

## SHADOW BANKING AND THE FOUR PILLARS OF TRADITIONAL FINANCIAL INTERMEDIATION<sup>1</sup>

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What I am going to discuss this morning is shadow banking. I have to warn you: it is based on a pretty technical paper, shared with Emmanuel Farhi, who is a young professor at Harvard. Trying to understand what shadow banking is about, and what the consequences of shadow banking are for regulation supervision, which is a big topic nowadays with FinTech, but also with all kinds of other activities.

What I am going to try to do, even though it is an extremely technical paper, is to give you some intuition for those of you who are not trained in mathematical economics, so that you get the intuition for what we do, and some of it will be of help for the research department.

There are various definitions of *shadow banking* but the most prominent one is that it is unregulated banking, with no access to public liquidity, so you do not get deposit insurance, which is a form of liquidity which is provided to banks (lender of last resort).

At least in theory. Because if you look –and we will go back to that– at the financial crisis in 2008, actually the shadow banks had actually wide access to public liquidity. It may include the money market mutual funds, hedge-funds, investment banks.

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- 1 Edited transcription of prof. Jean Tirole conference at XXXII Jornadas Anuales de Economía, JAE, organized by Banco Central del Uruguay, November 6-7, 2017.
  - 2 Jean Tirole is a French economist who was awarded the 2014 Nobel Prize Economics in recognition of his innovative contributions to the study of monopolistic industries. Tirole's work has had a significant impact across a wide range of fields within economics, including microeconomics, game theory, and industrial organization. He adapted his models to study a number of specific industries, ranging from telecommunications to banking, that are highly regulated owing to their tendency to form monopolies. From the mid-1980s, his research became the basis of a general theory of the market power of firms, which helped economists to devise policy recommendations on issues such as monopoly regulation and ways to best design antitrust laws to ensure desirable social outcomes without harming competition. Tirole's many publications include more than 200 articles and several books, including the influential graduate-level textbook *Game Theory* (1991), cowritten with Drew Fudenberg, *The Theory of Corporate Finance* (2006), and *Inside and Outside Liquidity* (2011), cowritten with Bengt Holmström.

And what we have seen repeatedly is some kind of migration waves. So prior to 2008, there was an increase in the market share of shadow banks in many ways, and today we see it in many countries and most prominently in China.

Partly because of the regulation, there is more and more lending to small and medium enterprises by unregulated banks, wealth management products. So many people actually, instead of putting their deposit at a retail bank, they would actually put their money into wealth management funds in shadow banks. We see more and more of that in the US, and the UK and Europe. For example, small and middle enterprises (SMEs) are borrowing more and more from private lenders and that raises concerns, including there was a financial stability board which was trying actually to make sure that the shadow banking sector is not going to create the next financial crisis.

Surprisingly, sometimes there is shadow banking anchorage by the government itself, so that is a little bit what it is happening in the US now with real estate lending, especially what is called *subprime* mortgages. Basically, high risk mortgages, those which have done so much damage in 2007, 2008. And it is growing again, lots of subprime mortgages, but they are done mainly by the shadow banking sector. So, actually, it is a share of the shadow banking sector. The flow of subprime loans has grown from 20 % to 75 %.

And it is a very typical thing: there is a migration, so if you try to make the regulation of retail banks tougher, you raise the capital adequacy requirements, liquidity requirements and so on and so forth, and at the same time, the activity tends to move to the shadow banking sector. And we have to take that into account, and the interesting thing in the US, actually, is the migration to the unregulated sector that is taking place actually thanks to the US government, because many of those securities are securitized thanks to the GSEs.

GSEs in the US are government-sponsored enterprises. They are the Fannie Mae and Freddie Mac, and all those things. Actually there is another one which is doing that, but those are basically government entities and the government buys the securitized loan from shadow banks, and actually the

shadow banks keep only 5% of the loans on their balance sheet, which is very small compared to retail banks, which actually keep 25%. In fact, it is rather dangerous, because if there is a downturn in real estate, then you are going to end up with a big crisis, again with the government losing money, and the taxpayer is going to pay for the bill.

Now, people who are actually supporting, defending shadow banks, actually say the shadow bank actually is some kind of breathing space, because of all those regulations. In fact, some part of the financial sector is needed to be done by unregulated entities, because they are going to innovate faster. So actually that paper, which is a discussion paper, in that segment the market share of the shadow banking sector has grown to 75% and the authors try to estimate how much is due to innovation and how much is due to regulatory arbitrage. Buchak et al. found that 55% of 2008-2015 growth is due to increased regulatory burden and only 35% is due to disruptive technology (1/3 fintech, big data). They found some innovation; very typically the fintech firms have innovated faster than the retail banks.

**Economists' views on shadow banking.** There are multiple views. The first one is a positive view: regulatory constraints stifle innovation, distort markets and shadow banking is seen as a kind of a breathing space. Regulators fail to recognize superior investment opportunities that are exploited by shadow banks. (Ordonez (2017), Fève-Pierrard (2017)). We need shadow banking because that is where innovations are going to take place, that is, where it is going to be most useful.

There are two views I am not going to discuss. One of them is a *behavioral view*, which is that for some reason –we do not know why– the retail banks tend to forget the tail risk<sup>3</sup>, the extreme risk, and the shadow banks do not, and they exploit that neglected risk to their advantage. There is a regulatory failure, but nuisance.

The other one, a *comparative advantage view*, basically says shadow banks capture demand for safe assets and, by securitizing and selling assets,

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3 **Tail risk** is a form of portfolio risk that arises when the possibility that an investment will move more than three standard deviations from the mean is greater than what is shown by a normal distribution. (*Investopedia*).

they actually create liquid assets, a demand in the economy for safe assets in particular, and retail banks create liquidity simply by using government deposit insurance. (Hanson et al.(2015)).

But the question is, of course, with this view, why retail banks themselves actually cannot securitize. And actually they do, so it is a kind of strange theory, because you do not know why the shadow banking sector has an advantage. After all, the banking sector is able to create liquidity through securitization; safe assets are created in the regulated sector through deposit insurance (costly capital requirements); and in the unregulated sector through an early exit option and costly liquidation of assets.

Now, there is a last view, and actually our paper will be closer to that. It is a *regulatory arbitrage view*, where in shadow banking, in some kind of new sense, basically you cut regulatory corners and shadow banks are not regulated, but at the same time they can have access to public liquidity and bailouts when things go wrong. So basically you have your cake and eat it too (free of constraints in normal times, bailout if tail risk materializes): that's certainly a big danger, as we have seen in 2008.

There are two possible subviews of this issue: one is *capital requirement evasion by shadow banks*. So, basically, shadow banks take a lot of risk, they don't have enough capital, the capital requirements are evaded in some way, but then they will have access to public money.

An example of that will be AIG. In 2008 AIG was supposedly an insurance company, but it was really an investment bank. And in this investment bank, which issued lots of CDSs, the danger of that is that if AIG had gone bankrupt especially 2 or 3 days after Lehman Brothers, then that would have spread to the financial system, in particular to regulated banks and insurance companies. So the US government –and we should be grateful to the US government– rescued AIG and, in a sense, that means the shadow bank which was AIG had the possibility of getting access to public money and, at the same time, not face any regulation or any capital adequacy requirements.

There is another subview of that, and by the way, they are not the only ones, so there is a bunch of facilities which were set up by the FED in

2008 to basically make sure that the money market mutual funds would not be in trouble and the other broker dealers would not be in trouble.

The second possibility is that you have *capital requirement evasion by retail banks*, or regulated banks would actually evade capital requirements, and there is a fair amount of evidence of that, and the best known example is a conduit example.

The conduit is a special purpose vehicle which is created by a retail bank when it securitizes assets, real estate assets in particular. So what the banks did before 2008 is basically securitize their loans. That was why the famous portfolio of subprime loans, in particular, they keep very little on their balance sheet, and basically, in principle, they transfer the risk to that conduit.

The conduit on the asset side actually had the repayment of these realistic loans and was born in a very short time, ruling of one month-debt. On the liabilities side, the conduits were ruling over short time debt, which is extremely dangerous, because either there could be an all-sell background or there could be an increase in the interest rate and after a time, the conduits would have been in big trouble.

Except that the banks had granted lines of credit offering liquidity support to the conduits, so basically, the risk transfer which was supposed to be taking place through securitization, actually did not take place because the banks had issued lines of credits to the conduits they had created, and that reduced the capital requirements by huge amounts. That was corrected by Basel III; that went back to the balance sheet risk. (Acharya et al. (2013)).

In my paper together with Fahri (2017), a research paper, the first thing we tried to do is to understand the quadrilogy. Traditional banking, that is, the way we knew banking some years ago, typically is based on four pillars (quadrilogy): *the first pillar* is that the lending to SMEs (small and medium enterprises). The idea is that big corporations have access to the capital markets and they may not need the banks or occasionally may do.

*The second pillar* is actually that you have retail depositors and you give them safe assets. When you put your deposits at a regulated bank, you benefit –unless they are big deposits– from the contingency.

*The third pillar* is prudential supervision. In many countries, it is the Central Bank, but mostly, the prudential supervisor who is going to organize monitoring of your balance sheet, and finally the fourth pillar refers to the fact that you get access to public liquidity, so it has a kind of lender of last resort function.

And in principle, and that is very important, shadow banking is not meant to have access to lender of last resort and deposit insurance. But shadow banks may actually gain access to public liquidity:

1. Indirectly through syphoning: backstops from retail banks (puts: contingent lines of credit, tail risk insurance, name on the door)
2. Directly through liquidity assistance and bailouts: unconventional policies in case of stress, for example: Commercial Paper Funding Facility (issuers of CP) Primary Dealer Credit Facility (repo market) Term Asset-Backed Securities Loan Facility (ABS).

I think pretty much everyone agrees with the definition of shadow bank: “Transformation that takes place without direct and explicit access to public sources of liquidity or credit backstops.” (Poszar et al. (2013)). It is the same definition that is explained without direct or explicit access to public sources of liquidity and credit back swaps. In Europe there was a Directive, we were very worried about bailouts of shadow banks...and now the question is: what do we do?

It is not an obvious proposition, and let me just say one thing: it is that, after all, you could give or, I should say, sell deposit insurance and lender of last resort function to the shadow banking sector. So if the shadow banking sector, for example, is more innovative, more efficient, you might actually go to the shadow banking sector and say “I’m going to sell you deposit insurance, I’m going to sell you lender of last resort”.

Why is that? Why is it that we have this coincidence between regulation and deposit insurance and lender of last resort, those insurance functions? That’s something we try to explain in the paper, because it is not completely obvious. The Central Bank and the Deposit Insurance Fund could actually make money by selling their services to shadow banks. So why is that the case? That will be part of our discussion.

A few words about the client side of the puzzle. As I said, the banks traditionally deal with fragile and politically sensitive clients. That is also something which is actually pretty well accepted. Retail depositors want to have deposit insurance, and small and medium enterprises borrow from banks and all liquidity is there.

Again, that should not be taken for granted. After all, you could have migration of small depositors and SMEs to the shadow banking sector, and that is exactly what you have in China, actually.

Is it a good thing or a bad thing? In China, of course, part of the reaction comes from the regulations which have been put on the bank, which have been imposed on the bank, and also the pressure on them to lend to SOEs - state owned enterprises, as opposed to lending to small firms and startups. And there are also repressed savings in China, so there is a migration of those players to the shadow banking sector, and that creates a problem, of course, because the shadow banking sector by definition is not regulated.

Recent reforms include: **a)** structural reforms (Volcker rule in US, Liikansen Commission in Europe); and **b)** moving contracts to CCPs (creation of incentives to move contracts to platforms with central counterparty (central counterparty clearing houses)).

The most famous one is probably the Vickers Rule, but in the US there is the Volcker Rule, and so on, with the Vickers Rule, by the name of John Vickers, who is an economist at Oxford, but used to be a regulator.

Vickers rule: creates a *ring fenced* subsidiary (the retail bank) with a limited scope of activities (lend only to households and nonfinancial firms and trade high-quality securities. It can hedge the risk on corresponding exposures) prohibited from providing support to the investment bank. So, basically lending to SOEs, lending to SMIs trading in equality securities, most of the risk may actually come from the hedging function, because, of course, if you lend in the real estate market, you create a risk on the interest rates, other functions, you might create a risk on the exchange rate, and you want to hedge that risk with swaps, but, of course, any time you have hedging you can also use those instruments actually to take risk, as opposed to reduce risk.

But very importantly, the retail bank is prevented from bringing any liquidity support to the investment bank, so you can have support from the investment bank to the retail bank, but you cannot have support from the retail bank to the investment bank.

The other thing that we are going to try to provide a rationale for is the recent trend in Basel III to actually move contracts to Exchanges, CCPs. The idea is that there is nothing wrong with over-the-counter (OTC) market agreements, because they produce insurance products which are often specific to the board.

But the problem with this is that the regulatory authority does not have information about those products. And that makes supervision much more difficult, and what we are going to explain is why in the retail banking sector there may be some rationale for moving most of that stuff to an Exchange.

Part of what we are trying to do in funding macroeconomics is actually try to get at the concept of liquidity, which is not an obvious proposition. And for that, you need to understand the supply and the demand for liquidity.

On the demand side, you understand pretty well that both consumers and firms want to have some safe assets, because tomorrow they may need money and they want to have some kind of insurance that they will get the money tomorrow. Because they may face shocks, firms may face shocks in production or in demand and they want to be able to continue ...and we as consumers we may want to send our children to college or buy an apartment or something like that or maybe we have some illness, so we may need some kind of safe saving. So you have to think about this insurance against credit rationing.

On the supply side, you can have three sources of insurance: one is private insurance, so you all have claims on the private sector, and if you want them to be safe you want claims. Then, the government is, of course, a big supplier of safe assets through the insurance it provides, and we can discuss what the government can do that the market cannot do, and then you have the international market because you can always, for example, get lines of credit from abroad.



Just think about a bank, for example. Economists tend to distinguish between funding liquidity and market liquidity, depending on which side of the balance sheet you are.

So, for example, on the assets side or the liabilities, you have a number of assets and it is actually a continuum in terms of our liquidity, in terms of how much money you are going to lose when you resell them. It can go from very safe Treasury bills to extremely liquid assets. But, in general, you have a continuum of liquidity, and what you can do is, of course, resell the assets or securitize them in order to get cash, if you need cash.

So if you have assets on your balance sheet, you may be able to sell them to get the liquidity. On the liabilities side of the balance sheet you have retail deposits and you have all-sell deposits, you have all kinds of bail-in-able and we could discuss what is bail-in-able and what is not. But securities, medium-term, long-term debt and securities, like preferred stock, CoCos, you have tier-1 kind of liquidity and then you have all sorts of liquidity, which is called *funding* liquidity, which is: you can always issue more of those, and if you issue more of those, of course you dilute the existing claims.

For example, if you issue more equity, twice as much equity, then you are going to basically reduce the value of the existing equity. You are going to get cash, but, of course, the claim holders will not be happy, because you are expropriating them in some way. And that's usual to think, so when the bank is undercapitalized, you can ask the bank to sell assets or you can ask the bank to issue more claims and more equity, for example, and that's of course a big thing.

Working on liquidity requirements, we economists have for a long time said we need liquidity requirements, but we have not been very helpful at actually saying how you should do it.

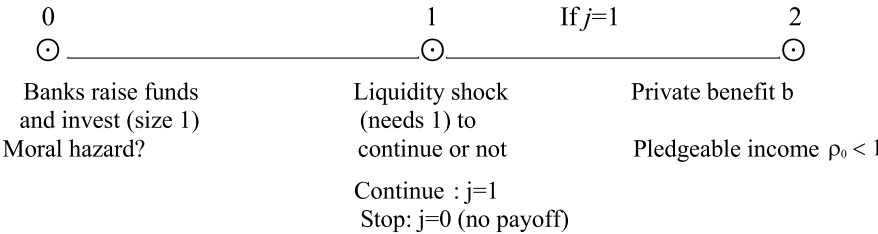
It is actually very hard, because if you think about liquidity, you have to look at the two sides of the balance sheet. Your reputation as a banker might help you... actually help you raise funds, for example, and then you can contract liquidity abroad. So, for example, if you think about a credit line, that is liquidity that you have in case you need cash.

If you think about a credit default swap, it is some kind of insurance mechanism that you get money in case you face a shock. It is just like an insurance product.

So, actually designing liquidity ratio –and there are two which have been designed by the Basel Committee– is actually a difficult thing, and we economists have to work harder on how to do it.

Let me do a little model. I apologize for those of you who do not like Maths, but I will try to give some intuition about what is going on. Just a little model, just to show you how it works, and to illustrate the main results and then we are going to use a similar model later on, in order to go through the insights.

**Figure 1 - Timing for bank’s operations**



Source: Fahir and Tirole (2017)

Imagine there are three dates. If you want to have liquidity shocks and liquidity needs, you need some kind of intermediate date. Between the date at which you borrow and the date at which you are going to get proceeds from your investment.

So imagine that the investors are completely risk-neutral and they do not discount the future; they are just interested in the extreme of the incomes or, I should say, the expectation of the extreme of the income.

In that economy there can be no rationale for deposit insurance, by the way. Because if consumers are risk-neutral, they do not want any insurance.

Imagine that the bank wants to invest 1 at date zero and does not have enough cash, so the bank is a net borrower. If it has assets  $A$  less than 1, it has to borrow 1 minus  $C$ . Look at the situation where there is shortage of money for the bank, the bank has to borrow, and in the end, that example is 1 minus  $C$ .

And then the project will give 2 returns at date 2: at least if it continues until date 2: one is something that you can give back to your investors: we call that the pledgeable income in economics.

So the pledgeable income is something that on average you can commit –on average, It is risky– you can commit to give back to investors and the bank's insider will have some prior benefit  $B$ . So there are two things. And actually, the other reason for why you ought to have liquidity requirements is that  $B$  is positive, so you cannot pledge the entire income to your investor.

Also, what we know from Arrow–Debreu, is that you could basically finance as you go. You will have no lines of credit, no liquidity primes, no liquidity ratio. And the fact that you cannot commit, you cannot pledge everything to your investor –to your uninformed investor, I should say– is exactly what creates a prime and gives rise to a liquidity ratio.

But the problem here we are going to be interested in is that you may need cash tomorrow. So you need one more to continue, so if you want to complete the project to date 2, you might actually need to pay more, and then you need cash, because at date 1 you do not have any cash, so you need to secure that cash in some way. You cannot use enough of the funding liquidity to finance this one. I told you the value at date 2, if you continue for investors, it is  $\rho_0$ .

So by diluting, by basically showing your equity and your claims, you can raise up to  $\rho_0$ . It is exactly what you raise when you completely dilute the existing claim owners. But because of the fact that  $\rho_0$  is less than one you need to secure more liquidity. So, in this case, one way you can secure liquidity is basically by holding claims in other banks, for example. And let me just give you the intuition.

Back we face a liquidity shock. And there is a shortage of  $1 - \rho_0$  to finance this liquidity shock, if it finances a liquidity shock. What you can do is actually hold claims in other banks, and that will be fine as long as the other banks actually are not correlated with you. Because there will always be banks which will not dilute their claim holders and you can always use that money, this cash. You resell the claims on the other banks at date 1 to make up for the shortfall.

So as long as the shocks –there is no macro shock– are not correlated across banks, that is perfectly fine, and the result we got twenty years ago with Bengt Holmström was that actually if –you have 2 conditions– if, first, banks are net borrowers and, second, the shocks are uncorrelated, so there is no macro shock, then, there is enough inside liquidity in the sense that by holding claims on other banks, you can make sure that you will face the liquidity shocks that you want to face. If I face a shock, but you do not, I can always resell my claim in your bank and finance my shock. If either of those two conditions is valid, that is no longer true.

So if the banking sector, or I should say more generally, the private sector is a net lender, then there is always a shortage of liquidity. Or, if there are macro shocks, there is always a shortage of liquidity. And that is where the government is going to step in, because the government can bring stuff that the private sector cannot bring.

These are mini-results. If you have those two conditions: no macro shocks and the private sector is a net borrower, you have enough liquidity, which means that technically there will not be any liquidity premium. If you buy a Treasury Bond which is pretty safe, you always have this premium that you have to pay, where the interest rate is very low, but you have no such premium under those conditions. But if you either have macro shocks, or you have a net-lender situation, then there is a shortage of liquidity, and that is when the government has a role to bring liquidity.

A few comments about this. The first is that we have observed now that the private sector is moving to a net-lender situation. Traditionally the private sector is a net borrower, but lately it has become more of a net lender. And, second, let me just explain why macro shocks matter. Just take the previous reasoning. I may face a shock, but I have claims in your banks which I can resell if your banks are fine.

But if you all face a correlated shock, once I face a shock, those claims are valued less as well, because you also face a shock. And the claims will be bailed-in: whenever you have a macro shock you always have liquidity shortages.

Why is it that the government can do things that the private sector cannot do? Well, simply because you can basically pledge the future taxpayers' income, whether they are corporations or individuals. You have this claim on future taxpayers' income, you can borrow against this future claim, and that is going to increase liquidity in the economy.

You have three pillars. And let's assume there is no stored value in the economy. Mostly, there are no stored values which we observe now, actually, and there are three classes of players. Consumer investors for the moment are risk neutral, they just care about the expectation of their consumption overtime.

There will not be any deposit insurance in this basic model. I will introduce deposit insurance later on and they cannot pledge their future income and grant lines of credit.

So you as an individual cannot grant a line of credit to Google for example. Google does not need lines of credit anyway, but any corporation... you cannot promise lines of credit to them and we can discuss that in detail. That is actually the reason why the government can do things that the private sector cannot do.

The bankers are just like before: they invest, then they may actually engage in more assets, so they may basically take risk.

Then, at date 1, there may be a liquidity shock, and with a probability of  $(1 - p)$  there is no liquidity shock, but if there is a liquidity shock they need one more to continue, just like before.

So one is to continue, and zero is do not continue. In that case, the bank has liquidity, so there is nothing, but if you continue there are those two payoffs at date 2: one is what you can promise to the investors:  $p0$ , and the other one is the private benefits that the insiders in the bank, the people with the information, and maybe the workers as well, all the bank insiders, get through continuation.

And the important thing is that this private benefit be positive. And again, the pledgeable income is less than 1, because otherwise, by diluting your existing claim owners, by bailing them in, to use a more popular term, you could actually finance a liquidity shock.

The bankers care about their zero money consumption, plus, they want to get their private benefit of continuation, if they can. You can generalize this function as you want but...there is an important thing: there are shocks, there will be some aggravated shocks and it is twofold: the first is that there is a fiscal shock, and we are going to formalize the fiscal shock as being a shock to the shadow costs of public funds.

The government is going to bail out the banks, because if the shadow cost of public funds is very high, maybe because you already have high public debt, then you are less eager to bail out the bank.

We have also written a paper on doom loops with Emmanuel Farhi that you may want to read, about that. So capital loan means that you have a high cost of public funds in the bad state. In the good state, the shadow cost of public funds, the cost of collecting taxes for the society, is greater than one, but it's less than capital lender.

So why do we want to overrun the fiscal shock? Simply to create some uncertainty about whether the banks will be bailed out. Unless it has a lender of last resort contract, what is going to happen is that, when you have a high cost of public funds, the Central Bank or the government will not want to bail out the banks, but then the liquidity shocks will also be correlated.

By misbehaving the bank can take more risk. The way we formalize that is by saying that you increase the probability that you are liquid. You increase the risk that actually you need to invest in one at date 1.

So you will choose to misbehave and increase the risk by  $\delta$  in the good state of nature and by  $\delta'$  in the bad state of nature and that's your choice. You can engage more assets, you can increase the risk of being illiquid at date 1 by  $\delta$  or you can increase the risk of being illiquid at date 1 in the bad state of nature, by  $\delta'$ . So we need both, we need the liquidity state and you need some kind of uncertainty about whether you will be bailed out if you do not have cash.

When  $m$  (monitoring) equals one, it means you are regulated and when  $m$  equals zero, it means you are unregulated.

By the way: we are not going to take stands, and we can discuss that in the end at the Q&A part, we are not going to take stands about whether the government is a better regulator or whether the private sector is a better regulator. We are going to discuss that later on maybe, but there is a cost  $C$ , there is a compliance cost of being regulated. You need a number of things and it costs both on the regulator side and on the bank side.

Let me give you the preferences of the social bailout. The prime of the bail-in-able social planner. The issue is not that the social planner will be captured by the banks, but it's going to be time-inconsistent. Time inconsistency, as you know, means that you will like to commit not to bail out the banks, maybe, but *ex post* you might still bail them out, which is a standard issue in banking which is you will like to commit not to bail out the banks but *ex post*, in front of the *fait accompli* you might actually want to bail out the banks.

So at date 0 you say I will never bail you out, and at date 1 you may actually end up bailing out the banks.

Moral always forces you to be very transparent about your implicit assumptions. There is always some kind of arbitrariness, the model is always too simple, it captures only the main ingredients, but there are always bells and whistles which are missing. But it forces you to be transparent about what you assume, what your implicit framework is.

So the social planner is going to put weight on consumer investors, put weight on zero, on bankers, so the issue is not going to be that the regulator is captured by the bankers.

Actually, it does not put any weight on the banker, but it puts weight on the bankers' activity, which is: you want the SMEs to be able to actually continue, because there is some benefit out of that, so you have to put weight on project completion, we have a foundation in the paper, it also goes back to an old paper I had with Bengt Holmström, but you basically want your firms to continue, so you do not care about banks *per se* but you care about banks lending to SMEs.

There is some uncertainty about whether our shadow bank will be bailed out. So if the shadow cost of public funds is more lending in the good state of nature, it is not too costly actually to bail out the banks and then how much do you need? You need... there is a shortage at date one, you need to reinvest one, and you can dilute the existing claim owner and get  $\rho_0$ s to those bail-in-able securities. So there are times when  $\rho_0$  is less than  $b$ , which means that you bail out the shadow banking sector, if it's not too costly to do that. In the other state of nature, in the bad state of nature, the shadow cost of the big funds is the capital lender and you are not going to be willing to bail out the banks in that case.

That introduces some uncertainty, you get the two ingredients in a sense. One is that *ex post*, the social planner is maybe eager to bail out the shadow banks, at least if it serves the SMEs, but it is not sure, because it might be too costly.

By the way, the lender is the shadow cost of public funds, but it can also be some kind of political cost of bailing out the banks. It might be more or less unpopular.

I am trying to explain the quadrology. Why is it that you are more eager to offer a lender of last resort function when you regulate at the same time? The lender of last resort function is: you tell the bank: "Look. I promise I will bail you out, even in the bad state of nature, even when the shadow cost of public funds (inaudible) lender." That is basically a commitment by the social bailor to come to the rescue of the bank.

You have some kind of lender of last resort facility. Why is that? That is connected with regulation. Well, a very simple argument, and you do not need to do the Maths for that. Your lender of last resort function is very expensive, because you commit to help the banks especially when it is expensive to do so. You do not want to do that too often, right?

If you monitor the bank, you reduce the amount of risk, you reduce the moral hazard. If you have a shadow bank, the shadow bank is going to take risk in the good state of nature because it knows that it will be bailed out, but in the bad state of nature it is not going to be bailed out, so it is not going to engage in risk-taking in that state of nature, because it is going to be too costly for the government to bail out.



If you monitor what the lender of last resort is going to do, it is actually going to increase the priority of liquidity, because if you insure the bank against shortfall in income, then the bank is going to take risk in that state of nature as well, so that is going to be an issue, and if you monitor, the monitoring is going to get rid of that moral assumption. Monitoring gets rid of moral hazard. In the two states of nature you are at risk.

That is the assumption, monitoring is about lowering the risk and, therefore, that means that you are more eager to extend lender of last resort facilities when you monitor at the same time because it is cheaper: you reduce the amount of risk, you reduce the probability that the bank actually is going to use the lender of last resort facility.

Now, I can apply exactly the same reasoning to deposit insurance. There is no need, there is no rationale for deposit insurance, because investors are risk-neutral. So what we do later on is we introduce risk averse depositors. So people like you and me want to make sure that at least part of our savings will be safe, we can actually count on it. In that case it is exactly the same reasoning, because it is costly to apply deposit insurance to depositors.

And therefore, if you regulate you reduce the risk, and therefore you reduce the probability that actually the deposit insurance fund will be called to supply the money. Because in no more times, when there is no illiquidity of the bank, the bank can basically create deposits through its  $p_0$ , through its pledgeable income. So the bank can create deposits through its  $p_0$  in the good state of nature, when it is liquid. When it is liquid, then you need the government to create this thing.

So it is exactly the same reason: you have a complementarity between supervision, monitoring and deposit insurance, because the cost of deposit insurance is on average lower when you monitor, there is less resort to the deposit insurance fund.

It is exactly the same reasoning as for the lender of last resort: you have two insurance products: one is an insurance product for banks, the other one is an insurance product for depositors, both are supplied by the government and the cost of supply may be lower when you supervise a

firm, because you reduce risk taking. It is as simple as that and that explains the coincidence, in a sense, between regulation and lender of last resort and deposit insurance.

In a sense, that is a justification of all-style banking. If you are going to have those insurance products, lender of last resort and deposit insurance, you also have to regulate.

Then let me conclude with the other two. I'll just give you the intuition. What about *ring fencing*? We extend this analysis framework by allowing macro shocks, but not perfectly correlated shocks among banks, liquidity shocks. Why is that important? Well, simply because one of the main institutions of banking, which is cross exposures, can only be justified if you have an imperfect correlation of shocks, just like an insurance mechanism.

If I am short of cash and you are not, then you can transfer money to me. And that is for example what a CDS does, and it is a typical thing. All kinds of credit lines and so on are basically insurance mechanisms.

So what we do is to have imperfect correlation, so as to create scope for actual cross exposure among banks, but the problem with cross exposure, of course, is that it may lead to domino effects. So if you do not get insurance from the right counterparty, what may happen is that I fail and I give you insurance and you are counting on the insurance but you do not get it and then you might fail. Those are domino effects, right? And you want to avoid that, but for that you need to have the right organization of the insurance market, the right cross exposures.

Now, two instruments can be used to do that: one is *ring fencing*, to avoid what I call the AIG syndrome which is, if you do *ring fencing*, you get cross exposure only within the regulated sector, and since you are regulating the regulated sector, by definition you can do joint strength tests, so as to see whether you will have domino effects. What you can do is run joint strong tests among banks to see if you have domino effects.

You cannot do that with the shadow banking sector because, by definition, you do not know where the balance sheet is. You cannot run a stress test within the shadow banking sector. So that is an argument for ring fencing: it is that you can better control the cross exposures and make be sure that basically you do not get the wrong insurance.

The wrong insurance is when we make sure that when I need the money, you do not have it. That is the CDS, the AIG syndrome. You know: the banks needed the money, AIG did not have it, and promised the money and basically there was no transfer and the government has to bail out AIG, which is a pretty unlucky state of affairs.

But even within the regulated banking sector, it is still hard for a regulator supervisor to actually monitor the cross exposures. In that case, what we show actually is you may want to have an exchange.

An old argument in the economics of information is, when you have an exchange, you do not select your counterparty, so you do not select risk, so you are not able to make sure that actually we are not going to supply liquidity to each other and claim *ex ante* that we have liquidity that we do not really have. With an exchange you do not select risk, you just have all the others as counterparty.

This acts as a free selection, actually makes it easy for the supervisor to know whether you have liquidity. So those two instruments: *ring fencing* and use of an exchange, is actually something which can be useful.

I just wanted to give you the intuition, those of you who are technically more minded, you can have a look at the paper, and there are a lot of issues for future research. Shadow banking is huge and it is there to stay, whether you like it or not, there are arguments actually for supervision to be done within the public sector, I think so.

## QUESTIONS AND ANSWERS

**QUESTION** - La pregunta concreta es si no piensas que este sistema del *shadow banking* puede actuar como una especie de regulador automático del propio sistema de bancos universales, del *universal banks*.

**ANSWER** - The shadow banking sector is actually applying competitive threat to the regular banking sector, and there are some benefits of course, for two reasons: one is that it may be more innovative and a little bit of what is happening in FinTech, as I said early on, is about innovation.

You always need to shake up a little bit in commerce. We have seen that with Uber for example. The innovations are few, extremely small. They were all known actually: geolocation, credit card, rating and so on, they were all well-known, and I do not know about Montevideo, but all the taxis in the world I knew never implemented those. That tells you something about monopolies, you do not want to have monopolies, and the other thing is about...I am not a big fan of Uber, that is not the issue, but you see the role of competition and you see it is crucial.

It could also be the case that they do different activities than the regulated banks, because under prudential supervision you have to pay attention to exactly what you allow, because if you do not have the information, a *leitmotiv* of the economics, of course, is the economics of information. If you are a government, a Central Bank or whatever and you don't have the information to do the policy you try to do, it is going to be a big failure.

You have to make your policies compatible with the information you have, and if the banks use products which are way too complicated for your supervisory staff, that is going to create trouble. And one of the things at which we failed completely in 2008 or, I should say, before 2008, is to make sure that the shadow banks do not have recourse to public money.

Again, shadow banks are perfectly fine, but when they start playing with public money...That is exactly what we are trying to do in this paper, that is why we have all this time inconsistency framework which is pretty realistic, and we need to basically make sure that the shadow banks are not going to have access through many channels.

Just to repeat. In that framework, there are two channels through which you can have access to public money: one is that you serve politically fragile sensitive customers like small and medium enterprises, like small depositors. The other one is that you have cross exposures which regulate the sector and then the government is forced to bail you out. Either way you are in trouble.

I am not an enemy of shadow banking at all, I am just saying: “let’s make sure the shadow banking sector is not going to have access to public money” and for that you have to understand how it will have access, and that is exactly what this paper does.

**QUESTION** - El Banco Central de todos los países del mundo crea dinero. Los bancos comerciales son responsables de la creación secundaria de dinero. Ese es uno de los tantos motivos por los cuales la banca central los regula. Ahora, la banca de inversión, *shadow banking*, etc., ¿no crea dinero? ¿Y por ese motivo no deberían tener por ese solo motivo algún tipo de regulación? Yo recuerdo 2008, la destrucción de activos financieros creada por la banca en la sombra es la que originó el principio de la crisis: no tenía regulación.

**ANSWER** – I think there is some connection between your question and what I said, which is, in a sense, the Central Bank can control the creation of money in many ways: one is retail requirements, another one is prudential regulation.

You limit the laws which are being made, you also limit the number of deposits that you create for the customers.

So in a sense, you know, you are saying: “we should regulate those banks, because they are dealing with SMEs, and with small depositors” and that...because that is the reason why in the end you might actually bail out those banks. So I think what you are saying is pretty consistent with what I am saying here, phrased differently, of course.

What changes in the case of China? That they are not giving money to small and medium enterprises but to state-owned enterprises? That’s another risk that is inside that shadow banking, so what is your consideration?

I am not an expert in China, but I have a little bit of an opinion on it. There are two issues: one is the one you mentioned, there is political pressure for the banks to lend to SOEs, and therefore the SMEs have to migrate to the shadow banking sector, but at some point the Chinese government will also want to bail out those shadow banks, because it is going to be concerned equally with SMEs and not only with SOEs, and then something I really do not know about is all those wealth management products. They are considered quite as deposits, a little bit like money market mutual funds sometimes, they are not deposits, but they are perceived as being deposits.

The question is usually richer people will use those wealth management products and whether they will have enough clout with the politicians to ask for a bailout if there is a prime, I do not know. But it is a prudential thing, and it is an important thing that China can curb actually shadow banking in my view. In China they have repressed savings, as I mentioned, basically you cannot get high interests on savings, so that is why you move to the shadow banking sector and there is pressure on SOEs, so first you'd like to eliminate those distortions, but then the shadow banking sector can still develop and still have access to bailouts, so it is very important for China in this area to develop some kind of good regulatory infrastructure.

**QUESTION** - We have the feeling that there is a huge exuberance in financial markets right now, and shadow banking is increasing significantly, particularly in the developed world, so you feel that there is room for a new financial crack in the near term? You feel that there is an increasing risk of that in the near term?

**ANSWER** - So I have a few lines in the book *Economics for the Common Good* which was published in Spanish a couple of months ago. I tried...we economists are very good at doing certain things and there are some things we are not very good at, for good reasons, I think, and one of them is predicting, and predicting is pretty hard for many reasons.

I think we are better off saying: are we going in the right direction? Somehow. Trying to put...Basel III, I think on average goes in the right direction. I have capital requirements and liquidity requirements, countercyclical requirements, better regulatory infrastructure. We have

seen that with the FED, the CB in Europe, that kind of thing, and may be more recourse to exchanges, less OTC markets, for the regulated sector.

But again, we are always going to have the shadow banking sector, some will see it as a breathing space against bad regulation, some will see it as an arbitrage opportunity and it is very hard to regulate the shadow banking sector, simply because you always migrate somewhere else, you might try to regulate this and that, and then it is going to move somewhere else. It is a cat and mouse game, you would have to regulate the entire economy just to make sure that there is no shadow banking.

It is always going to be there anyway, and we just have to pay attention. I know you are concerned about that, but just thinking about FinTech, for example. FinTech is wonderful in many ways, but you have things which are *de facto* banking nowadays, banks which actually are doing the intermediation, without capital requirements. And what is going to happen when the small investors will have lost all their money? What will the government do? Probably bail them out.

So again we have a situation where the shadow banking sector has its cake and eats it too. And that, I think, is very dangerous. So these are two things.

On the retail banking side, I think we have moved in the right direction now, whether it suffices or not. I mean, anyway, zero risk is not optimal as we know; we need to have a little bit of risk, but we have to reduce the risk, to avoid, basically, using taxpayer money all the time.

And on the shadow banking sector side, we have to be very careful. I said I was worried about the US, I am worried about China, I am worried about FinTech, possibly, and again FinTech can be really useful because it introduces some competition. And I am worried about many other things, I am worried about bitcoin, and I am worried about all those things, and I could talk to you in detail about that. Those are dangerous, they move around, and the job of the supervisor is not always easy, because you have to catch up with an industry which is extremely, extremely innovative, for the good and the bad.

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