Figure 2: Gross and net utilities of an agent
Figure 3: Optimal Investment when $w^3 > w^{n+1}$
A large set of literature on financial markets conclude that when external borrowing by firms is indispensable, capital-poor firms are denied credits by uninformed investors and they have to rely on informed capital available in the economy. Informed capital owners, in general, better monitoring technology compared to less informed investors. 

Moreover, it is better able to cope with the firm-level that arises because of the inability to contract upon all the actions taken by the entrepreneur in a firm seeking credit. This moral hazard problem is more severe with the poorer firms, and hence they fail to obtain credit from the uninformed investors. Other firms are sometimes able to invest by borrowing from informed capital which is supplied by financial intermediaries but only after being monitored more intensively.

The main goal of this chapter is to analyze a financial economy consisting of firms (run by entrepreneurs) with different levels of start-up capital, and financial intermediaries (or, investors) with different monitoring technologies. In this financial market, several firms and intermediaries interact with each other which calls for a general equilibrium framework. In this model, the payoff of each individual is
determined endogenously, unlike the standard financial market models where the payoffs are determined exogenously. The framework also allows us to establish the identities of the intermediaries who become potential sources of credit to different firms.

We model the financial market as a two-sided one. If a firm convinces an intermediary to finance his project, we say that the firm and the intermediary are to form a pair. A matching is a rule that specifies all such possible pairs in the economy. An outcome of this market is an exogenous matching and a set of financial contracts, one for each firm-intermediary pair under the matching. A financial contract specifies that the intermediary finances the project and receives state-contingent claims on the project return. Each firm operates on his project after he obtains external finance and chooses a non-controllable effort level. Choice of effort influences the probability of having a high return from the project. Firm’s liability is limited to his current income. Once differences in wealth imply differences in liabilities. We use the term as the equilibrium concept. An outcome is stable if there is no intermediary-firm pair that would be (strictly) better-off than under the initial outcomes.

We characterize the equilibrium of the financial market. First, all contracts are not optimal, i.e., given the others being equally well-off as before, no individual can strictly improve upon his/her situation in the outcome by signing a different contract. Second, there is always a subset of the firms (the poorest ones) which fail to obtain credit from any external source. If the firms form the long-side of the market, the size of this (unmatched) set is even larger. Also, capital-rich firms earn higher payoffs. On the other hand, if the intermediaries form the long-side of the market then less informed intermediaries stay out of business earning zero profit. The equilibrium payoff of each individual is endogenous in this model. We are able to establish bounds on the payoff of each firm, and these bounds depend on the other pairs formed in the economy.

Next, in this financial market with both-sided heterogeneity, we show that in a stable outcome the matching is negatively assortative, i.e., capital-poor firms rely on more informed capital, and they are monitored more intensively. In this framework, for an intermediary-firm pair, firms capital and monitoring intensities turn out to be substitutes in producing as well as transferring the surplus between each other. Negatively assortative matching patterns are consequences of this two-sided substitutability.
Our model bears resemblance with the financial intermediation models proposed by Gillström and Tirole [17], and Repullo and Suarez [25]. In both papers the authors consider models of bank monitoring under moral hazard. In these models, the financial economies are characterized by a continuum of firms with different wealth levels, and small number of investors. There are two types of investors: insiders and outsiders. The outside investors are not able to monitor the firms as intensively as the insiders can. In the model of Gillström and Tirole [17], the investors are capital constrained, and they face a moral hazard problem at the level of monitoring. They show that capital-rich firms prefer outsiders to raise finance, whereas capital-poor firms have to rely on bank (insiders) finance to invest in their projects. They also analyze the effects of different types of capital tightening in the economy. Any sort of adverse shocks hits the poor firms more severely by taking them out of business and leads to a contraction in the bank loan which is only granted towards rich firms thus implying, what Bierens et al. [7] call, a flip flop game. A change in the intermediary capital also affects the monitoring levels. Repullo and Suarez [25] consider similar kind of model where the intermediaries are not capital constrained. They draw similar conclusions as the previous paper. Moreover, they find an intermediate range of firm’s wealth where the firms can choose between outside finance and bank credit. Moreover, they also study the effects of interest rate spread on the equilibrium. Besanko and Kunnia [9] also consider a theoretical model of endogenous bank monitoring and show that firms might suffer from excessive monitoring in equilibrium.

In this chapter we consider a discrete set of firms and intermediaries. This allows us to deal with small as well as large number of individuals. In the papers cited above, although a general (competitive) equilibrium framework is considered, intermediary payoff is determined by its reservation value and hence, the intermediaries of each type break-even. Since an endogenous matching market is used in the current model, the payoff each individual earns is determined endogenously. The equilibrium matching pattern, namely negatively assortative matching, conforms to the findings of Gillström and Tirole [17], and Repullo and Suarez [25], if we consider only two types of investors: insider with higher monitoring intensity and outsiders with lower monitoring intensity. We later consider a many-to-one market where the investor can finance more than one project only with the restriction that the project returns are uncorrelated. Another difference between the model of Gillström and Tirole [17]...
and that of course is that they consider both the intermediaries and firms are capital constrained, whereas in the current model only firms lack capital to fund their project. In this sense, we only have demand-side considerations.

Our model is built on the theoretical model proposed by Diu and et al. [12], where the authors characterize the set of stable outcomes of a principal-agent economy with identical principals and heterogeneous agents. From the matching theory point of view, this paper is also related to works by Becker [6], Crawford and Knez [11], Logn and Newman [1], and Sere [2], which, as am and also et al. [12] do, feature a or imperfect transferability of surplus among the agents. This non-transferability is typical in agency models characterized by provision of incentives since optimality is not implied by maximization of total surplus. Becker [6], and Logn and Newman [1], in a more general matching framework, also provide sufficient conditions for positively and negatively assortative matching patterns in equilibrium.

In a recent empirical paper, Ackerberg and Battistin [1], using a data set on agricultural contracts between landlords and tenants in early Renaissance Tuscany, show that, although the characteristics of a land owned by landlord is exogenous, the kind of tenant attracted to it is determined by an ex-ante ex-ante process. They further note:

... rivest s at re bided on re r e bided c sure out ut

... ri v e d e h e y re or s re r e y g y g e h t c s g i d e e

... ri v e d e h e y g e n d s at re r e o a e r e e a e d e d d

... ri e r e c e n t e r e r e r e r e r e r e re r e r e.

The above suggests that strong influence of exogenous matching is not unusual in determining the terms of incentive compatible contracts among individuals.
We consider an economy with a finite set of risk-neutral agents who own a project of (fixed) size 1 apiece. A generic firm is identified by its level of initial wealth (or, start-up capital) \( u \). We arrange the firms according to their wealth levels in descending order as \( 1 > u^1 > u^2 > \ldots > u^m \). Firm's initial wealth is not sufficient to cover the entire project cost, hence each firm seeks external finance. There are risk-neutral intermediaries (or, banks) with different monitoring technologies identified by the monitoring intensities. These intermediaries are the potential investors in the market. A firm has to convince an intermediary to finance his project. Intermediary \( i \) is identified by her monitoring intensity \( \alpha_i \). We arrange the intermediaries with respect to their monitoring intensities in descending order as \( \alpha_1 > \alpha_2 > \ldots > \alpha_n \). Intermediaries with higher monitoring intensity are often referred to as more important. An intermediary with intensity \( \alpha_i \) incurs a fixed cost and commits to monitor a firm she finances. Clearly, intermediary \( i \) owns the best monitoring technology and intermediary \( n \) owns the worst one. We assume that the monitoring technology does not permit an intermediary to control more than one firm. Also each intermediary incurs per unit opportunity cost of fund which is equal to. Intermediaries and firms are matched in pairs. We allow for the possibility that a firm can seek for an alternative financier once the matching is endogenous rather than being exogenous. Whenever matched, an intermediary-firm pair signs a financial contract and the intermediary finances the entire project. Firm's wealth works as a collateral in the project even though, the firm does not invest his wealth in the project.

When an intermediary agrees to finance a project, the firm undertakes an effort \([0, 1]\) which is the cost of effort \( c(y) \) across a firm. Effort \( c(y) \) is a strictly concave function with \( c(0) = 0 \) and \( c(y) \to \infty \) as \( y \to 0 \).
The text in the image appears to be a mathematical expression, but it is not clear due to the quality of the image. It seems to involve variables and functions, possibly related to financial mathematics or a similar field. The notation includes symbols and fractions, which are typical in such contexts. Without clearer visibility, a precise transcription or interpretation is not possible.
Assumption 2. \( \left[ \begin{array}{c} \hat{b} \\ \hat{g} \end{array} \right] \hat{r} \in W \),

A. \( W \in \mathbb{R}^k \)

Definition 6. (Feasibility)
A \( \mathbf{r} \) is \( \alpha \)-feasible for a firm \( u \) if it is a feasible region within \( u \) and \( \hat{r} \) lies in \( W \), i.e., \( \hat{r} \in W \in \mathbb{R}^k \).
Lemma 3. Under $w^\prime \leq 0$ we have 

$r \leq w \leq w^\prime \leq -1 \leq -r \leq w^\prime \leq -1$, 

and 

$Pr. S A \times B$

\[ M \times G \]

$\mu(\cdot)$

$F = \omega \times \omega \times \omega^\prime$

$V \times I$ 

Definition 7. (Matching)

A matching $v \in v$ and $w \in w$ is an $\mu: I \times F \to I \times F$ such that 

$\mu(\cdot)$ 

$F \subseteq I \times F$ 

$\mu(\cdot)$ 

$\mu(w) = \mu(\cdot)$ 

$w = \omega \times \omega \times \omega^\prime$ 

$V \times I \times F$ 

Definition 8. A matching $\mu$ is compatible with a matching $\mu'$ if $v \in v'$ and $w \in w'$ are in $F$ and $V \times I \times F$.

Definition 9. (Outcome)

An outcome $(\mu, \mathcal{C})$ is $v \in v'$ and $w \in w'$ are in $F$ and $V \times I \times F$.

\[ T \]

$W \times I$

$V \times I$ 

equi-invariant
Definition 10. (Stability) 
An outcome \((\mu, C)\) or the \(v\) of is stable if there exist \(m \in \mathbb{N}\) and \(c\) such that \(X^j > (\mu, C) \wedge (x^j, v^{i, 3}) \wedge (x^j, v^{i, 4}) \wedge (x^j, v^{i, 5})\).

Proof.

Lemma. A \(d \in \mathbb{Z}\) such that \(d \in \mathbb{Z}\) and \(d \in \mathbb{N}\) such that \(d \in \mathbb{N}\).
then there exists an element \( (q_0, w^d) \) in \( \mathbb{R} \) such that for any \( q \) in \( (q_0, w^d) \) the function \( r \) is

\[ r(q, w^d) = \mu(\mu(q, w^d), w^d, -\delta) \]

An interesting statement is that a more naive move, a richer function
is a win or a loss if, which is shown in the next lemma.

**Lemma 5.** In the liquidity case \( r \) is a function of \( w^d \) and \( w^d \) in the sense that \( r^i > r^j \) if \( w^d > w^d \). An \( r \) for \( w^d > w^d \) will be a \( -\delta = 0 \).

**Proof.** Spp that \( w^d > w^d \) are not attainable in a state \( \omega \) and \( \omega^d \geq -\delta \).

If \( \omega \in \mathbb{R} \), \( \mu(\mu(w^d), w^d, -\delta) > \mu(\mu(w^d), w^d, -\delta) \)

since there exists \( \phi \) such that \( \phi \) is a function of \( \mu \) and \( \mu(w^d), w^d, -\delta) \)

\[ r^i > \mu \geq r^j \] implies \( r \) is a function \( \mu(w^d), w^d, -\delta) \)

and \( \mu(\mu(w^d), w^d, -\delta) \).

The next part we insert in the act that if a fin is a niche then the six in a state \( \omega \).

A state that if a fin is a niche, then in this a niche \( \omega^d \geq 0 \)

in the win condition we insert the concept of ingenuity \( \gamma \), which

with \( \omega \) in characteristic the set state to es

**Definition 1.1. (Willingness to Pay)**

**Gli en ry uc e \( \mu(\mu, \mu) \) ere for s \( w^d \) and \( w^d \) id \( w^d \) and \( w^d \) is\( \mu \) a state \( \mu(\mu, \mu) \) is if \( \Delta \) of \( \mu(\mu, \mu) \).

This expression means that for every initial wealth, \( w^d \) an \( w^d \), an

path \( \omega_0, w^d = \omega \), the inner is for \( \omega_0 \) is receipted to be with \( w^d \), then the sequence is

the one in which is the \( \omega_0 \) in which is no \( \mu \) in \( \mu \) as in a \( \mu \) as a state \( \omega \) is kept \( w^d \) in case \( \omega_0 = \mu \) with \( w^d \) rather than \( \omega_0 \) for \( w^d \).

Then we try to as pr vi e a particular characteristic in the set state to es et \( \omega_0 = \omega \) in the case or for s which are a state since one in the win the re we characterize the set state to es
Theorem 4. An endomorphism $(\mu, \zeta)$ of the finisci such that $u_i < v_i$ if and only if $u_i < v_i$ for the finisci $u_i$ and $v_i$.

(a) Even $\gamma = \min\{m, r\}$ pairs re $f$ if $u_i < v_i$. If and only if for a $\mu$-inner $\gamma$-pair re different, it can exist or if $e$ such that $\{u^{(\mu, \zeta)}_i, r^{(\mu, \zeta)}_i, \ldots, u^{(\mu, \zeta)}_r\}$ $f$ for $\mu$, then $\gamma$-pairs re different $\gamma$-pairs re different.

(b) $T$ a $\gamma$-inner $\gamma$-pair $\gamma$-pairs $v_i$, $w_i$, if $u_i < v_i$ then $u_i < v_i$.

(c) If $w_i > u^d_i$, then $\Delta u^{(\mu, \zeta)}_i(\lambda, \delta) \geq w_i - u^d_i \geq \Delta u^{(\mu, \zeta)}_i(\lambda, \delta) f^{(\mu, \zeta)}_i w^d_i, u^d_i$.

Proof. We first prove that (a) and (c) are necessary. We first prove that $(\mu, \zeta)$ is an endomorphism.

(a) It is easy to see that $\gamma$-pairs are $u_i$ and $v_i$, since the condition $u_i < v_i$ is met. So, the condition $\gamma$-pairs are $u_i$ and $v_i$. Then there exist $e$ such that $e$ is an inner $e$ having an $\gamma$-pair re $\gamma$-pairs re $u_i$. Then there exists a $\gamma$-inner $\gamma$-pair $\gamma$-pairs $v_i$, $w_i$ and $e$.

(b) Theorem 4.

(c) If $w_i > u^d_i$, then $\Delta u^{(\mu, \zeta)}_i(\lambda, \delta) \geq w_i - u^d_i \geq \Delta u^{(\mu, \zeta)}_i(\lambda, \delta) f^{(\mu, \zeta)}_i w^d_i, u^d_i$.

End of proof.
(b) If \( x \) and \( y \) are \( n \times n \) matrices, then the pair \( (\mu, \nu) \) is in the interior of the set defined by

\[
\Delta_{\mu, \nu}(x, y) > 0,
\]

where \( \Delta_{\mu, \nu}(x, y) = \mu(x, y) - \nu(x, y) \), and the inequality is strict if and only if \( \mu(x, y) \neq \nu(x, y) \).

(c) We show that if \( x \) and \( y \) are \( n \times n \) matrices, then there exists a unique pair \( (\mu, \nu) \) in the interior of the set defined by

\[
\Delta_{\mu, \nu}(x, y) > 0,
\]

where \( \Delta_{\mu, \nu}(x, y) = \mu(x, y) - \nu(x, y) \), and the inequality is strict if and only if \( \mu(x, y) \neq \nu(x, y) \).

This is because \( \mu(x, y) \) has an eigenvector \( v \) and an eigenvalue \( \lambda \) such that \( \lambda \) is the smallest eigenvalue of \( \Delta_{\mu, \nu}(x, y) \).

For the other part, write (iii) as

\[
\Delta_{\mu, \nu}(x, y) = \Delta_{\mu, \nu}(x, y) - \Delta_{\mu, \nu}(x, y) + \Delta_{\mu, \nu}(x, y)\]

This expression is valid since there exists a unique pair \( (\mu, \nu) \) in the interior of the set defined by

\[
\Delta_{\mu, \nu}(x, y) > 0,
\]

where \( \Delta_{\mu, \nu}(x, y) = \mu(x, y) - \nu(x, y) \), and the inequality is strict if and only if \( \mu(x, y) \neq \nu(x, y) \).

The fact that \( \mu(x, y) \) is in the interior of the set defined by (iv) holds if and only if \( x \) and \( y \) are in the interior of the set defined by (iv).
exist any e which is in the set of stable outcomes. Let e be an element of this set, and let e be a vector in R. We can write e as a sum of two vectors, e = e + e. In the rest of this section, we characterize the set of stable outcomes in the financial system. First, we note that a financial contract must be in the set of stable outcomes. This is because, for any contract in this set, there exists an element of the set that is not stable. Thus, if e is in the set of stable outcomes, then e must be a stable element. This property is known as the no-arbitrage condition. In an asset market, the no-arbitrage condition implies that there are no opportunities for risk-free profit.

We now turn to the case where b is a vector in the set of stable outcomes. In this case, we can write b as a sum of two vectors, b = b + b. However, if b is not in the set of stable outcomes, then there exists an element of the set that is not stable. This property is known as the no-arbitrage condition. In an asset market, the no-arbitrage condition implies that there are no opportunities for risk-free profit.
non-empty.

Proof. We fix a technique per the above that we the the re, we
correct the notion a e escr e in Sect 3.2.3: the notion a e n a
in Alman e Cate 3, in Cah r in Ka r 11. Then in in re, we prove the existence a e e in b the ait e aari e a ease he here

in the current e e, we escr e a met e ait e a c with in ivi a s on a c in tr a in ivi e is c e to m 3 e is a er e a e S n a Sh
ik [8] n ait e a c, e e a in ivi e, is a e is a c e e is a e e e a c e e e e a c e e e e a c e a c e, e e is e 7 c e e e e e e e c e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e e
\[ \Delta \mu (x, y) \leq \Delta \mu (z, y) \quad \text{if} \quad u_i > u_0 \quad \text{and} \quad w^1 > w^0. \] 

(\text{DW})

Theorem 6. Let \( a \) be a vector in \( \mathbb{R}^n \) such that \( \mu(a) > 0 \). Then \( \mu(a + x) > 0 \) for all \( x \) in \( \mathbb{R}^n \) such that \( \mu(x) > 0 \).

\[ \Delta \mu(a + x) > 0 \quad \text{for} \quad \mu(x) > 0. \]
3.4 An Interm di r in nc s Morirms

\[ P \subseteq \mu \subseteq \mu (x) \subseteq \mathcal{F} \subseteq \mathcal{F} \subseteq \mathcal{N} \]

Definition 13. (Many-to-one Matching)
A (many-to-one) matching for the market is a mapping \( \mu : \mathcal{I} \cup \mathcal{F} \to \mathcal{I} \cup 2^\mathcal{F} \) such that
(i) \( \mu(\cdot) \subseteq 2^\mathcal{F} \) for all \( \mathcal{I} \),
(ii) \( \mu(u) = \emptyset \) for all \( u \in \mathcal{I} \),
(iii) \( \mu(u) \subseteq \mathcal{F} \) for all \( u \in \mathcal{I} \),
(iv) \( \mu(u) = \emptyset \) if \( u \) is not in \( \mathcal{F} \).

\[ x \in \mathcal{X} \subseteq \mathcal{U} \]

\[ \mathcal{I} = \mathcal{I}_1 \cup \cdots \cup \mathcal{I}_n \]

\[ u_0 = \cdots = u_n > u_n = \cdots = u_n > \cdots = u_n \]

Proposition 2. Let \( (\mu, C) \) be a matching for the market \( \mathcal{I} \).

(a) \( E \subseteq \mathcal{I} \subseteq \mathcal{N} \)
(b) \( \delta = (\cdot)^+ \)
(c) \( \Delta_{\mu(u)}(\cdot) \)

\[ \Lambda \subseteq \mathcal{T} \]

\[ \mathcal{T} = \mathcal{T}_1 \cup \cdots \cup \mathcal{T}_n \]

\[ n \]

k
away any e mem rt n the pr jects Hu the pr jects ame re ne then the cunucts s rin (P) w m t a w m p m p m m E xten in r c t the case c mem te pr jects w then ca r a r es p histic e cunuct es m which is e n the ap pe the cun e c

A spec ia case the e in this sect is c ami cr n tw inter c aries with g m, s m q b s ah that q b s > q b s. Then a e cese sit. i it is that the p r q b s w i cunuct s w the richer q b s = m q b s wi n w a t cunuct their pr ject. This a s ca s m Rep an S thes [25]. The inter c a the q b s is then ca e infor ed c a the m s, the unif r e c a put n this c we m a w r the possi it that e than c inter e a can cunect in on e d m n Tin e [17] pr v e tw cunuct as e rit rin. Firs, a win r the a ve p s h, e rit rin cers as cernit in n a dir as m th at cunucts a m re cunect in th dir. Sec m, when m ne cunect r cunucts a pr ject, e rit rin is cunecte as inter e am that he p s a, which are cne c e m a m re c unect m; cunect in their pr jects r in m re cunect. The cun e c a ne the see a strain, am be ne, the h is the paper we e cr c the cunect a m inter e a c

5 C l s s

In this paper we e a financia e a n a tw si e ndin a e a c a c h rterie the act e e e We a m th at wh en fr a e it mie e xtem a n c cunuct their pr jects, in eq ii ri, the cunect p r fr s have c ne m in r e cunect in the ares, am the s fr r e censive e rit rin. This ca r at th fin in s m n Tin e [17], an Rep an S thes [25]. Uline these tw w d, ra a e w th citre m e in ivi a on we m a w ra e scati a n the pr jects in a B t the sc and in a e e cunect e a u in ivi a We as pr p ever a p c m e w d th a e a e a ve em (e p sitive) eq ii ri e a financia ares c hae c hae incentive pr e a. The p s r richer fr arep n h h e eq ii ri is w r a m th that, there is ina the re s l a e sit an eq ii ri ndin p aers.
The current issue raises several issues in the research. We consider an extension of the concept of the restriction on the investment in the project so as to allow for a more realistic assessment of the externalities and the effects of different kinds of investment. In this context, as H. T. Morris and E. C. [17] interpret it, we may invest in the project as if in this case, the firm is interested in external capital but the firm or investor is interested in the firm's success. The investment in the project not only maximizes the firm's interests but also maximizes the long-term benefits for the firm and society. This is an important issue, and it is critical for the long-term success of the project.
Chapter 4

Does Market Concentration Preclude Risk-Taking in Banking?

[This chapter is jointly written with Santiago Suarez Puga]

4.1 Introduction

When banks are able to raise deposit to invest in assets with uncertain returns, excessive deposit is in use banks to take on risk. It is a risk, and this is true for high risk activities is viewed as one of the principal causes of several instances of banking crises that the world economy has witnessed in the last two decades.

The aim of this chapter is to analyze the role of market concentration and equity capital of banks in creating the risk-taking behavior of banks in the absence of deposit insurance. The banking sector examined here consists of a finite number of banks. Banks are constrained with respect to their equity capital. The more equity, the lower the costs of raising equity capital. Banks choose between a prudent asset mix and a continuing asset mix to invest their total funds (equity plus deposit). The prudent asset mix earns a lower return than the deposit asset mix, but if the prudent asset mix is successful it lowers its return. There is a continuum of equity plans. The equity plans have one unit of one unit sum per piece, which the a place in a bank to earn deposit rate offered. The equity plans are not insured in case the a risk taker.

We analyze the bank competition in the context of a circular city of sh the Salop [27]. Both the banks on the equators are located uniformly on a unit circle. The...
depositors incur a per unit transport cost to travel to a bank. Two types of adverse equilibria will arise. A prevalent equilibrium, where all banks invest in the pro cut asset, and a prevailing equilibrium, where all banks invest in the a blim asset. We use the unit transport cost relative to the number of banks as a measure of adverse concentration.

We can illustrate characterize the equilibrium of the bankin asset. We show that when concentration is low, banks on receive a reserve in or er to capture remit adverse share to obtain hi her epos it rate. In this case, all the epositors participate, an a competitive asset is said to arise. Here, for very low concentration, all banks invest in the Ca blim asset (i.e., a Ca positive Ca blim Equilibrium exists). As concentration increases, all banks invest in the pro cut asset can also be supported in equilibrium (i.e., a Ca positive Pro cut Equilibrium co-exists).

For hih levels of adverse concentration, banks never invest in the a blim asset. This is because, in a concentration asset, banks earn hi her rent which in excess the choose pro cut asset in or er to preserve that. Hence, for a critical hih concentration, no petition with banks invest in the pro cut asset is the one equilibrium. For even hi her levels of concentration, a local monopoly asset e or es where epos it rate is so low that no e epositors fin it unprofitable to place their fun s in banks an prefer to stay out of the epos it asset.

To an arise, we show that hi her adverse concentration in effe cts enhan ca. An adverse concentration increases, the resultin lower on petition in uses banks to invest only in the pro cut asset.

The equilibrium outcomes of the asset also have si nificant implications for social welfare. For a very low level of equity capital, hi her concentration prevents banks to choose the a blim asset. Banks invest in the pro cut asset and offer hi her epos it rates. As a result, social welfare increases. Only when a local monopoly asset arises, adverse concentration has a negative effect on social welfare. All this an es a non- econometric relation between adverse concentration an welfare that calls for a careful exaniation of co-petition policies. Also, when bank's equity capital increases a Ca positive Ca blim Equilibrium an a Monopol Pro cut Equilibrium become less likely.

Our a of ees bies to the literature in bank re solution. Pro cut re solutions of banks are viewed as instruments to prohibit banks from invest in risk projects.
In this end, several exahalis are use in the central bankin authorities. Two popular instrum ents are ini a capital require en ts an eposit rate ceilin s. Hell an Murr ock an SI 4 [16] show, using a max ic o el of pru ent rate re- 
viation, that de his e es eposit rates are inconsistent with Pareto efficiency, am that an opti all re relation public co houses ini a capital require en ts an eposit rate ceilin . Repuillo [24] uses a max ic o el of bankin base an special co persistent el el fa 
le to show that for a ver low levels of arrent concentration all banks invest in the a baim asset if there is no re relation. Chiuo nei, Perea- 
Castillo an Verb le [10] an at the re relation of eposit rates in a circular cit o el of bankin re perion in both the eposit an baim arlets.

The current setup is closest to that of Repuillo [24] an Keel [18]. The latter shows, using a static o el, that increase in perion a les to be her risk-takin in bankin. We also use a static o el an in an am an sort of eposit insurance. Sman ar portfolio choose those assets that positive risk pre in (the difference between the eposie return fr the risk asset an the return fr the safe asset) is necessar to in use (risk revere) in 4i el us to invest positive a. ount in a risk asset. In the current o el with an naive risk pre in, in a baim equilibirum, he aris since a successful a baim ic is one than a pru ent asset. Hence, in or to ensure a pru ent equilibirum, one ne a am anational restriction that, given eposit rates an total volume of eposit, the profit fr in vestin in the pru ent asset net exceed a that fr the a baim asset (the No Gambling Condition). In our o el, banks invest all their equi capital. This can be shown he as if there is free capital was an prac to re relation arther. But, as Hell an Murr ock an SI 4 [16] show, capital require en ts are not supo to achieve Pareto efficiency unless co houses with eposit rate ceilin. In our o el, unlike their work, total volume of eposit with a bank e as whether bank is aim to choose a a baim asset or a pru ent asset. Hence, the unimuse eposito play a major role in ever baim banks’ risk-takin behaviou.

The aim of this chapter shows that increase arrent concentration ensures that all banks invest in the pru ent asset. Much of the elution on bank er ers pose the view that er ers are able to enhance efficiency in face of bank risk. In the current o el we also assert that if we live agora capital power is allowin the bank er ers that will ensure that banks are less likely to choose the a baim assets to in vest in.