

# Universal Banking and the Equity Risk Premium

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**Abstract:** Did the unification of commercial and investment banking heighten risk in financial markets due to moral hazard of borrowers? In a simple intertemporal model with moral hazard and uninsured risk, we argue that if financial contracts are properly written, the integration in financial markets could give rise to greater risk sharing arrangement and could eliminate the equity risk premium attributed to informational asymmetry among the lenders and the borrowers.

**JEL Classification:** G10, G12.

**Key Words:** Equity Premium, financial Intermediary, moral hazard, Uninsured risks.

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## 1. Introduction

Following the great depression in the US, the Glass-Steagall Act of 1933 imposed a separation between investment banking and commercial banking activities. The former primarily deals with the business of underwriting of securities while the latter engages in the business of taking deposits and making loans. The financial intermediaries, thus, could not participate in both equity and bond markets simultaneously. A series of financial reforms, beginning in the late eighties and culminating in the Gramm-Leach-Bliley Act of 1999 (referred as GLB Act hereafter), had put an end to this separation between commercial banking and investment banking, leading to a greater integration in financial services market. On the other hand, the Basle approach (both I and II) accepts universal banking as a fait accompli. That is, while the Glass-Steagall approach calls for a separation of investment banking and commercial banking, the Basle approach favors integration of both activities.

In light of the current debate about the financial crisis a natural question arises whether this financial integration heightened the risk in the financial markets emanating from moral hazard of borrowers? The answer to this question requires analysis of relative performance of a fully integrated financial system with respect to a stand-alone system where there is strict separation between depositories and underwriting activities where both systems is vulnerable to problems of moral hazard.

In this setting, we address the following questions in this paper: (a) does an integrated financial market exacerbate or mitigate risk emanating from moral hazard between borrowers and the financial institutions? That is, which system (stand-alone or the universal banking) handles the issue of the risk due to moral hazard better? (b) If different, then how is this risk priced in the equity issued by firms in both systems? (c) What is the consequence of financial integration on inter-temporal allocation of real resources such as capital stock and output? <sup>1</sup>

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<sup>1</sup> There are two distinct types of moral hazard in the context of banking system. The first type refers to moral hazard between borrowers and banks where a bank cannot observe efforts chosen by the borrower and the second type, also known as risk shifting, is related to the choice of risky projects and thus the selection of risky borrowers by banks unobserved by depositors. For a comprehensive treatment on this issue, see Freixas and Rochet (1997). In this paper, we exclusively focus on the moral hazard of the first type where financial intermediaries do not observe choice of efforts made by borrowers. We analyze issues of risk sharing and risk premium of equities in this context.

The primary issue under moral hazard is how to provide insurance to risk averse individuals without jeopardizing their incentives to put harder effort level and this trade –off between risk-sharing and efficiency of effort is resolved via optimal financial contracts between borrowers and financial intermediaries. While both stand-alone and integrated banking system strikes optimal contracts to resolve the twin problems of insurance and provision of effort, the latter has more instruments which are more effective in an environment multiple financial markets such as equity and debt. The integrated system can also take into account the feedback effects between these two markets on the borrowers’ portfolio choice between debt, loan (savings) and equity and their consequent impact on allocation between intertemporal consumption, investment and provision of efforts.<sup>2</sup> Hence, overall risk undertaken by risk-averse agents is smaller in magnitude in an integrated system. We show that such a reduction in risk that occurs in a general equilibrium context where agents borrow, save and also issue state-contingent securities, has two-fold impact on pricing of financial assets and allocation of real resources. The first effect is the reduction of premium assigned to equities and the second effect is an increased capital stock resulting in higher level of output.

Hence, we argue that the banking unification per se cannot heighten risk premium in financial markets and will indeed give rise to efficient risk sharing among lenders and borrowers and lead to a reduction in overall risk resulting in a lower equity premium.<sup>3</sup> In addition, such financial integration enhances efficiency by decreasing the wedge between expected marginal productivity of capital and the risk free rate, which results in the rise of both capital and output.

We look at this issue from the perspective of the US equity market. The US equity premium actually showed a pronounced decline during the 90s. The average equity premium

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<sup>2</sup> It is well known that integration between two branches of activities generate diversification effects resulting in the reduction of risk. However, we eschew this route because the diversification effects are well known in the literature. Hence, we place sole importance to problems in the financial markets stemming from the issues of moral hazard in the spheres of both investment and commercial banking.

<sup>3</sup> In the absence of any other factor, such as aggregate risks, equity premium does not exist. However, ability of banks to deal with macroeconomic shock is limited. On the other hand, hordes of theoretical and empirical studies reveal the edge of financial intermediaries in alleviating informational asymmetry by writing contracts. See Freixas and Rochet (1997) for a comprehensive study on the financial contracting and banking. Hence, we introduce a friction due to asymmetry of information under both regimes to examine its impact on prices of equity in a similar way dealt by Kahn (1990) and Kocherlakota (1998). We follow this ‘contractual approach’ to investigate how equity premium is influenced by two factors which are informational asymmetry and the integration of financial services sector.

based on the S&P composite index dropped from 12.52% during 1990-98 to 2.58% during 1999-2004.<sup>4</sup> Blanchard (1993), Jagannathan et al. (2000), Fama and French (2002) also document a similar decline. This decline in the premium roughly overlapped with the era of banking integration. Although several factors contributed to this decline in premium (e.g., decline in transaction costs and tax provisions, Jagannathan et al, Macgrattan and Prescott), such a decline raises question whether the banking integration could contribute to a higher risk in the financial market.

Based on this motivation, this paper is thus a theoretical exploration about the relationship between financial integration, the equity risk premium and capital accumulation. To demonstrate this sharply, we construct a simple two-period model without aggregate risk but only with idiosyncratic project risks and compare equity premium and consequent impact on real allocation on capital under two alternative banking environments. In the first one, which we call “non-integrated financial services market”, a financial intermediary operates only in the domain of commercial banking ( deposits and borrowing) but is prohibited operating in equity markets. The second regime, which we refer to as “integrated financial services market”, financial intermediaries participate in loan, savings and equity markets. In both regimes, we allow the borrower to have private information in regard to his choice of efforts in production. In order to eliminate shirking under both regimes, financial intermediaries strike incentive compatible contracts, which partially insure individual consumption giving rise to an endogenous borrowing constraint.<sup>5</sup> Hence, the volatility of consumption across both states of nature is an outcome of the incentive constraint in both integrated and non-integrated financial services regimes.<sup>6</sup> Yet, a positive equity premium emerges in an environment where banks are not permitted to transact in equity market. This premium disappears in a world of complete integration of financial services market.

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<sup>4</sup> These numbers are computed from Robert Shiller’s online database, [www.econ.yale.edu/~shiller/data.htm](http://www.econ.yale.edu/~shiller/data.htm). We discuss the data sources in detail in section 2.

<sup>5</sup> In contrast with the extant literature dealing with borrowing constraint (Constantinides et al., 2002), our exercise highlights the role of the banking environment in explaining the size of the premium. Our model has a direct bearing on a growing body of literature exploring the link between asset market frictions and the premium. Such frictions tend to arise out of incomplete markets or borrowing constraints. Constantinides and Duffie (1996), and Heaton and Lucas (1996, 1997) looked for explanations for a high premium in terms of incomplete markets where individuals fail to insure their income in the presence of permanent shocks.

<sup>6</sup> In contrast with Constantinides et al. (2002), in our model such an incentive constraint makes the borrowing constraint endogenous.

The paper is organized as follows: In the following section, we lay out the environment. Section 3 compares and contrasts the equity premia in three regimes: (i) regime of non-integrated financial services, (ii) the regime of integrated financial services, (iii) the regime which combines the features of both (i) and (ii). Section 4 concludes.

## 2. The Model

### 2.1 Environment

We consider a simple inter-temporal general equilibrium model in which there is a continuum of identical agents in the unit interval who live only for two periods. At date 1, a stand-in agent is endowed with  $y$  units of consumption goods, and equity, which represents a claim to date 2 output. The value of this equity is  $Q$ , which is basically the period 1 value of period 2 output. This  $Q$  can be divided in shares. Suppose there are  $\bar{x}$  such shares in supply. Out of these  $\bar{x}$  shares, the agent keeps  $x$  and sells  $\bar{x} - x$  at the spot price  $Q$ . The buying and selling of shares takes place in period 1. Since  $\bar{x}$  is a constant, it can be safely normalized to unity. The representative agent's own share ( $x$ ) gives him proceeds in the second period. The production technology together with the resolution of the state of nature outlined below, will determine his pay-offs in period 2.

The agent invests  $k$  units of capital at date 1, which goes through a production process and results in output depending on the interaction between idiosyncratic risks and the agent's choice of effort. Individual's effort is a binary variable, which takes a value equal to 0 for no effort and 1 for positive effort. If the agent exerts effort in period 1, then output will be  $f(k)$  with probability  $p$ , and 0 with the complementary probability. This basically means that a fraction  $p$  of agents in the unit mass would succeed while the remaining  $1-p$  will fail. If they do not exert effort, output will be  $f(k)$  and 0 with probability  $q$  and  $1-q$  respectively where  $p > q$ . The disutility of effort is given by  $\varphi$ . The function  $f(k)$  is increasing in  $k$ . All the risks in technology are idiosyncratic in nature. There is no aggregate risk.

Let us next turn to the process of financial intermediation. There are competitive banks, which provide loans ( $l$ ) to agents in the first period and charge a borrowing rate of interest. The intermediaries also accept a deposit ( $s$ ) from individuals and offer a safe rate ( $r$ )

to depositors. These loans are subject to default risk. If the project succeeds, the agent makes a repayment of ( $R$ ) to the bank and if it fails he walks out paying nothing (due to limited liability). However, if project risks are independent and individuals are distributed in a continuum, intermediaries can generate a safe rate of return ( $r$ ) by invoking the law of large numbers.<sup>7</sup> Hence, the expected profit of an intermediary assuming that agents have exerted effort is:

$$p[R - (1 + r)l] + (1 - p)[0 - (1 + r)l] = pR - (1 + r)l. \quad (1)$$

If there is free entry and exit, then zero expected profit of the intermediaries implies:

$$pR - (1 + r)l = 0. \quad (2)$$

Since these banks are competitive, the individual just faces a menu of contracts  $R$  and  $l$ , which satisfies this zero profit condition. The agent picks the  $R$  and  $l$  from this menu in such a way that it maximizes his expected utility. His budget constraints are thus given by

$$c_1 + s + k + xQ = y + Q + l \quad (3)$$

$$c_2^g = xf(k) - R + (1 + r)s \quad \text{and} \quad c_2^b = (1 + r)s \quad (4)$$

where  $c_2^g$  = consumption in the second period if the project is successful,  $c_2^b$  = consumption in the second period when the project is unsuccessful, and  $s$  = individual's saving.

### 3.2 Preferences

The utility function facing each agent is additively separable in consumption at each date and is of the form:

$$u(c_1) + v(c_2) \quad (5)$$

where  $c_i$  = consumption in period  $i$ ,  $i=1,2$ ,  $u(\cdot)$  and  $v(\cdot)$  are: (a) three times continuously differentiable, (b) concave, and (c) have a convex marginal utility function. Hence, agents are risk-averse.

The expected utility of a representative agent given that he puts effort is:

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<sup>7</sup> The probability of all projects failing is close to zero because  $(1-p)^n$  approaches zero as the number of independent projects,  $n$  approaches infinity. By this, we assume no-bankruptcy for the banks. See Azariadis and Smith (1993) for a similar model of intermediation under adverse selection.

$$U = u(c_1) + pv(c_2^g) + (1-p)v(c_2^b) - \varphi,$$

which, based on the budget constraints outlined in (3) and (4), can be rewritten as:

$$U = u(y + Q + l - s - k - xQ) + pv[xf(k) - R + (1+r)s] + (1-p)v[(1+r)s] - \varphi \quad (6)$$

### 3.3 Information Friction

We now introduce informational frictions due to moral hazard in the spirit of Holmstrom (1979) as well as Kahn (1990) and Kocherlakota (1998). Throughout the paper, we assume that efforts expended by individuals are unobserved by financial firms. The effort is value enhancing in the sense that it increases the probability of successful state from  $q$  to  $p$ , where  $p > q$  but also extra effort is costly for individuals. Hence, financial contracts must incorporate enough incentives to elicit efforts from households. This requires household's net expected utility from expending efforts must exceed from the corresponding pay-off when they shirk for any given terms of contract. In other words, in order to alleviate the moral hazard problems, the relevant incentive constraint must satisfy the following condition:

$$u(y + Q + l - s - k - xQ) + pv[xf(k) - R + (1+r)s] + (1-p)v[(1+r)s] - \varphi \geq$$

$$u(y + Q + l - s - k - xQ) + qv[xf(k) - R + (1+r)s] + (1-q)v[(1+r)s]$$

which could be written more compactly as

$$v(xf(k) - R + (1+r)s) - v((1+r)s) \geq \frac{\varphi}{p - q} \quad (7)$$

The interpretation of (7) is quite intuitive. It suggests that financial contracts must incorporate enough incentives so that the equity holder's utility (hence, consumption) in the successful state must exceed the utility (consumption) in the bad state. Hence, this constraint requires equity holder's consumption will not be perfectly smoothed out. It is well known that full insurance of consumption would destroy individual incentive to exert higher levels of effort and can be easily seen that inequalities in (7) will get violated if consumption is equal in both states of nature. Hence, the intermediaries would issue a loan and charge a

borrowing rate of interest such that consumption is only partially insured.<sup>8</sup> This partial insurance is the source of risk in our model and is endogenous because the degree of risk, measured by the volatility of consumption across two states, is determined by terms of financial contracts. The question is: whether this risk, originating from informational constraint, can generate a premium for the equity holders? We next turn to two different contracting environments below to address the question.

### 3. Moral Hazard and Financial Contracting

#### 3.1. *The Case of a Non-Integrated Financial Services Market*

We consider next a contractual arrangement in which financial intermediaries accept deposits and lend money to firms but their participation in the equity market is prohibited by legislation. This type of environment mirrors a typical financial intermediary's activities in the Glass-Steagall era where commercial banking was separated from investment banking. We focus on a contracting environment where both households and banks move simultaneously. Therefore, banks do not monitor the household's issue of shares ( $x$ ), and the storage or capital stock; hence these are outside the purview of the contract. The competitive banks design an optimal contract with households with respect to their deposits in the bank ( $s$ ), loans they receive ( $l$ ), repayment on loans ( $R$ ). Such an optimal contract maximizes the household's expected utility subject to zero profit condition given by (2) and the incentive compatibility condition (7). The zero profit condition appears due to the assumption that numerous intermediaries compete with each other that drives expected profit to zero.

The households, on the other hand, make decision about the purchase of shares ( $x$ ), and the storage ( $k$ ) in order to maximize their expected utility. Although these two decisions of the household are not under the purview of commercial banking activities, there is interdependence between the financial contracting problems and households' transactions in

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<sup>8</sup> In the presence of full information about entrepreneurial effort, full consumption insurance takes place. All the idiosyncratic project risks will be transferred from the risk averse households to the risk neutral financial intermediaries. The banks pool the risk by redistributing consumption between the lucky and unlucky households in an actuarially fair fashion, meaning  $c_2^g = c_2^b = pf(k)$ . In fact, a social planner can also implement the same risk pooling. It is straightforward to show that absent informational frictions and aggregate risks, the equity premium will be zero in both integrated and non-integrated markets.

equity market. The amount of shares transacted and the storage by households affect the incentive constraint (7), and thus has an impact on the optimal contract problem. On the other hand, terms of contracts, given by  $(s, l, R)$ , affect marginal utility of the household and thus influence his decisions to buy shares. This interdependence between the optimal contracting problems in credit market and the maximization problem of the household in equity market can be resolved by invoking to a Nash equilibrium, in which all these variables are determined simultaneously.

So far, this is a partial equilibrium exercise because contractual variables and acquisition of equity are decided given the lending rate  $(r)$  and price of equity  $(Q)$ . Next, we invoke the market clearing conditions in credit and equity markets for the determination of all these variables  $(s, l, R)$  and  $(r, Q)$  simultaneously resulting in intertemporal allocation of resources in a setting where incentive compatibility conditions, first-order and market clearing conditions determine the magnitude of endogenous risk that emerge in equilibrium. Then, we derive implications of endogenous informational frictions and integrated banking services on the premium of equity. The paragraph below puts these issues in a precise and succinct manner.

### ***Characterization of Equilibrium***

D1. Given  $r, s, Q, l, R$ , the household chooses the share holding  $x$ , and storage  $k$  which maximizes its expected utility (6) subject to the bank's zero profit condition (2).

D2. Given  $r, Q, k$  and  $x$ , competitive banks offer a menu of contracts,  $s, l, R$  which maximize household's expected utility (6) subject to the bank's zero profit condition (2) and incentive compatibility condition (7).

D3. The share and loan markets clear meaning  $x=1$  and  $s=l$ .<sup>9</sup>

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<sup>9</sup> While D.1 and D.2 capture micro economics of optimal contracting between households and financial intermediaries, D.3 illustrates the general equilibrium component of the model. For similar approach towards financial contracting and general equilibrium, under adverse selection (as opposed to moral hazard here) see Azariadis and Smith (1993).

The household now solves two sets of problems: (i) as an equity holder and entrepreneur/investor, and (ii) as a borrower, depositor. This separating role emerges due to a contracting environment that segregates commercial and investment banking. When the household trades in security and invests in physical capital it solves the optimization problem *that is free from any incentive constraint stipulated by the banks*. Thus (D1) in the above characterization of the Nash equilibrium satisfies the following first order condition:

$$x : -u'(c_1)Q + pv'(c_2^g)f(k) = 0 \quad (8)$$

$$k : -u'(c_1) + pv'(c_2^g)xf'(k) = 0 \quad (8a)$$

On the other hand, financial contracts with the intermediary are outcome of the following optimal contract problem:

$$\text{Max}_{\{l,s,k,R\}} U = u(y + Q + l - s - k - xQ) + pv(xf(k) - R + (1+r)s) + (1-p)v((1+r)s) - \varphi$$

Subject to  $pR = (1+r)l$  and (7).

The problem can be rewritten as:

$$\begin{aligned} L_{\max_{\{l,s,k\}}} &= u(y + Q + l - s - k - xQ) + pv(xf(k) + (1+r)(s - \frac{l}{p})) + (1-p)v((1+r)s) - \varphi \\ &+ \mu \{v(xf(k) + (1+r)(s - \frac{l}{p})) - v((1+r)s) - \frac{\varphi}{p-q}\} \end{aligned}$$

First-order conditions:

$$s : -u'(c_1) + (1+r)[\{pv'(c_2^g) + (1-p)v'(c_2^b)\} + \mu\{v'(c_2^g) - v'(c_2^b)\}] = 0 \quad (9)$$

$$l : u'(c_1) - (1+r)v'(c_2^g)[1 + \frac{\mu}{p}] = 0 \quad (10)$$

**Proposition 1:** The households are credit constrained and risks are uninsured so that  $c_2^g > c_2^b$

Proof: It can be shown that incentive constraint binds with equality, which means  $\mu > 0$

(see, also the proposition 2 below to see why  $\mu > 0$  ). Hence, from the constraint itself follows immediately that  $c_2^g > c_2^b$  .

We can verify now from (10) that  $u'(c_1) - (1+r)v'(c_2^g) > 0$  , implying that individuals would be better-off with additional borrowing. //

The incentive compatibility constraint deters full consumption insurance and leading to endogenous variations in consumption across good and bad states of nature. The financial intermediaries create such wedge by rationing the size of the loan. The household would always wish that they could save and borrow more. The incentive compatibility constraint is thus imposing an endogenous borrowing constraint on individuals.

### **Equity Premium**

Denote the proportional equity premium in this non-integrated contract economy as  $EP^{NI}$  , which , by definition, is equal to the ratio of the expected gross return to equity given by  $\frac{pf(k)}{Q}$  and the (gross) risk-free interest rate, which  $(1+r)$  . If the ratio exceeds unity, then the return on equity generates a premium over the safe bonds and if the ratio is equal to unity, then there is no premium. We have the following proposition.

**Proposition 2:** The equity premium in a non-integrated financial services market is

$$EP^{NI} = \frac{1}{(1-p)\frac{v'(c_2^g)}{v'(c_2^b)} + p} > 1$$

Proof: Define the proportional equity premium as:  $EP^{NI} = \frac{pf(k)}{Q(1+r)}$

Using (8) and (10), we get:  $Q = \frac{pf(k)}{[1 + \frac{\mu}{p}](1+r)}$  Using this last expression into the above

definition of equity premium, we get:  $EP^{NI} = 1 + \frac{\mu}{p}$  .

From (9) and (10) and we get,  $\mu = \frac{p(1-p)[v'(c_2^b) - v'(c_2^g)]}{(1-p)v'(c_2^g) + pv'(c_2^b)} > 0$  and plugging it into the

$EP^{NI}$  and then dividing the numerator and denominator by  $v'(c_2^b)$ , yields the proposition because incentive constraint implies that  $c_2^g > c_2^b \Rightarrow v'(c_2^b) > v'(c_2^g) //$

The equity premium is thus determined by the shadow price of the incentive constraint and it is positive. Households while participating in the stock market bear a greater uninsurable consumption risk than when they participate in the bond market. This is because the bond market transactions are under the purview of the optimal contract while the stock market transactions are not. The Lagrange multiplier, which is basically the shadow price of incentive compatibility constraint, drives a wedge between the perceived intertemporal marginal rate of substitution (IMRS) of the consumer/shareholders and consumer/bondholders.<sup>10</sup>

### **Real Effects of a Non-integrated Banking System:**

Since agents choose capital stock on their own, they do not internalize its impact on the incentive constraints. Hence, there is a gap between interest rate and the expected marginal product of capital, implying that capital is costlier than the risk free rate by the shadow price of the incentive constraint. This can be easily checked from (8a), (9) and (10), we have:

$$(1+r)[1 + \frac{\mu}{p}] = pf'(k)$$

### **Corollary:**

The incentive constraint drives a wedge between interest rate and the expected marginal product of capital resulting in an inefficient accumulation in comparison with the universal banking benchmark.

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<sup>10</sup> One may as well interpret this nonintegrated financial services market as a scenario where the market is not complete. In an incomplete market environment typically the stochastic discount factor is not unique (see, Cochrane, 2001, p. 68 for a formal discussion). This might explain why the perceived IMRS of stocks holders differs from that of the bondholders to support the same real allocation.

### 3.2. The Case of an Integrated Financial Services Market

Now, we turn to the case where the household could write financial contracts with an intermediary in all markets. Thus, the financial intermediaries have unrestricted access to all markets, and can stipulate the number of shares to be purchased by the equity holders of the borrowing firm in addition to specifying the size of loan, borrowing rates and investment. The integrated banks, however, encounter the moral hazard of the borrowing firm exactly similar to the case discussed in the previous sub-section.

Hence, the optimal contract problem can be written as:

$$\text{Max}_{\{l,s,k,R,x\}} U = u(y + Q + l - s - k - xQ) + pv(xf(k) - R + (1+r)s) + (1-p)v((1+r)s) - \varphi$$

subject to the zero profit condition:

$$pR = (1+r)l$$

and the incentive compatibility condition :

$$v(xf(k) - R + (1+r)s) - v((1+r)s) \geq \frac{\varphi}{p-q}$$

which can be rewritten after substituting out  $R$  using the zero profit condition:

$$\begin{aligned} L_{\max, \{l,s,k\}} &= u(y + Q + l - s - k - xQ) + pv(xf(k) + (1+r)(s - \frac{l}{p})) + (1-p)v((1+r)s) - \varphi \\ &+ \mu[v(xf(k) + (1+r)(s - \frac{l}{p})) - v((1+r)s) - \frac{\varphi}{p-q}] \end{aligned}$$

First-order conditions are:

$$s : -u'(c_1) + (1+r)[\{pv'(c_2^s) + (1-p)v'(c_2^b)\} + \mu\{v'(c_2^s) - v'(c_2^b)\}] = 0 \quad (11)$$

$$l : u'(c_1) - (1+r)v'(c_2^s)[1 + \frac{\mu}{p}] = 0 \quad (12)$$

$$k : -u'(c_1) + v'(c_2^s)xf'(k)[1 + \frac{\mu}{p}] = 0 \quad (13)$$

$$x : -u'(c_1)Q + pv'(c_2^s)f(k)[1 + \frac{\mu}{p}] = 0 \quad (14)$$

### *Characterization of Equilibrium*

C1. Given  $r$  and  $Q$ , agents choose  $l, s, R, x$  optimally which satisfy the above first order conditions.

C2. Loan and Equity markets clear meaning  $s=l$  and  $x=1$ .

From these first-order conditions, we immediately deduce the following proposition.

**Proposition 3:** The price of equity is:  $Q = \frac{pf(k)}{1+r}$  and the equity premium is zero.

Proof: The proportional equity premium is defined as the ratio of gross expected return on stock to the gross risk free rate, i.e.  $\frac{pf(k)}{Q(1+r)}$ . The proof directly follows from (12), and (14) and also using the equilibrium condition  $x = 1$ . //

The zero equity premium results from the fact that there is no aggregate risk in this model. All the idiosyncratic individual risks are properly contracted. The presence of borrowing constraints and uninsurable risk, *per se*, thus cannot explain the existence of equity premium, as long as all project risks are contracted in advance. A social planner can as well allocate the consumption risk for an economy like this. In fact, the financial intermediary in a fully integrated market for financial services reproduces the outcome of a social planning problem so that the resulting outcome is constrained Pareto efficient. The following proposition makes it evident.

**Proposition 4:** The following social planning problem is isomorphic to the present optimal contract environment.

$$\begin{aligned} \text{Max} \quad & u(c_1) + pv(c_2^g) + (1-p)v(c_2^b) & (P) \\ \text{s.t.} \quad & c_1 + k = y; \\ & pc_2^g + (1-p)c_2^b = pf(k); \text{ and} \end{aligned}$$

$$v(c_2^g) - v(c_2^b) \geq \frac{\varphi}{p-q}.$$

Proof: Substitute the equilibrium conditions  $s=l, x=l$ , into the household's sequential budget constraints (3) and (4) and then multiply the second period budget constraints (4) for good and bad states by  $p$  and  $(1-p)$  respectively, add them up to get the social planner's resource constraints.

In the next step, check that the first order condition of the social planning problem (P) is given by:

$$\frac{1}{u'(c_1)} = \frac{1}{pf'(k)} \left[ \frac{p}{v'(c_2^g)} + \frac{1-p}{v'(c_2^b)} \right] \quad (15)$$

Next combine the first order condition (11),(12) and (13) of the optimal contract problem together with the asset market equilibrium condition  $x=l$ , verify that it reduces to (15). //<sup>11</sup>

### 3.3 A Parametric Example and comparison of the two systems.

In this section, we present a parametric example of the equity premium for financially non-integrated economy to gain further insight into the role of information friction in determining the equity risk. Assume the following parametric specifications of the utility function and the production function:

$$U = \ln c_1 + p \ln c_2^g + (1-p) \ln c_2^b - \varphi \quad \text{and} \quad f(k) = ak.$$

where  $a$  is a positive total factor productivity (TFP) term. Using this specification, we get the following closed form solution for the proportional equity premium  $EP^{NI}$ . The appendix provides an outline of the derivation.

$$EP^{NI} = 1 + (1-p) \left[ \frac{(\lambda-1)}{1+p(\lambda-1)} \right] \quad (16)$$

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<sup>11</sup> It is instructive to note that the first order condition of this social planning problem resembles the Pareto optimal contract condition in Rogerson (1985) although Rogerson's setting is quite different from ours.

$$\text{where } \lambda = \exp\left(\frac{\psi}{p-q}\right). \quad (17)$$

and the capital stock is given by:

$$k^{NI} = \left[ \frac{1 + p(\lambda - 1)}{1 + p(\lambda - 1) + \lambda} \right] y. \quad (18)$$

The lagrange multiplier is directly proportional to the ratio of consumption in good and bad states which keeps the household just indifferent between shirking and not shirking. In the context of the logarithmic utility function, this ratio is  $\lambda$  which is positively related to the disutility of effort  $\psi$ . The higher the disutility of effort  $\psi$ , the greater the value of  $\lambda$ . Thus  $\lambda$  is a measure of informational friction. Note that a higher informational friction raises the uninsurable risk for all the households. Since the household, while participating in the share market, bears even a greater uninsurable consumption risk, the equity premium is monotonically increasing in the informational friction parameter  $\lambda$ . When  $\psi$  is zero,  $\lambda$  equals unity, in which case the equity premium vanishes due to the absence of informational friction.

Hence, a similar calculation for the log utility function shows that  $k^U = \frac{y}{2} > k^{NI}$  and

$EP^I = 1 < EP^{NI}$ . This confirms our results captured in propositions 1 to 3 and the corollary that premium on equity declines under universal system while the capital stock is higher compared to non-integrated banking system, implying that the system enhances efficiency in capital accumulation and also reduces risks.

### 3.4. Case of Aggregate Risk

The stylized models developed in the preceding may provide a misleading counterfactual impression that the equity risk premium is necessarily zero in an environment with universal banking. This is evidently not the case because major European countries have universal banking and do not experience a lower equity risk premium compared to the US. The presence of equity premium under universal banking can be attributed to aggregate risk. To

see this clearly, note that there is no aggregate risk in any of the models that we described so far. If aggregate risk is introduced, there will be an equity risk premium regardless of the banking structure just due to the presence of non-diversifiable risk. In the Appendix B we have formulated the case of a universal banking system with moral hazard where an equity risk premium arises due to the presence of aggregate risk.

#### **4. Conclusion**

The unification of commercial and investment banking in the United States is often attributed to the heightened financial risk in the context of present financial crisis. In this paper, we argue that if financial contracts are efficiently designed, such a unification in fact lowers equity risk premium. In reality, investment banks perform far more complex tasks than what we consider in this paper. They involve underwriting of wide class of securities, including stocks, bonds and options, repurchase of shares and pricing of IPOs etc. Complexities of financial contracts partly depend on the degree of informational asymmetry between banks and the firms. Instead of going into such details, which are specific to individual cases, we discuss the ability of a bank to intervene simultaneously in bond and equity markets. Our analysis suggests that better co-ordinations of transactions of the borrowing firm consequent upon the GLB Act translated into increased financial market efficiency lowering the equity premium. A useful extension of our work would be to incorporate other imperfections such as transactions costs and taxes and identify their respective contributions to the recent decline in the premium.

**Appendix A : Derivation of equation (16)**

Using (9) and (10), we could collapse the first-order conditions to:

$$\frac{(1+r)}{u'(c_1)} = \frac{p}{v'(c_2^g)} + \frac{(1-p)}{v'(c_2^b)}, \quad (\text{A.1})$$

Then by using the logarithmic utility we get:

$$pc_2^g + (1-p)c_2^b = (1+r)c_1 \quad (\text{A.2})$$

Note first that the first order conditions for stock and storage are:

$$x : -Q/c_1 + (p/c_2^g)ak = 0 \quad (\text{A.3})$$

$$k : -(1/c_1) + (p/c_2^g)xa = 0 \quad (\text{A.4})$$

(A.3) and (A.4) with asset market equilibrium ( $x=1$ ) imply that  $Q=k$  implying a unit

Tobin's  $q$ .

This means from (A.3) that,

$$c_2^g = apc_1$$

or

$$c_2^g = ap(y - k) \quad (\text{A.5})$$

Use of the incentive constraint means

$$c_2^g = \lambda c_2^b \quad (\text{A.6})$$

Which upon substitution in (A.5) gives:

$$\lambda c_2^b + apk = apy \quad (\text{A.7})$$

Use (3), (4) and the loan market clearing condition,  $s=l$  to obtain

$$c_2^g = ak + (1+r)\left(1 - \frac{1}{p}\right)s \quad (\text{A.8})$$

$$c_2^b = (1+r)s \quad (\text{A.9})$$

and

$$c_1 = y - k \quad (\text{A.10})$$

Using (A.6) and the loan market equilibrium condition  $s = l$  gives:

$$l = \frac{pak}{(1+r)[1+p(\lambda-1)]} \quad (\text{A.11})$$

Which upon plugging into (A.8) gives:

$$c_2^b = \frac{pak}{1+p(\lambda-1)} \quad (\text{A.12})$$

Which upon substitution in (A.7) gives:

$$k = \frac{1+p(\lambda-1)}{1+\lambda+p(\lambda-1)} y < \frac{y}{2}$$

The equity premium expression stays the same.

The greater the  $\lambda$ , the greater output loss and higher the premium.

## Appendix B: The universal banking in the presence of aggregate risk

In this Appendix, we demonstrate that the equity risk premium will not be zero if we introduce aggregate risk. Consider an environment where the economy can be in good (G) or bad states (B) with probabilities  $\pi$  and  $1 - \pi$ . In the good state the productivity realization is  $\varepsilon^G$  and in the bad state it is  $\varepsilon^B$ . There are individuals in a unit mass interval.  $p$  fraction of these individuals will succeed in the project and  $1-p$  will fail. There are four possible combinations of individual and aggregate states namely, gG, bG, gB, bB.

### *Financial Intermediary's Problem*

Since the technology rules out the possibility of transferring resources from good to bad aggregate state, the financial intermediary equates expected profit to zero for each aggregate state. This gives rise to two state contingent interest rates.

The expected profit is given by:

$$\begin{aligned} & p\pi[R^G - (1 + r^G)l] + \pi(1 - p)[0 - (1 + r^G)l] + p(1 - \pi)(R^B - (1 + r^B)l) + (1 - p)(1 - \pi)[0 - (1 + r^B)l] \\ & = [pR^G - (1 + r^G)l]\pi + [pR^B - (1 + r^B)l](1 - \pi) = 0 \end{aligned}$$

The bank does not know the outcome in the following period and therefore cannot make the loan state contingent. However, it can make the interest rate and the repayment state contingent. Zero expected profit condition then means:

$$pR^G / l = (1 + r^G) \quad (\text{B.1})$$

and

$$pR^B / l = (1 + r^B) \quad (\text{B.2})$$

(B.1) and (b.2) basically mean that the loan,  $l$  will be set to equate the excess returns of projects in good and bad aggregate states.<sup>12</sup>

The optimal control problem can be formally written as:

$$\begin{aligned} & \text{Max.}_{\{l, s, k, R^G, R^B, x\}} \\ U &= u(y + Q + l - s - k - xQ) + p\pi v[x\varepsilon^G f(k) - \{(1+r^G)l/p\} + (1+r^G)s] \\ &+ p(1-\pi)v[x\varepsilon^B f(k) - \{(1+r^B)l/p\} + (1+r^B)s] + (1-p)\pi V((1+r^G)s) + \\ &(1-p)(1-\pi)V((1+r^B)s) - \varphi \end{aligned}$$

s.t. (B.1), (B.2) and the incentive constraint as follows:

$$\pi[v(c_2^{gG}) - v(c_2^{bG})] + (1-\pi)[v(c_2^{gB}) - v(c_2^{bB})] \geq \frac{\psi}{p-q}$$

The optimal control problem also reflects the fact that the household makes decisions about saving, loan and investment at date 1 before the realization of individual and aggregate states.

The first order conditions are:

$$\begin{aligned} s : u'(c_1) &= (1+r^G)\pi\{pV'(c_2^{g,G}) + (1-p)V'(c_2^{b,G})\} + (1+r^B)(1-\pi)\{pV'(c_2^{g,B}) + (1-p)V'(c_2^{b,B})\} \\ &+ \mu[\pi(1+r^G)\{v'(c_2^{gG}) - v'(c_2^{bG})\} + (1-\pi)(1+r^G)\{v'(c_2^{gB}) - v'(c_2^{bB})\}] \end{aligned} \tag{B.3}$$

---

<sup>12</sup>The question arises why we do not set  $l = \frac{pR^G + (1-p)R^B}{\pi R^G + (1-\pi)R^B}$ . This is equivalent to assuming that the financial intermediary can shift resources from G to B which is technologically not feasible. To check this conjecture, plug  $l = \frac{pR^G + (1-p)R^B}{\pi R^G + (1-\pi)R^B}$  and then solve an optimal contract problem where  $R^G$  and  $R^B$  are optimally chosen. You will find that consumption will be equalized across aggregate states which is not feasible.

$$l: u'(c_1) = [(1+r^G)\pi v'(c_2^{g,G}) + (1+r^B)(1-\pi)v'(c_2^{g,B})][1+(\mu/P)] \quad (\text{B.4})$$

$$k: u'(c_1) = [p\pi v'(c_2^{g,G})x\varepsilon^G f'(k) + p(1-\pi)v'(c_2^{g,B})x\varepsilon^B f'(k)][1+(\mu/P)] \quad (\text{B.5})$$

$$x: Qu'(c_1) = [p\pi v'(c_2^{g,G})\varepsilon^G f(k) + p(1-\pi)v'(c_2^{g,B})\varepsilon^B f(k)][1+(\mu/P)] \quad (\text{B.6})$$

From (B.4) and (B.5) it follows that

$$1+r^G = p\varepsilon^G f'(k) \quad \text{and} \quad 1+r^B = p\varepsilon^B f'(k)$$

There are thus two state dependent riskfree rates. Note that  $r^G > r^B$ .

Since there are two risk free rates, we have two state dependent equity premia:

$$G: EP_G = \frac{(\pi\varepsilon^G + (1-\pi)\varepsilon^B)pf(k)}{Q} - (1+r^G) \quad (\text{B.7})$$

$$B: EP_B = \frac{(\pi\varepsilon^G + (1-\pi)\varepsilon^B)f(k)}{Q} - (1+r^B) \quad (\text{B.8})$$

Since  $r^G > r^B$ , it follows immediately that equity premium in the good aggregate state is less than the equity premium in the bad aggregate state because aggregate risk is higher in the bad state.

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