INSTITUTIONAL INVESTORS, STOCK MARKETS AND FIRMS' INFORMATION DISCLOSURE

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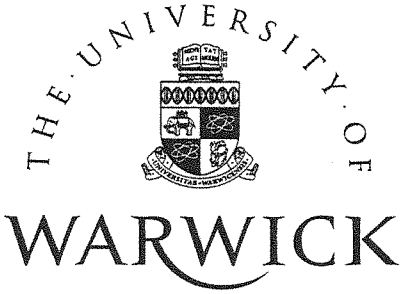

DEPARTMENT OF ECONOMICS

INSTITUTIONAL INVESTORS, STOCK MARKETS AND FIRMS' INFORMATION DISCLOSURE

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Institutional investors, stock markets and firms' information disclosure*

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Abstract

This paper argues that a mutual relationship exists between the development of institutional investors, and more specifically the development of pension funds, and the development of stock markets. It is shown that the development of pension funds promotes the development of stock markets directly through bargaining or indirectly through improving funds allocation efficiency. Growth is eventually achieved through a larger number of firms listed on the stock exchange and with firms disclosing a larger volume of information. This in turn, positively affects the development of pension funds and corporate governance mechanisms.

JEL classification code: G1, G23.
Keywords: Financial development, pension funds, stock markets, information disclosure.

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Introduction

The vast majority of the literature on financial development and economic growth suggests a positive relationship, and often causality, between development and growth.[1] This is likely to be the case as: financial markets promote the mobilisation of savings by reducing transaction costs and through the agglomeration of capital from different savers; they facilitate the efficient allocation of resources through the collection of information on alternative projects; they promote more efficient risk management through trading, hedging, diversification or pooling; they promote the creation of more effective schemes of corporate governance; they facilitate the exchange of goods and services through the promotion of specialisation (Levine 1997).

In this framework, the developments of stock markets and institutional investors are argued to be closely related. Stock markets are expected to perform three main roles. 1) Stock markets provide long-term finance to firms. Levine and Zervos (1995), argue that stock market size and integration are positively linked to growth as efficient stock markets represent a means to attract long-term and cheap equity finance to attract foreign capital as a circuit for transferring know-how and to improve resource allocation. Furthermore, liquidity is important for growth as this allows long-term investments to be undertaken without investors needing to relinquish the control of their savings for long periods of time. Hence, the absence of a stock market can be seen as an "internal" constraint for the financial sector and economy-wide development. 2) Stock markets provide evaluation of the financial information produced by firms as these are likely to compete for cheap equity finance by providing information on their expected value (Dhaliwal 1979, Diamond 1985, Diamond and Verrecchia 1991). 3) Stock markets promote the devel-

[1]The literature on financial development and economic growth is immense and it provides us with conflicting results, especially on the issue of causality from development to growth. For comprehensive surveys of theoretical, empirical and policy literature see: de Gregorio and Guidotti 1995; Fry 199; Levine 1997 and Mayer and Vives 1992. A stimulating survey of the different approaches to financial development and growth recently appeared in the controversy section of the Economic Journal with contributions from Fry (1997), Singh (1997) and Arestis and Demetriades (1997).

opment of effective schemes of corporate governance. Holmstrom and Tirole (1990, 1995) argue that liquid stock markets, by facilitating shareholders' exit and lively take-over activity, improve corporate governance. Alternatively, that information in stock prices allows for effective managerial schemes to be implemented as efficient stock markets make it easier to link manager compensation to stock performance.[2]

The development of institutional investors can contribute to the development of stock markets with potential benefits related to the distribution asset in investment portfolios skewed towards equities, to allocation efficiency due to institutionalisation, to financial innovation, to the promotion of specialised intermediaries providing financial services and finally to corporate governance. In this paper only pension funds are taken into consideration. It is argued that their development is likely to have a larger impact on stock markets than the development of other institutional investors. This because pension funds benefit from a constant flow of funds from contributors due to legal and/or contractual arrangements and they have particularly long liabilities as benefits are only distributed at the time of retirement. Although constant flow of funds and long-term liabilities are also characteristics of certain close-end investment funds, pension funds tend to be the largest institutional investors in countries with no Pay-as-you-go pension schemes.[3]

The mutual relationship between pension funds and stock markets relates the fact that the former benefit from the brokerage services of the latter and their development represents an increase in the demand for such services which are crucial to address pension funds portfolio policies.

> "*However, existing theories have not yet assembled the links of the chain from the functioning of the stock markets, to information acquisition, and finally to aggregate long-run growth*" (Levine 1997, page 695).

In this paper I develop a model that assembles the links of the chain

[2] For criticisms on the role of stock markets, see Davis 1995 and Mayer and Vives 1992.

[3] For a comprehensive survey of the impact of institutional investors on stock markets, with focus on pension funds, see Davis 1995.

from the functioning of the stock market to information acquisition, and finally to aggregate long-run growth. In the model outlined in the next section I formalise how the mutual relationship between the development of institutional investors, and more specifically of pension funds, and the development of stock markets is based on increasing information disclosure on the part of firms. This, in turn, is likely to promote the emergence of effective schemes of corporate governance and improve market efficiency. Growth is eventually achieved through a larger number of firms listed on the stock exchange.

Section 1 introduces the model. Section 1.1 uses a signalling model to justify firms' incentive to disclose information.. Section 1.2 models the role of stock markets in the provision of equity finance and , Section 1.3 models the behaviour of pension funds. Conclusions follow in section 2.

1 The model

The model analyses the relationships among three sets of agents: a continuum of firms, a stock market and pension funds. The complex interactions among these agents are simplified to highlight the impact on the creation of information on the part of firms. Such information is processed by the stock market and then sold to pension funds against long-term equity finance. The fundamental assumption made here is that long term equity finance favours economy-wide growth and that information disclosure improves on the one hand corporate governance as it offsets the possible negative impact on governance of institutional investors portfolio policies; on the other hand it facilitates risk diversification policies of pension funds and therefore, it promotes their development. Improved governance, together with the increased efficiency represented by the development of pension funds, can lead in turn to a decrease in the cost of capital with positive feedback on economy-wide growth through its impact on the supply and demand for long term finance.

1.1 Firms

In the economy there is a continuum of risk neutral, profit maximising firms uniformly distributed[4] over the interval $H = [0, 1]$. Firms differ only by the quality of their management which is translated into firms having a constant but different probability of bankruptcy h at any given time. Firms' individual types (realisation of h) cannot be observed by investors nor can firms alone credibly inform investors about the quality of their management and only the distribution of types is public information.

Firms see the possibility of running a project which will increase their gross revenue flow to X during their infinite lifetime horizon. Given a safe rate of interest r, the expected present value of the gross revenues from the project for an h type firm is then given by $\frac{X}{r+h}$. The investment needed to run the project is fixed and indicated by I. Firms' internal resources are not sufficient to fund the investment project and external finance, sought by floating on the local stock market, is required.[5] Equity finance is provided by risk neutral investors against a claim share $s \in [0, 1]$ on the expected present value of the firm.

The banking sector is not explicitly modelled here. Its introduction would not affect the level of information possessed by investors about firms types as the information gathered by banks through their ongoing credit relationships with borrowers is private to banks and not likely to be transferred. This would suggest that banks have a comparative advantage in servicing firms with which they have an ongoing relationship. Nevertheless, a few arguments can be put forward for why certain firms may prefer equity finance to banks' loans.[6] Bank lending indirectly reveals information about borrowing firms

[4]The use of the uniform distribution simplifies the treatment of the model without limiting the generality of results.

[5]This assumption can be justified by taking on board that firm financing decisions follow some sort of pecking order model (Myers, 1984). The least-cost source is retained earnings, followed by debt and equity issues. Banks are not likely to lend for infinite horizon projects. Local stock market is third up in the financing source list if we assume that firms are likely to meet higher signalling costs to inform foreign than local investors about their investment opportunities.

[6]The literature on firms financing decision is immense. Seminal contributions in this

and this may decrease the transaction costs of equity finance. Rajan (1992) argues that borrowers who anticipate a sequence of profitable future projects would prefer "arms-length" financing to bank borrowing. This is because bank lending is dictated by borrowers' previous loan repayment behaviour while equity financing, in this sense, is more "forward looking". Finally, bank lending may be an unsuitable financing tool for highly risky projects with a long term horizon, or when market institutions are in a transition period.[7]

The lack of knowledge about inside investor opportunities causes share prices to reflect the market's perception of firms' investment rather than the firms' true quality. Therefore, in competing for investors' funds, firms (especially good firms) have an incentive to signal their type in order to reduce the cost of equity finance. Such variable costs[8] are met by internal resources and indicated by i. The reason for introducing signalling costs is that one of the functions of stock markets is to evaluate firms and new investment projects; the variable i, allowed to vary across types, synthesises both the costs and the level of information produced by firms before equity transactions take place. In this sense, the production of information is seen as a necessary condition for firms to be listed on the stock exchange.

Hence, the expected present value of an h type firm is simply:

$$V(h,i) = [1 - s(h)] \frac{X}{r+h} - i \tag{1}$$

where $s(h) = (r+h)\frac{I}{X}$ is the capital share that an h type firm needs to sell in order to obtain the equity finance I.[9]

area of research are: Battacharya and Thakor 1992, Chan Siegel and Thakor 1990, Diamond 1989, Rajan 1992.

[7]This issue is particularly relevant in the transition economies of Eastern Europe where the highly unstable economic environment may require more flexible financing tools than bank loans.

[8]Even if floating costs are fixed for all firms, this allows for the possibility that better firms may want to sustain higher pre-floating costs (by choosing better audit firms to analyse their books, for instance) in order to present themselves to investors as better investment.

[9]The same set-up can be re-interpreted as a problem of a single firm facing a continuum of projects ranked according to their probability of failure $h \in [0,1]$. In this situation the unique firm would choose a different levels of signal i according to which project is financed.

Notice that (1) implies that the expected value of a bad firm is lower than the expected value of a good firm. This because for any given level of signal, good firms discount time at a lower rate (they are more patient) and since $\frac{\partial s}{\partial h} > 0$, good firms pay a lower premium than bad firms on the same level of finance I. Furthermore, it follows that the share price of good firms is higher than the share price of bad firms. This because the amount of shares sold against I can be seen as a firm's cost of capital. Hence, $s(h)^{-1}$ can be interpreted as the price at which a type h firm is selling its shares.

1.1.1 Separating equilibrium

When the stock market performs its informational function any pooling equilibrium is unstable as better types can use the signal i to reveal themselves to investors and lower their cost of capital. In our simplified world the stock market performs its informational function when it provides a mechanism to reveal the signal i of every firm h to investors. For the moment I will assume that such activity is costless; later on, this will be relaxed and results compared.

Firms use the signal i to reveal information about their type and investors observe the signal and form an inference about types. A separating equilibrium exists when types are correctly inferred and no type has incentive to mimic anybody else in equilibrium. The existence and uniqueness of signalling equilibrium in games with incomplete information and a continuum of agents has been considered by Mailath (1987). Let $\phi(i)$ be the differentiable and invertible function that maps each possible investors' inference $\phi \in [0,1]$ about type h for any strategy i. Each firm, with true type h, decides the optimal level of signal to produce by solving the following maximisation problem:

$$\max_{i(h)} V(h,i,\phi) = [1 - s(\phi(i))] \frac{X}{r+h} - i \tag{2}$$

subject to a non-negative firm's value participation constraint.[10]

[10]The participation constraint for firms is given by $X \geq (I+i)(r+h)$. The possibility of firms selling more than 100 per cent of their shares is here excluded as this would imply making negative profits. I implicitly assume that firms' investment decision follow some

The maximisation of firms' value yields the following first order condition:

$$\frac{\partial V}{\partial i} + \frac{\partial V}{\partial \phi}\frac{d\phi}{di} = -1 - \frac{I}{r+h}\phi'(i) = 0 \tag{3}$$

which has a very intuitive explanation. By choosing i, firms affect their value directly and also indirectly by modifying investors' perception of their type.

In a signalling equilibrium, investors correctly infer firms' type so $h = \phi(i)$. Hence, the differential equation in (3) can be solved to yield the equilibrium inference function. The inference function correctly reveals individual firms type h to investors once i is signalled and therefore, its inverse is the signalling function that yields the optimal level of signal produced by each individual firm. Thus:

$$i(h|h_m) = I\log\left(\frac{r+h_m}{r+h}\right) \tag{4}$$

The marginal type h_m, being the worst type in the equilibrium, has no incentive to separate himself from the other firms: i.e. $i(h_m|h_m) = 0$. Therefore, it makes zero profits: i.e. $V(h_m, 0) = 0$. This, in turn, guarantees that the equilibrium is incentive compatible. As a matter of facts if $V(h_j|h) = [1 - s(h)]\frac{X}{r+h_j} - i(h|h_m)$ is the value of a h_j type firm mimicking any other h type, then $\frac{\partial V(h_j|h)}{\partial h} = 0 \; iif \;\; h = h_j$ and $\frac{\partial^2 V(h_j|h)}{\partial h^2} < 0$. In other words, the value (profit) of a firm is maximised only when firms do not mimic other types.

Proposition 1 *The volume of firms' information disclosed in the economy is an increasing function of the heterogeneity of types in the economy.*

Proof. $\frac{\partial}{\partial z}\int_0^z i(h|z)dh = I\frac{z}{r+z} > 0$. ■

This has an important consequence for the development of financial markets: the larger the number of firms listed on the stock exchange, the larger the volume of information available in the economy. This is likely to have positive effects on investors portfolio policies and corporate governance schemes.

type of Tobin-Q model (Brainard and Tobin, 1968).

1.2 The stock market

In this section I relax the assumption of costless stock market evaluation of firms. One of the two main services provided by financial intermediaries is brokerage (the other being qualitative asset transformation) and the assumption of costless provision of transactions services, financial advice, screening, certification *et cetera* is simply non-realistic.

In the presence of information processing costs, a stock market has an incentive to limit the entry of firms on the stock exchange listing to the most "profitable" firms. Firms with a high hazard rate produce a low level of signal in equilibrium and this signal may too low to produce enough revenues to cover the processing costs. Since firms with a high hazard rate have also low expected profits, the stock market can exclude these types by imposing an entry fee that cannot be afforded by the bottom end of the distribution of firms. For simplicity, this non-competitive behaviour is here analysed for the extreme case when the stock market acts as a monopolist.

Let's indicate with $\xi(z) = \frac{X}{r+z} - I$ the entry fee charged to all listed firms; the functional form of the entry fee can be derived from the expected value of the optimal marginal type z.[11] Let us also assume for simplicity that the stock market faces linear information processing costs with constant marginal costs C. Then, the profit maximisation problem of the stock market can be written as:

$$\max_{z} \pi_{sm}(z) = \int_{0}^{z} [i\,(h|z) + \xi\,(z) - C]dh \tag{5}$$

where $z \in [0,1]$ and $i\,(h|z) = I \log\left(\frac{r+z}{r+h}\right)$.

The maximisation of (5) yields the following first order condition that defines the optimal marginal type z^* for the stock market:[12]

$$\left(\frac{X}{r+z^*} - I\right)\frac{r}{r+z^*} = C \tag{6}$$

[11] The problem of establishing the optimal entry fee is tantamount to establishing the optimal entry level and hence, the optimal marginal type.

[12] The second order condition is verified as: $\frac{\partial^2 \pi_{sm}}{\partial z^2} = \left(I - \frac{2X}{r+z}\right)\frac{r}{(r+z)^2} < 0$.

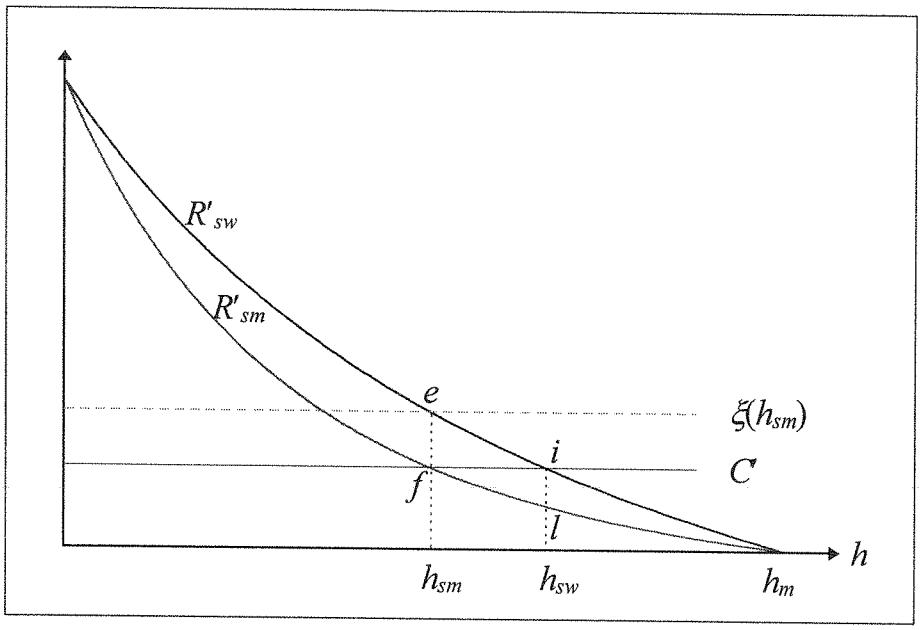

Figure 1: Stock market and welfare maximiser solutions.

The left hand side and right hand side of (6) are the stock market marginal revenues R'_{sm} and marginal costs C respectively.

Proposition 2 *A non competitive stock market with positive information processing costs limits the number of firms' listed on the stock exchange.*

Proof. In the absence of information processing costs, the solution to (6) is $(r + z^*) = \frac{I}{X}$ which, through the zero profit constraint $V(z^*, 0) = 0$ identifies the marginal type h_m. Hence, when $C > 0$ the solution to (6) is $z^* = h_{sm} < h_m$. ■

The solution just derived is illustrated in figure 1, where the stock market equates marginal revenues to marginal costs at f, it charges an entry fee $\xi(h_m)$ and it limits entry to h_m. Limited entry, together with proposition 1, implies that a lower volume of information is produced in the economy. This is likely to have a negative impact on investors' ability to diversify risk and on the effectiveness of corporate governance schemes based on firms' information.

1.2.1 Limited entry and social welfare

The inefficiency of the solution just derived can be analysed from a social welfare point of view.

Proposition 3 *A social welfare maximiser allows more firms than the stock market to be listed on the stock exchange.*

Proof. Let

$$SW(z) = \int_0^z \{s(h)\frac{X}{r+h} - I\}dh + \int_0^z \{i(h|z) + \xi(z) - C\}dh + \\ + \int_0^z \{[1-s(h)]\frac{X}{r+h} - i(h|z) - \xi(z)\}dh \quad (7)$$

be the social welfare function, defined as the sum of investors, stock market and firms' profits. Its maximisation with respect to z yields the following first order condition:[13]

$$\left(\frac{X}{r+z^*} - I\right) = C \quad (8)$$

The left hand side of (8) gives the social marginal revenues R'_{sw}. Notice that since $R'_{sw} > R'_{sm}$, it must be the case that a social welfare maximiser allows more entrants in the stock exchange than a monopolist stock market: i.e. $z^* = h_{sw} > h_{sm}$. ■

With the aid of figure 1 it is possible to compare the stock market solution h_{sm} with the social welfare maximiser solution h_{sw}.[14] The dead-weight loss for the society deriving from a monopolistic behaviour of the stock market is given by the area (efi). Thus:

$$SW(h_{sw}) - SW(h_{sm}) = X\log\left(\frac{r+h_{sm}}{r+h_{sw}}\right) + (I+C)(h_{sm} - h_{sw}) > 0 \quad (9)$$

[13] The second order condition is verified as: $\frac{\partial^2 SW}{\partial z^2} = -\frac{X}{(r+z)^2} < 0$.

[14] Notice that when the marginal type is h_{sw} a lower optimal entry fee is required $\xi(h_{sw}) = C < \xi(h_{sm})$

1.3 Pension funds

In the previous section we saw how the stock market may have the incentive to limit firms' entry in the stock exchange as this maximises monopoly profits. Social welfare is not maximised by the stock market as welfare can be increased if a higher number of firms were listed on the stock exchange. In this section I consider how the development of pension funds can promote a more competitive solution by directly offsetting the monopolistic power of the stock market and by increasing the general efficiency with which funds are allocated in the economy.

1.3.1 Bilateral monopoly

The ability to offset the monopolistic power of the stock market relates to the fact that pension funds are major suppliers of long term equity finance. In this section, this is analysed in a framework of bilateral monopoly with efficient bargaining. In order to do so, it is necessary to define the profit functions of both stock market and pension funds.

Let us assume that stock markets sell processed information[15] z to pension funds at a fee F.[16] Hence, the stock market's profit function is now given by the maximand in (5) to which the fee F has been added. Thus:

$$\pi_{sm}(z, F) = \int_0^z [i(h, z) + \xi(z) - C]\, dh + F \tag{10}$$

Pension funds profits will of course depend on the amount of information in the economy, on the fee at which information is bought and finally on the degree of bargaining power that pension funds have in the determination of price and quantity traded. Lets assume for the moment that only one

[15] I use z as a proxy of the volume of information produced in the economy as information is monotonically increasing with the number of firms listed on the stock exchange which, in turn, is given by the marginal type z. Therefore, in what follows information, number of listed firms and marginal type will be used interchangeably.

[16] The use of a fixed fee helps to simplify the treatment of the model. One can of course think of any increasing monotonic transformation of z instead without altering the essence of what follows.

pension fund exists and that its profit function is given by:

$$\pi_{pf}(z, F, \alpha) = Q(z, \alpha) - F \tag{11}$$

where $\alpha \in [0, 1]$ is a measure of the pension funds bargaining power in the determination of fee and quantity of information traded.[17] The "production function" Q captures the gross revenues to pension funds deriving from the number of firms listed on the stock exchange for a given level of bargaining power. Revenues are assumed to be increasing in z and α. Furthermore, $Q''_{\alpha,z} > 0$: i.e. the marginal product of information increases with the bargaining power of pension funds.

The assumptions just made need to be justified. 1) Pension funds benefit from a large number of listed companies because this is positively correlated with the level of information produced in the economy. Information decreases uncertainty about investment outcomes as it allows investors to know the exact probability of success h of their investment and therefore, the right price to be paid. Furthermore, a high number of listed firms facilitates the adoption of risk diversification strategies.[18] Hence, the level of information processed by the stock market is an intermediate good that enters the "production function" of pension funds and it is here proxied by the number of listed firms. Thus, $Q'_z > 0$. 2) Unlike individual investors with no market power, pension funds are not perfectly competitive. They are major providers of long term finance and also the most important beneficiaries of the evaluating activity of the stock market. Thus, $Q'_\alpha > 0$. 3) Pension funds are more efficient than individual investors in processing information. Such efficiency is likely to increase with the importance of pension funds if we agree that the larger a pension fund the better qualified its fund managers. This means that the marginal product of information increases with the bargaining power of pension funds. Thus $Q''_{\alpha,z} > 0$.

After having defined the profit functions of the stock market and of pension funds, it is possible to analyse the bargaining problem between the two

[17] For instance, $\alpha = 0$ means, that pension funds have no bargaining power in the determination of fee and quantity of information traded.

[18] Notice that projects are all independent and hence, they have zero covariances.

monopolists. The generalised Nash bargaining problem between stock market and pension fund can be written as:

$$\max_{z,F} \Pi = \pi_{pf}^{\alpha} \pi_{sm}^{1-\alpha} \tag{12}$$

where $\alpha \in [0,1]$ is the pension funds share of joint profits which determines the bargaining power of each agent;[19]. The maximisation of (12) yields a system of two first order conditions whose solution is given by:

$$F^* = (1-\alpha)\, Q - \alpha \int_0^{z^*} [i(h|z^*) + \xi(z^*) - C]\, dh \tag{13}$$

and

$$\left(\frac{X}{r+z^*} - I\right) \frac{r}{r+z^*} + Q'_z(z^*) = C \tag{14}$$

where $z^* = h_{bm}$ and the left hand side of (14) represents the integrated market marginal revenues R'_{bm} [20]

Proposition 4 *The creation of pension funds promotes the development of stock markets by increasing the demand for information in the economy.*

Proof. Since R'_{bm} in (14) is larger than R'_{sm} in (6) it must follow that $h_{bm} > h_{sm}$. ■

In other words, the introduction of pension funds produces an increase in the demand for information in the economy. This, in turn, determines a larger number of listed companies, a larger volume of information produced with positive impact on investment portfolio policies and corporate governance.

[19]Notice that the bargaining power of each agent is determined by the relative shares of joint profits. This of course may not be the case if for instance, the evaluating costs for the stock market are considered sunk costs when pension funds and stock market enter the bargaining process. Nevertheless, changing the structure of the problem would not affect the qualitative results.

[20]So far four different marginal types have been identified: h_m is the marginal type defined in a competitive market with zero information processing costs; h_{sm} is the marginal type defined by a monopolist stock market with positive information processing costs; h_{sw} is the marginal type defined by a social welfare maximiser; and finally h_{bm} is the marginal type defined in a framework of bilateral monopoly between an up-stream monopolist stock market and a down-stream monopolist pension fund. Since $R'_{sw} > R'_{bm} > R'_{sm}$, it must follow that $h_{sm} < h_{bm} < h_{sw}$.

1.3.2 The development of pension funds

The creation of pension funds increases the demand for information in the economy. Their growth can have a further impact on the stock market through two different channels: through an increase in bargaining power and through a general increase in the efficiency with which savings are allocated.

Proposition 5 *The development of pension funds promotes the development of stock markets directly through an increase in bargaining power.*

Proof. The development of pension funds is captured by an increase in bargaining power α. By totally differentiating (14) it is possible to determine how the equilibrium marginal type changes when α changes. Thus:

$$\frac{dz^*}{d\alpha} = -Q''_{z\alpha}\left\{\left[I - \frac{2X}{r+z}\right]\frac{r}{(r+z)^2} + Q''_{zz}\right\}^{-1} > 0 \tag{15}$$

■

In the previous sections, it has been argued that pension funds activity stimulates the creation of new financial instruments and improves the efficiency with which the financial sector allocates savings. This increase in investment opportunities is likely to foster individuals savings as new instruments modify individuals utility function. The increase in the supply of funds is likely to drive down the level of interest in the economy in the long-run further stimulating the development of the stock market.

Proposition 6 *The development of pension funds promotes the development of stock markets indirectly through the efficiency with which savings are allocated and therefore, thorough the level of interest in the economy.*

Proof. By totally differentiating (14) it is possible to determine how the equilibrium marginal type changes when the interest rate r changes. Thus:

$$\frac{dz^*}{dr} = -\frac{\left\{\left[I - \frac{2X}{r+z}\right]\frac{r}{(r+z)^2} + \left(\frac{X}{r+z} - I\right)\frac{1}{r+z}\right\}}{\left\{\left[I - \frac{2X}{r+z}\right]\frac{r}{(r+z)^2} + Q''_{zz}\right\}} < 0 \tag{16}$$

as long as $r > \underline{r} = z^*\frac{X - Iz^*}{X + Iz^*}$. [21] ■

[21] This simply means that the worse the allocative efficiency of savings, the more beneficial the development of pension funds.

The decrease in the interest level in the economy reduces the cost of equity finance and hence, more firms can afford to be listed. Because more firms need to be separated, a larger volume of information has to be disclosed and this, in turn, is likely to have a positive effect on firms corporate governance and on the development of the stock market.

2 Conclusions

The development of stock markets is strictly linked to the development of pension funds with cyclical feedback among the two sets of agents. Firms with different probability of survival seek long term equity finance to boost their net revenues and this is obtainable only if firms meet some given information disclosure requirements. Firms incentive to produce information is strictly related to the fact that information allows them to obtain equity finance at decreasing costs. I used a stylised signalling game to model the disclosure of information on the part of the firms. In equilibrium, the amount of information disclosed is a positive function of the heterogeneity of firms listed on the stock exchange since a higher level of signal is needed to separate a larger number of different firms.

Information is processed by the stock market and then sold to pension funds. Hence stock markets should maximise the volume of information in the economy by maximising the number of firms listed on the stock exchange. Nevertheless, the stock market is the only agent responsible for the evaluation of information and entry may be limited to a number of firms smaller than what is socially desirable if non-competitive behaviour is allowed.

Pension funds can offset such non-competitive behaviour. They rely on the evaluative function of the stock market in order to address portfolio policies and provide firms, through the stock market, with long term equity finance. Contrary to individual investors, pension funds possess the technology to efficiently process the information produced by the stock market and the larger the availability of information the more efficiently savings are likely to be allocated by pension funds while addressing their portfolio poli-

cies. This means that their presence in the economy is likely to promote both information disclosure on the part of firms, and the development of information intermediaries. In a framework of bilateral monopoly I showed that the increasing bargaining power of pension funds represents an increase in the demand for information and hence, it is likely to increase social welfare. The growth of the stock market in turn, positively affects the development of pension funds as a larger number of listed firms implies that more information is produced and therefore, that a more efficient allocation of funds is achieved.

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