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Corporate control rights and the long-run equity risk premium

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Abstract

We address the role of incomplete contracting in the equity market in a long-run growth model. Equity delivers control rights, but holding equity might lead to disutility, since the right to vote is costly to carry. We analyze voting power and its burden in an equilibrium growth model. One of our main contributions is that we test our ex ante equity premium model using data for 44 countries over the years 1989–2005. Higher capital productivity, inflation and valuation of leisure increase the ex ante equity premium, as does lower population growth.

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1. Introduction

The return on equity exceeds the return on risk-free assets on average. A large body of the literature tries to find an explanation of the size of the ex post measured equity premium by considering differences in risk attitude. Because equity is more risky it gets a higher expected return in equilibrium. In the short run the return on equity can be lower than the risk-free rate; in general one has to consider a substantial time span to be sure to observe a positive equity premium. In this paper we present a long-run analysis of the equity risk premium, based on a growth model

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and assuming perfect foresight. Risk and uncertainty are not the focal point of attention, but we stress the utility derived from holding different assets under certainty. We assume that holding equity delivers disutility, while holding bonds yields direct utility. The difference in marginal utility is compensated in equilibrium by an additional return: the equity risk premium.

Our analysis differs from the well-known literature on the equity risk premium that focuses on ex post measures of the premium compensating risk. The literature labels the magnitude of the premium to be a major puzzle in financial economics. Given the fact that most developed equity markets have a Sharpe ratio of about 0.5, there should either be a large degree of consumption volatility (which we do not observe) or a huge degree of risk aversion (which is not supported by evidence from experimental economics). Since Mehra and Prescott (1985) many studies tried to give (partial) explanations of the existence and size of the premium on equity (see e.g. Kocherlakota, 1996, or more recently Mehra and Prescott, 2003). A twin puzzle is the risk-free rate puzzle (see Weil, 1989) that focuses on the fact that the real return on risk-free bills is so low. Ebrahim and Mathur (2001) present a classification of the ‘solutions’ to the equity premium puzzle. Most of the work on the equity premium is focused on matching the data on equity returns with observed interpretations of risk aversion (see e.g. Ferson, 1995). The common explanation of the existence of the equity premium is the uncertainty of equity prices and the risk attitude of investors. A second class of explanations is based on market segmentation (see Mankiw and Zeldes, 1991). Third, theoretical approaches of utility, like habit formation in consumption (see Campbell and Cochrane, 1999), uninsured idiosyncratic risks (see Constantinides and Duffie, 1996), and borrowing constraints (see Constantinides et al., 2002) are proposed. Fourth, incomplete markets and transaction costs are used. Finally, empirical observations, like survivorship bias (see Brown et al., 1995) or the use of ex ante real-time expectations versus ex post measured data (see Fama and French, 2002), are explored. Although all these elements probably carry at least a part of the explanation of the puzzle, there is no clear consensus on what factor dominates.

In this paper we deviate from the standard literature on the equity risk premium in two respects. First, we model the equity premium in general instead of partial equilibrium. So we follow Danthine et al. (1992) and Jermann (1998), which explain asset prices in production economies, wherein consumption and dividend payments are endogenized instead of being assumed to be given. The problem with these kinds of models is that agents can easily change their production plans in order to reduce fluctuations in consumption, which increases the problem of explaining the equity premium. Consumption so becomes smoother as risk aversion is increased. Jermann (1998) shows that capital adjustment costs, like in the q -model of investment, prevent instantaneous adjustment of capital and so help to explain the existence of the equity premium. Jermann moreover includes habit formation in a real business cycle (RBC) model. In Jermann’s model the equity premium comes from a payout uncertainty premium and a term premium. One of the disadvantages of his model is that it generates relatively large long-term bond premia, which we do not observe in reality. To avoid these kinds of complications, one needs production technologies that allow easy transformation across time, but not across states of nature. Jermann experiments with the impact of leverage and finds that the equity premium increases in leverage, but still needs unrealistic levels of volatility of dividends. In this paper we also take the general equilibrium route, but look at a growth model instead of the impulse–response functions of an RBC or a dynamic stochastic general equilibrium (DSGE) model. We agree with Jermann that the equity premium is an equilibrium variable, determined by demand (by financial investors) and supply, say IPO’s by firms, but we do not follow the approach of letting dividend and term structure uncertainty explain the premium. Secondly, we model another imperfection, namely incomplete contracting between the consumer and the producer. One might argue that uncertainty is ‘solved’ if one waits

long enough: in a growth model we can assume that the infinitely lived agent can wait forever to collect knowledge about the “true” states of the economy. But an agent needs to consume each period, and as long as there are costs of postponing consumption, current uncertainty will affect allocation decisions even if agents live infinitely. We assume that an investor might want to hold assets with control rights or not, depending on taste. Those agents that care about having discrete control rights (maybe via private benefits of control) are willing to attribute a higher value to voting rights (see e.g. Zingales, 1995). So we assume that two long-run asset markets exist. One in which control rights do not play a role as such, say the bond market, and a market for corporate control (traded as equity). We model this feature in a very simple way: we assume that bonds give control over physical capital goods (without any voting or control rights), while intangible assets are financed by equity, leading to corporate control. This institutional split between bonds and equity leads to long-run imperfect substitution that explains the equity premium. This approach resembles the segmentation argument (between equity and bonds) as suggested by Ebrahim and Mathur (2001), who focus on different degrees of risk aversion of equity and bondholders.

As we show the intuition of a long-run model of the equity premium is totally different from the common explanation that stresses uncertainty; it relates more to the afore-mentioned literature on corporate governance (see Shleifer and Vishny, 1997). We argue that in the long run there is an important role for the market for corporate control. We assume that corporate control is an immaterial factor necessary in producing goods and services. Consumers can participate in the market for corporate control by buying equity and so getting valuable voting rights. The main friction in our model is the separation of interests of owners and managers of the firm due to incomplete contracting as in Aghion and Bolton (1992). Aghion and Bolton show that in an incomplete contracting setting the control of the firm is endogenous from the entrepreneur’s perspective. Having control over the firm gives the right to decide on non-contractable outcomes. In principle the entrepreneur wants control, but is willing to sell the control rights to external financiers under certain conditions. We assume that the entrepreneur knows more about the technology used, but might not return all profits to the financiers. If consumers have control rights, they have the ability to correct the producer and will value the voting rights. But this comes at a cost: the consumer needs effort (and so loses utility) to pursue active control of the firm (if a shareholder wants to change the policy pursued by the firm, he has to go to the annual shareholders meeting and prepare and present the arguments). So we assume costs of controlling the firm and analyze its role in equilibrium. In return the representative consumer will receive a return to compensate for this disutility. A better system of corporate control leads to higher productivity and will make all agents better off.¹

We proceed as follows. In Section 2 we present the basic model. We analyze the growth model and its steady state. We conclude that the equity premium depends positively on a higher marginal productivity of capital, a higher marginal valuation of leisure, a lower rate of population growth and a lower rate of depreciation of capital goods. Next we discuss the role of inflation in this model in Section 3. We assume a cash-in-advance economy and show that inflation might have a positive impact on the equity premium. Section 4 presents a simple cross-country test using data for 44 economies over the years 1989–2005. We include both developed and emerging economies and use a cross-section model of the ex ante risk premium. We identify the drivers of the long-run

¹ On the other hand, the entrepreneur might not want to give away control of the firm (think of a family enterprise), and strategically sell (part of) the control rights (this is an argument that we will not further analyze here, but see Aghion and Bolton, 1992).

equity risk premium. Although our approach is new, some other papers have addressed related topics. There are not so many papers that analyze the equity risk premium in an international setting. Famous exceptions are Jorion and Goetzmann (1999) and Dimson et al. (2003) who present statistical description of the size and development of international equity risk premia. Bansal and Lundblad (2002) analyze the ex ante risk premium for five economies and conclude that the role of real variability of e.g. cash flow is important in explaining the premium. Another study, comparable to ours, is Shackman (2006) who analyzed ex post equity risk premium data for 39 countries and concludes that the degree of capital market integration of especially emerging markets has a positive relation with excess returns. We conclude our paper in Section 5 with a summary and conclusions.

2. A growth model with capital and control rights

We present a growth model with debt and equity capital. We assume that both financial sources become productive via both tangible and intangible assets and have different marginal productivity levels. A financier (consumer) can invest in two ways in a firm. First, by buying debt the financier gets a senior claim to profits, while the entrepreneur keeps the control rights. The entrepreneur is assumed to have intensive knowledge about the production process, from which she is able to extract ‘private benefits of control’. Secondly, the financier can buy control rights of the firm. While debt financing is a natural way of implementing contingent control, equity financing gives full direct control. But the financier is not able to retrieve the private benefits of control like the entrepreneur directly. Having control of the intangibles of the firm the financier can make the entrepreneur work harder, retrieve more value, but has to invest leisure time in order to be able to do so. Generally, debt is considered to have more seniority, less control rights, and a higher inflation sensitivity. In a long-run deterministic model the seniority claim vanishes. Control issues remain and this will be the core of our argument. As a sidestep we discuss the role of inflation and show that if control rights can be sold easily (or one can go short in control rights), investment in physical capital and consumption can be seen as cash goods, and equity as a credit good (see Section 3).

We model the differences in claims in a very rudimentary way. Suppose the representative firm has the following technology function (we skip current time indices for convenience):

$$y = f(k_{t-1}, e_{t-1}) \quad (1)$$

where y is the per capita production, k the per capita capital, and e is the per capita voting capital. In Eq. (1) we assume a time-to-build production process. We assume that tangible capital k is fully owned by debt holders, while intangibles e are fully owned by equity holders. Of course it is hard to disentangle debt and equity capital in empirical settings, but we abstract from this problem to keep things as simple as possible. The production function has the normal Inada properties ($f_k \geq 0$, $f_{kk} \leq 0$, $\lim_{k \rightarrow 0} f_k(k) = \infty$, $\lim_{k \rightarrow \infty} f_k(k) = 0$, $f_e \geq 0$, $f_{ee} \leq 0$, $\lim_{e \rightarrow 0} f_e(e) = \infty$, $\lim_{e \rightarrow \infty} f_e(e) = 0$) and moreover the crucial assumption that $f_{ke} > 0$. It must be so that a larger voting power increases productivity at the margin. Note that in a time-to-build technology one needs production factors prior to being able to produce. Finally, we require that both capital k and equity e are so-called essential production factors. Capital k is essential if for all positive values of e : $f(0, e) = 0$ (and in a similar way we define e to be an essential factor). These assumptions rule out zero-debt or zero-equity financing policies.

The market for production factor e is labeled the market for corporate control. Investing in e leads to an increase in production y and so to higher attainable levels of income per capita. On

the other hand investing in e can be seen as a combined buy of equity and sale of labor time. Corporate control requires time to be invested in (re)thinking about firm policies, optimizing the use of capital, etc. So the owner of e will derive disutility from having e . In reality there is a limited amount of agents active in the market for corporate control. Shareholders hire managers in order to exercise control and collect relevant firm information. If managers exercise all of the control duties and payments to managers are sufficient compensation for the costs of control, these costs are not reflected in the equity premium. But it might be that the well-known conflict of interest between managers and outside financiers leads to agency costs, which are not paid directly and require compensation in terms of the equity premium. In our model we aggregate these costs and agents into our representative agent.

In terms of utility we assume that the representative consumer derives utility from per capita consumption c and disutility from investing in corporate control e and maximizes utility using a subjective discount rate $0 < \beta < 1$:

$$W = \sum_{t=0}^{\infty} \beta^t u(c_t, e_t) \quad (2)$$

So we assume that $u_c > 0$, $u_e < 0$ (since we assume that shareholders have disutility from holding stock) and $u_{cc}, u_{ee} < 0$. Why should a representative consumer be interested in holding equity at all? It will be in the interest of a specific consumer to let others buy the equity, such that in equilibrium no one will ever hold equity and wants to freeride. Our representative agents solves this puzzle, knowing that higher equity holdings will lead to higher productivity and a positive monetary return on holding equity. The sign of u_{ce} is a priori unclear. The demand for equity will always be positive if $\lim_{e \rightarrow 0} u_e(c, e) = \infty$ for all c .

The technology and production function drive the long-run solution of the model, which is close to Sidrauski's (1967) extension of the Ramsey growth model. We need to define the resource constraints. In absolute terms (defined by capitals) we have

$$Y_t + (1 - \delta)(K_{t-1} + E_{t-1}) = C_t + K_t + E_t \quad (3)$$

and $y_t = Y_t/N_t$, $k_t = K_t/N_t$, $e_t = E_t/N_t$, $c_t = C_t/N_t$, and N_t is population size. We assume that capital depreciates by a rate δ . We assume that physical and intellectual capital depreciate by the same rate (this assumption does not affect the main conclusions). Dividing all terms in Eq. (3) by N_t and using $Y_t/N_t = f(k_{t-1}, e_{t-1})$ gives

$$f(k_{t-1}, e_{t-1}) + \left(\frac{1 - \delta}{1 + n} \right) (k_{t-1} + e_{t-1}) = c_t + k_t + e_t = \omega_t \quad (4)$$

where ω_t , a state variable, represents the household's initial resources. n is the fixed growth rate of population.

Next we can define the value function by

$$V(\omega_t) = \max u(c_t, e_t) + \beta V(\omega_{t+1}) \quad (5)$$

where we maximize over c_t , k_t , and e_t subject to the budget constraint (4). We express k_t as $\omega_t - c_t - e_t$ and rewrite the problem into

$$V(\omega_t) = \max u(c_t, e_t) + \beta V \left(f(\omega_t - c_t - e_t, e_t) + \left(\frac{1 - \delta}{1 + n} \right) (\omega_t - c_t) \right) \quad (6)$$

so we can maximize now an unconstrained problem over c_t and e_t . The first-order necessary conditions are:

$$u_c(c_t, e_t) - \beta \left(f_k(k_t, e_t) + \frac{1 - \delta}{1 + n} \right) V_\omega(\omega_{t+1}) = 0 \quad (7)$$

$$u_e(c_t, e_t) - \beta (f_k(k_t, e_t) - f_e(k_t, e_t)) V_\omega(\omega_{t+1}) = 0 \quad (8)$$

The transversality conditions are:

$$\lim_{t \rightarrow \infty} \beta^t \lambda_t k_t = 0 \quad (9)$$

$$\lim_{t \rightarrow \infty} \beta^t \lambda_t e_t = 0 \quad (10)$$

The envelope theorem gives

$$\lambda_t = V_\omega(\omega_t) = u_c(c, e) \quad (11)$$

The solution is defined by Eqs. (4), (7) and (8), which we can solve for c_t , k_t , and e_t . Eq. (7) gives the condition that the marginal utility of holding additional capital must equal the marginal utility of consumption. Eq. (8) gives a condition for the equity return. We define r_k as the return on debt and r_e as the return on equity. In equilibrium we have $r_e = f_e(k, e)$ and $r_k = f_k(k, e)$. So we can rewrite the equity premium ($r_e - r_k$) into

$$r_e - r_k = -\frac{u_e}{u_c} \left(r_k + \frac{1 - \delta}{1 + n} \right) \quad (12)$$

Note that this is not exactly the equity premium, since this would be the excess return of equity over the return on riskless assets. The model shows that in the long run the equity premium is positive, depending on the assumption that holding equity yields disutility. In equilibrium the return on equity can be lower, since consumers derive utility from holding equity. Take as an example $u(c, e) = \log(c) - \alpha \log(e)$, we get

$$r_e - r_k = \frac{\alpha c}{e} \left(r_k + \frac{1 - \delta}{1 + n} \right) \quad (13)$$

The equity premium therefore depends positively on: a lower rate of depreciation, a lower rate of population growth, higher marginal productivity of capital, and lower levels of marginal utility of consumption. It should also be noted that higher marginal valuation of leisure also leads to a larger premium. In the next section we introduce money and analyze the role of inflation.

3. Money, equity, and inflation

One of the alleged key differences between equity and bonds is the sensitivity to inflation. Equity is believed to be rather insensitive to inflation, while bonds loose real value due to inflation tax. This view goes back to Tobin (1968), who argues that money and capital (e.g. equity in our view) are perfect substitutes, while money and (government) bonds are not. As Ritter and Warr (2002) state, an unexpected increase in inflation leads to a wealth transfer from bond- to equity holders. Therefore it is interesting to analyze the impact of money and inflation in a long-run model of the equity market. Modeling money in the utility function does not affect the real allocation of bonds and equity. Therefore we proceed along the lines of a cash-in-advance argument. Imposing a cash-in-advance constraint raises a tax on cash goods relative to credit goods. In the case of

consumption being the single cash good, we get again superneutrality in equilibrium, leaving the equity premium unaffected by inflation. We assume that consumption and physical investment are subject to cash-in-advance constraints, while investing in equity is not. One could argue that in a market economy it is relatively easy to borrow funds to invest in equity. Moreover, it is well documented that corporate investment heavily relies on internal liquidity (see Fazzari et al., 1988). Inflation will therefore tax cash goods, like consumption and capital (bonds), and possibly lead to more attractive equity returns.

We assume that our agent optimizes utility to be derived from consumption and leisure. Controlling a firm in terms of holding equity again leads to less leisure:

$$U = \sum_{t=0}^{\infty} \beta^t u(c_t, e_t) \tag{14}$$

with $0 < \beta < 1$ and $u_c > 0, u_e < 0$ and the usual second-order properties. The sequence of budget constraints reads

$$f(k_{t-1}, e_{t-1}) + \left(\frac{1 - \delta}{1 + n} \right) (k_{t-1} + e_{t-1}) + \tau_t + \frac{m_{t-1}}{(1 + n)(1 + \pi_t)} = c_t + k_t + m_t + e_t$$

Let $\Pi_t = 1 + \pi_t = P_t/P_{t-1}$, $\Pi_t^* = (1 + n)\Pi_t$, $\tau_t = T_t/N_t P_t$, $R_t = I_t/\Pi_{t+1}$, and $R_t^* = R_t/(1 + n)$. π_t is the inflation rate, τ_t the real transfers to the public, R_t the real interest rate, T_t nominal transfers to the private agents, and n is the population growth rate. Note that this model is with certainty and consumers know at time $t - 1$ the price level P_t in period t , so the CIA imposed on consumption and investment $i_t = k_t - (1 - \delta)/(1 + n)k_{t-1}$ is

$$c_t + k_t - \frac{1 - \delta}{1 + n} k_{t-1} \leq \frac{m_{t-1}}{\Pi_t^*} + \tau_t = a_t \tag{15}$$

which will be an equality without uncertainty. Write the Bellman equation:

$$V(a_t, k_{t-1}, e_{t-1}) = \max u(c_t, e_t) + \beta E_t[V(a_{t+1}, k_t, e_t)] \tag{16}$$

Note that we will use: $a_{t+1} = (m_t/\Pi_{t+1}^*) + \tau_{t+1}$. Define λ_t and μ_t as the Lagrangian multipliers of the budget constraint and the CIA-constraint. The first-order necessary conditions read under certainty:

$$u_c = \lambda_t + \mu_t \tag{17}$$

$$\beta V_k(a_{t+1}, k_t, e_t) = \lambda_t + \mu_t \tag{18}$$

$$u_e + \beta V_e(a_{t+1}, k_t, e_t) = \lambda_t \tag{19}$$

$$\beta \left(\frac{1}{\Pi_{t+1}^*} \right) V_a(a_{t+1}, k_t, e_t) = \lambda_t \tag{20}$$

$$V_a(a_t, k_{t-1}, e_{t-1}) = \lambda_t + \mu_t \tag{21}$$

$$V_k(a_t, k_{t-1}, e_{t-1}) = \lambda_t \left(f_k + \frac{1 - \delta}{1 + n} \right) + \mu_t \left(\frac{1 - \delta}{1 + n} \right) \tag{22}$$

$$V_e(a_t, k_{t-1}, e_{t-1}) = \lambda_t \left(f_e + \frac{1 - \delta}{1 + n} \right) \tag{23}$$

Skipping time indices in the steady state and defining $F_e = f_e + (1 - \delta)/(1 + n)$ and $F_k = f_k - (1 + \delta)/(1 + n)$ we get

$$u_c = \lambda + \mu, \quad \beta V_k = \lambda + \mu, \quad u_e + \beta V_e = \lambda, \quad \beta V_a \frac{1}{\Pi} = \lambda,$$

$$V_a = \lambda + \mu, \quad V_k = \lambda F_k + \mu \left(\frac{1 - \delta}{1 + n} \right), \quad V_e = \lambda F_e$$

We can solve this system for F_e and F_k :

$$F_k = \frac{1}{\beta} \left(\frac{1}{\beta} - \frac{1 - \delta}{1 + n} \right) \Pi + \left(\frac{1 - \delta}{1 + n} \right) \quad (24)$$

$$F_e = -\frac{u_e}{\beta^2 u_c} \Pi + \frac{1}{\beta} \quad (25)$$

From these expressions it can be seen that inflation stimulates physical capital productivity: $dF_k/d\Pi > 0$ since $0 < \beta < 1$: there is no superneutrality in this model. The model incorporates the Tobin-effect: money stimulates capital. Inflation also stimulates the productivity of intangibles for $u_e < 0$. If the return on money becomes lower, other assets will become more attractive. In equilibrium for large absolute values of u_e relative to u_c an approximation of the equity premium will depend positively on inflation Π . The extra return of equity over bonds will depend positively on inflation if the absolute value of u_e/u_c exceeds $1 - \beta((1 - n)(1 + \delta))$. So for countries with a higher population growth n this probability will decrease. But overall, whether we will find a positive impact of inflation on the equity premium seems to be an empirical matter.

4. Empirics of the long-run equity premium

In the previous two sections we showed that the equilibrium long-run equity premium in a simple growth model increases if:

- The marginal productivity of capital increases.
- The marginal valuation of leisure increases. Especially in those economies that give legal protection to control rights this effect will become manifest.
- The rate of depreciation of fixed capital decreases.
- The rate of population growth decreases.
- The rate of inflation increases.

In our model we obviously we present an abstract world. [Shackman \(2006\)](#) showed that for emerging markets the degree of capital market integration might be relevant (better integration leads to larger excess returns) and [Bansal and Lundblad \(2002\)](#) concluded that real output (cash flow) volatility is positively related to the equity premium. In our empirical work we explore these other findings.

We test these hypotheses in a cross-country model using data of 44 economies, for which we have so-called ex ante information on the equity premium. As [Shackman \(2006\)](#) we include both developed and emerging markets in our sample. The ex post measurement of the ERP considers the historical excess return of equity relative to bonds, while the ex ante approach is the prospective

premium for equities relative to bonds. Fama and French (2002) have shown that for US data the difference between the two approaches is substantial. Since 1946, investors in the US have earned a 2% higher yearly return than they should be reasonably expected. Our study uses ex ante data, because we are not interested in de facto misallocations. Expected returns are not readily observable, so we need a proxy. Our approach is comparable to Fama and French, who calculate the unconditional ERP. It is well documented in the literature that the predictability of equity returns can be enhanced by valuation models that rely on historical dividends and/or earnings (Campbell and Shiller, 2005; Fama and French, 1988, 2002; Arnott and Bernstein, 2002). Given data availability we include a broad subset of developed (23) and emerging (21) markets. Ilmanen (2003) and Salomons (2005) discuss several of the approaches to measure the equity premium. Limitations with regards to emerging markets data lead us to the Rozeff (1984) proxy.² Rozeff builds on the Gordon (1962) growth model. In the special case of the Gordon model when earnings and dividends grow into perpetuity at a constant rate, it is easy to show that the real expected return on equity is the sum of the dividend yield, DY , and the real growth rate g . The empirical implementation of the real growth rate g would be the average growth rate of dividends or earnings. In a growth model this boils down to include the growth rate of output in the steady state. Subtracting the real risk free interest rate leads to the ERP. For simplicity one might assume that the real growth rate is equal to the real interest rate. Rozeff (1984) relied on this *golden rule of accumulation* and showed that the dividend yield has predictive power to the level of excess return in US data.

The first columns of Tables 1 and 2 present the average risk premium in emerging and developed economies. We use the distinction, because other studies showed that emerging markets have higher excess returns in general, but also larger stock market volatility (see Shackman, 2006, for ex post data). We use Morgan Stanley capital international (MSCI) data for both the emerging and developed markets and report the average monthly ERP in the sample November 1989–December 2005. For the emerging markets we could have used data from the International Financial Corporation (IFC). Some commentators criticize the reliability of the IFC-data, especially for the 1980s, due to the rather closed character of emerging markets. This turns the dividend payout figures rather uninformative, so we confirm ourselves to the post 1989 data.

The first columns of Tables 1 and 2 highlight several interesting points:

- (1) Based on the dividend yield, we observe an average ERP of 2.68% for developed markets and 2.32% for the set of emerging markets in the years 1989–2005. Based on the IFC-data (not reported here) one can observe a slightly higher excess return in emerging markets in the 1980s, but again this higher return fully coincides with larger volatility.
- (2) There is a wide country variation of the average ERP. Investors in Japanese equity could only expect 0.9% additional return over bonds, while equity investors in Venezuela or New Zealand could reasonably expect about a 4.7% premium.
- (3) The ex ante excess returns are by far lower than the (ex post) excess returns reported by e.g. Shackman (2006) for both classes of economies.

² The main issue is not the expected real return on equity as using the earnings yield (Siegel, 2002; Ritter, 2005) would be a possibility. However, for expected bond returns we are unable to generate such proxies. Ilmanen (1995) suggests that current bond yields are a fair estimate of future bond returns, but not for all markets data are available. An alternative would be to use short-term rates for those markets, but that would not provide an “apples for apples” comparison and might trouble the results.

Table 1
Descriptive statistics of main variables: emerging economies

Country	ERP	GDP, GC	Hours, H	Population, n	Inflation, Π	Latitude, L	Mobility, ICM
Argentina	2.52	1.06	1953	1.54	189.82	−36.68	9.5
Brazil	3.96	2.34	1985	2.32	506.98	−19.56	3.6
Chile	3.91	2.09	1979	1.78	51.04	−33.55	6.5
China	2.18	4.68	2200	1.61	7.23	29.56	4.9
Czech	2.48	2.11	1975	0.25	5.98	49.00	5.7
Hungary	1.32	2.44	1774	0.13	12.01	47.42	6.4
India	1.63	2.47	2200	2.04	6.75	25.27	2.3
Indonesia	2.09	2.88	2200	1.92	57.87	−6.56	3.8
Israel	1.91	3.46	1772	2.98	39.16	32.08	4.2
Korea	1.56	5.59	2453	1.55	9.19	37.55	4.8
Malaysia	2.50	3.37	2237	2.43	3.00	3.27	6.2
Mexico	1.66	2.18	2095	2.42	21.98	16.76	6.4
Peru	2.59	1.10	1996	2.47	251.57	−11.79	8.6
Philippines	1.20	1.73	2200	2.64	8.44	13.92	6.6
Poland	1.42	2.43	1944	0.81	42.91	50.24	5.2
Russia	1.44	1.54	1813	0.63	147.94	55.68	3.5
South Africa	3.23	1.17	1864	2.15	8.27	−29.13	4.0
Taiwan	1.16	5.73	2565	1.96	6.05	23.00	5.7
Thailand	2.29	4.28	2224	2.17	4.67	13.77	4.6
Turkey	2.86	2.92	2068	2.19	36.70	41.20	5.5
Venezuela	4.76	0.27	1958	3.03	16.61	9.84	6.9
Average	2.32	2.75	2086	1.87	65.43	15.18	5.7

Following [Rozeff \(1984\)](#) the equity risk premium ERP is computed as the dividend yield. Data for emerging and developed markets are from Morgan Stanley capital international (MSCI). We use monthly data for November 1989–December 2005 to compute the geometric average. GDP per capita is the average growth rate of GDP per capita (GC), H is the average number of hours worked (H), the growth rate of population (n), is the relative change of the CPI (Π), latitude of the capital city (L), and an indicator of capital mobility (ICM). The source of the GC, H and n is the Groningen Growth and Development Center (<http://www.ggdc.nl>), Π is from the International Financial Statistics, ICM is from the Fraser Institute (<http://www.freetheworld.com>). The sample for GC, H , n , and Π is 1951–2005 upon availability. ICM is for 1995.

The fact that in episodes of lower uncertainty, like the period 1989–2005, the excess premium is lower, stresses our argument that other arguments that explain the ‘hardcore’ premium become more relevant. Our argument is that in the long run excess return on equity is a compensation paid on the costs of carrying control rights.

Some of the variables in our theoretical models, like the rate of depreciation and the marginal (dis)utilities of consumption, leisure, and equity holdings are hard to proxy by observable variables. We use the growth rate of GDP per capita (GC) as an indicator of overall productivity and the average number of hours worked (H) as an indicator of the marginal value of leisure. An increase in the value of H coincides with lower leisure and hence a higher marginal valuation of leisure. It is hard to find a direct proxy of the rate of depreciation of physical capital. We argue that geographical conditions might matter and include latitude L in the model. Population growth n and inflation Π are relatively easy to collect. We use indicators of the legal system, as [La Porta et al. \(1997\)](#) developed, to proxy the protection of control rights in the various judicial systems. And finally, in order to proxy for the capital mobility freedom ICM we used an indicator as developed by the Fraser Institute on freedom of capital (see <http://www.freetheworld.com>). The higher the value of ICM the more mobile capital

Table 2
Descriptive statistics of main variables: developed economies

Country	ERP	GDP, GC	Hours, H	Population, n	Inflation, Π	Latitude, L	Mobility, ICM
Australia	3.82	2.19	1855	1.63	5.71	-32.22	8.3
Austria	1.75	3.32	1818	0.31	4.12	48.23	8.5
Belgium	3.88	2.59	1896	0.33	3.70	50.84	9.3
Canada	2.30	2.23	1894	1.56	4.11	43.73	8.4
Denmark	1.65	2.32	1749	0.44	5.25	55.72	8.8
Finland	2.08	3.03	1813	0.48	5.74	60.21	8.7
France	2.84	2.69	1759	0.68	5.31	48.86	6.8
Germany	2.64	3.06	1495	0.34	1.78	48.16	9.6
Greece	3.40	3.83	2068	0.63	9.80	38.06	6.5
Hong Kong	3.62	4.66	2438	2.20	5.37	22.70	9.7
Ireland	2.26	3.81	2043	0.56	6.42	54.61	8.5
Italy	2.59	3.19	1772	0.38	6.68	45.42	8.0
Japan	0.84	4.62	1962	0.77	4.09	35.71	7.7
Netherlands	3.36	2.40	1666	0.88	3.93	51.87	9.6
New Zealand	4.70	1.48	1843	1.37	6.45	-36.89	9.6
Norway	2.23	2.97	1655	0.62	5.32	59.98	8.6
Portugal	3.02	3.61	1988	0.37	8.85	38.82	8.3
Singapore	1.69	4.55	2393	2.71	2.78	1.36	9.3
Spain	3.23	3.96	1968	0.66	7.75	37.40	8.3
Sweden	2.08	2.27	1687	0.45	5.40	59.28	9.3
Switzerland	1.74	1.71	1768	0.86	2.90	47.41	9.6
United Kingdom	3.68	2.15	1864	0.34	5.95	51.51	9.4
United States	2.22	2.17	1927	1.21	3.95	34.36	8.4
Average	2.68	2.92	1858	0.80	5.27	38.29	8.6

Symbols and sources: see Table 1.

is. Tables 1 and 2 give an overview of the the major data for emerging and developed markets.

Tables 1 and 2 show that in developed economies the number of hours worked is typically smaller, the growth rate of population lower, and capital mobility relatively free. Inflation is by far lower in the developed economies, but GDP per capita growth is only a little higher. In our econometric analysis we do not distinguish emerging or developed economies, but use the full sample of 44 countries. Because we have a low number of countries dynamic panel data estimation methods like GMM will be ill-conditioned. The long-run character of the model forces us to use a cross-section model. Pesaran and Smith (1995) argue that there are three important properties of coefficients estimated from a cross-section model:

- (1) they represent the long-run average effects,
- (2) they are consistent for large time span, and
- (3) they are robust to misspecification of dynamics in the underlying micro-model.

We first check for the collinearity between the main determinants GC, H , n and Π . The number of hours worked per person H is correlated with both GDP per capita growth GC and population growth n by about 0.5. In all models we include dummy variables for legal origin (British, French, German, Socialist or Scandinavian), latitude, and the international capital mobility variable ICM.

We use an interaction term for inflation Π and population growth n , GDP per capita GC , and the number of hours worked H , given the nonlinear results we found in Section 3. Table 3 presents the results. Table 3 presents two sets of parameter estimates. We use two approximations of the steady-state values of our regressors n , GC , Π , and H . The first is based on the 1951–2005 sample. Next we use the 1989–2005 sub-sample means. As one can see this does not change the results by and large. There is a weak negative impact of population growth n on the ERP, a positive impact of inflation Π , and no impact of GDP per capita growth rates GC or hours worked H . In interaction with inflation we see that GDP per capita growth has a positive impact on the ERP, and the number of hours worked a negative one (as expected). The British and especially French legal systems seem to stimulate the ERP, while the Socialist, Scandinavian and German legal origin do not seem to matter. There is a weak impact of the international capital mobility variable ICM and latitude is relevant. The more to the north the capital of the country is located on the globe the lower the ERP.

We experimented with two robustness checks. First, we included volatility of GDP per capita, as suggested in the literature, to correct for the reduction of cash flow uncertainty. This did not change the results by and large. Second, we tested for the impact of controlling costs or benefits of holding equity. It might be so that in some countries shareholders benefit more from control rights of equity ownership. We used an indicator of the private benefits of control, as developed by Dyck and Zingales (2004) to control for these differences in private benefits of control. Following Barclay and Holderness (1989), Dyck and Zingales argue that private benefits of control can be measured by the difference between the price per share paid by the acquiring party of controlling blocks in publicly traded companies and the price per share after the acquisition has taken place (the latter giving an indication of non-controlling returns). Dyck and Zingales estimate the indicator of private benefits of control for 39 countries, of which 37 are in our sample. If international differences in private benefits of control would matter, this variable should be a

Table 3
Determinants of the equity premium

	$t = 1951-2005$		$t = 1989-2005$	
	Parameter	S.E.	Parameter	S.E.
n_t	-0.445	0.265	-0.456	0.274
$n_t \Pi_t / 1000$	8.150**	3.565	11.020***	3.843
GC_t	-0.186	0.257	-0.031	0.126
$GC_t \Pi_t / 1000$	5.738**	2.101	1.633	1.673
Π_t	0.112	0.059	0.154***	0.047
$H_t / 1000$	0.599	1.192	-0.195	0.592
$H_t \Pi_t / 1000$	-0.072	0.035	-0.092***	0.028
British	0.788	0.437	1.137***	0.278
French	1.237***	0.254	1.427***	0.275
Socialist	0.436	0.493	0.849	0.581
Scandinavian	0.167	0.323	0.292	0.253
Latitude	-0.016***	0.005	-0.015***	0.004
ICM	0.139	0.092	0.119**	0.058
C	1.218	2.319	2.050	1.466
Adjusted R^2	0.414		0.438	
S.E. of regression	0.739		0.732	

A** (***) denotes significance at the 95 (99)% confidence interval. We use two approximations of the steady-state values of our regressors n , GC , Π , and H . The first is based on the 1951–2005 sample and the second one on 1989–2005 sub-sample means.

significant variable in the estimation of the equity premium. According to our model we expect that those countries with the most pronounced disutility of holding equity should have the largest equity premium. So the larger the block premium according to Dyck and Zingales, the lower the equity premium should be. We included the Dyck–Zingales block premium variable in the models. For the 1951–2005 model the block premium variable gets a p -value of 0.77, and for the 1989–2005 sample we get a p -value of 0.64, indicating that this variable does not contribute to the explanation of the equity premium. So we decided not to include the Dyck–Zingales indicator in our final estimation results, because we have to drop seven observations from our sample of 44 countries.

From [Table 3](#) we conclude that the equity premium (ERP) seems to move with population growth (negatively), GDP per capita growth (positively), inflation (positively), and the number of hours worked (negatively). The legal origin of the economy matters: countries in the British and French systems seem to have higher excess returns. Countries with relatively large capital mobility seem also to have larger ERP's, as was found by [Shackman \(2006\)](#). Countries with relatively large capital mobility seem also to have larger ERP's, corroborating the findings of [Shackman \(2006\)](#).

5. Conclusions

In this paper we develop a theoretical model that explains the long-run equilibrium equity premium. We impose long-run imperfect substitutability of equity and bonds assuming a difference in control rights. Consumers influence production decisions by holding equity. They need to substitute leisure for owning equity (and having the private benefits of control) and so equity ownership leads to disutility. Bondholders own physical capital. The equity premium depends positively on: a lower rate of depreciation, a lower rate of population growth, higher marginal productivity of capital, lower levels of marginal utility of consumption, and higher marginal valuation of leisure. We show that it is likely that equity returns depend positively on inflation.

Next we estimate our theoretical model. Our sample consists of 44 emerging and developed economies with observations from 1989–2005. We conclude that countries with a relatively low population growth rate, high GDP per capita growth rate, relatively high inflation, and high valuation of leisure (low number of hours worked) have higher equity premia. Legal origin and geographical location matter, as well as the degree of freedom of capital mobility.

Our analysis is maybe a first step in understanding the long-run equity excess returns. We fully abstracted from the role of uncertainty, which has influence in short-run adjustment processes. Our paper analyzes the equity premium in a steady-state version of a Ramsey-type growth model, so our results only hold in 'equilibrium'. It is interesting to estimate the adjustment process to the equilibrium path and cope with uncertainty. This type of analysis is then close to a calibrated version of a model like [Jermann \(1998\)](#).

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