Stockmarket Liberalization and Firm Level Uncertainty*

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Abstract

This paper provides an analysis of the impact of stockmarket liberalization on firm level uncertainty. We posit that firms may choose the degree of risk inherent to their marketing/organisational strategies. Stockmarket liberalization, by making shareholders better diversified, increases the willingness of firms to take risky bets. As a result, stockmarket liberalization props up firm level uncertainty in sales, employment and profits. In equilibrium, we show that this effect is amplified by product market competition and diffuses to non listed firms, a group not directly affected by the liberalization. The effect is larger when competition increases, and when labor market institutions are flexible.

This paper thus provides a financial rationale for the increase of firm level uncertainty that has recently been documented in France and the US. We then use the French stockmarket reforms of the late 1980s to test our predictions, using listed firms as the treated group and privately held firms as a control group. Consistently with our model's testable predictions, we find that (1) for listed firms, firm sales volatility has increased markedly after liberalisation (2) this effect is stronger where product market competition was the strongest. This evidence holds in front of various robustness checks.

1 Introduction

This paper investigates the relation between stockmarket liberalization and firm level uncertainty in a general equilibrium model. We start with the premise that a well developed stockmarket promotes risk sharing. Against this background, the direct effect of liberalization is that listed firms adopt riskier, but more profitable, strategies. But in general equilibrium, firms compete on the labor and products markets. Because of competition, non listed firms are induced to bear more risk as well. The overall result is a pervasive increase in sales volatility and labor market reallocations, amplified by both the extent of product market competition and the flexibility on the labor market. We then bring these predictions to firm level data, using the French stockmarket liberalization of the 1980s as an experiment. Our testable predictions seem supported by the data.

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This theory can be used to explain the rise of firm level uncertainty which took place over the past thirty years. This rise in uncertainty is now documented by a fair number of papers, using mostly US data. First, firm sales have become more volatile among US listed firms, as shown by Comìn [2000] and Chaney, Gabaix and Philippon [2002]. Secondly, the input demand of firms has become more subject to idiosyncratic shocks. Campbell, Lettau, Malkiel and Xu [2001] show that stock returns have become more volatile over the past thirty years and interpret this as evidence that cash flows themselves have become more volatile. On the US labor market, wages have become more uncertain over the 1980s (Gottshalk and Moffitt [1994] and some categories of workers have experienced in an increase in job insecurity; on the French labor market over the 1990s, job turnover has increased markedly for all types of workers (Givord and Maurin [2004]). Consistently with this, workers now perceive their positions as more insecure than ever (OECD [1997]).

We propose to relate this trend to prior changes on the stockmarket that led to more diversified equity holders. Temporally slightly ahead of this rise in firm level uncertainty, the US and France had indeed experienced significant broadening and deepening of their stockmarkets; the average investor there has become more and more diversified over years. In the US, the dominant post war trend is the rising institutionalization of equity ownership: as a result, the share of outstanding equity directly held by households has been decline from over 90% in 1950 to about 50% in the mid 1990s (Friedman [1996]). Part of the reason for this trend is due to socio economic factors that have gained momentum in the 1970s: the baby boom cohorts started to accumulate for retirement and they planned to live longer on their pensions. In addition, some categories of workers who did not save before - like women - gained access to retirement savings (Mitchell [1999]). This propped up the demand for equity through funds. Secondly, defined contribution retirement plans, with a bias toward equity, were given a favorable tax treatment (401k's) when the 1978 ERISA law was enacted. As a result, pension and mutual funds, who are sophisticated and diversified investors, have replaced households as the real owners of "corporate America". In France, the main stockmarket evolutions occurred in the mid 1980s, as the state sought ways to finance its debt and help firms to raise much needed equity capital. Within a few years, capital controls were lifted, the Paris stock brokers' monopoly was dismantled, tax incentives were provided to equity investors and stock issues were made simpler. This resulted in a massive increase in the number of shareholders, as well as a sharp rise of institutional investors presence, both domestic and foreign, on the French stock market (see section 5.1 of this paper).

In looking at stockmarket development, this paper proposes a new form of interaction between financial and product markets. In our model, the emergence of diversified shareholders encourage the adoption by listed firms of riskier business strategies but whose profits are larger on average. This

direct effect comes, however, with an *indirect* effect that appears in general equilibrium and affects *both* listed and non listed firms. By adopting more ambitious strategies, listed firms gain market shares from each other and from privately held firms. To recover their profits, all firms choose to increase the size of their project, at the expense of more risk taking. Hence, the rise in firm level uncertainty is pervasive and goes beyond those firms directly affected by the reform (listed firms here). Secondly, we show that product market competition and labor market flexibility enhance this diffusion effect, and therefore amplify the effect of stockmarket development.

Two of the predictions of our model are easily testable: (1) compared to privately held firms, the uncertainty borne by listed firms increases more following the reforms. (2) this effect should be stronger when product market competition is tougher. We use the 1984-1988 French stockmarket liberalization as the event with which we test these predictions. We have a panel of large firms over the 1984-1999 period, which we break down into listed and non listed firms. We argue that shareholders of listed firms have become more and more diversified over the period, while this trend has been much less marked among privately held firms. We then measure firm level uncertainty as the elasticity of own sales to industry sales shocks. We first show that listed firms become more sensitive to industry shocks after liberalization, much more so than privately held firms. This result is robust to numerous checks. Then, we show that most of the effect occurs in industry where traditional measures of product market competition are high. Last, we show that this result is not driven by the firms taking part to foreign product market (not a globalization effect), nor by the subset of very large firms listed in the main stockmarket index.

The idea that stockmarket development causes greater firm uncertainty is certainly not new but has not, to our knowledge, been applied to the response of firms to financial liberalization in the context of developed countries. With the respect to existing papers, our contribution is twofold. First, our careful modelling of the product market allows us to look at indirect effects of stockmarket development, that go through firm competition. This type of analysis explain why the shareholder diversification may have a *pervasive* effect on the economy, even when few firms happen to be publicly held. Secondly, none of the existing papers in that literature provide any empirical test of this mechanism. As it turns out, most related contributions are to be found in the areas of economic development and international macroeconomics. Saint Paul [1992], Jovanovic and Greenwood [1992] and Obstfeld [1994] for example, have looked at how investor's access to developed financial markets permit diversification and the undertaking of more risky, but more profitable, projects. Given its interest for labor market consequences of financial liberalization on the labor market, our paper is also related to a recent contribution by Pagano and Volpin [2000], who focus on a very different channel

between finance and labor market: in some political environments, workers may collude with managers to exchange low investor protection for high employment protection. Their theory is thus one of the determinants of managerial vs investor corporate control. While it fits cross country evidence well, we feel it does not work as well for explaining labor market changes after financial reforms, since the evidence on increased investor after liberalization control at best inconclusive. More closely related to our theory is a paper by Perrotti and Von Thadden [2003]: they argue that strong investors are in a position to favor equity over bank finance. This induces more risky strategies among firms. Through this channel, workers are hurt as their human capital is specific and undiversifiable. Our theory features no bank, but risk averse investors, who are undiversified when financial markets are under developed.

The next section lays out the macroeconomic model and section 3 draws the main predictions. Section 4 brings the predictions to the test. Section 5 concludes.

2 The Model

We consider a static closed economy endowed with L risk-averse workers. There are three markets: the financial market, the labor market and the product market on which n firms compete imperfectly. These firms are initially owned by some workers that we call entrepreneurs[1]. Among those firms, a share μ_L is listed on the stockmarket while the remaining share μ_P is privately held. For the moment we assume n, μ_L and μ_P to be exogenously fixed.

The sequence of events is broken down into three periods. At date 1, each entrepreneur (whether his firm is public or private) chooses a strategy indexed by $0 \leq s \leq 1$. A strategy defines both the mean and the variance of the demand addressed to the firm, and we assume that increased average demand come at the expense of more uncertainty (variance). While this trade-off can be interpreted in many ways, we will hereafter refer to it as an aspect of the marketing policy of the firm: the degree of product customization. Under this interpretation, selling standardized products allow firm face a low and safe demand, while selling a highly customized good gives rise a potentially high, but uncertain demand. At date 2, the financial market clears and risk sharing takes place: $\mu_L n$ entrepreneurs sell the shares of their firms to a pool of investors. At date 3, demand uncertainty is revealed and production takes place. The product and labor market clear and the savers get their earnings from the securities they hold and repay their loans.

[1] Hence we implicitely assume that: (i) $L \geq n$; (ii) the n entrepreneurs are simultaneously working in the sense that they provide one unit of labor; they consequently get w in addition of the incomes they get from owning a firm.

2.1 Demand Side

Each agent $k \in (0, L)$ in the economy has a CARA utility

$$U_k = -e^{-aC_k} \tag{1}$$

where C_k is a consumption index which depends on the consumption levels $y_{k,i}$ of the n different goods i which are produced under monopolistic competition. The consumption index is given by the usual Dixit Stiglitz formulation:

$$C_k = \left(\sum_{j=0}^{n} (1 + \tilde{\delta}_i)^{\frac{1}{\sigma}} . y_{k,i}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}} \tag{2}$$

where we assume n to be large enough and $\sigma \geq 2$. The difference with the standard Dixit Stiglitz framework is that consumers experience taste shocks, materialized by random coefficients $\tilde{\delta}_i$. These shocks are the *only* source of uncertainty in the model. The $\tilde{\delta}_i$'s are assumed to be good-specific, small and uncorrelated: hence all agents k experience the same taste shocks on the good i. This extreme form of correlation structure is not necessary; what matters here is that correlation is imperfect, so that there is some scope for risk sharing. Finally the specific mean-variance profile of the taste shock $\tilde{\delta}_i$ is a choice variable of the firm i (cf. infra). Obviously, the standard Dixit-Stiglitz framework correspond to $\tilde{\delta}_i = 0$.

Given these assumptions about preferences, the total demand y_i addressed to each industry i, can be easily derived by aggregating the individual demand functions $y_{k,i}$ over the whole population $k \in (0, L)$:

$$y_i = (1 + \tilde{\delta}_i) . \frac{E}{P} . (\frac{p_i}{P})^{-\sigma} \tag{3}$$

where p_i is the price charged by the monopoly producing the good i, $E \equiv \sum_0^L E_k$ is the aggregate nominal expenditure and P is a consumption price index equal to:

$$P \equiv \left(\sum_{j=0}^{n} (1 + \tilde{\delta}_j) . p_j^{1-\sigma} \right)^{1/1-\sigma} \tag{4}$$

Apart from choosing the distribution of $\tilde{\delta}_i$, each monopoly i takes the demand function [3] as given.

Together with [2], the demand equation [3] ensures that, for each agent k, we have: $P.\tilde{C}_k = \tilde{E}_k$ where $\tilde{E}_k$ is her (stochastic) income which is composed of her financial income (from savings if she is a saver with access to financial markets and/or from her firm if she is an entrepreneur) and her labor income. Assuming for the moment that $\tilde{E}_k$ is Gaussian, we standardly get that her indirect utility is an increasing transformation of the following mean-variance criterion:

$$E(\tilde{E}_k) - \frac{a}{2P} Var(\tilde{E}_k) \tag{5}$$

2.2 The Strategy: Standardization vs Customization

Each good i is produced by a monopoly firm owned by an entrepreneur. At date 1, the entrepreneur chooses her marketing strategy $0 \leq s \leq 1$; this choice impacts the distribution of demand shocks $\tilde{\delta}_i$ that the firm experiences at date 3. We assume that this demand shock[2] is drawn from a Gaussian distribution with mean s and variance Σs^2 :

$$\tilde{\delta}_i \sim N(s, \Sigma s^2) \tag{6}$$

While such strategies could receive many alternative interpretations, we will refer to the choice of s and $\tilde{\delta}_i$ as the design of the marketing policy: $s = 0$ corresponds to the design of a standardized good where market demand is fully safe but remains small; $s = 1$ corresponds to the design of a fully customized good where the firm seeks a high valued niche at the risk of a less predictable product demand due to erratic trends and fashions. Hereafter we call s the degree of *customization*.

This view of customization as a first order emerging phenomenon is not new. It was first discussed by Piore and Sabel [1984] in an informal manner. More recently Mobius [2000] starts from Piore and Sabel's analysis to look at how customization played a central role in the regime switch from *mass production* to the *knowledge based economy*. Comìn [2000] investigates its consequences on the productivity slowdown. Thesmar and Thoenig [2000] discussed its impact on wage inequality and the process of creative destruction. Unlike these contributions, this paper argues that the rise of customization has been facilitated by financial liberalization.

Finally, whatever the choice of s, each firm produces with a constant return to scale technology using labor l paid at a wage w:

$$y = l \tag{7}$$

2.3 The Financial Market

The $\mu_L n$ entrepreneurs who own a listed corporation may sell equity (claims of their firms' profits) on the financial market. The pool of investors is constituted by a exogenous number $\phi L < L$ of agents that are given access to security trading on a domestic financial market. To make analysis tractable, we follow Pagano [1993] and assume that these agents are also given the right to borrow an infinite amount of savings from international capital markets at a given risk free rate R.[3]

[2] Obviously, avoiding corner solution requires to assume that the variance of the strategy increases at least as the squared of the mean. Otherwise firms would always choose $s = 1$

[3] Alternatively, one could assume that these agents have the choice between domestic securities and an infinite supply of foreign bonds paying interest R. The same functional forms would obtain as long as agents do not invest all their savings into domestic securities.

The financial market allows to trade two types of securities. First, it allows the ϕL investors to issue or purchase bonds at the exogenous risk free rate R: hence there is no restriction on short sales or borrowing as in Pagano [1993]. Second, claims on listed firms' profits can be sold by entrepreneurs, and bought by investors with access to the financial markets. These securities give to their holders a right to a fraction of profits. In the following, we use for these securities the labels "equity" or "shares" interchangeably, although the exercise of control rights usually attached to the possession of equity are explicitly not modelled here. In addition, entrepreneurs do not need external capital to produce. Hence, in this model, the sole role of financial markets is to share risk.

Given our assumptions, there are ϕL investors on the demand side of the stockmarket. On the supply side, there are $\mu_L n$ listed firms. In the rest of the analysis, we interpret ϕ as the *degree of stockmarket liberalization* within the economy.

3 Basic Results

We solve the model by backward induction. At period 3, after observing its idiosyncratic demand shock $\tilde{\delta}$, each firm maximizes its monopoly profit. At period 2, trade on financial assets takes place: listed firms sell shares to the pool of ϕL investors, who can themselves issue perfectly safe bonds bearing interest R. At period 1, both listed and privately held firms choose their degree of customization s.

3.1 Firm Profits

At date 3, after the idiosyncratic demand shock $\tilde{\delta}$ is revealed, each entrepreneur chooses the amount of production in order to maximize the firm's monopoly profit. [4] Given [3] and [7], this maximization problem can be written as:

$$\tilde{\pi}(s) = \arg\max_{l}(1+\tilde{\delta})^{1/\sigma}.(P^{\sigma-1}E)^{1/\sigma}l^{\frac{\sigma-1}{\sigma}} - wl \tag{8}$$

which depends on the predetermined degree of customization s through the realization of the demand shock $\tilde{\delta}$ as given by [6]. This maximization problem gives the following reduced form for the firm's profits:

$$\tilde{\pi}(s) = (1+\tilde{\delta}).\pi_0 \tag{9}$$

where π_0 corresponds to the profits of a fully standardized firm (ie. with $s = 0$):

$$\pi_0 \equiv \frac{(\sigma-1)^{\sigma-1}}{\sigma^{\sigma}}.\left(\frac{P}{w}\right)^{\sigma}.\frac{E}{P} \tag{10}$$

[4] We assume that, even when the firm is widely held, there are no agency costs of separation of ownership and control

Using [6] and [9], the mean and variance of the firm's profits are given by:

$$\begin{cases} E(\tilde{\pi}(s)) = (1+s).\pi_0 \\ VAR(\tilde{\pi}(s)) = \Sigma s^2.\pi_0^2 \end{cases} \tag{11}$$

This mean is increasing in s, the degree of customization. In this set-up, a risk neutral firm owner would always choose the largest s; what prevents it to happen is that owners are risk averse.

3.2 Risk Sharing On The Stockmarket

In this section we derive the equilibrium price level of shares sold by listed firms at period 2. As entrepreneurs are risk averse, they gain from being listed because the sale price of their firm is larger than the utility they would derive from holding it: finanical market enables entrepreneurs to share risk among the pool of ϕL investors.

Portfolio Selection by Investors

On the supply side there are $\mu_L n$ listed firms, indexed by j; issuing claims on firm j' profits. Each share j is traded at price ρ_j. On the demand side there are ϕL investors, indexed by k: each one borrows on international market b_k units of savings at rate R in order to buy x_{kj} shares of each firm j. Investor k's budget constraint thus writes as:

$$\sum_{j=0}^{\mu_L n} x_{kj}\rho_j \leqslant b_k \tag{12}$$

Her ex post consumption is equal to portfolio return plus her wage minus the repayment of the loans:

$$\tilde{C}_k = P^{-1}.\left\{ w + \sum_{j=0}^{\mu_L n} x_{kj}\widetilde{\pi}_j - (1+R)b_k \right\}$$

Plugging back the budget constraint [12] into the consumption expression yields:

$$\tilde{C}_k = P^{-1}.\left[\sum_{0}^{\mu_L n} x_{kj}\left(\widetilde{\pi}_j - \rho_j R\right) + w \right] \tag{13}$$

The program of investor k consists in maximizing her expected CARA utility $-\exp(-aC_k)$ with respect to her portfolio $\{x_{kj}\}_{j=0}^{\mu_L n}$, taking equity prices ρ_j, the risk free rate R and ex post deterministic wage w as given. As the $\tilde{\delta}$ demand shocks are Gaussian (see definition [6]), so are the profits $\tilde{\pi}_j$ and therefore the consumption level $\tilde{C}_k$. As shown in [5], solving this investor's problem amounts to maximizing the following mean-variance criterion:

$$\max_{\{x_{kj}\}_{j\in(0,\mu_L n)}} \quad \frac{w}{P} + \sum_{j=0}^{\mu_L n}\left[x_{kj}\frac{E\tilde{\pi}(s_j) - \rho_j R}{P} - \frac{a}{2}\frac{x_{kj}^2.VAR(\tilde{\pi}(s_j))}{P^2} \right] \tag{14}$$

Given the quadratic forms, the problem is well defined and demand for share j by investor k is given by:

$$x_{kj} = P.\left\{\frac{E\tilde{\pi}(s_j) - R\rho_j}{a.VAR(\tilde{\pi}(s_j))}\right\} \tag{15}$$

where $E\tilde{\pi}(s_j)$ and $VAR(\tilde{\pi}(s_j))$ as functions of s_j are given by equations [11]. Demand for risky asset j is a decreasing function of risk aversion a, its risk $VAR(\tilde{\pi}(s_j))$ and of its price ρ_j. It is, of course, an increasing function of its expected return $E\tilde{\pi}(s_j)$.

Equilibrium on the Stockmarket

We assume that listed entrepreneurs do not behave like monopolies when they decide to sell their firm on the stockmarket.[5] The price of their firm is therefore taken as given and lies at the intersection of the demand and supply curves of share of firm j. X_j^d is the aggregate demand for shares j and can be easily obtained through adding individual demands given by [15] for all ϕL investors:

$$X_j^d = \phi L.P.\left\{\frac{E\tilde{\pi}(s_j) - R\rho_j}{a.VAR(\tilde{\pi}(s_j))}\right\}$$

As the supply of shares is equal to one, we get that in equilibrium:

$$\rho_j = \frac{1}{R}\left\{E\tilde{\pi}(s_j) - \frac{a}{\phi L}\frac{VAR(\tilde{\pi}(s_j))}{P}\right\} \tag{16}$$

This equilibrium condition illustrates the benefit of risk sharing for a listed entrepreneur j with a risk aversion a. Indeed, at the stockmarket equilibrium, a listed entrepreneur gets ρ_j which corresponds exactly to the utility (or the mean-variance criterion) of an investor with a risk aversion $a/\phi L$. In other words, being listed allows entrepreneurs to reduce their risk aversion by a factor ϕL.

3.3 The Choice of s

At period 1, entrepreneurs choose the marketing strategy s in order to maximize their own utility. However, this utility takes a very different form whether the entrepreneur owns a firm that is going to be sold on the stockmarket or a firm that is going to remain privately held. For future listed firms, the choice of s will affect the sales price of the firm through [16], but not the variance of the entrepreneur's ex post income - the price is fixed before the revelation of uncertainty. For privately held firms, this choice affects the variance of the entrepreneur's ex post income directly as can be seen from equation [14].

[5] This does not change the results qualitatively, as Pagano [1993] shows

Let us first look at the utility of an entrepreneur whose firm remains privately held. Equations [14], [15] and [16] lead to the following functional form:

$$U_k^P = \frac{w}{P} + \underbrace{\left(\frac{E\tilde{\pi}(s_k)}{P} - \frac{a}{2}\frac{VAR(\tilde{\pi}(s_k))}{P^2}\right)}_{\text{return from own firm}} \tag{17}$$

As her project k is not listed, the entrepreneur bears all the specific risk specific linked to the project. She therefore chooses a degree of customization s_P such as to maximize her utility U_k^P. Using the definitions of $E\tilde{\pi}(s_j)$ and $VAR(\tilde{\pi}(s_j))$ (see equations [11]), this maximization program is equivalent to

$$\max_{s_k}\left((1+s_k).\frac{\pi_0}{P} - \frac{a\Sigma}{2}s_k^2.\frac{\pi_0^2}{P^2}\right)$$

Hence the degree of customization chosen by a privately held firm is given by:

$$s_P = \frac{1}{a\Sigma}.\frac{1}{\pi_0/P} \tag{18}$$

Let us now turn to the strategy choice of an entrepreneur that goes public. From [16] her utility can be written as:

$$U_k^L = \frac{w}{P} + \left(\frac{E\tilde{\pi}(s_k)}{P} - \frac{a}{2\phi L}\frac{VAR(\tilde{\pi}(s_k))}{P^2}\right) \tag{19}$$

In contrast to an entrepreneur that did not list, she is able to diversify her risk on the stockmarket among the ϕL agents. Consequently she faces, on her own project, a risk given by $VAR(\tilde{\pi}(s_k))/2\phi L$, whereas equity holders of privately held firms face a variance in their returns given by $VAR(\tilde{\pi}(s_k))/2$.

The stockmarket , by allowing for risk sharing, makes listed entrepreneurs less risk averse than non listed; thus listed entrepreneurs choose a larger degree of customization s_L. Indeed, they choose s_L in order to maximize U_k^L. Solving the problem leads to the simple equation:

$$s_L = \frac{\phi L}{a\Sigma}.\frac{1}{\pi_0/P} \tag{20}$$

Unsurprisingly, given that the sole purpose of the financial market is to share risk, we have that entrepreneurs of listed firms choose riskier projects than private ones:

$$s_P < s_L = \phi L.s_P \tag{21}$$

Notice that this mechanism at work is a plain size effect in this model.[6] More efficient firms generate larger, and therefore more volatile incomes. Undiversified entrepreneurs may not want this and prefer lower on average, but less uncertain incomes.

[6] Our modelling strategy here relies heavily on the use of a CARA utility for risk averse investors. We are aware that this utility form is crucial to our results here; however, the mechanism we highlight is robust to making absolute risk aversion decreasing (with a CRRA utility function), provided we introduce a fixed input as in Thoenig and Thesmar [2003]. The cost of such an alternative modelling strategy is that we are, in this case, not able to solve the model unless we look for symetric equilibria only (all firms listed or none).

4 The Impact of the Stockmarket Liberalization

We now study the impact of a stockmarket liberalization viewed as an increase in ϕ, the number of investors. From the previous analysis, we know that in partial equilibrium - for given wage w and price P - a larger ϕ will make the stock market behave more like a risk neutral investor: as a result, listed firms will raise s_L. An increase in ϕ has, however, no effect on s_P since owners of privately held firms are not directly affected by the stock market liberalization. Hence, through a broadening of the shareholders base ϕL, stockmarket liberalization in the model has *a direct effect* on listed firms *only.* However a look at [18] and [20] shows that s_L and s_P also depend on aggregate variables (the term π_0/P in each equations) which are affected by a change in ϕ. As a consequence we expect stockmarket liberalization to have an *indirect effect* on both listed *and* private firms through its general equilibrium effect on wages w and price P. This is what the following analysis will make clear.

4.1 The Diffusion Effect

To compute the values of s_L and s_P in equilibrium, we need to obtain π_0/P, the real profit of a firm adopting a riskless strategy. This requires to clear both product and labor markets. At the firm level, labor demand is easily derived from the program [8]. Then, by aggregating[7] on the whole set of firms, the labor market clearing condition writes:

$$L = \frac{(\sigma-1)^\sigma}{\sigma^\sigma}.\frac{E}{P}.(\frac{P}{w})^\sigma.\left[n\mu_L(1+s_L)+n\mu_P(1+s_P)\right] \tag{22}$$

Similarly the maximization of firm profits [8] gives that the optimal price charged by each monopoly is a constant mark-up over the labor cost: $p = \frac{\sigma}{\sigma-1}.w$. Using the definition of the price index, we obtain the consumption price index:

$$P = \frac{\sigma}{\sigma-1}.w.\left[n\mu_L(1+s_L)+n\mu_P(1+s_P)\right]^{1/(1-\sigma)} \tag{23}$$

[7] Aggregating over the total number of firms, we get:

$$L = \frac{(\sigma-1)^\sigma}{\sigma^\sigma}.\frac{E}{P}.(\frac{P}{w})^\sigma.\left[\sum_{i\in\{listed\}}(1+\tilde{\delta}_i)+\sum_{j\in\{private\}}(1+\tilde{\delta}_j)\right]$$

As $\mu_L n$ and $\mu_P n$ are assumed to be large at equilibrium, the law of large numbers implies:

$$\begin{aligned}\sum_{i\in\{listed\}}(1+\tilde{\delta}_i) &= \mu_L n.E[(1+\tilde{\delta}_i)\mid listed] = \mu_L n.(1+s_L)\\ \sum_{j\in\{private\}}(1+\tilde{\delta}_j) &= \mu_P n.E[(1+\tilde{\delta}_j)\mid private] = \mu_P n.(1+s_P)\end{aligned}$$

And we straightforwardly get the equation [22].

These two equations give us the wage and price levels; profits are thus given by:

$$\frac{\pi_0}{P} = \frac{L}{\sigma}.\left[n\mu_L(1+s_L) + n\mu_P(1+s_P)\right]^{(2-\sigma)/(\sigma-1)} \tag{24}$$

As $\sigma \geq 2$, we see that the profit π_0/P is decreasing with respect to the average degree of customization within the economy, $(\mu_L s_L + \mu_P s_P)$. Two countervailing effects are at work. Notice first that an increase in $(\mu_L s_L + \mu_P s_P)$ means that the average demand shock $\tilde{\delta}$ is larger; first, this props up aggregate labor demand (see [22]). As labor supply is inelastic, wages go up and profits fall. Secondly, more production reduces prices through the standard demand externality of Dixit Stiglitz models, which props up aggregate demand and therefore profits. Given that we assumed that $\sigma \geq 2$, the demand externality effect is dominated and profits are reduced by an increase in the average level of customization.

Now that we computed the equilibrium level of riskless profits π_0/P, we get the equilibrium values of s_L and s_P from equations [20] and [18]:

$$s_P = \frac{\sigma}{L.a\Sigma}.\left[n\mu_L(1+s_L) + n\mu_P(1+s_P)\right]^{(\sigma-2)/(\sigma-1)} \tag{25}$$

and

$$s_L = \frac{\sigma}{L.a\Sigma}.\phi L.\left[n\mu_L(1+s_L) + n\mu_P(1+s_P)\right]^{(\sigma-2)/(\sigma-1)} \tag{26}$$

From these equations, we immediately obtain that:

Result 1: *After stockmarket liberalization, both listed and non listed firms adopt more risky strategies.*

$$\frac{ds_P}{d\phi} > 0 \text{ and } \frac{ds_L}{d\phi} > 0$$

Financial liberalization impacts the economy through two channels. The direct channel, acting only on listed firms s_L, relies on the broadening of the shareholders base ϕL and the consecutive *improvement of risk sharing*: more numerous investors are on average smaller equity holders, who are therefore willing to pay more for a larger s_L. The indirect effect corresponds to a *pro-competitive effect* of stockmarket liberalization and comes from the general equilibrium effect of firms' strategies on the labor and product markets: an increase in ϕ promotes s_L; this makes the average degree of customization within the economy, $(\mu_L s_L + \mu_P s_P)$, higher. Firms want to produce more. Competition to attract workers on the labor market becomes tougher; and profits π_0/P decline. In equilibrium claims on firms' profits become smaller and owners are therefore willing to bear more risk because their absolute risk aversion is constant.

4.2 Customization and Uncertainty

It is straightforward to see that the *size-adjusted variances* of in-house labor demand, $\tilde{l}$, and sales, $\tilde{y}$, for listed and private firms are increasing with the degrees of customization s_L and s_P. Basic computations give, for listed and private firms respectively:

$$\frac{VAR(\tilde{y}_L)}{E(\tilde{y}_L)^2} = \frac{VAR(\tilde{l}_L)}{E(\tilde{l}_L)^2} = \frac{\Sigma.s_L^2}{(1+s_L)^2} \tag{27}$$

$$\frac{VAR(\tilde{y}_P)}{E(\tilde{y}_P)^2} = \frac{VAR(\tilde{l}_P)}{E(\tilde{l}_P)^2} = \frac{\Sigma.s_P^2}{(1+s_P)^2} \tag{28}$$

As a consequence, all the results related to s_L and s_P have a clear counterpart in term of firm level uncertainty of sales and labor demand. This point is of interest because empirically we are able only to observe sales and labor demand but not firms' marketing policies (either in term of customization or in term of flexibility).

Result 2: *After stockmarket liberalization, the size adjusted uncertainty of sales, employment and profits rises in both listed and non listed firms.*

The effect of liberalization on the uncertainty borne by listed firms is fairly obvious, given the way we specified the model. What is less obvious, however, is that stockmarket liberalization has the effect of increasing uncertainty *even for those firms who are remotely related to the stockmarket.* Moreover, even for listed firms, this diffusion effect *amplifies* the direct effect of liberalization. Hence the effect of stockmarket liberalization on firm level uncertainty can be very widespread even a priori if the share of listed firms is small.

The main result of our theoretical investigation is that stockmarket liberalization and globalization (this would be, in the model, the equivalent of increasing the number of investors) are therefore good candidates to explain the recent rise in firm level uncertainty within industrialized economies. This phenomenon has been documented in a recent literature that has looked at trends of firm idiosyncratic uncertainty in both output and input demands. On the output side, Chaney et al. [2002] confirm this evidence by looking at firm level US data using Compustat: They show that standard deviations of sales and employment growth rates at the firm level have simultaneously increased during the last 3 decades, even after controlling for entry and size effects. On the input demand side, Campbell et al [2001] documents an increase in stock returns volatility over the past four decades, which they interpret as a rising volatility in firm-level cash flows. There has also been an increase in the short run volatility of labor earnings (Gottschalk and Moffit [1994]) and some authors have documented an

increase in job turnover, at least for some skill groups in the US (Neumark [2000]), and for all kinds of workers in France (Givord and Maurin [2001]).

4.3 Product Market Competition

We have just shown that a stockmarket liberalization has widespread effects in the economy because firms compete with each other. Hence, it seems natural to ask whether this diffusion effect of liberalization on firm level uncertainty is *amplified* when competition between firms is tougher. In a standard way, we will measure product market competition as the total number n of firms on the product market.[8] By looking at how the reaction of s to ϕ changes when we increase n, we obtain easily that:

Result 3: *The effects of stockmarket liberalization are stronger when competition on the product market is tougher.*

$$\frac{d^2 s_L}{d\phi dn} > 0 \text{ and } \frac{d^2 s_P}{d\phi dn} > 0 \tag{29}$$

The economic intuition of this result is fairly straightforward: as n increases, competition on the labor market becomes more intense and a given increase in average customization props the real wage even higher. As result, firm profits decline more, which stimulate both among listed and private firms a further increase in risk taking.

4.4 Job Protection

In a large number of countries, some institutions on the labor market are specifically designed to protect existing jobs and prevent their excessive destruction (firing costs for instance). The existence of such institutions limits the gains that firms may experience by choosing riskier strategies. If labor market rigidity augments the costs of choosing a risky strategy, it is likely that the rise in uncertainty caused by stockmarket liberalization is smaller in countries with rigid labor markets. This section sketches the formal argument and the detailed calculations are provided in appendix. The analysis we show in this section is a partial equilibrium one where both price index and wage are fixed. Taking in account the market clearing conditions and the aggregate equilibrium[9] does not affect our conclusions

[8] n is, however, endogenous. In appendix, we introduce an entry cost Γ and allow for free entry. We then test the robustness of our conclusions to taking Γ as an alternative measure of competition - an increase in entry costs meaning *less* competition.

[9] In appendix we compare the effects of financial liberalization in a fully flexible economy vs a fully rigid economy. Conclusion [31] is still robust. However computations require to restraint the parameters space in order to get some analytical tractability (ie. we set $\sigma = 2$).

[31].

Starting from our basic framework, we now assume that among the $\mu_L n$ listed firms, some operate in industries where labor contracts are flexible (such firms are denoted $flex$) while others (denoted by rig) operate in industries where labor contracts are rigid. Flexible contracts correspond to the basic framework where labor force can be chosen at date 3, after demand is revealed. Rigid contracts are such that labor force must be chosen at date 1, before uncertainty is resolved. Finally we do not allow firms to choose the type of contracts they are using.

The choice of s at date 1 depends on the nature of the labor contracts the firm is operating under. Under flexible labor contracts, firms' decisions remain the same as the ones described in the basic model. Let $U^{flex}(s)$ be the utility of such a flexible entrepreneur The maximization program of firms operating in rigid industries is however, different. Let $U^{rig}(s)$ be the utility of these entrepreneurs. In the appendix, we show that, provided demand shocks are small, this utility can be written as:

$$U^{rig}(s) \simeq U^{flex}(s) + \Psi(s)$$

where $U^{flex}(s)$ is given by [19] and $\Psi(s)$ is such that:

$$\Psi(s) \equiv E\left[\frac{\left(\tilde{l}^{flex} - l^{rig}\right)^2}{2}.\frac{\partial^2\tilde{\pi}}{\partial\tilde{l}^2}\right] \text{ and } \Psi < 0, \Psi' < 0.$$

where $\tilde{l}^{flex}$ stands for the stochastic employment chosen ex-post under flexible labor contracts and l^{rig} stands for the fixed amount of workers chosen ex-ante under rigid labor contracts.

Hence, the utility of an entrepreneur operating in a "rigid" industry is equal to that of a "flexible" entrepreneur *minus* a term that is an increasing function of s. The reason for this is that, when s increases, the variance of demand shock $\tilde{\delta}$ increases. Under rigid contracts however, the labor force, l^{rig}, is chosen ex-ante. Hence the discrepancy between initially chosen and ex post optimal employment increases. On average, the rigid firm makes more mistakes when it chooses a riskier strategy. s therefore induces additional costs to the firm. Therefore listed firms choose less risky strategies when they operate in rigid industries. A similar case can be made when we look at the effect of an increase in ϕ. As a result::

Result 4: *Firms adopt less risky strategies when labor contracts are rigid. In addition, the effect of stockmarket liberalization on firm uncertainty is reduced when institutions on the labor market are more rigid.*

$$s^{rig} < s^{flex} \tag{30}$$

$$\frac{ds^{rig}}{d\phi} < \frac{ds^{flex}}{d\phi} \tag{31}$$

If this theoretical prediction is correct, we expect to see empirically a larger effect of stockmarket liberalization on corporate uncertainty in economies with flexible labor markets (such as UK and US), rather than in economies with rigid labor markets (such as Continental Europe). In particular, it would mean that our empirical investigation, based on French evidence, underestimate the effects of financial liberalization that we should observe in the US or the UK.

5 Evidence

We have proposed a theory of the relation between the degree of financial development, the organization of firms and firm level uncertainty. In this section, we propose a formal test of some of the predictions of our model. Our first prediction is that more diversified shareholders should prompt, other things equal, more risky strategies among firms. Our second important prediction is that this effect should be amplified by the extent of product market competition. We will test these two predictions in turn.

In order to lay out an empirical test of this mechanism, we need to compare firms with diversified shareholders and firms with concentrated ones. As has been argued on the vast empirical literature on ownership concentration and corporate performance (see, for a recent survey, Shleifer and Vishny [1997]), both ownership concentration and corporate performance (here, volatility) may be solutions to simultaneous equations (a common choice). In this case, it would become difficult to infer causality from correlation. Under these circumstances, it would be best to see firms changing from a concentrated to a diversified ownership. To do this, we look at the effect of French financial liberalization on the risk borne by French firms. As we argue below, this liberalization is likely to have had more impact on the nature of shareholders of firms that were listed on the French stockmarket.

5.1 Big Bang of the Paris Bourse: 1984-1988

In this section, we explain why the financial liberalization in France in the 1980s really fostered a change in the nature of the holders of French shares, by making them smaller and more diversified.

5.1.1 Context

France has experienced in the 1980s one of the deepest and most comprehensive financial reforms in Europe (Melitz [1990]). The irony is that it was started by a socialist government, that had

nationalized most of the banking system in 1982, and was therefore not known for being friendly to the financial industry. The reasons why such reforms were undertaken then were at the same time institutional, macroeconomic and microeconomic in nature. First, there had already been an attempt to open capital markets of member states of the European Union in the early 1960s, but by the late 1960s, further attempts were blocked by France, while Germany and the Benelux countries seemed to be relatively compliant. By 1984, the European commission took charge again and urged the reluctant member states to comply with a detailed process of deregulation of capital flows that would yield to total freedom of movement by 1990. But this time, the commission's interests coincided with that of the French government, for economic reasons.

After the failed stimulation of 1981-1982, the French economy was entering a severe crisis that had both short and long run causes; the French industry was quickly loosing competitiveness, partly because part of the necessary restructuring had been delayed (as opposed to, for example, Germany), and partly because of a chronic high inflation since the second oil shock. As a result, the French franc lost 20% with respect to the DM in 1981-1982, and the country was quickly accumulating a large external debt. External debt was as high as 9% of GDP in 1984, and while this ratio was small compared to Sweden, Norway, or even Italy, the absolute size of France's GDP made its external debt one of the largest in the world. As often happens in these cases, the rise in external debt was paralleled by a quick rise of the government debt, as successive governments had tried to stimulate the economy, without generating sustainable growth.

The high level of government spending, as well as the increase in interest rates that was required to sustain the Franc's parity with the DM, raised concerns that corporate investment was never going to recover, crowded out by public debt and monetary policy. This was particularly a problem for the then large public sector which needed equity finance to restructure and clean its balance sheets, while a heavily indebted state was not in a position to provide the needed fresh capital. That is why Jacques Delors and Pierre Bérégovoy, its successor as finance minister, undertook reforms of the financial system: the purpose was to channel saving to investment bypassing the banking system, who also needed to get rid of its poorly performing loans and whose ability to lend to the productive sector was temporarily impaired.

5.1.2 Content

These three reasons explain why the socialist government so quickly moved from the plan to the market. The first change in legislation came as soon as 1982 (Plan Delors, after the name of the finance minister). Savings in the stockmarket were encouraged : tax on bonds and stocks were reduced

by a significant amount (25% for bonds), while tax free schemes were set up for those willing to hold stocks and investment certificates for long enough. Simultaneously, it was made fiscally interesting, and simpler for corporations to raise equity and bonds. Finally, the second marché, designed for the public listing of safe, medium sized, mature corporations, was created in 1983, partially in order to fill the gap created on the French stockmarket by nationalizations.

The second wave of reforms came in 1984,1985 - still under the socialists, but under a new finance minister, Pierre Bérégovoy : the process of bond issue was further relaxed, issue of commercial papers was authorized and the financial market was modernized through greater transparency and computerization. Commercial paper for banks were allowed in 1985. A market for future, the MATIF, was created - the first one in continental Europe. Then came the right, still under president Mitterrand. The new finance minister, Edouard Balladur, further speeded up the process. His goal was admittedly to foster a financial "big bang", as large as the one that took place in London and New York in the 1970s. Competition among intermediaries on the financial market was promoted: brokers on the Paris Bourse were until then "state officers", and there were a few of such positions (61 in 1986). This quasi monopoly was broken up in 1987: entry was made easier, and it became possible for banks - French or foreign - to become brokers too. Brokers accepted this with resignation, and did not try to oppose a reform that was rent-destroying, but considered as necessary. The increase in competition was further promoted by allowing commercial banks to have investment banking activities, which was before forbidden.

Transparency - in particular for small shareholders - was further improved in 1988, by reinforcing the powers held by the Commission des opérations de bourse (the French SEC). It approves a code of good behavior for brokers, based on the duty of loyalty to investors. It even sets up punishment for offenders, that are largely accepted by the financial community. Takeover procedures are also made more transparent. The stockmarket index was reformed and simplified in order to encompass the 40 largest capitalizations.

In parallel with reforms of the stockmarket itself, foreign investment inflows were stimulated through a progressive lifting of capital controls. After a temporary tightening in 1982-1983, capital controls were progressively relaxed from 1984 to 1990. In october 1984, a law was passed removing the tax on interests paid to non residents. The market for eurofrancs - closed in may 1981 - was reopened that same year, allowing Franc denominated bonds to be traded outside France. In 1985, French corporations were allowed to purchased derivative on foreign currencies to shelter from risk. The duration of these derivatives was progressively extended until 1986. When elected in 1986, the right wing government went on relaxing capital control, allowing French residents to purchase real es-

tate abroad and simplifying the process to buy securities listed abroad. The final step toward complete liberalization was taken on January 1st, 1990, six month ahead of the deadline set by the European commission.

5.1.3 Consequences

This financial liberalization, we argue, had the effect of making the average shareholder of French firms smaller and better diversified; it therefore constitute a natural experiment to test our theory of the relation between shareholder diversification and the riskiness of firm's' strategies.

[Insert figure 1]

First, the share of listed equity in total equity increased as a delayed consequence of the liberalization. The timing of this increase in provided in figure 7, which displays the ratio of listed equity to total equity as given the macroeconomic Flow of Funds published by the Bank of France for the 1977-2001 period. If we are willing to admit - this will be checked in the microeconomic data - shareholdings in private companies tend to be more concentrated, financial liberalization thus had the impact of reducing the average stake held by the major shareholder in the average firm. This increase is first moderate following the first set of measures (1982-1983), and the trend is slightly positive until the early 1990s. It then accelerate from 1992 onwards, where the share of equity that corresponds to listed security jumps from 20% in 1992 to nearly 35% in 2001. It can be noticed from figure 7 that such an upward trend and acceleration is not so sensible for bonds, whose share in total financial debt (bonds plus bank credit) goes up only from 10 to 15% over the past 20 years.

[Insert figure 2]

Second, as the result of lifting capital controls, the share of foreign owners in total equity went up dramatically, also mostly in the 1990s. The figure 7 uses the Flow of Funds published by the Bank of France to display the evolution of the share of foreign owners in private and listed firms. Both types of firms have experienced a rise in foreign owner in their capital, but the increase has been much more dramatic for listed corporations (from 5 to 35% between 1984 and 2000) than for private ones (from 10 to 15%). This suggest that the lifting of capital controls interacted with the stockmarket liberalization to bias foreign investment (direct and portfolio) in favor of listed firms. Given that the bulk of foreign investment is done by multinationals (direct) and foreign institutional shareholders (portfolio), we view the rise of foreign ownership as further evidence that the average shareholder is more diversified over the years. As figure 7 shows, the trend is stronger for listed firms.

Some international comparisons give reasons to believe that a large chunk of the rise in foreign ownership is actually due to the financial reforms. Among continental european countries, financial liberalization went the furthest in France (as a result, the share of stockmarket capitalization over GDP is the highest among those countries). As it turns out, France is also the country where the share of stockmarket capitalization held by foreign investors is the highest (see, for example, Plihon and Ponssard [2001]).

[Insert figures 3,4]

Third, the result of stockmarket liberalization was also a broadening of the shareholder base among French households. While the share of French households owning French equity declined, the share of outstanding equity held by mutual funds went up over the past 25 years from 7 to 20% of the total. Hence, the new French owners of equity tend to be more diversified than the former ones. They also tended to be smaller: the dismantlement of the Paris brokers monopoly on the Paris stock exchange, as well as the string of privatization fostered a shareholder culture in France and simplified access to the stockmarket, even for moderate amounts of savings. As a result, the number of French owners of listed shares went up from less than 2 millions before 1980 to some 6 millions after 1988 (see figure 4 and Chocron, Grandjean and Vernois [2001]).

All in all, we are going to interpret the financial liberalization as fostering the emergence of smaller, more diversified shareholders. Although the reforms that were taken were spread over the 1983-1990 period, we are going to take 1990 as the date after which these reforms had their full effect. This choice is partly inspired by the timing of the reforms (most of the financial market deepening was done in 1987, but capital controls were fully lifted in 1990) and partly by what we observe in the macroeconomic data from the Bank of France (which tend to place the break in trend in 1990 for foreign ownership and 1992 for the share of listed equity).

5.2 Data

5.2.1 Sources

We have accounting data for all large French firms whose total sales exceed 30 million euros or whose labor force exceeds 500 employees. These accounting data are extracted from tax files used by the Ministry of Finance to collect the corporate tax. We restrict ourselves to firms that are present at least three years in a row between 1984 and 1999, which corresponds to a period without any change in the accounting framework for French corporations. This restriction leaves us with some 126,007 observations, corresponding to some such 8,000 firms per year. These accounting data provide very

detailed information on the balance sheet, the breakdown of the operating profit, the industry and employment of these firms.

Our empirical strategy is based on the comparison between private and listed firms. As it turns out, only some 700 firms each year are listed on the French stockmarket, and only some 400 of them are in our database.[10] This comparison, however, does not do full justice to the size of the French bourse, since many of the firms in our sample are affiliate to a group, whose controlling entity is itself listed. Hence, in order to have a proper idea of whether the firm belongs to a listed group or not, we need to recover, for each firm, the identity of its group leader when there is one.

This is done by using the Financial Relation Survey (LIFI in French), conducted each year from 1985 to 1999 by the French Statistical office (INSEE). This survey is exhaustive on all firms whose sales are worth more than 30 million euros or whose employment exceeds 500 employees (this is why we chose this threshold to select our basic sample of accounting data). These firms are sent questionnaires to, and are required to fill them by law. The information thus collected is of two forms. First, respondents provide the structure of their ownership by large category: shares held by known French individuals, known French firms, known Foreign firm, known foreign individuals and the state. The rest corresponds to shares held by people or firms that are unknown to the firm when it fills in the form. Second, firms are required to provide the identity of the firms that hold more than 50% of their equity ("mothers") as well as the identity of other corporations in which they hold more than 50% of the capital ("daughters"). This identity is coded using a 9 digit number that is also available in the accounting data. In addition to surveying the firms that cut one of the two thresholds refereed to above, firms that were either daughters or mothers of firms surveyed a year earlier are included in the sample the year after. This data thus allows to get a fairly detailed information on the structure of French groups.

[Insert Table 1]

Table 1 presents simple information on the firms present in the base sample. We have approximately 8,000 firms each year, some 380 (less than 4.8%) of them being directly listed each year (out of a total of some 600-700). This, however, underestimates the relation of large French firms with the stockmarket: among these 8,000 firms, 61% belong to a group, i.e. at least 50% of their capital is owned by another firm. Group leaders, in turn, tend to be more often listed. All in all, roughly 19.5% of all observations correspond to firms (1) that are affiliate to a group and (2) whose group leader is listed. Thus, if we

[10] Many firms listed on the French bourse take the form of open ended funds ("sociétés de portefeuille") that holds tiny amounts of share in various listed or private firms. These are not part of our data.

consider as listed a firm that is either directly listed are belongs to a listed group, the percentage of listed firms in our sample totals some 24% over the years.

Finally, we want to abstract from the vast movement of privatizations that took place after the general elections of 1986, which brought a centre right coalition, economically liberal, into the power. To do this, we restrict the sample to firms (1) where the state never held any equity and (2) who never were in a group where the state ever had any equity. This removes 22,271 observations from the sample, or an equivalent of 1,420 firms each year. This is not surprising given the importance of the public sector in 1986 in France.[11]

5.2.2 Consistency With Macroeconomic Evidence

Our empirical strategy is going to consist of comparing the destinies of listed and non listed firms before and after liberalization. As we saw above, this is based on the fact that liberalization can be argued to have fostered the entry of diversified shareholder in French firm's capital. Second, that this movement has been stronger for listed firms. Such a reasoning is natural, given the nature of the reforms described above (favoring savings in equity for households, increasing competition for brokers, which decreases the cost of purchasing equity etc). It was confirmed by looking at the share of listed equity and the share of foreign owners in listed firms, using aggregate data from the Bank of France.

Before turning to the empirical tests of our theory, it seems natural to check whether these trends are present in our micro economic sample. First, we can check whether there actually is an increase in the fraction of listed equity in the sample. To do this, we simply compute the total book value of equity for firms that are listed and then divide it by the total equity of all firms. Given that many firms tend to belong to groups and are therefore not directly listed, we focus ourselves on firms that lead their group - those that are not controlled by another company - or firms that do not belong to any group. Table 2 reports the share of listed independent firms and the share of their equity in the total. While the share of listed independent firms is low, some 3%, even below the share of listed firms in the whole sample. This suggests that in many groups, the listed vehicle is not the group leader, i.e. there is another, privately held entity that controls the listed vehicle. Within this set of independent firms, listed ones are, however, very large. Over the 1984-1999 period, listed firms account for some 40% of total equity - in terms of book value, not of stockmarket capitalization. This figure is clearly pro-cyclical (higher than the trend in the late 1980s and the late 1990s). In addition to being larger, the equity of listed firms has risen more over the period than the equity of non listed firms. The share

[11] Only part of which was due to the application of 1981 left wing platform; the bulk of the public sector came from the nationalisations of some key actors of the financial sector and industry in 1945 by the De Gaulle government of national union.

of listed equity begins around 30-40% before 1990 and goes up progressively to 50% in the end of the 1990s. Hence, the share of capital that corresponds to listed securities went up in the past 15 years in our sample.

[Insert Table 2]

Let us now turn to foreign ownership. In addition to ownership relations that allows us to track group leaders of firms in the sample, the financial relation survey provides us with a breakdown of each firm's ownership structure by five categories: foreign firms and individuals, French firms and individuals, and the State. We know from macroeconomic data that the rise of foreign ownership has been stronger among listed firms. To test this conjecture within our data, we run the following regression, for firm i at date t:

$$\%\text{foreign}_{it} = \alpha_i + \beta \text{list}_{it} + \gamma \text{list}_{it} \times 1_{\{t>1990\}} + \sum_T \delta_T 1_{\{t=T\}} + \sum_T \delta'_T \log(\text{assets}) \times 1_{\{t=T\}} + \varepsilon_{it} \quad (32)$$

where $\%\text{foreign}_{it}$ measures the share of foreign owners (individuals and corporate, *known to the firm*), list_{it} a dummy variable, equal to one when the firm is currently listed. Year dummies have been included to capture possible year to year changes in the sampling methodology or short term fluctuation of foreign ownership. Note that this equation allows for time varying size effects, in order to disentangle as much as it is possible the impact of being listed from the mere impact of being large onto the share of foreign ownership.

Table 3 reports the regression results of (32). The first column includes no fixed effect α_i, no year dummy nor any time varying size effects, and shows that an aggregate effect is indeed there: on average, the share of foreign owners in listed firms' equity increases by 5 more percentage points then for privately held firms. The second column confirms that there is some endogeneity is this point estimate, part of it is due to the fact that foreign owners tend to prefer large firms, be they public or private (captured by the time varying size effects in (32)). Another part of this upward bias is due to the fact that some firms that are owned by foreigners tend, in general, to go public after 1990 (this is captured by the firm effects in the second column). All in all, however, the share of foreign ownership goes up by a strongly significant 3 percentage points for listed firms after the financial liberalization took place. This figure seems small but conceals at least two important facts about foreign ownership. First, our dataset underestimates foreign ownership, in particular for listed firms, since this variable corresponds to the share of foreign owners that *are known to the firm*. However, nothing forces owners of listed equity below 5% of capital to signal themselves to the company. Given that foreign institutional shareowners tend to hold very small stakes, they are invisible in our dataset.

Table 3: Foreign Ownership of Listed Firms

	% Foreign Owners	
	Model 1	Model 2
Listed × (an>1990)	5.6***	3.7***
	(0.9)	(1.3)
Listed	-1.1	-2.5
	(0.7)	(1.6)
(an>1990)	-0.2	-0.6
	(0.3)	(4.4)
Time varying size effects	no	yes
Firm effects	no	yes
Observations	17,476	15,318

Source: Tax files and Financial relation survey (INSEE) over the 1984-1999 period. The dependant variable is the percentage of equity held by foreign owners known to the firm. The "listed" dummy equals one when the firm is itself listed on the French stock market or when its group leader is. Sample: To control for privatizations, we removed from the sample all firms that were at some point state owned, even partially. In model 2, year dummies are interacted with log(assets) to control for time varying size effects are included. Standard errors correct for firm level heteroskedasticity using the White's method.

Second, an equity weighted regressions (not reported) gives a larger coefficient (5 percentage points instead of 3): given that listed firms tend to be larger, the unweighted point estimate underestimates the real effect of foreign ownership.

5.3 Foundations of Our Empirical Strategy

In the next section, we will test our general claim that firms more exposed to liberalization - i.e. listed firms - experience a larger increase in uncertainty. A straightforward way of getting an idea of firm volatility is to look at the variance in firm sales, employment etc. To compute a variance, we need however a lot of observations in the time dimension, which is a problem given that we have only 15 years and annual (accounting) data. This is why we focus instead on the relation of firm sales to industry demand shocks (Bertrand, Mehta, Mullainathan (2001)). We will argue that firms reacting more closely to industry shocks will face more uncertainty - the equivalent of an increase in s. The present section shows why this is, theoretically speaking, a valid strategy.

We keep a framework most similar to our theoretical analysis, except that we now assume that firm compete monopolistically in industries that face common shocks. At date t, firm i operating

within a given industry - subscript omitted - faces the following demand shock:

$$1 + \tilde{\delta}_{i,t} = 1 + s_i.\tilde{\delta}_t$$

where the industry-level taste shock is such that $\tilde{\delta}_t \sim N(1, \Sigma)$. As in our main model, the firm is a monopoly in its niche i. Its sales are thus given by:

$$\tilde{y}_{i,t} = (1 + s_i.\tilde{\delta}_t).(\frac{\sigma - 1}{\sigma})^{\sigma} \frac{P^{\sigma-1}E}{w^{\sigma}} \tag{33}$$

where $\frac{P^{\sigma-1}E}{w^{\sigma}}$ is determined in equilibrium. Hence, noting $\Delta\tilde{y}_{i,t} = \tilde{y}_{i,t} - \tilde{y}_{i,t-1}$, and using the fact that $s_i\tilde{\delta}_t$ is small, we have:

$$\Delta \log \tilde{y}_{i,t} = s_i.\Delta\tilde{\delta}_t$$

which tells us how much the firm reacts to the industry level structural shock $\tilde{\delta}_t$.

We cannot, however, directly observe $\tilde{\delta}_t$, but we can observe changes in industry sales. Aggregating [33] at the industry level, taking the logs and differentiating leads to:

$$\Delta \log \tilde{y}_{\text{sec},t} = (\mu_L s_L + \mu_P s_P).\Delta\tilde{\delta}_t$$

Combining the two relations with those obtained in our theoretical section, we obtain the relation between the firm's sales shock and the industry sales shock

$$\begin{aligned} \Delta \log \tilde{y}_{i,t} &= \left(\frac{s_P}{(\mu_L s_L + \mu_P s_P)} + 1_{i=L} \frac{s_L - s_P}{(\mu_L s_L + \mu_P s_P)} \right) .\Delta \log \tilde{y}_{\text{sec},t} \\ &= \left(\frac{1}{\mu_L(\phi L - 1) + 1} + 1_{i=L}.\frac{1}{\mu_L + 1/(\phi L - 1)} \right) .\Delta \log \tilde{y}_{\text{sec},t} \end{aligned}$$

where $1_{i=L} = 1$ if the firm is listed. This consequently implies that: $\Delta \log \tilde{y}_{i,t} = [\alpha + 1_{i=L}.\beta] .\Delta \log \tilde{y}_{\text{sec},t}$. As it turns out, the elasticity of firm sales to industry sales is equal to the ratio of firm customization to industry customization. From which we derive two insights. Straightforwardly, (1) $\frac{d\beta}{d\phi} > 0$: listed firms'degree of customization increases more than average after stockmaket liberalization. Less obviously, (2) $\frac{d\alpha}{d\phi} < 0$:if a firm's degree of customization increases less than the industry average, its elasticity of own sales to industry should *decrease*. This exactly what our main model predicts for privately held firms.

5.4 Main Tests

We now turn to the test of our two main theoretical claims. First, did stockmarket liberalization result in more risk taking by French firms, in particular among listed firms. Secondly, was the effect amplified by the degree of competition on the product market.

5.4.1 Sales and Labor Demand

We have shown in our basic model that the effect of stockmarket liberalization was larger for listed firms, even though privately held ones were also experiencing an increase. The reason for this was that listed firms were subject to a direct effect of liberalization in addition to the indirect, general equilibrium one. In our empirical analysis, we will not be able to test the induced effect of privately held firms, since we use them as a control group, i.e. a set of firms that have been affected by other shocks to the economy (for instance, globalization) in a way similar to "treated" (listed) firms. Put otherwise, *comparing* listed and privately held firms allows to look at the "pure" effect of the liberalization, but looking at each group *separately* is misleading because other shocks happened to the economy.

Following the semi structural analysis above, the test of the first conjecture requires to run the following regression:

$$\begin{aligned}\log \text{sales}_{it,s} &= \alpha_i + \beta \text{list}_{it} \times 1_{\{t>1990\}} \times \log \widehat{\text{sales}}_{st} + \gamma \text{list}_{it} \times \log \widehat{\text{sales}}_{st} + \eta 1_{\{t>1990\}} \times \log \widehat{\text{sales}}_{st} \\ &\quad + \nu \log \widehat{\text{sales}}_{st} + \beta' \text{list}_{it} \times 1_{\{t>1990\}} + \gamma' \text{list}_{it} + \sum_T \delta_T 1_{\{t=T\}} + \sum_T \delta'_T . \log(\text{assets}_{it}) 1_{\{t=T\}} + \varepsilon_{it} \quad (34)\end{aligned}$$

where it, s denotes firm i at date t within industry s. $\widehat{\text{sales}}_{st}$ represent total sales in the industry s the firm belongs to. The regression includes firm and year fixed effects, as well as time varying size effects given that one might expect listed firms to be larger and large firms to have experienced a different history over the past 20 years. All in all, this regression amounts to computing the elasticity of one firm's sales with respect to the aggregate industry sales. This elasticity is estimated in first differences (hence the firm fixed effect), i.e. it measures the average percent change of one firm's sales when total industry sales increase by 1%. In addition, this elasticity corresponds to the response of the firm to the the part of the industry shock that is *orthogonal* to macro shocks, given that we include year dummies in the estimating equation (the δ's). In the above regression, this elasticity is allowed to depend on the listing status of the firm and the period of observation. For listed firms, it equals $\gamma + \beta + \eta + \nu$ after liberalization, and $\gamma + \nu$ before. For privately held firms, the elasticity is given by $\eta + \nu$ after reforms and ν before. If our theory has some empirical relevance, we should therefore observe a larger elasticity for listed firms (γ and $\gamma + \beta$ should be positive), and more so after the end of the financial liberalization (β should be positive).

[Insert Table 3]

Within estimates of equation (34) are given in table 3. Industry sales were computed using the two digit classification, excluding own firm's sales and industries that have less than 50 observations.

Standard errors account for firm level heteroskedasticity using White's method. The first column sets all coefficients in (34) to zero but ν, in order to prove that there indeed is a correlation between changes in firm and industry sales - this checks the relevance of the industry classification. The second column constrains β and η to zero, and thus merely compares the response of firms that are listed to those that are not listed. The last column corresponds to the estimation of the full model.

Reading the first column confirms the fact that there is a strong, positive correlation between industry level changes in sales and firm sales: our industry definition is therefore not spurious. On average, an increase by 1% of industry sales, that is not macroeconomic (i.e. captured by the year dummies), leads to an increase by 0.14% of firm sales. As column 2 shows, there is no significant difference between listed and non listed firm over the 1984-1999 period. This, however, conceals important time differences, which appear in column 3. After the financial reforms, this elasticity increases by 0.08 for listed firms, while decreases slightly but significantly by 0.01 for privately held ones. This is consistent with our discussion above: while the absolute level of customization is supposed to increase even for private firms, it increases by less than the industry's average. Moreover, privately held firms are a control group in our empirical methodology; they may be subject to all sorts of shocks beside financial liberalization.[12] Economically, the difference between listed and non listed firms is sizeable since on average across time and listing status this elasticity is 0.14. This estimation is robust to the selection of the period (post reform period after 1988 instead of 1990), of the sample (non financial industries, manufacturing only).

Columns 4, 5 and 6 of table 3 focus on the reaction of employment to sales shocks. We replaced firm sales growth by firm employment growth in regression [34] as a dependent variable. As it turns out the effect of liberalization goes in the right direction, but is weakly significant and economically small. Part of the reason might be that (1) there is a large level of employment protection in France and (2) our empirical model is not adapted, since employment growth is not even correlated to industry sales shocks (column 4).

5.4.2 The Competition - Finance Nexus

In our,model, the impact of liberalization on firm level uncertainty has been shown to be amplified by product market competition. The reason is that product market competition tends to reduce firm profits more after liberalization. As a result, each competitors is willing to take on more risk. It can be

[12] As it turns out, one of them might be purely statistical in nature; the industry classification that we use here was defined in 1973 and became more and more obsolete after the years. Hence, the probability that two firms from the same industry according to this classification are actual competitors declines over the period. As a result, the correlation between industry and firm sales declines for the sample as a whole.

shown that this effect should be more apparent among listed firms, because they react more to a given decline in size. As a consequence, we expect to see the results from table 3 to be more pronounced in more competitive industries.

We thus broke down our sample into competitive and non competitive industries, and ran regression (34) separately on each of the samples. To do this, we took three different measures of competition computed *in the first year of the firm's existence*. The first measure is the industry sales concentration using the Herfindahl index. The second measure is the number of firms in the industry. Both measures were computed at the 2 digit industry level (our results carry out at the 4 digit level). Our last measure is the firm's mark up computed as (value added - labor costs - 0.08*tangible assets) / sales. This measure avoids the shortcomings of industry classification and has the advantage of being computed at the firm level. The problem is that we have to make an assumption over the cost of capital that is most likely to be wrong. For all the measures, we broke down the sample into firm facing above the median and under the median competition.

[Insert Table 4]

In table 4, regressions (34) for each half sample are reported. The last line of the table. presents the t probability that the effect of liberalization - the β coefficient in regression (34) - is the same in both equations. This test has been performed through running this regression on the whole sample, interacting all coefficients with a dummy variable equal to one when competition was "high". As it turns out, almost all of the effect of liberalization discussed in table 3 is located in competitive industries. The coefficient of the effect of financial liberalization drops to zero for firms facing low competition, while it reaches some 0.10 for firms in competitive industries. It is fairly stable across competition measures and is economically large. This difference is however not statistically very significant.

5.5 Robustness Checks

5.5.1 A VAR-like Approach

We propose here an alternative model to identify the firm's reaction to shocks: instead of looking at the correlation between industry and firm sales *growth*, we focus at the relation between *innovations* on these process. This approach is a little more subtle than the previous one because it might well be that a large part of sales growth can be predicted using past information. This predicted part does not reflect risk and our theoretical argument therefore does not apply to it. Hence, we have a noisy

measure of the firm's reaction to uncertainty, and are likely to underestimate the effects we are looking for.

To take out the predictable part, we first regressed firm log sales on past firm log sales (using two lags) including firm and year fixed effects, and took the residuals $Esales_{it}$ of this regression. The realizations of this residual are likely to be containing a larger part of "true" uncertainty, that is unexpected realizations from the entrepreneur's viewpoint. We then do the same thing for industry sales, including year and industry fixed effects; the residual $\widehat{Esales}_{st}$ of this equation. Again, this might be closer to the unexpected part of the realization. Although we could have added other likely predictors in both equations, or have estimated on prediction equation per firm/industry, we preferred to keep the method as simple as possible.

We then directly regress $Esales_{it}$ on $\widehat{Esales}_{st}$ as ask whether the coefficient has increased more for listed firms after liberalization:

$$\begin{aligned} Esales_{it} &= \alpha_i + \beta \text{list}_{it} \times 1_{\{t>1990\}} \times \widehat{Esales}_{st} + \gamma \text{list}_{it} \times \widehat{Esales}_{st} + \eta 1_{\{t>1990\}} \times \widehat{Esales}_{st} \\ &\quad + \nu \widehat{Esales}_{st} + \beta' \text{list}_{it} \times 1_{\{t>1990\}} + \gamma' \text{list}_{it} + \sum_T \delta_T 1_{\{t=T\}} + \sum_T \delta'_T . \log(\text{assets}_{it}) 1_{\{t=T\}} + \varepsilon_{it} \end{aligned} \tag{35}$$

where this modified version of [34] simply replaces sales shocks by residuals from their forecasting autoregressions.

[Insert Table 5]

Table 5 provides the estimates of equation [35] looking at the effect of industry sales shocks on firm sales and employment. For sales, these results simply confirm table 3; they are larger, in part because the correlation of unexpected firm and industry sales shocks is a priori larger (0.19 instead of 0.14). The effect of liberalization also appears much larger (an increase in elasticity by 0.22 instead of 0.08), both in absolute terms and with respect to the initial value of the elasticity. As could be expected, the estimation is, however, slightly less precise and we lose some statistical significance. Interesting news also come from employment. Employment is a very inert variable, more so than sales. hence, the past evolution of employment is a good predictor of the current one and employment growth as we used it above is therefore likely to be a very poor measure of unexpected shocks. As columns 3 and 4 of table 5 show, employment regression do indeed work much better with this new methodology. The "natural" correlation between unexpected employment and industry sales shocks is significantly positive, albeit small (0.06) compared to sales. The effect of liberalization on labor demand uncertainty also turns out to be both economically large and significant (an increase by 0.20).

5.5.2 Globalization

It may be argued that listed firms are the one that are the most exposed to the trend in globalization faced by French firms over the 1990s. Some of these firms have become very large multinational corporations and now operate on truly global markets, facing more competition and product market uncertainty as a result. In addition, because of globalization, their subsidiaries in France may have become more sensitive to shocks in other parts of the world: they export to and import from numerous foreign affiliate firms and shocks can easily transmitted.

It may be argued that such a picture is likely to be more representative of the very biggest French firms, a subgroup we focus on in the next section, than of little "second marché" firms, whose equities do not even trade every day. To answer this concern more systematically, we performed several robustness checks using the firm's export available from the accounting data.[13] First, we showed that it was indeed true that listed firms increased the share of export in total sales to a larger extent than non listed firms. This effect did, however, vanish once we included time varying size effects in the regression. Hence, it is large firms, not listed firms, who went global over the period. This gave us further confidence in our results since our regressions all control for time varying size effects. Second, we reran regression [34] on firms who do not export at all; with only 28,800 observations left, we lost some significance (though the effect of liberalization β remained significant at the 1.4% level) but the magnitude of the effect remained the same (0.09 instead of 0.08). Third, we reran regression [34] using the share of exports in total sales as an additional control, and this did not affect our results at all.

5.5.3 Firms Belonging to the Leading Stock Market Index

This last test singles out the 40 firm listed in the CAC40 leading index of the Paris bourse for two very different reasons. First, these firms could be argued to be very atypical of the usual French listed firm, because they are the 40 largest and are, by definition successful multinationals. These firms may have implemented a new strategy of risk taking that has been specific to them, and no other French firm has experienced. Secondly, since these firms belong to a very visible index they are privileged targets for foreign investors who want to diversify their portfolio (Plihon and Ponssard [2001] note that on average in 2000, some 50% of the equity of these firms was held by foreign mutual funds). Because of their sheer size and exposure, these firms are, among those listed in the Paris stock exchange, the one who came to be held by the most diversified shareholders of all.

Thus, we expect two things. First, we expect that our effect survives if we remove these CAC40 firms from the sample, but we *also* expect it to be larger among these firms than it is for other listed

[13] All the econometric results we refer to hereafter are available from the authors upon request.

firms, whose ownership remains sometimes fairly concentrated (one family holding 70%, for instance). This leads us to create two estimation samples: the first one contains all privately held firms and non CAC40 listed firms. The second one contains privately held firms as well as CAC40 firms only.

[Insert Table 6]

Regression [34] has been run on these two samples and results are reported in table 6, columns 3 and 4. Column 1 repeats the estimate of [34] on the whole sample. Columns 2 repeats this estimation on all observations corresponding to firms after 1987, the year the CAC40 index was created. This sample restriction does not affect the result too much (the effect of liberalization drops from 0.08 to 0.06, an insignificant difference). Column 3 report the estimation procedure for non CAC40 firms. The estimated effect is not really different from column 2, but is a little less well estimated. By removing CAC40 firms, we removed a lot of observations corresponding to subsidiaries of listed firms (these groups tend to have more affiliate companies than the average listed firm). Last, from column 4, we can see that the estimated effect on firms who were part of the CAC40 in 1987 is very large and highly significant (0.38 instead of 0.05 for non CAC40 firms). This is consistent with the idea that CAC40 had more and more diversified shareholder over the period.

6 References

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7 Figures

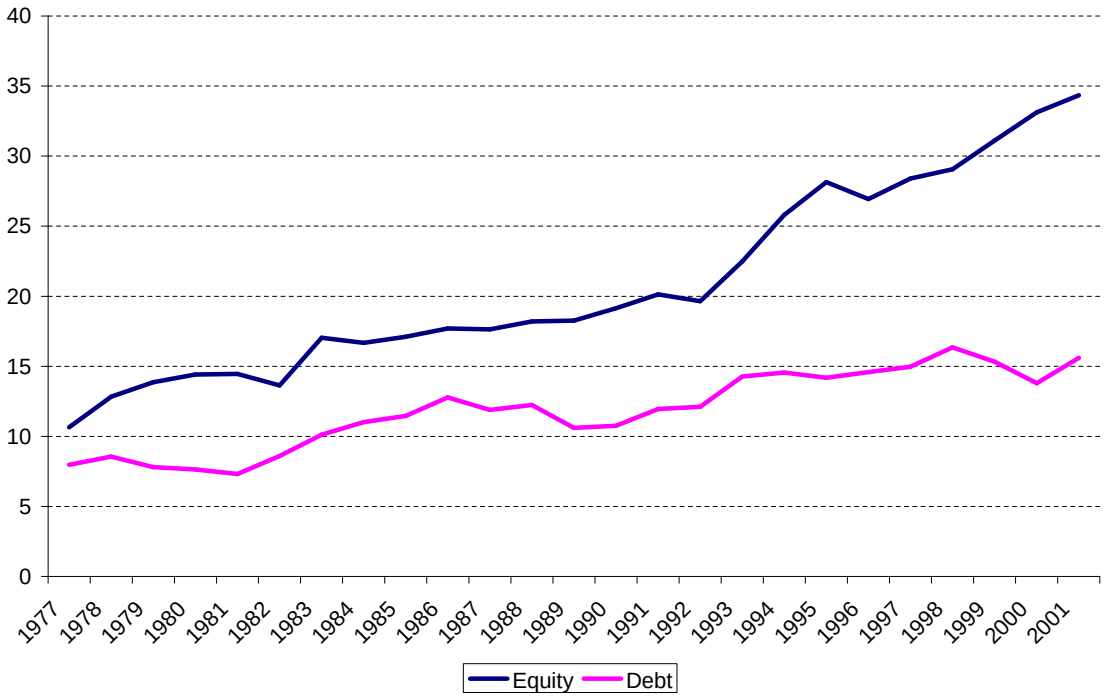

Figure 1: Share of Listed Securities By Category of Liability

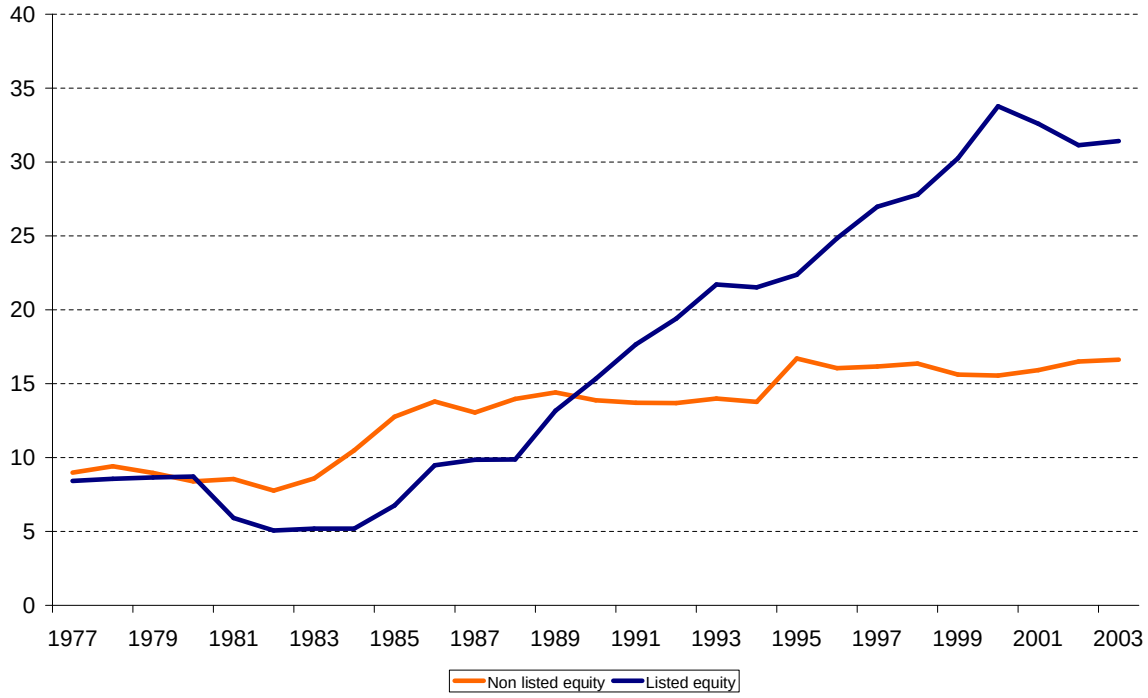

Figure 2 : Share of Foreign Ownership by Category of Equity

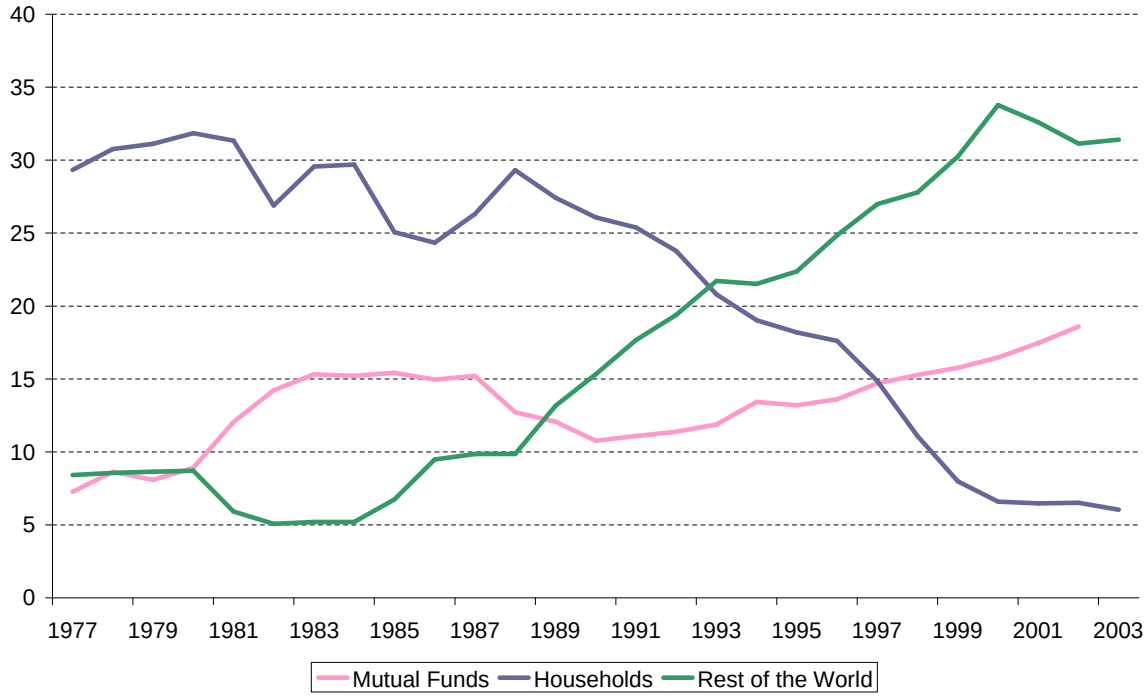

Figure 3 : Ownership of French Listed Equity

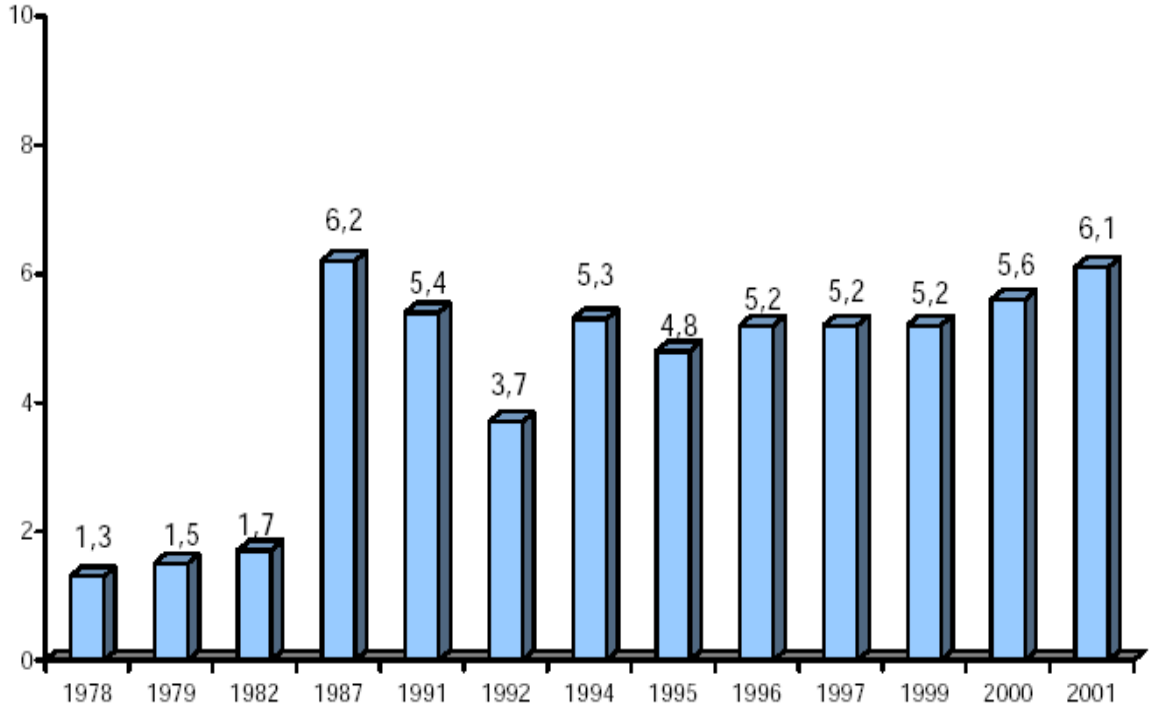

Figure 4: Number of French Holders of Listed Shares (Source: Chocron, Grandjean and Vernois (2001))

8 Tables

Table 1: Sample Description

	Number of Firms	% Directly Listed	% Affiliate To a Group	% Affiliate Listed Group
1984	5,621	5.3	-	-
1985	6,182	5.4	49.4	18.4
1986	6,722	5.3	49.9	21.0
1987	7,096	5.3	50.0	21.7
1988	7,196	5.2	-	-
1989	7,906	5.0	50.9	24.8
1990	7,906	4.9	53.1	23.7
1991	8,283	5.0	54.4	23.9
1992	8,608	4.7	57.3	21.1
1993	8,747	4.6	60.0	20.6
1994	8,817	4.6	62.9	20.5
1995	8,896	4.8	67.0	20.7
1996	8,850	4.7	69.8	19.9
1997	8,728	4.7	71.9	19.7
1998	8,381	4.5	73.2	18.8
1999	8,068	4.4	74.1	17.9
Observations	126,007	6,038	68,942	16,762

Source: Tax files and Financial relation survey (INSEE) over the 1984-1999 period. In 1984 and 1988, the financial relation survey was not conducted.

Table 2: Listed Firms and Listed Equity

	Indpt Firms	% Firms Listed	% Equity Listed
1984	-	-	-
1985	3,541	3.3	26.1
1986	3,842	3.2	18.8
1987	4,051	3.0	32.5
1988	-	-	-
1989	4,569	2.9	40.5
1990	4,546	2.7	39.3
1991	4,680	2.6	32.4
1992	4,764	2.4	31.7
1993	4,744	2.7	33.1
1994	4,714	3.0	42.7
1995	4,549	3.3	46.1
1996	4,443	3.3	51.1
1997	4,343	3.4	44.3
1998	4,137	3.3	50.0
1999	3,990	3.1	50.1
Observations	60,913	2.9	41.6

Source: Tax files and Financial relation survey (INSEE) over the 1984-1999 period. In 1984 and 1988, the financial relation survey was not conducted. Firms that were at any point state owned were removed from the sample. The sample is restricted to firms that are either independent or lead a group (are not controlled). Column 1 presents the fraction of firms that are listed within this sample. Column 2 presents the total book value of equity of listed firms as a fraction of the total.

Table 3: Sales Response to an Industry Shock

	Sales			Employment		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
$\widehat{\log \text{sales}}_{st}$ ×Listed × (an>1990)	-	-	0.08***	-	-	0.03
			(0.02)			(0.03)
$\widehat{\log \text{sales}}_{st}$ ×Listed	-	-0.01	-0.04*	-	0.02	0.01
		(0.02)	(0.02)		(0.03)	(0.04)
$\widehat{\log \text{sales}}_{st}$ × (an>1990)	-	-	-0.01**	-	-	0.05
			(0.01)			(0.01)
$\widehat{\log \text{sales}}_{st}$	0.14***	0.13***	0.13***	-0.01	-0.02	-0.05**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Listed × (an>1990)	-	-	-1.53***	-	-	-0.61
			(0.38)			(0.50)
Listed	-	0.17	0.81*	-	-0.33	-0.18
		(0.34)	(0.43)		(0.50)	(0.65)
Time Varying Size effects	yes	yes	yes	yes	yes	yes
Firm effects	yes	yes	yes	yes	yes	yes
Observations	90,968	85,550	85,550	88,820	83,559	83,559

Source: Tax files and Financial relation survey (INSEE) over the 1984-1999 period. The dependant variable is the logarithm of the sales at the firm level. The "listed" dummy equals one when the firm is itself listed on the French stock market or when its group leader is. Sample: To control for privatizations, we removed from the sample all firms that were at some point state owned, even partially. In model 2, year dummies are interacted with log(assets) to control for time varying size effects are included. Standard errors correct for observation level heteroskedasticity using the White's method.

Table 4: Sales Response to an Industry Shock: 2 digit Level Measure of Competition

Measure of Competition	1/Herfindahl		# of firms		1/Mark-up	
Intensity of Competition	Low	High	Low	High	Low	High
$\widehat{\log \text{sales}}_{st}$×Listed × (an>1990)	0.00	0.09***	-0.01	0.08***	0.01	0.12***
	(0.03)	(0.02)	(0.04)	(0.03)	(0.04)	(0.04)
$\widehat{\log \text{sales}}_{st}$×Listed	0.00	-0.05**	0.01	-0.06***	-0.06	0.03
	(0.04)	(0.02)	(0.05)	(0.02)	(0.04)	(0.04)
$\widehat{\log \text{sales}}_{st}$× (an>1990)	0.00	-0.02*	0.01	-0.03***	0.00	-0.03**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
$\widehat{\log \text{sales}}_{st}$	0.26***	0.07***	0.29***	0.10***	0.15***	0.20***
	(0.05)	(0.02)	(0.05)	(0.02)	(0.03)	(0.03)
Listed × (an>1990)	-0.28	-1.57***	-0.06	-1.49***	-0.39	-2.32***
	(0.59)	(0.56)	(0.71)	(0.48)	(0.64)	(0.84)
Listed	0.24	0.86*	0.06	1.17***	1.20	-0.57
	(0.73)	(0.45)	(0.93)	(0.40)	(0.69)	(0.75)
Time Varying Size effects	yes	yes	yes	yes	yes	yes
Firm effects	yes	yes	yes	yes	yes	yes
Test equality (t-prob)	0.11		0.15		0.43	
Observations	37,332	48,218	39,448	46,102	38,040	47,510

Source: Tax files and Financial relation survey (INSEE) over the 1984-1999 period. The dependant variable is the logarithm of the sales at the firm level. The "listed" dummy equals one when the firm is itself listed on the French stock market or when its group leader is. Sample: To control for privatizations, we removed from the sample all firms that were at some point state owned, even partially. In model 2, year dummies are interacted with log(assets) to control for time varying size effects are included. Standard errors correct for observation level heteroskedasticity using the White's method.

Table 5: Correlation Between Innovation on Sales and Industry Sales

	Log Sales		Log Empl.	
	Model 1	Model 2	Model 1	Model 2
$\widehat{\log \text{sales}}_{st}$ ×Listed × (an>1990)	-	0.22**	-	0.20**
		(0.12)		(0.09)
$\widehat{\log \text{sales}}_{st}$ ×Listed	-	-0.16	-	-0.05
		(0.11)		(0.05)
$\widehat{\log \text{sales}}_{st}$ × (an>1990)	-	-0.11***	-	-0.05**
		(0.03)		(0.02)
$\widehat{\log \text{sales}}_{st}$	0.19***	0.25***	0.06***	0.08***
	(0.02)	(0.02)	(0.02)	(0.02)
Listed × (an>1990)	-	-0.02*	-	-0.01
		(0.01)		(0.01)
Listed	-	-0.00	-	-0.00
		(0.01)		(0.01)
Time Varying Size effects	yes	yes	yes	yes
Firm effects	yes	yes	yes	yes
Observations	79,017	78,636	71,035	68,306

Source: Tax files and Financial relation survey (INSEE) over the 1984-1999 period. The dependent variable is the logarithm of employment at the firm level. The "listed" dummy equals one when the firm is itself listed on the French stock market or when its group leader is. Sample: To control for privatizations, we removed from the sample all firms that were at some point state owned, even partially. In model 2, year dummies are interacted with log(assets) to control for time varying size effects are included. Standard errors correct for observation level heteroskedasticity using the White's method.

Table 6: Being initially part of the Leading Stock Market Index

	All	Post 1987	Not CAC40	CAC40
$\widehat{\log \text{sales}}_{st}$×Listed × (an>1990)	0.08***	0.06***	0.05**	0.38***
	(0.02)	(0.02)	(0.02)	(0.14)
$\widehat{\log \text{sales}}_{st}$×Listed	-0.04*	-0.00	0.01	-0.31**
	(0.02)	(0.03)	(0.02)	(0.16)
$\widehat{\log \text{sales}}_{st}$× (an>1990)	-0.01	-0.01	-0.00	-0.35***
	(0.01)	(0.01)	(0.02)	(0.14)
$\widehat{\log \text{sales}}_{st}$	0.13***	0.14***	0.13***	0.52***
	(0.02)	(0.02)	(0.02)	(0.18)
Listed × (an>1990)	-1.53	-1.11***	-1.07***	-6.54***
	(0.38)	(0.40)	(0.45)	(2.48)
Listed	0.81	0.27	-0.21	5.70**
	(0.44)	(0.50)	(0.57)	(2.82)
Time Varying Size effects	yes	yes	yes	yes
Firm effects	yes	yes	yes	yes
Observations	85,550	44,890	42,687	2,203

Source: Tax files and Financial relation survey (INSEE) over the 1984-1999 period. The dependant variable is the logarithm of the sales at the firm level. The "listed" dummy equals one when the firm is itself listed on the French stock market or when its group leader is. Sample: To control for privatizations, we removed from the sample all firms that were at some point state owned, even partially. In model 2, year dummies are interacted with log(assets) to control for time varying size effects are included. Standard errors correct for observation level heteroskedasticity using the White's method.

Appendix

A Labor market rigidity

As shown in the main text, an entrepreneur operating with flexible contracts chooses ex-post the labor force $\tilde{l}^{flex}$ in order to maximize cash-flows:

$$\tilde{\pi}^{flex} = \arg\max_{l}(1+\tilde{\delta})^{1/\sigma}.(P^{\sigma-1}E)^{1/\sigma}(\tilde{l}^{flex})^{\sigma/\sigma-1} - w\tilde{l}^{flex} \tag{36}$$

such that ex-ante, this entrepreneur faces the following problem $s^{flex} = \max_{s} U^{flex}(s)$ where $U^{flex}(s)$ is given by:

$$U^{flex}(s) = \frac{w}{P} + \left(\frac{E\tilde{\pi}^{flex}(s)}{P} - \frac{a}{2\phi L}\frac{VAR(\tilde{\pi}^{flex}(s))}{P^2}\right) \tag{37}$$

An entrepreneur operating under rigid contract chooses ex-ante the labor force l^{rig}. Hence its cash-flows ex-post are given by $\tilde{\pi}^{rig}(l^{rig})$. A straightforward Taylor expansion at the second order gives:

$$\tilde{\pi}^{rig}(l^{rig}) = \tilde{\pi}^{flex}(l^{rig}) + (\tilde{l}^{flex} - l^{rig})\frac{d\tilde{\pi}^{flex}}{dl} + \frac{(\tilde{l}^{flex} - l^{rig})^2}{2}.\frac{d^2\tilde{\pi}^{flex}}{dl^2}$$

Using the FOC of problem (36), we get that $\frac{d\tilde{\pi}^{flex}}{dl} = 0$ and $\frac{d^2\tilde{\pi}^{flex}}{dl^2} < 0$. Hence at the second order, the ex-ante mean-variance criterion of this entrepreneur can be written as:

$$U_k^{rig}(s) = U_k^{flex}(s) + E\left[\frac{\left(\tilde{l}^{flex} - l^{rig}\right)^2}{2}.\frac{d^2\tilde{\pi}^{flex}}{d\tilde{l}^{flex}}\right]$$

Let $\Psi(s)$ denote the right member of the RHS of this equation. Clearly $\Psi(.)$ denotes the misallocation cost implied by the choice of labor before the demand shock has been revealed; we have $\Psi(s) < 0$, $\Psi'(s) < 0$ and $\Psi''(s) > 0$.

Each entrepreneur chooses a degree of customization s such that:

$$\begin{aligned} s^{flex} &= \max_{s} U^{flex}(s) \\ s^{rig} &= \max_{s} U^{rig}(s) \end{aligned} \tag{38}$$

From the FOC of problems (38) and the fact that $\Psi' < 0$ and $\partial U^{flex}/\partial s > 0$, we get $s^{rig} < s^{flex}$. Now let's consider an increase in ϕ, the degree of portfolio diversification. Differentiating the FOC of problems (38) yields:

$$\frac{d\ln s^{rig}}{d\phi} = -\left(\frac{\frac{\partial^2 \ln U^{flex}}{\partial \ln s \partial \phi}}{\frac{\partial^2 \ln U^{flex}}{\partial^2 \ln s} + \frac{\partial^2 \Psi}{\partial^2 \ln s}}\right)_{s^{rig}} \tag{39}$$

and

$$\frac{d\ln s^{flex}}{d\phi} = -\left(\frac{\frac{\partial^2 \ln U^{flex}}{\partial \ln s \partial \phi}}{\frac{\partial^2 \ln U^{flex}}{\partial^2 \ln s}}\right)_{s^{flex}} \tag{40}$$

From the definition of $U^{flex}(.)$ as given by (37) and the fact that $s^{rig} < s^{flex}$, we get:

$$\left(\frac{\partial^2 \ln U^{flex}}{\partial \ln s \partial \phi}\right)_{s^{flex}} > \left(\frac{\partial^2 \ln U^{flex}}{\partial \ln s \partial \phi}\right)_{s^{rig}} > 0 \tag{41}$$

and

$$\left(\frac{\partial^2 \ln U^{flex}}{\partial^2 \ln s}\right)_{s^{rig}} > \left(\frac{\partial^2 \ln U^{flex}}{\partial^2 \ln s}\right)_{s^{flex}} > 0 \tag{42}$$

Finally $\Psi'' < 0$ together with equations (39)-(42) gives:

$$\left(\frac{d \ln s^{rig}}{d\phi}\right)_{rigid} < \left(\frac{d \ln s^{flex}}{d\phi}\right)_{flex}$$

B The Entry Decision

We perform here a robustness check of our model by allowing for free entry on the product market and on the stockmarket: the total number of firms n, the share of publicly listed firms, μ_L, and private firms, μ_P, are now endogenously determined. Most of our results are robust to this change.

The entry decision and the decision to go public are made at period 0. The timing is now: $t = 0$, entrepreneurs enter on the market and decide to list or not on the stockmarket; $t = 1$: entrepreneurs choose their customization strategy s; $t = 2$: financial market clears up; $t = 3$: uncertainty is revealed and production takes place.

In a very standard way, the entry decision entails a fixed cost κ (labelled in term of foregone consumption units). In the same way going public entails an extra fixed IPO cost, $\Gamma\mu_L$, that is increasing in the share[14] of listed firms μ_L. An entrepreneur therefore decides to enter on the market and to list (resp. not to list) if her net consumption gain of managing a public firm (resp. a private firm) is larger than the consumption of being a worker only:

$$U^P - \kappa \geq \frac{w}{P} \tag{43}$$

and

$$U^L - (\kappa + \Gamma\mu_L) \geq \frac{w}{P} \tag{44}$$

At equilibrium those conditions hold as equality and using [17], [19] and [24] this gives μ_L, the fraction of listed firms:

$$\mu_L = \frac{\phi L - 1}{2a\Sigma\Gamma} \tag{45}$$

which is increasing in the number of investors ϕ and decreasing in the agents' risk aversion a, the taste shocks' variance Σ and the cost of listing Γ. Using [18], [20], [24], [43], [44] and [45], we get:

$$n = \left(\frac{(\kappa a\Sigma - 1/2)\sigma}{a\Sigma L}\right)^{(\sigma-1)/(2-\sigma)} \cdot \left[1 + (\frac{(\phi L - 1)^2}{2a\Sigma\Gamma} + 1)\frac{1}{\kappa a\Sigma - 1/2}\right]^{-1} \tag{46}$$

and

$$s_P = \frac{1}{\kappa a\Sigma - 1/2} \text{ and } s_L = \frac{\phi L}{\kappa a\Sigma - 1/2} \tag{47}$$

Result: Under free entry, the impact of financial liberalization on non listed firms disappears: the pro-competitive effect is counterbalanced by the decrease in the number of active firms n.

The intuition is the following. An increase in ϕ promotes s_L, customization among listed firms; this makes π_0/P smaller and thus promotes s_P, customization among non listed firms (this is the

[14] We are aware that this way of modelling the IPO costs may sound a little bit ad-hoc. Alternative modelling strategy would obscure the exposition without adding new conceptual issues. Moreover a simple way to justify the form of IPO costs here is the following.

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pro-competitive effect). All in all, this makes π_0/P smaller which discourages entry on the product market: as a consequence, the total number of active firms, n, decreases (see equation [46]); this in turn makes π_0/P increase until reaching its level before financial liberalization (the pro-competitive effect cancels out); and so s_P goes back to its pre-liberalization level.

This discussion shows that under free entry, financial liberalization has no impact on s_P because the pro-competitive effect vanishes out as the increase in s_L is exactly compensated by the decrease in n. We believe that this extreme result is due to the functional form of entry costs assumed here for facilitating computations. A more general form (such as entry costs increasing and convex in n) would keep active the pro-competitive effect but in a attenuated way. Hence we would get that under free entry, the impact of financial liberalization on non listed firms is partially reduced with respect to the basic framework.