Business Groups, the Financial Market and Modernization

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Abstract

Business groups are an important aspect of the industrial organization of many developing countries. This paper develops a theory suggesting that they may be organizations that facilitate modernization in the presence of financial market constraints.

An important function of the stockmarket is the diversification of risk that comes with specialized, productive technology. But in the face of serious information problems a well functioning stockmarket may fail to emerge, relegating the economy to a low productivity-poverty trap. Bilateral links between a firm and a group of others may be a more cost effective way to achieve risk-sharing. Such business groups may be feasible when a full-fledged stockmarket is not. As modernization takes place, either because information problems become less severe or more firms enter the economy, business groups actually expand in size before being abruptly rendered obsolete by the stockmarket. This is consistent with empirical results from a number of emerging economies.

1 Introduction

A common thread in the industrial organization of developing countries is the absence of uniformity. The institutional infrastructure — legal, financial and physical, that underpins the efficient functioning of developed economies is either absent or inadequate in developing countries. The precise composition of these deficiencies varies from country to country. One way to interpret the considerable cross-country diversity in industrial organization is in terms of country-specific responses to the pattern of institutional inadequacy. With this as the leitmotif, in this paper we gird one aspect of the diversity in industrial organization — the presence of diversified business groups — within a theoretical framework.

Diversified business groups are a feature of the organizational landscape of many developing countries. Such groups dominate private-sector industrial activity in economies such as Brazil, Chile, Hong Kong, India, Indonesia, Malaysia, Pakistan, South Africa, South Korea and Taiwan, among others (see Table 1). These entities are characterized by diversification across a wide range of businesses[1], partial financial interlocks (See Eric Berglof and Enrico Perotti (1994) and Raphael La Porta et al. (1998)), and, in many cases, familial control. Given the costs of diversification, what explains the ubiquity of diversified business groups in developing countries?

The two commonly forwarded explanations are: a) Group structures are

[1]For example, the House of Tata in India has interests in steel, watches, detergents, tea, automobiles, and computer software. Grupo Luksic of Chile has interests in banks, hotels, mining, beer and pasta. Grupo Carso of Mexico has firms in telecoms, internet services, retail and finance. See "When eight arms are better than one," *The Economist,* Sept. 12, 1998, pp. 67-68.

privately economical responses to avoidable policy distortions and political influence. b) Groups are economically valuable responses to failings in basic institutional infrastructure. Their scale and scope allow them to replicate the functions provided by stand-alone institutions in advanced economies (See Pankaj Ghemawat and Tarun Khanna, 1998).

We are concerned with the second set of explanations. This is because of the following empirical conundrum. Many developing countries have been in the process of transition toward more transparent market-driven environments, implying reduced policy distortions and scope for political patronage. According to the first set of reasons, this ought to be accompanied by a decrease in the dominance of groups. But on the contrary, in countries for which studies have been done, business groups appear to have emerged from the policy changes with greater vigor. Specifically, in a recent study that looks at India and Chile before and after liberalization, Tarun Khanna and Krishna Palepu (1999a) find an increase in group scope, an increase in the strength of social and economic ties that bind together group firms, an increase in self-reported market intermediation attempts by the groups and some evidence of improvement in profitability and market value of group affiliates[2].

If liberalization of the economy proceeds without an attendant develop-

[2]Providing a precise definition of a business group is tricky, because there can be subtle differences across countries, but Mark Granovetter (1994) has made the suggestion that "A business group is a collection of firms bound together in some formal and/or informal ways." The emphasis is on "...an intermediate level of binding — excluding, on the one hand, a set of firms bound merely by short-term strategic alliances and, on the other, a set of firms legally consolidated into a single one." Since our objective here in not to explain the ownership structure of the business group, we are content to accept this definition and the existence of business groups that goes with it.

ment of intermediaries to facilitate transactions in these markets, business groups may perform a valuable function by compensating for the institutional inadequacy. As intermediaries gradually develop, business groups actually benefit, expanding in size and scope until intermediation reaches a critical level, at which point they abruptly become redundant. We formalize this idea by focussing on the financial market. Our theory suggests that business groups may be organizations that facilitate the adoption of modern production techniques in the presence of institutional — especially financial market, constraints.

An important function of the stockmarket is as a vehicle for the diversification of risk[3]. Since entrepreneurs are risk averse, the existence of a well functioning stockmarket encourages them to invest in specialized, albeit risky productive activities. But the establishment of a stockmarket has a public good character associated with it. There is therefore a coordination problem leading to the possibility of multiple equilibria: either the stockmarket takes off with all entrepreneurs listing their firms on it, or there is no stockmarket (See Marco Pagano (1993) for a formal model). If there are serious obstacles to the free flow of information in the economy, solving the coordination problem will be difficult, making the second possibility especially likely. Overcoming informational asymmetries and thence solving the multilateral stockmarket coordination problem can be quite costly. On the other hand, the intermediation costs associated with forming bilateral links between firms may be smaller. Because of this it may be more attractive

[3]Another important function of the stockmarket is, of course, the raising of capital for investment purposes. We recognize this, but choose to downplay it for the objectives of this paper. See the final section for further comments on this.

for an entrepreneur to form bilateral links between his firm and a number of other firms and engage in risk sharing with them than to become part of the stockmarket. A set of such inter-firm links is what we call a business group[4]. We find that it may be possible for business groups to emerge when a stockmarket cannot.

The intermediation problems arising from the existence of informational asymmetries, based in moral hazard and adverse selection, are particularly serious for many developing countries because of the absence of specialized financial intermediaries that perform monitoring services, or with the lack of skills and incentives of such intermediaries that do exist. As economic development proceeds, more and better qualified financial intermediaries emerge, leading to smaller intermediation costs[5]. This eventually enables well functioning stockmarkets to develop. In fact, a positive correlation between indices of stockmarket development and indices of financial intermediary development has been established by Asli Demirguc-Kunt and Ross Levine (1996). To make a case for robustness, Demirguc-Kunt and Levine construct a number of different indices of stockmarket and financial intermediary development. Depending on how these indices are defined, the correlation lies between 0.62 and 0.92.

[4]Several scholars have empirically examined the prevalence of risk-sharing among members of the business group. Asanuma (1989) and Kawasaki and Mcmillan (1987) provide evidence for post-war Japan. Khanna and Palepu (2000) find evidence for this in the case of Chile.

[5]We do not provide microfoundations for the link between development of financial intermediation and reduction in coordination/transaction costs arising from moral hazard or adverse selection type issues. For microfoundations of this process, see Bengt Holmstrom and Jean Tirole, (1993). For detailed empirical work, see Tarun Khanna and Krishna Palepu (1999b).

Our model enables us to envisage a number of different scenarios that correspond to stages in the process of economic development. If informational problems in the economy are severe, implying high intermediation costs, neither a stockmarket nor business groups are feasible, in which case the economy will be stuck with a safe but unproductive technology. We label this situation the *traditional* economy. The shift to a productive, but risky technology is what we term *modernization*[6]. As intermediation costs fall, a second scenario is possible in which business groups can emerge as organizations that permit modernization even though a full fledged stockmarket is not feasible. Eventually, if intermediation costs continue to fall, the feasibility of a stockmarket renders business groups obsolete. Depending on the configuration of basic economic conditions, a third scenario is possible in which as intermediation costs fall, the transition from the traditional economy to the modern economy takes place directly through the emergence of the stockmarket. Business groups are not observed at all in this scenario.

We are most interested in the second scenario. We examine conditions under which business groups are preferable to the stockmarket. We are also able to derive the size of the business group that maximizes it's net expected benefits. Matching the empirical riddle that we alluded to earlier, we find that as the economy modernizes the business group actually expands in size, before finding itself abruptly rendered obsolete by the stockmarket.

[6]Abhijit Banerjee and Andrew Newman (1998) also use this terminology to distinguish between a low-productivity *traditional* sector and high productivity *modern* sector. See also Kevin M. Murphy, Andrei Shleifer, and Robert Vishny (1989).

Examples of traditional production are cottage production and agriculture. An example of modern production is industrialized factory production.

The model has the following elements. Risk averse entrepreneurs can choose between two technologies, one of which is highly productive though risky (modern), while the other has a low level of productivity but is safe (traditional). Because of the intermediation problems that are a feature of the underdeveloped economy, establishing links between firms or between a firm and the stockmarket, is costly. Membership of the stockmarket is attractive because it allows diversification over a large pool of firms. Forming bilateral profit-sharing links with a smaller group of firms achieves much less diversification, but may have the advantage of lower costs. This sets up the background for a potential trade-off between the stockmarket and business group. We identify the subgame-perfect equilibrium in entrepreneurial technology choice and examine under what conditions this equilibrium involves a failure to modernize, when are business groups the vehicle for modernization instead of stockmarkets, and when do business groups become obsolete.

We use a simple spatial framework to formalize the intermediation costs associated with link formation. This is a natural way to think of link formation, and the notion of 'distance' is a ready metaphor for the costs of link formation[7]. Such a setting also seems appropriate given the importance of networks, connections and ties of kinship in surmounting informational problems in countries with poor formal infrastructure[8].

The business groups of the model are overlapping networks, in that each firm is a member of multiple business groups. In many developing countries it is indeed the case that some firms are members of multiple business

[7]An example of a model that uses the 'distance' metaphor for coordination costs is by Alberto Alesina and Enrico Spolaore (1997).

[8]For theoretical work on this issue see Rachel Kranton (1996) and Raja Kali (1999).

groups. In fact, in their series of empirical papers on business groups around the world, Khanna and Palepu (1999a,b and 2000) note that data exercises on business groups are bedeviled by the fact that in many countries firms belong to multiple groups. Castaneda (1998) also discussed the prevalence of overlapping business groups in Mexico.

A remark about interpretation. Throughout the paper we use the words intermediation cost to refer to both the cost of joining the stockmarket and the cost of bilateral link formation between firms. We recognize however, that the actual nature of these costs are different. For the cost of joining the stockmarket we have in mind legal and administrative expenses due to the obligation of certifying balance sheets and disclosing information. The cost of establishing formal or informal contracts between firms is what we have in mind as the cost of bilateral link formation. All that we posit is that the development of financial intermediation leads to a reduction in both kinds of costs.

Our paper is related to the growing literature on financial markets and economic development[9]. The two papers we feel are closest to our context are by Gilles Saint-Paul (1992) and by Daron Acemoglu and Fabrizio Zilibotti (1997). Saint-Paul's paper formalizes the link between the adoption of specialized, more productive but risky technology and diversification opportunities. In the absence of well developed financial markets, agents may limit risk by choosing less specialized and less productive technologies. Acemoglu and Zilibotti enrich the argument by recognizing that specialized

[9]See, among others, Maurice Obstfeld (1994), Jeremy Greenwood and Boyan Jovanovic (1990) and Valerie Bencivenga and Bruce Smith (1991).

investments involve large sunk costs and that poor countries suffer from capital constraints. Therefore poor countries are either destined to remain poor, or rely on good exogenous shocks (lucky draws) and cross the development threshold by chance and are susceptible to variability. We suggest business groups may be another way out for poor countries. We discuss this issue and related policy implications in greater detail in section 6 of the paper.

The structure of the paper is as follows. Section 2 describes the modeling framework. Section 3 sets up the payoffs under different technology choice and risk diversification organizations. Section 4 then uses these scenarios to understand when modernization will occur and whether the facilitating organization will be the stockmarket or business groups. We need to note that the analysis of this section is underpinned by the assumption that technology and organizational choices will be driven by economic efficiency. We discuss caveats to this in the final section of the paper. Section 5 considers the effects of changes in market concentration. We find that entry of firms can be the driver of modernization and stockmarket takeoff even if it is assumed that intermediation costs are unaffected by entry. Extending the framework to allow intermediation costs to be positively related to market concentration – essentially a "thick-markets " effect, facilitates the transition. Section 6 discusses caveats and policy implications of the theory and concludes.

2 The Model

This section describes the theoretical framework that will be the vehicle for subsequent analysis.

Spatial Differentiation and Link Formation

Consider an economy populated by N entrepreneurs/firms who are uniformly distributed along a circle with circumference L. The distance between any two adjacent firms is therefore $\frac{L}{N}$. Firms can establish bilateral links between each other and engage in profit sharing activities. Link formation is costly. This cost is captured by the 'distance' between firms. If two firms form a link they split the link-formation cost evenly. A firm can establish as many bilateral links as it wishes[10]. On the basis of the order of their proximity to firm i in the clockwise direction we index the remaining firms as $1, 2, 3...N-1$ as shown in Figure 1.

[Figure 1 should be about here]

The spatial differentiation of firms is a metaphor for the intermediation problems that exist between them and could be based in information asymmetry stemming from product heterogeneity or geographic and social distance.

Preferences and Technology

Agents are risk averse and possess the quadratic utility function $u(w) = w - \frac{aw^2}{2}$, $a > 0$, in final period wealth.

Each agent can choose to operate one of two linear technologies which we call traditional (T) and modern (M). The traditional technology offers

[10]We wish to have a formulation where greater proximity to other firms makes link formation easier and the cost to participating in the stockmarket is the same for all firms. The circle-radius metaphor is a simple setting that provides these features. For more general models of link formation, see Rachel Kranton and Deborah Minehart (1997) and Mathew Jackson and Asher Wolinsky (1996).

Section 5 considers the endogeneity of information costs to the number of firms in the economy.

a safe but relatively low return on investment. Here k units of capital invested in the first period yields a return of γk in the final period. Thus, more formally, $y = \gamma k$, where γ is a technological constant. The modern technology yields a higher unconditional expected return but is more risky. Specifically, with this technology, returns for agent i are $y_i = \theta_i k$ where θ_i is an idiosyncratic shock. The variable θ is an independently distributed random variable drawn from a distribution $F(\theta)$ with mean μ and variance σ^2. Also, $E[\theta] = \mu > \gamma > 0$. The shock θ can be interpreted as uncertainty in demand for a particular firm's products.

An agent's objective is to maximize final period expected utility. Given the quadratic utility function, this is $E[u(w)] = E(w) - \frac{a}{2}[(E(w))^2 + Var(w)]$.

Stockmarkets and Business Groups

There are two organizations that firms can establish in order to diversify risks: a stockmarket or a business group.

Since we are concerned only with its risk diversification capabilities, a stockmarket is defined as an organization in which profits of all the firms that are members are pooled and then shared through dividends. The stockmarket is located at the centre of the circle along the circumference of which firms are located. Establishing links with the stockmarket is costly. This cost is represented by the distance between a firm and the centre of the circle. Since the stockmarket is located at the centre, the cost of becoming a member is the same for all firms and is r, the radius of the circle.

Alternatively, a firm can diversify risks by establishing links with a set of firms along the circle. The set of firms that firm i has direct links with is referred to as a business group. A business group engages in profit sharing.

We assume that intra-group profit sharing is equiproportionate in the following way. If firm i has direct links with M firms, then the dividend that i disburses to each member of the group is $d_i = \frac{Y_i}{M}$, where Y_i is firm i's final period profit[11].

Establishing links between firms is costly, as outlined above. If the distance between two firms who form a link is x, the total cost of this link is x. The cost of this bilateral link is split evenly. Each firm therefore bears the cost $\frac{x}{2}$.

Timing

The timing of events is as follows:

Morning:

An entrepreneur chooses between the two technologies:

(T): Safe, but low productivity.

(M): Risky, but high productivity.

Afternoon:

An entrepreneur's actions at this stage depend on the choices made in the morning. If the choice was (M), the entrepreneur decides on an organization for risk diversification, i.e., either to join the stockmarket or to form a business group. The relevant transactions costs are incurred. If the choice was (T), the entrepreneur simply engages in production. The production process takes place at this stage.

Evening:

[11]We are content to permit risk sharing only through direct bilateral links because we wish to maintain a distinction between the business group as a product market diversification device and a closed-end investment fund which is an explicit financial services company.

Returns from production are realized. Dividends are disbursed to shareholders. Consumption of returns takes place.

3 Stockmarkets and Business Groups

There are a number of different scenarios that can emerge based on the framework described above. These are:

(A) Modern technology — Stockmarket — Consumption.

(B) Modern technology — Business Group — Consumption.

(C) Traditional technology ——— Consumption.

In this section we evaluate the payoffs from each of these scenarios.

Scenario A

Firm i evaluates whether to join the stockmarket given the choices of other firms that have decided to join. Suppose $n-1$ other firms are in the stockmarket. If i joins, the stockmarket will be constituted of n firms. Total stockmarket profits will then be $Y^A = \sum_{i=1}^{n} y_i$. The dividend that each member receives in the final period will be $d_i^A = \frac{Y^A}{n}$. The transaction cost associated with being a member is r. So the final period net expected utility will be [see the Appendix for details on this derivation],

$$U^A = E[u(d_i^A)] - r$$

or,

$$U^A = \mu k - \frac{a}{2}[\mu^2 k^2 + \frac{k^2\sigma^2}{n}] - r$$

Note that if a stockmarket is worthwhile for a subset $n \subseteq N$ of firms, it is worthwhile for all the firms. Therefore if a stockmarket emerges at all, it

will contain all N firms[12]. Because of this, in what follows we evaluate the payoff from a stockmarket containing N firms, i.e.,

$$U^A = \mu k - \frac{a}{2}[\mu^2 k^2 + \frac{k^2\sigma^2}{N}] - r \tag{1}$$

Scenario B

Let $c(i:j)$ denote the cost to i of a bilateral link with firm indexed j. Then[13],

$$c(i:1) = \frac{L}{2N} = c(i:N-1)$$

Since a firm will seek to minimize on the costs of link formation, links will be formed in a symmetrical fashion on either side of i. Thus, the difference between the number of links on the right and left of i will be no greater than one.

Let $c(i:1,N-1)$ denote the cost of link between i and the two closest firms. Then,

$$c(i:1,N-1) = c(i:1) + c(i:N-1) = \frac{L}{N}$$

Similarly,

$$c(i \ : \ 2) = \frac{L}{N} = c(i:N-2)$$

$$c(i \ : \ 2,N-2) = c(i:2) + c(i:N-2) = \frac{2L}{N}$$

and

[12]The paper by Marco Pagano (1993) explicitly makes this point.

[13]Note that in the interests of notational simplicity we are taking the ordering of firms in Figure 1 literally where firm i is firm N. A more general notation would be $C(i;i+1) = C(i;i-1)$.

$$c(i \ : \ 3) = c(i : N-3) = \frac{3L}{2N}$$
$$c(i \ : \ 3, N-3) = c(i:3) + c(i : N-3) = \frac{3L}{N}$$

and so on.

Suppose firm i establishes links with $g-1$ other firms. $g-1$ could be an even or an odd number. Assume that $g-1$ is even[14]. The number of firms on either side that i has links with is then $\frac{g-1}{2}$. Consequently, the total linkage cost that i bears is [see the Appendix for details on this derivation],

$$c(i \ : \ 1, N-1) + c(i:2, N-2) + c(i:3, N-3) + ... + c(i : \frac{g-1}{2}, N - \frac{g-1}{2})$$
$$= \frac{L\ (g^2-1)}{8N}$$

If firm i has bilateral links with $g-1$ other firms then it splits its profits evenly with all the firms, including itself. The dividend that each of these firms receives from i in the final period is thus $d_i^B = \frac{Y_i}{g}$. Similarly, the returns that i receives in the final period are $Y_i^B = d_i^B + d_2^B + d_3^B + ... + d^B_{\frac{g-1}{2}+1} + d^B_{N-1-\frac{g-1}{2}} + d^B_{N-1-\frac{g-1}{2}} + ... + d^B_{N-1}$. So the final period net expected utility will be [see the Appendix for details on this derivation],

$$U^B = E[u(Y_i^B)] - \frac{L\ (g^2-1)}{8N}$$

or,

$$U^B = \mu k - \frac{a}{2}[\mu^2 k^2 + \frac{k^2\sigma^2}{g}] - \frac{L\ (g^2-1)}{8N} \qquad (2)$$

[14]As remarked upon earlier, if there is asymmetry, it will be to the maximum extent of one. The analysis would need to be modified, but the change is not substantive and does not offer any new insights. We therefore proceed with the even number assumption.

$$= \mu k - \frac{a}{2}[\mu^2 k^2 + \frac{k^2\sigma^2}{g}] - \frac{2\pi r\ (g^2-1)}{8N}$$

where we use π to stand for the ratio of the circumference to the radius of the circle. We can use expression (2) to find the optimal size of the group. The value of g at which U^B is maximized is[15],

$$g^* = \left(\frac{ak^2\sigma^2 N}{\pi r}\right)^{\frac{1}{3}} \tag{3}$$

Substituting g^* in the expression for U^B given above yields the maximized value of net expected utility, U^{B*}. It is useful to think of the set of bilateral links that firm i possesses as business group i or $G[i]$ and the set of bilateral links that firm 1 possesses as $G[1]$ and so on. Figure 1 depicts these links.

Scenario C

If the entrepreneur chooses the traditional technology, there is nothing to be gained from diversification. Consequently, final period profit is simply $y_i = \gamma k$, for all i. Final period expected utility is,

$$\begin{aligned} U^C &= E(\gamma k) - \frac{a}{2}[(E(\gamma k))^2 + Var(\gamma k)] \\ &= \gamma k - \frac{a}{2}[\gamma^2 k^2] \end{aligned} \tag{4}$$

In order to ensure that this is always positive and thus that the traditional technology is preferred if there is no risk sharing we assume $1 \geq \frac{a}{2}\gamma k$.

[15]It is easy to verify that the second derivative is negative. Note also that since the number of links is an integer, we will take the closest integer value to g^*.

We also need to ensure that $g^* < N$. Under assumption (A1) – made below, this is satisfied for $N \geq 2$. See the appendix for a proof.

If we differentiate the final period payoffs in scenarios A and B with respect to intermediation costs, we obtain,

$$\begin{aligned} \frac{\partial U^B}{\partial r} &= -\frac{2\pi\ (g^2-1)}{8N} \\ \frac{\partial U^A}{\partial r} &= -1 \end{aligned}$$

This implies that if intermediation costs increase, the returns from both stockmarkets and business groups fall. Furthermore, if $\frac{2\pi\ (g^2-1)}{8N} < 1$ then the returns from stockmarkets fall faster.

This is actually a necessary (but not sufficient) condition for the payoff with a business group to be greater than that with a stockmarket, i.e., $U^B > U^A$. It is therefore useful to label it for subsequent reference as follows:

Condition (A1): $\frac{2\pi\ (g^2-1)}{8N} < 1$

Since the optimal size of the business group g^* is determined from basic parameters of the economy, **A1** is essentially a condition requiring that business groups are 'small' relative to the number of firms in the economy. If **A1** is violated a business group will never be preferred to a stockmarket. Because the business group is the focus of our inquiry, in the next section we assume **A1** holds. The analysis is straightforward when **A1** is violated and we discuss this situation at the end of the following section.

4 Modernization

We now analyze the subgame perfect equilibrium in technology and organization choice. An entrepreneur's technology and organization choice in

the morning will be based on the expected payoff that the different scenarios yield in the evening.

Equating the payoff from the business group with that from the stock-market, $U^B = U^A$, yields,

$$r = \frac{2ak^2\sigma^2(N - g^*)}{g^*(4N - \pi(g^{*2} - 1))} \tag{5}$$

Call this value r^*. This represents the level of intermediation costs at which an entrepreneur is indifferent between a business group and a stock-market. We will use $\widetilde{r}$ to refer to the prevailing value of intermediation costs in the economy in order to differentiate it from r^*.

It is useful, at this stage to graph the payoff functions U^A, U^B and U^C. There are two possibilities, depending on whether U^C is greater than or less than $U(r^*)$. Figures 2 and 3 depict these two situations.

[Figures 2 and 3 should be about here]

Modernization through the stockmarket: Figure 2

Consider a situation where the indifference point between stockmarkets and business groups corresponds to a lower level of utility than that obtainable under traditional technology, i.e., $U^C > U(r^*)$ implying that $r^A > r^*$.

As the prevailing value of intermediation costs fall, say because of developments in financial intermediation, at some point it becomes worthwhile to switch from the traditional sector to the industrialized sector. This takes place at the point where $U^C = U^A$, i.e.,

$$r^A = k(\mu - \gamma) - \frac{a}{2}[k^2(\mu^2 - \gamma^2) + \frac{k^2\sigma^2}{N}] \tag{6}$$

In this case the transition is from the traditional economy to the modern economy directly through the adoption of stockmarkets.

Modernization through business groups: Figure 3

Consider a situation where the indifference point between stockmarkets and business groups corresponds to a higher level of utility than that obtainable under traditional technology, i.e., $U^C < U(r^*)$ implying that $r^* > r^A > r^B$.

In this case, the transition is from the traditional economy to the modern economy through the establishment of business groups, at the point where $U^C = U^B$, i.e.,

$$r^B = \frac{8N}{2\pi(g^{*2} - 1)}\left[k(\mu - \gamma) - \frac{a}{2}[k^2(\mu^2 - \gamma^2) + \frac{k^2\sigma^2}{g^*}]\right] \tag{7}$$

However, as we move to lower levels of intermediation costs, at r^* stockmarkets become preferable and the business group is abruptly rendered obsolete.

r^B defines the minimal size of the business group, through the function g^* (equation (3)). Since g^* is decreasing in r, as r falls, say because of developments in financial intermediation, we find that business groups actually expand in size before finally becoming obsolete at r^*. Maximal group size is thus defined by $g^*(r^*)$.

The intuition for this is that, as intermediation costs fall, business groups are able to incorporate more firms, thereby improving the benefits they yield from diversification. The stockmarket of course enables the greatest diversification, but the intermediation costs involved are still larger than these benefits until the intermediation costs fall sufficiently.

It is useful to summarize the preceding analysis in the form of the following propositions.

Proposition 1:

Under (A1) and $U^C > U(r^*)$ the economic transition to modernization takes place directly through the emergence of a stockmarket: When $r^A > r^*$, if prevailing intermediation costs cross $r^A = k(\mu - \gamma) - \frac{a}{2}[k^2(\mu^2 - \gamma^2) + \frac{k^2\sigma^2}{N}]$, entrepreneurs adopt modern technology and diversify their risks through the stockmarket.

Proposition 2 (a):

Under (A1) and $U^C < U(r^*)$ the economic transition to modernization takes place through the emergence of business groups: When $r^* > r^A > r^B$, if prevailing intermediation costs cross $r^A = k(\mu - \gamma) - \frac{a}{2}[k^2(\mu^2 - \gamma^2) + \frac{k^2\sigma^2}{N}]$, entrepreneurs adopt modern technology and diversify their risks through a business group.

Proposition 2 (b):

Under (A1) and $U^C < U(r^*)$ i.e., $r^* > r^A > r^B$, *after the economic transition to modernization through the emergence of business groups has taken place, a further reduction in prevailing intermediation costs increases the size of the business group until they are abruptly rendered obsolete by the stockmarket:* $\frac{\partial\, g^*(r)}{\partial r} < 0$ *and for* $r < r^*$, $U^B < U^A$.

5 Market Concentration: Comparative Statics on the Graph

We now turn our attention toward the effects of increasing the number of firms in the economy. We first examine how the stockmarket can takeoff in a situation where the prevailing level of intermediation costs are unaffected by the entry of more firms. We then allow intermediation costs to be positively related to market concentration[16].

5.1 Exogenous Information Costs

If we apply the implicit function theorem to the condition $U^B = U^A$ we find that $\frac{\partial r^*}{\partial N}$ is positive or negative depending on whether $[\pi r(g^{*2} - 1) - 4k^2\sigma^2]$ is negative or positive respectively [see the Appendix for more details]. Since g^* is a positive function of the number of firms N, this effectively translates to a condition on the number of firms in the economy. We can interpret the condition as follows.

[16]While recognizing N is an integer, for the purpose of the comparative static exercise we take it to be continuous.

If the number of firms is 'small', $\frac{\partial r^*}{\partial N}$ will be positive. In this event, an increase in the number of firms increases the critical level of intermediation costs at which an entrepreneur is indifferent between a stockmarket and a business group. If however, the number of firms is 'large', $\frac{\partial r^*}{\partial N}$ will be negative implying that an increase in the number of firms decreases the critical level of intermediation costs at which an entrepreneur is indifferent between a stockmarket and a business group. We consider each of these situations in turn.

Case (i): Suppose parameter configurations are such that $\frac{\partial r^*}{\partial N} > 0$.

Both $\frac{\partial U^A}{\partial N}$ and $\frac{\partial U^B}{\partial N}$ are positive. Then, as N increases the intersection point of U^A and U^B moves up and to the right, i.e., in the northeast direction. Holding the prevailing level of intermediation costs in the economy ($\widetilde{r}$) fixed, if r^* rises sufficiently until it equals $\widetilde{r}$, business groups will be rendered obsolete, with the stockmarket emerging as preferred instead.

Notice that $\frac{\partial g^*}{\partial N} > 0$. In other words, as the number of firms increases the optimal business group increases in size. Interpreted in combination with the previous result, this implies that business groups will actually become larger before abruptly becoming obsolete. This result is similar in flavor to Proposition 2(b), though now the driving force is the decrease in market concentration.

Case (ii): Suppose parameter configurations are such that $\frac{\partial r^*}{\partial N} < 0$

In this case, since $\frac{\partial U^A}{\partial N}$ and $\frac{\partial U^B}{\partial N}$ are positive, as N increases the intersection point of U^A and U^B moves up and to the left, i.e., in the northwest direction. If prevailing intermediation costs in the economy were such that stockmarkets were initially preferred, as the number of firms in the economy

increases, r^* could fall sufficiently until business groups are actually better.

The implication obtained from combining (i) and (ii) is that if the economy starts from a situation with a small number of firms, an increase in the number of firms causes business groups thrive and expand. At a critical value, say N^* when r^* equals the prevailing value $\widetilde{r}$ they abruptly become obsolete in favor of the stockmarket. However, if market concentration decreases further, stockmarkets may be rendered obsolete by business groups.

This is because as market concentration decreases the increase in firm density makes bilateral link formation easier. However if prevailing coordination costs remain the same, the cost of joining the stockmarket remains unchanged. Consequently, business groups look increasingly attractive. Figure 3 provides a graphic illustration of what this process looks like.

We can state the previous analysis in terms of the following proposition.

Proposition 3:

If we hold fixed the prevailing level of intermediation costs ($\widetilde{r}$), and if the initial number of firms in the economy is small, a decrease in market concentration is accompanied by an increase in the size of the business group before the business group is abruptly rendered obsolete by the stockmarket. However, if market concentration continues to decrease the economy may switch back to business groups: If $\frac{\partial r^*}{\partial N} > 0$, then as N increases, business groups expand until they are dominated by the stockmarket. But if $\frac{\partial r^*}{\partial N} < 0$, then as N increases, business groups may dominate the stockmarket.

5.2 Endogenous Information Costs

From an empirical standpoint, an serious caveat to Proposition 3 stems from the realization that the level of intermediation costs in an economy are usually endogenous to the number of firms. More firms in the economy make it easier to surmount the fixed costs associated with financial intermediation (See Jeremy Greenwood and Boyan Jovanovic (1990)). This "thick-market" effect facilitates the development of financial intermediation and a consequent reduction in intermediation costs. It therefore seems reasonable to assume development in financial intermediation displays increasing returns in the number of firms. This consideration can be made part of the model by permitting the prevailing level of intermediation costs to become a function of the number of firms in the economy, through a function of the form $\widetilde{r} = \phi(N), \phi' < 0$. In terms of figure 3, this implies $\widetilde{r}$ moves to the left as the number of firms in the economy increases. In conjunction with the arguments of the previous subsection, as more firms enter the economy, r^* and $\widetilde{r}$ move toward each other, making business groups obsolete sooner.

Whether case (ii) will come to pass is ultimately an empirical matter and depends on the nature of the function $\phi(N)$, but making the prevailing intermediation costs a decreasing function of N makes it less convincing.

Violation of A1

When condition A1 is violated, $U^B < U^A$. Business groups will never be preferred to the stockmarket. As intermediation costs fall, the economic transition is from a traditional economy to a modern economy through the emergence of a stockmarket. Figure 5 depicts this situation.

6 Discussion

In the presence of serious information problems it may be difficult for a well-functioning stockmarket for the diversification of risk to emerge. Because the shift to modern, high productivity technology is risky, the economy may consequently remain trapped with its traditional low-productivity methods of production. In such a situation, the formation of a business group, and the risk sharing that goes with it, may be one means of escape. Precisely because intermediation problems may be more manageable at a bilateral level between firms, business groups can be organizations that facilitate modernization when the stockmarket cannot.

A stockmarket, of course affords much better risk sharing on account of its scale than a business group. It would therefore be best if the economy could move to a situation where these groups are obsolete. Within the model, there are two ways this can happen. One is through the obvious improvement in institutional infrastructure that reduces intermediation costs. The way this operates is that it reduces the costs associated with joining the stockmarket. This eases the coordination problem associated with the stockmarket, enabling it to take off. A second path is through an increase in the number of firms in the economy. More firms increase the attractiveness of both the stockmarket and the business group, but in different ways. An increase in firm density in the economy implies lower intermediation costs in bilateral link formation. It is easier to form and sustain larger groups. However, the scale of diversification obtainable from a full-fledged stockmarket increases, and these benefits eventually tip the balance in its favor.

Because the benefits of a business group improve with an increase in the number of firms in the economy, we obtain the somewhat surprising result that business groups actually expand in size and benefits before abruptly being rendered obsolete by a full-fledged stockmarket. We find that this also happens if infrastructure improves to reduce intermediation costs, though for a slightly different reason. A reduction in the costs of link formation makes it easier to form links with more firms that constitute the business group, improving its diversification possibilities. However, at some critical level of costs it is worthwhile to go all the way and form a stockmarket instead.

Realistically, the scale of a business group will always be much smaller than that of a full-fledged stockmarket. A well functioning stockmarket brings with it much better diversification opportunities. Better diversification leads to greater capital accumulation, more investment and faster economic growth (See Ross Levine and Sara Zervos, (1998), Raghuram Rajan and Luigi Zingales, (1998)). Moreover, although for reasons of focus we have ignored this in the paper, stockmarkets also perform an important role with regards to the raising of finance for investment purposes. An important policy question is therefore, how to foster a well functioning stockmarket?

Keeping to the model of this paper, a business group is not coalition-proof[17]. This implies that since the firms can freely communicate with each other, once the stockmarket emerges as a more efficient organization we should observe a wholesale shift to the stockmarket.

But from a political economy perspective, it is important to realize that even when a business group has become obsolete it may fail to disappear from

[17]See B. Douglas Bernheim, Bezalel Peleg and Michael D. Whinston (1987).

the organizational landscape. The theory in this paper has kept to purely economic arguments[18], but vested interests and political patronage may play a role in their persistence. If business groups continue they may retard the functioning of the stockmarket. There is empirical evidence that in many developing countries, stockmarkets, such as they do exist, are atrophied, with limited flotation and few firms listed (See Gonzalo Castañeda (1998) for the Mexican case and Katherina Pistor (1999) for the Czech Republic, Hungary and Poland). To this end, we feel that the rich set of configurations described in the paper provides a foundation for interesting empirical work in this area.

This brings us full circle to the first set of (political) arguments that we presented in the introduction about the existence of business groups and that we chose not to focus on in the paper. It has been suggested that perhaps radical reform in the legal sphere, such as has been proposed in some countries with regards to corporate governance and minority shareholder rights will provide the momentum to overcome these forces[19]. However, it is worth recognizing that reform of one aspect of the economy while serious distortions still persist in others, may be counterproductive. Caution is therefore in order.

[18]We have focused solely on the risk diversification aspect, but there can be, of course, other economic functions that business groups perform. In situations with imperfect markets for labor and capital, business groups are able to act as surrogate labor markets and venture capitalists. See Tarun Khanna & Krishna Palepu, (1997) for more detailed arguments. Further theoretical work will try to explicitly account for these functions.

[19]See for example *Institutional Modernization for Effective and Adaptive Corporate Governance,* OECD 1997 report.

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Appendix

1. Scenario A

$$U^A = E[u(d_i^A)] - r$$

$$E[u(d_i^A)] = E(d_i^A) - \frac{a}{2}[(E(d_i^A))^2 + Var(d_i^A)]$$

$$E(d_i^A) = E[\frac{Y^A}{n}] = \frac{1}{n}E[\sum_{i=1}^{n} y_i] = \frac{n\mu k}{n} = \mu k$$

$$Var(d_i^A) = Var(\frac{Y^A}{n}) = \frac{Var(\sum_{i=1}^{n} y_i)}{n^2} = \frac{nk^2\sigma^2}{n^2} = \frac{k^2\sigma^2}{n}$$

Then,

$$U^A = \mu k - \frac{a}{2}[\mu^2 k^2 + \frac{k^2\sigma^2}{n}] - r$$

2. Scenario B

Linkage Costs

$$\begin{aligned} c(i:1,N-1) + c(i:2,N-2) + c(i:3,N-3) + ... + c(i:\frac{g-1}{2}, N-\frac{g-1}{2}) \\ = \frac{L}{N} + \frac{2L}{N} + \frac{3L}{N} + ... + \frac{(g-1)L}{2N} \\ = \frac{L}{N}[1+2+3+...+\frac{g-1}{2}] \\ = \frac{L}{N}[\frac{\frac{g-1}{2}(\frac{g-1}{2}+1)}{2}] = \frac{L\,(g-1)(g+1)}{8N} \\ = \frac{L\,(g^2-1)}{8N} \end{aligned}$$

Final Period Utility

$$U^B = E[u(Y_i^B)] - \frac{L\,(g^2-1)}{8N}$$

$$E[u(Y_i^B)] = E(Y_i^B) - \frac{a}{2}[(E(Y_i^B))^2 + Var(Y_i^B)]$$

$$E(Y_i^B) = E[d_i^B + \sum_{j=2}^{\frac{g-1}{2}+1} d_j^B + \sum_{j=N-1-\frac{g-1}{2}}^{N-1} d_j^B] = \frac{g\mu k}{g} = \mu k$$

$$Var(Y_i^B) = Var(d_i^B + \sum_{j=2}^{\frac{g-1}{2}+1} d_j^B + \sum_{j=N-1-\frac{g-1}{2}}^{N-1} d_j^B) = \frac{gk^2\sigma^2}{g^2} = \frac{k^2\sigma^2}{g}$$

3. Verifying $g^* < N$.

   From (A1) we obtain $g < (\frac{4N}{\pi} + 1)^{\frac{1}{2}}$.

   For $N \geq 2$, $N - (\frac{4N}{\pi} + 1)^{\frac{1}{2}} > 0$. Hence under (A1), $g < N$.

4. Technology and Modernization

$$\begin{aligned} U^B &= U^A \\ \mu k - \frac{a}{2}[\mu^2 k^2 + \frac{k^2\sigma^2}{g}] - \frac{2\pi r\ (g^2-1)}{8N} &= \mu k - \frac{a}{2}[\mu^2 k^2 + \frac{k^2\sigma^2}{N}] - r \\ r &= \frac{2ak^2\sigma^2(N-g^*)}{g^*(4N - \pi(g^{*2}-1))} \end{aligned}$$

5. **Market Concentration**

   Let $Z(r, N) = U^B - U^A$.

   $\frac{\partial Z}{\partial r} = \frac{\partial U^B}{\partial r} - \frac{\partial U^A}{\partial r} = -\frac{2\pi\ (g^2-1)}{8N} + 1 > 0$, under **A1.**

   $\frac{\partial Z}{\partial N} = \frac{\partial U^B}{\partial N} - \frac{\partial U^A}{\partial N} = \frac{2\pi r\ (g^2-1)}{8N^2} - \frac{k^2\sigma^2}{N^2} = \frac{2}{8N^2}\ [\pi r\ (g^2-1) - 4k^2\sigma^2]$

   By the implicit function theorem, $\frac{\partial r}{\partial N} = -\frac{Z_r}{Z_N}$ where Z_r and Z_N are the partial derivatives with respect to r and N respectively.

Hence, $\frac{\partial r}{\partial N} \lesseqgtr 0$ depending on whether $[\pi r\ (g^2-1) - 4k^2\sigma^2] \gtreqless 0$.

Since g^* is a positive function of the number of firms N, if the number of firms is 'small',$[\pi r\ (g^2-1) - 4k^2\sigma^2] < 0$,implying $\frac{\partial Z}{\partial N} < 0$ and thus$\frac{\partial r^*}{\partial N} > 0$. Similarly, if N is 'large', $[\pi r\ (g^2-1) - 4k^2\sigma^2] > 0$,implying $\frac{\partial Z}{\partial N} > 0$ and thus$\frac{\partial r^*}{\partial N} < 0$.

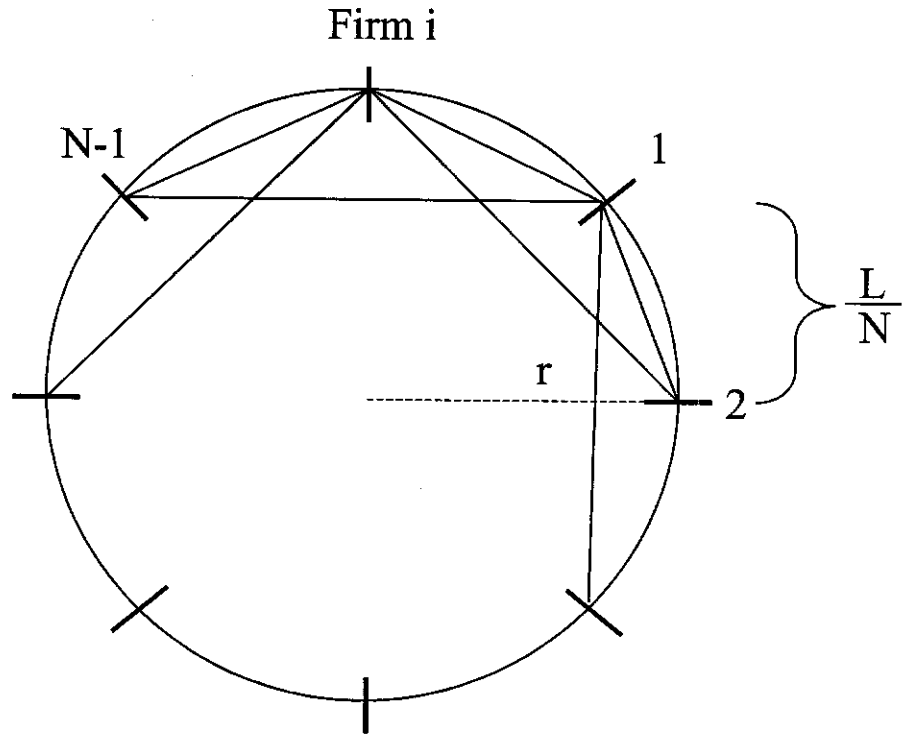

Figure 1

Figure 1:

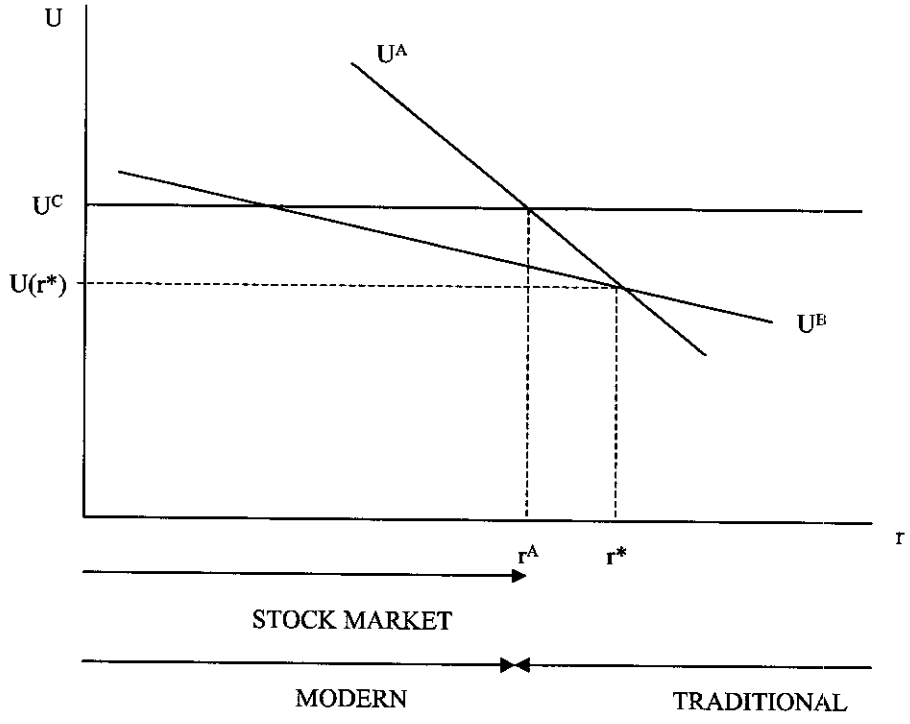

Figure 2

Figure 2:

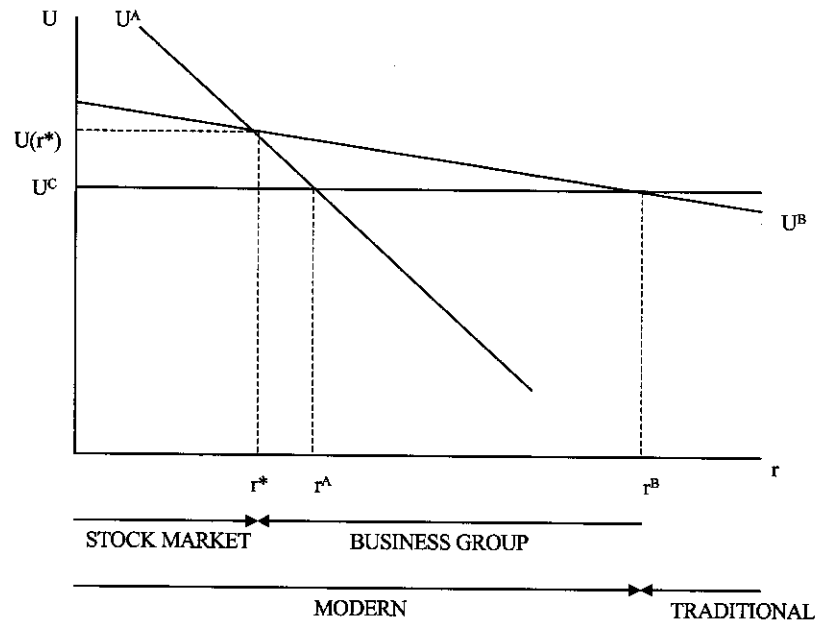

Figure 3

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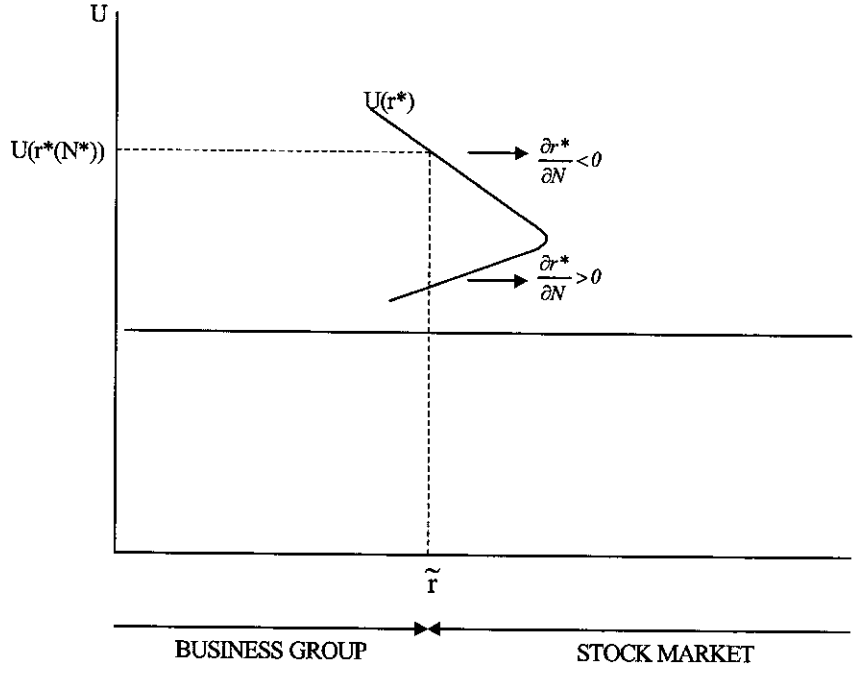


Figure 4

Figure 4:

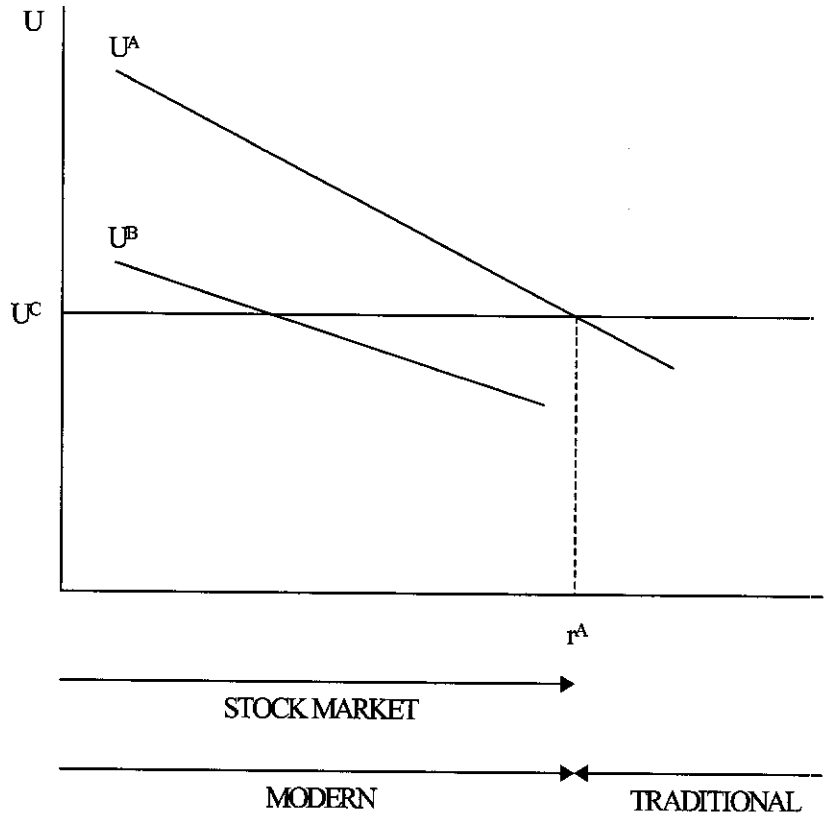


Figure 5

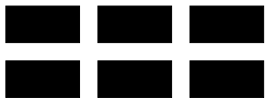
Figure 5:

Table 1: The Ubiquity of Diversified Business Groups

This table lists some of the many sources on business groups in a range of economies, while intending no representation that this is a comprehensive list. In addition, sources which discuss the general phenomenon of diversified business groups include: Leff (1976), Amsden and Hikino (1994) and Granovetter (1994). For a discussion particular to the numerous groups controlled by the Overseas Chinese in Asia, see EAAU (1995); for general discussions of groups in Asia, see Kunio (1988: especially Appendix 2), and McVey (1992). Table excerpted from Ghemawat and Khanna (1998).

Belgium	Daems (1977)
Chile	Zeitlin et al (1974), Majluf et al (1996)
Costa Rica	Strachan (1976)
Hong Kong	Knoop and Yoshino (1995)
France	Jacquemin & Ghellinck (1980), Encaoua & Jacquemin (1982)
India	Herdeck & Piramal (1985), Khanna & Palepu (1997), Piramal (1996)
Indonesia	Robison (1986), Schwartz (1992)
Japan	Caves & Uekusa (1977), Goto (1982), Hoshi et al (1991), Weinstein & Yafeh (1995)
Malaysia	Ling (1992), Khanna et al (1996)
Mexico	Strachan (1976), Camp (1989)
Nicaragua	Strachan (1976)
Pakistan	White (1977)
Philippines	Hawes (1992)
Russia	Blasi et al (1997)
South Korea	Chang & Choi (1998), Amsden (1989, 1996)
Taiwan	Wang (1992)
Thailand	Suehiro (1992)

Figure 6:



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