probabilities of bank default from the following set of risk-taking indicators:

- Loan quality, or credit risk taking: Loan loss reserves / Loans
- Lending activity: Loans / Assets
- Management quality: Personnel expenses / Operational Expenses
- Liquidity: Liquid assets / Assets

²² Haselmann R., Wachtel P. Risk taking by banks in the transition countries. Social Science Research Network Working Paper, December 2006 (www.ssrn.org).

- Bank size: Log of assets
- Liabilities management: Customer deposits / Assets

While the last two indicators provide insight into general bank characteristics, all other indicators are measures of certain types of risk: credit risk, operations risk and liquidity risk. According to the authors, this set of indicators has proven to be most relevant in terms of default prediction among many other similar indicators of risk-taking by banks.

Our choice of this model is particularly motivated by the following two factors:

1. Haselmann and Wachtel's model uses public data.

Similar regression analysis models have been proposed by several authors²³. US FDIC's new risk-based assessment model is also based on estimating probabilities of default through regression analysis. However, most of these models, including the one utilized by FDIC, use non-public accounting data, such as non-performing asset ratios, loan charge-offs and CAMELS component ratings. Other models (e.g. Canadian Deposit Insurance Corporation's expected-loss pricing approach) incorporate subjective supervisory ratings into their default scoring systems, yet others use external ratings by S&P, Moody's or Fitch. These improvements undeniably add value to the accuracy of default prediction models; nevertheless, we are forced to constrain our practical analysis to publicly available financial data due to the lack of access to publicly unavailable supervisory information and absence of external ratings. The aim of our practical exercise is thus limited to explaining the general logic behind expected-loss (or risk-based) pricing, while the policy-relevant value of a specific model, should regulators choose to employ one, can be improved by incorporating additional supervisory information into it.

2. The model is constructed based on a sample of transition countries, thus provides for a better fit for Armenia's case.

Godlewski's default prediction model is constructed for emerging economies of South-East Asia, South America and the CEE, A. Peresetsky and co-authors have developed their clustering-based model for Russian banks, the models employed by FDIC and CDIC provide best fit for US and Canadian banking systems. Thus, we have endeavored to choose a model which stands closest to Armenia's transition realm, particularly in terms of general characteristics of the overall economy and the banking system. Further, as Haselmann and

²³ For a non-exhaustive list of default prediction models, see e.g.: *Laeven L.* Pricing of Deposit Insurance. World Bank Policy Research Working Paper 2871, July 2002 (subsequent references); *Peresetsky A., Karminsky A., Golovan S.* Probability of default models for Russian banks. Bank of Finland Discussion Papers, no. 21/2004; *Godlewski C.* Are Bank Ratings Coherent with Bank Default Probabilities in Emerging Market Economies? Social Science Research Network Working Paper, August 2004 (www.ssrn.org); etc.

Wachtel point out, their model provides a good fit regardless of year- and country-specific controls²⁴. The authors conclude that “the estimation of default probability is not specific to the countries or years included in the sample, but to measures describing the conditions of the individual banks.”²⁵ Further, our own argument supporting the use of this model to predict Armenian bank defaults could be that, according to our expert analysis, significant similarities exist between country- and industry-specific control variables among the model sample countries and Armenia. The latter cannot be stated with equal confidence concerning any other model mentioned above.

Below are the coefficient estimates of the final Haselmann-Wachtel model for each of the regression variables:

<i>Loan loss reserves / Loans</i>	4.641
<i>Loans / Assets</i>	-16.122
<i>Personnel expenses²⁶ / Operational expenses</i>	-2.209
<i>Liquid assets / Assets</i>	-19.909
<i>Log²⁷ of assets</i>	-1.218
<i>Customer Deposits / Assets</i>	9.545
<hr/>	
<i>Constant</i>	10.071

The signs of the above coefficients correspond to the expected effect of risk factors on bank default: as larger loan loss reserves (poor loan quality) and larger customer deposit base (stronger dependence on deposits) indicate stronger default risk, so do factors like the smaller asset base, smaller share of liquid assets and loans, as well as the larger share of non personnel-related expenses in total operational expenses.

We have used public report data for twenty-one Armenian banks registered and operating in Armenia as at the end of 3rd quarter 2007. Loan loss reserves for five banks were estimated based on industry averages due to the lack of relevant information in these banks’ publicly filed financial reports. For the same reason, we’ve used a similar estimate of personnel expenses for one bank.

Estimated probabilities of default for Armenian banks according to the Haselmann-Wachtel model are shown in the table and chart below.

²⁴ The overall fit of the model is extremely high, with over 94% correct prediction. For additional indicators of model fit, see *Haselmann R., Wachtel P. Risk taking by banks in the transition countries. Social Science Research Network Working Paper, December 2006 (www.ssrn.org)*.

²⁵ *Ibid*; p. 9.

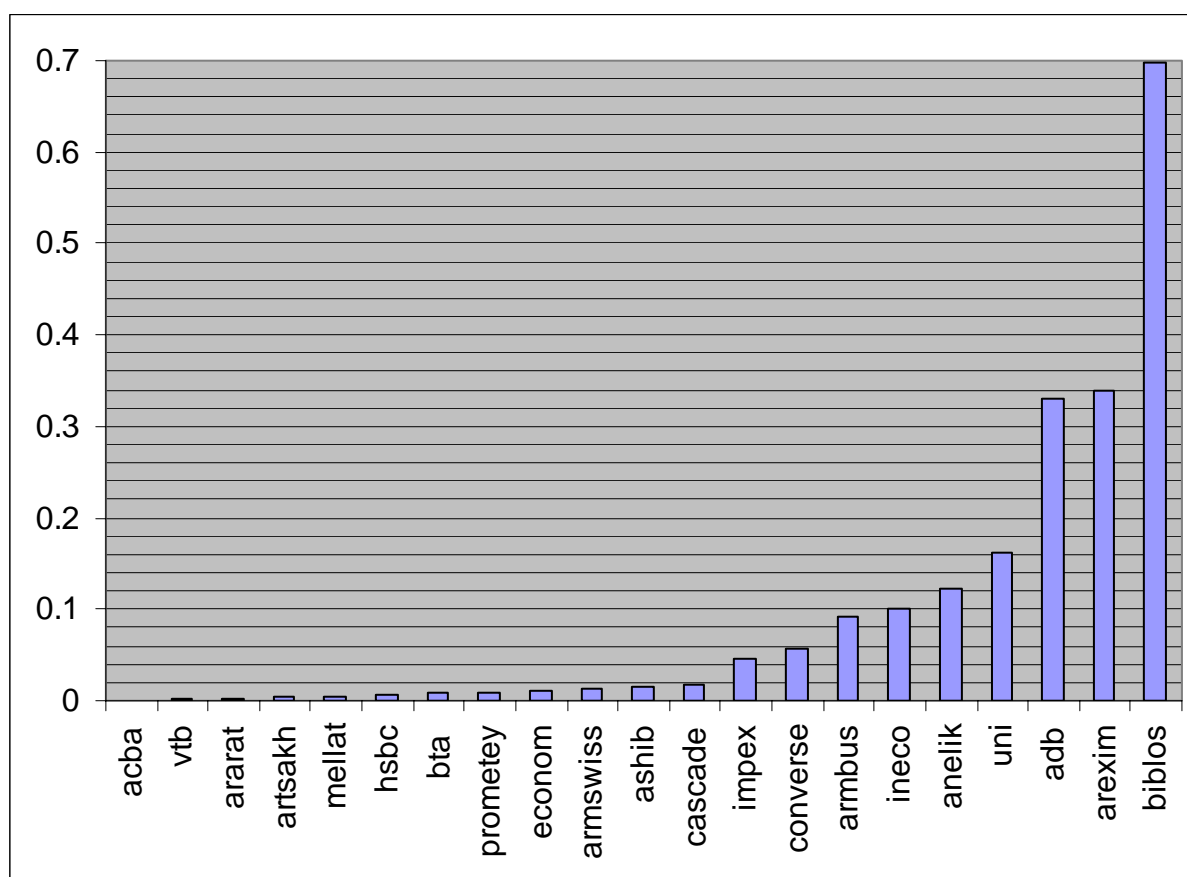
²⁶ We have included salary and social security payments, as well as training and business travel expenses in personnel expenses for the purposes of the model.

²⁷ For the purposes of the model, we have computed the natural logarithm of balance-sheet assets.

Table 2. Estimated default probabilities of Armenian banks, 3rd quarter 2007

	Bank	Probability of default (x10⁻⁸)
1.	ACBA-Credit Agricole Bank CJSC	0.00073888
2.	VTB-Armenia Bank CJSC	0.00137236
3.	Ararat Bank OJSC	0.00255229
4.	Artsakh Bank CJSC	0.00422630
5.	Mellat Bank CJSC	0.00456128
6.	HSBC Bank Armenia CJSC	0.00700383
7.	BTA InvestBank CJSC	0.00832813
8.	Prometey Bank LLC	0.00937709
9.	ArmeconomBank CJSC	0.01169812
10.	ArmSwissBank CJSC	0.01274041
11.	ArdshininvestBank CJSC	0.01508358
12.	Cascade Bank CJSC	0.01845089
13.	ArmimpexBank CJSC	0.04633328
14.	Converse Bank CJSC	0.05624030
15.	ArmbusinessBank CJSC	0.09275361
16.	InecoBank CJSC	0.09990776
17.	Anelik Bank CJSC	0.12163208
18.	UniBank CJSC	0.16197363
19.	Armenian Development Bank OJSC	0.33039685
20.	AreximBank CJSC	0.33972192
21.	Biblos Bank Armenia CJSC	0.69851699

Chart 1. Estimated default probabilities of Armenian banks, 3rd quarter 2007(x10⁻⁸)



One striking finding, according to these results, is that there is a sizeable difference between “best” and “worst” banks: the probability of default for the “worst” bank is almost 10^3 times greater than that of the “best” bank. This reinforces our initial hypothesis, stated at the outset of our research, that a differentiated approach to the pricing of deposit protection is justified. More detailed policy implications and recommendations will be discussed in the subsequent section.

CONCLUSIONS AND POLICY RECOMMENDATIONS

As stated earlier in this paper, the general aim of our research was to examine the possibilities of an improved deposit protection system for a transition country like Armenia – one that would be:

- a) efficient from the economics point of view (in best achieving its system objectives);
- b) fair from the social point of view (both for system agents and consumers); and
- c) feasible from the organizational point of view.

Having in mind the sizeable range of organizational alternatives for deposit protection systems around the globe, as well as the inherent conflict between fairness and efficiency in any policy decision, we could hardly succeed in searching for a universally acceptable organizational model of deposit protection that would be optimal in all dimensions. In the previous sections we have endeavored to analyze the full multitude of features of a typical deposit protection system, from organizational factors to pricing. In conclusion, it is clear that our analysis leaves us the ability not to indicate the single optimal set of DI features, but to outline a set of recommendations that would improve the existing deposit protection scheme in Armenia.

Meanwhile, in designing our policy recommendations, we have departed from the well-known evolutionary concept, “if it ain’t broke, don’t fix it.” When reforms concern an issue which has not been widely preached as in need of urgent transformation – a system that seems to be working well enough “as is”, the theory of political change suggests gradualism to be the weapon of choice in improving the work of such a system.

It is with the above in mind that we have assessed some of the key organizational features of the Armenian deposit protection system. Namely, our comparative analysis and expert advice support the hypothesis that a **pre-funded** deposit protection system **administered by an independent public authority** and financed through **bank**

contributions can be considered a best-choice model for Armenia, taking into account the following factors:

- the limited capacities of state budget would hardly allow for an unfunded scheme to be financed from *ex-post* budgetary contributions when bank failures occur;
- the Armenian banking industry – banks themselves and the Bankers’ Union – seems to be insufficiently mature to assume any additional organizational and coordinating functions concerning the management of the deposit protection fund.

Compulsory membership of all banks in the scheme, in our opinion, is also justified in light of the weak market discipline, where market and competition forces can not, at this stage of financial development, drive banks to realize benefits of system membership and “punish” those who have selected to trade uninsured.

Issues related to the financing of the Armenian deposit protection scheme are not as straightforward as its organization. And even though the main focus of our research in the previous section has been pricing for deposit insurance, another finance-related feature of the Armenian deposit protection scheme deserves attention here. As discussed earlier in the paper, the law requires Armenian banks to make **additional contributions** to the fund at times when a bank default has occurred, and fund money is not sufficient to reimburse all rightful claimants of the defaulted banks. However, one could hardly argue that most bank defaults are likely to occur at times of industry distress, when most (if not all) other banks are in financial hardship themselves. Forcing banks to face extra costs at times of downturn may have an additional destabilizing effect on the banks themselves and the system as a whole, thus negatively affecting the policy purpose of deposit protection as a tool for stabilization. On the other hand, one should not neglect the formal necessity of a provision securing additional sources of funding for the deposit protection fund in cases where fund money is not sufficient. In order to avoid the aforementioned possible distortions in stability, however, we propose to shift the “burden” of additional contributions from banks to the fund itself: where financial resources accumulated with the fund are insufficient to cover reimbursement costs, the deposit protection fund itself should be entitled to raise additional funding through the issue of **government-backed debt securities**. Future moneys available to the fund through regular contributions can be used to finance this debt, whereas government guarantees will secure stronger demand for it on the local market and provide additional liquidity.

We now turn to the “special topic” of our research, **pricing for deposit protection**. Our analysis shows that there exists a large difference in the extent of risk-taking by Armenian banks, which speaks in favor of a risk-differentiated framework for deposit insurance pricing. Both normative theory and practice support our hypothesis that a risk-based pricing approach can be more effective in mitigating moral hazard and minimizing market discipline-related distortions caused by a regulatory intervention in the form of explicit deposit protection. Meanwhile, we believe gradualism and care should be applied in the transition from a uniform pricing system to risk-based differentiation. As an initial step towards such transition, we propose to classify banks into a few risk groups, based on their probability of default, and apply different contribution margins to each group depending on the extent of risk they pose to the system. At least in the initial stage of such reform, any classification should take into account the following constraints:

- the reformed structure of contributions should be equivalent to the existing one in terms of gross contributions to the fund;
- the portion of banks affected by higher contribution requirements should be as small as possible;
- price differentiation should be minor at the initial stage, with a gradual trend to increasing such differentiation commensurate with the variation in the extent of inherent risks. Additionally, any such gradual increase should be planned in advance and communicated to market agents; this will give banks a chance to prepare for a “stricter” regime or restructure their activity to decrease their risk rating.

As an exemplary model for establishing risk-differentiated pricing, we propose the following structure for risk categories based on probability-of-default thresholds and relevant contribution rates. The transition from “scenario A” rates to “scenario B” rates is brought below as an example of the gradual increase in risk-based differentiation and can be exercised over a certain period of time.

Risk Category	1	2	3	4	5
PoD, x 10 ⁸	(0; 0.005)	[0.005; 0.03)	[0.03; 0.1)	[0.1; 0.5)	[0.5; 1)
Contribution rate, % of customer deposits (scenario A)	0.035	0.05	0.055	0.06	0.075
Contribution rate, % of customer deposits (scenario B)	0.02	0.05	0.065	0.08	0.095

Under the proposed categorization structure, the breakdown of Armenian banks by categories is the following:

Risk Category	1	2	3	4	5
Number of banks	5	7	4	4	1
Share, % (customer deposits)	18.1	44.1	19.8	17.5	0.5

The proposed contribution structure leaves conditions unchanged for one third of Armenian banks, with a share in total customer deposits of over 44%. “Negative” change, or increases in contribution rates, affect little more than a third of banks with a much lower share of deposits. With both of the proposed contribution structures, the overall contributions remain roughly equivalent to a flat-rate contribution of 0.05% of total customer deposits currently in place. Moreover, provided the composition of risk categories does not change, “scenario B” contributions provide for total contributions of more than 0.05%. This leaves the fund with a “safety cushion” that total contributions will be maintained at a consistent level even if limited positive change takes place in the composition of risk categories (e.g. some banks improve their risk performance and move to lower-contribution categories).

In the longer run, “minimum negative change” constraints set out above will gradually lose their policy importance, which will allow for a stronger risk differentiation and a more effective categorization/contribution structure. Provided that default prediction models and the underlying risk differentiation methodology will be continually improved, an ultimate expected-loss pricing model may be eventually adopted, where bank contributions exactly match the expected amount of risk an individual bank poses to the system.

Finally, our analysis and policy recommendations would be incomplete without the discussion of prospects to **improve the overall risk-based assessment methodology** for deposit insurance pricing. The model discussed in this paper, proposed by Haselmann and Wachtel, is undoubtedly not the best possible alternative. Another model incorporating more explanatory variables, including ones not available through public financial reports but obtainable through regulatory channels (especially CAMELS-related indicators), could significantly improve the accuracy of default prediction. Ultimately, a similar model constructed on the basis of a sample of Armenian banks would certainly be of higher practical value. The present study, for reasons previously indicated, is limited in its capacity to accomplish these improvements, but nevertheless they remain an important issue for consideration by policy-makers in the longer run (e.g. when sufficient data becomes available to construct a relevant regression model for Armenian banks), should risk-differentiation techniques in deposit protection pricing become reality.