

On and Off Balance Sheet Securitisation and Banking Firm

by

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ABSTRACT

In this paper we have been exploring the theoretical foundations for on /off balance securitisation. We found that the net benefit of on-balance securitisation depends on (1) the effect based on the improved capital/asset ratio and (2) the effect based on the imperfect information. Although the former decreases the profit, the latter wholly cancels it out. This suggests that we should not regard securitisation as financial innovation to improve the capital/asset ratio.

Another finding is that there is a substantial difference between on-balance and off-balance securitisation, in the sense of whether or not banks can convert loans into cash without any changes in the liability side, for example, banks can liquidate the asset and get a perfect disposal fund.

Further, we succeeded to show off-balance securitisation is valid only for banks with excellent asset management ability.

On and Off Balance Sheet Securitisation and The Banking Firm

I Introduction

Interest in securitisation has rapidly been growing not only in US but also in other developed countries. Generally, securitisation is considered to be a mirror image of the declining the traditional banking. Some people consider that the development of securitisation may bring drastic change or reconstruction of the current financial system, in which banks play a dominant role¹.

This kind of discussion is not wrong. However, it only focuses on one side of the matter. It is a widely accepted argument that financial intermediation is an activity that produces information about lenders and borrowers. In this sense, banks are typical financial intermediaries and the skill to produce information (financial intermediation skill) is important for them. On the other hand, to issue attractive securities, which represent claims on the stream of future income, the issuer must inquire into the probability of the investment project raising profits. As well as banks the security-issuer also must learn highly sophisticated information-producing technology.

This means that information-producing technology is the fundamental and common prerequisite both for intermediation and security issuing. If we ignore resource re-allocation cost within banks, traditional banks have great potential for being the forerunners of securitisation. In other words, the development of securitisation provides banks with a new business chance.

Typical securitisation occurs as follows; banks issue the securities backed by a loan. The security represents claims on the future interest revenue. This is why such a security is called as an *asset-backed security*². If banks are lending to profitable investment projects, then the asset backed security as well as the deposit links the ultimate lenders and the project. In other words, banks can widen the fund raising channel and write off the loan asset, which results in the improvement of the capital/asset ratio. According to popular belief, the latter is the most distinguished benefit of securitisation. Especially in the financial system with heavy non-performing loans, securitisation is expected to be the special medicine, which makes banks' balance sheets slimmer.

The main purpose of this paper is to consider the effects of securitisation on banks' profit structures, especially focusing on two types of securitisation, "on-balance sheet securitisation" and "off-balance sheet securitisation"³.

This paper consists of two parts. The first part deals with the simple loan backed / on-balance securitisation and derives some fundamental propositions. We start from describing the basic model developed by Twinn(1995). In section II, we discuss the benefits banks can enjoy. In section III and IV, the model is extended to the more realistic one, by introducing the S.P.V.(special purpose vehicle). The S.P.V. is the key agent in off-balance securitisation, especially, in cases where the non-financial firms securitise their asset. The final section consists of concluding remarks and some policy implications.

II. On-balance securitisation

II-1 Twinn model

The Twinn model is explained initially because it is very simple and operational. The following relation can specify the balance sheet of the representative bank that securitises the part of its loan.

$$G + L = S + D + K, \quad (1)$$

¹ See, for example, Edward and Mishkin(1995) and Mishkin(1997).

² Distinguish it to a *loan sale*. In a loan sale, securities are not issued. For an introductory explanation of ABS, see O.E.C.D.(1995), Fukaura(1997), for example. In the practical sense, security backed by banks loan is not an A.B.S. However, because an ABS is normally defined as security backed not by the expected capacity to repay of the originator but by the future cash flow stemmed to assets, securities backed by the cash flow from future repayments by the borrowers is regarded as an A.B.S. in the theoretical or broad sense.

³ Hereafter, we simply say "on-balance securitisation" and "off-balance securitisation".

where,

G : gilt
L : loan
S : loan-backed securities
D : deposit
K : capital

We call this on-balance securitisation because the issued securities(S) remain on the liability side. Profit is defined as

$$\Pi = r_G G + r_L L - r_S S - r_D D - r_K K, \quad \text{where } K = \delta (L - S) \quad (2)$$

r_i is the interest rate for each asset.

We assume G is the short term gilt and $r_K > r_G$. This is a very important assumption as we show later. Further the gilt and capital markets are competitive where banks are the price takers. On the other hand, in the markets for L,S,D, banks have price setting power. Therefore, the demand and supply functions are identified as

$$D^S = \exp(\alpha_0 + \alpha_1 r_D) \quad \alpha_1 > 0 \quad (3)$$

$$L^d = \exp(\beta_0 - \beta_1 r_L) \quad \beta_1 > 0 \quad (4)$$

$$S^d = \exp(\varphi_0 + \varphi_1 r_S) \quad \varphi_1 > 0 \quad (5)$$

Substituting (3)-(5) into (2) gives

$$\Pi = \exp(\alpha)(r_G - r_D) + \exp(\beta)(r_G(\delta-1) + r_L - \delta r_K) + \exp(\varphi)(r_G(1-\delta) - r_S + \delta r_K)^4 \quad (6)$$

The first order conditions for r_D, r_L, r_S are

$$\frac{\partial \Pi}{\partial r_D} = -\exp(\alpha) + \exp(\alpha)(r_G - r_D) \alpha_1 = 0$$

$$r_G - r_D^* = \alpha_1^{-1} \quad (7)$$

$$\frac{\partial \Pi}{\partial r_L} = \exp(\beta) - \exp(\beta)(r_G(\delta-1) + r_L - \delta r_K) \beta_1 = 0$$

$$r_L^* = r_G(1-\delta) + \delta r_K + \beta_1^{-1} = r + \beta_1^{-1} \quad (8)$$

$$\frac{\partial \Pi}{\partial r_S} = -\exp(\varphi) + \exp(\varphi)(r_G(1-\delta) - r_S + \delta r_K) \varphi_1 = 0$$

$$r_S^* = r_G(1-\delta) + \delta r_K - \varphi_1^{-1} = r - \varphi_1^{-1} \quad (9)$$

where $r = r_G(1-\delta) + \delta r_K$ ⁵.

Proposition 1 summarizes some characters of our economy.

PROPOSITION 1:

1. $r_L^* - r_D^* > 0$.
2. r_L^* is increasing and approaching to r as the loan demand becomes elastic.
 r_S^* is decreasing and approaching to r as the security demand becomes elastic, too.
When both markets are perfect, $r_L^* = r_S^* = r$.
3. The perfect deposit market gives $r_G = r_D^*$.

PROOF:

⁴ The required reserve is not considered. The reserve, $R = \phi D$ where ϕ is the legal reserve ratio, does not make any substantial change to our discussions because it just makes the first term of (6) $(1-\phi) \exp(\alpha)(r_G - r_D)$.

⁵ The higher δ makes r increase and approach to $r_K (> r_G)$. In the Twinn model capital is expensive to hold then the higher capital/asset ratio requires banks to receive the higher normal profit.

1. $r_L^* - r_D^* = (r_G - r_K)\delta + \beta_1^{-1} + \alpha_1^{-1} > 0$. The interest spread is positive.
2. r_L^* can be represented by the weighted average of r_G and r_K , adjusted by the elasticity terms, β_1 and ϕ_1 . β_1 is positive so $r_L^* > r$. Further, they diverge to infinity (converge to r) in the elastic (inelastic) market. Then, we have

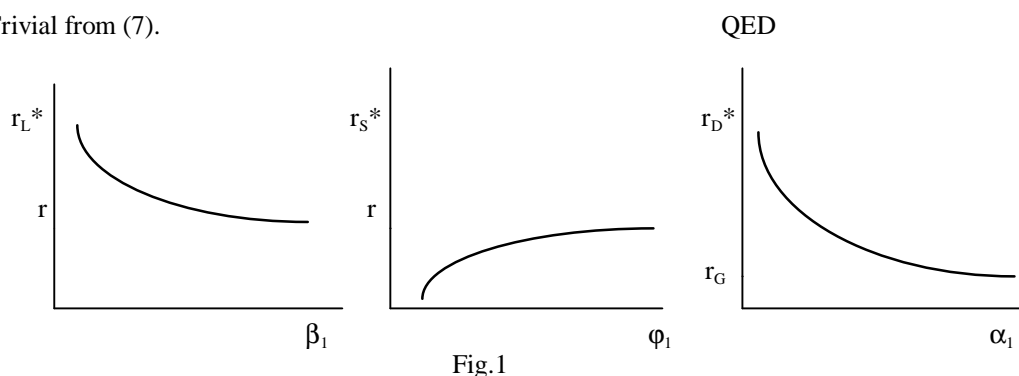
$$\partial (r_L^* - r) / \partial \beta_1 = -\beta_1^{-2} < 0, \quad \partial^2 (r_L^* - r) / \partial \beta_1^2 = 2\beta_1^{-3} > 0 \quad \text{and} \quad r_L^* > r.$$

Similarly,

$$\partial (r - r_S^*) / \partial \phi_1 < 0, \quad \partial^2 (r - r_S^*) / \partial \phi_1^2 > 0 \quad \text{and} \quad r_S^* < r$$

In perfect market we directly have $r_G = r_D^*$ and $r_L^* = r_S^* = r$. Note $r > r_G$ because r is the weighted average of r_G and r_K . See the Fig -1.

3. Trivial from (7).



It is interesting to consider the interest spread between r_S^* and r_D^* . From (7) and (9), we have

$$r_S^* - r_D^* = (r - r_G) + (\alpha_1^{-1} - \phi_1^{-1}).$$

Thus when the security demand is more inelastic and the deposit is more elastic, a small spread results. However, in an economy where securitisation is popular, the demand for security is supposed to be highly elastic. So in what follows, we consider only the case of $r_S^* - r_D^* > 0$. However, later we will also prove the net profit of securitisation does not depend on the sign of $(r_S^* - r_D^*)$.

II-2 imperfect market effect⁶

The above discussion leads to the next proposition.

PROPOSITION 2:

Suppose banks securitise loans. Then profits when banks are in an imperfect market are larger than when they are in a perfect market.

PROOF:

Bank profits in an imperfect market is given by (6). Some rearranging yield

$$\Pi = \exp(\alpha)(r_G - r_D^*) + \{r_G(1-\delta) + \delta r_K\} \{\exp(\phi) - \exp(\beta)\} - r_S^* \exp(\phi) + r_L^* \exp(\beta) \quad (10)$$

From proposition 1, bank profits under perfect competition is written as

⁶ In what follows, in the case we refer to the optimum, we assume all markets are clear. Then we simply write $\exp(\alpha)$ as D etc.

$$\begin{aligned}\Pi^P &= \exp(\beta)\{r_G(\delta-1) + r - \delta r_K\} + \exp(\varphi)\{r_G(1-\delta) - r + \delta r_K\} \\ &= \{r_G(1-\delta) - r + \delta r_K\}\{\exp(\varphi) - \exp(\beta)\} = (r - r)\{\exp(\varphi) - \exp(\beta)\} = 0\end{aligned}\quad (11)$$

Combining (10) and (11) yields $\Pi > \Pi^P = 0$. QED

Proposition 2 simply means that perfect competition forces firms to give up excess profit. The author discussed in Fukaura(1997) that the advantage of securitisation is derived from the difference in transaction costs between the (ultimate) lenders and the (ultimate) borrowers. Needless to say, the transaction costs represent market imperfection, i.e., asymmetric information. As the financial intermediary, banks bridge them by producing information on investment potentiality and on the availability of funds. On the other hand, in securitisation, this information must be imputed in the structure of the securities itself. In securitisation, as well as traditional intermediation, the advantages banks can enjoy depend on the degree of the information asymmetry.

Theoretically, the margin between r and $r_L^*(r_s^*)$ reflects the information produced by banks under imperfect market as well as banks' monopolistic power. For banks, securitisation is the alternative to traditional intermediation, however, it must be noted both are based on information producing technology.

II-3 Capital/asset ratio effect

Generally, securitisation is said to be beneficial because the capital/asset ratio is improved by writing off the asset (= loan). The capital asset ratio is defined as

$$\begin{aligned}\delta^B &= K / L && \text{before-securitisation} \\ \delta &= K / (L - S) && \text{after-securitisation}\end{aligned}$$

Certainly, $L > S > 0$ then $\delta > \delta^B$.

However, securitisation also requires liability adjustment. Consider these two balance sheets.

$$\begin{array}{l} G + L = \begin{array}{|c|} \hline D_0 \\ \hline \end{array} + K \quad \text{before-securitisation} \\ G + L = \begin{array}{|c|} \hline S + D_1 \\ \hline \end{array} + K \quad \text{after-securitisation} \end{array}$$

D_0 is divided to S and D_1 after securitisation. However, the cost of $S(=r_s^*)$ is normally greater than r_D^* . This means, by writing off the loan through securitisation, banks will face a more expensive fund than before, *seteris paribus*. We must check how this affects bank profits. Simple calculations provide the next proposition.

PROPOSITION 3 :

On-balance securitisation improves the capital/asset ratio. However, it decreases profit.

PROOF:

Substituting $K=\delta^B L$, $G=D+K-L$ and $D_0 = S+D_1 = \exp(\beta)$ into (6) yields banks' before-securitising profit ,

$$\begin{aligned}\Pi^B &= r_G G - r_K K - \{\exp(\alpha) + \exp(\varphi)\} r_D + \exp(\beta)r_L \\ &= \exp(\alpha)(r_G - r_D) + \exp(\beta)\{(\delta^B - 1)r_G - \delta^B r_K + r_L\} + \exp(\varphi)(r_G - r_D).\end{aligned}\quad (12)$$

On the other hand, banks' after-securitising profit is already given by (6). Then we have

$$\Pi^B - \Pi = \exp(\beta)(\delta^B - \delta)(r_G - r_K) + \exp(\varphi)\{\delta(r_G - r_K) + r_S - r_D\}.\quad (13)$$

The first term represents the profit change by the increase of the capital/asset ratio and the second term is the effect caused by securitisation itself. Some manipulations lead to

$$\Pi^B - \Pi = (r_G - r_K) \{ \exp(\beta)(\delta^B - \delta) + \exp(\varphi)\delta \} + \exp(\varphi)(r_G - r_D^*) \quad (14)$$

From the definitions of δ^B and δ , we obtain

$$\begin{aligned} K &= \delta(L - S) = \delta^B L \\ L(\delta^B - \delta) &= -\delta S \end{aligned} \quad (15)$$

From (7), (14), (15), we get

$$\Pi^B - \Pi = \exp(\varphi)(r_G - r_D^*) = \exp(\varphi)/\alpha > 0. \quad (16)$$

QED

We can trace this proposition with the simple numerical example. Assume a bank has the following balance sheets and its loans are securitised. The B/S of the non-bank agent that purchases that security changes simultaneously. We must note that the asset sides of the bank (before and after) are same. This means the bank can not change their asset management strategy.

Bank(before)		Bank(after)			
G 10	D 90	G 10	S 20	$r_G=0.15 \quad r_S=0.1 \quad r_L=0.2$ $r_D=0.05 \quad r_K=0.1$	
L 90	K 10	L 90	D 70		
			K 10		
Non Bank(before)		Non Bank(after)			
D 90	L 90	D 70	L 90		
		S 20			

Fig. 2

From (16), $\Pi^B - \Pi = 20(0.1 - 0.05) = 1.0$. As shown in the balance sheets, securitisation does not bring out any change in the asset side, which also means the revenue is constant. Then we consider only the *liability* side (note the risk weight of $G = 0$). This is the reason that $\Pi^B - \Pi$ does not depend on the capital/asset ratio, but only on the deposit rate⁸.

To ensure the accuracy of our proposition, calculate the funding cost directly before/after securitisation.

$$\begin{aligned} 0.05(90) + 0.1(10) &= 5.5 \quad \text{: before} \\ 0.1(20) + 0.05(70) + 0.1(10) &= 6.5 \quad \text{: after} \end{aligned}$$

Profit is decreased by 1.0, which is equal to the value obtained above, as might be expected. It is often said that securitisation makes the funding channel more wide, however, we must note that banks will face more expensive funds than the deposits. In other words, the opportunity cost of securitisation depends on the price setting power in the deposit market. The last equation of (16) represents this⁹.

⁷ Re-arranging (15) gives $(\delta - \delta^B) / \delta = S/L$. The capital/asset ratio is increased in proportion to the securitised loan. This supports the popular belief directly.

⁸ The non-performing loan problems can be depicted by Fig 2. Consider 20 of L is bad loan. If banks write it off directly it faces capital shortage ($K = -10$). Alternatively the RTC (or something) can obtain the bad loan by the back-finance. S. finances the back finance. So we have the same B/S as Bank(after) in Fig 2. Note the capital/asset ratio is not improved.

⁹ We referred $r_S^* > r_D^*$ just to give an intuitive interpretation. We know from (16) the profit increase does not depend on r_S^* .

II-4 Net benefit of securitisation

As discussed above, the net benefit of securitisation depends on (1) imperfect market effect and (2) capital/asset ratio effect. Remember (10) shows the imperfect market effect, which increases the profit, and (16) is the capital/asset ratio effect, which decreases profit. The net effect can be derived easily by subtracting (16) from (10). Remember we can not say simply $\Pi - \Pi^B + \Pi = \Pi^B$ because the capital/asset ratio is different. Instead, we must use the explicit expression of $\Pi^B - \Pi$ given by (13).

$$\begin{aligned} \Pi^N &= \exp(\alpha) (r_G - r_D^*) + \exp(\beta) \{ r_G (\delta-1) + r_L^* - \delta r_K \} + \exp(\varphi) \{ r_G (1-\delta) - r_S^* + \delta r_K - (r_G - r_D^*) \} \\ &= \exp(\alpha) (r_G - r_D^*) + \exp(\beta) \{ r_G (\delta-1) + r_L^* - \delta r_K \} + \exp(\varphi) \{ r - r_S^* + (r_D^* - r_G) \}. \end{aligned} \quad (17)$$

PROPOSITION 4:

Under the imperfect competition, the net profit of securitisation is positive.

PROOF:

The first and second terms of (17) are both positive therefore we should consider the last. From proposition 1 (Fig-1) we know

$$\begin{aligned} r_S^* < r & \text{ if } \varphi_1 < 8 \quad \text{and} \quad \lim_{\varphi_1 \rightarrow 8} r_S^* \rightarrow r \\ r_D^* > r_G & \text{ if } \alpha_1 < 8 \quad \text{and} \quad \lim_{\alpha_1 \rightarrow 8} r_D^* \rightarrow r_G \end{aligned} \quad (18)$$

So if the markets are imperfect ($\varphi_1, \alpha_1 < 8$), $r - r_S^* > 0$ and $r_D^* - r_G > 0$. Therefore,

$$\Pi^N > 0^{10}. \quad \text{QED}$$

From proposition 4 we have next collorary.

COLLORARY:

The net profit of on-balance securitisation is independent from the spread between r_S^* and r_D^*

It looks a little strange that banks gain net profit despite a higher security rate than the deposit rate. This is because r_S^* intersects r_D^* between r and r_G (see Fig-2). The last term is written as

$$\exp(\varphi) \{ (r - r_G) + (r_D^* - r_S^*) \} \quad (19)$$

so even if $(r_D^* - r_S^*) < 0$, the absolute value of $(r - r_G)$ is greater than that of $(r_D^* - r_S^*)$.

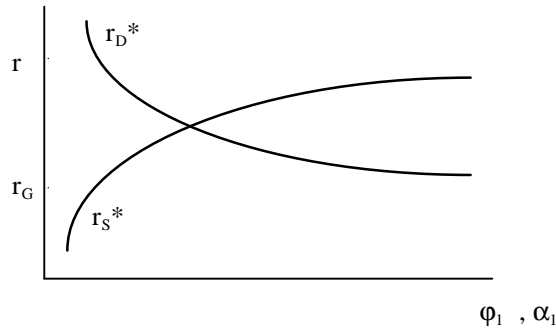


Fig-3

¹⁰ It is straightforward, when all markets are perfect ($r_L^* = r_S^* = r, r_D^* = r_G$), (18) equals to zero.

We should note the importance of the assumption $r_K > r_G$ because this secures the condition $r > r_G$. Conventional wisdom is at least correct only in the sense that the benefit of securitisation depends on changes in the capital/asset ratio.

III. Off balance securitisation

III-1 The function of the S.P.V.

In the earlier section we concentrated on the Twinn model as the basic model. Justification for this approach is twofold. First, it is a convenient way to understand securitisation process. Second, it also models on-balance securitisation, which is the typical way banks securitise assets (loan). In European countries, which have laws and banking systems ill suited to securitisation, banks often package their mortgages that remain on banks' balance sheet.

Off-balance securitisation has a more complicated set-up. In on-balance securitisation, there are three agents (i.e., banks, the lender, and the borrower¹¹). In the contrast, in off balance securitisation, the asset holder does not issue asset backed securities alone. Instead, a new agent, the companies designed only for issuing securities, must be added. This is called the S.P.V. or L.P.C. (Special Purpose Vehicle, Limited Purpose Cooperation). Hence, it consists of four agents, three plus the S.P.V..

Accordingly, we need following balance sheets¹². The original state is given in section II-3, as the numerical example, before-securitisation.

bank		S.P.V.		household		firm	
G 10	D _H 70	D _S 20	S _S 20	S _S 20	P 90	P 90	L _F 70
C 20	D _S 20			D _H 70			L _S 20
L _F 70	K _B 10						

Fig-4

The real aspect of this economy is summarized in the physical assets (liability) of the firms (house). The remaining entities are all financial assets and liabilities then should be canceled out. However, to cancel out every entity, L_S in the firms must be equal to C in banks. Before securitisation, the firms' borrowing corresponds to banks' loan. After securitisation, the counterpart is the cash. In this sense, *banks can liquidate the loan* (= getting the cash) and the credit-risk are transferred to the security holders¹³.

Compare the banks' balance sheet with Fig. 2 (numerical example, after-securitisation). The total amount of deposit is constant (=90), which means the funding cost is also the same between the two schemes. However, the depositors are divided into the household and the S.P.V.. Further, note the capital/asset ratio is same (1/7) if C is cash. The firms' interest bill is not changed¹⁴.

¹¹ The borrowers and the lenders are not explicitly considered in the fundamental model.

¹² To avoid the complexity, we assume the original asset holders are banks as well as the former discussion, although we lost some of generality. Such banks are called the *originator*. First, a bank sell the loan to firms 20 units to the S.P.V. so the bank's cash is increased ($C=20$) and L_F becomes 70. The S.P.V. issues asset backed securities ($S_S=20$) and the proceeds are deposited at banks ($D_S=20$). The household purchases the securities from S.P.V. so the household's asset changes ($S_S=20$ and $D_H=70$). The firms liabilities owes banks ($L_B=80$) and S.P.V. ($L_S=20$). Strictly speaking, the firms has a liabilities to household (the security holder), however, in the typical securitisation scheme the firms must pay their interest to the S.P.V.. It passes through the received interest to the security holders. So the S.P.V. is often called the conduit. The physical assets are in the liability side of the household and the asset side of the firms' asset side. This means our firms are producing the goods and services by utilizing the household's physical assets. Building model to deal with the non-financial firm's securitisation is a theme to be solved. Summing up the banks' and S.P.V.'s balance sheet in Fig -3 leads to the banks' balance sheet in section II-3. This means off-balance securitisation divides the original balance sheet or it *unbundles* the traditional banking service into two.

¹³ To benefit from the law of large number, the pooled assets should back securities. We can show this by regarding Fig-3 as the balance sheet for the whole economy.

¹⁴ it is argued that securitisation breaks the tie between banks and firms, undermining the corporate governance

By comparing Fig 4 with Fig 3 we know the substantial difference between the on and off balance sheet securitisation. When banks issue the securities themselves, the liability structure is changed. On the other hand, when the S.P.V. carries out the banks' liability reshuffle, it brings a favorable change in the asset side. The Non Bank sector in Fig 3 is splitted into the SPV(the issuing agent), the household (security holder) and the firm(debtor). In Fig 4 the firm's liability consists of the bank borrowing($L_F=70$) and securitised debt to household($L_S=20$). The household purchases S_S from SPV, not from the bank. The SPV's new deposit($D_S=20$) is often called bank's "new money" in the sense that a part of asset is released from the original usage(original bank loan). It is almost same to the proceeds the bank could get if it directly sells off the loan in the asset market. On the other hand, in Fig 3, the bank's asset composition dose not change, which means the banks can not enjoy new money. In other words, $L_S(=20)$ in Fig-3 is "sleeping".

In other words, *off balance securitisation provides banks an additional investment channel*, in contrast to the widespread argument emphasizing that it widens the fund-raising channel¹⁵.

These discussions are formalized by the next proposition.

PROPOSITION 5:

The loan is converted into cash without any change in the liability side, only if the S.P.V. issues the securities instead of banks.

PROOF: See above discussions.

QED

Sometimes concern has been expressed that banks write off the best assets that evade the soundness of the financial system. However, if banks invest C for high profits, it contributes to enhance the soundness of banks, which is consistent with the global principle of the sound financial system¹⁶.

III-2 Banks' profit

Now we can expect banks' profit (Π^S) to be less than Π , because banks lose the income from securitised loan and gain nothing from cash holding. Therefore, securitisation does not pay unless banks can find more profitable investment opportunities.

This can be shown as follows.

$$\Pi^S = r_G G + r_C C + r_L L - r_D D - r_K K, \quad (20)$$

By substituting $S = -C$ and $r_S = r_C$ into (2) we have

$$\Pi^S = \exp(\alpha)(r_G - r_D) + \exp(\beta)\{ r_G (\delta^S - 1) + r_L - \delta^S r_K \} - C(r - r_C) \quad (21)$$

Comparing (21) and (6), it is easy to confirm that the optimal values of r_D , r_L are same. The rate the S.P.V. offer the household are also determined according to (6). This is not an unnatural assumption because the S.P.V. is merely the agent of the banks. Further, note the capital/asset ratios are same in our numerical example, both equal to 1/7). Then in equilibrium we get

$$\Pi^S - \Pi = C(r - r_S^*) - C(r - r_C) \quad (22)$$

mechanism provided by banks.

¹⁵ See Greenbaum and Thakor(1987).

¹⁶ Fig-3 is also helpful to understand the bad loan problems. Starting from B/S(a) if 15 of outstanding loan become worthless, its net worth is now -5 so bank can not pay off all liability. When bad loan is written off by securitisation, we have B/S (b).This is substantially same as Fig-3.

$$B/S(a) : G(10)+L(90)= D(90)+K(10)$$

$$B/S(b) : G(10)+L(75)+C(15)= D(90)+K(10)$$

If C is cash ($r_C = 0$), $\Pi^S - \Pi = C(-r_S^*) < 0$, that is, if banks hoard cash, on-balance securitisation does not pay¹⁷. Now we can reach the new proposition.

PROPOSITION 6 :

Off-balance securitisation is desirable if and only if banks have a superior fund managing ability .

PROOF:

The proof is trivial. From (22) we have

$$\Pi^S > \Pi \iff r_C > r_S^* \tag{23}$$

Accordingly, if banks can use C more profitably in the sense r_C is higher than the rate banks pay (r_S^*), off-balance securitisation is desirable. That is, (23) reflects the banks' ability of investment, in other words, the *asset management ability*. It is the banks with high investment ability that benefit from off-balance securitisation¹⁸. **QED**

Some observers have been discussing on securitisation, without the explicit recognition of the difference between on/off-balance securitisation. They take it for granted that off-balance securitisations are dominant. However, unless we explain the differences between two schemes, we can not understand the exact importance of the S.P.V..

It is worth considering the case when banks purchase equity directly instead of lending. The resulting balance sheets are same as the Fig -5, except C is replaced by Equity. In other words, if the cash raised from securitisation is invested into the stock market, the bank's balance sheet in Fig-3 is same as the one in Fig-4. However we should note the firm's situation.

banks		household		firms	
G 10	D 90	D 90	P 90	P 90	L 80
Equity 10	K _B 10				Equity 10
L _F 80					

Fig -5

Because the loan has been curtailed, firms must issue the equity. It is easy for the established, named firms, but impossible for infant firms, small businesses, or venture companies. In this sense, off-balance securitisation is very helpful to foster potential firms¹⁹.

IV Securitisation or intermediation ?

In section II-3, we discussed that on-balance securitisation is not superior in the sense it gives banks smaller profit. It means the traditional intermediation is more profitable. Further, III-3 discussed that off-balance securitisation is superior in the sense it gives banks larger profits than off-

¹⁷ Note $\exp(\alpha) - \exp(\beta) = C$. We assume the market for C is perfect and r_C is given.

¹⁸ In his excellent textbook, Bessis(1998) discussed the benefit and cost of securitisation . He analyzed the non-S.P.V. case and concluded that the benefit stemmed from the reduction of the funding cost. This conclusion are based on the assumption that $r_S < r_D$ and $r_C=0$ (exactly speaking, he ignored the revenue from C.

¹⁹ Securitisation described by Fig-4 is also applicable to securitisation by the venture business. First we should note that this never means the venture issues the security by itself. If so, the venture can raise the fund directly from the capital market. See below, where A denotes the venture's asset for the production.

household		venture	
EQ 90	P 90	A 90	EQ 90

Initially the venture must borrow the fund from the intermediary, at the same time the intermediary issues the security backed by the cash flow from the venture's expected profit. The intermediary loan on the condition that it can be securitised immediately.

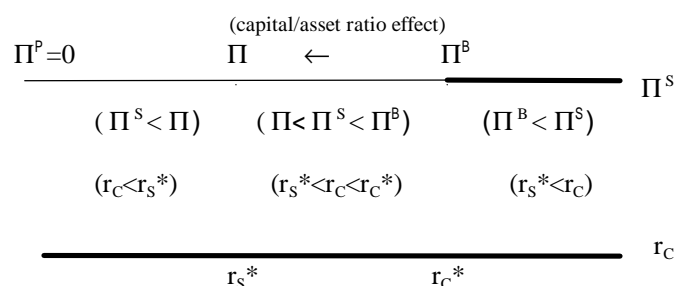
balance securitisation under some condition. Accordingly, our final task is to consider the advantage of off-balance securitisation over the traditional intermediation. Needless to say, the income position of traditional banking was already given by (12). Compare (12) with (21), with noting the balance sheet condition.

$$\Pi^S - \Pi^B = \exp(\beta)(r_G - r_K)(\delta^S - \delta') + C(\alpha^{-1} + r_C^* - r) \quad (24)$$

The first term is negative because of $r_G - r_K < 0$ and $\delta^S > \delta'$ (in our concrete balance sheet, $\delta^S = 1/7$, $\delta' = 1/9$), this reflects the capital/asset ratio effect. Because by proposition 6 we know $r_C^* > r_S^*$ and from Proposition 1 we have $r = r_S^* + \phi^{-1}$, then $r_C^* - r = (r_C^* - r_S^*) + \phi^{-1} > 0$. Hence the second term is positive. Accordingly, the sign of (24) is unknown.

However, we can say if $\Pi^S > \Pi^B$ then $r_C^* > r_S^*$. This means $r_C^* > r_S^*$ is the necessary condition for on-balance securitisation, but it is more restrictive than proposition 6 says.

Accordingly, we can relate r_C and r_S^* to banks' profit in different securitisation schemes. See Fig-5 where r_C^* is rate at where $\Pi^S = \Pi^B$. Proposition 2 ensures the axis is positive and proposition 4 ensures Π locates between Π^P and Π^B .



From the view of banks' profit in the imperfect financial markets, three cases are classified according to the level of r_C .

1. If $r_C < r_S^*$ (= banks cannot get sufficiently high return from C) on balance securitisation is desirable.
2. If $r_S^* < r_C < r_C^*$, on-balance securitisation is preferable to off.
3. If $r_C^* < r_C$, off-balance securitisation is desirable.

However, further consideration leads us to a more interesting finding.

PROPOSITION 7:

If $r_C < r_C^*$, the traditional intermediary is dominant.

If $r_C > r_C^*$, off-balance securitisation is dominant.

On-balance securitisation is not conducted.

PROOF:

The case 3 described above gives the proof for $r_C > r_C^*$.

When $r_C < r_C^*$, on/off-balance securitisation is desirable (case 1 and 2). However, banks can realize Π^B in traditional intermediation. So they have no incentive to securitise their assets, i.e., both securitisations are always dominated by intermediation in this area(dashed line). Q.E.D

This proposition is again emphasizing the importance of banks' asset management ability in securitisation process. Inversely, the traditional intermediation is not always inferior business, even in the liberalized financial markets.

V Concluding Remarks

In preceding sections we have been exploring the theoretical foundations for on /off balance securitisation. We found that the net benefit of on-balance securitisation depends on (1) the effect based on the improved capital/asset ratio and (2) the effect based on the imperfect information.

Although the former decreases the profit, the latter wholly cancels it out. This suggests that we should not regard securitisation as financial innovation to improve the capital/asset ratio.

Another finding is that there is a substantial difference between on-balance and off-balance securitisation, in the sense of whether or not banks can convert loans into cash without any changes in the liability side, for example, banks can liquidate the asset and get a perfect disposal fund.

Further, we succeeded to show off-balance securitisation is valid only for banks with excellent asset management ability.

Our findings have some policy implications. Suppose the rating is enhanced by securitisation, which is often referred as an important benefit of securitisation. Our model ensures this. Because banks' capital costs ($=r_K$) are decreased, stock prices buoy up. This brings smaller $r (=r_G(1-\delta)+\delta r_K)$ and makes $\Pi < \Pi^S$ more attainable.

The introduction of the off-balance sheet securitisation into their mortgage program by some governments, for example Irish, Argentina government, is one vital example, which shows the benefits of it. The expanding the policy to promote the house ownership may worsen the financial deficit. If the government could securitise the cash flow from the mortgage payments, it can setup the program without further deterioration.

When no alternative market in which invests the additional fund is available, banks must hold cash or find a new lending. This leads to $\Pi > \Pi^S$. Before 1970's, on-balance securitisation was not popular in Japan. According to our discussions, it is because there was little market where banks could earn a preferable rate. This explanation enables us to focus on another aspect of the Japanese financial system characterized mainly by the main-bank relationship between banks and firms. Japanese monetary authority enacted a special law for securitisation in 1992, however, it has too many restrictions to encourage securitisation. In US, these restrictions requiring banks to back their loans with capital even after securitisation or limiting the type of investor that could buy the resultant securities were all eliminated in 1994. These deregulation resulted in the growing concern about securitisation in US. It was not a happening but a natural process.

After the middle of 70's, markets for CD, repo, swap and option, foreign exchange and so on, have dramatically been extending. These markets give banks a large opportunity to realize higher r_C . This makes $\Pi < \Pi^S$ more attainable. At the same time, however, we must remember that if banks cannot raise sufficiently high return, securitisation deteriorates the profitability of banks.

REFERENCES

- J. Bessis, 1998, *Risk Management in Banking*, Wiley
- R.Cantor,R.Demsetz, 1993, Securitisation, Loan Sales, and the Credit Slowdown, Federal Reserve Bank of New York *Quarterly Review*.
- F.R.Edwards, F.S.Mishkin, 1995, The Decline of Traditional Banking: Implications for Financial Stability and Regulatory Policy, Economic Policy Review, Federal Reserve Bank, New York
- A.Fukaura, 1997, *Economics of Securitisation*(in Japanese), Nihon-Hyoronsya
- S.I.Greenbaum, A.V.Thakor, 1987, Bank funding modes:securitisation versus deposit. *Journal of Banking and Finance* Vol.11
- F.S.Mishkin, 1997,*The Economics of Money, Banking, and Financial Markets*, Addition Wesley
- O.E.C.D.,1995, Securitisation : An international Perspective, *Financial Market Trends*.
- C.I.Twinn, 1995, Asset-backed securitisation in the United Kingdom, *Bank of England Quarterly Bulletin*.