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A Comment**

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Capital Structure and International Debt Shifting: A Comment

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ABSTRACT: In a recent article, Huizinga, Laeven and Nicodème (2008) present a novel model that motivates an extensive empirical analysis of international debt shifting. We point out that the model fails to account for internal debt, and that once internal debt is properly accounted for, the external debt mechanism they propose is not identified in the empirical analysis. We also point out that affiliate specific debt costs reduce affiliate dividends. When this is implemented in the model, their regression equation can only be derived under the very restrictive assumption that effective tax rates on dividends are the same in all countries.

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1 Introduction

In a recent article Huizinga, Laeven and Nicodème (2008) (henceforth HLN) present a novel model that motivates an extensive empirical analysis of international debt shifting. They report their findings by stating: "*...stronger incentives for debt finance in one country encourage debt finance in that country but at the same time discourage debt finance in other countries to keep the overall indebtedness of the multinational in check*" (paragraph 4, p. 81).

This theoretical result is derived under two problematic assumptions. The first is that internal debt is not part of the firm's financing structure. A main insight of the corporate finance literature is that internal debt and equity are equivalent except for tax purposes, and that it is optimal for a multinational firm (MNC) to use internal debt as part of a tax-efficient debt structure. The importance of this mechanism is also documented in a series of empirical papers.¹

Their second assumption is that incentive related debt costs that affiliates incur do not affect affiliate dividends available for repatriation. It is well known that in a static model as in HLN, net cash-flow available for repatriation as a dividend in an affiliate consists of economic profit plus the return to equity minus tax payments (see Sinn 1987, p. 66). Hence, economic profit is diminished by affiliate specific debt costs, and such costs do indeed reduce affiliate dividend payments.²

We show that (i) if the first assumption is relaxed so that internal debt is allowed, the effect of the external debt mechanism in HLN is not identified. It is in fact likely that the empirical results in the paper are driven by internal debt shifting. (ii) If the second assumption is corrected, their regression equation (5) can only be derived if effective tax rates on dividends are the same in all countries. To make these points more rigorous, we present a brief model.

2 The model

Following HLN a multinational firm is domiciled in country p , but has affiliates in $i = 1, \dots, n$ countries. Each affiliate has fixed assets A_i and for the purpose of exposition we shall let this asset be capital used to produce a homogenous good by the production function $y_i = f(A_i)$. Rental costs of capital are exogenous (small country assumption) and equal to r . Capital A_i is financed either by equity I_i , external (third party) debt L_i , or internal debt \hat{L}_i from related affiliates. The inclusion of internal debt is a new feature we add to the HLN model. The balance sheet of affiliate i can be stated as $A_i = I_i + L_i + \hat{L}_i$, and the balance sheet of the MNC is $\sum_{i \neq p} I_i = I_p + L_p + \hat{L}_p$. Following HLN the cost function of external debt is

$$C(\lambda_i) = \frac{\mu}{2} \cdot (\lambda_i - \lambda^*)^2 \cdot A_i + \frac{\mu}{2} \cdot (\lambda^*)^2 \cdot A_i, \quad (1)$$

where λ^* is the optimal leverage ratio in absence of taxation, $\lambda_i = L_i/A_i$ is the leverage ratio of external debt in affiliate i , and $\mu > 0$ is a cost parameter.

¹See Mintz and Smart (2004), Desai, Foley, and Hines (2004), Mintz and Weichenrieder (2005), Büttner et al (2006) and Büttner and Wamser (2007).

²One could interpret the cost function in HLN as costs related to choosing investments with an inappropriate risk profile. Note, however, that only in a dynamic model such costs would reduce firm value only in the short run without showing up in the current income statement.

In a static model as the one used in HLN, the value of the firm and the dividends paid must be identical.

Internal debt costs may accrue due to the need to circumvent thin-capitalization and controlled-foreign-company rules, say, and we assume in line with the literature on internal debt that the cost function is given by

$$\hat{C}(\hat{\lambda}_i) = \frac{\eta}{2} \cdot (\hat{\lambda}_i)^2 \cdot A_i \text{ if } \hat{\lambda}_i > 0 \text{ and } \hat{C}(\hat{\lambda}_i) = 0 \text{ if } \hat{\lambda}_i \leq 0 \quad (2)$$

where $\hat{\lambda}_i = \hat{L}_i/A_i$ is the leverage ratio of internal debt in affiliate i and $\eta > 0$ is a cost parameter. In line with HLN we define $\lambda_f = \sum_i L_i / \sum_i A_i$ as the firm-wide leverage ratio for external debt, and follow them in that bankruptcy costs are proportional to the MNC's overall assets, as

$$C_f = \frac{\gamma}{2} \cdot \lambda_f^2 \cdot \sum_i A_i = \frac{\gamma}{2} \cdot \frac{(\sum_i L_i)^2}{\sum_i A_i}. \quad (3)$$

In order to make clear how HLN implicitly invoke symmetry assumptions on withholding taxes, let true and taxable profit in affiliate i be π_i^e and π_i^t , that is,

$$\pi_i^e = f(A_i) - r \cdot A_i - C(\lambda_i) - \hat{C}(\hat{\lambda}_i), \quad \pi_i^t = f(A_i) - r \cdot (L_i + \hat{L}_i).$$

In this set-up, debt costs are not tax deductible. One might argue that debt costs should be tax deductible, but the purpose here is to show the implications of the assumptions invoked by HLN. Tax deductible debt costs would not change our basic argument that debt costs reduce the amount of income available as a dividend, but it would greatly complicate the model.³

As in HLN we let V_i^L and V_i^U be the values of a leveraged and a completely unleveraged affiliate in country i , and define t_i as the statutory corporate tax rate in country i . Affiliate i 's profit after corporate taxation in country i is then

$$\pi_i = \underbrace{\pi_i^e - t_i \cdot \pi_i^t}_{=V_i^L} = \underbrace{(1 - t_i) \cdot f(A_i) - r \cdot A_i}_{=V_i^U} + t_i \cdot r \cdot (L_i + \hat{L}_i) - C(\lambda_i) - \hat{C}(\hat{\lambda}_i), \quad (4)$$

where it is seen from (4) that affiliate specific debt reduces potential dividend payouts.

In a static one-period model as used by HLN, the value of a firm (V^L) and the firm's after tax profit (Π_p) are identical, and can be calculated by summing up profits across all affiliates. Following HLN, repatriated dividends π_i can be subject to a non-resident withholding tax (w_i^e), the parent tax rate t_p on repatriated dividends (adjusted possibly for various credit schemes) and the corporate tax rate t_i . In HLN the effective after tax rate on dividends is defined as τ_i and encompasses different combinations of these three taxes, depending on the system for taxing repatriated dividends.⁴ Equation (4) shows, however, that the corporate tax rate t_i cannot be compounded in τ_i (as done in HLN). Hence, τ_i is a function of t_p and w_i^e only.⁵

The value of the firm can be written as $\Pi_p = V^L = \sum_i \tau_i \cdot V_i^L - C_f = \sum_i \tau_i \cdot \pi_i - C_f$. Maximizing Π_p taking into account that the overall sum of lending and borrowing from related

³With tax deductible debt costs, we are not able to derive a closed form structural equation like equation (8). The complication arises due to the overall debt cost that is key to the HLN external debt shifting mechanism.

⁴See, e.g. page 87 where under the deduction system $\tau_i = 1 - (1 - t_p)(1 - w_i^e)(1 - t_i)$.

⁵See Leechor and Mintz (1993) for a discussion of how τ_i also may depend on corporate policy.

companies must be equal to zero ($\sum_i r \cdot \hat{L}_i = 0$), the maximization problem is

$$\begin{aligned} \max_{L_i, \hat{L}_i} \Pi_p &= \sum_i \tau_i \cdot \{(1 - t_i)f(A_i) - r \cdot A_i + t_i \cdot r \cdot (L_i + \hat{L}_i) \\ &\quad - \frac{\mu}{2} \cdot \left(\frac{L_i}{A_i} - \lambda^*\right)^2 \cdot A_i - \frac{\mu}{2} \cdot (\lambda^*)^2 \cdot A_i - \hat{C}(\hat{\lambda}_i)\} - \frac{\gamma}{2} \cdot \frac{(\sum_i L_i)^2}{\sum_i A_i} \\ \text{s.t. } \sum_i r \cdot \hat{L}_i &= 0. \end{aligned}$$

The resulting first order conditions are

$$L_i: \tau_i \cdot \left\{ t_i \cdot r - \mu \cdot \left(\frac{L_i}{A_i} - \lambda^* \right) \right\} - \gamma \cdot \frac{\sum_i L_i}{\sum_i A_i} = 0, \quad (5)$$

$$\hat{L}_i: \tau_i \cdot \left\{ t_i \cdot r - \hat{C}'(\hat{\lambda}_i) \cdot \frac{1}{A_i} \right\} - m \cdot r = 0, \quad (6)$$

where m is the Lagrangian multiplier. From (6) it follows that

$$\frac{\hat{C}'(\hat{\lambda}_i)}{A_i} = r \cdot \frac{\tau_i \cdot t_i - m}{\tau_i} \quad \text{and} \quad m = \min_i t_i^e = \min_i \tau_i \cdot t_i = \tau_1 \cdot t_1. \quad (7)$$

For illustrative purposes we number the countries such that country 1 has the lowest effective tax rate t_i^e . By applying (2), $\hat{\lambda}_i = \frac{r}{\eta} \cdot \frac{\tau_i \cdot t_i - \tau_1 \cdot t_1}{\tau_i} > 0$ in all affiliates $i > 1$ and $\hat{\lambda}_1 = \frac{-\sum_{i>1} \hat{L}_i}{A_1} < 0$. This shows that it is profit maximizing for a multinational firm to use internal debt and that any analysis that omits internal debt does not model a tax-efficient financing structure.

In an unpublished note related to their main paper Huizinga, Laeven and Nicodème (2006) discuss the effect of thin capitalization rules on optimal ratios for both total debt to assets, external debt to assets and internal debt to assets. Our result above implies that almost all the cases discussed in this note do not arise. This is because they structure the problem so that only a parent company can provide internal debt.⁶ As shown in equation (7) any subsidiary can provide internal debt, not only the parent firm. Furthermore, a tax efficient financing structure implies that it is the subsidiary located in the country having the lowest effective rate of tax that will be the financial center. Indeed this seems to explain why countries such as Belgium and the Netherlands attract so many financial centers of multinationals. Both countries have special rules for financial operations that lead to very low effective tax rates.

Turning to the first order condition (5), it can be shown that only if all countries employ the same effective tax on repatriated dividends ($\tau_i = \tau_j$, $i \neq j$), can the first order condition (5) in HLN, which is used as a basis for their regression equation (6), be derived.⁷ Applying the definitions given in HLN for β_k , $k = 0, 1, 2$, correcting these for the proper effective withholding tax term, we have $\beta_0 = \frac{\tau \cdot \mu}{\tau \cdot \mu + \gamma}$, $\beta_1 = \frac{1}{\tau \cdot \mu + \gamma}$ and $\beta_2 = \frac{\gamma}{\tau \cdot \mu + \gamma}$. Following the same procedure as in HLN, we obtain

$$\lambda_i = \beta_0 \cdot \lambda^* + \beta_1 \cdot r \cdot \tau \cdot t_i + \beta_2 \cdot r \cdot \sum_{j \neq i} (t_i - t_j) \cdot \rho_j, \quad (8)$$

⁶This assumption is used in much of the literature, but Mintz and Smart (2004) make it clear that this assumption is far too restrictive.

⁷The full derivation is available in a discussion paper version of this comment.

which corresponds to equation (5) in HLN if we set the interest rate $r = 1$, an assumption they implicitly invoke. Defining $\beta_3 = \frac{1}{\eta}$ and using $\tau_i = \tau_j = \tau$ again, the total leverage ratio $b_i = \lambda_i + \hat{\lambda}_i$ of an affiliate $i > 1$ is

$$b_i = \beta_0 \cdot \lambda^* + \beta_1 \cdot r \cdot \tau \cdot t_i + \beta_2 \cdot r \cdot \sum_{j \neq i} (t_i - t_j) \cdot \rho_j + \beta_3 \cdot r \cdot [t_i - t_1], \forall i > 1,$$

whilst the overall leverage ratio of the internal bank, $b_1 = \lambda_1 + \hat{\lambda}_1$, is

$$b_1 = \beta_0 \cdot \lambda^* + \beta_1 \cdot r \cdot \tau \cdot t_1 + \beta_2 \cdot r \cdot \sum_{j \neq 1} (t_1 - t_j) \cdot \rho_j - \frac{\sum_{i>1} \hat{\lambda}_i}{A_1}.$$

3 Interpretation of Empirical Results

In the empirical application, HLN measure leverage as total leverage including internal debt. The equation they estimate is

$$b_{pit} = \alpha_p + \beta_1 \cdot \tau_{pit} + \beta_2 \cdot \sum_{j \neq i} (\tau_{pit} - \tau_{pjt}) \rho_{pjt} + \gamma \cdot X_{pit} + \varepsilon_{pit},$$

where X represents various control variables and ε is an error term. The index pit is subsidiary i of parent firm p at time t . Parent firms are not included in their main sample, and data on subsidiaries outside Europe is unavailable. According to our revised version of their model they should have estimated

$$b_{pit} = \alpha_p + \beta_1 r \cdot \tau t_{it} + \beta_2 r \cdot \sum_{j \neq i} (t_{it} - t_{jt}) \rho_{pjt} + \beta_3 r \cdot (t_{it} - t_{p1t}) + \gamma \cdot X_{pit} + \varepsilon_{pit}, \forall pi > p1$$

In this equation t_{p1t} denotes the corporate tax rate of the subsidiary within the group facing the lowest corporate tax rate. We see immediately that the inclusion of r demands some reinterpretation of their estimated coefficients.⁸ Furthermore, the use of τ_{pit} (as they define it) instead of t_{it} will cause an attenuation bias in β_2 due to measurement error in their main variable, $\sum_{j \neq i} (\tau_{pit} - \tau_{pjt}) \rho_{pjt}$.⁹ Regarding the sample, we see that it is the subsidiary in the low tax country that should have been excluded, rather than the parent firm.

We will put these issues aside and focus on the effect of the omitted variable $(t_{it} - t_{p1t})$. Desai, Foley, and Hines (2004), Mintz and Weichenrieder (2005), Büttner et al (2006) and Büttner and Wamser (2007) all find that internal debt is sensitive to tax rates. It is therefore likely that this is an important explanatory variable for total leverage. Since $(t_{it} - t_{p1t}) \approx (\tau_{pit} - \tau_{p1t})$, and $(\tau_{it} - \tau_{p1t})$ is part of their main variable $\sum_{j \neq i} (\tau_{pit} - \tau_{pjt}) \rho_{pjt}$, the omitted variable $(t_{it} - t_{p1t})$

⁸ Assuming that $r = 1$ as HLN implicitly do seems rather haphazardous.

⁹ What happens to β_1 is harder to assess. τ_{pit} is different from the "true" variable τt_i coming out of the revised model, but this "true" variable builds on the inaccurate symmetry assumption $\tau_i = \tau_j$ for all i and j .

will be positively correlated with their main variable.¹⁰ This will cause a positive bias in the estimated β_2 . Actually, it is quite possible that the effect HLN find of the differences between the national and foreign tax rates on leverage, is driven by internal debt rather than the external debt mechanism they model.¹¹

It should be noted that HLN discuss internal debt in an extension to the empirical analysis. In order to explore the robustness of their results, they construct a variable φ_i , capturing the relative tax advantage of internal debt versus equity. This variable is defined in their table 6. It will in most cases be equal to $(t_i - t_p)$.¹² They report the result of adding φ_i to the regression in table 11, column (1). They do not find a significant effect of this variable and conclude that their main result is not affected by the incentive to use internal debt. It is, however, evident from our revised version of their model that this ad hoc procedure is ill-conceived since it is not the tax difference vis-a-vis the parent firm that matters, but the tax difference vis-a-vis the subsidiary facing the lowest tax rate within the group.

¹⁰Note that $(t_{it} - t_{p1t}) = (\tau_{pit} - \tau_{p1t})$ in cases where both the parent firm and the subsidiary belong to countries in the Eurozone.

¹¹The external debt mechanism they model depends on the assumption that parent firms provide explicit or implicit credit guarantees for the debt of all their subsidiaries. One motive of setting up a subsidiary in a foreign country may, however, be to limit the liability of the parent company. If this is common, the true β_2 will be small. On the other hand, $(t_{it} - t_{p1t})$ is unobservable in cases where MNCs have subsidiaries in tax havens outside Europe. This may weaken the omitted variable bias, although it also increases the measurement error in their main variable.

¹²This is, e.g. the case when both the subsidiary and the parent belong to an EU country. Repatriated dividends are tax exempt in the parent country while interests received are subject to the ordinary corporate income tax.

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