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Summary of doctoral dissertation

The payment system and financial intermediation: should banks use current deposits to finance risky assets?

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The aim of the thesis

In this thesis, I examine what is the rationale behind the fractional reserve banking, in which transaction accounts serve as a source of funding for banks. An alternative scheme, which is considered in the thesis, is narrow banking that would separate some of the deposits from banks' credit activity. The aim of the thesis is to verify the following argument: reducing the role of current deposits in financing banks' risky assets may improve social welfare.

Introduction and research hypotheses

An ubiquitous feature of contemporary banking is the interlinkage between the two functions performed by banks: facilitating transactions and financial intermediation. On the one hand, banks use transaction deposits as a source of funding. Moreover, banks can extend credit without having accumulated deposits. This is because newly created credit becomes debtor's deposit (Werner 2016). On the other hand, the potential loss of value of banks' assets may hamper the ability of households and businesses to make payments, because some of their deposits may be frozen or lose nominal value.

To prevent potential disruptions in the payment system, public authorities provide guarantees for banks' liabilities. Although the state is usually efficient in protecting the value of deposits, there are three major categories of costs related to public guarantees. First, banks are subject to less market discipline as some of the creditors are covered by the explicit insurance schemes, while others may expect to benefit from the implicit support of state. Second, banking crises lead to serious costs for taxpayers. Third, public guarantees create a need for extensive regulations and supervision over banking activity.

The fractional reserve banking is also criticised for its role in creating macroeconomic volatility, including boom and bust cycles. For some of the economists, this is the main motivation to reduce the money creation by commercial banks (e.g. Fisher 1936, Friedman 1959, Benes and Kumhof 2012).

In this thesis, I attempt to answer the question, what are the factors that justify functioning of the financial system in its contemporary form, and whether an alternative design of the financial system would bring more benefits to the society.

I formulate the following research hypotheses:

1. The risk of suspension of convertibility of transaction deposits is one of the main reasons why public authorities decide to provide guarantees for banks' liabilities.

2. The financial intermediation theory does not explain, why the transaction deposits, which are bound to be spent in near future, should be used to finance risky assets.

3. The use of the current deposits to finance credit leads to an increased volatility of monetary developments.

   (a) Credit extended by the banking sector does not depend on the savings deposited in banks.

   (b) Credit booms are associated with the decreased share of genuine savings in the deposits of non-financial agents, what magnifies macroeconomic imbalances.

4. There are narrow banking schemes that could replace publicly funded deposit insurance. The financial system based on narrow banking would perform its functions continuously, without the need of fiscal backstop, even in the case of substantial drop in the value of banks assets.

The thesis consists of four chapters that are summarized below.

Chapter I - Security of transaction deposits and its importance for economic activity

In the first chapter, I describe the characteristics of the current deposits (or - in theoretical approach - transaction deposits) and I analyze historical evolution of the security of deposits.

I interpret transaction deposits as those funds that satisfy the transaction demand for money. That is, transaction deposits are expected to be spent in the near future, e.g. within one month. These funds need to be placed in banks, because otherwise agents would not be able to use transaction services provided by banks. In contrast, savings do not need to be deposited in banks, as there are many other financial assets available for investment purposes. The use of transaction deposits has enabled a decrease in transaction costs since, at least, ancient Greece. In the theoretical literature there are solid arguments, for why transaction deposits should be risk-free (Gorton and Pennacchi 1990, Andolfatto and Martin 2013).

In the history of banking, there were three main models of securing transaction deposits. In the one dominant from antiquity to the 1st half of XX century, deposits were backed by risky banks' assets and sometimes they were additionally guaranteed by banks' owners or other private guarantors. The second model, which predominates contemporarily, is based on public guarantees. The third model uses the idea of narrow banking, that is, some deposits

are fully collateralized by risk-free asset. A characteristic feature of historical narrow banks was that prudential standards were enforced by public regulations.

Based on my review of history of banking, I formulate three complementary explanations why narrow banks did not emerge spontaneously as a result of market mechanisms:

1. Depositors wanted to benefit from free transaction services and interest paid on deposits, even if they took into consideration the risk of bank's insolvency. In particular, in times of the insufficient supply of specie, banks encouraged customers to use deposits backed by fractional reserves. Banks used incentives such as availability of overdraft or high costs of withdrawing coins.

2. Depositors were not aware that banks used transaction deposits to finance risky assets.

3. Banks were not able to credibly commit to keep high level of reserves. This led to the equilibrium, in which banks took investment risk and depositors expected to obtain remuneration of this risk. However, functioning of narrow banks was feasible if verification of reserves level was conducted by external supervisory bodies.

The first explantation indicates that fractional reserve banking might have played a useful role in times of specie money. This system allowed to make money supply less dependent on the availability of specie. However, in times of the fiat money, whose value is protected by independent central banks, this benefit of fractional reserve does not matter any longer. Nowadays, money supply might be easily increased even if transaction deposits were fully backed by central bank money.

The second and the third explanation imply that, in some cases, lack of narrow banks might have been contrary to the interest of depositors. Such situation may be attributed to the market failure, namely, the moral hazard for banks. The moral hazard existed because of the asymmetry of information between banks and depositors, with the latter not being able to fully monitor actions of the former. That market failure was sometimes addressed by regulations and supervision of financial institutions (e.g. collateralization of banknotes in the US under the National Bank Act) or by public institutions providing safe transaction deposits (e.g. the Bank of Amsterdam).

In this chapter, I also analyze contemporary banking crises in Argentina, Cyprus and Greece. These crises were characterized by severe disturbances in the payment system as deposits were partially frozen to prevent bank runs. Above-mentioned case studies show that suspension of convertibility of deposits has very negative impact on welfare, because it increases transaction costs and makes it impossible to make some of the transactions.

Moreover, Laeven and Valencia banking crises database (2013) provides an evidence that the developed countries undertake extensive interventions to protect all of the bank deposits (not only those protected by the official insurance scheme) in the event of a crisis.

The first hypothesis of my thesis may be confirmed by three arguments: the discussion accompanying introduction of the deposit insurance in the US, the case studies of financial crises combined with the freeze of deposits and by the analysis of governments reactions to banking crises. It may be concluded that potential costs associated with the freeze of deposits are usually so large that governments cannot let the banks fail. In response to this problem, developed countries have recently introduced new methods of banks resolution. Although these new mechanisms may reduce the costs borne by taxpayers, in the literature there are important objections, whether bank resolution will be efficient, especially in the case of systemic crises.

Chapter II - Theoretical underpinnings of the banks' use of transaction deposits

The second chapter is focused entirely on verifying the second research hypothesis. I analyze existing theoretical models, and I also develop an original model, in which transaction deposits are used as a source of funding for risky investment.

The Diamond-Dybvig model (1983), and its numerous modifications, is the most commonly used explanation for why fractional reserve banking is beneficial for depositors. This class of models unravels why banks are dealing with maturity transformations and what is the mechanism of a bank run. In this chapter, I review canonical model as well as other models relevant for the verification of the second research hypothesis. An important contribution of my thesis is to show that Wallace's model (1996) may actually support some of non-radical narrow banking proposals, whereas in the literature this model is cited as a proof of inefficiency of narrow banking.

I also use Diamond-Dybvig class of models to analyze factors influencing the level of reserves kept by banks as backing for demand deposits. I focus on three articles that add important features to the baseline model: Cooper and Ross 1998, Allen and Gale 1998 and Allen et al. 2014. I identify two reasons why banks decide to maintain reserves (that is, to store real goods or to invest in short-term risk-free investment technology).

First, reserves allow to make payments for impatient depositors. Hence, the optimal level of reserves depends, among others, on the risk aversion of depositors. The higher risk aversion,

the higher are payments for early withdrawals, which constitutes insurance against liquidity needs.

Second, reserves serve to secure consumption of all depositors if the bank run occurs. This motive of holding reserves depends on the risk aversion and on the severity of consequences of banks' insolvency.

My analysis indicates that in the models, in which the risk of run is explicitly taken into account when solving optimization problems, reserves may significantly exceed expected payments for impatient depositors. This means that reducing the role of current deposits in financing risky assets may be consistent with maximizing depositors' expected utility. This conclusion confirms the second research hypothesis as well as the main argument of the Ph.D. thesis.

In this chapter, I also review seven articles that are not based on the class of Diamond-Dybvig models. Each of these articles provides explanation why fractional reserve banking may be useful from the perspective of social welfare. However, an in-depth analysis points out that these models do not justify why the transaction deposits, which are bound to be spent in near future, should be used to finance risky assets. In contrast, Chari and Phelan (2014) show that full-reserve banking might be more preferable solution.

The last part of this chapter presents an original model, in which transaction deposits are used by banks to finance risky assets. [1] Based on the model, I prove the theorem that a risk-averse depositor prefers to have her deposit partially backed by risk-free assets. The optimal level of risk-free reserves is an increasing function of the risk aversion parameter. This result means that in the economy with heterogeneous agents, there would be a need of many different banks addressing varied risk-aversion preferences. Alternatively, there might be only two types of banks: a narrow bank holding full reserves and a credit bank maintaining low reserves level. Then, non-financial agents could achieve optimal level of reserves as a combination of deposits placed in those two banks.

In this model, I also show that if there is no mechanism forcing banks to keep the pre-agreed level of reserves, then banks tend to have minimum feasible reserves and depositors demand interest on deposits that would reflect the actual risk profile of deposits. This conclusion is consistent with the finding from historical analysis that one of the reason for the absence of narrow banks was lack of the appropriate enforcement mechanism. This sub-optimal market outcome may be improved by publicly funded deposit insurance. Similarly to the market outcome, level of reserves do not depends on depositors' preferences. However,

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[1]This model draws heavily on the unpublished model prepared by myself and Paweł Borys.

deposit insurance allows to avoid costs of banks' insolvency (e.g. transaction costs related to deposits freeze). It is important to bear in mind that costs of deposit insurance are not well reflected in the model as, for example, I assume that taxes financing the insurance are neutral for economic activity.

Chapter III - The role of transaction deposits in financing credit booms

The role of fractional reserve banking in generating macroeconomic imbalances may be reduced to its impact on the divergence between the market interest rate and the natural interest rate. Although in the literature there is no uniform definition of the natural interest rate, various schools of economic thought agree with the following two statements. First, deviations of the market interest rate from the natural interest rate lead to macroeconomic imbalances. Second, an increase (a decrease) in propensity to save exerts downward (upward) pressure on the natural interest rate. Based on these two premises, it is possible to formulate following conclusion. If the changes in the supply of voluntary savings had no influence on the availability of funding for non-financial borrowers, the economy would be prone to macroeconomic imbalances.

I verify two specific hypotheses regarding the impact of fractional reserve banking on macroeconomic imbalances. The weaker hypotheses (3a) says that credit extended by the banking sector does not depend on the savings deposited in banks. Hence, commercial banks may freely increase money supply. The stronger hypothesis (3b) says that credit booms are associated with the decreased share of genuine savings in the deposits of non-financial agents, what adds to macroeconomic volatility. This prediction draws on the Austrian business cycle theory (Hayek 1933).

I conduct econometric analysis using panel data on 20 countries in the period 1960-2015. Careful preparation of the dataset was an important element of this research project, as data on banking sector liabilities often suffer from methodological changes and inaccuracies that make it difficult to conduct long-term analyses. Although it is not possible to precisely separate genuine savings from transaction deposits, I use dynamics of term deposits and saving accounts as an approximation of changes in savings, while transaction deposits are approximated with overnight deposits.

The hypothesis 3a is tested with the use of simple Granger causality tests (1969). It may be expected that if there is any impact of exogenous increase in savings on credit, it would

materialize with some delay. I conduct tests, whether lagged growth rates of deposits have statistically significant impact on the credit growth.

The results of the causality tests tend to confirm the hypotheses 3a, because at the standard 5% level of confidence, one cannot reject the statement that lagged savings growth rates are insignificant in explaining credit growth. Thus, it may be concluded that changes in thrift do not influence credit, at least in the short run. On the contrary, growth in the total deposits contains relevant information for predicting credit growth. One interpretation is that banks care about funding, and an abundance of retail deposits makes it easier to originate new loans. Banks, however, may not differentiate between savings and transaction deposits.

The hypothesis 3b is verified with the fixed effects panel models. To analyze the changes in the structure of deposits, for each country I calculate the long-term trend of share of transaction deposits in total deposits. Its purpose is to control for the institutional and technological factors that influence the money demand in the long run. The dependent variable is the deviation of the transaction deposits' share (seasonally adjusted) from the trend. Main explanatory variables are lagged credit growth standalone and lagged credit growth interacted with dummy variable denoting a credit boom. I develop my own method of credit booms identification, because standard methods used in the literature (Gourinchas et al. 2001, Mendoza and Terrones 2008) identify as booms those periods that come after episodes of rapid credit growth.

The results show that credit growth contributes positively to the share of savings deposits in all deposits. That is, money created in the previous quarter is relatively likely to be saved. However, during a credit boom, the situation reverses. Then, an increase in the real credit of 1% leads to an increase in the share of transaction deposits of 0.04 percentage points in the next quarter (this result is significant at 1% level of confidence for all main specifications). An average credit boom is associated with growth in the real credit of 33%, which implies the effect of transaction deposits' share being larger by about 1.3 percentage points. Hence, this effect turns out to be economically significant, but not very strong.

Chapter IV - Narrow banking proposals

In the fourth chapter, I review nine narrow banking proposals that exist in the literature. I also analyze the problem of financial stability of the broad financial system, absent deposit insurance. As a last part, I discuss impact of full-reserve banking on monetary developments.

To facilitate discussion on the narrow banking proposals, I develop their classification, which divides the proposals into three categories: radical, moderate and hybrid ones. The table

below presents the criteria of the classification.

Table 1: Classification of the narrow banking proposals

		Would it be forbidden to finance credit with uninsured demand deposits?	
		Yes	No
Would it be allowed to finance risky assets with publicly insured deposits?	Yes	-	Hybrid proposals
	No	Radical proposals	Moderate proposals

source: own elaboration

The publicly funded deposit insurance would be still needed to ensure smooth functioning of the payment system in the case of the hybrid proposals, whereas the moderate and radical proposals envisage that the payment system would be based on transaction deposits backed by risk-free assets. The comparison of the radical and moderate proposals leads to the conclusion that the former can theoretically provide more stable financial system. On the one hand, restricting the use of short-term debt (or even elimination of debt as proposed by Chamley et al. (2012)) may prevent bank runs. On the other hand, it may come at the cost of decreased utility of depositors, because it might limit possibilities of insurance against liquidity shocks or reduce the pool of safe assets insensitive to market news. Moreover, the transition to the financial system based on the radical proposals would be a serious experiment and would bring a substantial dose of uncertainty.

Therefore, if the moderate proposals would be able to guarantee the stability of the broad financial system and, at the same time, eliminate costs of deposit insurance, they might be a sufficient reform, but less risky than the radical plans. An example of such moderate plan is the proposal of Merton and Bodie (1993). They propose that commercial banks should offer risk-free transaction deposits that would be backed by ear-marked safe assets. Importantly, other deposits would not be covered by any form of the public guarantees.

However, if illiquid assets were to be financed with uninsured demand deposits, there would be a need for some mechanism preventing bank runs. In this thesis, I propose a solution analogous to the suspension of convertibility of deposits. In the event of extraordinary liquidity problems, an appropriate supervisory body could decide to convert bank's liabilities into long-term bonds. Such a mechanism would allow to combine liquidity insurance in normal times with the stabilization of the financial system during the panic.

In the contemporary banking system, the freeze of deposits results in the paralysis of the payment system. In contrast, under the narrow banking the payment system would function smoothly as transaction deposits would not be subject to freeze as they are run-proof anyway. Furthermore, agents holding deposits converted into bonds would be able to sell them on the market.

In a likely case of insufficient liquidity on the market, central bank might intervene in a way analogous to the Bagehot rule. Depositors could borrow money from central bank (with technical assistance of their depository institutions), posting newly created bonds as collateral. The role of financial supervision would be to valuate liabilities of each commercial bank.

In this chapter, I also review arguments why the narrow banking would not need to be associated with reduced funding for the real economy. Central bank credit for commercial banks might play a key role.

Regarding the benefits from stabilizing macroeconomic volatility, they might materialize in the financial system based on the radical proposals. Then, banks would not be able to create credit *ex nihilo*. In the case of less radical proposals, the potential stabilization of monetary developments would depend on the share of transaction deposits being backed by the full reserves.

It is important to note that introduction of full-reserve banking does not guarantee elimination of unsustainable booms. There would still be a need of macroprudential policies that limit credit expansion. Although such tools are also available in the contemporary banking system, their efficiency is much lower than in the hypothetical full-reserve banking.

References

Allen F., Carletti E., Gale D. (2014), *Money, financial stability and efficiency*, Journal of Economic Theory, 149, s. 100–127.

Allen F., Gale D. (1998), *Optimal Financial Crises*, Journal of Finance, 53, s. 1245–1284.

Andolfatto D., Martin F. (2013), *Information disclosure and exchange media*, Review of Economic Dynamics, 16, s. 527–539.

Benes J., Kumhof M. (2012), *The Chicago Plan Revisited*, IMF Working Paper No. 12/202.

Chamley C., Kotlikoff L., Polemarchakis H. (2012), *Limited-purpose banking: moving from trust me to show me banking*, American Economic Review: Papers and Proceedings, 102, s. 1–10.

Chari V., Phelan C. (2014), *On thesocial usefulness of fractional reserve banking*, Journal of Monetary Economics, 65 (1), s. 1–13.

Cooper R., Ross T. (1998), *Bank runs: Liquidity costs and investment distortions*, Journal of Monetary Economics, 41, s. 27–38.

Diamond D., Dybvig P. (1983), *Bank Runs, Deposit Insurance, and Liquidity*, Journal of Political Economy, 91 (3), s. 401–419.

Fisher I. (1936), *100 percent money*, Adelphi Company, Nowy Jork.

Friedman M. (1959), *A Program For Monetary Stability*, Fordham University Press, Nowy Jork.

Gorton G., Pennacchi G. (1990), *Financial Intermediaries and Liquidity Creation*, Journal of Finance, 45, s. 49–71.

Gourinchas P., Valdes R., Landerretche O. (2001), *Lending Booms: Latin America and the World.*, Economia, s. 47–99.

Granger C. (1969), *Investigating Causal Relations by Econometric Models and Cross-spectral Methods*, Econometrica, 37, s. 424–438.

Hayek F. (1933), *Monetary theory and the trade cycle*, Nowy Jork.

Laeven L., Valencia F. (2013), *Systemic Banking Crises Database*, IMF Economic Review, 61, s. 225–270.

Mendoza E., Terrones M. (2008), *An Anatomy of Credit Booms: Evidence from Macro Aggregates and Micro Data*, NBER Working Paper 14049.

Merton R., Bodie Z. (1993), *Deposit insurance reform: a functional approach*, Carnegie-Rochester Conference Series on Public Policy 38.

Wallace N. (1996), *Narrow Banking Meets Diamond-Dybvig Model*, Quarterly Review, Federal Reserve Bank of Minneapolis, 20, s. 3–13.

Werner R. (2016), *A lost century in economics: Three theories of banking and the conclusive evidence*, International Review of Financial Analysis, 46, s. 361–379.