Ownership Structure in Foreign Direct Investment Projects*

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September 1998

Abstract

This paper develops a theoretical model of equity composition in foreign direct investment (FDI) projects and applies it empirically to examine the role of firm, industry, and country characteristics in ownership structure. The results show that in choosing the ownership structure, foreign investors, local entrepreneurs, and governments consider the specific, costly-to-market assets that the participants and the country bring to the project. The equilibrium foreign equity share rises with the importance of foreign investor assets and declines with the contribution of local assets towards the amount of surplus generated in the FDI project. Government policy and institutional structure of the host country affect the outcome through the form of regulations that apply to FDI, the environment established for the operation of FDI projects, and the roles created for local entrepreneurs.

Key words: Multinational enterprises, equity structure, firm and country characteristics.
JEL Classification: F23, O27, G32

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* We are indebted to Anne Villamil for helpful comments on earlier drafts of this paper. We are grateful for the financial support of the Center for International Business Education and Research at the University of Illinois.

1. Introduction

Foreign Direct investment (FDI) to developing countries has surged, increasing from $24 billion in 1990 to $120 billion in 1997. Moreover, it has become an important source of finance, accounting for about 40 percent of international capital flows in 1997 compared to 24 percent in 1990.[1] These investments are however concentrated in a few countries. For example in 1997 ten countries absorbed 72 percent of FDI.[2] As a result, most developing countries have not benefited from the growth in FDI and many potentially profitable investment opportunities remain untapped.

The existing literature suggests a number of explanations for the inability of some countries to attract FDI. In particular, economic and political instability and bad policies are identified as the culprits, and among the bad policies, restrictions on foreign equity ownership are often held as a prime example. Hence in order to participate in the FDI boom, a number of countries followed the recommendations of international organizations such as the World Bank and eased restrictions on foreign investment.[3] To the disappointment of many developing-country governments, FDI reform did not induce much response from foreign investors.[4] As documented in UNCTAD (1995: iii):

> The African continent did not benefit from the increased investment flows to developing countries as a whole, in spite of the fact that the countries of the region undertook many efforts to attract investment, liberalizing, …

Subsequently, some governments have abandoned or slowed down reform.

One objective of this paper is to probe deeper into the motivation of governments to impose equity restrictions and the extent to which such policies constrain TNEs' equity choices.[5] In other words, we ask: to what extent is the observed equity shares determined by government regulations as opposed to strategic responses of transnational enterprises (TNEs) and local firms to economic and institutional

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[1] The decline in official assistance coupled with the recent currency crises in Latin America and East Asia may strengthen this trend as developing countries come to appreciate the long-term benefits of FDI, which unlike portfolio investment is not subject to "erratic" investor response.

[2] Brazil and China accounted for 16 and 37 percent respectively of net FDI flows. The other eight countries are Argentina, Chile, India, Indonesia, Malaysia, Mexico, Poland and Venezuela.

[3] Between 1986 and 1991, Argentina, Brazil, Chile, Colombia, El Salvador, Mexico, Nigeria, and Peru and many others removed restrictions on foreign equity ownership (UNCTD, 1994: 21). For example, until 1989, Nigeria restricted FDI to a maximum of 40 percent equity in many industries. Since 1990, foreigners can be sole investors in all enterprises with the exception of investments in banking, insurance, petroleum and mining (UNCTD, 1995: 5).

[4] Contractor (1991) finds no relationship between the liberalization of equity restrictions and FDI flows.

conditions prevailing in the host countries? More broadly, we are interested in exploring the sources of variation in the equity structure of foreign subsidiaries across firms, industries, and countries. This can shed light on the reasons why TNEs accept local participation in one country but not in another, why joint ventures are more prevalent in developing countries, and why TNEs' response to the removal of equity restrictions has been subdued. These issues matter because without understanding the role of various factors in the determination of FDI and without isolating the impact of policy, reform attempts may prove misdirected and unproductive.

Equity structure is important because it influences the cost of capital, the level of investment, the degree of technology transfer, and the distribution of gains from FDI. Equity shares affect the incentives of the participants in an FDI project to apply their resources to the project. For the TNE, equity share determines the extent to which it can control the operations of the subsidiary and ensure the integrity of the assets that are the basis of its existence.[6] The participants as well as the government, of course, care about the distribution of rents generated by the FDI project.

We develop a theoretical model of equity structure in FDI projects. The model pinpoints the key characteristics of the firm, industry, and country that influence equity choice. Guided by the model, we conduct an empirical study of equity structure in foreign subsidiaries of U.S. firms around the world. The results show that in choosing the ownership structure, TNEs, local entrepreneurs, and governments consider the specific, costly-to-market assets that the participants and the country bring to the project. The equilibrium foreign equity share rises with the importance TNE assets for production and declines with the significance of local assets. Government policy and institutional structure of the host country affect the outcome through the form of regulations that apply to FDI, the environment established for the operation of FDI projects, and the roles created for local entrepreneurs.

Our model is based on the idea that foreign direct investment entails the use of inputs that are costly to transact on the market.[7] Indeed, the main rationale behind foreign production is that TNEs possess intangible assets (technologies, management and marketing skills and know-how) whose arms-

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[5] The degree of "restrictiveness" varies by country. For example in 1982, about 8 percent of US TNEs operating in Spain faced equity restrictions, compared to 19 percent for Indonesia and 54 percent for India (1982 Benchmark Survey Results).

[6] Following Grossman and Hart (1985) we define ownership as the power to exercise control. Thus we consider ownership and control as synonymous.

[7] This aspect of our model is akin to some of the contributions to the share-cropping literature, particularly that of Eswaran and Kotwal (1985).

length transaction is subject to severe moral hazard, adverse selection, and free rider problems.[8] Moreover, FDI projects need local knowledge and connections that are again assets subject to high transaction costs if they are to be purchased from the local entrepreneurs who have comparative advantage in their provision. While either side (local entrepreneur or TNE) may be able to overcome these problems at some cost and obtain the other side's inputs through market transactions (i.e., full ownership), joint ownership offers an alternative that reduces reliance on markets, although it entails other costs, especially weakened incentives for input supply (Hennart, 1988). Incentive problems can be solved if side payments are costless and partners can be rewarded according to their marginal contributions, while distributing the surplus according to their bargaining powers (Svejnar and Smith, 1984). However, when there are restrictions on side payments, the preferences of different partners over sharing rules diverge. Governments may also have an interest to intervene to coordinate and strengthen the bargaining position of their own nationals to help them capture more rents. The outcome is a game between the TNE, the local entrepreneurs, and the government.

Our results crucially depend on the presence of side-payment restrictions and rents in FDI projects. The existence of rents is plausible because countries differ in their institutions, natural resources, labor force attributes, and demand characteristics and tend to offer different returns on the differentiated specific technological, managerial, and organizational assets owned by TNEs. As a result, the matches between the assets of TNEs and host countries that attract investment are likely to entail substantial specific rents. Constraints on side payments, on the other hand, are partly due to the government's effort to control transfer pricing for tax purposes and to keep the rents of FDI projects in the host country. Another factor is the informational advantage of TNEs over local partners and the government that allows the TNEs to capture some minimum amounts of rent.[9]

An important advantage of our model is that it specifies the government's motive to restrict foreign equity share and identifies the sources of variations in those restrictions. This is in contrast with the existing theoretical and empirical models of equity structure which treat equity restrictions as essentially *ad hoc* moves by the government. Another advantage of the model is that it ties together the roles played by a host of factors in the equity ownership decisions and takes the empirical analysis beyond the existing literature in terms of comprehensiveness and consistency. Many subgroups of the variables considered here have been included in previous studies, but the role of each one has been

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[8] See Caves (1982) and Markusen (1995) for reviews and summaries on the role of intangible assets in the formation of a TNE.

[9] For more on the implications of TNE private information and match-specific capital in FDI projects, see Choi and Esfahani (1998).

explained separately, sometimes with conflicting implications. We manage to explain a variety of observed relationships from a unified perspective.

For our empirical work, we use a data set based on a large sample of subsidiaries of U.S. TNEs. Compared to other empirical studies of ownership structure in FDI projects, our data set has more recent information and a much larger sample size and variable space brought together from a variety of sources. These features allow us to explore the role of a wide range of factors simultaneously. Moreover, unlike other studies which use a dichotomous ownership indicator (e.g., minority vs. majority), we use data on the actual shares in joint ventures. We also create innovative measures of non-marketable assets and successfully relate them to the theory of transnational enterprises.

In the rest of this paper, we first briefly review the equity structure literature in section 2. Section 3 describes our theoretical model and section 4 specifies the econometric model and discusses the variables included in the regressions. Section 5 presents the empirical results and section 6 concludes.

2. Theories of Equity Structure

Existing models of a firm's equity structure are based on two theories: bargaining framework and transactions cost theory.[10] Under the bargaining framework, a TNE's equity position is modeled as the outcome of a bargaining process: the greater the bargaining power of the TNE, the higher its equity share. This approach was pioneered by Vernon (1971) and extended more rigorously by Svejnar and Smith (1984). For empirical implementation, the bargaining power of the TNE relative to that of the host country is often assumed to increase with the benefits the TNE brings to the host country (such as the TNE's assets, export sales) and to decrease with the attractiveness of the internal market of the host country (a large and growing market, cost-effective labor, infrastructure). However, these relationships are not derived from first principles. Moreover, for many of the factors considered, especially country characteristics, it is not clear from the theory why a change in bargaining power translates into a change in equity share rather than simply a change in the returns to the supplied inputs. The approach can also be criticized for inconsistencies with some empirical regularities. For example, according to the bargaining theory, joint ventures and low TNE equity shares should be more common among FDI projects in industrialized countries as opposed to those in developing countries. But, the data indicates otherwise.

[10] Research on a TNE's mode of entry has generally been done by scholars in the field of international business. See Gomes-Casseres (1990) for an empirical model that integrates the two theories.

More recent studies of equity structure have relied on the transactions cost theory of ownership choice.[11] This theory posits that the choice between whole and joint ownership depends on the costs of sharing ownership (such as difficulties in decision-making, reduced incentives, and free riding by partners) relative to the benefits of avoiding costly arms-length transactions. Here the focus is on the role of intangible, often knowledge-based, assets that are costly to exchange through the market because of potential opportunistic behavior (e.g., adverse selection, moral hazard, incomplete contracting). However, the modeling is often heuristic and lacks sufficient structure to produce predictions about equity share beyond the choice of whole vs. joint ownership. Another difficulty with the existing transaction-cost models is that they do not provide any active role for the local entrepreneurs in the equity share decision. Nor do they specify the conditions under which recruiting local entrepreneurs as partners is superior to hiring them as employees. Furthermore, when the government is introduced in the model, its motive for intervention is not modeled. Finally, the potential relationship between shares and the relative contribution of each partners' assets to production is often ignored.

Past empirical research on the determinants of equity structure has mostly focused on the role of firm and industry characteristics, with many of the studies relying on the 1975 Harvard Multinational Database as their main source of information (Anderson and Gatignon, 1988, Gomes-Caserres, 1989 and 1990).[12] However, Stopford and Wells (1972) and Beamish (1994) use survey data to suggest that the host country's institutions play an important role in business operations, especially in developing countries.[13] For example, in countries with a high level of corruption, local ownership may be used as a means to gain access to preferential treatment. In a recent study, Henisz (1997) offers a more comprehensive analysis based on a large data set similar to ours. In his view, the choice between minority

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[11] See Gomes-Casseres (1990), Hennart (1991), Erramilli (1996), Pan (1996), and Henisz (1997). See Hennart (1988 and 1990) for a detailed discussion of transactions cost theory as a rationale behind a firm's equity structure.

[12] There is somewhat more work on the relationship between host country institutions and the level of FDI. Mody and Wheeler (1992) test this relationship using a summary index of thirteen institutional variables. However, they find that their institutional index does not have a significant impact on FDI. In a more recent study, Lee and Mansfield (1996) find a significant relationship between a country's intellectual property protection (IPP) and the volume and composition of U.S. foreign investment it receives. Kumar (1996) also examines the extent to which a country's IPP affects its ability to attract R&D investments.

[13] Based on a survey of U.S. chief executives of TNEs operating in developing countries, Stopford and Wells (1972) and Beamish (1994) report that executives in high-performing ventures rated general knowledge of the local economy, politics and customs as the most important contribution of their local partner. Beamish (1994: 69) quotes one respondent as saying "we need our partner in the same way that a child playing in the park still likes to have his parent around if he gets into trouble. Its not that the child is dependent on the parent, but more a function of being reassured that he's there if needed." There is also a related paper by Erramilli (1996) that examines how a TNE's nationality (i.e. the institutional characteristics of the home country) affects its ownership preference.

and majority ownership depends largely on contractual and political hazards of the business environment, with political hazards encouraging joint ventures and contractual hazards doing the opposite especially in the presence of political hazards. He finds support for these hypotheses by estimating a PROBIT model, where firm and industry characteristics are employed as the determinants of contractual hazards and the probability of policy change is used as a measure of political hazard.

This paper advances the transaction cost approach by developing and testing a structured model that relates the business conditions of a project to its equity composition. The model also incorporates the effects highlighted by the bargaining framework to the extent that those effects reflect the relative capabilities of different partners to shape the project's output.

3. The Model

Consider a TNE that has identified a profitable FDI project in a host country and has decided to invest in that project by establishing a subsidiary.[14] The project entails the use of local assets in the host country that can generate a surplus (over and above their alternative uses) if they are combined with the TNE's specific assets. The TNE's specific assets consist of non-contractible technological and managerial know-how for organizing and operating projects, international marketing connections, and other intangible assets. The non-contractibility of TNE assets is natural because, as the literature on TNEs has found, the existence of TNEs is contingent on the presence of such firm-specific intangible assets.

There are two types of local assets. The first consists of local public goods such as the quality of institutions, public infrastructure, and access to markets. We will refer to these assets as "infrastructure" and assume that they are non-contractible because they are too costly to transact through the market.[15] As a result, the subsidiary can always benefit from these assets without having to pay for them directly. The second type of local asset consists of local technologies and know-how or knowledge of local markets and labor characteristics that facilitate production and marketing. This type of asset also includes personal connections with policy-makers that can help reduce bureaucratic delays or bribes when country conditions necessitate them. These assets, which we refer to as "local inputs," can be either supplied by

[14] A TNE's decision to invest abroad can be modeled as a two step process. First, the TNE decides whether or not to establish an affiliate in a particular country. If it decides to invest in a country, it then chooses its mode of entry, i.e., whether to establish a wholly owned subsidiary or form a joint venture with a local partner. We focus only on the latter decision.

[15] Besides being realistic, the presence of such assets in the model serves two purposes. First, the assets act as a fixed factor and give rise to diminishing returns in the project and ensure that the equilibrium size of the project is finite. Second, it provides a foundation for the existence of match-specific capital whose rents motivate government intervention in the distribution of project returns and ownership.

local entrepreneurs or produced by the TNE, although the cost to the TNE would be higher if it chooses to produce them itself or to obtain them through an arms-length transaction. The additional cost in case of self production may be viewed as the excess time and energy that the TNE's managers have to spend to learn the local conditions or as the extra payments they have to make to elicit bureaucratic cooperation. In case of arms-length transaction, the premium may be interpreted as the cost of creating incentives for the local supplier. When a local entrepreneur joins the subsidiary as a partner, he partially internalizes the returns to his inputs. The choice between the two alternatives and the division of shares in case of a joint venture is the focus of our paper. Assuming transaction costs for the TNE and local assets is essential for explaining the existence of FDI, joint ventures, and government intervention, otherwise one party would make a fixed payment to the others and have full control over the project. All other inputs are assumed to be available through competitive markets.

Let t denote the summary measure of the resources (including time) needed to apply the TNE's specific assets to the project. Similarly, let k be a measure for the provision of local inputs. Assume that the process of combining infrastructure services, A, with the foreign- and local-inputs is Cobb-Douglas:

$$(3.1) \qquad Q = (A^{\eta} t^{\lambda} k^{\nu})^{1/(\eta+\lambda+\nu)},$$

where Q is the output of the project net of the costs of all inputs other than A, t and k.[16] η, λ, and ν are parameters that represent, respectively, the importance of the infrastructure, TNE assets, and local inputs in the project's operation. These parameters are partly determined by industry characteristics that shape the role of various factors in the project's operation. They are also influenced by the range and type of resources that the country, the TNE, and the local entrepreneurs can contribute to the project. The more unique and extensive the TNE's assets, the higher will be the value of λ. Similarly, η should be higher when local resources and infrastructure can play more crucial roles in production. This interpretation of the exponents follows from the view that the project requires a wide range of inputs and a supplier that offers services for a larger set of those inputs is in a position to contribute more to the project. The use of a Cobb-Douglas functional form is for ease of parameterization and presentation. The implications of the model hold for more general functional forms, but the derivations become cumbersome.

[16] For analytical convenience, we abstract from other inputs and focus on the surplus generation process. Note that if the production function of the gross output is Cobb-Douglas, after maximization of profits with respect to the additional inputs, the net output is also Cobb-Douglas in the remaining factors. For example, if ℓ is an input available through a competitive market at a price, w, and the gross output is $Y = A^{\zeta} k^{\xi} t^{1-\zeta-\xi-\varphi} \ell^{\varphi}$, maximization of the net output, $Q = Y - w\ell$, yields $w\ell = \varphi Y$ or $Q = (1-\varphi)(\varphi/w)^{\varphi/(1-\varphi)} A^{\theta} k^{\gamma} t^{1-\theta-\gamma}$, where $\theta = \zeta/(1-\varphi)$ and $\gamma = \xi/(1-\varphi)$.

We normalize the price of the output to one. Let p_t and p_k denote the unit costs of t and k for the TNE and the local entrepreneurs, respectively. If the TNE chooses to obtain the local inputs without a joint venture, the minimum amount of resources that it must spend to purchase one unit is ρp_k, where $\rho > 1$ indicates the comparative advantage of the local entrepreneurs vis-à-vis the TNE in providing the local inputs. Forming a joint venture absolves the TNE of the excess costs and provides partial incentives for the local partner, although it weakens the TNE's own incentive to apply its assets as well. The trade off between the two alternatives drives the decision. For simplicity, we also assume that there are many local entrepreneurs who can serve as local partners. This puts the TNE in a position to extract all project rents as long as the government does not intervene. Assigning some bargaining power to the local partner does not change the results much except weakening the government's incentive to intervene.

The host government's objective is to increase the share of the project's rents that stays in the country, either as taxes and other charges or as income of a local entrepreneur participating in a joint venture. However, the government, has limited information about the project and, thus, its ability to redistribute the returns to infrastructure or other project rents is restricted. To keep the presentation simple, we do not model this feature explicitly. We assume that the only instrument at the government's disposal for direct rent extraction from the project is a fixed-rate tax, τ, on the net output. For redistributing the remaining rents toward the local partner, the government can curb competition among local entrepreneurs by imposing restrictions on the TNE's equity share and making it difficult for the TNE to receive side payments from the project. The constraint on side payments can be viewed as a byproduct of the regulations and controls that the government imposes on FDI projects to prevent tax evasion through transfer pricing.

Whole Ownership

Under whole ownership, the TNE obtains local inputs at cost ρ, pays a fraction τ of the net output to the host government and keeps the rest. The TNE's problem in this case is:

(3.2) $\pi_t^w = \max_{t,k} (1-\tau)Q - p_t t - \rho p_k k.$

The solution yields:

(3.3) $\pi_t^w = A^* \dfrac{(1-\tau)\eta}{\eta+\lambda+\nu} \rho^{-\frac{\nu}{\eta}}$, where $A^* = A\left(\dfrac{1-\tau}{\eta+\lambda+\nu}\right)^{\frac{\lambda+\nu}{\eta}} \left(\dfrac{\lambda}{p_t}\right)^{\frac{\lambda}{\eta}} \left(\dfrac{\nu}{p_k}\right)^{\frac{\nu}{\eta}}$.

The government's revenue is given by $\pi_g^w = \pi_t^w (\eta+\lambda+\nu)\tau/[\eta(1-\tau)]$.

Joint Ownership Without Equity Restrictions

Under a joint venture, the TNE offers a contract to a local entrepreneur to share the after-tax net output of the project, $(1-\tau)Q$. The contract sets an equity share, $\beta \in (0,1)$, for the TNE according to which $(1-\tau)Q$ is formally distributed. In addition, the contract requires a side payment, α, from the local partner to the TNE after production has occurred. At the time of production, the two sides decide on their asset services, t and k, which they set individually. The net return to the TNE and the local partner are respectively,

(3.4) $R_t = \alpha + \beta(1-\tau)Q - p_t t,$

(3.5) $R_\ell = -\alpha + (1-\beta)(1-\tau)Q - p_k k.$

For a joint venture to be feasible, both sides must find it worthwhile to participate. This is the case if $R_t \geq \pi_t^w$ and $R_\ell \geq 0$ because for the TNE the alternative is whole ownership and for the local entrepreneur the reservation payoff is zero.[17]

In the absence of any impediments to transfers between the two partners, β has no consequence for production or distribution since side payments can be adjusted to ensure the efficiency of allocation in the project subject to the tax rate (Svejnar and Smith, 1984).[18] However, limitations are likely to exist due to government controls or strategic use of information by the partners. We model this aspect by simply assuming that α is a fixed proportion, ϕ, of the local partner's pre-transfer share in the output; that is,

(3.6) $\alpha = \phi(1-\beta)(1-\tau)Q.$

α may be specified in many other forms, or be derived from more basic principals. But, such variations do not change the results in substantial ways as long as they make the marginal payoff of each partner depend on the equity shares. Assumption (3.6) satisfies this requirement in an innocuous way, while avoiding unnecessary complications.

Given the value of α assumed in (3.6), the payoff in (3.4) and (3.5) become:

(3.4') $R_t = \gamma(1-\tau)\, Q - p_t t.$

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[17] Assuming a positive reservation payoff for the local entrepreneur does not change the main results.

[18] This can be seen by noting that competition among the local entrepreneurs allows the TNE to set $\alpha = (1-\beta)(1-\tau)Q - k + \varepsilon[(1-\tau)Q - k - t]$, where ε is a small positive number. Such an α induces both the TNE and the local partner to choose t and k so as to maximize the total after-tax profits of the project. The same result obtains if the local partner has some bargaining power and the two sides engage in a Nash bargaining game (Svejnar and Smith, 1984).

(3.5') $R_\ell = (1-\gamma)(1-\tau)Q - p_k k.$

where $\gamma = 1 - (1-\phi)(1-\beta)$ is the effective share of the TNE. Then the optimal choices of t and k from the perspectives of the TNE and the local entrepreneur, respectively, would be

(3.7) $$t^* = \frac{\lambda}{\eta+\lambda+\nu}\gamma(1-\tau)Q^*/p_t \qquad \text{and} \qquad k^* = \frac{\nu}{\eta+\lambda+\nu}(1-\gamma)(1-\tau)Q^*/p_k,$$

where Q^* is determined by:

(3.8) $$Q^* = A^*(\gamma)^{\lambda/\eta}(1-\gamma)^{\nu/\eta}.$$

Knowing the above outcome, the TNE would be interested in setting β to maximize:

(3.9) $$R_t^* = \left(\frac{\eta+\nu}{\eta+\lambda+\nu}\right)\gamma(1-\tau)Q^*.$$

The solution to this problem is simply:

(3.10) $$\gamma_t = \frac{\eta+\lambda}{\eta+\lambda+\nu} \quad \Rightarrow \quad \beta_t = 1 - \frac{\nu/(1-\phi)}{\eta+\lambda+\nu}.$$

In this situation, the payoff of the TNE from a joint venture, π_t^{jv}, would be equal to R_t^* with $\gamma = \gamma_t$.

From (3.10) it is easy to see that γ_t is increasing in λ and η and decreasing in ν. This implies that as the importance of a production factor rises, the TNE finds it optimal to raise the factor owner's effective as well as contractual shares, balancing the rent distribution function of β with its incentive consequences. Furthermore, an increase in the contribution of infrastructure, η, raises the TNE's preferred β because there are more rents in the project to be captured. As we see below, the same factor motivates the government to try to restrict the TNE's share.

In the absence of equity restrictions, the TNE would prefer whole ownership to joint ownership if $\pi_t^w \geq \pi_t^{jv}$. That is, if

(3.11) $$1 \geq \frac{\eta+\nu}{\eta}(\gamma_t)^{(\eta+\lambda)/\eta}[(1-\gamma_t)\rho]^{\nu/\eta}.$$

Note that γ_t maximizes the right-hand side of (3.11). Therefore, using the envelope theorem, it is easy to see that that expression increases as λ declines or ρ rises. As we show in Appendix A, the expression is also rising in ν when the two sides of (3.11) are close to each other and variations in the system are most likely to affect the TNE's choice. On the other hand, the impact of η on the right-hand side of (3.11) is

ambiguous. It is positive when λ is sufficiently large relative to η and ν and negative when λ is relatively small. Taking into account the possibility of random effects in the ownership decision, these results imply that, the probability that the TNE prefers whole ownership rises with λ and declines with ν and ρ, while η plays an ambiguous role.

It is important to note that in our model the relative costs of TNE and local inputs, p_t and p_k, do not play any role in the ownership decision. This is because of the Cobb-Douglas assumption that implies constant factor shares in output. Under a production function with a larger elasticity of substitution, a factor's contribution to output rises as its price falls. This case can be simulated by our present specification by interpreting a decline in the price of *t* or *k* (which can follow from increases in their supplies) as an increase in λ or ν, respectively. A lower elasticity of substitution implies the opposite. We don't know the values of substitution elasticities and use 1, which is the typical finding for aggregate production functions, as an average.

Another important observation is that while the comparative advantage of local entrepreneurs in providing local inputs, ρ, plays a key role in the choice of whole vs. joint ownership, it does not influence the choice of β in joint ventures. The reason again is that the Cobb-Douglas form of the production function allows each partner to internalize the cost savings for its own inputs and obviates the need for adjusting the incentive structure in response to changes in the cost level. However, even if other functional forms apply, ρ is still likely to play a small role in the determination of shares in the case of a joint venture than in the choice between full vs. partial ownership because the influence of factor costs on shares is strong only when factor substitution elasticities are significantly different from one.

Equity Restrictions

The government's objective is to increase the amount of the project surplus that stays in the country. Thus, from the point of view of the government, the optimal effective share of the TNE under a joint venture, γ_g, should maximize:[19]

$$(3.12)\quad R_\ell + \tau Q^* = (1-\gamma)(1-\tau)Q^* - p_k k^* + \tau Q^* = \left[\tau + \left(\frac{\eta+\lambda}{\eta+\lambda+\nu}\right)(1-\gamma)(1-\tau)\right]Q^*.$$

γ_g (and it associate contractual share, β_g) is determined by:

[19] The government may weigh the profits of entrepreneurs differently from its own revenues. Adding such a weight does not have any substantial impact on the results.

(3.13) $(1-\tau)(\eta+\lambda)(1-\gamma_g)[\gamma_g - \frac{\lambda}{\eta+\lambda+\nu}] + \tau(\lambda+\nu)[\gamma_g - \frac{\lambda}{\lambda+\nu}] = 0.$

Equation (3.13) has two solutions, one of which is between $\lambda/(\eta+\lambda+\nu)$ and $\lambda/(\lambda+\nu)$ and yields a maximum. Since $\lambda/(\lambda+\nu) < \gamma_t$, the government's preferred γ (or β) is always lower than that of the TNE. This is, of course, because the government cannot directly extract all the project's rents and a lower share for the TNE is a mechanism to redistribute the remaining rents in favor of the local partner, although such redistribution causes some inefficiency. When there is no direct taxation, $\tau = 0$, the incentive to lower the share is stronger and $\gamma_g = \lambda/(\eta+\lambda+\nu)$. As τ rises, the government receives a larger share of the output directly and finds the distributional role of γ (or β) less significant. But, γ_g never reaches γ_t because taxation is assumed to be an incomplete rent extraction mechanism. Using the derivative of (3.13) and the second-order condition of the government's problem, it is easy to show that γ_g rises with λ, but declines with η and ν.

If our assumptions regarding incomplete taxation and side payment are correct, the model helps explain the government's motive to restrict the contractual foreign equity share, β. However, there are many situations in which governments do not impose equity restrictions. There are two main reasons for this. First, governments often do not have complete information about individual projects and are sometimes constrained to apply the same policy to a range of projects. This introduces the possibility of inefficient restrictions that the government may want to avoid by following more liberal policies. Second, the government may prefer whole foreign ownership to a joint venture even though its preferred share under a joint venture is lower than that of the TNE. This is because like the TNE, the government's preference for whole ownership is driven by factors that are somewhat different from those influencing its choice of β in case of joint venture. Below, we discuss these two issues in detail.

We model the role of incomplete information about individual projects by assuming that the government imposes a foreign share ceiling, $\overline{\beta}$, on the project that is related to β_g by $\overline{\beta} = \beta_g + \mu + \theta$, where θ is a random variable with a zero mean and the cumulative distribution function, $F(.)$.[20] The parameter $\mu \leq \eta/(\eta+\lambda+\nu)$ reflects the extent to which the government prefers to avoid errors toward overly restrictive policies. In this case, the probability that the ceiling is binding for a given project will be $F(\beta_t - \beta_g - \mu)$ and the expected value of the equilibrium equity share is

[20] $\overline{\beta}$ may be a ceiling formally imposed on a class of projects through laws and decrees or a limit imposed informally on individual projects in the negotiation between the government and the TNE.

(3.14) $\beta^* = \beta_t - F(\beta_t - \beta_g - \mu)(\beta_t - \beta_g - \mu)$.

The government's inclination to follow more liberal policies (i.e., higher μ) tends to reduce the likelihood of binding equity restrictions. We do not observe μ directly, but it may be inferred from the percentage of TNE's in each country reporting binding equity restrictions, $\overline{F}$, for which data is available. This percentage may be seen as the average of $F(\beta_t - \beta_g - \mu)$ over all FDI projects in each country. Therefore, we may write the last terms on the right hand side of (3.14) as a function of $\overline{F}$ and $\beta_t - \beta_g$. Using a linearized version of this function, the expected share of a TNE in its subsidiary becomes

(3.15) $\beta^* \approx \beta_t - \sigma(\beta_t - \beta_g) - \omega\overline{F} = (1-\sigma)\beta_t + \sigma\beta_g - \omega\overline{F}$,

where $0 < \sigma < 1$ and ω is a positive parameter. β^* rises with λ and declines with ν because both β_t and β_g do so. Also, β^* rises with τ since β_g is increasing in τ. That is, in countries where the government is more effective in collecting taxes, equity shares tend to be higher. The impact of an increase in η on β^* is ambiguous because it raises β_t and lowers β_g.

The government's preference for whole ownership depends on π_g^w relative to π_g^{jv}, the maximized value of the government's objective function under joint venture, $R_\ell + \tau Q^*$. The government would prefer full ownership if $\pi_g^w \geq \pi_g^{jv}$, that is, if:

(3.16) $1 \geq [1+\left(\frac{1-\tau}{\tau}\right)\left(\frac{\eta+\lambda}{\eta+\lambda+\nu}\right)(1-\gamma_g)](\gamma_g)^{\lambda/\eta}[(1-\gamma_g)\rho]^{\nu/\eta}$.

Taking account of informational problems and other random elements, we expect the probability that the government allows full ownership, $\overline{\beta}=1$, to be declining with the right-hand side of (3.16) and increasing in the government's inclination to avoid excessive restrictions, μ. As we show in Appendix A, in the neighborhood where (3.16) holds as an equality and parameter changes matter most, the right-hand side of (3.16) is increasing in ρ and η and declining in λ and τ. But, its response to changes in ν is not clear-cut. Note that as in the case of the TNE's choices, the factors underlying the parameters of the model may play different roles in the government's incentive to set $\overline{\beta} = 1$ and its preference for β under joint venture.

Given the decisions of the TNE and the government about whole ownership and allowing for random elements in those decisions, the probability that $\beta=1$ is the outcome for the project is

(3.17) $\text{Prob}\{\beta=1\} = \text{Prob}\{\pi_t^w \geq \pi_t^{jv} \cap \overline{\beta} = 1\}$

$= \text{Prob}\{\pi_t^w \geq \pi_t^{jv}\} - \text{Prob}\{\pi_t^w \geq \pi_t^{jv} \cap \overline{\beta} < 1\}$.

The last term on the second line of (3.17) is the probability that the TNE experiences a binding equity restriction when it wants to establish a wholly owned subsidiary. As in the case of shares under joint venture, the probability of full TNE ownership can be expressed as a function of the parameter μ (again proxied by the economy-wide probability of binding equity restrictions, $\overline{F}$) and the factors behind the TNE's and the government's preferences for whole ownership. Using these results and those from (3.11) and (3.16), we can conclude that Prob{β =1} must rise with all factors that raise λ and τ or lower ρ. Given that an increase in η lowers Prob{ $\overline{\beta}$ = 1} but has a positive effect on Prob{ $\pi_t^w \geq \pi_t^{jv}$ } only when λ is relatively large, the net effect of η on Prob{β =1} is likely to be negative. The same is true about an increase in ν that lowers Prob{ $\pi_t^w \geq \pi_t^{jv}$ } but has an ambiguous effect on Prob{ $\overline{\beta}$ = 1}.

The following table summarizes our results. Although there are some ambiguities in the model's predictions regarding the impact of η and ν on equity structure, it may still be tested on this part by its implication that the direction in which the determinants of these parameters affect β^* or Prob{β =1} should be the same. The above discussion suggests that all factors that raise η or ν are likely to have negative effects on foreign equity share.

Theoretical Impact of the Model's Parameters on Equity Structure

Parameters:	η	λ	ν	τ	μ	ρ
Prob{β =1}	–?	+	–?	+	+	–
β^* in joint ventures	–?	+	–	+	+	0

4. Econometric Specification

To estimate the above model, we begin by introducing the variables that allow us to measure firm, industry, and country characteristics. We then specify the econometric model that can estimate the relationships between these explanatory variables and ownership structure. Each observation represents a subsidiary of a U.S. parent in a foreign country. The dependent variable is the share of equity owned by the U.S. parent in the subsidiary, which takes on values between 0 and 1. We will refer to this variable as EQUITY. The data on EQUITY and most firm characteristics were obtained from the 1997 Directory of Corporate Affiliates and refer to firms that were active in 1996. Industry data was obtained from the Benchmark Survey Results published by the U.S. Department of Commerce. Data on country characteristics were obtained from various sources and measured as averages for the prior 10 to 15 years, depending on data availability. Appendix B describes the data and provides references for the sources.

In the analysis of joint ventures (EQUITY < 1), we treat EQUITY as a continuous variable. In the context of the choice between whole and joint ownership, EQUITY will be treated as a dichotomous variable that takes the value 1 if ownership is full and zero if there is any equity sharing. Since the variables that are relevant for both choices affect foreign equity in the same direction in the two situations, we economize in following discussion by examining how various variables affect EQUITY without specifying the type of choice unless it is not clear from the context.

In this section, we discuss a host of variables for which direct or proxy data is available and, based on our model, seem to be relevant in the choice of ownership structure. We also consider other variables that have been widely discussed in the literature and try to reinterpret them in light of our model and test our hypotheses against alternative ones offered by other frameworks. Some of these variables as well as those that a priori seem applicable in our model prove to be statistically insignificant in our regressions. This is natural because reality is far more complex than our stylized theoretical construct and, with a large number of parameters to be estimated, predicting all outcomes is hopeless. Therefore, we do not claim to have accounted for all possible factors, however, we hope that our model helps identify important variables that influence equity decisions and shed light on the mechanisms through which they work. Although we interpret the estimation result in light of our model, we remain aware that there are alternative explanations for the findings. We point out these alternatives as we discuss our results and make an attempt to assess them vis-à-vis the implications of our model.

Firm Characteristics

Our model suggests that firm characteristics that influence a TNE's equity position in a subsidiary are factors that determine its contribution to the net output of the project, which is captured by the parameter λ. These factors are largely the intangible assets that are costly to transact on the market and induce a firm to become a TNE. Below, we present variables that proxy for the range and productivity of a TNE's intangible assets and, therefore, should be among the determinants of EQUITY.

1. *TNE Non-Contractible Assets*: We measure the significance of a TNE's non-contractible assets for surplus production in its FDI projects by the ratio of its sales to its tangible assets (SAL). The greater a firm's intangible assets (which are largely the same as the non-contractible ones), the more the firm can produce with a given amount of tangible assets. Since tangible assets are often included in a firm's balance sheet while the intangible ones are not, the measured SAL can act as an indicator of the firm's richness in intangible assets, which tends to raise λ and should therefore be positively related to EQUITY. Note that SAL increases with the labor intensity of production. Hence the relationship between SAL and EQUITY may be influenced by any role that labor intensity may play in ownership choice. To control for

this factor, we include the asset-employment ratio (AER) of the TNE in the econometric model. We also include the TNE's total sales in the regression to separate the possible effects of firm size from that of intangible assets. We examine the hypotheses concerning firm size below.

In the FDI literature, the ratio of R&D and advertising expenditures to sales are often used as alternative measures of intangible assets (see, for example, Anderson and Gatignon, 1988). However, these measures miss many types of intangible assets such as management and marketing skills. This is true even for technology and brand name assets accumulated through R&D and advertising if the time-series data on the latter variable is short. Indeed, the findings regarding the impact of R&D and advertising intensity on EQUITY are far from unanimous. While Anderson and Gatignon (1988) conclude that a TNE's affinity for a wholly owned subsidiary increases with R&D-sales ratio, Hennart (1991) and Gomez-Casseres (1989) find no relationship between the two variables. For advertising-sales ratio, Pan (1996), Gomez-Casseres (1989) and Anderson and Gatignon (1988) find a positive relationship with EQUITY, while Aswicahyono and Hill (1995) and Hennart (1991) reject those findings.[21]

In our sample, a problem with the use of R&D and advertising measures is that the data is missing for many firms. Nevertheless, we used the ratios of research expenditure, goodwill and advertising expenditure to sales (to the extent available in the Compustat Database) along with SAL to explain EQUITY. The results for the limited sample for which the data was available suggested the superiority of SAL. We also used R&D-sales ratio at the 3-digit industry level. This variable performs better, but it is an industry characteristic, which we discuss below.

2. *TNE Size and Other Capability Indicators*: A number of papers on TNE equity position have observed a relationship between firm size and EQUITY, which has come to be known as the "Wells effect". The "Wells effect" states that smaller firms tend to take a lower equity position in their foreign subsidiaries (Stopford and Wells, 1971; Franko, 1989; Anderson and Gatignon, 1988). Stopford and Wells (1971) assert that smaller firms have a higher propensity for joint ventures because they have "special needs." The more prevalent explanation for this relationship is that intangible assets are likely to be more significant in larger firms. This is consistent with our model if we take firm size as an additional measure of intangible assets. By including the logs of the total employment and sales of the parent TNE, we test

[21] Few of the studies mentioned in this paragraph attempt to distinguish the role of the intangible assets captured by R&D and advertising indicators from the role of other factors that may also be reflected in those measures. There are also differences among the studies in the use of firm and industry level measures. For example, Hennart (1991) uses firm-level R&D figures while Anderson and Gatignon (1988) and Gomes-Casseres (1989) use industry-level data.

whether firm size represents any effect on equity position beyond the role of TNE intangible assets captured by SAL.

Another variable that is related to a TNE's capabilities is whether or not its stocks are publicly traded (PUBTRADE). Publicly traded firms must have proven their capabilities to generate and maintain substantial specific assets. Moreover, their access to equity market tends to lower the cost of capital for them and put them in a position to satisfy a wider range of the project's needs. Letting PUBTRADE to be 1 if a TNE's stock is publicly traded and 0 otherwise, we expect it to be positively related to EQUITY.

3. *Parent Diversity*: While a TNE may be well-endowed in intangible production factors, its assets may be diverse and its role in a particular subsidiary that it forms may be less significant than that of a TNE with more focused assets. In other words, a diversified parent is more likely to miss complementary assets for the operation of each subsidiary. For this reason, we supplement the sales-asset ratio with a measure of TNE diversity, namely, the number of 4-digit product lines that the parent manufactures (DIVERSE). The hypothesis is that DIVERSE is negatively related to EQUITY.[22]

4. *International Experience*: Anderson and Gatignon (1988) argue that firms experienced in an international setting may be more adept in monitoring and dealing with local employees, and consequently, less likely to rely on a local partner for such inputs. Hennart (1991) and Gomes-Casseres (1989) also find a positive relationship between a TNE's international experience and its equity position in its foreign subsidiary.[23] Davidson and McFetridge (1984 and 1985), on the other hand, find a negative relationship. They argue that experienced firms monitor their partners more effectively and find it easier to form joint ventures. However, it is not a priori clear why international experience should give TNEs an advantage in dealing with locals as partners rather than as employees, or vice versa. Our model's implications about the role of TNE experience are closer to the former view: International experience, especially the duration of exposure to a host country's conditions, increases the local knowledge and connections of the TNE and reduces the comparative advantage of the local entrepreneurs, ρ, which in turn lowers the probability of joint ownership.

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[22] Hennart (1991) and Gomes-Casseres (1989) test a similar hypothesis using a different measure of diversity, namely, a dummy variable that takes on value 1 if the affiliate is in a different industry than the parent. Both authors conclude that diversity encourages equity sharing.

[23] Johanson and Vahlne (1977) and Davidson (1982) offer a somewhat different, but related, argument for a positive relationship between international experience of a TNE and its equity in its subsidiaries: Less experienced firms perceive considerable uncertainty, overstate risks and understate returns and, therefore, are less likely to make significant resource commitments and assume control. With increasing experience, firms acquire knowledge of foreign markets and are better able to assess risks and returns and manage foreign operation.

Erramilli (1991) observes that the empirical support for a negative relationship between international experience and foreign ownership is typically based on studies that focus on the early parts of TNEs' lives, while the opposite result is common among studies that employ long-term measures of experience. He postulates that the two effects may dominate at different stages of a firm's life and find support for his view by estimating a quadratic function. In our econometric analysis, we also allow for this possibility by using quadratic terms for the experience measures. But, we also note that some of the variables used for capturing the role of experience may represent entirely different effects. In particular, measures based on the number of foreign subsidiaries of a TNE (SUBNUM), which are common in the literature, are likely to reflect the aspects of a firm's activity that lack economies of scale and require localization of production.[24] Also, involvement in many projects may spread the firm's managerial resources more thinly across subsidiaries and require more local inputs as the role of the TNE inputs diminish in production. Both of these effects tend to increase ρ or ν and, therefore, raise the marginal gains from local participation, counteracting with any positive contribution of the scope of international experience to the TNE's local knowledge and capability. Therefore, theoretical considerations based on our model do not offer definite predictions about the relationship of SUBNUM with EQUITY. But, experience as measured by the age of the TNE (AGE) should have a positive impact on EQUITY.[25]

Industry Characteristics

While firm characteristics measure the assets of TNE that can potentially contribute to an FDI project, industry characteristics indicate the importance of these assets for the project. In this sense, industry characteristics may affect all production parameters.

1. *Technology Intensity*: Besides reflecting many firm characteristics, λ captures the importance of non-marketable technological know-how in the industry. Technology intensity is not just a matter of patented products and processes, but it originates in the need to continually innovate in both respects. For this reason, Anderson and Gatignon (1988), Gomes-Casseres (1990) and Pan (1996), among others, have used

[24] Anderson and Gatignon (1988) employ the number of foreign entries of TNE as a proxy for international experience while Gomes-Casseres (1989) uses the number of foreign subsidiaries in the same industry as parent. But, Hennart (1990) measures experience by the number of years since the parent established its first subsidiary.

[25] We have data on the age of the parent company, but not on how long it has been a TNE. However, these two variables are likely to be closely correlated. It should also be noted that since over time country conditions around the world have become more favorable for whole ownership, older TNEs are likely to have more joint ventures, which they have formed earlier when country conditions encouraged joint ventures. Our estimates include this effect, if it exists. Finally, we considered two other proxies for international experience—foreign sales and foreign income as share of TNE's totals. The coefficients of both variables proved insignificant.

the ratio of R&D expenditure to sales as a proxy for technology intensity. We follow those studies and include the industry-level value of this variable in our econometric model. Our theoretical analysis suggests that this variable should have a positive coefficient.

2. *Capital Intensity*: A number of studies using the transaction cost approach have suggested that capital intensity of production must be positively related to the probability of foreign majority ownership because TNEs investing in projects with greater investment requirement are more vulnerable to contractual hazards and try to mitigate the problem by maintaining full control of the subsidiary (Henisz, 1997). This argument, however, has two shortcomings. First, the contractual hazards of obtaining local inputs are unlikely to disappear by recruiting the providers of those inputs as employees rather than partners. More specifically, it is unclear why complementary local inputs should be more costly to acquire through joint ventures as opposed to employment. Second, it is not clear why in the presence of investment risk, TNEs should take a majority position rather than reducing their investment level. Our model may be extended to yield an alternative explanation for the positive relationship between capital intensity and foreign share. This extension requires the assumption that TNEs have an advantage in supplying capital which raises their contribution, λ, in capital intensive projects. This hypothesis implies that, as a proxy for industry capital intensity, the TNE asset-employment ratio, AER, should be positively related to EQUITY and to Prob{$\beta = 1$}. Note that this is a somewhat different measure of capital intensity than the asset-sales ratio (SAL) that some other studies have employed for this purpose. Indeed, the relationship that we predict between the TNE's equity position and SAL is exactly the opposite of what those studies expect. Therefore, as pointed out above, including both SAL and AER in the regressions strengthens the test of our hypothesis regarding the relationship between intangible assets and β.

3. *Resource Intensity*: A number of studies of equity sharing in FDI projects have argued that TNEs in resource-based industries—such as mining, rubber, and food—may give up control in order to gain access to sources of raw materials (Stopford and Wells, 1972; Hennart, 1991; Gomes-Casseres, 1989 and 1991). The argument here is that local firms are more likely than TNEs to have access to natural resources and that such resources cannot be easily accessed through competitive channels. In terms of the parameters of our model, the importance of local inputs for production and the extent of the local's advantage in supplying these inputs imply higher ν and ρ, respectively, which are associated with lower EQUITY. In addition, the importance of the host country's resources for generating project rents in an industry translates into a higher η, which lowers the government's preferred foreign equity share and puts further downward pressure on β. This effect may be particularly important and may dominate the TNE's increased interest in capturing project rents through a larger share because natural resources in many countries are owned by the government.

To examine the relationship between EQUITY and the importance of natural resource in the industry, following Hennart (1991) and Gomes-Casseres (1989,1990), we use a dummy for the set of industries that they identify as "resource-based" manufacturing (RESBASED).[26] We also include a dummy for petroleum, coal and mining (PETMIN). Although the links of these industries to natural resources is extensive and direct, they are not included in the "resource-based" indicators in previous studies because those studies focus on manufacturing. Both dummies proved to have negative effects on EQUITY. However, our model suggests that what should particularly matter in this relationship is the contribution of the country's resources to the specific rents of the FDI project.[27] If a natural resource can be easily sold on the market, it may not contribute much to the *surplus* of the project. To examine this refined hypothesis, we interact dummies of resource-based industries with the degree of backward vertical integration in the industry (BVERT), which we define for each industry as the share of parent firms' imports supplied by their subsidiaries. If TNEs in an industry buy most of their imports from their subsidiaries, direct access to the resources through arms-length transactions must be costly and, hence, the resources must be generating more rents in the subsidiaries. We construct two interactive terms for this purpose, which we call RESVERT and PETVERT. Our analysis suggests that these variables should account for the bulk of the negative relationship between their corresponding industry dummies and EQUITY.

Another set of industries that are in a sense intensive in resources is chemicals. Most chemical industries are environmentally costly for the host country. As a result, in dealing with chemical FDI projects, host governments are keen to capture the returns to the use of their environment resources. As we have argued, the superior information of TNEs regarding their business is likely to impede the direct extraction of those returns. In response, the government is likely to put pressure on the TNE to share equity with local businesses. If our conjecture about the impact of η on EQUITY is correct, this should generate a negative correlation between EQUITY and the dummies for chemical industries.

4. *Vertical Integration*: As discussed above, TNEs are more likely to engage in backward integration when subsidiaries have access to resources that are costly to transact on the market. For an industry as a whole, such vertical integration implies the importance of country assets for the project's output and surplus generation. Therefore, variables such as BVERT are positively associated with η and, if η has a negative effect on EQUITY, backward vertical integration should reduce the TNE's share in the project. Of course,

[26] The dummy variable equals 1 if the subsidiary's main product was in one of the following industries: food and beverages, tobacco, textile, mills, wood except furniture, pulp and paper,, rubber, and primary metals.

the natural resource dummies and their interaction terms capture part of this effect and therefore their presence in the regression may take away any significance of BVERT.

A similar reasoning implies that forward vertical integration should be positively related to EQUITY. This is because when TNEs in an industry sell more of their output to their subsidiaries, the role of non-marketable TNE assets in the industry's production is likely to be more important, which implies a higher λ and, therefore, higher EQUITY. We test this hypothesis by including the share of the total sales of U.S. parent firms exported to their subsidiaries (FVERT) in the model. Note that our reasoning suggests that FVERT may reflect the effects of the industry R&D-sales ratio as well as indicators of other intangible assets not captured by the R&D variable. We will examine this relationship as part of our empirical work.

5. *Other Effects and Industry Dummies*: Besides the variables discussed above, there are many other industry characteristics that may influence equity shares, but we do not have reasonable measures for them. For example, ν should be higher for the so-called "market-seeking" industries in which production units mainly serve their local markets. However, we do not have data concerning the share of local sales in each industry. We use one and two-digit SIC-level industry dummies to account for such effects. We have already discussed the dummy variables for resource-based industries. We expect the dummies for food and bakery industries to have negative coefficients because their production often has to be close to the point of consumption. Industries such as electronic and electrical equipment, on the other hand, can more easily serve distant markets. Therefore, their dummies should have positive coefficients.

Country Characteristics

The nature of the host country's infrastructure affects η. Country conditions also influence the type of contributions that local entrepreneurs can make to FDI projects, reflected in ν, and the extent of their comparative advantage in supplying those inputs, captured by ρ. The government's policy toward FDI, reflected in μ, is another country factor that affects equity positions of foreign subsidiaries. To the extent that country conditions affect ρ, our model predicts that they should influence the decision concerning whole vs. joint ownership, but not the β selected when joint ventures are formed. This issue particularly applies to variables discussed below under the rubric of "local knowledge and connections."

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[27] Rents generated in natural resource-based projects appear to be quite substantial. For example the return on US FDI in 1993 averaged 23 percent for investments in petroleum compared to 14 for projects in manufacturing and 16 percent for those in trade, banking, and other services (UNCTAD, 1995: 76).

1. *Country Resources and Institutions*: Reliability of institutions and availability of natural resources and physical infrastructure are country-specific assets that enhance the productivity of FDI projects. As the quantity and quality of such factors increase in a country, their role in FDI projects is likely to increase because they can provide a greater variety of services, which implies a higher η. For measuring these effects, we use a number of variables. For natural resource availability we use the share of fuel and minerals (FUEL) in total exports. For infrastructure availability, we use the number of telephones per 1000 population (PHONE). For institutional reliability, we employ the survey-based indicator of enforceability of government contracts (CONTRACT) from the *Investors' Country Risk Guide* (ICRG) data set.[28] We also include in the model a measure of political instability (POLINST) constructed by Barro and Lee (1993) based on the frequency of assassinations and revolutions in each country. As an indicator of institutional unreliability, POLINST implies a lower η and therefore the impact of POLINST on EQUITY should be the opposite of that of FUEL, PHONE, and CONTRACT. Furthermore, given our conjecture about the relationship between η and β, we expect EQUITY to be positively related to POLINST and negatively to the other three variables. The predicted relationship between POLINST and EQUITY agrees with the findings of Pan (1996), Contractor (1990), Gomes-Caseres (1989) and Anderson and Gatignon (1988).[29]

A country's market size and growth potential should offer better opportunities for foreign investment and should be positively related to η. Therefore, assuming the net effect of η on EQUITY is negative, the level of GDP (TOTGDP), GDP growth rate (GROWTH), and the share of investment in GDP (INVEST) should tend to lower EQUITY. These claims agree with the implications of the transaction cost and bargaining models of equity (Gomes-Casseres, 1989; Lecraw, 1984), but go against a number of other studies (Contractor, 1990).

2. *Local Knowledge and Connections*: Local knowledge and connections are the key sources of comparative advantage for local entrepreneurs, which is mainly captured by the parameter ρ. Here we examine a number of variables that influence the local's comparative advantage. Our model suggests that such variables should have significant effects on the whole vs. joint ownership decision, but not on the determination of the share under joint ownership.

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[28] For a detailed discussion of the source and interpretation of this variable, see Knack and Keefer (1995).

[29] Another country variable that may facilitate joint venture formation is intellectual property protection (IPP) [cf., Lee and Mansfield (1996) who build such an index for 14 countries based on survey of 100 US TNEs]. We do not have a measure of IPP for the countries in our sample. However, our contractual enforcement variable, CONTRACT, should be closely related to IPP.

First, we use an indicator of the share of black market in the economy (BLACK) developed by Johnson and Sheehy (1996) to measure the degree of distortion in the economy.[30] Firms that operate in countries with a large black market are more likely to face problems in their transactions or experience regulatory and bureaucratic hassles. In such an environment, an influential local partner can more effectively provide access to "special" treatment. Thus, BLACK should be negatively related to EQUITY. A variable related to BLACK that may seem to motivate joint ventures is corruption.[31] However, corruption may work both ways. While corruption may imply the importance of personal relations rather than rules, it may also help TNEs to simply payoff bureaucrats and policy-makers directly without having to know the details of the rules and regulations. We examined the role of corruption by using the survey-based index available from ICRG, but did not find any significant relationship.

Second, we introduce the openness of the host economy (OPEN = the sum of imports and exports scaled by GDP) as another measure of ease of TNEs' access to alternative sources of input. Openness also reflects less government intervention in markets, which should facilitate impersonal transactions. When subsidiaries can more easily import their inputs and export their products, TNEs are less likely to encounter difficulties in their relations with local buyers, suppliers, and officials. This reduces the projects' need for individuals with local knowledge. As are a result, the likelihood of full ownership rises.

Third, we include in the model the per capita years of schooling in the country (EDUC). The more educated the labor force, the easier it should be for a TNE to communicate with the labor force and customers of its subsidiaries. Hence, education should reduce the need to hire local entrepreneurs for intermediation and, in turn, should obviate equity sharing with local partners.

Finally, we use dummy variables to capture the effect of socio-cultural distance between the U.S. and the host country. Operating in a dissimilar culture raises the costs of acquiring information to monitor and evaluate business activities. This raises the comparative advantage of the local entrepreneurs and makes full foreign ownership less likely (Anderson and Gatignon, 1988; Jones and Hill, 1988; Koguts and Sigh, 1988; Pan, 1996). The dummy variables that we use identify five groups of countries (see Appendix

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[30] We also used the black market premium in the foreign exchange market as measured by Barro and Lee (1993), but the results were weaker.

[31] There is no study on the impact of corruption on equity structure. However, some work has been done regarding the effect on the levels of FDI. Mody and Wheeler (1992) use corruption as part of 12 indicators that they aggregate into a risk index. The index shows no correlation with FDI. Wei (1997), on the other hand, examines the direct impact of corruption on FDI levels and finds a negative relationship. Campos *et al* (1997) focus on the nature of corruption. They argue that corruption regimes that are more "predictable" have less negative impact on FDI than those in which those paying for favors remain uncertain about what they get.

Table B1): (1) countries with British cultural heritage (ANGLO), (2) non-Anglo European countries (EUROPE), (3) Latin American countries (LATIN), (4) Asian countries (ASIA), and (5) others. We hypothesize that U.S. firms are likely to take a larger equity position when they operate in Western cultures (ANGLO, EUROPE, and LATIN).

3. *Technological Capabilities of Domestic Firms*: The inputs from local entrepreneurs may also include commercial experiences or technological capabilities that are complementary to those of the TNE (Gomes-Casseres, 1990). Such variables tend to raise ν and should be negatively related to EQUITY. We do not have good measures of local technological capabilities. However, purchasing-power-parity adjusted per-capita (GDP) may be used as an overall index.[32] The caveat about this measure is that it reflects many other factors as well and may be collinear with other country characteristics already included in the model.

4. *FDI Policy of the Host Government*: As pointed out in the previous section, the host government's policy toward equity position in FDI projects can be summarized by the probability that a foreign investor faces a government imposed constraint in its equity choice. The 1982 Benchmark Survey of the US Department of Commerce provides data on the percentage of U.S. parent firms in each host country that were asked to limit their equity in their foreign subsidiaries. We use this variable (which we call "RESTRICT") as a measure of restrictiveness of host country policy and expect it to affect EQUITY negatively.[33] Although the 1982 data for government policy may seem too old for predicting ownership of subsidiaries in 1996, it should be kept in mind that the subsidiaries have been formed over a long time and that the equity structure of established firms respond to changed circumstances very slowly.

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[32] We also used the capital stock per worker as a measure of technological capabilities but it was not significant.

[33] Note that the percentage of TNEs that face equity restriction in a host country may depend on the country's characteristics. This should not bias the coefficient of RESTRICT because we include a host of relevant country characteristics in the model and only the residual role of RESTRICT that represents policy is likely to be reflected in its coefficient. Gomes-Casseres (1990) and Anderson and Gatignon (1989) use dummy variables to capture restrictive countries. Erramilli (1996) and Contractor (1991) use a performance index. This index turned insignificant when country variables were included in the model. Further, the data is available for fewer countries. We also used a policy restrictiveness index computed by Henisz (1997), but it was insignificant. Another set of variables with which we experimented is performance requirements such as limits on imports, minimum export stipulations, technology transfer, and local content and employment requirements. (These variables are measured in the same way as RESTRICT and reported by the same source.) The theoretical effect of these variables on EQUITY is quite ambiguous. On the one hand, if the government manages to divert some of the FDI rents toward the local population through performance requirements, then there is less need for restricting the equity share. On the other hand, performance requirements may reflect the general restrictiveness of the host government's policies and,

Moreover, perceptions and policies tend to last and investments take time to mature. As a result, the 1982 policy data cannot be dismissed as outdated.[34]

The Econometric Model

The econometric model that our theoretical framework implies is a variant of TOBIT analyzed by Cragg (1971). The model can be specified as:

(4.1) $y = \varphi X + \varepsilon$

EQUITY = 1 if $y \geq 1$ and

EQUITY = $\gamma Z + \varepsilon'$ if $y < 1$,

where y is a latent variable, ε and ε' are normally distributed random variables, X and Z are vectors of the explanatory variables, and φ and γ are vectors of parameters to be estimated. In a TOBIT model, $X = Z$ and $\varphi = \gamma$. However, as we have seen, the set of variables that affect the whole-joint ownership choice is not the same as the one determining β under joint ownership and even the ones that are common may not have the same impact. As it stands, this model can be estimated in two parts by using a PROBIT procedure for the discrete choice between whole and joint ownership and a truncated regression model for the joint venture observations. The following section presents the estimation results of these two parts.

5. Estimation Results

Past empirical work on the cross-country variation of equity share in FDI projects have focussed on the manufacturing sector.[35] In this study, we consider non-bank parents and their non-bank subsidiaries, which includes firms involved in finance except depository institutions (includes insurance, real estate and holding companies), services, wholesale and trade, manufacturing, extractive industries, and agriculture. We have data on EQUITY for 4430 non-bank subsidiaries, but firm, industry, and country data for these observations is not complete. Our PROBIT regressions typically use 2011 observations from 388 U.S. parent TNEs in 46 countries. About 14 percent of all samples used in our regressions are joint

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therefore, an enhanced role for local entrepreneurs. These issues and the determinants of various FDI policies are explored in a related paper, Asiedu and Esfahani (1998).

[34] Data on FDI restrictions was not collected during the most recent Benchmark Survey in 1994. Further, the unpublished data for the 1989 survey was deemed unreliable by the Department of Commerce. They certainly seemed so upon close examination.

[35] Few studies venture to study other sectors. Among them, Erramilli (1996) examines ownership decisions of TNEs in the advertising industry.

ventures.[36] This is somewhat less than the share of joint venture in of all US non-bank foreign subsidiaries, which in the mid-1990s was about 20 percent (Cf., Survey of Current Business, June 1995). However, this does not seem to introduce a sampling bias into our regressions because our results did not change in any substantial way in a series of experiments where we randomly eliminated part of the fully-owned sub-sample to make its proportions similar to that of the total population of subsidiaries. The truncated regressions for joint ventures are based on 282 observations. Summary statistics of the variables involved in the analysis are compiled in Table 1.

Table 2 presents the main results for the PROBIT model. Column (1) is a basic version of the model where we include all the variables whose coefficients were robust in terms of magnitude and statistical significance to variations in specification. We test the robustness of the model to changes in the sample by running the basic version with three sub-samples: non-service and non-finance, non-wholesale and manufacturing. The results are presented in columns (2), (3) and (4) respectively. The results show a remarkable degree of consistency across samples and specifications, with the coefficients of the variables carrying their expected signs. Moreover, the regressions are significant, and a large number of coefficients are estimated with a great deal of accuracy. Tables 3 and 4 show the consequences of omitting or including industry and country variables, respectively, to the basic regression. Column (1) of Table 3 includes the dummy for resource-based industries and omits the interaction terms with a measure of backward integration (BVERT). Column (2) includes BVERT and omits all natural resource dummies and the interaction terms with BVERT while Column (3) adds a measure of forward vertical integration (FVERT) to the basic model. Column (4) replaces R&D-sales ratio with FVERT. Columns of Table 4 replace PHONE, GDP, GROWTH, and TOTGDP with INVEST in the basic regression. The results of the truncation model estimation are reported in Table 5.

TNE characteristics measured by sales-asset ratio (SAL), capital intensity, age, production diversity, and public trading of stocks perform quite well in the regressions and carry the expected signs. The fact that SAL remains highly significant after controlling for a host of effects lends credence to our

[36] Of course, there are substantial differences across countries in the ownership patterns of U.S. subsidiaries abroad. For example, according to the 1995 Survey of Current Business, 88 percent of U.S. affiliates in Canada are wholly owned, compared to 85 percent for subsidiaries in Europe, 76 percent for Latin America and the Caribbean, 71 percent for Africa and 59 percent for the Middle East. Even within regions there are striking differences. For example, in Asia, 89 percent of U.S. subsidiaries in Singapore are wholly owned compared to 49 percent for subsidiaries operating in Japan.

claim that it is a good measure of intangible assets.[37] The AGE-EQUITY relationship turns out to be quadratic, with a positive and rising derivative throughout the sample range. The relationship of the number of subsidiaries (SUBNUM), with EQUITY also seems to be quadratic, but its derivative is negative for SUBNUM values beyond the lower part of the sample range. This finding suggests that SUBNUM is mainly reflecting the localized nature of production rather than the asset value of the TNE's international experience. Finally, our data do not seem to support the "Wells Effect" because once we controlled for other factors, all measures of TNE size that we used proved insignificant.

Among the industry level variables in the PROBIT model, natural resource dependence and vertical integration variables proved most significant. In particular, as we expected, the interaction terms between natural resource dummies and backward vertical integration have strong negative relationships with the probability of whole ownership (see Table 2). Further, the coefficients of the natural resource dummies are negative when the interaction terms are excluded, although that of PETMIN is not very significant (see column (1), Table 3). Interestingly, when the interaction terms are included, both dummies turn positive (see Table 2; PETMIN is again insignificant and is left out of the regressions Backward vertical integration (BVERT) is negative and significant when the natural resource dummies and the interaction terms are dropped (see column (2), Table 3). These findings confirm the implication of our model that the inverse association of backward integration with EQUITY is mainly because such integration indicates the significance of host country resources that are costly to transact on the market.

The forward vertical integration measure (FVERT) consistently has a positive coefficient, as expected. But, it is closely associated with the R&D-sales ratio (correlation coefficient of 0.76) and causes multi-collinearity when both variables are present in the regression (column (3), Table 3).[38] FVERT is statistically significant when R&D-sales ratio is omitted (column (4), Table 3). These findings and the high correlation between the R&D-sales ratio and FVERT provide support for our claim that forward vertical integration reflects the importance of TNE intangible assets in an industry, including the products of R&D activities. The finding that backward and forward integration are related to EQUITY in opposite ways further suggests that using an overall measure of vertical integration (e.g., intra-system sales) to determine

[37] We also considered two alternative measures for a firms assets—the ratio of capital invested to sales (CAPINV) and the ratio of capital expenditure on property, plant and equipment to sales (PPE). After controlling for asset-labor ratio, both variables were significant at 1% and robust to changes in specifications. Data for CAPINV and PPE are available for only publicly traded firms. As a result the dummy variable for public trading of the parent firm is dropped and we lose about 200 observations. Of course, excluding non-public firms may introduce a sample bias. For these reasons, we prefer to use SAL in our analysis.

the relationship between equity share and vertical integration, as done in a number of other studies, would produce misleading results. This particularly diminishes the significance of the view that overall vertical integration is positively related to the probability of whole ownership because intra-system sales generate conflict between joint venture partners over transfer prices.

Dummy variables for industrial and other chemical products have a negative effect on the probability of whole ownership, possibly reflecting their environmental consequence as a natural resource base. The coefficient of the dummy for grain, milling, and bakery products is also negative, which is likely to indicate the importance of local markets in those industries.[39] The textiles dummy has a similar effect, possibly due the need for local managers to facilitate relations with the mass of low-skill local workers required in textile factories. Industries producing electronic components and accessories or wholesaling professional and commercial equipment display positive effects. Note that these effects are all after we control for a specific manufacturing effect, which itself is negative.

Country indicators generally produce the predicted pattern in the PROBIT model: The probability of whole ownership rises with the openness of the host economy, the absence of market interventions, the country's educational attainment and its socio-cultural affinity with the U.S. (Table 2). All these factors reduce the comparative advantage of local entrepreneurs and reduce the need for recruiting them as partners. On the other hand, joint ventures are more likely when the country is politically more stable, has better investment opportunities, and its natural resources and physical and institutional infrastructure are more extensive. These aspects allow FDI projects to be more productive and induce the host government to raise its pressure for rent sharing through joint ownership. Measures of physical infrastructure (PHONE), GDP per capita, GDP growth, and market size are separately introduced as a replacement for the investment ratio in Table 4 because their marginal effects on EQUITY are collinear with that of the investment share of GDP (INVEST). All these measures have negative effects on EQUITY, although the coefficients of GROWTH and TOTGDP are not significant.[40] Other indicators of host country institutions, such as bureaucratic quality, corruption, expropriation risk, and the rule of law available from the ICRG data set and similar

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[38] This may explain the insignificance of the coefficient of R&D-sales ratio in a number of other studies that include forward integration measures as well (e.g., Gomes-Casseres (1990)).

[39] Note that these industries are also part of the resource-based group dummy.

[40] Gomes-Casseres (1990) finds that GDP growth rate has a negative impact on probability of full ownership only in restrictive countries. Our experiments with the interaction of GROWTH and RESTRICT did not yield any significant results.

sources, do not seem to add to the explanation of ownership choice.[41] The insignificance of corruption is interesting because, as we argued in the previous section, the theoretical effect is also ambiguous.

The degree of restrictiveness of government policy toward foreign equity ownership (RESTRICT) has a clearly negative effect on ownership structure. However, it is by no means a dominant force. Many country, industry, and firm characteristics that shape the differential preferences of the government and the TNEs create subtle pressures on foreign investors to share ownership. Moreover, the overall policy and institutional environment the country induces the TNEs themselves to seek local partners. These factors remain active even when governments try to adopt more liberal attitudes.

We now turn to the estimation results of the truncated model reported in Table 5. The first column shows the results of running the truncated model with the same variables as the basic PROBIT model. The estimated coefficients have generally the sign as in the PROBIT model, but many of them lose their significance. This is not surprising because the determinants of β in joint ventures should be a subset of the variables influencing the choice between whole and partial ownership. Furthermore, the magnitude of each variable's coefficient may be different in the two equations. Another issue is that truncated regression models are less well behaved than the PROBIT or TOBIT models and the results may be more volatile. To arrive at a regression with significant coefficients, we eliminated the variables that generally did not perform well or caused multicollinearity. Column 2 of Table 5 reports the end result. Column 3 shows the results of including BVERT and GDP, which are among the variables considered in Tables 3 and 4 as additions to the basic regression. The coefficients of those additional variables display the same sign in the truncated model as in the PROBIT estimations, but only the two shown in column (3) are statistically significant.

The end result of the truncated model estimation offers three important observations. First, the fact that the TNE's sales-asset ratio (SAL), remains significant lends credence to our claim that SAL is a better measure of a firm's intangible assets and plays an important role in equity choice in FDI projects. Second, equity restrictions again matter in the determination of β. Third, the country characteristics that

[41] We also used the average measure of ethno-linguistic diversity (the probability that two randomly selected individuals in a country may speak different languages) built by Easterly and Levine (1997). This variable proxies for the cultural diversity of the host country and, therefore, can highlight the difficulty of obtaining local information for foreigners vis-à-vis local entrepreneurs. We argued that operating in a culturally diversified country may require more detailed local knowledge in relations with customers, employees, suppliers, and officials. As a result, foreign investors may have to rely more heavily on local entrepreneurs, which strengthens the incentive to invite local participation in ownership. Although the estimated coefficient in the PROBIT regression has the correct negative sign, it was not always significant as we changed the model's specification.

lose their significance in the determination of equity share (such as OPEN, BLACK, and ANGLO and LATIN dummies) are essentially the ones that affect the comparative advantage of local entrepreneurs (represented by ρ). On the other hand, most of the characteristics that reflect a country's resources and institutional infrastructure (determinants of η: FUEL, CONTRACT, and TOTINV) remain significant and display their expected signs. This outcome conforms well with our theoretical observation that ρ is important in the decision to share, but not in the decision regarding the division of shares.

6. Concluding Remarks

This paper has theoretically and empirically examined the extent to which equity restrictions and country conditions affect ownership decisions of TNEs. We find that the relative importance of assets of the TNE, the local entrepreneurs, and the country in production plays a key role in the equity structure of FDI projects. An important contribution of this paper is the unified interpretation that it provides for the determinants of equity positions in FDI projects. It also manages to develop useful measures for firm, industry, and country characteristics that influence foreign investment decisions. For example, the sales-asset ratio as a measure of TNE intangible assets seems to be quite useful in understanding equity shares.

From a policy perspective, our results suggest that simply focusing on the removal of formal equity restrictions on FDI may have small effects in improving the country's environment for foreign investment. So long as there are significant restrictions on domestic markets and foreign trade and the host population is uneducated, foreign investors themselves would be interested in forming joint ventures. More importantly, as a country's physical and institutional infrastructure or natural resources become more attractive to foreign investors, greater pressure may be generated for equity sharing as the host government finds it worthwhile to extract a larger share of the resulting rents for the country. This is not necessarily bad for foreign investment because it gives the government an incentive to increase its effort in the area that is ultimately the best FDI policy; i.e., improving the country conditions that enhance the productivity of investments.

An important question that arises is whether there are less costly and effective ways for host governments to achieve their objectives; i.e., to participate in sharing the surplus from FDI projects without imposing restrictions. According to our model, one solution to this problem is improving taxation. Imposing taxes allows the host government to capture some of the surplus.[42] As the tax rate

[42] It is interesting to note that in order to attract FDI, a number of countries not only removed restrictions but also provided incentives such as tax breaks to TNEs. This may help explain the quick disappointment of many governments that saw their revenues dwindle without receiving a strong response from foreign investors.

increases, the host government's preferred foreign equity share increases while that of the TNE remains constant. Consequently, the wedge between the TNE's and the host government's preferred equity share decreases.[43] However, the problem is that most less developed country governments do not have the administrative capability to effectively monitor and collect taxes from TNEs. Furthermore, tax codes are difficult to enforce in distorted environments. This helps explain why host governments in less developed countries tend to restrict FDI more than their developed country counterparts. It also suggests that that improving the government's administrative capabilities may produce a double dividend: One the one hand, a more effective taxation system can induce positive reform in FDI policies and, on the other hand, a better administration and more open FDI policy can contribute to institutional reliability. Both effects can make the country more attractive to foreign investors and increase its payoff from the resulting investments.

[43] Of course, there is a limit on the amount of surplus that can be extracted via taxation.

Appendix A

Proofs for the Case of Joint Ownership With Government Restrictions

Claim 1: In the neighborhood of parameter values for which (3.11) holds, the derivative of the right-hand side of (3.11) with respect to ν is positive. The derivative with respect to η is positive only if λ is sufficiently large relative to ν and η.

Proof: Let H denote the right-hand side of (3.11). For η we have,

$$\text{(A.1)} \qquad \frac{\partial \log H}{\partial \eta} = \frac{-\nu/\eta^2}{1+\nu/\eta} - \frac{\lambda}{\eta^2}\log \gamma_t - \frac{\nu}{\eta^2}\log[(1-\gamma_t)\rho].$$

Substituting from $\log H = 0$ for the last two terms on the right-hand side of (A.1) and using (3.10), we find

$$\text{(A.2)} \qquad \frac{\partial \log H}{\partial \eta} = \frac{1}{\eta}\left[-\frac{\nu/\eta}{1+\nu/\eta} + \log\left(1+\frac{\nu}{\eta}\right) + \log\left(\frac{\eta+\lambda}{\eta+\lambda+\nu}\right)\right].$$

The sum of the first two terms in the brackets is positive. If λ is sufficiently large relative to ν and η, then the last term will be close to zero and $\partial \log H/\partial \eta > 0$. However, if λ is relatively small, then the third term will almost cancel the second term and $\partial \log H/\partial \eta$ can be zero or negative.

For ν, using $\log H = 0$ and (3.10), we have

$$\text{(A.3)} \qquad \frac{\partial \log H}{\partial \nu} = \frac{\nu}{\eta+\nu} + \frac{\nu}{\eta}\log\left(\frac{\rho\nu}{\eta+\lambda+\nu}\right) = \frac{\nu}{\eta+\nu} - \log\left(\frac{\eta+\nu}{\eta}\right) + \frac{\eta+\lambda}{\eta}\log\left(\frac{\eta+\lambda+\nu}{\eta+\lambda}\right),$$

where on the right hand side we have substituted from $\log H = 0$. When ν is close to zero, $\partial \log H/\partial \nu > 0$. This is also true for higher values of ν because $\partial \log H/\partial \nu$ rises with ν:

$$\text{(A.4)} \qquad \frac{\partial^2 \log H}{\partial^2 \nu} = \frac{1}{\eta+\nu}\left(\frac{\eta+\nu}{\eta+\lambda+\nu}\frac{\eta+\lambda}{\eta} - \frac{\nu}{\eta+\nu}\right) > 0.$$

Claim 2: The derivative of the right-hand side of (3.16) with respect to η (λ) is positive (negative). The sign of the derivative with respect to ν turns from negative to positive as τ rises from 0 to 1.

Proof: Let K denote the right-hand side of (3.16). $\partial \log K/\partial \rho > 0$ is obvious. For η we have,

$$\text{(A.5)} \qquad \frac{\partial \log K}{\partial \eta} = \left(\frac{1}{\eta+\lambda+\nu}\frac{1}{\eta+\lambda}\frac{\nu}{\eta}\right)\frac{x}{1+x} - \frac{\lambda}{\eta^2}\log \gamma_g - \frac{\nu}{\eta^2}\log[(1-\gamma_g)\rho],$$

where $x = (1-\gamma_g)\left(\frac{1-\tau}{\tau}\right)\left(\frac{\eta+\lambda}{\eta+\lambda+\nu}\right)$. When log K is close to zero, we can write:

$$\text{(A.6)} \qquad \frac{\partial \log K}{\partial \eta} = \left(\frac{1}{\eta+\lambda+\nu}\frac{1}{\eta+\lambda}\frac{\nu}{\eta}\right)\frac{x}{1+x} + \frac{1}{\eta}\log(1+x) > 0.$$

For ν we have,

$$\text{(A.7)} \qquad \frac{\partial \log K}{\partial \nu} = -\left(\frac{1}{\eta+\lambda+\nu}\right)\frac{x}{1+x} + \frac{1}{\eta}\log[(1-\gamma_g)\rho],,$$

When log K is close to zero, (A.7) yields:

$$\text{(A.8)} \qquad \frac{\partial \log K}{\partial \nu} = -\left(\frac{1}{\eta+\lambda+\nu}\right)\frac{x}{1+x} - \frac{1}{\nu}\log(1+x) - \frac{\lambda}{\eta\nu}\log\gamma_g.$$

Note that if $\tau = 1$, $x = 0$ and $\partial \log K/\partial \nu > 0$, while if τ is close to 0, x would be very large and, thus, $\partial \log K/\partial \nu < 0$.

For λ we have,

$$\text{(A.9)} \qquad \frac{\partial \log K}{\partial \lambda} = -\left(\frac{\nu}{\eta+\lambda+\nu}\frac{1}{\eta+\lambda}\right)\frac{x}{1+x} + \frac{1}{\eta}\log\gamma_g.,$$

In this case, if τ is close to 1, x is close to 0 and $\partial \log K/\partial \lambda < 0$. As τ declines, $x/(1+x)$ grows and β_g^* declines. As a result, $\partial \log K/\partial \lambda$ always remains negative.

Appendix B

Data Sources and Description

Dependent Variable: Data for the dependent variable, the equity share owned by U.S. parent company in its foreign subsidiary, was obtained from the 1997 edition of the *Directory of Corporate Affiliations* published by the National Register Publishing.

Explanatory Variables: The data were obtained from various sources.

Firm Characteristics: Firm data was obtained from two sources: *Directory of Corporate Affiliations and the Compustat Database*. The Directory of Corporate Affiliations covers U.S. TNEs (both public and private) with revenue of at least $10 million or a work force in excess of 300 persons. Data obtained from this source include sales, assets, number of employees, number of foreign subsidiaries, the year parent firm was established, 4 digit industry classification for both parent and subsidiary, and the number of product lines the TNE and subsidiary manufacture. Data from Compustat was however available for only public firms. This includes data on research expenditure, advertising expenditure, capital invested, goodwill, capital expenditure on property plant and equipment, and TNE's foreign income.

Industry Characteristics: Industry data at the 3-digit level was obtained from the *U.S. Direct Investment Abroad: 1994 Benchmark Survey Data* published in 1997 by the Department of Commerce, Bureau of Economic Analysis. The survey which is done every five years presents detailed financial data on the operations of non-bank U.S. parent companies and their non-bank foreign subsidiaries for the fiscal year (survey year). The 1994 survey covered all foreign affiliates of U.S. direct investors (foreign companies owned 10 percent or more by a U.S. person) that had assets, sales, or net income of at least $3 million. This comprised of 2,658 non-bank U.S. parents and 21,300 non-bank affiliates.

FDI Policy of the Host Country: The data was obtained from the *U.S. Direct Investment Abroad: 1982 Benchmark Survey Data* published in 1985 by the Department of Commerce, Bureau of Economic Analysis. The survey which covered 18,339 affiliates reports the number of U.S. subsidiaries that were subject to performance requirements and/or equity restrictions during the 1982 *fiscal year*. Specifically, respondents were asked the following questions:

"If any level of government of the country in which affiliate is located require (by law, regulation, or administrative practice) that the affiliate do any of the following during the fiscal year (year of survey) as a condition for it to operate in the country, to expand its operations, to receive any of the investment incentives listed on the questionnaire, or to avoid penalties:

1. export a minimum amount,

2. import no more than a certain amount,
3. acquire a minimum amount of inputs locally,
4. employ a minimum of local personnel or add a minimum amount of labor content to products,
5. transfer technology to the host country,
6. maintain a specified ratio of exports to imports, or of earnings of foreign exchange to expenditures of foreign exchange,
7. limit the proportion of equity that the parent may hold in the affiliate."

Data on FDI restrictions was not collected during the 1994 survey. Further, the unpublished data for the 1989 survey was deemed unreliable by the Department of Commerce. As a result we use the 1982 data for our regressions.

Host Country's Characteristics: Data on the host country's resources and infrastructure such as such as GDP, investment, growth rate, share of natural resources in total exports, number of phones per 1000 population, number of years of education in total population were obtained from the dataset used in Barro and Lee (1996), Easterly and Levine (1997), and Summers and Heston (1996). These data are available on the internet. Data on the host country's institutions such as the degree to which contracts are enforced, bureaucratic quality, rule of law, expropriation risk, and corruption was obtained from the *International Country Risk Guide (ICRG*) data set. These are survey-based indicators and lie within the ranges of 1 and 10. Data on the share of black market in the economy (BLACK), a proxy for the degree of distortion in the host country was also obtained from Johnson and Sheehy (1996). BLACK varies from 1 (no distortion) to 5 (severe distortion).

Table B1 : Countries Grouped by Socio-Cultural Distance

Anglo	Non-Anglo Europe	Asia	Latin America	Other
Australia	Austria	Hong Kong	Argentina	Egypt
Canada	Belgium	India	Brazil	Jamaica
Ireland	Denmark	Indonesia	Chile	Nigeria
New Zealand	Finland	Japan	Colombia	Saudi Arabia
United Kingdom	France	Korea	Ecuador	South Africa
	Germany	Malaysia	Mexico	Trinidad
	Greece	Philippines	Panama	United Arab Emirates
	Italy	Singapore	Peru	
	Netherlands	Taiwan	Venezuela	
	Norway	Thailand		
	Portugal			
	Spain			
	Sweden			
	Switzerland			
	Turkey			

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Table 1: Summary Statistics for the Full Sample (2011 Subsidiaries)

Variables	*Mean*	*Standard Deviation*	*Minimum*	*Maximum*
Equity share owned by TNE	0.943	0.160	0.100	1.000
Firm Characteristics				
Log (TNE sales/assets)	0.170	0.407	–2.180	2.026
Log (TNE assets/employees)	2.896	0.679	0.139	5.934
Age of TNE[a]	77.280	42.136	1.00	229
Log (1+No. of foreign subsidiaries)	2.934	1.080	0.693	4.727
Production diversity of TNE[b]	5.288	3.064	1.00	10.0
Industry Characteristics				
Research expenditure/sales	4.424	3.789	0.008	11.985
Backward vertical integration[c]	0.486	0.218	0.067	0.964
Forward vertical integration[d]	0.469	0.200	0.043	0.869
Country Characteristics				
Equity restrictions[e]	4.440	8.630	0	53.571
Investment/GDP	0.222	0.049	0.174	0.408
Log (GDP per capita)	9.222	0.485	7.006	9.923
Log (No. of phones per 1000 population)	6.788	0.784	2.051	7.437
100*(Exports + imports)/GDP	66.11	57.86	15.35	360.05
(Fuel and minerals exports)/total exports	15.74	16.87	1.00	95.77
Log (Average years of schooling)	2.092	0.316	1.218	2.576
Contract repudiation[f]	8.745	1.270	4.360	9.980
Black market[g]	1.584	1.055	1	5

Political instability[h]	0.042	0.066	0	0.424

[a] Number of years since the parent company was established.

[b] Number of 4-digit product lines that TNE manufactures.

[c] The share of parent firms' imports supplied by their subsidiaries.

[d] The share of the total sales of U.S. parent firms exported to their subsidiaries.

[e] The 1982 Benchmark Survey measure of the percentage of U.S. parent firms in each host country that were asked to limit their equity in their foreign subsidiaries.

[f] ICRG indicator for risk of a modification in a contract taking the form of a repudiation, postponement, or scaling down due to budget cutbacks, indigenization pressure, a change in government, or a change in government economic and social policies. Lower scores indicate higher risks.

[k] Johnson and Sheehy's (1996) indicator of the share of blank market in the economy, ranges from 1 (less than 10%) to 5 (more than 30%).

[h] The average of the numbers assassinations and revolutions per year constructed by Barro and Lee (1996).

Table 2: The Basic PROBIT Model

Determinants of the Choice Between Whole and Joint Ownership by U.S. Non-Bank TNEs[a]

(Dependent Variable equals one if the subsidiary is wholly owned and equals zero otherwise)

Variables	(1) *All Industries*	(2) *All Industries Except Finance and Service*	(3) *All Industries Except Wholesale*	(4) *Manufacturing*
Intercept	0.183	0.290	0.670	–0.072
	(0.840)	(0.752)	(0.503)	(0.950)
Firm Characteristics				
Log (TNE sales/assets)	0.455	0.481	0.786	0.761
	(0.001)	(0.000)	(.000)	(0.000)
Log (TNE assets/employees)	0.125	0.130	0.255	0.244
	(0.087)	(0.081)	(0.004)	(0.024)
Age of TNE	–0.008	–0.009	–0.010	–0.009
	(0.012)	(0.006)	(0.004)	(0.013)
Age of TNE Squared	0.086	0.091	0.106	0.098
	(0.002)	(0.001)	(0.001)	(0.003)
Log (1+No. of foreign subsidiaries)	0.366	0.359	0.286	0.278
	(0.050)	(0.056)	(0.186)	(0.254)
Log (1+No. of foreign subsidiaries) squared	–0.072	–0.071	–0.060	–0.058
	(0.025)	(0.028)	(0.104)	(0.150)

Production diversity of TNE	–0.033	–0.033	–0.056	–0.062
	(0.036)	(0.004)	(0.001)	(0.001)
Public trading dummy[b]	0.589	0.511	0.865	0.781
	(0.010)	(0.030)	(0.001)	(0.004)
Industry Characteristics				
Research expenditure/sales	0.039	0.039	0.045	0.044
	(0.003)	(0.004)	(0.002)	(0.005)
RESBASED[c]	1.365	1.368	1.350	1.334
	(0.002)	(0.002)	(0.003)	(0.004)
PETMIN*BVERT[d]	–1.009	–0.888	–1.419	
	(0.016)	(0.038)	(0.006)	
RESBASED*BVERT[e]	–3.096	–3.100	–3.036	–2.988
	(0.000)	(0.000)	(0.000)	(0.004)
Industry Dummies				
Manufacturing	–0.275	–0.225	–0.461	
	(0.018)	(0.067)	(0.018)	
Grain and bakery products	–0.966	–0.968	–1.036	–0.981
	(0.004)	(0.005)	(0.003)	(0.005)
Textile	–0.743	–0.739	–0.705	–0.708
	(0.040)	(0.041)	(0.052)	(0.054)

Table 2 (continued)

Variables	(1) *All Industries*	(2) *All Industries Except Finance and Service*	(3) *All Industries Except Wholesale*	(4) *Manufacturing*
Textile	–0.743	–0.739	–0.705	–0.708
	(0.040)	(0.041)	(0.052)	(0.054)
Industrial chemicals	–0.667	–0.664	–0.661	–0.643
	(0.000)	(0.000)	(0.000)	(0.000)
Chemical products	–0.731	–0.732	–0.766	–0.720
	(0.002)	(0.002)	(0.002)	(0.004)
Electronic components	0.373	0.376	0.382	0.389
	(0.028)	(0.027)	(0.028)	(0.028)
Commercial equipment[f]	0.740	0.787		
	(0.027)	(0.020)		
Country Characteristics				
Equity restrictions	–0.018	–0.019	–0.021	–0.023
	(0.003)	(0.002)	(0.002)	(0.002)
Investment/GDP	–1.991	–2.160	–1.623	–1.260
	(0.053)	(0.039)	(0.128)	(0.253)
100*(Exports + Imports)/GDP	0.004	0.004	0.004	0.004
	(0.000)	(0.000)	(0.000)	(0.000)

(Fuel and minerals exports)/total exports	–0.009 (0.003)	–0.009 (0.004)	–0.011 (0.001)	–0.013 (0.000)
Log (Average years of schooling)	0.692 (0.005)	0.695 (0.005)	0.644 (0.023)	0.745 (0.018)
Contract repudiation	–0.246 (0.004)	–0.252 (0.003)	–0.358 (0.000)	–0.333 (0.002)
Black market	–0.319 (0.000)	–0.317 (0.000)	–0.384 (0.000)	–0.374 (0.000)
Political instability	2.511 (0.000)	2.368 (0.005)	3.342 (0.000)	2.841 (0.006)
British heritage (Anglo)	0.662 (.000)	0.617 (0.000)	0.831 (0.000)	0.876 (0.000)
Non-Anglo European	0.580 (0.000)	0.564 (0.000)	0.825 (0.000)	0.860 (0.000)
Latin America	1.165 (0.000)	1.124 (0.000)	1.316 (0.000)	1.491 (0.000)
Log-likelihood	–633.56	–619.95	–521.65	–450.63
No. of observations	2011	1931	1520	1291

[1] P-values are reported in parenthesis. Except for variables noted below, all others are defined in Table 1.

[b] Dummy variable is equal to one if TNE's stocks are publicly traded.

[c] Dummy variable is equal to one if the subsidiary is in resource-based manufacturing sector.

[d] Interaction of PETMIN (dummy variable =1 if subsidiary is in mining or petroleum) and a measure of backward vertical integration (BVERT = share of TNE's imports supplied by subsidiary).

[e] Interaction of RESBASED and the measure of backward vertical integration (BVERT = share of TNE's imports supplied by subsidiary).

[f] This dummy variable is part of wholesale dummy and was dropped from regression (3) and (4) due to collinearity.

Table 3

Other Specifications of the PROBIT Model: Resource Base and Vertical Integration[a]

Variables	(1)	(2)	(3)	(4)
Intercept	0.160	0.400	0.042	–0.000
	(0.858)	(0.655)	(0.963)	(1.000)
Firm Characteristics				
Log (TNE sales/assets)	0.497	0.469	0.430	0.404
	(0.000)	(0.000)	(0.001)	(0.002)
Log (TNE assets/employees)	0.131	0.091	0.121	0.133
	(0.073)	(0.226)	(0.103)	(0.065)
Age of TNE	–0.009	–0.008	–0.008	–0.008
	(0.008)	(0.008)	(0.011)	(0.011)
Age of TNE Squared	0.089	0.084	0.086	0.084
	(0.001)	(0.002)	(0.002)	(0.002)
Log (1 + No. of foreign subsidiaries)	0.334	0.364	0.281	0.243
	(0.070)	(0.051)	(0.143)	(0.200)
Log (1 + No. of foreign subsidiaries) squared	–0.069	–0.073	–0.057	–0.050
	(0.031)	(0.023)	(0.084)	(0.128)
Production diversity of TNE	–0.039	–0.045	–0.031	–0.029
	(0.11)	(0.003)	(0.049)	(0.060)

Public trading dummy	0.680	0.651	0.610	0.617
	(0.003)	(0.004)	(0.008)	(0.007)
Industry Characteristics				
Research expenditure/sales	0.0384	0.057	0.019	
	(0.004)	(0.000)	(0.283)	
RESBASED	–0.400		1.394	1.366
	(0.004)		(0.002)	(0.002)
PETMIN dummy	–0.289			
	(0.138)			
Backward vertical integration (BVERT)		–0.435		
		(0.054)		
RESBASED*BVERT			–3.090	–3.061
			(0.000)	(0.000)
PETMIN*BVERT			–1.186	–1.251
			(0.006)	(0.003)
Forward vertical integration			0.518	0.766
			(0.119)	(0.002)
Industry Dummies				
Manufacturing	–0.273	–0.273	–0.314	–0.309
	(0.007)	(0.007)	(0.008)	(0.007)

Table 3 (continued)

Variables	(1)	(2)	(3)	(4)
Grain and bakery products	–0.151	–0.479	–0.984	–0.978
	(0.568)	(0.056)	(0.004)	(0.004)
Textile	–0.257	–0.106	–0.750	–0.733
	(0.672)	(0.672)	(0.038)	(0.042)
Industrial chemicals	–0.653	–0.548	–0.645	–0.644
	(0.000)	(0.001)	(0.000)	(0.000)
Chemical products	–0.731	–0.647	–0.710	–0.712
	(0.002)	(0.006)	(0.003)	(0.003)
Electronic components	0.355	0.395	0.375	0.381
	(0.037)	(0.019)	(0.027)	(0.025)
Commercial equipment	0.771	0.801	0.677	0.697
	(0.021)	(0.017)	(0.044)	(0.036)
Country Characteristics				
Equity restrictions	–0.018	–0.019	–0.017	–0.017
	(0.003)	(0.002)	(0.004)	(0.005)
Investment/GDP	–2.081	–1.99	–2.000	–1.957
	(0.042)	(0.050)	(0.054)	(0.058)
100*(Exports + Imports)/GDP	0.004	0.004	0.004	0.004

	(0.000)	(0.000)	(0.000)	(0.000)
(Fuel and minerals exports)/total exports	–0.008	–0.004	–0.008	–0.009
	(0.004)	(0.006)	(0.005)	(0.000)
Log (Average years of schooling)	0.645	0.655	0.670	0.595
	(0.008)	(0.007)	(0.000)	(0.014)
Contract repudiation	–0.235	–0.232	–0.231	–0.211
	(0.005)	(0.006)	(0.007)	(0.012)
Black market	–0.329	–0.333	–0.310	–0.311
	(0.000)	(0.000)	(0.000)	(0.000)
Political instability	2.451	2.348	2.600	2.643
	(0.003)	(0.005)	(0.002)	(0.002)
British heritage (Anglo)	0.645	0.616	0.678	0.711
	(0.000)	(0.000)	(0.000)	(0.000)
Non-Anglo European	0.554	0.549	0.586	0.581
	(0.000)	(0.000)	(0.000)	(0.000)
Latin America	1.166	1.173	1.149	1.149
	(0.000)	(0.000)	(0.000)	(0.000)
Log-likelihood	–645.54	–648.81	–626.38	–636.22
No. of observations	2011	2011	2003	2011

[a] For description of variables, see the notes for Tables 1 and 2.

Table 4

Other Specifications of the PROBIT Model: The Role of Income, Growth, and Infrastructure[a]

Variables	(1)	(2)	(3)	(4)
Intercept	0.757	3.042	–0.375	–0.527
	(0.434)	(0.080)	(0.683)	(0.549)
Firm Characteristics				
Log (TNE sales/assets)	0.447	0.447	0.466	0.437
	(0.001)	(0.001)	(0.000)	(0.001)
Log (TNE assets/employees)	0.129	0.126	0.129	0.122
	(0.078)	(0.084)	(0.078)	(0.105)
Age of TNE	–0.009	–0.008	–0.008	–0.008
	(0.008)	(0.011)	(0.009)	(0.019)
Age of TNE Squared	0.088	0.086	0.087	0.084
	(0.001)	(0.002)	(0.001)	(0.004)
Log (1+No. of foreign subsidiaries)	0.380	0.367	0.372	0.314
	(0.042)	(0.049)	(0.046)	(0.105)
Log (1+No. of foreign subsidiaries) squared	–0.076	–0.073	–0.073	–0.061
	(0.019)	(0.023)	(0.022)	(0.071)
Production diversity of TNE	–0.029	–0.030	–0.031	–0.033
	(0.069)	(0.054)	(0.043)	(0.043)

Public trading dummy	0.601	0.598	0.602	0.585
	(0.009)	(0.009)	(0.009)	(0.016)
Industry Characteristics				
Research expenditure/sales	0.040	0.040	0.038	0.042
	(0.003)	(0.003)	(0.004)	(0.003)
RESBASED	1.401	1.387	1.383	1.659
	(0.002)	(0.002)	(0.002)	(0.001)
PETMIN*BVERT	–3.183	–3.153	–3.127	–3.506
	(0.000)	(0.000)	(0.000)	(0.000)
RESBASED*BVERT	–1.200	–1.094	–0.996	–0.793
	(0.008)	(0.009)	(0.017)	(0.073)
Industry Dummies				
Manufacturing	–0.276	–0.269	–0.267	–0.290
	(0.018)	(0.021)	(0.021)	(0.017)
Grain and bakery products	–0.970	–0.980	–0.979	–1.138
	(0.004)	(0.004)	(0.004)	(0.002)
Textile	–0.754	–0.740	–0.762	–1.019
	(0.038)	(0.041)	(0.035)	(0.012)
Industrial chemicals	–0.662	–0.661	–0.662	–0.661
	(0.000)	(0.000)	(0.000)	(0.000)

Table 4 (continued)

Variables	(1)	(2)	(3)	(4)
Chemical products	–0.712	–0.711	–0.725	–0.711
	(0.003)	(0.003)	(0.002)	(0.005)
Electronic components	0.392	0.377	0.384	0.334
	(0.021)	(0.026)	(0.024)	(0.054)
Commercial equipment	0.749	0.751	0.748	0.674
	(0.027)	(0.026)	(0.026)	(0.050)
Country Characteristics				
Equity restrictions	–0.022	–0.022	–0.016	–0.015
	(0.000)	(0.001)	(0.022)	(0.037)
Log (telephones per 1000 population)	–0.295			
	(0.011)			
Log (GDP per capita)		–0.446		
		(0.028)		
Log of GDP			–000	
			(0.541)	
GDP growth rate				–0.034
				(0.389)
100*(Exports + Imports)/GDP	0.004	0.004	0.004	0.004
	(0.000)	(0.000)	(0.000)	(0.000)

(Fuel and minerals exports)/total exports	–0.008 (0.005)	–0.006 (0.099)	–0.010 (0.001)	–0.011 (0.001)
Log (Average years of schooling)	0.799 (0.002)	0.811 (0.001)	0.731 (0.004)	0.750 (0.003)
Contract repudiation	–0.178 (0.049)	–0.189 (0.039)	–0.259 (0.003)	–0.230 (0.017)
Black market	–0.369 (0.000)	–0.413 (0.000)	–0.322 (0.000)	–0.305 (0.000)
Political instability	1.916 (0.027)	2.000 (0.023)	2.864 (0.002)	2.920 (0.001)
British heritage (Anglo)	0.954 (0.000)	0.908 (0.000)	0.806 (0.000)	0.788 (0.000)
Non-Anglo European	0.856 (0.000)	0.791 (0.000)	0.701 (0.000)	0.703 (0.000)
Latin America	1.391 (0.000)	1.423 (0.000)	1.3000 (0.000)	1.253 (0.000)
Log-likelihood	–632.35	–633.18	–653.78	–583.67
Observations	2011	2011	2011	1836

[a] For description of variables, see the notes for Tables 1 and 2.

Table 5: Truncated Model

Determinants of TNE Share in Joint Ventures[a]

Variables	(1)	(2)	(3)
Intercept	1.167	1.084	1.686
	(0.000)	(0.000)	(0.000)
Firm Characteristics			
Log (TNE sales/assets)	0.060	0.095	0.073
	(0.234)	(0.010)	(0.040)
Log (TNE assets/employees)	–0.018		
	(0.501)		
Age of TNE	0.010		
	(0.343)		
Age of TNE Squared	–0.002		
	(0.785)		
Log (1+No. of foreign subsidiaries)	–0.032		
	(6.854)		
Log (1+No. of foreign subsidiaries) squared	0.008		
	(0.684)		
Production Diversity of TNE	–0.016	–0.016	–0.016
	(0.005)	(0.001)	(0.004)

Public trading dummy	–0.100		
	(0.200)		
Industry Characteristics			
Research expenditure/sales	–0.008		
	(0.109)		
RESBASED	–0.013		
	(0.928)		
BVERT			–0.225
			(0.002)
PETMIN*BVERT	–0.150		
	(0.219)		
RESBASED*BVERT	–0.009		
	(0.967)		
Industry Dummies			
Manufacturing	–0.009		
	(0.839)		
Grain and bakery products	0.092		
	(0.332)		
Textile	0.129	–0.123	–0.149
	(0.196)	(0.097)	(0.039)

Table 5 (continued)

Variables	(1)	(2)	(3)
Industrial chemicals	–0.031		
	(0.516)		
Chemical products	–0.046		
	(0.480)		
Electronic components	0.104		
	(0.122)		
Commercial equipment	0.256		
	(0.173)		
Country Characteristics			
Equity restrictions	–0.005	–0.004	–0.005
	(0.003)	(0.011)	(0.001)
Investment/GDP	–0.549	–0.558	–0.534
	(0.096)	(0.048)	(0.051)
Log (GDP per capita)			–0.085
			(0.042)
100*(Exports + Imports)/GDP	0.002		
	(0.421)		
(Fuel and minerals exports)/total exports	–0.002	–0.002	–0.000

	(0.066)	(0.056)	(0.663)
Log (Average years of schooling)	0.130	0.188	0.193
	(0.139)	(0.017)	(0.012)
Contract repudiation	–0.055	–0.071	–0.040
	(0.074)	(0.008)	(0.168)
Black market	0.021		
	(0.290)		
Political instability	0.205		
	(28.173)		
British heritage (Anglo)	0.040		
	(0.472)		
Non-Anglo European	0.152	0.147	0.151
	(0.000)	(0.000)	(0.000)
Latin America	–0.022		
	(0.644)		
Log-likelihood	98.50	89.35	96.20
No. of observations	282	282	282

[a] For description of variables, see the notes for Tables 1 and 2.