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Abstract

This paper explores how banks specialize into different activities when they start with differing comparative advantages in some industry or geographic area or product. The possibility of coordination failure, i.e. wrong specialization is highlighted with risk neutral financial intermediaries. Mechanisms for eliminating the coordination failure are discussed. Too much diversification takes place with risk averse financial intermediaries and is shown to be mitigated by financial innovation in banking like credit derivatives and securitization.

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1. Introduction

In this paper, the focus shifts on the following question: how do banks compete when they have comparative advantage in different areas (like products and services, industry groups, geographical areas etc.)? As it turns out, the answers are not trivial and have important welfare implications. Before we explore the above question formally, it is useful to relate the question to the extant theory of industrial organization as applied to the theory of financial intermediation. The usage of monopolistic competition framework is a more acceptable resolution to the extremities predicted by the Bertrand Framework (another example is of course, the capacity and price competition model of Kreps-Scheinkman (1983). Financial Intermediaries do compete in terms of product or service differentiation, and a number of authors have tried to examine different regulatory issues in banking using the concept of the locational Salop circle model (Salop (1979)). However, the equilibria of these models are symmetric and nothing would change if banks reversed their positions. To break away from this paradox we need bank specific characteristics that determine why different banks finance different types of business. Different degrees of increasing returns in financing different industries could be one factor: bank A may face increasing return in lending to firm X while bank B may have it over firm Y. But while the presence of increasing returns in monitoring, screening and lending could be a sufficient condition, the necessary condition turns out to be comparative advantage. While it is true, that sometimes expertise evolve endogenously, it is also equally true that

certain intrinsic characteristics of financial intermediaries, and their clients and regions where they serve, lead to differences in cost patterns and create absolute and comparative advantages. For example, in wholesale and corporate banking, domestic banks typically have a great of advantage over foreign banks due to their intimate relationship with depositors and industries and knowledge of domestic and local industrial and market conditions. On the other hand, due to the information technology and communications revolution, foreign banks find it relatively easy to profitably penetrate a new retail market provided it is growing. Thus, one can surmise, that, foreign banks may have comparative advantage in retail banking sector of an emerging market country, though they would have less of a chance in the wholesale banking market. Similarly, community and regional banks find it difficult to penetrate across regions with different cultures and communities since business mobilization depends on cultural networks for these banks. Thus they develop comparative advantage in serving a specified community or a geographic region (of course merger waves can lead to inter-regional consolidation for them later on in their evolutionary path, but that is a different story). The question is whether the allocation of resources by the banking system is efficient, and reflects this kind of intrinsic comparative advantage patterns? As we shall see, they need not be and may very well require regulatory intervention of different kinds.

The existing literature on financial intermediation provides strong reasons why banks should be diversified. On the liabilities side, banks should have a

diversified set of depositors with different withdrawal patterns such that by utilizing the law of large numbers a bank can predict efficiently the withdrawal demand at any point in time and thus minimize the risk of costly bank runs (Diamond and Dybvig (1983)). On the asset side, portfolio diversification directly follows from risk aversion on the part of the financial intermediaries under incomplete markets. Hellwig (2000) studies financial intermediation under risk aversion in the context of the model of delegated monitoring of Diamond (1984) and shows the viability of financial intermediation and a pattern of risk allocation where risk is shifted from borrowers to banks and / or depositors. Limited liability and / or diminishing returns of borrowers could be additional reasons and could lead to asset diversification even with risk neutral banks. However, there are pitfalls to diversifying too much as well. As Winton (1997, 1999) has pointed out, when banks keep diversifying their portfolios, the ability to monitor the new or the marginal borrowers may fall, and there also might be a disincentive to monitor in general, leading to possibilities of accumulation of bad debt and even bank collapse. Some papers have examined the diversification motives of financial intermediaries under competition but most of them assume that different loan return distribution are uncorrelated and diversification increase with bank size. Yosha (1997) analyzes diversification and competition in a large Cournot-Walras economy, and Winton (1997) examine competition among financial intermediaries where diversification matters. Shaffer (1994) identifies conditions where pooling or diversification increase failure probability.

Here we start with a simple model of comparative advantage and Cournot competition in banking and extend the model to show how inefficiency can arise in the course of strategic competition and different solutions to those inefficiencies. Here we assume that banking regulator's task is to ensure maximizing surplus or efficiency in the banking industry.

2. A Simple Cournot Model of Specialization

There are two banks A and B. Each has one unit of loanable funds whose cost is normalized to zero (We are not considering explicitly the competition for inputs like deposits and capital between the banks but focusing only on the credit market. Extensions along those lines will not change the analysis qualitatively as will be clear from the argument below.). There are two industrial sectors that borrow from the two banks. Total amount lent to the jth sector by the ith bank is q^i_j (where i =A,B indicate the banks and j = 1,2 denote the industries) and the resource constraint for the ith bank is $\sum_j q^i_j = 1$ for all i.

Demand Function for each sector is $P_j = \alpha - \beta Q_j$ **(2.1)**

where $j \in [1, 2]$,

and $Q_j = q^A_j + q^B_j$ **(2.2)**

The marginal management cost (which includes cost of screening, monitoring etc.) of lending to each sector for each bank is m^i_j. This cost is assumed to be constant but one could generalize to the case of falling costs or increasing returns.

Assumption 2.1 : $m^A_1 < m^B_1$ and $m^A_2 > m^B_2$. Thus each bank has a absolute and comparative advantage in lending to one sector. Further, cost differences are such that $(m^A_2 - m^A_1) > 3\beta$ and if $(m^B_1 - m^B_2) > 3\beta$

The objective function for bank A is (the case for B is symmetric) :

$$\prod^A = [\{\alpha - \beta (q^A_1 + q^B_1) - m^A_1\} q^A_1] + [\{\alpha - \beta (q^A_2 + q^B_2) - m^A_2\} q^A_2]$$

The optimization problem is such that

$$\text{Max } \prod^A = [\{\alpha - \beta (q^A_1 + q^B_1) - m^A_1\} q^A_1] + [\{\alpha - \beta (q^A_2 + q^B_2) - m^A_2\} q^A_2]$$

w.r.t. q^A_1, q^A_2

s.t. $q^A_1 + q^A_2 = 1.$

$0 \leq q^A_1 \leq 1$

$0 \leq q^A_2 \leq 1$

Proposition 2.1: The optimal quantity choices in the Cournot equilibrum are $q^{A*}_1 = 1$ and $q^{B*}_1 = 0$

Proof : We prove the case of bank A, that of B is symmetric.

The Kuhn-Tucker conditions for bank A in this optimization problem are as follows :

$$\{\alpha - \beta (2q^A_1 + q^B_1) - m^A_1\} - [\alpha - \beta \{2 (1- q^A_1) - (1 - q^B_1)\} - m^A_2] \leq 0 \text{ and } q^A_1 = 0 \quad \textbf{(2.3)}$$

or,

$$\{\alpha - \beta (2q^A_1 + q^B_1) - m^A_1\} - [\alpha - \beta \{2 (1- q^A_1) - (1 - q^B_1)\} - m^A_2] \geq 0 \text{ and } q^A_1 = 1 \quad \textbf{(2.4)}$$

(note that the second order condition is satisfied)

Now, the left hand side of the first order conditions is:

$\{\alpha - \beta (2q^A_1 + q^B_1) - m^A_1\} - [\alpha - \beta \{2 (1- q^A_1) + (1 - q^B_1)\} - m^A_2]$

$= - 4 \beta q^A_1 - 2 \beta q^B_1 + (m^A_2 - m^A_1) + 3 \beta$ **(2.5)**

$> (m^A_2 - m^B_1) - 6 \beta + 3 \beta = (m^A_2 - m^B_1) - 3 \beta > 0$, so $q^A_1 = 1$

Similarly, for bank B. **Q.E.D.**

Therefore, there will be dominant strategy Cournot-Nash solution with strategic specialization and no diversification by banks provided the above conditions are satisfied. Are they the efficient solution too? Yes, because banking industry profits are maximized from strategic specialization (the first order conditions are same). Note that the assumption 3.1 ensures that the dominant strategy is the Counot-Nash equilibrium. For low cost differences, dominant strategy equilibrium will not hold and banks will diversify. While such a possibility should be borne in mind, here the emphasis is on depicting the basic pattern of specialization as a result of comparative advantages. This is a useful benchmark in the sense that

(a) One would be interested to know if there exist situations where banks can specialize in the wrong area and the equilibrium is inefficient, and if so, what are the possible remedies and

(b) What happens when risk aversion comes into play and creates tradeoffs between specialization and diversification.

3. Coordination Problem in a Discrete Choice Model

Now consider the same Cournot model with the added assumption:

Assumption 3.1: Minimum investment in each sector by a bank is one unit.

This introduces a non-convexity into the optimization problem of each bank.

Now the game becomes a one shot discrete choice game with strategy sets and payoff matrix of the following form:

Table 1: The Normal Form Cournot game with nonconvexity

Strategies	A to Invest in Sector 1	A to Invest in sector 2
B to Invest in Sector 1	$\Pi_A = [\ \alpha - \beta 2\ ] - [m^A_1]$, $\Pi_B = [\ \alpha - \beta 2\ ] - [m^B_1]$.	$\Pi_A = [\ \alpha - \beta\ ] - [m^A_2]$, $\Pi_B = [\ \alpha - \beta\ ] - [m^B_1]$.
B to Invest in Sector 2	$\Pi_A = [\ \alpha - \beta\ ] - [m^A_1]$, $\Pi_B = [\ \alpha - \beta] - [m^B_2]$.	$\Pi_A = [\ \alpha - \beta 2\ ] - [m^A_2]$, $\Pi_B = [\ \alpha - \beta 2\ ] - [m^B_2]$.

There exist two equilibria: in the first one, banks specialize in the industry where they have comparative advantage; in the second, banks specialize where they have comparative disadvantage. The second equilibrium arises because of the following reason: if bank A decides to specialize in industry 2, then bank B can get monopoly profit by choosing to specialize in industry 1 whereas it would only get Cournot profit (although a greater relative share due to the comparative

advantage). If the monopoly effect is sufficiently high, then it pays for bank B to forego its comparative advantage factor.

The equilibria, moreover, are Pareto ranked, since the intermediation efficiency and borrower welfare are higher when banks specialize according to their comparative advantage. So in this case, if government could induce the selection of the better equilibrium, the intervention could be clearly justified. However, it is not quite clear how the government could exactly intervene. One possible way is to restrict entry into specialization through licensing. The Regulator can charge a license fee in such a way that a bank would buy a license for doing business with a particular industry only when it has a comparative advantage in that industry.

Consider the following mechanism: A fee F is charged on (a) bank A entering industry 2 and (b) bank B entering industry 1 such that the following conditions hold:

$$[\ \alpha - \beta 2\ ] - [m^{A}_{1}] > [\ \alpha - \beta - m^{A}_{2}\ ] - F \qquad \textbf{(4.3.1)}$$

$$[\ \alpha - \beta 2\ ] - [m^{B}_{2}] > [\ \alpha - \beta - m^{B}_{1}] - F \qquad \textbf{(4.3.2)}$$

Therefore, even if A has the strategy to specialize in industry 2, bank B still finds it optimal to invest in industry 2. Thus choosing industry 2 becomes a dominant strategy for bank B. Similarly, choosing industry 1 becomes a dominant strategy for bank A. Thus we get to the pareto efficient equilibrium.

The matrix below shows the normal form of the game with changed payoffs.

Table 2: Cournot Game with entry fee

Strategies	A to Invest in Sector 1	A to Invest in sector 2
B to Invest in Sector 1	$\Pi_A = \alpha - \beta 2 - m^A_1$ $\Pi_B = \alpha - \beta 2 - m^B_1 - F$	$\Pi_A = \alpha - \beta - m^A_2 - F$ $\Pi_B = \alpha - \beta - m^B_1 - F$
B to Invest in Sector 2	$\Pi_A = \alpha - \beta - m^A_1$ $\Pi_B = \alpha - \beta - m^A_2$	$\Pi_A = \alpha - \beta 2 - m^A_1 - F$ $\Pi_B = \alpha - \beta 2 - m^B_1$

However, in reality, a license fee arrangement of this type in the banking industry would be difficult to implement optimally because of two kind of constraints:

i) Informational constraints – Suppose that costs are private information of the banks and the Social Planner or the Banking Regulator does not know the costs or comparative advantage of banks sufficiently well to choose an optimal fee. When comparative advantage is slight relative to the monopoly effect, the actual fee may turn out to be too low to create the efficient dominant strategy equilibrium. On the other hand, if comparative advantage is too high, a high fee may create excess burden and turn out to be suboptimal.

ii) Corruption - Now consider a corrupt regulator: it will try to create a monopoly because it can extract a higher surplus from the monopoly arrangement than the competitive arrangement. Although the coordination failure may not occur because of high fees (so that comparative advantage dominates), welfare falls compared to the case without regulation and intervention.

So, the above constraints, when they are present, warrant a different mode of resolution, other than regulatory intervention (except possibly, when the honest regulator can screen effectively to mitigate informational problems or the corruption of the regulator can be monitored and neutralized effectively). One mechanism is a cooperative game of communication and binding commitments preceding the stage of investment. Clearly, the Pareto inefficient will not be chosen in this case, but the theorist has to worry about the efficiency with which communication can take place and regarding the enforceability of binding commitments. Introducing complexity and generalizing this simple two by two one shot game with respect to number of players, private and public information, the mode of communication, agency and organization factors in banking etc. may further add to the coordination problem. For example, suppose the manager of Bank A has a deal with the industry 2 that it will charge less than the monopoly price to the industry in return for a bribe. Similarly, in the case of a deal between the manager of bank B and industry 1. Clearly, the two managers will negotiate to get into the wrong equilibrium in the absence of a proper incentive mechanism within the banks.

The equilibrium selection problem vanishes if instead of a one shot game, we change the timing of moves to make this a sequential move game. Consider the following assumption:

Assumption 3.1: One bank moves at a time. Nature selects which bank will move first.

It is immediately obvious that, irrespective of who moves first, the Pareto efficient equilibrium will be chosen. If the monopoly effect dominates, the second mover will choose the residual industry. In that case the first mover will find it a dominant strategy to select the industry where it has comparative advantage. Obviously, the same equilibrium will materialize when the comparative advantage effect dominates. Note however, that if the agency problem mentioned above is present, the bad equilibrium will be chosen by the managers by virtue of their decision making powers.

To conclude, in our simple setup, the coordination problem can be resolved through the following mechanisms:

- An industry access license fee arrangement imposed on the banks
- Binding commitments
- Sequential moves

The efficiency of these mechanisms are of course, subject to the fact, that information and agency problems in private and public sector are not present or can be suitably neutralized without creating further strategic distortions, and also that, in more complex games, the mode of communication will allow binding commitments and the mechanism for eliciting or revealing information will be effective. It is interesting to note that De Palma and Gary-Bobo (1996) have

reported a similar coordination failure in the context of Cournot competition. Their mechanism is to bring in liquidation costs to generate non-concavities in the bank's objective functions. The non-convexity in the present model is basically technological in nature. Further, the present model is concerned about coordination failure in the pattern of specialization rather than looking at possibility of coordination failure in the context of a model with homogenous bank clients. Therefore the present model and the De Palma and Gary-Bobo model should be seen as complementary ones.

4. Risk Averse Intermediaries

Now suppose that banks are risk averse and maximize expected utilities of profits rather than expected profits. The utility function is represented as one of mean-variance tradeoff function. The assumption of risk averse intermediaries come from the fact that shareholders of banks cannot perfectly diversify away risk since the market for such risk sharing (through multiple ownership of banks by a single shareholder) is essentially incomplete.

The noise that creates risk is assumed to come from demand that has an additive stochastic element for each industry. Further, let us assume that demands in the two industrial sectors are negatively correlated. We assume the following:

$E(\varepsilon_j) = 0, \sigma^2_1 = \sigma^2_2 = \sigma^2$ and $\sigma_{12} < 0$ **(4.1)**

The demand function is:

$P_j = \alpha - \beta Q_j + \varepsilon_j$ **(4.2)**

where $j \in [1, 2]$ and

$$Q_j = q^A_j + q^B_j \qquad \textbf{(4.3)}$$

The objective function of bank A is :

$$\text{Max } U^A = E(\prod{}^A) - (1/2)\,\psi \text{Var}(\prod{}^A) =$$

$$E\,([\{\alpha - \beta\,(q^A_1 + q^B_1) + \varepsilon_1\} - m^A_1]\,q^A_1 + [\{\alpha - \beta\,(1 - q^A_1 + q^B_2) + \varepsilon_2\} - m^A_1]\,(1 - q^A_1))$$

$$- (1/2)\,\psi \text{Var}\,[\{\alpha - \beta\,(q^A_1 + q^B_1) + \varepsilon_1\} - m^A_1]\,q^A_1 + [\{\alpha - \beta\,(1 - q^A_1 + q^B_2) + \varepsilon_2\} - m^A_1]\,(1 - q^A_1))$$

(where it is assumed that $\psi = 2$ to simplify the analysis)

$$= E\,[\{\alpha - \beta\,(q^A_1 + q^B_1) + \varepsilon_1\} - m^A_1]\,q^A_1 + [\{\alpha - \beta\,(1 - q^A_1 + q^B_2) + \varepsilon_2\} - m^A_1]\,(1 - q^A_1)) - E\,[q^A_1\,\{\varepsilon_1 - E(\varepsilon_1)\} + (1 - q^A_1)\,\{\varepsilon_2 - E(\varepsilon_2)\}]^2$$

The First Order Condition is:

$$[\{\alpha - \beta\,(2q^A_1 + q^B_1) + \varepsilon_1\} - m^A_1] - [\{\alpha - \beta\,((-2q^A_1 + 2) + 1 - q^B_1) + \varepsilon_2\}$$

$$- m^A_2] - 2q^A_1 E\,\{\varepsilon_1 - E(\varepsilon_1)\}^2 + (2 - 2q^A_1)\,E\{\varepsilon_2 - E(\varepsilon_2)^2 - 2\,(1 - 2q^A_1)E\,\{\varepsilon_1 - E(\varepsilon_1)\}$$

$$E\{\varepsilon_2 - E(\varepsilon_2)\} = 0 \qquad \textbf{(4.4)}$$

$$\text{or } q^A_1(-4\beta - 4\sigma^2 - 4\sigma_{12}) + (2\beta + 2\sigma^2 + 2\sigma_{12}) - 4\sigma_{12}$$

$$= 2\beta\,q^B_1 + (m^A_1 - m^A_2) - 1$$

In a symmetric equilibrium $q^A_1 = 1 - q^B_1$

$$\text{or } q^A_1(-4\beta - 4\sigma^2 - 4\sigma_{12}) + (2\beta + 2\sigma^2 + 2\sigma_{12}) - 4\sigma_{12}$$

$$= 2\beta\,(1 - q^A_1) + (m^A_1 - m^A_2) - 1$$

$$\text{or } q^A_1(-2\beta - 4\sigma^2 - 4\sigma_{12}) + (\beta + 2\sigma^2 + 2\sigma_{12}) - 4\sigma_{12}$$

$= \beta + (m^{A}_{1} - m^{A}_{2}) - 1$

or $q^{A}_{1} = [\{ \beta + (m^{A}_{1} - m^{A}_{2}) - 1\} / (-2\beta - 4\sigma^{2} - 4\sigma_{12})]$

$+ 4\sigma_{12} / (-2\beta - 4\sigma^{2} - 4\sigma_{12}) - (1/2)$ **(4.5)**

There are three terms on the right hand side and it has to be established how each of them behaves with changes in the stochastic parameters.

First we take the first term and determine the sign of the numerator. Recall from our earlier assumption 4.2.1 that $3\beta - (m^{A}_{2} - m^{A}_{1}) < 0$ which implies that the numerator term: $\beta - (m^{A}_{2} - m^{A}_{1}) - 1 < 3\beta - (m^{A}_{2} - m^{A}_{1}) < 0$. Therefore, the first term will have a lower value if variance increases and a higher value if the covariance increases.

With respect to the second term, the numerator is negative since industry demand functions are negatively correlated. One can see that as variance increases the degree of specialization falls and it increases (falls) with an increase (fall) in covariance of the noise terms between the two sectors

The last term is a constant and therefore invariant with respect to the degree of specialization.

Therefore, with an increase in variance, banks tend towards greater diversification and with an increase in covariance the tendency is towards more specialization (The solution for bank B is symmetric and the conclusions are similar).

What one observes here is basically that due to risk aversion and negative correlation between the two sectors, diversification is preferred to specialization in the Cournot equilibrium even though each bank has a comparative advantage in one industry. The result would be different if there existed market for Credit Derivatives and Securitization so that banks could specialize in accordance with their comparative advantages and also, hedge against the risk of specialization (overexposure in some sectors) at the same time. It is obvious that efficiency gains exist with such instruments and markets. The next section discusses in brief these credit derivative instruments and how they can improve efficiency in the context of strategic competition.

5. Credit Derivatives and Securitization

5.1 Credit Derivatives

Credit Derivatives are financial instruments used to transfer credit risk of loans and other assets. There are various types: the basic categories are options, forwards and swaps. Due to their high flexibility credit derivatives can be structured according to the end-user's needs. For instance, the transfer of credit risk can be done for the whole life of the underlying asset or for a shorter period, and the transfer can be a complete or a partial one. Delivery can take place in the

form of over the counter contracts or embedded in notes. Moreover, the underlying can consist of a single credit sensitive asset or a pool of credit sensitive assets.

The market for credit derivatives arose during the early 1990s and is apparently developing quickly, as measured by both increasing activity and declining spreads. So far, the most commonly transacted forms of credit derivatives have so far been credit default swaps, total return swaps, and credit default linked notes.

The credit default swap is an agreement in which one counterparty (the protection buyer) pays a periodic fee, typically expressed in fixed basis points, on the notional amount, in return for a contingent payment by the other counter party (the protection seller) in the event of default of the underlying. A default is strictly defined in the contract to include, for example, bankruptcy, insolvency, and / or payment default. The contingent payment can be defined as either

- A payment of par by the protection seller in exchange for physical delivery of the defaulted underlying
- A payment of par less the recovery value of the underlying as determined by a dealer poll
- A payment of a binary or a fixed amount.

Credit default swaps can be viewed as an insurance against the default of the underlying or as a put option on the underlying.

The total return swap is an agreement in which one counterparty (total return payer) pays the other counterparty (total return receiver) the total return of the underlying, while the total return payer receives a Libor (London Interbank Rate) related amount in return. In contrast to the credit default swap, it does not only transfer the credit risk but also the market risk of the underlying.

In this context the credit banks can use credit derivatives strategically. Bank A can swap part of its revenue from industry from 1 in exchange for part of the revenue accruing to bank B from industry 2. Since the two industries are negatively correlated, this obviates the need for portfolio diversification by banks and enables them to specialize in their core (comparative advantage) areas. Consider the following discrete choice game between banks which tradeoff risk and return and therefore have a mean-variance objective function as in the last section. This is illustrated in the table below:

Table 3: A Portfolio Game between risk averse Intermediaries

	Strategy B2(1)	Strategy B2(2)
Strategy B1(1)	M + x – V - y	
Strategy B1(2)		M - V

The table depicts the normal form of the game. Strategies of bank 1 are shown along the rows and that of bank 2 are shown along the columns. The cells show

common payoffs. Note that when a pair of strategies is incompatible, such as the off diagonal ones in the cell, then no payoffs are applicable.

Strategy B1(1) is the strategy to bank 1 of completely specializing in industry 1 and swapping half of it's net revenue for half of net revenue of bank 2 from industry 2 where bank 2 has completely specialized. The strategy is inoperative if bank 2 has a different lending pattern or does not agree to the swap. Strategy B2(1) is the strategy to bank 2 of completely specializing in industry 2 and swapping half of it's net revenue for half of net revenue of bank 1 from industry 1 where bank 1 has completely specialized. The strategy is inoperative if bank 1 has a different lending pattern or does not agree to the swap. Strategy B1(2) is the (only) other option of bank 1 of lending equally to the two industries and thus hold a diversified portfolio. Similarly Strategy B2(2) is the (only) other option of bank 2 of lending equally to the two industries and thus hold a diversified portfolio.

Now, when the bank 1 plays B1(2) and bank 2 plays B2(2)), Cournot competition implies mean return (denoted by M) is low compared to monopoly. Let the variance to each bank in the case of bank 1 playing B1(2) and bank 2 playing B2(2) be denoted as V. As opposed to this, when banks play their first strategies, they get a higher return not only due to monopoly effect but also due higher returns from specializing completely in their comparative advantage. Let us assume this difference is x. However, although in both cases banks are

diversified, the variance goes up with mean return. Let us denote this increase in variance as y. Therefore, when the mean effect (x) is greater than the variance effect (y) banks will opt for swapping net cash flows.

The key issue is to find a partner with negatively correlated returns. If it is a over the counter market, banks have to basically search for a partner with negative correlation and if derivatives take place through an exchange then it is easy for the banks to find counterparties for risk sharing.

5.2 Securitization

The term credit securitization refers to the transformation of illiquid, non- market assets into liquid, marketable assets or securities. The development of the credit securitization market started in the United States with the securitization of mortgage loans in the early 1970s and a significant amount of the volume of such derivative securities are still that market. Other markets that use such securities are markets for consumer loans, credit card receivables and to an extent the market for asset backed securities.

In the first stage of the process the originator pools a number of roughly homogenous assets. Them method of pooling in conjunction with the character of the asset pool enables a cost efficient analysis of credit risk and the achievement of a common payment pattern. In the next stage, the originator sells the assets to a Special Purpose Vehicle or SPV that is a trust or a corporation with the sole

function of supervising the asset. The SPV issues securities in the next stage with the help of a Consortium in private placements or a public offering made through an investment bank. The payment of interest and principal on the securities is directly dependent on the cash flows deriving from the underlying pool of assets. A service agent (who frequently is the originator) collects and manages these cash flows and a trustee superintends the distribution of the cash flows to the investors. The pool of assets is usually provided with some credit enhancement, because investors are normally not willing to bear all the credit risk associated with the pool. Common forms of credit enhancement are over-collaterization, third party insurance, and insurance by the originator. Often different forms of enhancement are combined. Additionally the asset backed securities will be rated by a rating agency.

The main benefit from asset securitization is that it enables banks to pass the risk of lending onto other parties, thus freeing capital resources to back new lending which would otherwise be beyond their capacity. The funding and liquidity benefits of the securitization process derive from the conversion of illiquid assets into liquid funds available for additional lending. Because of the credit enhancements, the rating of asset backed securities is often higher than that of the originator who is able to tap funding sources not normally available to him. Asset securitization also helps banks in their assets and liability management. Interest risk can be reduced by passing it onto investors. A bank wishing to extend it’s lending but not having funds of adequate maturity can avoid a maturity mismatch

by securitizing the new loans. Securitization offers a bank heavily exposed to a sector or a region an ability to transfer part of it's loan portfolio and also to purchase with the proceeds other types of asset backed securities thus achieving a more diversified portfolio.

When a bank finds it difficult to find another bank with which it has a negative correlation in sectoral returns, it has to look for outside investors. When there are outside investors who hold assets with negative correlation with that of a bank, securitization and thus risk sharing is possible for that particular bank. Recourse to securitization is particularly useful when the market for credit derivatives is not fully developed and is largely over the counter instead of an active exchange mediated.

6. Conclusion

With risk neutral financial intermediaries playing a Cournot game in the presence of comparative advantages, strategic interaction can create coordination problems inducing banks to specialize in areas where they do not have comparative advantage. Such a situation may warrant a regulatory intervention in the form of entry fees subject to the fact that the regulator is not subject to severe informational problems or corruption possibilities. Further it should be noted that the coordination problem arises due to the nonconvexity in the optimization problem and the one shot nature of the Cournot game. In a sequential game the

problem does not arise. Another potential cause for coordination problem lies in the agency problem in banking.

With risk averse financial intermediaries and shocks to demand, diversification arises when the two sectors are negatively correlated. A better solution is banks specializing in areas where they have comparative advantage but hedging against risk of extreme specialization by issuing credit derivatives or securitizing assets. Hedging against industry specific risks typically warrant financial innovation by banks. As Gale and Hellwig (1994) have shown, financial innovation can have large impacts on bank profits and customer welfare. However the financial innovation game in banking may exhibit multiple equilibria when network externalities are present. This remains a subject for future future.

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