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# *Law and Equity Markets: A Simple Model*

**Davide Lombardo[*] and Marco Pagano[**]**

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## Abstract

We analyze how the law and its enforcement affect equity market equilibrium. Improvements in the legal system, while invariably associated with broader equity markets, have different effects on equity returns depending on the institutional change considered and on the degree of international stock market segmentation. The model is useful to interpret the results of recent empirical work, such as La Porta et al. (1997) and Lombardo and Pagano (1999). In particular, it can rationalize the observed cross-country pattern, whereby better institutions are associated both with broader equity markets and higher risk-adjusted returns on equity.

**Keywords**: law, enforcement, shareholder protection, corporate governance, return on equity

**JEL Classification** G12, K22, K42

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# 1 Introduction

Recent research in corporate finance has highlighted the importance of legal institutions and judicial enforcement for the performance of capital markets. Equity markets are generally thought to be the most sensitive to the legal provisions in favor of financiers and to the effectiveness of judicial enforcement of these provisions.

By definition, shareholders are residual claimants to the income stream generated by companies: their income rights are less tightly specified than those of debt holders. Therefore, they are more exposed to the danger of opportunistic behavior by managers, be it diversion of corporate resources or non-value-maximizing decisions (such as nepotistic appointments, pursuit of unprofitable "pet" projects, low managerial effort, etc.). The main limit to such opportunistic behavior is the set of legal rules protecting shareholders (often referred to as corporate governance legal standards), the effectiveness of courts in enforcing such rules and the ability of shareholders to verify if their rights have been violated. The latter in turn depends on the transparency of corporate accounts and on the quality and timeliness of the information that companies disseminate.

It is generally believed that improving corporate governance rules, their enforcement and the quality of accounting standards should result in greater reliance on equity financing by companies. This could occur either because such institutional changes directly limit the amount of corporate resources diverted by managers or because they allow shareholders to monitor managers more cheaply and effectively. The hypothesis that stronger protection of shareholder rights leads to a broader market for external equity is central to the recent work by La Porta, Lopez de Silanes, Shleifer and Vishny (henceforth LLSV, 1997). It is present also in Modigliani and Perotti (1997), Carlin and Mayer (1998), Demirgüc-Kunt and Maksimovic (1998), Rajan and Zingales (1998) and Tadesse (1999).[1]

The presumption that better corporate governance rules and stricter judicial enforcement should lead to a larger amount of equity funding appears reasonable, being borne out by a host of microeconomic models of agency costs in corporate finance, starting with the seminal paper by Jensen and Meckling (1976). However, the literature has been silent on the effect that such improvements in the institutional framework should have on the equilibrium rate of return on equity and on the cost of capital faced by companies. This is not surprising,

[1] For a cursory review of this literature, see Lombardo and Pagano (2000).

considering that microeconomic models of corporate financing take the opportunity cost of funds as *exogenously given*. For instance, Jensen and Meckling (1976) portray financiers as competing risk-neutral individuals who require companies to pay an expected rate of return (net of agency costs) equal to the interest rate, and the latter is assumed to be fixed. Perhaps this has induced many to presume that the rate of return on equity is unaffected by changes in the legal environment.

However, this need not be true if one shifts focus from a single company to the equity market as a whole. In this paper, we show that the effect of the legal environment on the return on equity depends on the specific mechanism through which this change impacts the equity market. For instance, consider two different experiments. The first is a reduction of the private benefits that managers can extract from the company, for instance by introducing legal limits to transactions with other companies that may dilute the income rights of minority shareholders (mergers, asset sales, etc.). The second experiment is a reduction of the legal and auditing costs that shareholders must bear to prevent managerial opportunism. Such cost reduction may for example result from the introduction of class action suits or voting by mail. These two types of institutional change can have opposite effects on the observed equilibrium rate of return on equity, controlling for undiversifiable risk, even though they both reduce agency costs and boost the size of the equity market.

We also show that the size of these effects on the equilibrium rate of return is increasing in the degree of international segmentation of equity markets. In fact, a by-product of our analysis is the conclusion that the magnitude of these effects provides new evidence on the degree of international segmentation of stock markets.

The degree of international integration also determines who gains and who loses from legal reforms, and therefore who will support or resist them. For instance, if legal rules are unexpectedly changed so as to reduce managerial diversion of corporate resources, in a fully integrated economy the gains are entirely reflected in a increase of stock prices (with no change in the rate of return) and therefore are reaped only by existing shareholders. In contrast, in an internationally segmented stock market, only a fraction of the benefits materializes in a stock price increase: the remainder translates into an increase of the expected rate of return, which accrues to future shareholders as well.

Apart from the intrinsic interest for the explanation of the international cross-section of stock returns, these issues are clearly relevant for the investing community. For instance, in a

companion paper (Lombardo and Pagano, 2000), we find evidence that respect for the law and judicial efficiency are positively associated with the risk-adjusted return on equity. This suggests that fund managers and individual investors should stay away from countries with a poor legal environment and low corporate governance standards. To put it differently, there is an equity premium to good legal institutions. To the extent that investors are aware of such empirical regularity, international net equity flows should be directed to countries that are in the process of improving their legal and judicial systems. If so, the payoffs to such improvements include not only a broader local stock market, but also one that is more closely integrated in world capital markets.

The paper is organized as follows. In section 2, we present a simple model that allows us to analyze the effects of changes in the legal environment on equity market equilibrium. In section 3, we study the relevant comparative statics in the benchmark case of a stock market fully integrated within world markets. In section 4, we turn to the case of an internationally segmented equity market. In section 5 we describe the effects of an increase in international integration. In section 6 we show how this analytical framework can be used to interpret the empirical findings of LLSV (1997) and those of Lombardo and Pagano (2000). Section 7 concludes.

## 2 The model

Consider a simple environment with two countries: a small country, populated by $N_h$ domestic investors, and the rest of the world, populated by $N_w$ investors. A fraction $\lambda$ of these $N_w$ investors is able to invest also in the home market. We call these investors "global" and subscript their asset demands by *g*. The remaining $(1-\lambda)N_w$ foreign investors only invest on the world market, because transaction or information costs prevent them from accessing the home market. We subscript their asset demands by *f*. Therefore, $\lambda$ is an index of international integration (with $\lambda = 0$ there is no international presence in the home market; with $\lambda = 1$, the two markets are fully integrated). Throughout, asset demands have two subscripts: the first refers to the country where the asset is traded and the second to the investor's type. For instance, $x_{hg}$ denotes the global investors' holdings of the home stock and $x_{hf}$ the amount of the same asset held by foreign "non-global" investors.

The rate of return on home equity $\tilde{R}_h$ is a random variable with mean $1+\mu_h$ and standard deviation $\sigma_h$. Symmetrically, the rate of return on the world portfolio $\tilde{R}_w$ is a random variable with mean $1+\mu_w$ and standard deviation $\sigma_w$. The covariance between the two rates of return is denoted by $\sigma_{hw}$.

The rate of return $\tilde{R}_h$ is the cash flow that investors receive per dollar of their initial investment in home equity, net of any private benefits taken by the company's management. We assume that this cash flow can be entirely appropriated by managers as private benefits, unless shareholders pay legal and auditing costs *c* per dollar invested in home market equities.[2] One can think of these costs as lawyers' and accountants' fees needed to verify the truthfulness of the company's accounts.[3] However, payment of these fees does not fully eliminate the agency problem. Managers can still divert a fraction *d* of the investments' proceeds to their benefit. Therefore, the cost *c* merely ensures that no less than a fraction $1-d$ of the total returns is paid to shareholders.

Since the focus of the analysis is on the home equity market, we assume that in the foreign market there are neither agency problems (foreign managers do not steal) nor legal and auditing costs to secure payment from managers (foreign lawyers and accountants are free). Both assumptions are irrelevant to our results and just simplify the notation.

### 2.1 Portfolio Choice

To make the model as simple as possible, we assume that investors have mean-variance utility.[4] The problem of the representative *j*-type investor (*j={h,g,f}*) is then:

$$\underset{x_{hj},x_{wj}}{\text{Max}}\, E(\tilde{W}_{1j}) - \frac{b}{2} Var(\tilde{W}_{1j}) - cx_{hj} \qquad (1)$$

[2] We envision a situation in which the financial resources contributed by managers and controlling shareholders are insufficient to operate companies, so that the marginal investor is an outside shareholder.

[3] We sidestep the possible free-riding problem involved in monitoring management by assuming that only the shareholders who pay this cost can claim in court (or threaten to claim) the verifiable fraction 1-*d* of the company's cash flow to which they are entitled.

[4] As it is well known, an utility index as the one in equation (1) can either result directly from quadratic utility or from negative exponential utility and normal returns.

where $\tilde{W}_{1j}$ is the value of investor *j*'s terminal wealth, *b* is an index for the investors' degree of risk aversion, $x_{hj}$ and $x_{wj}$ are the amounts she invests in the home and the world market respectively. The expected value of terminal wealth is

$$E(\tilde{W}_{1j}) = (W_{0j} - x_{hj} - x_{wj})(1+r) + x_{hj}(1+\mu_h) + x_{wj}(1+\mu_w) \qquad (2)$$

and its variance is

$$Var(\tilde{W}_{1j}) = \sigma_h^2 x_{hj}^2 + \sigma_w^2 x_{wj}^2 + 2\sigma_{hw} x_{hj} x_{wj} . \qquad (3)$$

The foreign investor with no access to the domestic market, i.e. investor *f*, has the additional constraint that her holdings of the domestic assets are zero: $x_{hf} = 0$.

By combining the first order conditions of the different types of investors, we can express the home market expected return as a function of the supply of equity to domestic companies ($X_h^S$) and of their "beta" with the world stock market (see the appendix for derivations):

$$\mu_h = r + c + b(\sigma_h^2 - \frac{\sigma_{hw}^2}{\sigma_w^2}) \frac{X_h^S}{N_h + \lambda N_w} + \beta_h(\mu_w - r), \qquad (4)$$

where $\beta_h \equiv \sigma_{hw} / \sigma_w^2$ and the term in parenthesis is positive if the home market is less than perfectly correlated with the world market.

Equation (4) has the interpretation of an equity supply schedule: the required return on equity is an increasing function of the per capita funding supplied to domestic corporations by domestic and global investors. As the international integration parameter λ increases, this supply curve flattens out. With more foreign investors, the domestic equity risk borne by each of them decreases. In the limit it becomes negligible if their number $N_w$ is very large compared to the funds supplied to domestic companies, that is, $X_h^S / (N_h + N_w) \approx 0$. Thus, with complete international integration the supply of equity funding becomes perfectly elastic.

### 2.2 Demand for Equity Finance by Companies

We model the other side of the stock market in the domestic economy in the simplest possible fashion. There is a continuum of entrepreneurs in the home market, each endowed with an investment opportunity requiring 100 percent outside financing (the continuum assumption ensures price taking behavior). The profit per unit of physical capital invested in project *j* (for

$j \in [1,2,..., J]$) is a random variable, with expectation $1+\pi_j$, and variance $\sigma^2$. The cost of a unit of physical capital is standardized at 1. Each investment project *j* has a maximum size *s*. Projects are ranked according to their profitability, so that, for $j \geq j', \pi_j \leq \pi_{j'}$. For each *j*, there are *n(j)* entrepreneurs with projects yielding $\pi_j$ and therefore $N(j) = \int_0^j n(s)ds$ entrepreneurs with projects yielding at most $\pi_j$. All projects are perfectly correlated, so that in the eyes of the investors they are perfect substitutes, and therefore in equilibrium pay the same expected rate of return to investors.

The projects' profitability is increasing in the efficiency of the legal and judiciary institutions, measured by an index *L*. The idea is that a reduction in the resources needed to enforce breached contracts expands the production opportunity set of companies, and thereby their profitability. For instance, if default on leasing contracts is promptly sanctioned by courts, companies can rent their machinery rather than own it, which may be more efficient in some settings. Formally, we assume that $\pi_j = \pi_j(L)$, where $\pi_j$ is increasing in *L*.

Recall that managers divert at most a fraction *d* of the company's cash flow to their own benefit, provided shareholders pay the auditing cost *c* per dollar invested. Investors rationally anticipate this diversion of resources, and therefore expect the company to distribute a liquidating dividend equal to $(1+\pi_j)(1-d)$ per share. Since investors are perfectly competitive, entrepreneurs can sell their shares at a price such that they all yield the same expected rate of return,[5] to be denoted by $r^e$. Thus, the market price of a share in project *j* is :

$$p_j = \frac{(1+\pi_j)(1-d)}{1+r^e}, \qquad (5)$$

so that shares in firms with higher profitability command a proportionately higher price. Entrepreneurs with such projects capture the present value (PV) of the associated rents when they sell their shares.

The marginal project $j^*$ that obtains financing has a market value per share equal to the replacement cost of capital (which is 1 by assumption), and thus generates no rents for the relevant entrepreneur:

$$p_{j^*} = 1 \Leftrightarrow 1 + r^e = (1 + \pi_{j^*})(1 - d), \tag{6}$$

which just says that profit-maximizing investment decisions require Tobin's *q* to be equal to 1. This decision rule implies a downward sloping demand for equity funding by the corporate sector as function of the expected required return on equity $r^e$:

$$X_h^D = \int_0^{j^*} s \cdot p_j \cdot dN(j). \tag{7}$$

The aggregate demand for equity, $X_h^D$, is decreasing in $r^e$ for two reasons. First, the price of each share is decreasing in the required rate of return $r^e$, from equation (5). Second, the upper integration limit $j^*$ in equation (7) is itself decreasing in $r^e$, from equation (6): as the required rate of return increases, the profitability of the marginal project must increase, so that fewer projects can be financed. Consider an example where *n*(*j*) is a constant *n* and $\pi(j)$ is linear in *j*, according to the function $\pi(j) = \bar{\pi} - j$. Then the total demand for equity in (7) is:

$$X_h^d = \frac{sn}{2}\left(\frac{(1-d)(1+\bar{\pi})^2}{1+r^e} - \frac{1+r^e}{1-d}\right),$$

where the two effects of $r^e$ just described are captured in the two terms inside the parenthesis.

Rewriting equation (6) in terms of expected return, we obtain:

$$r^e = \pi_{j^*} - d(1 + \pi_{j^*}) \tag{8}$$

The private benefit *d* drives a wedge between the expected profitability of capital and the rate of return that can be credibly pledged to outside investors, just as a tax would do. Graphically, this implies that the profitability of physical capital lies uniformly above the demand schedule expressed by the entrepreneurs as shown in Figures 1 to 6 (to be discussed below). The bottom line (the demand schedule) indicates the rate of return that investors expect to make on their investment. The top line (the expected profitability schedule) indicates the rate of return on companies' investment, gross of the diversion effected by managers. The distance between the two curves depends on the magnitude of *d*: they collapse to a single locus if $d = 0$, that is, when managers can extract no private benefits. As *d* increases, therefore, the required

[5] While treated parametrically by investors, the expected rate of return $r^e$ is a variable to be determined in

profitability of the marginal project $\pi_{j^*}$ must increase, for given $r^e$: since the marginal expected profitability is a decreasing function of *j*, it is immediate that the marginal *j* is negatively related to *d*, that is, agency costs reduce investment.

The equilibrium rate of return and quantity are determined by the intersection of the demand schedule in equation (8) and the supply schedule in equation (4), i.e. imposing the condition that $X_h^D = X_h^S$. This is equivalent to setting the required rate of return $r^e$ anticipated by entrepreneurs equal to the expected rate of return required by investors, $\mu_h$. In the figures this intersection (initially) occurs at point A. The equilibrium rate of return expected by investors can be read off their supply curve at point A ($\mu_{h0}$). But this is only one component of the hurdle rate that the marginal project must pay in equilibrium. This hurdle rate must also include the expected amount diverted by managers. Graphically, the equilibrium hurdle rate is read off the expected profitability schedule, at point B ($\eta_{h0}$). It is the "shadow" cost of capital to domestic companies, in that it determines the marginal project that they carry out. The tax-like wedge between the shadow cost of capital and the expected return paid to investors measures the severity of the agency problem in the equity market.[6]

### 2.3 Effects of the Legal System on the Equity Market

The legal system of the home market can affect the equity market in three different ways.

First, it may affect the fraction of corporate profits that managers are able to divert. For instance, legal limits to managerial discretion concerning asset sales or merger agreements may curtail the scope for dilution of minority shareholders' income rights. Our model can capture an improvement of the legal system along this dimension - a reduction in managerial private benefits - by a reduction of the parameter *d*.

Second, the legal environment determines the legal and auditing costs that shareholders must incur in order to secure any payment from managers. For example, better accounting

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equilibrium.

[6] Notice that the equilibrium amount of equity that investors provide to domestic companies, $X_h$, exceeds the value of corporate physical investment. The latter equals $N(j^*)s$, that is, the number of projects undertaken in equilibrium multiplied by their size. This does not arise from the agency problem, but from the fact that the value of outstanding equity also includes the PV of entrepreneurial rents on inframarginal companies, $X_h - N(j^*)s$.

standards lower the cost of monitoring the company's performance, by reducing the need to rely on expensive expert advice by accountants, lawyers and financial analysts. Similarly, the availability of class action suits and the possibility of voting by mail reduce the cost of shareholder activism. In our model, a reduction in auditing and legal costs is reflected in a lower value for the parameter *c*.

Finally, quite apart from its effects on the agency problem between managers and shareholders, better law enforcement may benefit companies by expanding the set of contracts with suppliers and customers that can be enforced in court. Equivalently, it can reduce the cost of enforcing these contracts. Ex ante, this makes a wider menu of transactions available to each company, which in general will increase its profitability. We capture this by an increase in the index of legal and judicial efficiency *L*, which raises the marginal productivity of physical capital and therefore the demand for equity funding by domestic firms.

In the next two sections, we use the model to study the effects of these three different factors on the equilibrium on the domestic equity market. We do so first under the assumption of perfect international integration of the equity market and then under the assumption of internationally segmented equity market.

## 3 An Internationally Integrated Equity Market

As explained in commenting on equation (4) above, the equity supply schedule is flat when $\lambda = 1$ (the case of complete international integration), assuming that the number of foreign investors is large relative to the size of the domestic stock market. This case is depicted in Figures 1 to 3. In all three figures, the expected profitability of capital exceeds the demand for equity finance by companies. Of course, it is along the latter curve that one reads the rate of return that investors expect to receive from companies.

Figure 1 shows how the equilibrium of the equity market is affected by the ability of the legal system to constrain managerial diversion, as reflected in different levels of the parameter *d*. Countries with a lower level of managerial diversion (lower *d*) feature a demand curve closer to the expected profitability schedule. The associated equilibrium point is C instead of A. The rate of return earned by investors is the same irrespective of managerial diversion, due to the perfectly elastic supply of funds. Investors are willing to supply any amount of equity at

the going expected rate of return. Therefore, a lower *d* results only in a higher equilibrium amount of equity: $X_{h1}$ instead of $X_{h0}$.

Moreover, in countries where managers can extract less private benefits, a higher number of projects get financed, because the cost of capital (which equals the expected profitability of the marginal project, namely $\pi_{j^*}$) is lower: $\eta_{h1}$ (point D) instead of $\eta_{h0}$ (point B).[7] Projects that are not a fair investment opportunity in a jurisdiction where managers extract large private benefits are competitive when managerial discretion is curtailed. In terms of equation (8), $j^*$ and $N(j^*)$ are larger in countries where *d* is lower.

A lower level of *d* is also associated with a higher welfare for society as a whole. The gain stems from the projects that are funded in the low-*d* country but not in the high-*d* one. In the figure it is represented by the trapezoid ABDC, which is the integral of the expected profits net of the rate of return paid to shareholders (the social opportunity cost of capital). This welfare gain is entirely appropriated by the owner-managers of the additional projects, either in the form of additional private benefits or in the form of higher sale prices of equities. The owner-managers of infra-marginal projects are equally well off in the two countries: what they fail to receive as private benefits in the low-*d* country, they gain in the form of a higher initial price of equities to the investing public. As a result, the low-*d* equilibrium is Pareto-superior relative to the high-*d* equilibrium.

This does not mean, however, that if a country starts with a legal system that allows high diversion, there will be no losers from a transition to a low-diversion regime. Consider in fact an unanticipated reduction in *d*. In this case, the initial entrepreneurs with infra-marginal projects have already sold their shares at a price that discounted extraction of high private benefits. Therefore, they fail to reap the benefit of the regime change, which accrues instead to the investors who bought those shares. In contrast, entrepreneurs who could not get funding before the regime change and obtain it under the new regime will gain. As a result, the change in legislation will be supported by the investing public and by entrepreneurs who currently cannot get funding, but will be fought by currently active entrepreneurs. Bebchuk (1999) and LLSV (1999) also stress that controlling groups have the incentive to oppose legal reform in order to protect their private benefits of control, especially when these are currently large.

Figure 2 illustrates the effects of a reduction in the auditing and legal costs that shareholders face to secure payment from managers (a fall in the parameter *c*). This change reduces the expected total rate of return required by investors, since they will need to spend fewer resources to enforce their claims. The equilibrium moves from point A to point C: the rate of return on equity is reduced (from $\mu_{h0}$ to $\mu_{h1}$), while the quantity of equity financing increases from $X_{h0}$ to $X_{h1}$. The cost of equity capital to firms is also reduced, from $\eta_{h0}$ (point B) to $\eta_{h1}$ (point D).

The distribution of welfare gains and losses is quite different relative to the previous case. Entrepreneurs of already active companies do not lose their private benefits, while their shareholders earn a capital gain (as before) and newly active entrepreneurs gain (as before). As a result, everyone is better off, except for lawyers and accountants!

Figure 3 shows the effect of a change in the legal regime that increases the profitability of investment, without affecting the agency problem between managers and shareholders. In this case both the schedule for the expected profitability of physical capital and the demand schedule shift outward. Their relative distance remains unchanged, in the sense that the net-of-diversion rate of return generated by each project (which is read off the demand-for-funds curve) is a constant fraction $1-d$ of its expected profitability. Following this regime change, the equilibrium shifts from point A to point C. Once again, the investors' rate of return stays constant at $\mu_{h0}$, while the quantity of equity funding increases from $X_{h0}$ to $X_{h1}$. Under the model's assumptions, the cost of capital remains constant at $\eta_{h0}$.[8]

The distribution of welfare gains in this case is still more even-handed that in the previous experiment: everyone gains from the regime change. Already active entrepreneurs earn larger private benefits since they take a constant proportion *d* of bigger cash flows. Their shareholders reap a capital gain as before. Newly active entrepreneurs also gain, since their projects become more profitable and can now be sold to outside investors.

In conclusion, under perfectly integrated markets, our model predicts that any improvement in the legal environment either leaves the expected rate of return unchanged, or

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[7] As explained in the last section, with agency costs of external finance, the cost of equity capital exceeds the return that must be promised to outside investors. On top of this rate, the hurdle rate used in capital budgeting decisions will have to factor in the expected amount of private benefits taken by managers.

[8] From equation (6), the expected profitability of the marginal project (i.e. the cost of capital) exceeds by a fixed proportion 1-*d* the expected rate of return paid to shareholders. Since the latter is constant in the presence of perfect international integration, the cost of capital cannot change.

reduces it, while it increases the size of the stock market. It also increases the amount of capital invested by companies, while lowering their shadow cost of equity capital or leaving it unchanged.

## 4 An Internationally Segmented Equity Market

In this section, we consider a country that is not fully integrated in the world equity markets. Due to information asymmetries or other prohibitive transaction costs, only a small fraction $\lambda$ of the world investors can access the domestic equity market. Under this scenario, the supply of equity funds to domestic companies is upward sloping, as can be seen from equation (4). The restricted pool of investors that buys domestic shares requires a higher rate of return the higher is the total amount of funding provided, because that translates into a higher per capita risk to be borne.

Figure 4 illustrates that the effect on equilibrium of a reduction in private benefits is now quite different from to the benchmark case analyzed in the previous section. The equilibrium return on equity is now inversely related to the private benefits *d* that managers can extract: in the figure, it increases from $\mu_{h0}$ (point A) to $\mu_{h1}$ (point C). The equilibrium amount of equity finance also increases (from $X_{h0}$ to $X_{h1}$). The breakdown of the effect between the rate of return and amount of funding depends on the slope of the supply function, and therefore on the size of the pool of investors in the local market: the less integrated is the country in international markets (the lower $\lambda$), the larger will be the increase of the rate of return and the lower that of the size of the local equity market.

While it raises the return on equity, the regime change lowers the cost of capital from $\eta_{h0}$ (point B) to $\eta_{h1}$ (point D), and thereby increases the amount of physical investment taking place in the economy. The latter effect on the cost of equity capital has the same sign as in the corresponding experiment of Figure 1.

The welfare and distributional consequences of a reduction in managerial diversion also differ relative to the case of perfect international integration, illustrated in Figure 1. Consider two countries that have a different level of *d* but are otherwise identical. The low-*d* country as a whole is better off: in Figure 4, a measure of the extra surplus enjoyed relative to the high-*d* country is the area of the trapezoid ABDC. However, entrepreneurs who can get funding in both countries are worse off in the low-*d* country: not only they consume a lower amount of

perks, but also face a higher discount rate when selling their shares, and therefore get a lower price for them. Entrepreneurs who are active only in the low-*d* country are clearly better off than their counterparts in the high-*d* country. Similarly, investors are unambiguously better off in the low-*d* country, since they earn a higher expected rate of return (they bear more risk, but gain a surplus corresponding to the area of the trapezoid $\mu_{h0}\mu_{h1}CA$). The presence of winners and losers contrasts with the result obtained for the same comparison in the previous section, where we found that the low-*d* economy Pareto-dominated the high-*d* economy.

However, the distributional effects of an unexpected transition from a high-*d* to a low-*d* regime are qualitatively similar to those of the internationally integrated economy. Already active entrepreneurs will stand to lose from the reform, while investors and newly active entrepreneurs will gain.

In Figure 5 we analyze the effect of a reduction of the legal and auditing costs faced by shareholders. As in the internationally integrated economy, the equilibrium rate of return on equity falls from $\mu_{h0}$ (point A) to $\mu_{h1}$ (point C), while the quantity of equity financing increases from $X_{h0}$ to $X_{h1}$. The cost of equity capital to firms is also reduced, from $\eta_{h0}$ (point B) to $\eta_{h1}$ (point D).

Finally, Figure 6 illustrates the effects of an improvement in the legal and judicial system that increases the profitability of investment, without affecting the agency problem between the managers and their shareholders. As in Figure 3, the regime change is represented by an outward shift of the expected profitability and the demand-for-funds schedules. In contrast with the case of Figure 3, however, both the equilibrium rate of return paid to shareholders and the cost of equity capital relevant for firms' investment decisions increase. The rate of return moves from point A to point C, while the cost of capital moves from point B to point D. While the positive implications of the regime change are different from those in Figure 3, the welfare implications are similar: everyone gains from it.

Summarizing, the novel prediction of the model with international segmentation is that improvements in the legal regime can bring about increases in the expected rate of return on equity. This happens when the scope for diversion by managers is reduced or when the legal regime change increases the expected profitability of investment.

## 5 Effects of International Integration

Our model can also be used to analyze the impact of increased international integration on the domestic equity market equilibrium, for a given legal environment. Lately, this issue has received increasing attention in research. Stulz (1999) highlights that globalization can raise domestic share prices via two channels. First, increased diversification opportunities reduce the required rate of return by lowering the risk premium (if the idiosyncratic variance of the liberalizing market exceeds its covariance with the world equity market). This increases equity prices by lowering the discount factor applied to a *given* stream of future cash flows. Second, exposure to international markets raises the pressure on managers to maximize shareholder value, because foreign investors have superior monitoring ability as well as resources to take over inefficiently managed companies. This second channel impacts stock prices by increasing the stream of cash flows that domestic companies will pay out to shareholders.

Our model easily captures the two mechanisms described by Stulz (1999). The increased diversification amounts to an increase in the fraction $\lambda$ of foreign investors who access the domestic market. In Figure 7, this flattens the supply of equity schedule (assuming that $\lambda$ rises to its maximal value 1) and moves the equilibrium point from A to E, reducing both the expected return on equity (from $\mu_{h0}$ to $\mu_{h1}$) and the cost of equity capital (from $\eta_{h0}$ to $\eta_{h1}$). The reduction in the rate of return on equity is precisely the fall in the discount rate mentioned by Stulz, and leads to a jump of share prices, even though the future cash flow paid to shareholders remains constant. Martin and Rey (2000) derive the same effect of integration in the context of a simple general equilibrium model. They also show that financial integration expands the sets of projects that can obtain funding in equilibrium, as we do in Figure 7.

To the extent that financial integration also increases the scrutiny of managers by investors, it should reduce the fraction *d* of private benefits, as suggested by Stulz. In Figure 7, this is shown as an outward shift of the demand-for-funds schedule. This additional effect does not modify the rate of return received by investors but it further increases the stock price and the equilibrium amount of equity finance (from $X_{h1}$ to $X_{h2}$). It also contributes to the reduction in the cost of equity capital (from $\eta_{h1}$ to $\eta_{h2}$).

## 6 Interpreting the Evidence

The model presented so far can be used to interpret the findings of cross-country empirical studies which analyze how equity markets are affected by differences in the legal system, especially in the protection of shareholders' rights, and in the degree of international integration.

First and foremost among these studies is the study by LLSV (1997), who document a positive correlation between the amount of external equity funding and indicators of the general quality of the legal environment (respect for the law and judicial efficiency) as well as specific measures of the protection of shareholder rights vis-à-vis company directors. LLSV interpret this positive correlation as resulting from the effect that better legal and judicial institutions have on the severity of agency problems between managers and external shareholders. This specific interpretation is indeed consistent with our model, as can be seen in Figures 1 and 4: a reduction in the scope for managerial diversion $d$ increases the equilibrium amount of external equity. The same effect on quantities could also be caused by a reduction in the legal and auditing cost $c$ that shareholders must bear to limit managerial private benefits, as shown in Figures 2 and 5. However, in our model the same relationship would also be observed even if the legal cross-country differences had no impact on the agency problems between managers and shareholders, but affected the profitability of companies via their effect on contractual relationships with downstream customers and input suppliers. This is illustrated in Figures 3 and 6.

Our model shows that, while better institutions invariably increase the equilibrium amount of external equity, they may affect the equilibrium rate of return quite differently. Their effect depends both on the degree of international integration of the domestic equity market and on whether they increase primarily the demand for equity by companies or its supply by investors. As seen above, in a perfectly integrated equity market, the effect can be either null (if the legal regime change impacts mainly the demand for equity by companies) or negative (if it translates into a reduction of the rate of return required by investors). When instead the domestic stock market is not integrated into world capital markets, an improvement in the legal environment can result either in an increased rate of return (if it affects demand for equity finance by companies) or in a decreased rate of return (if it increases the availability of equity funds supplied by investors).

So far the only empirical study investigating the cross-country relationship between the quality of institutions and the rate of return on equity is Lombardo and Pagano (2000). Their data set includes almost all the countries of the study by LLSV (1997). They find that indicators of the general quality of the legal environment have a consistently positive correlation with the risk-adjusted rate of return, whereas measures of the protection of shareholder rights have either no or negative impact on the return on equity.

Lombardo and Pagano employ two different measures of the rate of return on equity: the percentage return on each market stock index and accounting measures such as the dividend yield ratio and the earnings/price ratio.

In regressions that use the first type of dependent variables, general measures of the quality of the legal environment appear as important explanatory factors besides betas and idiosyncratic risk. Variables measuring the protection of shareholder rights do not appear to have additional explanatory power. The correlation between respect for the law or judicial efficiency and the risk-adjusted rate of return on equity is positive and statistically significant. The implied effects are economically large. Increases in the respect for the law have a comparable impact on secondary market returns.

A second set of regressions is based on aggregate accounting measures of equity returns for developed markets alone. Despite the noise potentially present in these variables, they can still shed some light on the issue at hand. In particular, they are exempt from a bias that may plague secondary market returns in the presence of regime shifts. Suppose, for example, that some unanticipated institutional change permanently increases stock prices, leaving the required rate of return on equity unaffected. An econometrician who relies on stock return data will record a very high positive return in conjunction with the improvement in institutions. This may introduce an upward bias in the estimated relationship between a certain feature of institutions and the rate of return on equity. A positive coefficient may be found even if the true coefficient is zero.

Lombardo and Pagano find that when the rate of return on equity is measured by accounting variables, the effects of general measures of institutional quality are still positive, statistically significant and, if anything, even larger. So, for these variables, the concern just raised is not relevant. Also in this case, the LLSV index of anti-director rights does not enter with a significant coefficient.

How can these results be interpreted in the light of the model developed in the previous sections? The positive impact of judicial efficiency and rule of law on the return on equity requires an upward sloping supply of equity by investors, that is, a substantial degree of segmentation between national stock markets. In this sense, the estimates agree with those by Bekaert and Harvey (1995), who find that the international CAPM has low explanatory power and attribute its failure to the segmentation of national markets. Harvey (1995) and Lombardo and Pagano (2000) further support the segmentation hypothesis by documenting that country specific risk is priced in stock return regressions that include emerging markets.

The model also reveals that the positive cross-country correlation between risk-adjusted secondary market returns and quality of legal institutions can have two different (though possibly complementary) interpretations. The first one is that good laws and efficient courts curtail the private benefits of managers and controlling shareholders. The second explanation is that they improve the expected profitability of companies, and therefore the rate of return that they pay to their shareholders. This is because better laws and more effective courts expand the menu of contracts that companies can use in dealing with customers and suppliers, and reduce the cost of enforcing these contracts. One cannot tell which of these two effects dominates in the data, but there is no reason to attribute the observed correlation entirely to the effect of legal institutions on the agency problem between managers and shareholders. This note of caution applies also to the positive correlation between the breadth of equity markets and the quality of legal enforcement documented by LLSV (1997).

From a practical point of view, the presence of an equity premium to good legal institutions implies that fund managers and individual investors can earn a higher risk-adjusted rate of return by investing in countries with a sound legal environment and high corporate governance standards. Rather than compensating shareholders for a less investor-friendly environment, markets with poor legal standards pay them lower rates of return, once the implied risk is taken into account. To the extent that investors are aware of this, they should overweight companies incorporated in countries with superior legal and judicial systems. By the same token, international net equity flows should be directed to countries that are improving their legal and judicial systems, even if this process is perfectly anticipated.

These empirical findings also help to uncover the welfare consequences of a change in legal standards and judicial effectiveness. It is often thought that the costs of corporate insiders' opportunism are ultimately borne by the controlling shareholders themselves, in the

form of a lower valuation for their shares, while the rate of return obtained by outside shareholders is unaffected. In contrast, these results, together with the model presented in the previous sections, suggest that the agency costs associated with legal laxity and judicial ineffectiveness fall upon outside shareholders, at least partly. Conversely, the investing community is bound to reap some of the advantages stemming from improvements in legal and judicial infrastructure. This may explain the investors' heightened interest for corporate governance rules and practices around the world.

## 7 Conclusions

We have presented a simple model to analyze the impact that the law and its enforcement have on equilibrium quantities and rates of returns in equity markets. Improvements in the legal system, while invariably associated with broader equity markets, have different effects on equity returns depending on the institutional change being considered and on the degree of international stock market segmentation.

The model is useful to interpret the results of recent empirical work, such as La Porta et al. (1997) and Lombardo and Pagano (2000). In particular, it can rationalize the observed cross-country pattern, whereby better institutions are associated both with broader equity markets and higher risk-adjusted returns on equity. This result is shown to be consistent with market equilibrium only if national equity markets are imperfectly integrated in the world market. In this case, the supply of equity finance to companies is described by an upward-sloping function, so that a larger demand for equity finance by companies is associated with a higher required return.

Our analysis identifies two distinct reasons why better legal institutions may be associated with a higher demand for equity finance by companies. First, good laws and efficient courts curtail the private benefits of managers, and this in turn increases both the return that companies pay to external shareholders and the availability of external equity finance. Second, better laws and more effective courts expand the menu of contracts that companies can use in dealing with customers and suppliers, and reduce the cost of enforcing these contracts. This makes companies more profitable, and hence raises their rate of return and the amount of financing they attract. One cannot tell which of these two effects dominates in the data, but there is no reason to attribute the observed correlation solely to the effect of legal institutions on companies' financial relationships.

# Appendix

In this appendix, we spell out the derivations involved in obtaining equation (4) in the text. The problems of the representative home investor and of the representative global investor are:

$$\underset{x_{hj},x_{wj}}{\text{Max}}\ E(\tilde{W}_{1j}) - \frac{b}{2}Var(\tilde{W}_{1j}) - cx_{hj},\ \ j=\{h,g\} \tag{a1}$$

where $\tilde{W}_{1j}$ is the value of investor *j*'s terminal wealth, $x_{hj}$ and $x_{wj}$ are the amounts she invests in the home and the world market respectively. The expected value of terminal wealth is:

$$E(\tilde{W}_{1j}) = (W_{0j} - x_{hj} - x_{wj})(1+r) + x_{hj}(1+\mu_h) + x_{wj}(1+\mu_w) \tag{a2}$$

and its variance is

$$Var(\tilde{W}_{1j}) = \sigma_h^2 x_{hj}^2 + \sigma_w^2 x_{wj}^2 + 2\sigma_{hw} x_{hj} x_{wj}\,. \tag{a3}$$

Rearranging the first order conditions of the above maximization problem, one obtains:

$$\mu_h - r = c + b\sigma_h^2 x_{hj} + b\sigma_{hw} x_{wj} \tag{a4}$$

$$\mu_w - r = b\sigma^2{}_w x_{wj} + b\sigma_{hw} x_{hj} \tag{a5}$$

Finally, the portfolio choice problem of the foreign investors who cannot diversify is:

$$\underset{x_{ww}}{\text{Max}}\, E(\tilde{W}_{1f}) - \frac{b}{2}Var(\tilde{W}_{1f}) \tag{a6}$$

subject to

$$E(\tilde{W}_{1f}) = (W_{0f} - x_{wf})(1+r) + x_{wf}(1+\mu_w) \tag{a7}$$

and

$$Var(\tilde{W}_{1f}) = \sigma_w^2 x_{wf}^2\,. \tag{a8}$$

Her first-order condition yields:

$$\mu_w - r = b\sigma_w^2 x_{wf} \tag{a9}$$

We define the total investment in the two stocks *h* and *w* respectively as:

$$N_h x_{hh} + \lambda N_w x_{hg} = X_h\,, \tag{a10}$$

$$N_h x_{wh} + \lambda N_w x_{wg} + (1-\lambda) N_w x_{wf} = X_w\,. \tag{a11}$$

Multiplying equation (a4) first by $N_h$ (setting $j$=$h$) and then by $\lambda N_w$ (setting $j$=$g$), substituting from equations (a10) and (a11), and adding up, one obtains:

$$(N_h + \lambda N_w)(\mu_h - r) = (N_h + \lambda N_w)c + b\sigma_h^2 X_h + b\sigma_{hw}(X_w - (1-\lambda)N_w x_{wf}). \quad \text{(a12)}$$

Similarly, multiplying equation (a5) by $N_h$ (with $j$=$h$), (a5) by $\lambda N_w$ (with $j$=$g$) and (a9) by $(1-\lambda)N_w$, substituting again from equations (a10) and (a11), and adding up, one obtains:

$$(N_h + N_w)(\mu_w - r) = b\sigma_w^2 X_w + b\sigma_{hw} X_h . \quad \text{(a13)}$$

Replacing $x_{wf}$ from equation (a9) and $X_w$ from equation (a13) into equation (a12) and rearranging, we obtain the home market expected return as a function of the supply of equity funding to domestic companies ( $X_h^S$ ) and of its "beta" with the world stock market:

$$\mu_h = r + c + b(\sigma_h^2 - \frac{\sigma_{hw}^2}{\sigma_w^2})\frac{X_h^S}{N_h + \lambda N_w} + \beta_h(\mu_w - r), \quad \text{(a14)}$$

where $\beta_h \equiv \frac{\sigma_{hw}}{\sigma_w^2}$. This is equation (4) in the text.

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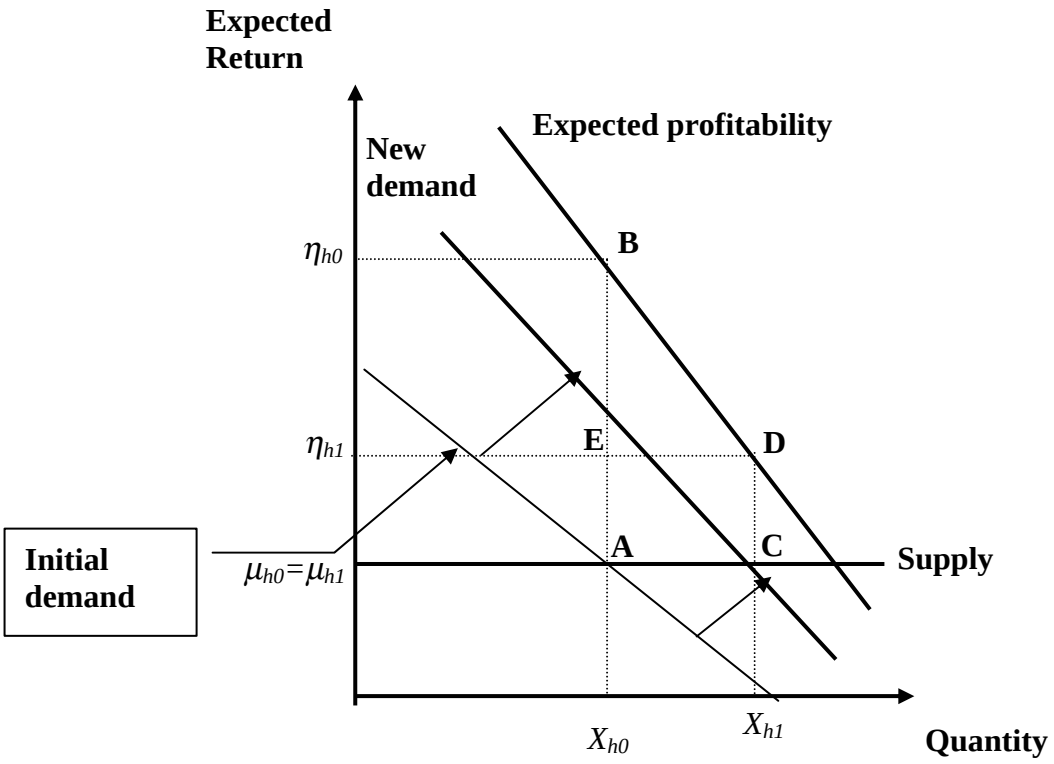


**Figure 1. Reduction of Private Benefits under International Integration**

This figure depicts the effects of an improvement in the legal and judicial system that reduces the fraction *d* of the company's profits that the manager can divert. After this improvement, managers can credibly commit to return more resources to outside investors: the demand for funds schedule shifts outward. The reduction in *d* shifts the equilibrium point from A to C. The rate of return stays constant at $\mu_{h0}$, but the cost of equity capital decreases from $\eta_{h0}$ (corresponding to point B) to $\eta_{h1}$ (point D). The equilibrium amount of equity finance increases from $X_{h0}$ to $X_{h1}$.

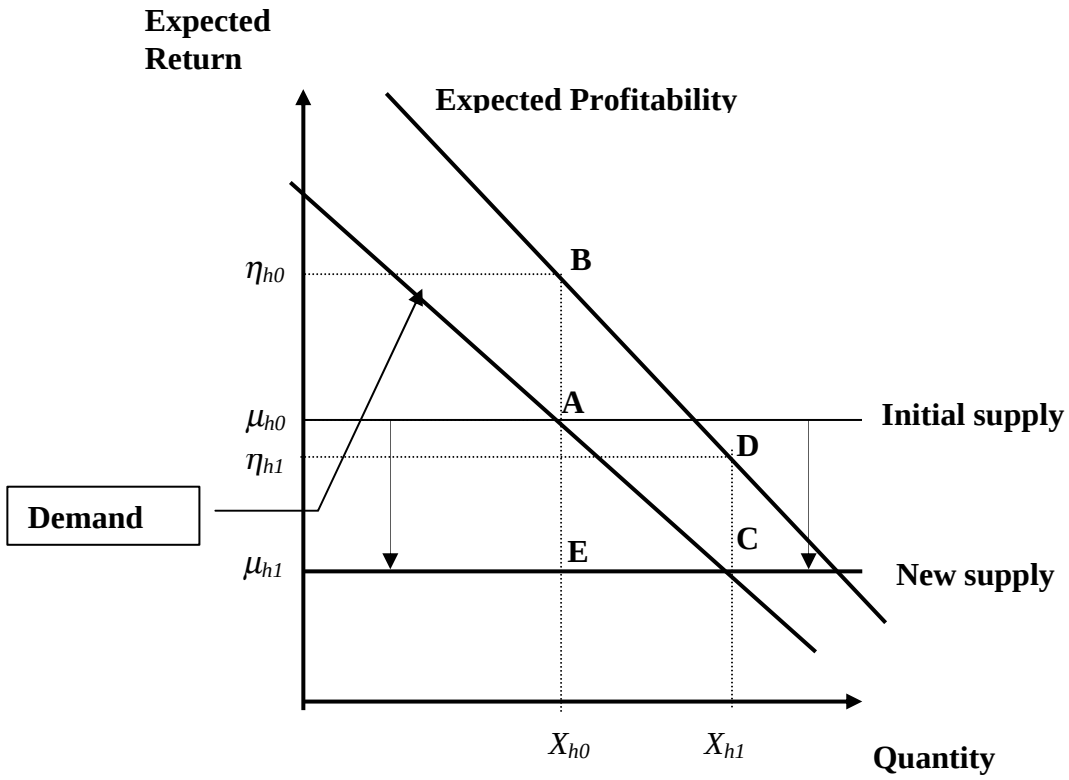


**Figure 2. Reduction of Legal and Auditing Costs under International Integration**

This figure depicts the effects of a reduction in the legal and auditing costs needed to monitor managerial conduct. The investors' supply of funds schedule shifts downward. The (expected) rate of return decreases (it goes from $\mu_{h0}$ to $\mu_{h1}$, as the equilibrium point moves from point A to point C). The cost of equity capital to firms decreases, from $\eta_{h0}$ (corresponding to point B) to $\eta_{h1}$ (point D). The equilibrium amount of equity finance increases from $X_{h0}$ to $X_{h1}$.

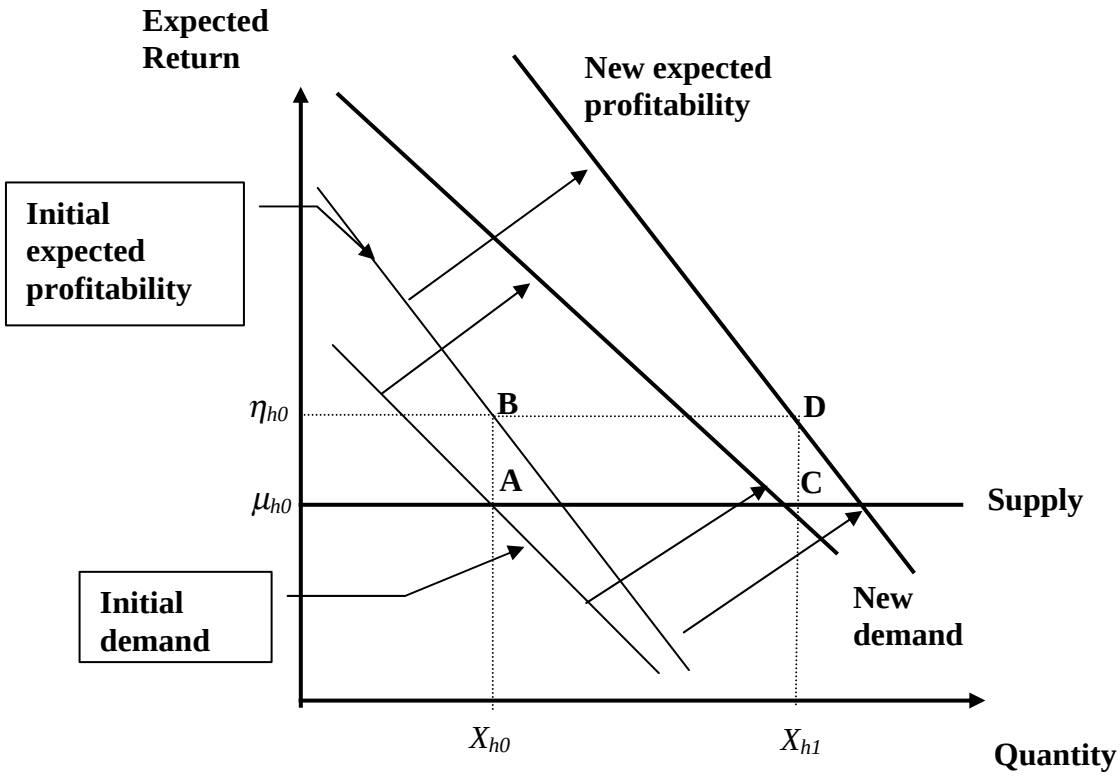


**Figure 3. Increase in Expected Profitability under International Integration**

This figure depicts the effects of an improvement of the legal system that increases the marginal productivity of capital. This is captured by an outward shift of the expected profitability of capital schedule. The associated increase in the demand for equity capital shifts the equilibrium point from A to C. The (expected) rate of return does not change (stays at $\mu_{h0}$ ). Also the cost of capital remains at the initial level. The equilibrium amount of equity finance increases from $X_{h0}$ to $X_{h1}$.

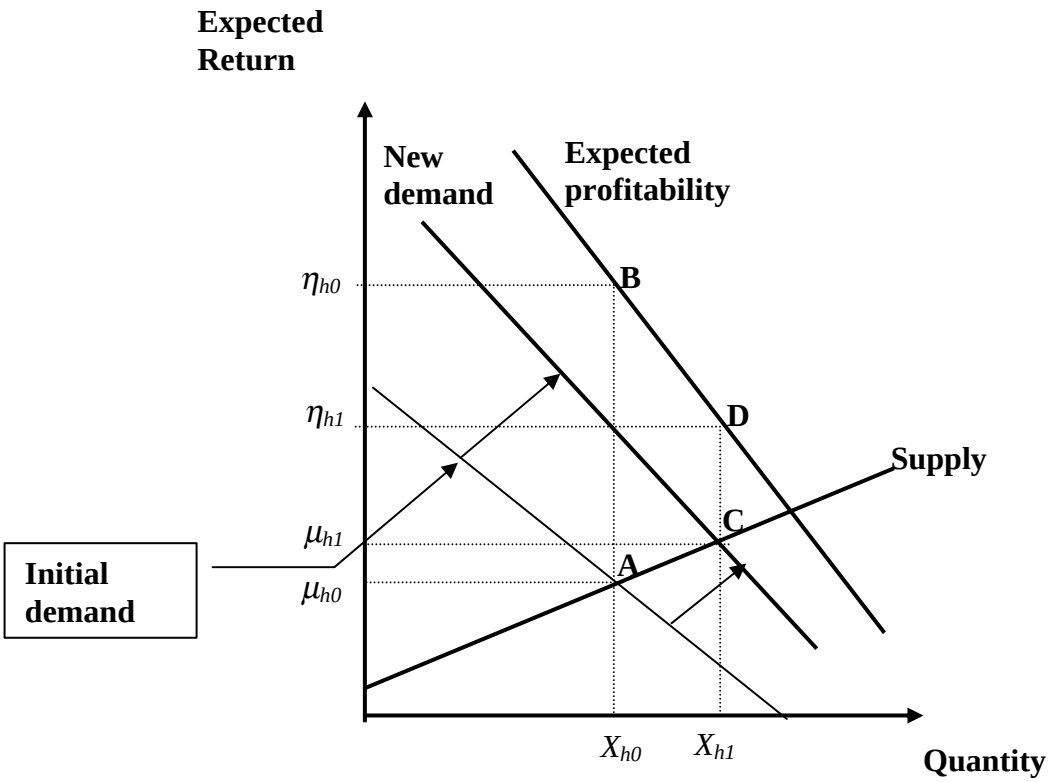


**Figure 4. Reduction of Private Benefits under International Segmentation**

This figure depicts the effects of an improvement in the legal and judicial system that reduces the fraction *d* of the company's profits that the manager can divert. After this improvement, managers can credibly commit to return more resources to outside investors: the demand for funds schedule shifts outward. The reduction in *d* shifts the observed equilibrium point from A to C. The rate of return increases from $\mu_{h0}$ to $\mu_{h1}$ but the cost of equity capital decreases from $\eta_{h0}$ (corresponding to point B) to $\eta_{h1}$ (point D). The equilibrium amount of equity finance increases from $X_{h0}$ to $X_{h1}$.

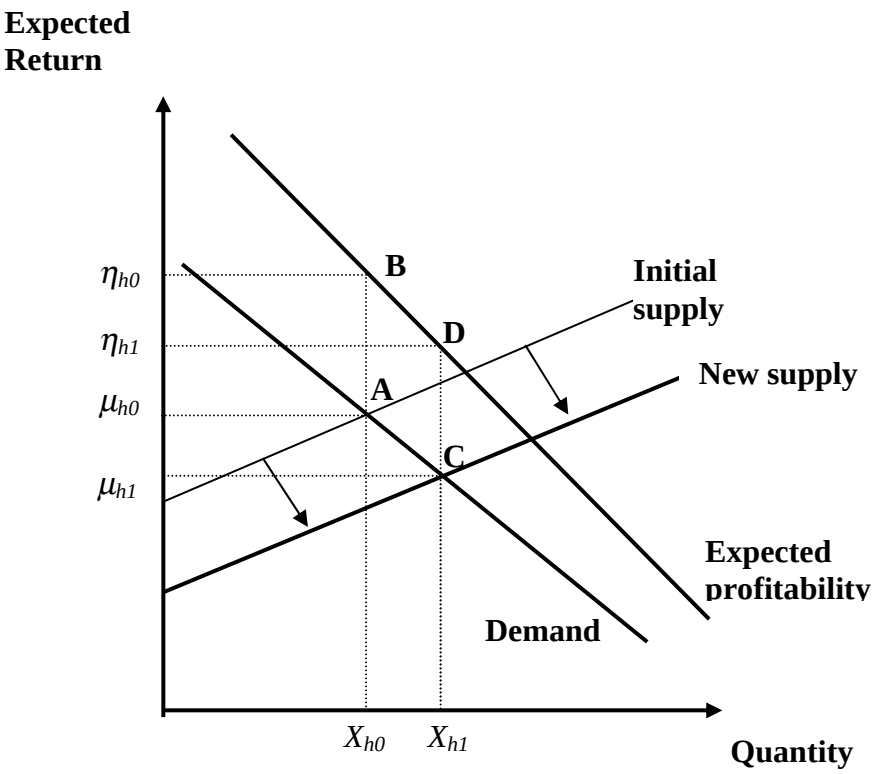


**Figure 5. Reduction of Legal and Auditing Costs under International Segmentation**

This figure depicts the effects of a reduction in the legal and auditing costs needed to monitor managerial conduct. The investors' supply of funds schedule shifts downward and to the right. The (expected) rate of return decreases (it goes from $\mu_{h0}$ to $\mu_{h1}$, as the equilibrium point moves from point A to point C). The cost of equity capital to firms decreases, from $\eta_{h0}$ (corresponding to point B) to $\eta_{h1}$ (point D). The equilibrium amount of equity finance increases from $X_{h0}$ to $X_{h1}$.

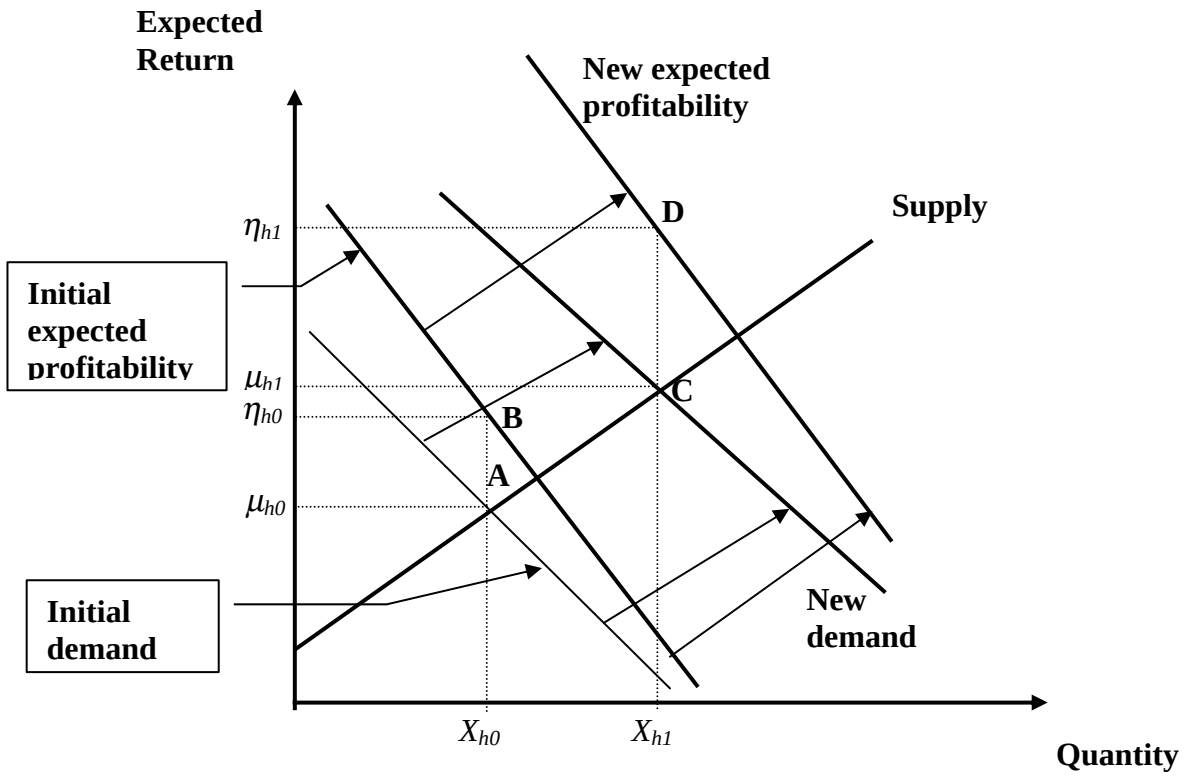


**Figure 6. Increase in Expected Profitability under International Segmentation**

This figure depicts the effects of an improvement of the legal system that increases the marginal productivity of capital. This is captured by an outward shift of the expected profitability schedule. The associated increase in the demand for equity capital shifts the equilibrium point from A to C. The (expected) rate of return increases (from $\mu_{h0}$ to $\mu_{h1}$). The cost of capital increases, from $\eta_{h0}$ (point B) to $\eta_{h1}$ (point D). The equilibrium amount of equity finance increases from $X_{h0}$ to $X_{h1}$.

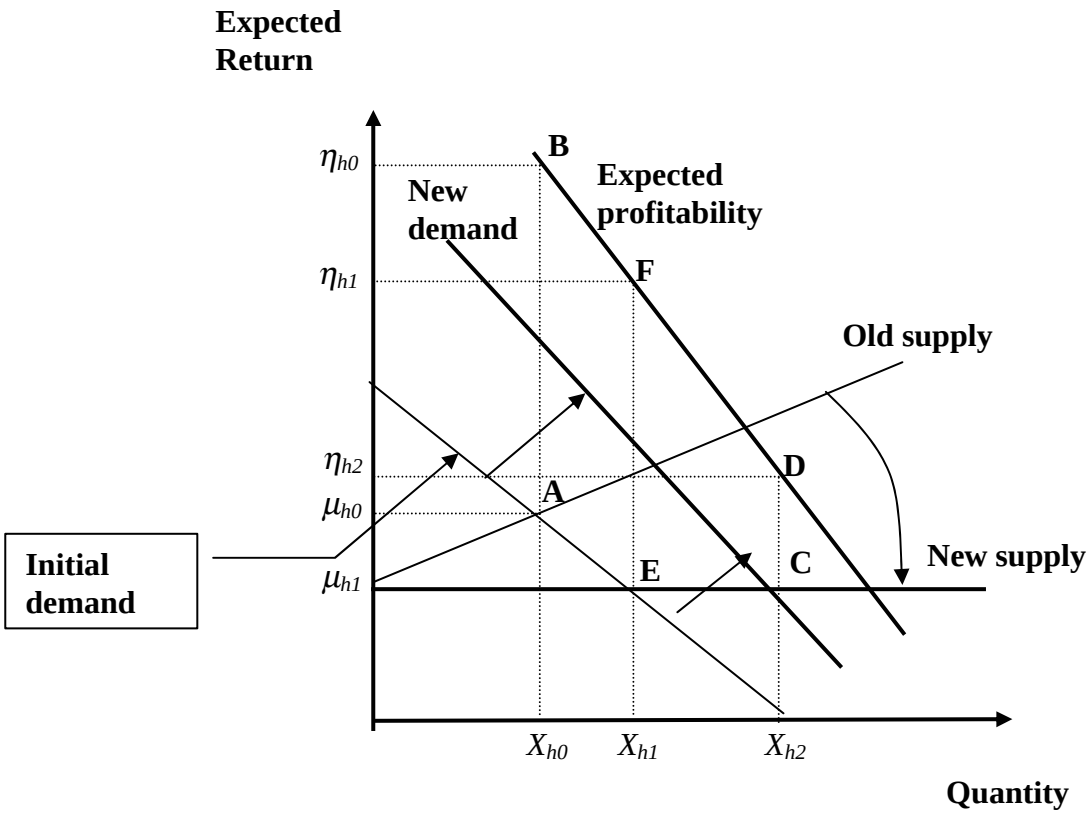


**Figure 7. Increase in International Integration**

This figure shows the effects of an increase in the degree of international integration. We consider two possible scenarios. In the first scenario, international integration only flattens the supply of equity finance, due to improved risk diversification. The equilibrium point moves from A to E, reducing both the equilibrium expected return on equity (from $\mu_{h0}$ to $\mu_{h1}$) and the cost of equity capital (from $\eta_{h0}$, corresponding to point B, to $\eta_{h1}$, corresponding to point F). In the second scenario, international integration also reduces the fraction $d$ of the company's profits that the manager can divert, so that the demand for funds schedule shifts outward. The equilibrium point moves to point C. This additional effect does not further modify the rate of return received by investors. However, it further expands the equilibrium amount of equity finance (from $X_{h1}$ to $X_{h2}$) and it further reduces the cost of equity capital to companies (from $\eta_{h1}$, corresponding to point F, to $\eta_{h2}$, corresponding to point D).