Volume Title: The Effects of Taxation on Multinational Corporations

Volume Author/Editor: Martin Feldstein, James R. Hines Jr., R. Glenn Hubbard

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-24095-9

Volume URL: http://www.nber.org/books/feld95-2

Conference Date: January 13-15, 1994

Publication Date: January 1995

Chapter Title: Accounting Standards, Information Flow, and Firm Investment Behavior

Chapter Author: Jason Cummins, Trevor Harris, Kevin Hassett

Chapter URL: http://www.nber.org/chapters/c7744

Chapter pages in book: (p. 181 - 224)

7 Accounting Standards, Information Flow, and Firm Investment Behavior

Jason G. Cummins, Trevor S. Harris, and Kevin A. Hassett

7.1 Introduction

In many countries, capital markets provide the major source of external financing for firms. In these countries, a financial accounting system has developed over time that seeks to fulfill a regulatory objective of providing relevant and reliable information about the financial position and profitability of the firm to shareholders and lenders. In other countries, capital markets have played a less crucial role, and the information objectives have been less well defined.

Tax authorities have also developed reporting requirements that facilitate the accurate calculation of tax liabilities. In the United States and several other countries the two sets of information are largely distinct ("two-book" countries); one book is designed to accurately describe the firm's tax liability, and one is designed to convey to the market essential information for assessing the firm's profitability.[1] The existence of two sets of books reflects the different objectives of financial-market participants and policymakers. The most effec-

Jason G. Cummins is assistant professor of economics at New York University and John M. Olin Fellow at Columbia University. Trevor S. Harris is professor of accounting at the Graduate School of Business of Columbia University. Kevin A. Hassett is associate professor of economics and finance at the Graduate School of Business of Columbia University and economist at the Board of Governors of the Federal Reserve System.

Cummins's research was funded by the Center for International Business Education (CIBE) and the Chazen Institute at Columbia University. Harris's research was partially funded by the CIBE and the Rudolph Schoenheimer Fellowship. The authors thank Valerie Amerkhail, Rusty Goldin, R. Glenn Hubbard, Steve Oliner, Pete Wilson, and Penelope Winkle for helpful discussions and Samuel Coffin for able research assistance. The views expressed in this paper are those of the authors and do not necessarily represent those of the Board of Governors of the Federal Reserve System.

1. As discussed in section 7.2, the designation "two-book" does not imply that all measures differ for accounting and tax purposes. Rather, it refers to the regulatory environment that separates accounting and tax reporting.

tive rules to enforce tax regulations may not be the same rules that induce efficient transmission of information about the firm to the market.

Many countries do not have a two-book system similar to that in the United States. Instead, these countries typically require firms to match their tax and accounting statements for each taxable entity. Under tax conformity (in "one-book" countries), firms may only take tax deductions if they have been recognized in reports to shareholders either before or concurrent with tax recognition. Firms operating in these countries face a fundamentally different environment in which signals of the firm's profitability to external investors are intermeshed, perhaps inextricably, with the firm's tax accounts.[2]

For the most part, tax research has ignored differences in accounting regimes. In this paper, we carefully document some of the institutional details of one-book and two-book countries, with the goal of identifying significant differences between the two regimes. We then explore the extent to which accounting regimes might be expected to affect the interaction between tax policy and real behavior.[3]

If information flows less smoothly to the market in one-book countries, one would expect several consequences. First, firms may have relative difficulty raising funds in equity markets if they cannot provide reliable information to shareholders. As a result, one-book firms may have relatively more capital supplied by and closer relationships with banks, which could, in principle, provide the careful monitoring necessary in a world without particularly useful accounting information. As we discuss below, there is already some limited evidence suggesting that this is the case (see, e.g., Hoshi, Kashyap, and Scharfstein 1991).[4] Second, while firms in the United States may freely act to minimize their tax burdens by availing themselves of all legal tax benefits, as we discuss below, firms in one-book countries may have to equate the benefit of tax minimization strategies, which effectively reduce their reported taxable income, with two potential costs: lower reported income may inadvertently signal that the firm's prospects have worsened and may, in addition, reduce the pool of funds that can be legally distributed to shareholders. These tradeoffs may make firm investment in this environment much less sensitive to tax policy than is the case in the United States.

These arguments suggest that multinationals based in one-book countries

2. Firms everywhere must keep a careful account of their assets in order to operate efficiently. This set of "operating books" could also be quite useful for information purposes (e.g., during a friendly takeover or to banks with insider holdings). Technically, this means that we should be referring to "two-book" and "three-book" countries. Since the operating books are not constrained by law (and thus their value is difficult to assess), and are generally unavailable for applied research, we will continue with our terminology.

3. It is not the purpose of this paper to model the equilibrium between the accounting system and the institutional environment or to explain the evolution of a country's system.

4. The direction of causality could well be the opposite. The demand for external equity capital may be low where close relationships with banks are allowed. In this case, low demand for information may explain the lack of a second set of financial accounts.

may be at a disadvantage when investing in countries with generous tax incentives. A necessary but not sufficient condition for this to occur is for firms in one-book countries to demonstrate less responsiveness to domestic tax incentives. By induction, if one-book firms do not utilize domestic tax benefits, they also may not utilize those earned abroad. Using panel data drawn from the Global Vantage database, we explore this question below and show that investment is in some cases less sensitive to tax policy in one-book countries.

The paper proceeds as follows: In section 7.2, we provide a description of the major differences in accounting systems across countries. In section 7.3, we develop a structural model in order to formalize and explore the implication that in countries with one-book accounting standards domestic firm-level investment may be less sensitive to tax law changes. In section 7.4, we introduce a multicountry firm-level panel data set that, combined with panels of tax information, allows us to estimate the model derived in section 7.3. Section 7.5 summarizes our results. Three appendices provide additional detail on the accounting system in each country of the sample, the data set, and the tax parameters.

7.2 The Different Accounting Regimes

There are certain generic attributes that apply in several countries that illustrate the key differences between national accounting regimes. We first focus on two countries, the United States and Germany, and then discuss in appendix A how other countries vary from the two benchmarks. It is crucial to understand from the outset that these regimes are not static and that national accounting systems are moving toward a more global equilibrium as global capital markets evolve. Hence, we relate some historical detail to develop an understanding of the dynamics of the environment over the period we consider.

7.2.1 The United States: A "Two-Book" Case

U.S. public companies are required to provide periodic published financial statements in conformity with generally accepted accounting principles (GAAP). While the requirement for publicly available annual financial statements derives from specific laws, the precise features of GAAP are determined by private-sector organizations, primarily the Financial Accounting Standard Board (FASB). The FASB operates under the watchful eye of a regulatory agency, the Security and Exchange Commission (SEC), that occasionally prescribes its own rules or interpretations that become part of GAAP. There is an established hierarchy whereby the SEC and FASB rules largely determine U.S. GAAP.

The clearly stated objective of U.S. GAAP is to provide information to investors and creditors to enable them to predict the future cash flows and profitability of an enterprise. The FASB has tried to ensure that it is not perceived to be providing a measure of income that is necessarily useful for meeting the

fiscal objectives of tax regulators. In fact, reporting requirements for tax purposes have evolved independently over time.[5] The tax base used for calculating income taxes is determined by the tax code, and differences arise in the valuation criteria and measurement rules applied for tax and financial reporting purposes. For example, tax regulations allow a specific accelerated schedule of depreciation for equipment. U.S. GAAP requires companies to allocate the costs of equipment so as to reflect how it is consumed in the production of revenue. While companies choose among a set of alternatives, often choosing an accelerated method, it is most unlikely that this method would yield the same depreciation schedule used for tax purposes, as the latter is determined by efforts to influence a firm's capital investment practices.

The spirit of financial reporting practice is to reduce the information asymmetries between managers and owners by reflecting the economic activity of the entity. This information can then we used to evaluate how well managers have utilized their resources, allowing shareholders and creditors to determine their investment strategies based on expected profitability. By maintaining a dual valuation and measurement system the potentially conflicting objectives of information revelation and fiscal policy can each be achieved independently.

Of course, accurate forecasts of tax liabilities are crucial for evaluating a firm's prospects. To aid in reconciliation of the two sets of books, U.S. GAAP requires a detailed explanation of material differences between tax payable on the basis of tax law and a hypothetical tax expense based on the product of accounting income and the federal tax code.

The separation of the two sets of books is the rule, but there are exceptions that help shed light on the forces that may govern behavior in one-book countries. The case of accounting for inventory provides an interesting example. Under U.S. tax regulations, companies may adopt a last-in-first-out (LIFO) policy to account for inventory. This practice will usually lead to higher expenses, and hence lower taxable income when prices of inputs rise. At the time LIFO was first allowed, the tax regulations required that companies adopting LIFO for tax purposes also use the method for financial reporting purposes. Thus, LIFO is the primary example of tax conformity in the United States. Initially, companies were not permitted to provide information about the value of inventory accounted for using other methods, such as the first-in-first-out (FIFO) method. However, this was perceived by managers and shareholders as creating biases in the information system. As a result, many managers chose not to adopt LIFO practices, even though such adoption would have significantly reduced tax liabilities. Eventually, firms lobbied for rules that allow for supplementary disclosures of the more current (and, presumably, more informative) measures of inventory. While extensive research has been performed

5. The alternative minimum tax (AMT) was an attempt to partially bridge the gap. To ensure that GAAP did not become tax driven, the FASB lobbied against making taxable income or AMT based on U.S. GAAP.

analyzing why many companies choose not to adopt LIFO, it seems reasonable to assume that, given rational investors and managers, the benefits from information based on unbiased measures outweighed the costs of forgone potential tax savings in this episode.[6]

To summarize, U.S. GAAP utilizes a broad proprietary concept that assumes shareholders and to an extent creditors are the focal point for resource allocation decisions and the corporate entity is the vehicle for the efficient use of the allocated resources. It is also widely presumed that profit maximization is the goal of both managers and shareholders, so that by providing information about the use of resources, investors can ensure their efficient allocation. Tax-reporting rules have evolved independently over time. In the one recent case where conformity of the books was required by law, some U.S. firms, surprisingly, chose not to use LIFO, even though this decision increased tax liabilities.

7.2.2 Germany: A "One-Book" Case

The U.S. perspective contrasts to the traditional German approach to accounting. The primary source of German accounting regulation has been the Commercial Code, Handelsgesetzbuch (HGB), which was revised in 1985 to incorporate the Fourth and Seventh Directives of the European Community.[7] In addition, there are several other laws that influence accounting practice, including the income tax law.

We shall describe the relationship between tax and accounting regulation in some detail, but initially it is useful to understand that the accounting laws have, from the beginning, been oriented toward a determination of what income is available for distribution to stakeholders (shareholders, tax authorities, and employees) with the clear objective of protecting creditors and "ensuring" the maintenance of the entity as an operating unit. German law and the institutional framework are oriented toward protecting and developing the capital base of each entity. The accounting system reflects a similar objective and utilizes an entity concept as the core framework. This creates fundamental differences relative to the proprietary approach adopted in the United States, where the purpose of reporting rules is less conservative.

The emphasis on capital maintenance and *minimization* of distributable income is manifested in the legally dictated dominance of the application of prudence for measuring assets and liabilities. Asset accruals are governed by

6. Recent examples of research in this area include Jennings, Mest, and Thompson (1992).

7. The Fourth Directive defined the format of financial statements, defined basic concepts and valuation principles, and required the accounts to be evaluated in terms of providing a "true and fair" view of the firm's financial position. However, within each of these categories, flexibility was permitted to reflect different jurisdictional preferences. The Seventh Directive focused on the requirement to present fully consolidated financial statements for groups of companies forming a single economic entity.

the "imparity principle" (*Imparitätsprinzip*), requiring recognition of both realized and unrealized losses (e.g., on foreign exchange contracts) but disallowing recognition of any unrealized gains.[8] This introduces a conservative bias in the reported net asset measure. As in the United States, German income is essentially equal to the change in cum dividend net assets. However, German taxable income is measured directly from the tax balance sheets, whereas U.S. taxable income is derived from revenue and expense flows.

Traditionally, Germany has also required a close conformity between tax and financial reporting measures. As explained, the legally based accounting rules are formulated on the basis of determining what income can be distributed. Ordelheide and Pfaff (1993) argue that the tax law takes a similar perspective as it is based on taxing the earnings that can be distributed by an enterprise while maintaining the productive capacity of the income source. Hence, in Germany there has been a symmetry in the objectives of tax and financial reporting that does not exist in the United States. This leads to the observation that both German tax and financial reporting regulations focus on long-run maintenance of the capital base, and therefore of the source of income, even if this may not lead to profit maximization in a neoclassical sense. The imposition of prudence has a noticeable effect on the pattern of German returns. German companies have lower average reported profitability than their U.S. counterparts, but there is also less cross-sectional variation in the reported profitability (see, e.g., Harris, Lang, and Möller 1993).

The similarity between tax and financial reporting systems is not only the result of confluent objectives. The German tax computation is based on balance sheets prepared in accordance with GAAP. This is known as the "authoritative principle" (*Massgeblichkeitsprinzip*), and the direction of causality is from accounting to tax. While this is the initial direction of the relation, there is a second effect that goes in the opposite direction and is known as the "reverse authoritative principle" (*umgekehrte Massgeblichkeitsprinzip*). The latter generally allows companies to use the tax rules to determine certain accounting policies when no specific policy is prescribed by the accounting law. The tax law requires companies to take the expense for accounting purposes in order to have it deducted for tax purposes, much like LIFO in the United States, and hence the two sets of books are virtually identical.[9]

The discussion so far describes how the German laws facilitate a lower tax base to restrict distributable and taxable income. However, once the base is determined the tax law creates an incentive to distribute the income by the differential rates applied to distributed and retained current income (see appendix C).

Another significant difference between the German and U.S. systems is the

8. In contrast, U.S. firms must recognize unrealized gains and losses in certain cases, such as foreign exchange contracts.

9. This explains the "one-book" nomenclature.

treatment of consolidation. German income tax is largely applied at the level of the legal entity, with investments in subsidiaries measured at acquisition cost or lower. The HGB of 1985 required companies to present fully consolidated financial statements.[10] To some extent, the HGB of 1985 permits companies to apply different accounting standards in their consolidated statements than they use for the legal entity tax-conforming financial statements. Consequently, to the extent that German companies perceive a cost created by tax conformity requirements they can choose a two-book approach if they have to present group accounts. While this may appear to create a system similar to that found in the United States, this is unlikely to be the case for several reasons. First, the information and accounting systems in place generate data for each of the individual, legal entity tax-conforming statements. The consolidated statements are compiled from these, and to the extent that the legal entity statements are uninformative because of their basis in tax law, this would also apply to the consolidated statements. The basic reporting practice is still governed by tax regulations. Second, users of financial statement, have, presumably, developed an understanding of how to interpret the individual legal entity reports or have created mechanisms to reduce information asymmetries. Thus, the marginal benefit of a change in accounting practice is probably less than it would be if the information set consisted solely of the financial statements. Nevertheless, since both types of firms appear in our sample, in the empirical tests of the model we consider controlling for these factors by differentiating between companies that applied full consolidation and those that do not.

If reports are perceived to be somewhat uninformative, alternative sources may emerge if the benefits of additional information are perceived to be high by market participants. In Germany, financial analysts have developed a process to yield an adjusted earnings measure that is meant to be more useful for making cross-sectional and time-series comparisons. Some firms voluntarily supply the information, and if it is not supplied, analysts attempt to impute it. The measure, known as the DVFA/SG earnings, does not adjust specifically for tax-oriented items; however, to the extent that a tax-based valuation measure makes earnings less comparable it will be adjusted in the calculation.[11]

In sum, the one-book basis of accounting in Germany arises from a common objective of capital maintenance for tax and reporting. This objective is weighted more heavily than profit maximization, which is a dominant objective in the United States. While the reasons for the German system having evolved in this manner are outside the scope of this paper, they are clearly related to the sources of capital available to firms, the history and institutional framework of the country, including the use of bearer shares, the lack of large amounts of institutional capital outside of banks, the acceptance of weaker antitrust regula-

10. After 1990, all German companies satisfied this requirement, but before then only a subset did.

11. Busse von Colbe et al. (1991) provide a useful discussion of the DVFA/SG earnings measure.

tion, and the lack of regulation of insider trading. However, increasing demand for international sources of capital is shifting the institutional structure toward a two-book system.

7.2.3 Summary of Accounting Differences

Figures 7.1 and 7.2 summarize the basic features of the U.S. and German accounting regimes, respectively. In the United States, the tax and financial reports are governed by separate bodies. The subsidiaries' information is consolidated by the parent into two separate statements, one prepared for the IRS and one for the SEC.

In Germany, the organization is more complicated. All reporting is based on the HBG, which governs unconsolidated tax returns filed by the parent and each subsidiary. These returns are filed with the Ministry of Finance. To some extent the tax rules feed back into the reporting practice via the *umgekehrte Massgeblichkeitsprinzip*. Finally, parents prepare consolidated statements that are mostly based on the same accounting rules that govern the tax returns.

7.3 Accounting Regimes and Firm Investment

In this section, we develop a structural model to help explore a precise implication of our descriptive analysis: the responsiveness of domestic investment to changes in the domestic tax code may also depend on the accounting regime. The reluctance of domestic investors to utilize tax incentives will drive a wedge between the costs of capital faced by investors from different countries. In our view, this investigation is a crucial precursor to the analysis of the effects of accounting regimes on foreign capital flows.

To derive testable implications from a model with varying information revelation by firms, we begin with the standard Euler equation model for investment.[12] The firm maximizes the present discounted value of after-tax dividends. The firm's production function is assumed to be Cobb-Douglas with constant returns to scale:

$$Y_{i,t} = F(K_{i,t-1}, N_{i,t}) = AK_{i,t-1}^{\theta} N_{i,t}^{1-\theta}, \tag{1}$$

where Y is output, K is the capital stock, N is labor input, i is the firm index, and t is the time index. Investment in capital, I, which depreciates at a constant geometric rate, δ, is assumed to be subject to quadratic adjustment costs:

$$C(I_{i,t}, K_{i,t-1}) = \frac{\alpha_0}{2}\left(\frac{I_{i,t}}{K_{i,t-1}} - \delta_i\right)^2 K_{i,t-1}. \tag{2}$$

In addition, we assume that in countries relying on only one set of books, the market participants employ an independent monitor, which verifies that the

12. Oliner, Rudebusch, and Sichel (1993) provide an excellent review of these models.

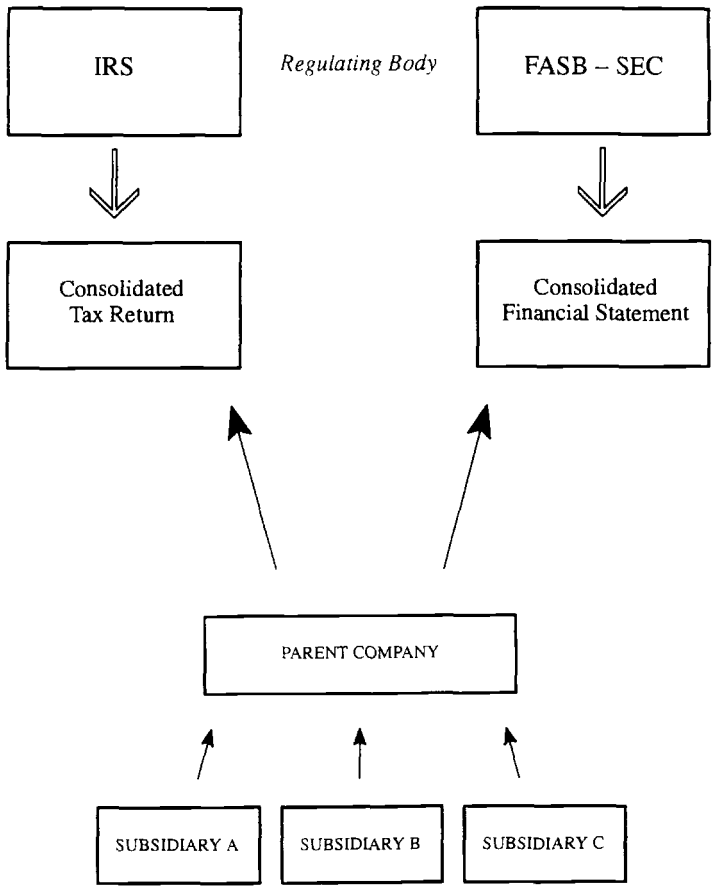

Fig. 7.1 Schematic of U.S. accounting regime

firm is actually investing at the level of I. One could think of these as costs incurred by the shareholder in order to gain an accurate description of firm activity.[13] These costs result from the fact that high deductions lower the firm's tax base, and the market requires that this type of reduction be distinguishable from a reduction due to lower profitability. In a two-book country, higher tax benefits are endnoted in the financial statement, and so should be desirable from the perspective of the firm. In a one-book country, this may not be the

13. The DVFA/SG earnings report is an example of the type of monitoring that we are attempting to model. Kanniainen and Södersten (1994) use such monitoring costs to develop a model in which a firm chooses not to maximize its tax debt, because higher tax debt would lead to higher marginal monitoring costs.

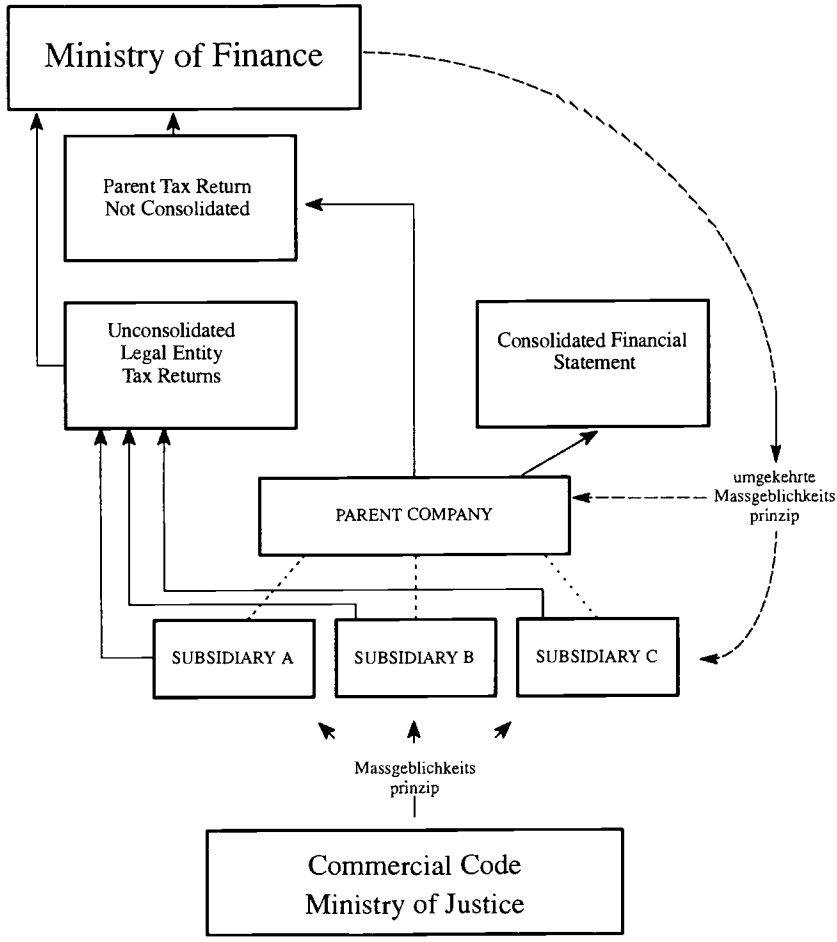

Fig. 7.2 Schematic of German accounting regime

case. Tax benefits that are large relative to earnings may require significant additional information costs.[14] Specifically, we assume that the firm faces an additional information revelation cost function;

$$\Omega(I_{i,t}, K_{i,t-1}) = \frac{\alpha_1}{2}\left(\Gamma_{i,t}\frac{I_{i,t}}{K_{i,t-1}}\right)^2 K_{i,t-1}, \tag{3}$$

where $\Gamma_{i,t}$ describes the tax benefit of investing, which, in the United States, is defined as

14. In a one-book country with few investment incentives, these costs should be inconsequential. But in all the countries in our sample, investment incentives exist (especially for depreciation) and are, in general, generous (see appendix C).

$$\Gamma_{i,t} = k_t + \sum_{s=t}^{\infty} (1 + \rho_s + \pi_s^e)^{-t} \tau_{i,s} \mathrm{Dep}_{i,s}(s - t), \tag{4}$$

where k is the investment tax credit, ρ is the real required rate of return, τ is the marginal corporate tax rate, and Dep(a) is the depreciation allowance permitted an asset of age a discounted at a nominal rate that includes the inflation rate expected, π^e. This expression may be defined slightly differently depending on the tax code.[15] We use the detailed information on each country's tax code (contained in appendix C) to calculate the above expression. This function has the desirable properties that the marginal cost of revelation increases with the tax benefits and that these costs have a lower bound of zero if tax benefits are also zero. The assumption that these costs are quadratic is somewhat restrictive, but simplifies our estimation problem significantly.[16]

The firm is assumed to be a price-taker in the prices of output, p, capital goods, g, and labor, w. To simplify the exposition, the price of output is normalized to equal unity, so that the purchase price of capital and labor are relative prices and the relative price of capital goods to output is simply g.

The firm chooses investment to maximize the expected present discounted value of after-tax dividends

$$V_{i,t} = E_t \sum_{s=t}^{\infty} \left(\prod_{j=t}^{s} \right) \beta_{i,j} D_{i,s}, \tag{5}$$

where

$$\begin{aligned} D_{i,s} &= (1 - \tau_{i,s})[F(K_{i,s-1}, N_{i,s}) - C(I_{i,s}, K_{i,s-1}) - \Omega(I_{i,s}, K_{i,s-1})] \\ &= g_{i,s}(1 - \Gamma_{i,s}) I_{i,s}, \end{aligned} \tag{6}$$

subject to the capital accumulation constraint

$$K_{i,s} = (1 - \delta_i) K_{i,s-1} + I_{i,s}, \tag{7}$$

where E_t is the expectations operator conditional on information available at time t and $\beta_{i,j}$ is the period-j discount factor for firm i. The derivational details and resulting Euler equations that incorporate equity and debt issuance are omitted here for expositional simplicity. Their addition generates few additional insights into the issues on which we have focused.

To derive the Euler equation for investment, set the derivatives of the Lagrangian that results from equations (5) through (7) to zero at time t:

$$(1 - \tau_{i,t}) \left[g_{i,t} \left(\frac{1 - \Gamma_{i,t}}{1 - \tau_{i,t}} \right) + C_{I_t} + \Omega_{I_t} \right] = \lambda_{i,t}, \tag{8}$$

$$E_t[\beta_{i,t+1}(1 - \tau_{i,t+1})(F_{K_t} - C_{K_t} - \Omega_{K_t}) + (1 - \delta_i)\lambda_{i,t+1}] = \lambda_{i,t}. \tag{9}$$

15. E.g., a slight redefinition would be necessary for those countries in our sample that have different rules for basis adjustment.

16. The monitoring adjustment cost is not a function of the depreciation rate because we believe that information costs are high when tax benefits are high relative to earnings.

Equation (8) is the first-order condition that equates the marginal cost of acquiring capital and the shadow value, $\lambda_{i,t}$, of an increase in the capital stock at time t. Equation (9) indicates that it is optimal to set the return in period $t + 1$ of a marginal unit of capital equal to the cost of capital in period $t + 1$. To derive the equation we estimate, we use equation (8), and equation (8) rolled forward one period, to substitute out for the unobservables, $\lambda_{i,t}$ and $\lambda_{i,t+1}$:

$$(10)\quad E_t\beta_{i,t+1}(1-\tau_{i,t+1})\left\{(F_{K_t}-C_{K_t}-\Omega_{K_t})+(1-\delta_i)\left[C_{I_{t+1}}+\Omega_{I_{t+1}}+g_{i,t+1}\left(\frac{1-\Gamma_{i,t+1}}{1-\tau_{i,t+1}}\right)\right]\right\}=(1-\tau_{i,t})\left[C_{I_t}+\Omega_{I_t}+g_{i,t}\left(\frac{1-\Gamma_{i,t}}{1-\tau_{i,t}}\right)\right].$$

Substituting in the specific functional forms for C, Ω, and F:

$$(11)\quad C_{I_t}=\alpha_0\left(\frac{I_{i,t}}{K_{i,t-1}}-\delta_i\right),$$

$$(12)\quad \Omega_{I_t}=\alpha_1\Gamma_{i,t}^2\frac{I_{i,t}}{K_{i,t-1}},$$

$$(13)\quad C_{K_t}=\frac{\alpha_0}{2}\left(\frac{I_{i,t+1}}{K_{i,t}}-\delta_i\right)^2-\alpha_0\left(\frac{I_{i,t+1}}{K_{i,t}}-\delta_i\right)\frac{I_{i,t+1}}{K_{i,t}},$$

$$(14)\quad \Omega_{K_t}=-\frac{\alpha_1}{2}\left(\Gamma_{i,t+1}\frac{I_{i,t+1}}{K_{i,t}}\right)^2.$$

After rearranging terms, simplifying, imposing rational expectations to eliminate the expectations operator, and generalizing the expectations error to account for the panel nature of our data, we obtain

$$(15)\quad \begin{aligned}\beta_{i,t+1}(1-\tau_{i,t+1})&\left\{\theta\frac{Y_{i,t+1}}{K_{i,t}}+\frac{\alpha_0}{2}\left(\frac{I_{i,t+1}}{K_{i,t}}\right)^2+\frac{\alpha_1}{2}\left(\Gamma_{i,t+1}\frac{I_{i,t+1}}{K_{i,t}}\right)^2\right.\\&+\alpha_0(1-\delta_i)\left(\frac{I_{i,t+1}}{K_{i,t}}\right)+(1-\delta_i)\left[g_{i,t+1}\left(\frac{1-\Gamma_{i,t+1}}{1-\tau_{i,t+1}}\right)\right.\\&\left.\left.+\alpha_1\Gamma_{i,t+1}^2\frac{I_{i,t+1}}{K_{i,t}}\right]-\alpha_0\left(\delta_i-\frac{\delta_i^2}{2}\right)\right\}-(1-\tau_{i,t})\left[\alpha_0\left(\frac{I_{i,t}}{K_{i,t-1}}-\delta_i\right)\right.\\&\left.+g_{i,t}\left(\frac{1-\Gamma_{i,t}}{1-\tau_{i,t}}\right)+\alpha_1\Gamma_{i,t}^2\frac{I_{i,t}}{K_{i,t-1}}\right]=u_i+v_{t+1}+e_{i,t+1}.\end{aligned}$$

The first error term on the right-hand side of equation (15), u_i, is a firm-specific measurement error in the levels of the left-hand-side variables. This error is assumed to be approximately constant over time. The last two error terms, v_{t+1} and $e_{i,t+1}$, are expectational errors, where $E_t(v_{t+1}+e_{i,t+1})=0$. The Euler equation we estimate follows directly from this equation. Equation (15) is first differenced to remove the first error term and estimated by the generalized method of moments (GMM) with time dummies. The GMM estimator

accommodates conditional heteroskedasticity of unknown form in the error term $e_{i,t+1}$, and the time dummies estimate v_{t+1} in each period.[17]

While the model is somewhat stylized, it does provide a structural test for the importance of accounting regimes for domestic investment behavior. Strictly speaking, for firms in two-book countries, α_1 should be equal to zero, and for firms operating in one-book countries, α_1 should be greater than zero. To the extent that firms in one-book countries are able to avoid information restrictions, α_1 may be zero even in one-book countries.

7.4 Empirical Analysis

In this section we present estimates of our model. For estimation, we use the Global Vantage data set and panels of tax information, described in detail in appendices B and C, to estimate the first difference of equation (15) for one-book and two-book countries. As we indicated above, in many countries mechanisms have emerged that attempt to provide a second set of books for some firms in one-book countries. In addition to the most basic split between one- and two-book countries, we also explore the extent to which consolidation helps firms in one-book countries avoid signaling problems. To briefly foreshadow the results, we will show that we can identify large differences in investment behavior between one- and two-book firms when we only include in our sample firms that can clearly be classified as one or two book. Simply classifying by country, which ignores additional information about firm-specific accounting practices, leads to inconclusive results.

The discussion of accounting regimes raises serious measurement issues that will affect any empirical studies that use the Global Vantage database. When constructing the model, we have specific variables for output, taxes, and capital. The extent to which the variables recorded in our database conform to these definitions varies considerably across and within countries. Nowhere is the measure as precise as we would like. These measurement problems are serious in every country in our sample, but it is important to note that one should not conclude from our accounting discussion that measurement error, in the classical regression sense, is higher in one-book countries. The theme of our discussion is that the information reported by firms in one-book countries is not as comprehensive and relevant for assessing future profitability as it is in two-book countries. The principal advantage of the second set of books is their ability to provide a signal of current earnings and hence profitability to external capital markets, perhaps better than tax accounts could. The degree to which specific variables are measured well or poorly is highly idiosyncratic, however. For example, the tax books may well be the best tool for measuring

17. The moving average error introduced by first-differencing is treated by using instruments dated before $t - 1$ and by a Bartlett spectral density kernel to correct the GMM weighting matrix.

the impact of a change in the tax law on a specific firm. These effects may appear larger in one-book countries if the variables reported in Global Vantage are based on tax conformity.

To help minimize the problems of measurement error, we pay careful attention to the source of each data item. Within our one-book countries, data for different firms are based on different levels of consolidation. To aid in a more precise mapping of accounting effects and econometric estimation, Global Vantage identifies the firm's accounting standard (see appendix B). The tax rules in many countries apply at the level of the legal entity. In the Global Vantage database, recorded data are frequently drawn from consolidated reports, which may have little correlation with the variables that go into the tax calculation. Moreover, these consolidated reports also may include foreign investments, which in many countries fall outside of the sphere of domestic tax policy. Global Vantage identifies whether the annual financial statements represent the legal entity report, a holding company report (rarely used), a domestic consolidation report, or full consolidation report.[18] Over our sample period, consolidation becomes increasingly prevalent, and we are able to explore the impact on our results of restricting our sample to firms whose data are drawn from consolidated and unconsolidated reports. In general, consolidation causes the most problems for our empirical analysis when it incorporates substantial foreign assets that are not covered by domestic tax laws. When this occurs, the measure of investment includes investment not necessarily covered by domestic law, which can bias tax coefficients severely.[19]

Tables 7.1 and 7.2 contain the tax variables that we use in our empirical work. Details of variable construction are contained in appendix B. Table 7.3 provides the means and standard deviations for the some of the variables we use. In addition, the number of observations available for estimation is reported in each cell.

The structural model developed in section 7.3 has many antecedents. Specifically, if α_1 is set equal to zero, so that the Ω adjustment function (eq. [3]) has no effect, equation (15) reduces to a standard investment Euler equation (see, e.g., Abel 1980; Cummins and Hubbard, chap. 5 in this volume; Himmelberg 1990; Hubbard and Kashyap 1992). This standard investment equation has been estimated on many different data sets under a wide variety of different assumptions. To provide a link to this literature and to introduce the model in this paper, the estimates of the standard investment Euler equation are provided in table 7.4.

For one-book countries, α_0, the investment adjustment cost parameter, is estimated to be 1.21 with standard error 0.499. For two-book countries, the estimate is 2.32 with standard error 0.771. The test of the overidentifying re-

18. Harris et al. (1993) provide a discussion of this issue for German companies.

19. For any single firm-year there is only one of the reports within the database. Hence, while it would be useful to discriminate between the legal entity (one-book) and consolidated (possible two-book) reports for a given firm-year, this is not possible with Global Vantage.

Table 7.1 **Marginal Corporate Income Tax Rates**

Country	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Australia[a]	.46	.46	.46	.46	.46	.49	.49	.39	.39	.39	.39	.39
Belgium[b]	.48	.45	.45	.45	.45	.45	.43	.43	.43	.41	.39	.39
Canada[c,d]	.483	.483	.472	.46	.483	.483	.464	.391	.391	.391	.391	.391
Denmark	.40	.40	.40	.40	.50	.50	.50	.50	.50	.40	.38	.38
France[e]	.50	.50	.50	.50	.50	.45	.45	.42	.39	.37	.34	.34
Germany[f]	.56	.56	.56	.56	.56	.56	.56	.56	.56	.50	.519	.519
Ireland[d]	.45	.50	.50	.50	.50	.50	.50	.47	.43	.43	.40	.40
Italy[c]	.363	.413	.413	.464	.464	.464	.464	.464	.464	.464	.478	.552
Japan[c,g]	.42	.42	.42	.433	.433	.433	.42	.42	.40	.375	.384	.384
Netherlands	.48	.48	.48	.43	.43	.42	.42	.42	.35	.35	.35	.35
New Zealand	.45	.45	.45	.45	.45	.48	.48	.28	.33	.33	.33	.33
Norway[h]	.508	.508	.508	.508	.508	.508	.508	.508	.508	.508	.508	.28
Spain	.33	.33	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35
Sweden[i]	.58	.58	.58	.52	.52	.52	.52	.52	.52	.40	.30	.30
Switzerland[j]	.098	.098	.098	.098	.098	.098	.098	.098	.098	.098	.098	.098
United Kingdom	.52	.52	.52	.45	.40	.35	.35	.35	.35	.35	.33	.33
United States[c]	.46	.46	.46	.46	.46	.46	.40	.34	.34	.34	.34	.34

[a]Undistributed profits were taxed at the rate of .50 until an imputation system came into operation July 1987.

[b]Excess profits surtax at the rate of .04 applied until 1982.

[c]Additional corporate income tax levied by state and/or municipal government which is rebated or deductible at the federal level.

[d]Corporate income tax is levied at a lower rate on manufacturing firms.

[e]Split-rate system, which applied a higher tax rate to distributed profits, was in effect from 1989 until 1992.

[f]Distributed profits taxed at a lower rate of .36.

[g]Distributed profits were taxed at a .10 lower rate until 1988. In 1989, distributed profits were taxed at a .05 lower rate. The split-rate system was permanently abolished in 1990.

[h]Additional corporate income taxes were levied at the municipal level and for a "tax equalization fund" resulting in a combined rate of .23 which was not deductible from the federal rate of .278. Effective 1992, the federal corporate income tax was abolished, the municipal rate was lowered to .11, and the tax equalization fund rate was increased to .17.

[i]Additional corporate income tax levied at the municipal level, which was deductible at the federal level, was abolished in 1985.

[j]Federal, cantonal, and municipal corporate income taxes, which are typically partially deductible against one another, are levied at graduated rates based on the proportion of taxable profits to equity capital. Top federal rate reported.

strictions rejects the model, at standard confidence levels, for one-book countries and does not reject it for two-book countries. Both parameter estimates are within the range reported in previous research using U.S. firm-level panel data (see, most recently, Hubbard, Kashyap, and Whited 1995).

To the extent that these results conform with previous estimates, we feel confident that the data will allow extension to incorporate the features of the model derived in section 7.3. However, we advise caution in interpreting the estimates of the standard model literally, and especially in interpreting the test

Table 7.2 **Investment Incentives**

Country	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Australia[a]	.18	.18	.18	.18	.18	0	0	0	0	0	0	0
Belgium[b]	.05	.05	.05	.05	.05	.05	.05	.05	.05	.04	.03	0
Canada[c]	.07	.07	.07	.07	.07	.07	.05	.03	0	0	0	0
Denmark[d]	0	0	0	0	0	0	0	0	0	0	0	0
France[e]	.10	.15	0	0	0	0	0	0	0	0	0	0
Germany	0	0	0	0	0	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	0	0	0	0	0	0	0
Italy	0	0	0	0	0	0	0	0	0	0	0	0
Japan	0	0	0	0	0	0	0	0	0	0	0	0
Netherlands[e]	.12	.12	.12	.125	.125	.125	.125	0	0	0	0	0
New Zealand	0	0	0	0	0	0	0	0	0	0	0	0
Norway	0	0	0	0	0	0	0	0	0	0	0	0
Spain[f]	.15	.15	.15	.15	.15	.15	.15	.10	.05	.05	.05	.05
Sweden[h]	.10	.10	.10	0	0	0	0	0	0	0	0	0
Switzerland	0	0	0	0	0	0	0	0	0	0	0	0
United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0
United States[c]	.1	.08	.08	.08	.08	.08	0	0	0	0	0	0

Note: All 17 countries have investment incentives for specific regions or industries, for certain types of business fixed investment, or for research and development which are not reported.

[a]Investment incentive was a deduction.

[b]Investment incentive was a deduction. Before 1982, the incentive was an investment reserve.

[c]Investment incentive was an investment tax credit (ITC). In Canada, regional and some asset ITCs were retained at reduced rates after 1988.

[d]A limited investment reserve is available. See footnote g below for a description.

[e]Investment incentive was an ITC (called "WIR"). In 1984, the various WIR rates were combined into one uniform rate; before 1984 the rate reported is that for most fixed assets. Beginning in 1990, an investment deduction is available at degressive rates ranging from .18 to .02 for relatively small scale investment; no deduction is allowed after the cutoff total is reached.

[f]Investment incentive is an ITC. In 1985, a statutory rate for fixed assets was instituted; before 1985 the rate reported is that for the typical investment grant.

[g]Investment incentive was an investment allowance. Until 1990, an investment reserve program was also available. It allowed companies to set aside and deduct, at their own discretion, up to 50 percent of their pretax profits for future investments in a countercyclical fund. The benefit of the fund was that it could be used for immediate depreciation of new assets acquired.

of the overidentifying restrictions. While it is usual in this literature to "accept" a model if the test statistic is less than the critical value, the test is only of the orthogonality of the instruments and the error terms. This may pose a more serious problem than usual in this data set since we have argued throughout that there are a wide number of measurement error problems in the variables that we use for instruments and in the estimation. We have attempted to alleviate these potential biases in constructing the variables and in estimating the model, but we, necessarily, remain agnostic about the degree to which these efforts are successful.[20]

20. The range of point estimates and their standard errors was relatively tight, but we found that wild swings in the χ^2 statistic could result from seemingly innocuous changes in the instrument set.

Table 7.3 **Sample Statistics**

Country	$\frac{I_t}{K_{t-1}}$	$\frac{\text{sales}_t}{K_{t-1}}$	$\frac{\text{cash flow}_t}{K_{t-1}}$	$\frac{\text{debt}_t}{\text{assets}_t}$	Number of Firms (1991)
Australia	.17	2.58	.26	.25	120
	(.21)	(1.93)	(.57)	(.21)	
Belgium	.27	3.95	.48	.39	51
	(.23)	(1.85)	(.55)	(.25)	
Canada	.18	2.18	.21	.34	299
	(.19)	(2.02)	(.41)	(.25)	
Denmark	.23	3.70	.30	.36	64
	(.19)	(1.85)	(.32)	(.24)	
France	.29	4.40	.48	.29	201
	(.19)	(2.06)	(.51)	(.20)	
Germany	.30	4.23	.40	.23	237
	(.19)	(1.97)	(.34)	(.22)	
Ireland	.17	3.35	.29	.27	45
	(.22)	(1.96)	(.62)	(.22)	
Italy	.24	3.25	.44	.34	79
	(.22)	(1.87)	(.48)	(.23)	
Japan	.24	4.02	.31	.26	336
	(.16)	(1.84)	(.23)	(.19)	
Netherlands	.21	3.61	.38	.33	101
	(.16)	(1.89)	(.38)	(.25)	
New Zealand	.18	3.20	.24	.37	21
	(.24)	(1.85)	(.37)	(.22)	
Norway	.22	2.81	.19	.50	45
	(.21)	(1.85)	(.32)	(.22)	
Spain	.12	2.03	.24	.31	75
	(.19)	(1.92)	(.33)	(.27)	
Sweden	.22	3.67	.31	.49	68
	(.20)	(1.84)	(.32)	(.25)	
Switzerland	.24	3.41	.38	.40	107
	(.19)	(1.78)	(.40)	(.23)	
United Kingdom	.21	3.71	.43	.21	598
	(.22)	(2.00)	(.48)	(.18)	
United States	.21	3.28	.32	.30	2486
	(.20)	(2.14)	(.66)	(.25)	

Note: Standard deviations are in parentheses below the means.

Table 7.5 presents estimates of α_0 and α_1 in equation (15). The investment adjustment cost parameter, α_0, in both samples is positive and significant. For one-book countries, it is estimated to be 0.739 with standard error 0.351. For two-book countries, it is estimated to be 0.998 with standard error 0.265. Both these estimates are within the range of adjustment costs—although somewhat lower than—estimated using the Euler equation formulation. An estimate of 0.998 implies that an extra dollar of investment will lead to about 0.05 dollars of adjustment costs.[21]

21. Interpretation of the size of the adjustment costs depends on the proximity to the steady state. Near the steady state, most of investment is replacement investment, which does not incur

Table 7.4 **Standard Euler Equation Estimates**

Regime	Investment Adjustment Cost Parameter ρ_0	Test of Overidentifying Restrictions χ^2_{13}
One-book countries	1.21	22.23
	(.499)	(.039)
Two-book countries	2.32	19.65
	(.771)	(.104)

Notes: The standard Euler equation sets α_1 equal to zero in eq. (15).

One-book countries are Belgium, Denmark, France, Germany, Italy, Japan, Norway, Spain, Sweden, and Switzerland. Two-book countries are Australia, Canada, Ireland, Netherlands, New Zealand, the United Kingdom, and the United States.

Standard errors, in parentheses, are computed from a heteroskedastic-consistent matrix. Significance levels of Hansen's test of overidentifying restrictions are in parentheses beneath the statistic.

The one-book sample contains 1,890 firms. The two-book sample contains 4,420 firms. The instrument set used for estimation includes: $(I/K)_{t-2}$, $(I/K)_{t-3}$, $(I/K)^2_{t-2}$, $(I/K)^2_{t-3}$, (cash flow/$K)_{t-2}$, (cash flow/$K)_{t-3}$, (sales/$K)_{t-2}$, (sales/$K)_{t-3}$, (depreciation/$K)_{t-2}$, (dividends/operating income)$_{t-2}$, (debt/assets)$_{t-2}$, (interest/$K)_{t-2}$, (taxes/$K)_{t-2}$, $(k + \tau z)_{t-2}$, and $(k + \tau z)^2_{t-2}$.

Table 7.5 **Euler Equation Estimates**

Regime	Investment Adjustment Cost Parameter α_0	Accounting Adjustment Cost Parameter α_1	Test of Overidentifying Restrictions χ^2_{12}
One-book countries	.739	−.696	45.33
	(.351)	(.489)	(9.05×10^{-6})
Two-book countries	.998	−4.84	77.09
	(.265)	(1.36)	(1.48×10^{-11})

Notes: One-book countries are Belgium, Denmark, France, Germany, Italy, Japan, Norway, Spain, Sweden, and Switzerland. Two-book countries are Australia, Canada, Ireland, Netherlands, New Zealand, the United Kingdom, and the United States.

Standard errors, in parentheses, are computed from a heteroskedastic-consistent matrix. Significance levels of Hansen's test of overidentifying restrictions are in parentheses beneath the statistic.

The sample sizes and instrument set are the same as reported in table 7.4

To provide additional insight into these estimates it is useful to compare them to those reported in closed-form q-model formulations. These estimates are substantially smaller than ones implied by closed-form q-formulations esti-

any adjustment costs in the model. For the first few dollars over and above depreciation, marginal adjustment costs are low, by the convexity assumption. Far away from the steady state, marginal adjustment costs can be very high, even given our parameter estimates. For the comparison reported in the text, we applied the sample means of the investment-to-capital ratio and depreciation rate (0.21 and 0.16, respectively) in order to gauge the relative adjustment costs.

mated with either U.S. firm-level panel data (see, e.g., Gilchrist and Himmelberg 1991) or with U.K. firm-level panel data (see, e.g., Blundell et al. 1992).[22] The small estimates reported in the q-studies implied unreasonably large adjustment costs, implying that the scale of the adjustment cost is substantially larger than that of the purchase cost of the investment good. The estimates above indicate significantly lower adjustment costs.

The accounting adjustment cost parameter α_1 in table 7.5 is negative and insignificant in the one-book sample, and negative, substantially larger, and significant in the two-book sample. For one-book countries, the estimate is -0.696 with standard error 0.489. For two-book countries, the estimate is -4.84 with standard error 1.36. However, we should not overemphasize the precision of these results: the tests of overidentifying restrictions are rejected in both models (with tiny implied p-values). Both estimates have the incorrect sign. An extra dollar of investment leads to 0.03 dollars more in total adjustment costs in the one-book sample, and 0.003 dollars less in adjustment costs in the two-book sample, given the sample means of the relevant parameters (see n. 21).

There are a variety of reasons why this result may not be spurious, in spite of the fact that it confounds the intuition outlined in the description of the countries' institutional features and the assumptions in deriving the model. However, we believe the crude one-book/two-book distinction may not be what the model captures. In section 7.2, we outlined how firms, even in one-book countries, can avoid restrictions placed on them by the tax authority and how they attempt to mitigate the information costs associated with their home countries' particular institutional features. Perhaps the estimation results were not illuminating because we incorrectly grouped firms; one-book/two-book may not be the exact partitioning between firms facing low information revelation costs and those facing high ones.

There are a number of different subsamples that might provide evidence on this point. In table 7.6, we consider two polar opposites that seem to confirm the analysis of why one-book/two-book is too coarse a distinction. Table 7.6 presents estimates for two subsamples. The first is one-book firms that report only in accordance with domestic accounting standards *and* are not fully consolidated (i.e., report as legal entities). The second is one-book firms that report in accordance with U.S. GAAP (nearly all of whom are fully consolidated). The groupings incorporate firms from many different countries.[23]

In the first subsample, both adjustment cost parameters are positive and significant. In the second, similar to the result in two-book countries reported in table 7.3, the investment adjustment cost parameter is positive and significant,

22. See Cummins, Hassett, and Hubbard (1994), who use the q-model but estimate much smaller adjustment costs, in line with those reported above.

23. The largest number of firms in the first subsample is from Germany, and in the second from Japan.

Table 7.6 **Euler Equation Estimates (one-book country subsamples)**

Subsample	Investment Adjustment Cost Parameter α_0	Accounting Adjustment Cost Parameter α_1	Test of Overidentifying Restrictions χ^2_{12}
Domestic accounting standards and domestic consolidation	.520	3.64	17.81
	(.219)	(1.02)	(.122)
Domestic accounting standards in accordance with U.S. GAAP	1.91	−7.55	56.17
	(.683)	(4.52)	(1.12×10^{-7})

Notes: One-book countries are Belgium, Denmark, France, Germany, Italy, Japan, Norway, Spain, Sweden, and Switzerland.

Standard errors, in parentheses, are computed from a heteroskedastic-consistent matrix. Significance levels of Hansen's test of overidentifying restrictions are in parentheses beneath the statistic.

The first subsample contains 790 firms. The second subsample contains 381 firms. The instrument set used for estimation is the same as reported in table 7.4.

while the accounting adjustment cost parameter is negative and not significant. In the first subsample, α_0 is estimated to be 0.520 with standard error 0.219 and α_1 is estimated to be 3.64 with standard error 1.02. These estimates imply that an extra dollar of investment leads to a total of 0.07 dollars of adjustment costs, with 0.05 dollars of that attributable to the accounting adjustment costs, given the sample means of the relevant parameters. In addition, the model cannot be rejected at standard confidence levels.

In the second subsample, α_0 is estimated to be 1.91 with standard error 0.683 and α_1 is estimated to be -7.55 with standard error 4.52. The test of the overidentifying restrictions is rejected conclusively. These estimates accord closely with those reported for two-book firms in table 7.3, providing some evidence that firms that report according to U.S. GAAP face adjustment costs similar to those faced in two-book countries. The total of the two adjustment costs is roughly zero. The investment adjustment cost parameter is plausible, the accounting adjustment parameter is negative, and the test of the orthogonality conditions is decisive.

The results in table 7.6 seem to confirm the hypothesis that additional costs can be associated with the taking of tax benefits in one-book countries and that this cost is largely avoided by a portion of firms even in one-book countries. Monitoring costs appear to be important, and their size depends critically on identifying which firms are likely to be subject to them within one-book countries. The size of the monitoring costs is at the high end of estimates for the investment adjustment cost parameters in the Euler equation literature and dominate investment adjustment costs in our model. Firms in one-book countries that prepare accounts according to U.S. GAAP appear to be qualitatively similar to firms in two-book countries.

7.5 Conclusions

We describe two different accounting regimes that govern reporting practice in most developed countries. We provide a structural model that formalizes a testable implication of our discussion: that domestic firm-level investment in one-book countries may face additional adjustment costs and, as a result, be less sensitive to tax law changes than is investment in two-book countries. In our discussion of the accounting regimes, we indicate that over time mechanisms have emerged in one-book countries that allow some firms to provide information in alternative ways. Our econometric estimates suggest that accounting regime differences play an important role in describing the domestic investment pattern across countries. In particular, firms that operate under a "pure" one-book system behave as if they face an additional cost when utilizing investment incentives. The firms appearing most constrained are those that do not file consolidated statements according to U.S. GAAP. Firms in one-book countries filing according to U.S. GAAP behave much more like U.S. firms. Since most multinationals face some type of consolidation requirement, our

evidence suggests that the playing field for multinationals is probably roughly even with respect to ability to claim tax benefits. Information costs may have driven a wedge in historical user costs of capital, but these forces are likely diminishing today; many one-book countries are gradually moving toward two-book systems, as exemplified by the Fourth and Seventh Directives of the European Community.

Our results, taken at face value, suggest one should not study international taxation in isolation. The institutional environment in which multinationals operate may be crucial to their decision making. We have studied one particular aspect of this interaction, but there are many others. In work in progress, we are exploring whether international capital flows have become more efficient over time in response to the gradual easing of information asymmetries imposed by accounting regimes.

Appendix A
Summaries of Country-Specific Accounting Practices

Canada

Canada has a two-book system with financial reporting accounting standards based on a proprietary approach prescribed by the Canadian Institute of Chartered Accountants. There is a close similarity to U.S. GAAP that is evidenced by the SEC allowing mutual recognition of Canadian accounting standards for Canadian firms listing in the United States. However, Canadian GAAP does not provide the detailed reconciliation of tax expense for tax and financial reporting purposes that we find in the United States. Canadian taxes are applied on the consolidated results but on a territorial basis.

United Kingdom and Ireland

The United Kingdom has had a two-book system since the corporation tax was first introduced. The basic financial reporting requirements derive from the Companies Act first issued in the mid-nineteenth century and amended many times since then. The Companies Acts of 1985 and 1989 are the key regulatory items currently in force. The Companies Acts require audited financial statements to present a "true and fair view" in conformity with GAAP. GAAP has been outlined by various private bodies in a similar manner to that found in the United States. The most recent standard-setting body is the Accounting Standards Board, which is structured on a basis very close to the FASB.

Two distinctions between the United Kingdom and the United States are

worth noting. First, there is no SEC equivalent to provide a tight regulatory link. Second, the existing codification of U.K. GAAP is much less detailed and less comprehensive than in the United States. There are also distinctions between U.K. and U.S. GAAP, some of which are relevant to the issues considered in this paper. The first distinction is that U.K. managers may revalue their assets periodically.[24] These asset revaluations are discretionary, and the gains and losses are not taxable, nor are they reported in current reported income. Thus, gross investment in assets measured from Global Vantage using tangible fixed assets (see appendix B) is measured with error as in some cases it includes revaluation adjustments (see, e.g., Easton, Eddey, and Harris 1993). The second distinction is that U.K. tax law does not permit the use of LIFO for inventory valuation. Thus, while LIFO is permitted by U.K. GAAP, it is not used. Third, the accounting treatment for temporary differences in the timing of tax and accounting revenues or expenses is usually different in the United Kingdom, relative to the United States. In the United Kingdom, companies have the option to accrue only for those differences which are expected to be realized ("crystallize") within a five-year period. In the United States, all temporary differences must be accounted for. The alternative treatments may cause a difference in reported debt, equity, and income measures.

The U.K. financial reporting system follows the proprietary approach, with equity being a major source of capital. Taxable income is determined by tax rules which are not bound by U.K. GAAP, so it is a two-book case.

Australia and New Zealand

The roots of accounting and tax practice for these countries lie in the United Kingdom, with the United States playing a greater role in more recent times. Both countries adopt a proprietary approach to their financial reporting practices and have established capital markets as the major source of capital for large firms. As in the United Kingdom, discretionary revaluations of assets are permitted and occur. Easton et al. (1993) find that these revaluations are value relevant but also demonstrate the potential errors in extracting this level of information from the aggregated data in Global Vantage, as we noted in the discussion of the U.K. practice. Hence, we note that our gross investment proxy is knowingly measured with error, in part because of the idiosyncrasies in the accounting systems.

Netherlands

The Netherlands provides another example of a two-book system. Historically, the Netherlands had an essentially laissez-faire system with companies

24. Asset revaluations in different forms occur in many countries in our sample. See appendix C for whether and to what extent countries allow revaluations.

applying generally acceptable accounting standards. While various laws have been enacted since the first Accounting Act, effective since 1971, for most of the time listed companies have usually followed accounting principles oriented toward representing the economic substance of transactions.

The tax law has its own specific requirements but requires taxable income to be based on sound business practice. So there is an implicit, but no direct link to financial reporting requirements.

The accounting law was amended to incorporate the Fourth Directive of the European Community with an effective date of January 1984 and the Seventh Directive of the European Community effective from January 1990. However, both of these amendments were more in form than substance as listed Dutch companies were already complying with most of the standards.

As in the case of Australia, New Zealand, and the United Kingdom, Dutch companies may revalue their assets or apply a full current cost system. In such cases, as the tax system continues to be based on historical costs, the depreciation charge may be higher for accounting purposes for certain assets.

In general, in the Netherlands we expect the differences between tax and accounting income to be less than for several other two-book systems.

Japan

The accounting system originates in the German Commercial Code (HGB), which was "imported" at the time of the Meiji Restoration, and was revised on the basis of changes in Germany's Commercial Code through 1938 (Ballon and Tomita 1988). Following World War II, revisions of the Commercial Code and the first Securities Exchange Law (1948) were based on U.S. practices. Hence, the Japanese system is a mix of our two benchmark systems. The focus of both tax and financial reporting has been the legal entity, as we find in Germany. Currently, tax is still applied on the legal entity results rather than the consolidated group accounts.

An example which helps to illustrate the legal versus consolidated entity aspect of taxation is the often misunderstood issue of the tax deductibility of goodwill. The tax law allows goodwill to be amortized over five years and deducted in the calculation of taxable income. But this goodwill is generally not the goodwill found in consolidated financial statements which arises from investments in the equity of subsidiaries. For such investments, there is no goodwill separately reported in the legal entity statements. The taxable goodwill that arises is from an asset purchase made at a premium to market value. On consolidation the two goodwill measures are accounted for in the same manner, but in the legal entity reports they are treated differently and hence are not taxed in the same manner.

To better understand the relationship between tax and financial reporting in Japan, it is useful to be aware of some of the regulatory influences and the evolution and perceived relevance of consolidated reporting. The foundation

of financial and tax reporting is the Commercial Code which applies to all legal entities and is under the jurisdiction of the Ministry of Justice. On the other hand, the Securities Exchange Law applies to listed companies, and is the source of regulations for consolidated reports. The Securities Exchange Law is administered by the Ministry of Finance, which is the *de facto* source of GAAP for listed companies despite the existence of advisory committees like the Business Accounting Deliberation Council. Measurement rules used to obtain taxable net income are largely based on GAAP for financial reporting purposes, at least as applied to the legal entity level. Thus, expenses such as depreciation and cost of goods sold conform in the tax and accounting income measures.

Differences arise in the two sets of books as a result of certain tax-exempt or disallowed items or when a company chooses to take expenses in excess of those allowed for tax purposes. A common example is in the accrual for employee postemployment benefits. The tax law allows a deduction equal to 40 percent of the amount payable at the fiscal year end. Many companies accrue between 40 and 100 percent of this amount. As we might expect from rational tax minimization strategies, we know of no instances of companies that accrue less than 40 percent. There are other examples where the tax-based reserve is usually in excess of what would be required under an information-oriented system. A simple example is the reserve for bad debts which is based on a percentage of total receivables plus allowances for specific doubtful customers.

There is a growing body of evidence that the reports which result from this hybrid system interact in idiosyncratic ways with market indicators. First, there is both anecdotal (see Viner 1988) and empirical evidence that the primary accounting information source in Japan is the legal entity rather than consolidated report (see, e.g., Darrough and Harris 1991; Hall, Hamao, and Harris 1993). Second, French and Poterba (1991) and Hall et al. (1993) show that equity prices are not related to accounting data in any manner that is consistent with what is found in the United States. This finding is consistent with what we might expect in a one-book country.

As we argued earlier, if the books are unreliable signals of the market performance of firms, alternative information sources may well emerge which attempt to fill the gap. As is the case in Germany, such alternative conduits have also emerged in Japan. Japanese companies began to access capital in the international markets in the 1960s. Many of these companies (e.g., SONY) sought capital in the United States but only had legal entity financial statements. Consequently, they "voluntarily" prepared consolidated statements in conformity with U.S. GAAP to comply with U.S. regulations. In 1983, Japan required fully consolidated financial statements for the first time for all listed companies. Those companies already preparing their consolidated statements under U.S. GAAP were allowed to use these for Japanese purposes too. Hence, to some extent, a two-book system has existed for some Japanese multinationals.

In addition, managers systematically provide forecasts of operating profits and sales. Darrough and Harris (1991) shows that these forecasts have information content, particularly at the legal entity level.

In sum, Japan has a one-book system applying to the majority of corporations. However, both via application of U.S. GAAP for certain companies' consolidated statements, and via supplementary information, investors receive additional information for valuation purposes.

France and Belgium

Traditionally, French companies have followed a one-book system, and this persists for legal entities. The French have a long tradition of a codified accounting system. There is a legally defined chart of accounts (from the Plan Comptable Général) which is followed for both financial reporting and taxation purposes, at least at the legal entity level.

Requirements for additional information oriented toward investors first occurred in 1967 with the creation of a stock exchange regulatory authority, the Commission des Operations de Bourse (COB), which encouraged companies to reveal more investor-oriented information. As consolidated accounts were urged by COB but had no legal basis, several large companies adopted their own approaches, with several choosing U.S. GAAP or International Accounting Standards (IAS). France adopted the EC's Seventh Directive, which required consolidated accounts for listed companies, and from 1986, companies were allowed not to apply French GAAP at the consolidated level. Hence, we find that there is a mix of accounting approaches applied for the French companies in our sample.

An interesting example of how French groups take a flexible approach to their group accounts is in the treatment of premia on acquisitions of other companies. Since the 1980s this "goodwill" has frequently been capitalized and labeled "market share" with no amortization generally applied. There is no tax consequence to this treatment.

The tax regulations use the legal entity reports in a manner similar to what we have described in other one-book countries. However, at least since the mid-1980s many French companies have deviated from the valuation rules applied for tax purposes, at least for their consolidated accounts.

Scandinavia

We describe Sweden as representative of the Scandinavian countries in our sample, which include Denmark and Norway. Tax law in Sweden has allowed a series of tax-free reserves which historically must be reflected in the published financial statements. These reserves have included an inventory reserve, investment reserves, and special depreciation reserves. Thus, while the tax rate has

been relatively high, this has been compensated for by a lower base. Recent tax reforms have eliminated many of the tax-free reserves (see appendix C).[25]

Scandinavian systems have been influenced by the German system and have a one-book approach. Nevertheless, to facilitate some separation of the tax-free reserve data, the annual adjustments have been reflected as a separate part of the income statement and the cumulative amounts are reported as a nondistributable reserve in the balance sheet. Hence, while the one-book model applies, the information related to specific tax-oriented adjustments can be largely differentiated.

Italy

Italy has a one-book system with roots in a Napoleonic Civil Code. The Italian system is perceived to be strongly tax driven, which may have led to the fact that it was unable to pass legislation to incorporate the Fourth and Seventh Directives of the European Community until the 1990s. The new directives are irrelevant for our sample of companies.

However, similar to France, Italy created a regulatory body to oversee the stock exchange and listed companies. This body, known as CONSOB (Commissions Nazionale per la Societe la Borsa), required listed companies to apply IAS as no domestic standards oriented toward investor information existed. Prior to the recently approved amendments, IAS allowed several options. Hence, it is likely that the financial reports even under IAS will closely mirror the legal entity statements that are based on the tax conformity principle.

Spain

The Spanish system was also based on the French system, but until the 1980s the system was almost entirely tax driven. Spain incorporated the Fourth and Seventh Directives in 1989 and 1990, so most companies will not meet these new reporting requirements during our sample period.

Switzerland

Historically, the only legal obligation for Swiss companies has been to prepare legal entity balance sheets and income statements. While many large companies have provided additional information, historically there has been no common approach by these companies. In the last few years there has been a trend by Swiss companies to adopt IAS, although not always in a uniform manner.

25. Denmark has a narrower investment reserve, and Norway none at all (see appendix C). In general, Denmark has the most investor-oriented system.

The tax system cannot be described in a concise manner as there is no single federal tax rate and the federal taxes need not even be the most significant (see appendix C). There are canton, municipal, and sometimes church taxes applied to varying degrees. Furthermore, the tax rates are often based on average income, so taxes may be applicable to income in years after the income is earned.

Appendix B
Data Description

The data set we use in an 11-year (1982–92) unbalanced panel of firms for 17 countries from the Global Vantage industrial database.[26] This database contains information on approximately 6,650 companies from 31 countries. Data for most companies are available since 1982. Comprehensive balance sheet and income statement data are provided. Definitions are standardized to insure intracompany data consistency between different accounting periods and intercompany data consistency within and across countries. However, Global Vantage does not adjust data for accounting differences. Instead, it provides extensive additional information on relevant accounting standards, data definitions, and available firm-specific disclosures to enable the user to make whatever adjustments are necessary. OECD member countries with more than 20 firms reporting data are chosen for analysis. Unlike the Compustat database, Global Vantage has relatively few firm entrants and exist, making the data set nearly balanced.

The variables used are defined as follows. To facilitate replication and extension of our empirical results and to aid researchers in data construction on this relatively unfamiliar data set, we provide the data item numbers in parentheses after each variable. Gross investment is the sum of the change in the net stock of tangible fixed assets (data item 76) and depreciation (data item 11).[27] A more precise estimate of depreciation can be obtained (data item 12), but we choose the one above since most firms do not separately report the more precise figure. The definition of economic depreciation used is the same as used in previous research with the Compustat database (see, e.g., Cummins et al. 1994). The investment variable is divided by the value of its own beginning-of-period capital stock. Output is defined as net sales/turnover (data item 1) and is also di-

26. See table 7.5 for a list of all the countries.

27. Defining gross investment as the change in the gross stock of tangible fixed assets (data item 77) is not feasible since that data item is frequently not reported by firms, or was not required to be reported by firms (e.g., German firms did not report the gross stock of fixed assets until the HGB of 1985). There is no data item in Global Vantage comparable to the capital expenditures data item in Compustat.

vided by the value of its own beginning-of-period capital stock. The Euler equation model we derived has a parsimonious specification so that the above variables are the only ones we need construct from Global Vantage.

In addition to those variables above we construct several others to use in the instrument set for econometric estimation. Operating income is defined exactly as such (data item 14). Net income is defined as income before extraordinary items (data item 32). Economists usually define cash flow as the sum of net income and depreciation (defined above). This definition is, at best, a coarse measure. The accounting literature stresses that better measures are available. We experiment with an alternative definition of cash flow derived from this literature. Alternative cash flow is defined as the sum of net income, depreciation, deferred taxes (data item 180), transfers to provisions (data item 182), gain (loss) on sale of fixed assets (data item 181), transfers to (from) reserves (data item 22), and the change in current liabilities (data item 104) minus the change in inventory (data item 66) and the change in accounts receivable (data item 63). The efficacy of this alternative measure was unclear in our empirical work, perhaps because the usual definition of cash flow is only another measure of income (whereas the alternative better measures free cash flow) or because the alternative definition is available less frequently or subject to more serious measurement error. Total income tax is defined exactly as such (data item 23). These variables are also divided by their beginning-of-period capital stocks. The dividend payout rate is defined as the ratio of common dividends (data item 36) to operating income (defined above). Alternative definitions of the payout ratio have no qualitative affect on the empirical results. We chose the above definition because it limited the number of negative observations. Total debt is defined as the sum of short-term debt (data item 94) and long-term debt (data item 106). The debt-to-asset ratio is defined as total debt divided by the sum of the equity value of the firm and total debt. The equity value of the firm is complicated to calculate in Global Vantage. There is no single shares outstanding variable to match with one stock market price variable. Instead, a separate database (called the issues file) contains market-related data items, which include multiple issues with multiple prices for firms in several countries (reflecting the differences across countries in capital markets.) The equity value of the firm is defined in the standard manner (end-of-year stock price multiplied by stock outstanding) when one issue exists.[28] When more than one issue exists, the value of each is calculated in the standard manner and all the issue values are summed. The firm's average interest rate is defined as the ratio of interest expense (data item 15) to total debt. All variables are deflated by the country's GDP deflator.

Firm-specific depreciation rates are constructed using the method in Cum-

28. The issues file uses descriptors instead of data item numbers.

mins et al. (1995). Past studies using foreign firm-level data have relied on the one-digit SIC code depreciation rates constructed from Hulten and Wykoff (1981) and capital stock weights.[29] We feel that the Euler equation model requires the more precise firm-specific depreciation rate and that, while the assumption of homogeneous capital stocks may be appropriate for some very large countries, it is inadequate for our sample of 17 countries.

The present value of tax savings from depreciation allowances is constructed from those tax parameters following Salinger and Summers (1983). The discount rate, β, is defined as $1/[1 + (1 - \tau)\, i - \pi^e]$, where i is the nominal interest rate, calculated as firm's average interest rate. Alternatively, fixing β at values between 0.90 and 0.99 did not qualitatively affect our empirical results. Finally, GDP deflators and investment price deflators (i.e., the price of capital goods) are from the OECD National Accounts tables.

Global Vantage provides information particularly well suited to the model derived in this paper. There are data that potentially allow precise identification of the accounting information that we have hypothesized have real effects. We use two period descriptors for additional identification of the model in our empirical work. Global Vantage provides a descriptor each period of the firm's accounting standard. Most usefully, the data reflect a domestic standard if a company omits a reference to a specific standard. When reported, the standards include: domestic standards; domestic standards in accordance with U.S. GAAP; domestic standards generally in accordance with OECD or International Accounting Standards Committee (IASC) guidelines; domestic standards for parents and domestic subsidiaries, native country or U.S. standards for overseas subsidiaries; modified U.S. standards (Japanese companies' financial statements translated into English); and U.S. standards. Another useful variable for our empirical analysis is the level of consolidation. This period descriptor identifies whether a company's financial statements represent consolidated or unconsolidated information. Applicable categories identified are: only domestic subsidiaries are consolidated, fully consolidated (parent company and subsidiary), nonconsolidated holding company, and nonconsolidated holding company (parent company only).

This appendix concludes with several caveats which may help guide applied researchers using Global Vantage in the future. Global Vantage offers a wealth of data that, in many ways, improve on more familiar firm-level panel data sets such as Compustat, Datastream, and Value-Line. There are, however, several negative features of the data set. The data set is split into four different files: industrial, financial services, issues, and currency.[30] The financial services file is superior to the industrial file in coverage and detail, reflecting the fact that

29. See, e.g., Hayashi and Inoue (1991).

30. The currency file contains exchange rates and cross-rate tables for designated currencies to facilitate cross-country analysis.

it was compiled after the industrial file. For example, equipment-and-structures capital stock data are provided in the financial services file but not in the industrial file. The biggest defect not easily overcome is that there is no way to seamlessly move between the industrial or financial services file and the issues file because there is no common reference variable across files. The issues file is in itself difficult to use because of the multiple equity issues discussed above. Finally, perhaps the most subtle and potentially important feature of the data is that the variables are scaled within each country. For example, data are reported in billions of yen or lira and in thousands of pound sterling. In addition, the scaling is not consistent *within* each country. For example, data for the British company BP are reported in millions of pound sterling, while most of the other companies in the U.K. sample are reported in thousands of pound sterling. Failure to account for this reporting difference causes data to be incorrect at three orders of magnitude with obvious consequences.

The programs used for data extraction and construction and for estimation are available from the authors on request.

Appendix C
Tax Parameters

This appendix details the tax parameters we use and relevant features of each country's tax code. It is divided into four sections. The first provides the marginal corporate income tax rate, τ. The second provides the investment incentive (credit or deduction), k. These first two sections consist primarily of two tables, annotated, where appropriate, to reflect particularly important features of the country's tax code. For additional detail we refer the interested reader to Cummins, Hassett, and Hubbard (1994), which specifically addresses the effects of tax reform on firm investment behavior. The next two sections provide depreciation and inventory valuation rules. Neither one of these sections of the tax code is easily or accurately summarized in a table, so we provide a detailed description for each country. Descriptions for the United States are omitted (see, e.g., Auerbach 1982, 1983; Hulten and Wykoff 1981; Salinger and Summers 1983; Shoven and Bulow 1975). While depreciation and inventory valuation rules change much less frequently than corporate tax rates and tax credits, they do change over our sample period. We will note particularly significant changes below, but again, we refer the interested reader to Cummins et al. (1995) for additional detail.

There are four data sources for this appendix. The primary source for current tax law is the loose-leaf services of the International Bureau of Fiscal Documentation (IBFD). The IBFD publishes guides to taxation in separate services

for Europe (*Guide to European Taxation. Volume 2, The Taxation of Companies in Europe*), Asia and the Pacific (*Taxes and Investment in Asia and the Pacific. Part 2, Countries*), and Canada (*Taxes and Investment in Canada*).[31] These services do not, in general, contain the historical detail necessary to construct a time series of changes in tax law. For that purpose, we use the IBFD's *Tax News Service*, which is a weekly periodical containing every significant tax law change. Some of the detail in the *Tax News Service* is contained in the IBFD's *Annual Report* and in its *European Tax Handbook*.

Two other sources are useful to validate and further illuminate the above sources. Neither provide sufficient detail, or, in some cases, accurate information, on relevant tax parameters. The OECD's *Taxing Profits in a Global Economy: Domestic and International Issues*, which tries to extend the King and Fullerton (1984) methodology, provides an annex which contains summaries of individual countries' tax laws. The summaries contain broad detail on each country's tax law but caution is advised. The data sources are undocumented, and several items were found to be incorrect. Coopers & Lybrand's *International Tax Summaries* and *International Accounting Summaries* provide concise and accurate yearly descriptions of countries' tax laws. The volumes sometimes lack sufficient detail on depreciation and inventory valuation rules and on the timing of tax changes.

Marginal Corporate Tax Rates

Table 7.1 reports the statutory marginal corporate income tax rates for the 17 countries in our sample over 1981–92. Close attention must be paid to the notes since no single rate completely summarizes the wide variation in the countries' tax systems. Two regularities are obvious. Rates vary widely and have steadily declined in nearly every country.

Investment Incentives

Table 7.2 reports the investment tax credits and deductions for the countries in our sample. Interestingly, only a few countries provide broad-based statutory investment incentives. However, all countries in our sample have investment incentives for specific regions or industries, for certain types of business fixed investment, or for research and development which are not reported. These special incentives tend to be extremely complex, and in many cases, they cannot be summarized because they are essentially negotiated between the taxpayer and tax authority.

31. In addition, the IBFD also publishes guides to taxation in Africa, the Middle East, China, Latin America, and the Caribbean.

Depreciation Rules[32]

Australia

Depreciation of assets is calculated on the cost price and the useful life of the assets (which before 1991 was estimated by the tax authority), which the taxpayer estimates based on the statutory definition. The tax authority continues to publish recommended depreciation rates which the taxpayer may elect over estimating useful life. Plant and machinery may be depreciated on either a straight-line (SL) or declining-balance (DB) basis. In the absence of a formal election for the SL method, the DB method is used. Most assets acquired after 1992 are depreciable by reference to a six-rate schedule, with useful lives ranging from three to more than thirty years and DB rates ranging from 10 to 60 percent. SL rates are two-thirds of DB rates. Assets may be depreciated at a lower rate at the option of the taxpayer. Assets with an effective life of less than three years or low-cost assets may be depreciated immediately. Structures may be depreciated at 2.5 percent per year if construction commenced after September 1987, 4 if construction commenced between August 1984 and September 1987, and 2.5 if construction commenced before August 1984. The period over which the depreciation may be claimed is 40 years for structures subject to the 2.5 percent rate and 25 years for structures subject to the 4 percent rate.

Belgium

Depreciation of assets is calculated on the cost price and the useful life of the assets and is allowed as of the financial year in which they were acquired or produced and must be applied every year. The law allows only SL and DB methods. SL is the normal method. The depreciation periods and the corresponding rates are normally fixed by agreement between the taxpayer and the tax authority, although for certain assets the rates are set by administrative ruling (e.g., commercial buildings 3 percent; industrial buildings 5; machinery and equipment 10 or 30; and rolling stock 20). DB is optional, as is a combination of both methods—if in a certain year the amount of depreciation computed by applying DB is lower than that computed according to SL, then a company can switch to the latter method. Accelerated depreciation (AD) is available for certain assets based on administrative ruling (e.g., ships and scientific equipment).

Canada

The capital cost allowance system groups depreciable assets into various classes (similar to the method used in the United States). Each class is depre-

32. Unless otherwise noted, assets may be revalued in conformity with the relevant tax law.

ciable at a specific rate, generally on a DB basis. In the year of acquisition, only half the normal rate may be claimed on that asset. The depreciation allowances are elective, allowing the taxpayer to claim any desired amount (subject to the maximum). The following sets out some of the more common types of depreciable assets with the applicable DB rates: structures 4 percent, machinery and equipment 30, and autos and computers 30. Asset revaluation is not allowed.

Denmark

SL depreciation for business structures is permitted. For most types of buildings the depreciation rate is 6 percent of cost during the first 10 years, and 2 percent thereafter (a lower rate is applied to service buildings of 4 and 1 percent, and a higher rate to building installations of 8 and 4 percent). Between 1982 and 1990, the depreciable base was adjusted annually for inflation. For equipment, DB depreciation is allowed on a collective basis. The rate may be chosen by the taxpayer but may not exceed 30 percent in any year. Tax depreciation is not allowed for accounting purposes.

France

Depreciation is normally computed by the SL method. However, the law provides for other methods, namely, DB and AD. The SL method may be applied without restriction. The rates are computed by dividing the expenditure by the estimated useful life of the asset as determined in accordance with accepted business practice. Taxpayers may opt for a varying depreciation rate based on a different useful-life estimation but this will be accepted only if the difference is within 20 percent of customary practice. The DB method is allowed on a more limited scale. It may not be applied to assets whose useful life is less than three years nor to many classes of assets. The rate is computed by multiplying the rate of SL depreciation by 1.5 if the useful life is three or four years, by 2 if the life is five or six years, and by 2.5 if the life exceeds six years. AD in the form of an initial deduction is available for certain assets (e.g., environmental protection equipment). Only limited asset revaluation is permitted.

Germany

Systems of depreciation allowed by law are the SL, DB, and certain other methods (e.g., sum of the years' digits). A switchover from DB to SL is permitted, but not vice versa. The rates of depreciation for buildings are set out in the law and for other assets in the official recommended tables (over 90 tables) that are issued by the various tax authorities. The taxpayer may deviate from them in individual cases on reasonable grounds. For business structures, the annual SL rate is 4 percent. The corresponding DB rates are, 10 percent for the first four years, 5 for the following three years, and 2.5 for the remaining 18 years. For fixed assets a general table applies SL rates of 10 percent for ma-

chinery, 20 for office equipment, 10 for office furniture, 20 for computers, and 20 for motor vehicles. If the assets are depreciated according to DB the annual rate is limited to three times the SL rate with an allowable maximum of 30 percent. AD is allowed for certain special assets (e.g., those in development areas or private hospitals) and if justified by excessive wear and tear. Asset revaluation is not allowed.

Ireland

Depreciation is granted for structures and plant and equipment (which has a relatively wide meaning). The SL method is typically used. Rates for principal depreciable assets are 4 percent for industrial structures, 10 for commercial structures, 10 for machinery and equipment, 20 for motor vehicles (DB method used), and 100 for research expenditure.

Italy

Depreciation of tangible assets is permitted on a SL basis. Depreciation is determined by applying the coefficients established by the tax authority, reduced by half for the first fiscal year. These coefficients are established for categories of assets based on normal wear and tear in various productive sectors (rates for structures vary from 3 to 7 percent, and for machinery and equipment from 20 to 25 percent). AD is also allowed. In addition to normal depreciation, the deductible amount may be increased by 200 percent in the year in which the asset is acquired and in one of the following two years. Moreover, normal depreciation may always be increased in proportion to more intense use of the asset (intensive depreciation). The amount of depreciation may be less than normal depreciation, and the difference may be spread over subsequent fiscal years. Only limited asset revaluation is permitted.

Japan

The amount depreciable on assets per year is computed on the assumption that their salvage value is 10 percent of the acquisition cost. However, companies may claim depreciation until the residual value of the asset reaches 5 percent (i.e., up to 95 percent of acquisition costs). The statutory useful lives of assets are prescribed by the tax authority. They range from 4 years (for motor vehicles) to 65 years (for office buildings). Special depreciation is available for assets subject to abnormal wear and tear and due to extraordinary circumstances. AD is also available for designated assets and industries (e.g., environmental protection equipment and ships.) Initial-year depreciation rates range from 8 to 30 percent and further AD can follow. Asset revaluation is not allowed.

Netherlands

Depreciation of assets is compulsory whether the company is profitable or not. Assets with a low cost can be fully depreciated in the year of acquisition.

All systems of depreciation are permitted provided that the system is in accordance with sound business practices and that it is consistently applied. This means that changes in the system will not be allowed when a change is made just for tax purposes. Depreciation is based on historic cost price, useful life, and the salvage value of the asset. No official guidelines for depreciation exist. In practice, the rates are agreed upon between the taxpayer and the tax authority.

New Zealand

A new depreciation regime became law in April 1993. The pivotal difference between the old and new regimes is that under the latter the taxpayer has a statutory right to a deduction for depreciation. Previous depreciation deductions were at the tax authority's discretion. The taxpayer may choose SL or DB methods. The method may be changed from year to year. Depreciation rates are calculated from a formula that accounts for acquisition cost, market value, and useful life. The tax authority provides a very extensive schedule of estimated useful lives (ranging from 4 to 50 years), with applicable DB and SL rates. Application for special rates may be made in certain circumstances. Previously, the tax authority mandated choice of SL or DB methods and depreciation rates.

Norway

The DB method of depreciation is mandatory. The 1992 tax reform has influenced the system of depreciation by changing the division of business assets into a smaller number of classes and by generally reducing the maximum rates allowed. Depreciable assets are divided into eight classes (maximum rates follow in parentheses): (1) office machines (30 percent), (2) goodwill (30), (3) motor vehicles (25), (4) equipment (20), (5) ships (20), (6) aircraft (20), (7) industrial structures (5), and (8) commercial structures (2). Assets in classes 1–4 are written down on a collective basis; classes 5–8 are depreciated individually. AD for ships, aircraft, and certain structures has been abolished as of 1992. Assets with an estimated life of less than three years and low cost assets may be depreciated immediately.

Spain

Depreciation is allowed on all tangible and intangible fixed assets on the basis of their normal useful life. Depreciation may be calculated by the SL method. In certain cases (e.g., industrial machinery and computers), the DB method is permitted. Rates for depreciation are contained in official tables. Examples of general maximum SL rates follow (with the minimum rate following in parentheses): Industrial structures 3 percent (2 percent), commercial structures 2 (1.33), machinery 8 (5.6), tools 20 (12.5), office furniture 10 (6.67), computers 25 (16.7), and motor vehicles 14 (9.1). Assets intensively used may be depreciated at a maximum rate increased by 33 percent for each

additional shift. Under the DB method, the annual depreciation rate is increased by 50 percent (if the useful life is less than five years), or by 150 percent (if the useful life is eight years or more). The tax authorities can accept, at their discretion, special AD (or even free depreciation) for certain assets and industries. Asset revaluation is not permitted.

Sweden

Machinery and equipment are normally depreciated by the DB method. The maximum depreciation allowance is 30 percent of the aggregate book value of all assets at the beginning of the tax year, plus the cost of assets acquired, less the amount received for assets sold during the year. Should a SL depreciation of 20 percent per year on all assets result in a lower book value in any year, the annual depreciation may be increased correspondingly. If the taxpayer can prove that the real value of machinery and equipment is lower than that resulting from the above-mentioned depreciation methods, the depreciation may be allowed in an amount resulting in the value. Assets with a useful life not exceeding three years and low-cost assets may be depreciated immediately. For buildings, only the SL method is permitted. In general, depreciation is based on cost and useful life. The rates vary between 1.5 and 5 percent per year as agreed by the taxpayer and the tax authority.

Switzerland

The SL and DB methods are allowed, but depreciation must conform to usual business practice. Official guidelines for depreciation are published, but they are not obligatory. In practice, depreciation rates vary among the cantons. AD (up to 80 percent) is allowed in certain cantons. Asset revaluation is not permitted.

United Kingdom

Industrial structures are eligible for 4 percent annual depreciation on the SL method. There are no allowances for commercial structures. Plant and equipment (which has a relatively wide meaning) is eligible for 25 percent annual depreciation on the DB method.

Inventory Valuation[33]

Australia

For valuation of stock, the tax authority accepts average cost (AC), standard cost (SC), specific identification (SI), and FIFO. LIFO and base-stock methods are not allowed.

33. Unless otherwise noted, stock is valued at the lower of cost or market value.

Belgium

The tax code does not contain special provisions for the valuation of stock. The tax authority therefore requires that the stock be valued at cost or market value, whichever is lower. As for methods, AC, SI, FIFO, and LIFO methods are accepted but the base-stock method is not.

Canada

Permissible inventory valuation methods include AC and FIFO. In some circumstances, the tax authority will accept the SC method. The LIFO method is not accepted.

Denmark

The AC, SI, FIFO, and SC methods are considered appropriate; LIFO is acceptable but rarely used.

France

The FIFO and AC methods are usually used. The LIFO method is not generally permitted except when used in consolidated financial statements.

Germany

From the assessment year 1990, LIFO is allowed. AC and SI are typical methods; FIFO is not allowed unless it approximates actual physical flows.

Ireland

FIFO, AC, or any similar method is allowed; LIFO is not acceptable.

Italy

Any system of inventory valuation is permitted provided it is not less than if the LIFO method is used.

Japan

For valuation of stock, the tax authority accepts AC, SI, LIFO, and FIFO. The method should be applied consistently and not distort the computation of the income of a corporation.

Netherlands

Under the sound business practice principle, many systems of inventory valuation are allowed (e.g., LIFO, FIFO, or base-stock methods). The system must be applied consistently.

New Zealand

The tax authority accepts the AC, SC, or FIFO methods of inventory valuation. LIFO and base-stock methods are not allowed.

Norway

The FIFO method must be used for inventory valuation.

Spain

Accepted methods for inventory valuation are AC (in practice, the generally applied method) and FIFO. The LIFO and base-stock methods are not accepted for tax purposes.

Sweden

Prior to 1991, inventories were frequently carried at an amount lower than the maximum amount permitted by the lower of cost or market value, due to tax incentives. In determining inventory valuation, the FIFO method should be applied.

Switzerland

Acceptable inventory valuation methods include AC, SC, and FIFO. LIFO is not permitted.

United Kingdom

FIFO, AC, or any similar method is allowed. LIFO is not acceptable.

References

Abel, Andrew B. 1980. Empirical investment equations: An integrative framework. *Carnegie-Rochester Conference Series on Public Policy* 12 (Spring): 39–91.

Auerbach, Alan J. 1982. The new economics of accelerated depreciation. *Boston College Law Review* 23 (September): 1327–55.

———. 1983. Taxation, corporate financial policy, and the cost of capital. *Journal of Economic Literature* 21: 905–40.

Ballon, R. J., and I. Tomita. 1988. *The financial behavior of Japanese corporations.* Tokyo: Kodansha.

Blundell, Richard, Stephen Bond, Michael Devereux, and Fabio Schiantarelli. 1992. Investment and tobin's *Q:* Evidence from company panel data. *Journal of Econometrics* 51 (January/February): 233–58.

Busse von Colbe, W., K. Geiger, H. Haase, H. Reinhard, and G. Schmitt. 1991. *Ergebnis nach DVFA/SG.* Dusseldorf: Schaffer.

Coopers & Lybrand. Various years. *International accounting summaries.* New York: Wiley.

———. Various years. *International tax summaries.* New York: Wiley.

Cummins, Jason G., and Kevin A. Hassett. 1992. The effects of taxation on investment: New evidence from firm-level panel data. *National Tax Journal* 45 (September): 243–52.

Cummins, Jason G., Kevin A. Hassett, and R. Glenn Hubbard. 1994. A reconsideration of investment behavior using tax reforms as natural experiments. *Brookings Papers on Economic Activity,* no. 2:1–74.

———. 1995. An international comparison of the effects of tax reforms on business fixed investment. Mimeograph, Columbia University.

Darrough, M., and T. S. Harris. 1991. Do management forecasts of earnings affect stock prices in Japan? In *Japanese financial market research*, ed. W. T. Ziemba, W. Bailey, and Y. Hamao. New York: Elsevier.

Easton, P. D., P. Eddey, and T. S. Harris. 1993. An investigation of revaluations of tangible long-lived assets. *Journal of Accounting Research* 31 (supplement): 1–38.

French, K., and J. Poterba. 1991. Are Japanese stock prices too high? *Journal of Financial Economics* 29 (October): 337–363.

Gilchrist, Simon, and Charles P. Himmelberg. 1991. Evidence on the role of cash flow in reduced-form investment equations. Mimeograph, New York University.

Hall, C., Y. Hamao, and T. S. Harris. 1993. A comparison of relations between security market prices, returns, and accounting measures in Japan and the United States. *Journal of International Financial Management and Accounting* 5 (February): 47–73.

Harris, T. S., M. Lang, and H. P. Möller. 1993. The value-relevance of German accounting measures: An empirical analysis. Mimeograph, Columbia University.

Hayashi, Fumio, and Tohru Inoue. 1991. The relation between firm growth and Q with multiple capital goods: Theory and evidence from panel data on Japanese firms. *Econometrica* 59 (May): 731–53.

Himmelberg, Charles P. 1990. A dynamic analysis of dividend and investment behavior under borrowing constraints. Mimeograph, New York University.

Hoshi, Takeo, Anil Kashyap, and David Scharfstein. 1991. Corporate capital structure, liquidity and investment: Evidence from Japanese industrial groups. *Quarterly Journal of Economics* 106 (February): 33–60.

Hubbard, R. Glenn, and Anil K. Kashyap. 1992. Internal net worth and the investment process: An application to U.S. agriculture. *Journal of Political Economy* 100 (June): 506–34.

Hubbard, R. Glenn, Anil K. Kashyap, and Toni M. Whited. 1995. Internal finance and firm investment. *Journal of Money, Credit, and Banking*, forthcoming.

Hulten, Charles R., and Frank C. Wykoff. 1981. The measurement of economic Depreciation. In *Depreciation, inflation, and the taxation of income from capital*, ed. Charles R. Hulten, 81–125. Washington, D.C.: Urban Institute Press.

International Bureau of Fiscal Documentation. Various issues. *Annual report.* Amsterdam: International Bureau of Fiscal Documentation.

———. Various issues. *European tax handbook.* Amsterdam: International Bureau of Fiscal Documentation.

———. Various issues. *Tax news service.* Amsterdam: International Bureau of Fiscal Documentation.

———. 1993. *Guide to European taxation. Volume 2, The taxation of companies in Europe.* Amsterdam: International Bureau of Fiscal Documentation.

———. 1993. *Taxes and investment in Asia and the Pacific. Part 2, Countries.* Amsterdam: International Bureau of Fiscal Documentation.

———. 1993. *Taxes and investment in Canada.* Amsterdam: International Bureau of Fiscal Documentation.

Jennings, R., D. P. Mest, and R. B. Thompson. 1992. Investor reaction to disclosures of 1974–75 LIFO adoption decisions. *Accounting Review* 67 (April): 337–54.

King, Mervyn A., and Don Fullerton, eds. 1984. *The taxation of income from capital: A comparative study of the United States, United Kingdom, Sweden, and West Germany.* Chicago: University of Chicago Press.

Kanniainen, Vesa, and Jan Södersten. 1994. Costs of monitoring and corporate taxation. *Journal of Public Economics* 55: 307–21.

OECD (Organisation for Economic Co-operation and Development). 1991. *Taxing profits in a global economy: Domestic and international issues.* Paris: OECD.

Oliner, S., G. Rudebusch, and D. Sichel. 1993. New and old models of business investment: A comparison of forecasting performance. Mimeograph, Board of Governors of the Federal Reserve System, Washington, D.C.
Ordelheide, D., and M. Pfaff. 1993. *German financial reporting.* London: Routledge.
Salinger, Michael, and Lawrence H. Summers. 1983. Tax reform and corporate investment: A microeconomic simulation study. In *Behavioral simulation models of tax policy analysis*, ed. Martin Feldstein. Chicago: University of Chicago Press.
Shoven, J., and J. Bulow. 1975. Inflation accounting and nonfinancial corporate profits: Physical assets. *Brookings Papers on Economic Activity*, no. 2: 557–98.
Tax Bureau, Ministry of Finance. 1990. *An outline of Japanese taxes: 1990.* Tokyo: Ministry of Finance.
Viner, Aron. 1988. *Inside Japanese financial markets.* New York: Dow Jones, Irwin.

Comment G. Peter Wilson

The Cummins, Harris, and Hassett paper differs from the typical offering in the international accounting literature because the authors test hypotheses using a rigorous model of economic behavior. This contrasts with the prevalent approach in the accounting literature, which is to use ordinary least squares to test for statistical relationships that are consistent with hypothesized behavior. I suspect the paper also differs from the usual offering in the economics literature in that the authors' hypotheses more fully exploit institutional aspects of international accounting. Thus, as we might expect from this research team, the paper significantly extends two literatures.

The authors examine an important research question: Are firms' investment decisions influenced by whether they are required to use essentially the same accounting for tax and financial reporting? In the United States, the accounting rules for recording many economic events differ significantly for tax and financial reporting because the authorities responsible for these rules recognize that their reporting objectives differ. The stated objective of financial reporting is to provide information that is useful for predicting future cash flows. In contrast, the objectives of tax reporting are subordinate to the broader social and economic objectives of the tax system, which include, among other things, raising revenue, redistributing income, and promoting certain kinds of economic activity.

The authors refer to the United States and other countries where there is little conformity between tax and financial reporting as "two-book" countries. They refer to countries where almost complete conformity is mandated for financial and tax accounting as "one-book" countries. Typically, one-book countries have congruent objectives for financial and tax reporting. For ex-

G. Peter Wilson is visiting associate professor of management at the Massachusetts Institute of Technology.

ample, in Germany, the ultimate one-book country, the objectives of the tax and financial reporting systems are essentially the same—to maintain capital.

The authors proffer that firms in one-book countries are disadvantaged, relative to their two-book counterparts, when they make tax-advantaged investments. The reason, they argue, is that the one-book firms must recognize the related accelerated depreciation deductions for both financial and tax purposes. In contrast, the two-book firms can use straight-line depreciation for financial reporting and, thus, report higher financial income. To the extent that profitability has the same impact on the cost of capital in both regimes, firms in one-book countries could face a higher cost of capital to finance new projects.

However, I question whether profitability is as important in the one-book regimes. For example, if the providers of German capital and the German tax authorities are both more interested in capital maintenance than in profitability, as the authors suggest, then why do the providers of capital care if financial reporting income is reduced to make investments that preserve capital? My concern here only makes the empirical question of whether the cost of capital is higher in one-book countries more interesting.

The authors cleverly model this additional cost of capital as the cost a one-book firm incurs to signal that its reduction in income is due to prudent tax planning rather than to poor operating performance. As indicated in equation (3), the cost of this revelation signal, Ω, which is treated as an additional adjustment cost in the standard investment model used by Cummins and Hubbard (chap. 5 in this volume), depends nonlinearly on the size of the tax benefit per dollar of investment, the amount invested, and the capital in place at the start of the year. This is a keen modeling insight, and I believe that it is the only point where the analytic and econometric analysis differs substantively from the Cummins and Hubbard paper. Thus, many of the discussant's comments about the Cummins and Hubbard paper are also appropriate here.

The signaling cost, Ω, is assumed to increase quadratically in the size of the tax benefits. On the one hand, this seems intuitive because we might expect firms with lower reported income to have to work harder to convince analysts that income is low because of good tax planning. On the other hand, if a one-book firm started using a second set of books (as some of the sample firms do), the cost of producing and distributing reports from these second books would not depend on the size of the tax break.

In a related matter, as the authors acknowledge, the model is silent as to whether the signaling cost is incurred by the firm or by shareholders in the form of additional monitoring fees. Another option is that these costs are paid to shareholders in the form of risk premiums that could possibly be reduced by additional disclosure. Accounting academics would like to know how these costs, which are variable in the model, compare to the fixed costs of establishing two sets of books or setting up business as an external intermediary such as the DVFA/SA. If firms or outside intermediaries cannot achieve the economies of scale to cover these fixed costs and firms cannot credibly convey their

private information to the capital markets, then the result could be a higher cost of capital in the form of risk premiums.

The results are mixed for the primary tests reported in table 7.5, which partition the data into one- and two-book countries. For both samples, the signaling cost parameter, α_1, has the wrong sign and the model's overidentifying restrictions are rejected. However, I agree with the authors that the most interesting results are reported in table 7.6. These are based on a subpartition of the one-book firms that produces a more powerful test of the authors' economic intuition. Firms are partitioned into (1) "pure" one-book firms that report in accordance with domestic accounting standards and are not fully consolidated and (2) not-so-pure one-book firms that voluntarily issue supplementary reports that conform to U.S. GAAP, presumably because they are accessing global capital markets. These latter firms do not incur revelation signaling costs because their U.S. GAAP numbers already reveal their profitability. The authors find that the signaling costs are significant and that the model is not rejected for the pure one-book firms. This is a nice result, and more generally, this paper is excellent research.

My only negative comment is that there are some disconnections between the appendices and the exposition in the main text. In particular, the authors could have explained more clearly how the various accounting procedures documented by country in the appendices affect the estimation of the model and the interpretation of the results. For example, they could have distinguished the accounting procedures that affect the variable's measurement errors from those that affect the accuracy of the sample partition. Aside from these minor concerns with the exposition, I think that this is superb work that demonstrates the gains that can be achieved when accountants and economists collaborate.

This Page Intentionally Left Blank