Endogenous Formation of Financial Dualism

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Abstract

Starting with a given initial distribution of wealth holders (who are potential wealth holders) we show the emergence of the formal sector consisting of joint stock banks and informal sector consisting of indigenous bankers. In other words we highlight the endogenous creation of financial dualism. This captures the experience of the developed countries in Europe, especially U.K. and Germany, during their early days of development and also the experience of the developing countries like India. As these country experiences suggest the history of modern banking can be traced to the formation of the joint stock banks, which stand in contrast to the native bankers. Typically the joint stock banks are initially formed by the local rich and attract deposits. The depositors belonging to the middle wealth segment. The native bankers on the other hand hardly ever in a position to receive deposits. The earlier chapters refer to the kind of financial dualism, which are more the outcome of government policies and regulation rather than a natural outcome of existing environment. We may broadly relate it to the "new financial dualism" as coined by Myint. In contrast, in this chapter we consider the endogenous creation of financial dualism in the absence of government intervention.

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1. Introduction

Myint (1973) talks of two distinct phases in financial dualism. 'The first, which represents the earlier phase in the development of domestic financial institutions, can be most clearly seen in the colonial economic setting with the modern sector oriented towards export production. The second is a more recent outcome of the policies to expand the modern manufacturing sector oriented towards the domestic market which most underdeveloped countries have adopted as a reaction against the older colonial economic pattern."

In the older economic setting, the big foreign trading enterprises, mines and plantations, could raise their long-term capital at low rates of interest from world capital markets. This was especially true of the enterprises in the colonies that could borrow at lower interest rates compared to their counterparts in the independent underdeveloped countries. Apart from their imperial connection, the stability of the colonial type currency meant that these countries did not experience the kind of inflationary developments experienced by Japan and Latin American countries. On the other hand, western commercial banks usually restricted short-term lending to big foreign owned enterprises in the export sector. The banks frequently adopted rigid and conservative rule of credit worthiness, which few of the indigenous businessmen could satisfy (Bauer, 1963).

Nowadays, in most LDCs, the old financial dualism has been overlaid and aggravated by the new financial dualism. The peasants, small traders and craftsmen in the traditional sector have always suffered from a shortage of capital and high rates of interest because of the much higher risks and costs of lending money on a retail basis these classes of small borrowers. But now this handicap has been aggravated by government policies to promote domestic industrialisation. Many underdeveloped countries have pursued a 'cheap money' policy and the central banks of the capital scarce countries, such as India and Pakistan, have consistently maintained an artificially low level of interest rates – lower than the prevailing interest rates in the capital-abundant developed countries during much of the post-war period. The artificially low rates of interest, which are frequently below the rate of inflation, have the effect of discouraging savings and creating an excess demand for loans. The channelling of bulk of domestic savings at low rates of interest to the modern industrial sector means a reduction in the supply of capital and higher rates of interest for peasant agriculture and other small economic units in the traditional sector.

The western commercial banks have offered little competition to the moneylenders because these banks are, so to speak, wholesalers dealing in large amount of loans, whereas the peasants required an efficient retail distribution of credit. On the other hand, it is widely believed that the moneylender, the village shopkeepers and the landlords occupying strategic positions in the local economy, can make use of their monopolistic powers over the peasants by charging excessively high rates of interest.

In this chapter we consider an economy consisting of wealth holders and entrepreneurs. The wealth holders are differentiated according to their endowment of investment good or loanable funds. The entrepreneurs do not have any endowments of their own but only have access to a project. The projects yield a random return. Project returns are identical across entrepreneurs. We assume that the projects are of variable size and exhibit constant returns to scale. Moreover we assume that there exists indivisibility in investment, the smallest unit of additional investment being one.

We assume that typically, each wealth holder has inside information about one project, acquired over years, through long acquaintance with the entrepreneur. We call this project the wealth holder's home project. For the remaining projects for which the wealth holder is an outsider, the cost of personal monitoring is infinity. To quote Deane (1979)

"Bankers often originated in industry or trade, or for example in the legal profession…Often too, tax collectors became bankers. …One of the consequences of this heterogeneous banking system was that when the pioneers of the industrial revolution went in search of capital, they could hope to find local bankers who had access to enough personal knowledge about the borrower on the one hand, and enough practical knowledge of the trade or industry concerned on the other, to be able to take risks which a less personally involved banker would find incalculable and therefore out of range."

Assume that the wealth holders are risk averse. Now the wealth holders are faced with four investment alternatives: (i) invest only in home project (ii) unilateral diversification (iii) multilateral diversification through formation of collusion (iv) keeping deposits with another collusion. We now explain these alternatives investment strategies stated above.

Firstly, a wealth holder could lend his funds only for his home project. He then earns a gross interest determined by a Nash bargaining solution between the wealth holder and the entrepreneur. The bargaining power arises through the personal relationship between the entrepreneur and the wealth holder and the fact that the outside opportunities for both the parties are either limited or costly.

Alternatively the wealth holder could diversify his investments, across other projects as well. In that case the wealth holder under consideration will have to rely on other wealth holders for information about their home projects for which he is an outsider. This however leaves the possibility of strategic default by other wealth holders. We assume that there is the possibility of leakage of information. This means that there is always the possibility that the defaulting party is exposed.

However the information would make a difference to wealth holder i, only if there is a court of law or some form of punishment or credible threat. In the absence of any form of punishment, i is not made any better off even if he finds out that j has lied as he is not able to recover his loan in either case. So this is the standard enforcement problem which is not particularly dependent on asymmetric information. We assume that there is a court of law but that it is not very efficient in terms of effort, time and expenses involved for the plaintiff. Specifically the cost borne is too high for any individual wealth holder to move the court. Under the circumstances risk diversification by one wealth holder, say wealth holder i, is bound to lead to strategic default by the other wealth holders, and yield a payoff of zero to wealth holder i. Hence it would never be profitable for a wealth holder to diversify risk unilaterally.

The third possible investment strategy for the wealth holders is risk diversification through formation of collusion. Since a collusion involves multilateral investments it leaves each wealth holder with the scope to impose some punishment on the defaulting wealth holders who get caught.

Once again, a court of law exists. However the court is not very attractive to the plaintiff because it is extremely costly in real and nominal terms. So they are always better off settling things outside the court. Talking in terms of the actual punishment imposed the defaulting party should be indifferent between the court and outside the court options. But they have to bear the social cost as well, if they go to the court because of the social stigma associated with it or its role in making information catch public attention. So the court is a worse option for both parties.

Here the court of law plays an important role not as an efficient instrument of justice, for the imposition of punishment and ensuring recovery of loans[1]. Its importance lies in making information public[2]. The defaulting wealth holder will comply with the punishment imposed by the collusion, once information leaks and he is exposed or is caught lying, because other wise he faces a greater threat, like social ex-communication.

The possibility of loss of good will or social standing is a large cost for the wealth holders. This is especially true for a traditional society, which has just embarked on the path of modernisation, where social anonymity is still not significant. One might consider for example the kind of society that characterised pre-independent India, in the twentieth century. Here the wealth holding class consists of men of important social standing either by birth or by profession as highly successful professionals like lawyers and doctors.

The mere existence of a punishment strategy does not necessarily imply that it will take away the incentive to default of each wealth holder belonging to the collusion. In other words because collusion leaves scope for punishment for default it does not necessarily mean that the collusion will be sustainable. Thus a collusion would enable the wealth holders to take advantage of risk diversification by exchanging inside information about their respective home projects provided truth telling by all wealth holders can be implemented as a Nash equilibrium.

This brings us to the fourth investment alternative. As long as formation of a sustainable collusion is possible, the other wealth holders have the option of keeping deposits with the collusion in exchange for a certain return. This is different from earning a return as a member of the collusion. It is to be noted that when wealth holders form a sustainable collusion each wealth holder essentially becomes a shareholder of the collusion (which constitutes a financial firm). Each wealth holder holds a share contract since his return varies with the number of projects that are successful. Here by projects we refer only to those projects that come within the realm of the collusion.

Here again there is the possibility that the "collusion" might default on payment of interest to depositors. Now there are two possibilities with regard to the nature of default: involuntary default and secondly strategic default. As far as the first possibility is concerned the crucial question is about the depositors' confidence in the banks ability to pay. This depends among other things on the bank's capacity to diversify risk. Thus it is only the large collusions, which are likely to receive deposits and hence can constitute a "bank".

Prevention of strategic default (from occurring with certainty) would require a court of law. It is to be noted that the existence of a court of law or depositor insurance is neither necessary nor sufficient condition for sustaining depositor confidence or avoiding bank runs. One can cite instances of bank runs even in the presence of a court of law or depositor insurance. Again

[1] The successful Union Bank experiment by Dwarkanath Tagore et. al. clearly showed the legislative disadvantages with which banking as an enterprise itself had to function. Till as late as 1860 the scope of limited liability enterprise was not available to Indian companies, there was no company law till mid-nineteenth century and the government was reluctant to give charters of incorporation to indigenous banking firms.

[2] For a traditional society, where social anonymity is still not significant, the social cost of non-compliance, even if the dispute is settled outside the court would be significant.

deposit keeping came into vogue before depositor insurance or laws relating to depositors' rights (Kaushal, 1979).

Here we assume that there is a court of law. Further unlike in case of an individual approaching the court, the court is more effective (in terms of cost, effort and time involved) in imparting justice, when the party concerned consists of a whole body of depositors. This model of the market is described in Section 2.

In the context of such an economy, which replicates the kind of economy, that characterises a traditional society, we show how financial dualism might emerge. We show the conditions that would be conducive to the formation of the native system of banking on the one hand, constituting the informal credit market, and the formation of the larger joint stock banks on the other. These joint stock banks unlike the indigenous bankers are also deposit taking institutions, and the forerunners of the modern commercial banks constituting the formal credit market.

Our analysis of the collusion formation problem, in section 3, shows that only people of similar stature will collude. Further two extreme sizes "large" collusions and "small" collusions will arise, where large and small refer to the number of wealth holders forming the collusion. If a collusion is quite large then other people, that is smaller wealth holders from the middle wealth class will find it profitable to invest their money with the colluding group and get a certain return. The collusion may also profit from this. So this is mutually beneficial. Thus, we have deposit taking joint stock banks owned by large number of large shareholders (and small shareholders). However "large" collusions can be formed only by the very wealthy. Thus joint stock banks will be born if enough such very rich people can collude. One segment of the wealth holders, specifically the wealth holders belonging to the lowest strata will however still find it profitable to form small collusions giving birth to local cartels, of the type found in the informal sector. This segment of wealth holders will continue financing local projects (as local moneylenders and indigenous partnership banks) rather than keeping their wealth as deposits with the "large" collusion or bank.

On the other hand, in the absence of sufficient number of wealthy individuals, only small collusions will be formed. We may think of these as the native or indigenous bankers consisting of sole-proprietorship and partnership banking firms formed by the local rich who carry on banking as a side line business, in a traditional society.

2. Model and Assumptions

We consider an economy consisting of wealth holders and entrepreneurs. The wealth holders are distributed over the interval $[0,\overline{W}]$ according to their endowment of investment good or loanable funds W. Let $f(W)$ and $F(W)$ denote the density and distribution functions of loanable funds respectively. The entrepreneurs do not have any endowments of their own but only have access to a project. The projects yield a random return of q with probability p and 0 with probability $(1-p)$ per unit of loanable funds invested in a project. Thus project returns are identical across entrepreneurs. We assume that the projects are of variable size and exhibit constant returns to scale. Moreover we assume that there exists indivisibility in investment, the smallest unit of additional investment being one. The size of a project can therefore take only integer values greater than or equal to one.

The entrepreneurs must borrow the investment good from the wealth holders in order to undertake their projects. Each entrepreneur has a new identical project each year and contracts are written for one period only. We assume that typically, each wealth holder has inside information about one project, acquired over years, through long acquaintance with the entrepreneur. We call this project the wealth holder's home project. Letting s denote the size of a project, this effectively means that the insider can observe whether qs or zero output has been realised. For the remaining projects for which the wealth holder is an outsider, the cost of personal monitoring is infinity.

We assume that wealth holders are risk averse. Now the wealth holders are faced with four investment alternatives: (i) invest only in home project (ii) unilateral diversification (iii) multilateral diversification through formation of collusion (iv) keeping deposits with another collusion. We now explain these alternatives investment strategies stated above.

Firstly, an wealth holder could lend his funds only for his home project. He then earns a gross interest of r per unit of loanable funds if the project is successful and zero otherwise. Here $r = \alpha\, q$ where $\alpha \in (0,1)$ corresponds to the Nash bargaining solution between the wealth holder and the entrepreneur. The bargaining power arises through the personal relationship between the entrepreneur and the wealth holder and the fact that the outside opportunities for both the parties are either limited or costly.

Alternatively the wealth holder could diversify his investments, across other projects as well. In that case the wealth holder under consideration will have to rely on other wealth holders for information about their home projects for which he is an outsider. This however leaves the possibility of strategic default by other wealth holders. In this model strategic default is defined as follows. Suppose wealth holder i invests in wealth holder j's home project. Then if j lies, he gets away with the lie with probability θ. He gets caught with probability $(1-\theta)$. That is, we assume that there exists some leakage of information, which occurs with probability $(1-\theta)$.

However the information would make a difference to wealth holder i, only if there is a court of law or some form of punishment or credible threat. In the absence of any form of punishment, i is not made any better off even if he finds out that j has lied as he is not able to recover his loan in either case. We assume that there is a court of law but that it is not very efficient in terms of effort, time and expenses involved for the plaintiff. Specifically the cost borne is too high for any individual wealth holder to move the court. Under the circumstances risk diversification by one wealth holder, say wealth holder i, is bound to lead to strategic default by the other wealth holders, and yield a payoff of zero to wealth holder i. Hence it would never be profitable for a wealth holder to diversify risk unilaterally.

The third possible investment strategy for the wealth holders is risk diversification through formation of collusion. Now suppose that the wealth holders form a collusion. Let us consider a collusion of m wealth holders, $m \in \{2,3,4,.....\}$. Each wealth holder has inside information about one project. Each wealth holder invests $k = w/m$ units of loanable funds in each of the m projects. Since there exist indivisibility in investment therefore $k \in \{1,2,3,...\}$ which is the set of positive integers greater than equal to one. Here w denotes each wealth holder's contribution of loanable funds to the collusion. Hence $w \le W$. Note that since $w = km$, therefore $w \in \{2,3,......\}$. A collusion is thus characterised by the ordered pair (m,w) or (m,k).

Since a collusion involves multilateral investments it leaves each wealth holder with the scope to impose some punishment on the defaulting wealth holders who get caught. Consider for example the following environment:
In case wealth holder j defaults and gets caught the other wealth holders give wealth holder j his due share. However wealth holder j, has to distribute the fraction c of his total earnings, as compensation amongst the members belonging to the collusion over and above giving them their due share[3].

Once again, a court of law exists. However the court is not very attractive to the plaintiff because it is extremely costly in real and nominal terms. So they are always better off settling things outside the court. Talking in terms of the actual punishment imposed the defaulting party should be indifferent between the court and outside the court options. But they have to bear the social cost as well, if they go to the court because of the social stigma associated with it or its role in making information catch public attention. So the court is a worse option for both parties.

Here the court of law plays an important role not as an efficient instrument of justice, for the imposition of punishment and ensuring recovery of loans. Its importance lies in making information public[4]. The defaulting wealth holder will comply with the punishment imposed by the collusion, once information leaks and he is exposed or is caught lying, because other wise he faces a greater threat, like social ex-communication.

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This brings us to the fourth investment alternative. As long as formation of a sustainable collusion is possible, the other wealth holders have the option of keeping deposits with the collusion in exchange for a certain return. This is different from earning a return as a member of the collusion. It is to be noted that when wealth holders form a sustainable collusion each wealth holder essentially becomes a shareholder of the collusion (which constitutes a financial firm). Each wealth holder holds a share contract since his return varies with the number of projects that are successful. Here by projects we refer only to those projects that come within the realm of the

[3] Alternatively, we could consider the case in which wealth holder j has to pay the other wealth holders their due share. The other wealth holders however pay wealth holder j only the fraction $(1-c)$ of his due share, and retain the fraction c. We assume $c = 1$. In other words the other wealth holders don't pay the defaulting wealth holder anything.
[4] For a traditional society, where social anonymity is still not significant, the social cost of non–compliance, (even if things were settled outside the court would not be insignificant / even if the dispute is not taken to the court , is likely to be substantial).

collusion. The total return to the bank/collusion when there are x successes is wxr. This gets distributed among the wealth holders depending upon their share. With equal shares each wealth holder gets the fraction $1/m$ of wxr.

Here again there is the possibility that the "collusion" might default on payment of interest to depositors. Now there are two possibilities with regard to the nature of default: involuntary default and secondly strategic default. As far as the first possibility is concerned the crucial question is about the depositors' confidence in the banks ability to pay. This depends among other things on the bank's capacity to diversify risk. Prevention of strategic default (from occurring with certainty) would require a court of law. It is to be noted that the existence of a court of law or depositor insurance is neither necessary nor sufficient condition for sustaining depositor confidence or avoiding bank runs. One can cite instances of bank runs even in the presence of a court of law or depositor insurance. Again deposit keeping came into vogue before depositor insurance or laws relating to depositors' rights.

Here we assume that there is a court of law. Further unlike in case of an individual approaching the court, the court is more effective (in terms of cost, effort and time involved) in imparting justice , when the party concerned consists of a whole body of depositors.

3. Formation of Collusions

In order to find out whether a collusion (m,k) is sustainable or not we compare the payoffs from telling truth and finking for one lender, given that his project is successful and all other lenders are telling the truth[1]. Alternatively we could compare the gain in expected utility from finking when he gets away with it with the loss in expected utility from finking when he gets caught.

Let $u(.)$ be the utility derived from returns to investment. We assume $u(0)=0, u'>0$ and $u''<0$. The last sign restriction follows from the assumption of risk aversion. Let $x \in \{1,2,......,m\}$ denote the number of projects[2] that are successful out of m projects. Then $x \sim B(m,p)$.

Now when wealth holder j tells the truth he retains kr, which is the return to his share of investment in his home project. He distributes the rest, $(m-1)kr$ among the rest of the wealth holders, who are shareholders in his home project. More over he receives kr from each of the other $(x-1)$ lenders whose home projects have been successful. Thus the utility derived by him is $u(xkr)$.

If j lies and doesn't get caught then he retains the entire return from his home project i.e. mkr. This includes the returns on his share, kr and the other lenders' share $(m-1)kr$ as well. Moreover he receives $(x-1)kr$ from the other lenders. Thus utility derived is $u\big((m+x-1)kr\big)$

On the other hand if j gets caught he distributes $(m-1)kr$ out of the returns from his home project. He receives kr from each of the other $(x-1)$ lenders, whose home projects have been successful, so that he is left with xkr. But as compensation he has to pay the fraction c of xkr to other members of the collusion. So the utility derived by him is $u\big((1-c)xkr\big)$.

We may summarise the preceding discussion as follows:

Remark: The utility derived by lender j from telling the truth when there are x successes including lender j's home project and all other wealth holders are telling the truth is $u(xkr)$. Lender j's payoff when he finks and gets away with it is $u\big((m+x-1)kr\big)$ and his payoff if he gets caught is $u\big((1-c)xkr\big)$. Thus for x successes, lender j's gain in utility from finking is $\{u\big((m+x-1)kr\big)-u(xkr)\}$ and his loss in utility from finking is $\{u(xkr)-u\big((1-c)xkr\big)\}$.

Now the conditional probability of occurrence of x successes given that lender j's project is successful is $P(x,m) = {}^{m-1}C_{x-1}\, p^{x-1}(1-p)^{m-x}$. The joint probability of occurrence of x successes given that lender j's project is successful *and* lender j lies and gets away with it is $\theta\ P(x,m)$. Replacing θ with $(1-\theta)$ would yield the corresponding joint probability of x successes *and* lender j lying and getting caught.

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[1] Considering the payoffs from lying and truth telling when the project for which the lender under consideration has inside information is unsuccessful is not required, as payoffs are the same. Hence the terms cancel on both sides.

[2] We need not consider $x=0$ since $u(0)=0$ by assumption.

Let $E[U(G)]$ and $E[U(L)]$ denote respectively, the expected utility gain and expected utility loss from finking by lender j when there are m lenders. This assumes that lender j 's project is successful[3] and that all other lenders are telling the truth. Then we may express $E[U(G)]$ and $E[U(L)]$ as follows.

Definition 1: $E[U(G)] = \sum_{x=1}^{m} \theta \; {}^{m-1}C_{x-1} p^{x-1}(1-p)^{m-x}\left[u\left((m+x-1)kr\right) - u(xkr)\right]$

$= \theta E_m \left[u\left((m+x-1)kr\right) - u(xkr)\right]$

Definition 2: $E[U(L)] = \sum_{x=1}^{m} (1-\theta)^{m-1} C_{x-1} p^{x-1}(1-p)^{m-x}[u(xkr) - u\left((1-c)xkr\right)]$

$= (1-\theta) E_m [u(xkr) - u\left((1-c)xkr\right)]$

In both the above definitions E_m denotes conditional expectation.

We will now state certain lemmas regarding $E[U(G)]$ and $E[U(L)]$.

Lemma 1: Let relative risk aversion be less than one. Then $E[U(L)]$ is increasing in m.

Proof: Now $\frac{d}{dx}[u(xkr) - u\left((1-c)xkr\right) = \frac{1}{x}\{u'(xkr)xkr - u'\left((1-c)xkr\right)(1-c)xkr\} > 0$

iff $u'(z)z$ is increasing in z. This requires that $u'(z) + u''(z)z > 0 \Leftrightarrow -\frac{z\,u''(z)}{u'(z)} < 1$.

Hence for relative risk aversion less than one $[u(xkr) - u\left((1-c)xkr\right)]$ is strictly Schur–convex in x. Further since $x \sim B(m,p)$, therefore $E_m[u(xkr) - u\left((1-c)xkr\right)]$ is strictly Schur-convex[4] in m.

Hence result follows.

Now from definition 1 and by using Mean Value Theorem we have,

$E[U(G)] = E_m\left[(m-1)r\,u'\left(\xi(x,m)\right)\right]$ where $xr < \xi < (m+x-1)r$.

Hence denoting $E_m\left[u'\left(\xi(x,m)\right)\right]$ by $\psi(m)$ we have $E[U(G)] = (m-1)r\,\psi(m)$.

Lemma 2: u' is strictly Schur-concave (decreasing) in x.

Proof: By Mean Value Theorem it follows that :

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[3] The probability that j's home project is successful is p. Therefore the joint probability of occurrence of x successes including j's home project is $p\,P(x,m)$. Hence the probability that he derives $U(G_{m,x})$ and $U(L_{m,x})$ is $\theta\; p\,P(x,m)$ and $(1-\theta)\; p\,P(x,m)$ respectively. But when comparing $E[(U(G)]$ and $E[(U(L)]$, p cancels on both sides. Hence we need to consider only the conditional probability rather than the joint probability.

[4] Refer to Olkin and Marshall, definition A.1and theorem J.2 in chapter 3.

$$U(G_{m,x}) = u\big((m+x-1)r\big) - u(xr) = (m-1)r\,u'\big(\xi(x,m)\big)$$
$$U(G_{m,x+1}) = u\big((m+x)r\big) - u\big((x+1)r\big) = (m-1)r\,u'\big(\xi(x+1,m)\big)$$
By concavity of $u(.)$ we have,
$$u\big((m+x-1)r\big) - u(xr) > u\big((m+x)r\big) - u\big((x+1)r\big)$$
$$\Rightarrow u'\big(\xi(x,m)\big) > u'\big(\xi(x+1,m)\big)$$
By concavity of $u(.)$ we have
$$\xi(x,m) < \xi(x+1,m)$$
Therefore ξ is increasing in x.
This implies that u' is decreasing in x i.e. $u(.(x))$ is concave in x.

Lemma 3: $u'(.)$ is decreasing in m.

Proof: By Mean Value Theorem we have,
$$u(G_{m,x}) = u\big((m+x-1)r\big) - u(xr) = (m-1)r\,u'\big(\xi(x,m)\big)$$
$$\Rightarrow \frac{u\big((m+x-1)r\big) - u(xr)}{(m-1)r} = u'\big(\xi(x,m)\big)$$
$$u(G_{m+1,x}) = u\big((m+x)r\big) - u(xr) = mr\,u'\big(\xi(x,m+1)\big)$$
$$\Rightarrow \frac{u\big((m+x)r\big) - u(xr)}{mr} = u'\big(\xi(x,m+1)\big)$$
By concavity of $u(.)$ we have,
$$\frac{u\big((m+x-1)r\big) - u(xr)}{(m-1)r} > \frac{u\big((m+x)r\big) - u(xr)}{mr}$$
$$\Rightarrow u'\big(\xi(x,m)\big) > u'\big(\xi(x,m+1)\big)$$
By concavity of $u(.)$ we have,
$$\xi(x,m) < \xi(x,m+1)$$
Hence ξ is increasing in m.
This implies that u' is decreasing in m i.e. $u(.(x))$ is concave in m.

Lemma 4: $\psi(m)$ is decreasing in m.

Proof: From lemma 2, $u'(.)$ is strictly Schur-concave in x. Further from lemma 3, $u'(.)$ is also decreasing in m. Hence $\psi(m)$ is strictly Schur-concave[5] in m.

Lemma 5: $E[U(G)]$ is initially increasing and then is decreasing in m eventually, for finite m.

Proof: Differentiating[6] $E[U(G)] = (m-1)r\psi(m)$, with respect to m, yields
$$\frac{dE[U(G)]}{dm} = (m-1)r\psi'(m) + r\psi(m)$$

[5] *Op.cit.*
[6] Here we use the differential notation, for expositional simplicity. The actual derivation in terms of successive differences would only complicate the algebra and not add qualitatively to our findings.

Now, for $m = 2$, $\frac{dE[U(G)]}{dm} = r\{\psi'(m) + \psi(m)\}$

$$= r\left\{E_m[u''(.)] + o(p^{m-1}) + E_m[u'(.)]\right\}$$
$$= r\left\{E_m[u''(.) + u'(.)] + o(p^{m-1})\right\}$$

This is analogous to the change in order of integration and differentiation as in the Leibnitz rule. Note that the magnitude of the term $o(p^{m-1})$ will be of very small compared to the other two terms.

Now relative risk aversion is less than one by assumption i.e. $-\frac{z\,u''(z)}{u'(z)} < 1$. Further $z > 1$, since $x, k \geq 1$, $m \geq 2$ and $r > 2$ and z is given by the functions xkr or $(m + x - 1)kr$ as we are considering $E[U(G)]$. Hence $-\frac{u''(z)}{u'(z)} < 1 \Rightarrow u''(z) + u'(z) > 0$. Therefore for $m = 2$, $\frac{dE[U(G)]}{dm} > 0$.

Again $\frac{dE[U(G)]}{dm} < 0$ iff $-\frac{\psi'(m)}{\psi(m)} > \frac{1}{m-1}$.

As $m \to \infty$, $\frac{1}{m-1} \to 0$. For strictly concave $u(.)$, as $m \to \infty$, $\frac{\psi'(m)}{\psi(m)}$ is strictly bounded away from zero.

Thus lemma 5 holds for strictly concave $u(.)$.

Lemma 6: Let $E[U(G)] < E[U(L)]$, at $m = 2$. Then there exists at least one $m > 2$ such that $E[U(G)] > E[U(L)]$.

Proof: Let us consider the class of utility function: $u(v) = \frac{1}{a} v^a$, $a \in (0,1]$. For this class of utility functions the coefficient of relative risk aversion, $r_R = 1 - a \leq 1$. The $E[U(G)]$ and $E[U(L)]$ are given by $\frac{\theta}{a}[(m+x-1)^a - x^a]$ and $\frac{1-\theta}{a}[x^a - \{(1-c)x\}^a]$ respectively.

Let us consider the inequality $E[U(G)] > E[U(L)]$. This upon simplification, and dividing throughout by $x^a \theta$ yields $\left(\frac{m+x-1}{x}\right)^a - 1 > \frac{1-\theta}{\theta}\{1-(1-c)^a\}$. Further simplification yields, $\frac{m+x-1}{x} > \left\{\frac{1-\theta}{\theta}[1-(1-c)^a] + 1\right\}^{1/a} = \lambda$, say.

Now, the maximum value that the fraction $\frac{m+x-1}{x}$ can take is $2 - \frac{1}{m}$, for any given *m,* when *x* = *m*. And this is less than 2 for all finite m. Thus, if $\lambda > 2$ then $2 - \frac{1}{m} > \lambda$ can never be satisfied. Hence, we will always have some terms in the expected gain expression that will dominate the corresponding terms in the expected loss expression.

Now choose parameter values so that $\lambda = 2$ and the maximum for $E[U(G)]$ occurs at m^* such that $\frac{1}{m^*} \approx 2$ so that $2 - \frac{1}{m^*} \approx \lambda$. Then, most of the terms in $E[U(G)]$ will be > than the corresponding terms in $E[U(L)]$.

As the utility function is concave, the gain terms (appearing in $E[U(G)]$) will be larger for small x's. So, for this m^*, most of the initial terms will be larger and this difference will be relatively larger than those differences where the gain terms are smaller (this happens for x's close to m). This implies that we can have a situation, for a particular parametric configuration, where, in aggregate, $E[U(G)] > E[U(L)]$ at some $m > 2$.

Note that we have assumed that the reverse of the inequality holds at $m = 2$.

Corollary 1: Let $E[U(G)] < E[U(L)]$, at $m = 2$. Then the $E[U(G)]$ will cross the $E[U(L)]$ curve twice.

Proof: Follows from lemmas 5 and 6. This requires that the value of the coefficient of relative risk aversion be initially small.

Lemma7: Suppose relative risk aversion is less than one. Further let $c < \frac{\theta}{1-\theta} \;\; \frac{1}{p+1}$ where $c, p \in (0,1)$. Then for any given m, as w tends to infinity, the collusion (m, w) becomes non-sustainable.

Proof: $$\frac{\partial E[U(G)]}{\partial w} = \sum_{x=1}^{m} \theta\, P(x,m) \frac{\partial}{\partial w}\left[u\left((m+x-1)\frac{wr}{m} \right) - u\left(\frac{xwr}{m} \right) \right]$$
$$= \sum_{x=1}^{m} \theta\, P(x,m) \left[u'\left((m+x-1)\frac{wr}{m} \right)(m+x-1)\frac{r}{m} - u'\left(\frac{xwr}{m} \right)\frac{xr}{m} \right] \geq 0$$
and $$\frac{\partial E[U(L)]}{\partial w} = \sum_{x=1}^{m} (1-\theta)\, P'(x,m) \left[u'\left(\frac{xwr}{m} \right)\frac{xr}{m} - u'\left((1-c)\frac{xwr}{m} \right)\frac{(1-c)xr}{m} \right] \geq 0$$
since $-\frac{z\,u''(z)}{u'(z)} < 1$ by assumption. Thus both $E[U(G)]$ and $E[U(L)]$ are increasing in w, for a given m.
Now let $u'(z) \to \varepsilon > 0$ (ε is an arbitrary small number) as $z \to \infty$.
Then as $w \to \infty$, $\frac{\partial E[U(G)]}{\partial w} \to \sum_{x=1}^{m} \theta\, P(x,m) \frac{\varepsilon(m-1)r}{m} = \frac{\theta\varepsilon(m-1)r}{m}$ (since $\sum_{x=1}^{m} P(x,m) = 1$)

and $$\frac{\partial E[U(L)]}{\partial w} \to \sum_{x=1}^{m} (1-\theta)\, P(x,m) \frac{\varepsilon\, cxr}{m}$$
$$= \frac{(1-\theta)\,\varepsilon\, cr}{m} \sum_{x=1}^{m} P(x,m)\, x$$
$$= \frac{(1-\theta)\varepsilon\, cr}{m} \sum_{x-1=0}^{m-1} {}^{m-1}C_{x-1} p^{x-1} (1-p)^{m-x} \{(x-1)+1\}$$
$$= \frac{(1-\theta)\varepsilon\, cr}{m} [(m-1)p+1]$$
Comparing slopes as $w \to \infty$, $\frac{\partial E[U(G)]}{\partial w} \overset{>}{<} \frac{\partial E[U(L)]}{\partial w}$ according as $\frac{(m-1)}{(m-1)p+1} \overset{>}{<} \frac{(1\text{-}\theta)}{\theta} c$.
Now at $m = 2$, $\frac{(m-1)}{(m-1)p+1} = \frac{1}{p+1} < 1$ and as $m \to \infty$, it tends to $\frac{1}{p} > 1$. Since $\frac{(m-1)}{(m-1)p+1}$ is increasing in m, therefore for $\frac{\partial E[U(G)]}{\partial w} > \frac{\partial E[U(L)]}{\partial w}$ as $w \to \infty$, it is sufficient that $c < \frac{\theta}{1-\theta} \;\; \frac{1}{p+1}$.
Thus proof of lemma 7 follows.

We may now the state the following proposition.

Proposition 1: For every $k \geq 1$, there exists a range of values of m, $[\underline{m}_k, \overline{m}_k]$ such that a collusion of m lenders will not be sustainable for $m \in [\underline{m}_k, \overline{m}_k]$. In other words a collusion of m lenders will be sustainable only for small $m < \underline{m}_k$ or for large $m > \overline{m}_k$ .As $k \to \infty$, $\overline{m}_k \to \infty$. At $k = 1$, $\underline{m}_k \geq 2$ according as For $m = 2$, $c = 1/2$ and $k = 1$, $E[U(G)] > E[U(L)]$ condition is $\theta[p(u(3r) - u(2r)) + u(2r) - u(r/2)] < (1-p)\{u(r) - u(r/2)\} + p\{u(2r) - u(r)\}$.

Proof: From lemma 1, we have $E[U(L)]$ increasing in m. From lemma 5, we have $E[U(G)]$ is initially increasing and then decreasing in m eventually, for finite m. Now for $m = 2$,

$E[U(G)] \overset{\geq}{\underset{<}{=}} E[U(L)]$ according as,

$$\theta[p(u(3r) - u(2r)) + u(2r) - u(r/2)] \overset{<}{\underset{>}{=}} (1-p)\{u(r) - u(r/2)\} + p\{u(2r) - u(r)\}.$$

Therefore if at $m = 2$, $E[U(G)] > E[U(L)]$, then $E[U(G)]$ must cross $E[U(L)]$ curve once. Hence $\overline{m}_k$ exists and $\underline{m}_k = 2$.

Again if at $m = 2$, $E[U(G)] < E[U(L)]$, then $E[U(G)]$ must cross $E[U(L)]$ curve twice (using lemmas 5 and 6 / corollary 1). Hence $\overline{m}_k$ exists and in this case $\overline{m}_k > 2$.

Finally from lemma 7, it follows that as $k \to \infty$, $\overline{m}_k \to \infty$ (since $k = w/m$).

Corollary 2: (a) $\overline{m}_k$ is non-decreasing in w or k. Thus as k increases either $\overline{m}_k$ remains constant (constant relative risk aversion) or it increases.

(b) $\underline{m}_k$ is non- increasing in k.

Further the slope of the curve must not be greater than $1/k_0$ as w tends to infinity. In other words the curve must approach the ray asymptotically.

Proof: Follows from lemma 7.

Corollary 3: $\overline{m}_k$ and $\underline{m}_k$ is unique for every k.

Proof: Follows from lemmas 5 and 6.

Thus the loci of points representing the collusions $(\overline{m}_k, k)$ and $(\underline{m}_k, k)$ must cut each ray only once.

So far we have been considering whether individuals with the same amount of wealth will find collusion incentive compatible or not. One can then raise the question whether wealth holders with different amounts of wealth can form sustainable collusions or not.

Proposition 2: Rich will not collude with the significantly poor.

Proof: Let us consider a collusion of m wealth holders such that all the m wealth holders' investment per project is k_1. The $E[U(G)]$ and $E[U(L)]$ from finking are

$\theta\, E_m\left[u\left((m+x-1)k_1 r\right)-u(xk_1 r)\right]$ and $(1-\theta)E_m[u(xk_1 r)-u\left((1-c)xk_1 r\right)]$ respectively (refer to definitions 1 and 2).

Now given m, suppose $(m-1)$ now invest $k_2\ (\geq k_1)$, per project. The expected utility gain from finking to the wealth holder investing k_1 per project is $E[U_1(G)]{=}\theta\, E_m\left[u\left((mk_2+(x-1)k_1)r\right)-u(xk_1 r)\right]>E[U(G)]$. The expected utility loss is $E[U_1(L)]=E[U(L)]$.

Now suppose the collusion (m,k_1) is non-sustainable, that is $E[U(G)]>E[U(L)]$. It follows that $E[U_1(G)]>E[U_1(L)]$. In other words, suppose a wealth holder investing k_1 per project has the incentive to fink when the investment per project for all the lenders is identical and equal to k_1. It follows that he has greater incentive to fink if the investment per project for the remaining $(m-1)$ wealth holders is $k_2>k_1$.

Now suppose the collusion (m,k_1) is initially sustainable, that is $E[U(G)]<E[U(L)]$. Then we may not conclude $E[U_1(G)]>E[U_1(L)]$. The inequality will not hold if k_2 is slightly greater than k_1 (the earlier "$<$" relation may continue to hold in that case). However the reversal of inequality will occur if k_2 is significantly greater than k_1.

4. Emergence of the Formal and the Informal sectors or Financial dualism :

So far we have identified the sets of collusions (m,k) that are sustainable and non-sustainable. We need not concern ourselves with the latter as these will never be formed. Henceforth we will focus only on the collusions that are sustainable. Below we specify several subsets of the set of the sustainable collusions S, (which is represented by the shaded region in figure 1).

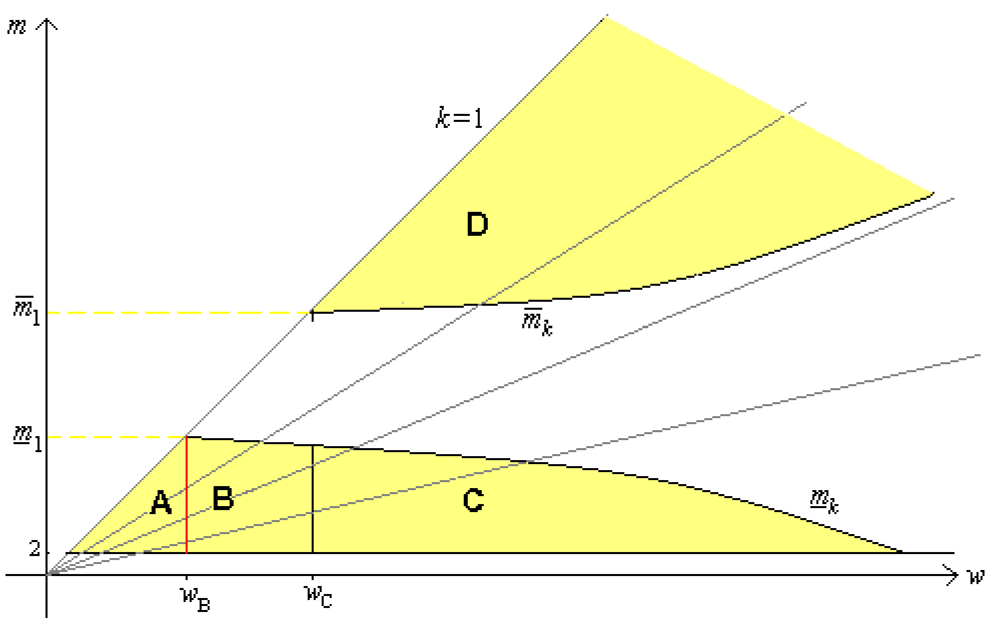
$A = \{(m,w): w \le w_B \text{ and } m \le w_B\}$

$B = \{(m,w): w_B < w < w_C \text{ and } m \le \underline{m}_k\}$

$C = \{(m,w): w \ge w_C \text{ and } m \le \underline{m}_k\}$

$D = \{(m,w): w \ge w_C \text{ and } m \ge \overline{m}_k\}$

Note that $S = A \cup B \cup C \cup D$. Further the sets A, B, C, D are mutually exclusive and exhaustive.



The shaded region in figure 1, represents the set of sustainable collusions. It is to be noted that the collusion space (m,w) is not continuous but consists of a set of discrete points along each ray.

We may now state certain lemmas.

Lemma 8: Individuals with $W \ge w_C$ will prefer forming collusions $(m,w) \in D$ rather than C.

Proof: The expected utility from the return on money invested in collusion by an individual wealth holder is $E_m[u(xkr)]$, where $k = w/m$. Now $E_m[xkr] = wrp$ which is constant as m increases. Further $Var[xkr] = (wr)^2 \dfrac{p(1-p)}{m}$, which is decreasing in m. Hence for any given w, $E_m[u(xkr)]$ is increasing in m (since wealth holders are risk averse).

Hence proof of lemma follows.

Thus forming larger collusions is more desirable than forming smaller collusions. Now suppose the initial distribution of wealth is such that the number of individuals with wealth $W \geq w_C$, is sufficiently large, so that $\sum_{W=w_C}^{\overline{W}} f(W) \geq \overline{m}_1$. We however assume that the number of rich wealth holders is not large enough to allow the formation of many large collusions in D ($f(W) < \overline{m}_k$). In that case richer wealth holders will form a large collusion in D. The less wealthy, that is individuals with wealth less than w_C will form small collusions, in A or B.

Given, that the rich wealth holders form collusion in D, the individuals with wealth $W < w_C$, face a fourth investment alternative. Now suppose the individuals with wealth $W < w_C$ keep deposits with the collusion in D, for a certain return r_d, the gross interest on deposits[1]. For the time being we will refer to the large collusion as the bank.

Now $E_{m_D}\left[u\left(\frac{xwr}{m_D}\right)\right]$ is the maximum that the bank can earn, from a deposit of w. Again $E_{m_i}\left[u\left(\frac{xwr}{m_i}\right)\right]$, $i = A, B$ is what the individuals with wealth $W < w_C$, could have earned by forming a collusion in A or B. Hence this is the reservation payoff of the wealth holders with $W < w_C$ who are potential depositors of the bank./ Hence this is the minimum that the bank must pay to the wealth holders with $W < w_C$ in order to attract deposits from them or the depositor's reservation payoff. Here m_i is m corresponding to the collusions in A or B.

Let $\overline{r}_d : E_{m_D}\left[u\left(\frac{xwr}{m_D}\right)\right] = u(wr_d)$ and $\underline{r_d} : E_{m_i}\left[u\left(\frac{xwr}{m_i}\right)\right] = u(wr_d)$. Then $r_d \in \left\lfloor \underline{r_d}, \overline{r}_d \right\rfloor$.

Now given that the wealth holders with $W < w_C$, have the option of keeping deposits with the bank for a certain rate of return, r_d, the wealth holders constituting the smaller collusions in A or B, will ask for a risk premium from the entrepreneurs. Let $z > r$, be the rate of return (inclusive of risk premium) charged by the collusion from the entrepreneur. In the absence of deposit keeping , the rate of return on loans $r = \alpha q$, was determined by Nash bargaining, between the entrepreneur and lender.

Then $z : E_{m_i}\left[u\left(\frac{xwz}{m_i}\right)\right] = u(wr_d)$ given the r_d chosen by the bank. Now z is increasing in r_d. Further for any given r_d, z is increasing in w assuming increasing relative risk aversion.

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[1] Note that the wealth holders forming collusions in A or B will not keep deposits with collusions formed in C.

Question is whether $z \overset{>}{\underset{<}{-}} q$? This is crucial since the wealth holders constituting the smaller collusions in A or B, will find keeping deposits with the bank attractive iff $E_{m_i}\left[u\left(\frac{xwq}{m_i}\right)\right] < u(wr_d) \Rightarrow z > q$.

Now as r_d falls the banks earn less per depositor. On the other hand as r_d falls, the number of depositors and the banks total deposits increase. Since z is increasing in both w and r_d therefore as r_d falls, the critical level of w, above which wealth holders becomes depositors decreases. This trade off yields optimal value of $r_d = r_d^*$ at which the banks profit is maximum.

Now as $m_D \to \infty$, $\bar{r}_d(m_D) \to pr$. Hence $\bar{r}_d = pr - \varepsilon$, for large and finite m.

At $r_d = \bar{r}_d$, the bank's profit per unit of deposit is equal to zero. Again at $r_d = \underline{r_d}$ the wealth holders constituting the smaller collusions in A or B are not made any better off by keeping deposits with the bank and hence would prefer forming the collusion and giving loans to the local/home projects. In that case the bank's receive zero deposits, and it's aggregate profits are zero. Thus the bank's optimal interest rate on deposits $r_d^* \in (\bar{r}_d, \underline{r_d})$.

We will now check whether given r_d, the interest rates inclusive of risk premium z, that is charged by the collusions in A and B from the local or home projects exceed or fall short of q. That is to check whether $E_{m_i}\left[u\left(\frac{xwz}{m_i}\right)\right] = u(wr_d)$ at $z \overset{>}{\underset{<}{-}} q$? Since the left-hand side of the equality is increasing in z, therefore it is sufficient to check whether at $z = q$ the left hand side is less than, equal to or greater than the right hand side.

We will first check this for $r_d = \bar{r}_d = p\alpha\, q - \varepsilon$. That is we check this for the highest possible value of r_d. Also we consider the case, $m_i = 2$ which implies $w = k2$. Then our objective is to check whether, for a given k, $pu(2kq) + (1-p)u(kq) \overset{<}{\underset{>}{-}} u(2kp\alpha\, q)$?

Let us consider the following class of utility functions:

$$u(v) = (A+v)^{\beta} \qquad 0 < \beta < 1,\ \ A \overset{>}{\underset{<}{-}} 0 \ \text{ and } \quad v > \max[-A, 0]$$

We consider the case of $A > 0$, for which the coefficient of relative risk aversion $r_R < 1$ and $dr_R/dv > 0$. Thus we assume relative risk aversion is increasing in wealth.

For the above utility function we check whether the following inequality holds.

$$p(A+2kq)^{\beta} + (1-p)(A+kq)^{\beta} < (A+2p\alpha\, kq)^{\beta} \tag{1}$$

Multiplying through inequality (1) by $(1/k)^{\beta}$, yields,

$$p\left(\frac{A}{k}+2q\right)^{\beta}+(1-p)\left(\frac{A}{k}+q\right)^{\beta}<\left(\frac{A}{k}+2p\alpha\, kq\right)^{\beta}$$

As $k \to \infty$, $A/k \to 0$. Using this and simplifying the above inequality may be expressed as,

$$2^{\beta}\left\{(p\alpha)^{\beta}-p\right\}>1-p$$

Expressing p as $(1-\varepsilon)$ and α as $(1-\eta)$, where ε and η are arbitrarily small positive numbers, we may substitute $(1-\varepsilon-\eta)$ for $p\alpha$, since $\varepsilon\eta \to 0$.

The above inequality may now be expressed as,

$$2^{\beta}\left\{(1-\varepsilon-\eta)^{\beta}-1+\varepsilon\right\}>\varepsilon$$

Considering the first two terms only, of the Binomial Expansion of $\{1+\beta(\varepsilon+\eta)\}^{\beta}$, and ignoring the remaining terms as $(\varepsilon+\eta)$ and β, both are very small numbers, we have,

$$2^{\beta}\{\varepsilon-\beta(\varepsilon+\eta)\}>\varepsilon$$

Since $2^{\beta}>1$ therefore the above inequality will hold if $\beta(\varepsilon+\eta)$ is very small. That is the inequality will hold if p and α are large and β is small. This requires that the probability of success of the project be high and the wealth holder's share in output of the home project be high (implying that the wealth holder enjoys a lot of bargaining power). Moreover this requires that the degree of relative risk aversion is high. This is expected for large k since relative risk aversion is increasing in wealth by assumption. Thus for large k, $z>q$. Since the entrepreneurs can pay at most q, therefore, these wealth holders will prefer keeping deposits with the collusion in D, which we may refer to as a "bank".

We now analyse the case when k is small. Specifically we consider $k=1$. Multiplying through inequality (1) by $(1/A)^{\beta}$ yields,

$$p\left(1+\frac{2q}{A}\right)^{\beta}+(1-p)\left(1+\frac{q}{A}\right)^{\beta}<\left(1+\frac{2p\alpha\, q}{A}\right)^{\beta}$$

For large A, $2q/A$ is small. In that case considering the first two terms of the Binomial expansion of $\left(1+\frac{2q}{A}\right)^{\beta}$ suffices, since the remaining terms in the expansion will be of very small magnitude. Hence putting $\left(1+\frac{2q}{A}\right)^{\beta}=1+\frac{2q\beta}{A}$, the above inequality, after simplification, may be expressed as, $2p+(1-p)<2p\alpha$. Since $\alpha<1$, this inequality does not hold.

Hence, for $k=1$, the inequality in (1) gets reversed to ">". Thus for $k=1$, $z<q$. So there exists a value of k (or at least one value of k) such that, the wealth holders with $w=k2$, will find it profitable to engage in local lending and finance the home projects, rather than keep deposits with the bank.

The above analysis is based on $r_d=\bar{r}_d$. The argument may be extended and will hold more strongly for $r_d<\bar{r}_d$ (since z varies directly with w and inversely with r_d).

Thus for the wealth holders constituting small collusions (partnerships), we get two cases. For one segment of wealth holders, those belonging to the lowest spectrum, the wealth holders will continue financing local home projects. These wealth holders will constitute the local informal lenders. There will be another segment of wealth holders, the relatively richer segment (the middle segment) who will keep deposits with the larger collusions formed by the richest segment of the wealth holders. These wealth holders will constitute the formal credit market.

Conclusion:

Starting with a given initial distribution of wealth holders (who are potential lenders) we show the emergence of the formal sector consisting of joint stock banks and informal sector consisting of indigenous bankers. In other words we highlight the endogenous creation of financial dualism. This captures the experience of the developed countries in Europe, especially U.K. and Germany, during their early days of development and also the experience of the developing countries like India. As these country experiences suggest the history of modern banking can be traced to the formation of the joint stock banks, which stand in contrast to the native bankers. Typically the joint stock banks are initially formed by the local rich[1] and attract deposits[2]. The depositors belonging to the middle wealth segment. The native bankers on the other hand hardly ever in a position to receive deposits[3]. The earlier chapters refer to the kind of financial dualism, which are more the outcome of government policies and regulation rather than a natural outcome of existing environment. We may broadly relate it to the "new financial dualism" as coined by Myint. In contrast, in this chapter we consider the endogenous creation of financial dualism in the absence of government intervention[4].

[1] J.C. Das (1927) argued, in the wake of several bank failures, that the only way of making banks accountable and restoring public confidence would be to start a new technique, by which, instead of accepting deposits against interest, banks should give out preferential shares in small amounts to the general public. The public then would not withdraw money suddenly, causing runs, and would want their money to remain invested for longer periods and greater dividends. In other words, Das argued for the public to own banks rather than a handful of businessmen.

[2] It was never easy to do banking business to the *mufassil*. In fact, despite the lack of easy credit sources, it was always a problem to find enough borrowers. And deposits had to be collected by exercising personal contacts.

[3] During the period of mughal rule, the indigenous bankers were mostly engaged in money changing. These early bankers could not, however, develop the system of obtaining deposits regularly from the public. Those who saved either hoarded or lent them to friends and neighbours.

[4] There is a large literature on the endogenous growth of financial intermediation – i.e. how financial intermediaries are formed endogenously. But we are not concerned with this issue as this does not distinguish between various types of financial intermediaries

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