

Trade Credit and Taxes¹

Mihir A. Desai
Harvard University and NBER
mdesai@hbs.edu

C. Fritz Foley
Harvard University and NBER
ffoley@hbs.edu

James R. Hines Jr.
University of Michigan and NBER
jrhines@umich.edu

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Abstract

This paper analyzes the extent to which firms use trade credit to reallocate capital in response to tax incentives. Tax-induced differences in pretax returns encourage the use of trade credit to reallocate capital from firms facing low tax rates to those facing high tax rates. Evidence from the worldwide operations of U.S. multinational firms indicates that affiliates in low-tax jurisdictions use trade credit to lend, whereas those in high-tax jurisdictions use trade credit to borrow: ten percent lower local tax rates are associated with net trade credit positions that are 1.4 percent higher as a fraction of sales. The use of trade credit to get capital out of low-tax, low-return environments is also illustrated by reactions of U.S. firms to the temporary repatriation tax holiday in 2005, when affiliates with positive net trade credit positions were significantly more likely than others to repatriate dividends to parent companies in the United States.

1. Introduction

This paper examines the extent to which taxation influences trade credit practices by affecting returns to investment. High rates of taxation generally increase the cost of capital, reducing investment levels and driving up pretax returns. As a result, tax rate differences create incentives to transfer capital from low-tax, low-capital-cost, low-return users to high-tax, high-capital-cost, high-return users by delaying or accelerating the payment of trade accounts.

The effects of taxation on the use of trade credit are most readily observed internationally, where tax rate differences are sizeable and apparent. The empirical work in this paper uses comprehensive data collected by the U.S. Bureau of Economic Analysis (BEA) on the operations of U.S. multinational firms to examine the extent to which international tax rate differences account for their trade credit practices. Foreign affiliates of U.S. multinational firms make extensive use of trade credit: at yearend 2004 these affiliates held current accounts receivable of \$1.49 trillion and had current accounts payable of \$1.39 trillion; each of these exceeded 30 percent of total annual affiliate sales.

The analysis of detailed affiliate-level data suggests that tax effects are large and statistically significant in explaining trade credit choices. Figure 1 offers descriptive evidence, drawn from published BEA data, of the extent to which tax incentives may influence the use of trade credit by multinational affiliates. The figure presents information on the foreign affiliates of U.S. multinational firms sorted by tax rates in their host foreign countries. The bars depict average accounts receivable, accounts payable, and net working capital (the difference between accounts receivable and accounts payable) for affiliates in countries with designated tax rates, all scaled by affiliate sales. Each bar is the mean of the country aggregate values, by varying levels of corporate tax rates. The figure shows that accounts receivable and accounts payable, as well as differences between the two, are greater in low-tax jurisdictions than in high-tax jurisdictions. The evidence that low tax rates are associated with high net working capital positions is consistent with incentives to use trade credit to allocate capital to places where it generates high pretax returns.

The regression analysis presented in section 3 investigates the effects of local tax rates in specifications that control for observable firm-level factors. Regressions using parent company fixed effects confirm that affiliates in high-tax countries have smaller net working capital

positions than do other affiliates; higher tax rates are associated with greater borrowing through trade accounts that is similar in magnitude to the additional non-trade account borrowing that is commonly associated with higher tax rates. The association of tax rate differences and net working capital positions is strongest for wholly-owned affiliates and for those with high levels of trade with related parties. These patterns suggest that tax-influenced use of trade credit is most easily facilitated when borrowers and lenders are controlled by the same firm. Furthermore, the net working capital positions of affiliates with strong idiosyncratic capital needs, as reflected by unusually large capital expenditures or little cash on hand, appear to be largely unaffected by local tax rates.

The association of higher tax rates and greater additional borrowing through trade credit typically reflects choices not only of trade credit practices but also of investment location and other decisions that influence a firm's average tax rate. Firms facing higher tax rates have greater incentives to borrow via trade credit; and firms with higher levels of trade credit borrowing are relatively less burdened by high tax rates. Consequently, while it is a convenient shorthand to refer to the effect of taxation on trade credit practices, the cross-sectional association of tax rates and net working capital positions is likely the product of many decisions that firms make.

Responses to recent changes in U.S. international tax policy offer additional evidence of the use of trade credit to reallocate capital to more productive uses. The 2004 U.S. Homeland Investment Act provided for a one-time tax holiday in 2005 for repatriated foreign earnings. Prior to the holiday, U.S. multinational firms with accumulated foreign profits but without attractive foreign investment opportunities could use trade credit arrangements to reallocate a certain amount of capital to the United States or another high-tax country. The 2004 Act greatly lowered the cost of reallocating capital to the United States, albeit only for a single year, by permitting many firms to pay U.S. tax on only 15 percent of the dividends they received from foreign affiliates. Among foreign affiliates that prior to 2005 were using trade credit to reallocate capital elsewhere, the sudden appearance of an attractive new alternative should be associated with significant dividend repatriations to the United States in 2005.

Figure 2 depicts aggregate dividend payout ratios for two samples of foreign affiliates of U.S. firms in 2004 and 2005. The left two bars display dividend payout ratios for directly owned

affiliates that had positive net working capital positions in 2004. If these affiliates used working capital arrangements to reallocate capital to a high-tax location such as the United States prior to the tax holiday, they should respond to the tax holiday in a more pronounced manner than other affiliates, whose behavior is described by the two bars on the right. The shaded bars present aggregate payout ratios for 2004, and the unshaded bars present payout ratios for 2005. This figure indicates that those affiliates that were directly owned and had positive net working capital positions prior to the tax change increased their dividend payout ratios much more than did other affiliates. Regression results are also consistent with this finding, and additional analysis indicates that affiliate net working capital positions fell in low tax jurisdictions at the time of the tax holiday on repatriations. These apparent reactions to the tax change are consistent with pre-2005 use of trade credit to reallocate capital to locations where it earns higher returns, and the emergence in 2005 of a more permanent and cost-effective method of doing so.

Existing work emphasizes explanations for the use of trade credit that are unrelated to taxes. Several papers, including Burkart and Ellingsen (2004), Giannetti, Burkart and Ellingsen (2011), Cunat (2006), and Fabbri and Menichini (2010) highlight the ability of suppliers to lend in a way that limits managerial opportunism more effectively than can financial lenders. Other studies, such as Lee and Stowe (1993), Long, Malitz, and Ravid (1993), Ng, Smith, and Smith (1999), and Antràs and Foley (forthcoming) explain how trade credit arrangements solve information problems concerning product quality and buyer creditworthiness. Relatedly, Petersen and Rajan (1994) present evidence that monitoring provided by suppliers might aid firms in accessing financial lenders who can free-ride on the monitoring provided by suppliers. Trade credit decisions also appear to reflect the bargaining power of buyers and suppliers, as indicated by Klapper, Laeven and Rajan (2012). Fisman and Love (2003), and Love, Preve, and Sarria-Allende (2007), identify some of the consequences of access to trade credit. Meltzer (1960) and Ramey (1992) explain trade credit as a means of reallocating capital across firms, though the motives for this reallocation are unrelated to taxes. Of course these different explanations for the use of trade credit, and explanations related to tax incentives, are not mutually exclusive.

A few studies consider tax motivations for the use of trade credit. Brick and Fung (1984) consider the implications of a cash accounting regime, in which transactions are taxed when payments are made. In such a setting, heavily taxed firms have incentives to extend credit to

lightly taxed firms, thereby deferring receipt of cash and thereby deferring the recognition of tax liabilities. Most corporations, however, including all publicly traded corporations, are required to use accrual accounting for tax purposes. Under accrual accounting, a firm must pay tax on income as it accrues, so is taxed on the proceeds of a completed sale even when cash is not yet received. Mian and Smith (1992) note that heavily taxed sellers might be able to defer tax liabilities by using installment sales that are permitted under IRS rules and that allow taxpayers using accrual accounting to defer recognizing sales revenue until cash is actually received. Brennan, Maksimovic and Zechner (1988) also consider the tax treatment of installment sales, but conclude that they do not reduce the present value of tax liabilities. Under IRS rules, if sellers defer income recognition then buyers are unable to claim tax deductions for expenses until payment is actually made. Furthermore, the special tax treatment of installment sales is available only in certain circumstances involving sales of capital assets; it is not available for the vast majority of corporate sales, including sales of inventory property and services.¹

The requirement that corporations use accrual accounting for tax purposes means that, as a practical matter, the use of trade credit does not affect the timing of tax liabilities resulting from a sale. Taxation does, however, affect incentives to locate capital assets in certain locations. High tax rates generally discourage investment and thereby raise pretax investment returns; low tax rates encourage investment and depress pretax investment returns. The adept use of trade credit affords the opportunity to locate capital where its pretax return is greatest. As a result, firms have incentives to use trade credit to reallocate assets to heavily taxed affiliates because tax rate differences make it more advantageous for one of the parties to a transaction to hold capital.

Section 2 of the paper analyzes the underlying tax incentives to use trade credit to reallocate capital and describes empirical predictions related to these incentives. Section 3 describes the data and presents the empirical analysis of the predictions. Section 4 concludes.

2. *Understanding the impact of taxes on trade credit*

This section considers the effect of tax rate differences on incentives to use trade credit to reallocate capital. High tax rates discourage investment, raising pretax marginal products of

¹ Graetz and Schenk (2009, pp. 693-732) review the interpretation and application of U.S. tax law to corporate accounts receivable and accounts payable.

capital above levels that prevail in environments with low tax rates. Differences in pretax marginal products of capital then create opportunities for mutually beneficial trade by delaying or accelerating payment of trade credit accounts to put capital where it is most productive. Temporary changes in the taxation of multinational firms can also influence the use of trade credit.

2.1. Trade Credit, Taxes, and Capital Reallocation

Two corporations that buy and sell items from each other can either pay at the time of purchase, or else pay at another time, in the meantime creating accounts payable and accounts receivable. Corporations are required to use the accrual method in calculating their tax liabilities, so income is taxable when it is earned, not necessarily when it is received. Consequently, a corporation must pay income taxes on sales to another party, even if it has not yet received payment, as long as the sale has taken place and the buying party can reasonably be expected to make that payment eventually; similarly, the buying party receives an immediate tax deduction, even though the payment takes place on a different date. Thus, for example, a corporation that sells inventory property for \$100 to another corporation that does not pay immediately is required to include the \$100 in its taxable income this year, and similarly, the corporation that purchases the inventory property is entitled to a tax deduction of \$100, even though it has not yet paid. One implication of accrual accounting is that the mere timing of the payments does not affect the timing of tax liabilities; what matters is the date on which income is earned. A similar rule applies to prepayments: if a buyer pays now for a future purchase, the seller does not have taxable income, and the buyer does not receive a tax deduction, until the sale is ultimately completed.

Consider a setting in which firm i , which could be a U.S. multinational parent company, purchases a good worth one dollar from firm j , which could be a foreign affiliate of that parent, at the start of a year and faces the question of whether or not to pay immediately. If firm i delays payment then it accrues an account payable that it will settle at the start of the following year with interest r , so next year it pays $(1+r)$. As a result of not paying this year, firm i has the use of an additional dollar of capital for the year, thus increasing K_i , and firm j foregoes the use of the same dollar of capital, thus decreasing K_j . Suppose that firm i 's production function is given by $Q_i(K_i)$, in which Q_i is firm i 's output and K_i its level of financial capital. Then after earning

$Q'_i(K_i)$ of income from the additional dollar of financial capital, and remitting $(1+r)$ to firm j at the start of the next year, the delayed payment nets firm i after taxes:

$$(1) \quad [Q'_i(K_i) - r](1 - \tau_i),$$

in which τ_i is the tax rate facing firm i . Expression (1) reflects that both that the additional income is taxable and that firm i is entitled to deduct from taxable income the interest component of its settlement of the account payable to firm j . Similarly, firm j loses the benefit of using a dollar of financial capital for a year, but receives interest, so after taxes it nets:

$$(2) \quad [r - Q'_j(K_j)](1 - \tau_j),$$

in which $Q'_j(K_j)$ is the marginal product of capital held by firm j and τ_j the tax rate facing firm j .

Expressions (1) and (2) can be viewed as participation constraints in which both parties have incentives to use trade credit if $Q'_i(K_i) \geq r \geq Q'_j(K_j)$. By delaying payment, firm i effectively borrows from firm j and benefits from this trade due to a difference in pretax marginal products of capital. If the pattern of pretax marginal products of capital were reversed, so that $Q'_i(K_i) < Q'_j(K_j)$ and r lies between them, then firm j is a more productive user of capital than firm i , and both can benefit by having firm i prepay for its purchase.

Tax rate differences influence marginal products of capital and thereby affect incentives to use trade credit. To describe these effects, it is helpful to begin by considering the case in which firms do not use trade credit, are equity financed, and thereby face the full corporate tax.² Then if the shadow cost of the use of a dollar of equity for a year is common for all firms at an

² The assumption of equity finance is a common starting place in the analysis of the effect of corporate taxation, since if corporate investment is instead debt-financed, then there is effectively no corporate tax: a firm that is 100 percent debt-financed, with an average return on investment equal to the interest rate, has interest deductions that exactly offset its taxable income, leaving zero corporate tax to be paid (Auerbach, 2002). The evidence that high tax rates discourage investment, together with the hundreds of billions of dollars collected by the U.S. corporate tax each year, suggests that in practice corporations are not entirely debt financed. Hassett and Hubbard (2002), Chirinko, Fazzari and Meyer (1999), Desai and Goolsbee (2004), Djankov et al. (2010), Da Rin, Giacomo, and Sembenelli (2011), and Bond and Xing (2010) offer evidence of the impact of corporate tax rates on investment. Graham (2000) measures the extent to which firms borrow too little from a tax standpoint; he estimates that the average firm in his sample could double its debt-related tax benefits by taking on additional debt.

after-tax value of λ , it follows that firms invest to the point that after-tax marginal products of capital equal this common cost of funds, $Q'_m(K_m)(1-\tau_m) = \lambda, \forall m$, so:

$$(3) \quad Q'_j(K_j) = Q'_i(K_i) \frac{(1-\tau_i)}{(1-\tau_j)}$$

Hence, if $\tau_i > \tau_j$ then $Q'_i(K_i) > Q'_j(K_j)$, the marginal product of capital held by firm i is greater than that held by firm j . There are mutual benefits available by delaying payment from firm i to firm j . As a result of the delayed payment, capital flows from the lightly taxed to the more heavily taxed firm, because the pretax marginal product of capital of the heavily taxed firm is higher due to the lower investment levels induced by the higher tax rate.

The advantage of using trade credit is manifest by summing expressions (1) and (2) to obtain the joint benefit generated by the contemplated delayed payment:

$$(4) \quad Q'_i(K_i)(1-\tau_i) - Q'_j(K_j)(1-\tau_j) + r(\tau_i - \tau_j)$$

The joint benefit consists of the difference between the after-tax marginal products of capital, as given by the first two terms of expression (4), and the tax-advantaged location of interest payments and receipts, as given by the third term. If after-tax marginal products of capital are equal, then the first two terms offset each other and there is a gain to the transaction associated with the third term.³ Capital reallocation raises the after-tax marginal product of capital of firm j and reduces the after-tax marginal product of capital of firm i . Reallocation continues until either there is no more opportunity to use trade credit in this way or the tax saving associated with having firm i incur costs r and firm j earn income r equals the wedge in after-tax marginal products of capital. All other considerations equal, larger tax rate differences induce greater reallocations of capital. Trade credit, just like debt, reduces the distortion to investment levels created by the corporate tax by encouraging firms to reallocate investment to higher tax locations.

³ The third term of expression (4) corresponds to the net value of interest tax deductions in the high-tax jurisdiction and taxes on interest income in the low-tax jurisdiction, reflecting that trade credit reallocates capital in a manner that is treated for tax purposes like borrowing. Since higher tax rates are consistently associated with greater propensity to use debt finance (Graham, 1996; Desai, Foley and Hines, 2004; Huizinga, Laeven and Nicodeme, 2008), it follows that firms facing high corporate tax rates should be expected to borrow using trade credit, whereas those facing low corporate tax rates should be expected to use trade credit to loan to other firms.

2.2 Sources of Tax Rate Differences for Multinational Firms

Tax rate differences across countries create incentives for multinational firms to use trade credit arrangements. Multinational affiliates in low tax jurisdictions where pretax investment returns are low have incentives to extend credit to affiliates in high tax jurisdictions where pretax returns are high. The system by which the United States taxes foreign source income also creates incentives for U.S. multinationals to use trade credit to reallocate capital between foreign and U.S. operations. The United States taxes the worldwide incomes of U.S. firms, but permits deferral of U.S. taxes on certain foreign income that is retained abroad. U.S. taxpayers are also entitled to claim tax credits for foreign income tax payments. As a result of this system, many U.S. firms have incentives to defer repatriation of foreign profits earned in low-tax countries because returning the profits to the United States triggers a tax equal to the difference between the U.S. corporate tax rate and the rate at which the profits are taxed by foreign governments.⁴

A U.S. firm repatriating one dollar from its foreign affiliate receives $(1 - \tau)$ after tax, in which τ is the U.S. tax net of foreign tax credits. Alternatively the firm could reinvest the same dollar in its foreign operation for n years and then repatriate the accumulated funds. Delaying repatriation in this way yields the firm:

$$(5) \quad \frac{[1 + \alpha(1 - \tau^*)]^n (1 - \tau)}{(1 + \delta)^n},$$

in which α is the pretax return on reinvested foreign profits, τ^* is the foreign tax rate, and δ is the annual rate at which the firm discounts cash flows. As Hartman (1985) notes, expression (5) equals $(1 - \tau)$ if $\alpha(1 - \tau^*) = \delta$, so that the after-foreign-tax return on foreign investment equals the domestic after-tax discount rate. Firms with foreign investment opportunities yielding pretax returns that exceed $\delta/(1 - \tau^*)$ therefore have incentives to delay repatriation.

⁴ Hartman (1985), Sinn (1993) and Hines (1994) analyze repatriation incentives created by home country taxation of foreign income; and Desai, Foley and Hines (2001), Foley, Hartzell, Titman and Twite (2007), and Dharmapala, Foley and Forbes (2011) offer evidence of the extent to which the U.S. tax system discourages repatriation of foreign income.

If the domestic discount rate equals the after-tax marginal return on domestic investment, and the domestic tax rate exceeds foreign tax rates, then a system that taxes foreign profits on repatriation encourages firms to retain profits abroad to the point at which marginal foreign capital generates lower pre-tax returns than marginal domestic capital, so any tax-neutral method of reallocating capital from foreign affiliates to the domestic parent company looks attractive. Firms can do so by having parent companies delay payment for inventory property received from foreign affiliates or have foreign affiliates prepay for inventory property that parent companies will subsequently provide the affiliates. In both cases the function of the trade credit arrangement is to reallocate capital from foreign affiliates to their parent companies. In the first of these cases one can think of the foreign affiliate as repatriating in the form of property rather than cash.

Some aspects of U.S. law create specific opportunities for U.S. multinationals to reallocate capital in response to differences between U.S. and foreign rates. Foreign affiliates can reallocate capital by purchasing accounts receivable from their parent companies; if the accounts are owed by non-U.S. persons, for example due to export sales by the parent company, then purchase of an account receivable is not treated as a constructive repatriation, and the subsidiary effectively swaps its capital for a loan made by the parent company. Laws limiting deferral of U.S. taxes on foreign income require that the payments subsequently received by the foreign affiliate from the accounts receivable will be subject to immediate U.S. taxation, but this arrangement nonetheless reallocates capital from the foreign affiliate to the U.S. parent company without subjecting the capital amount to U.S. taxation. If instead the foreign affiliate were to make an ordinary loan to the U.S. parent company, U.S. tax rules would treat the loan as a repatriation of profit, subjecting the loan amount to immediate U.S. taxation.

Suppose that a foreign affiliate is able to invest up to a fraction μ of its retained foreign earnings in real capital investments earning pretax annual returns of θ . If $\theta > r$, in which r is the market interest rate embedded in working capital loans, and $\theta > \delta / (1 - \tau^*)$, then the real capital investment opportunities are attractive on an after-tax basis and the affiliate will allocate the full fraction μ of its retained foreign earnings to these opportunities. Remaining funds that can be readily lent through trade credit and that earn a rate of return $r > \delta / (1 - \tau^*)$ will trigger the use of trade credit. This framework suggests a hierarchy: funds are used first for attractive

capital investments, next for trade credit loans in countries with sufficiently low tax rates, and remaining funds repatriated to parent companies.

The opportunity to exploit a temporary reduction in home country taxation of repatriated funds, as was available to U.S. firms in 2005, changes a firm's investment and repatriation decisions. Consider the case in which the applicable repatriation tax rate temporarily becomes $\gamma\tau$, so that immediate repatriation of a dollar yields $(1 - \gamma\tau)$ after tax. This after-tax yield equals expression (5) if:

$$(6) \quad (1 - \gamma\tau)(1 + \delta)^n = [1 + \alpha(1 - \tau^*)]^n (1 - \tau).$$

Taking logs of both sides of (6), and applying first-order Taylor approximations to evaluate the resulting log functions in the neighborhood of $\gamma\tau = \delta = \alpha = 0$ yields:

$$(7) \quad \frac{(1 - \gamma)\tau}{n} + \delta = \alpha(1 - \tau^*).$$

The first term on the left side of equation (7) reflects that required after-tax returns to foreign investments are quite a bit higher in the year of a temporary repatriation tax holiday. Firms will have incentives to repatriate accumulated foreign profits unless after-tax foreign returns (the right side of equation 7) exceed the sum of the discount rate (the second term on the left side of equation 7) and the tax holiday exemption discounted by prospects for future deferral (the first term on the right side of equation 7). Firms earning sufficiently high returns on long-lived capital investments will not repatriate during the tax holiday, but those with funds previously lent via working capital and for which $\frac{(1 - \gamma)\tau}{n(1 - \tau^*)} + \frac{\delta}{(1 - \tau^*)} > r > \frac{\delta}{(1 - \tau^*)}$ will respond by repatriating profits, suggesting an empirical test described below.

2.3 *Substitutes and Constraints*

There are alternatives to trade credit arrangements; for example, customers might exchange cash for goods at the time of sale, financing their expenditures, if need be, with loans from local banks. Bank loans serve many of the same functions as trade credit, though terms and conditions of bank loans are likely to differ from trade terms offered by suppliers because banks and suppliers have different relationships with buyers, access to different information, and can

draw on differing expertise. For example, as stressed in the existing literature, suppliers of goods and services might have monitoring advantages over more remote financial lenders, thereby making it less costly for suppliers to provide loans in the form of trade credit than it is for banks to provide more traditional loans. Additionally, the fact that suppliers offering trade credit effectively lend property rather than cash may restrict the ability of managers of buying firms to divert assets to uses that benefit them personally at the expense of their firms, and therefore make it more likely that loans are repaid. Agency and other costs associated with third-party transactions can make these alternative financing sources unattractive, as evidenced by the apparent willingness of corporations to use equity finance and thereby incur corporate tax liabilities.

If trade credit offers a type of borrowing not available elsewhere, and does not offset other forms of borrowing, then tax rate differences encourage firms to use trade credit to reallocate capital. The analysis in this paper proceeds under the assumption that agency costs limit the ability of firms to borrow from third parties, which accounts both for the existence of corporate tax burdens and the inability of firms to use debt finance to arbitrage at least some of the resulting differences in pretax marginal products of capital. Tax regulations may also effectively limit the use of alternatives; for example, thin capitalization rules limit the amount of borrowing for which interest payments are tax-deductible.

In addition, there are limits on the extent to which trade credit can be used to reallocate capital within firms. The U.S. tax system does not allow taxpayers unlimited ability to use intrafirm trade credit arrangements, generally imposing a requirement that trade credit balances not exceed those that are ordinary and necessary to carry on trade or business, thereby requiring that repayment schedules correspond to normal business terms, or else the arrangement can be recharacterized for tax purposes as a constructive repatriation. While this limits the value of using trade credit arrangements, it is nevertheless possible for parent companies and their subsidiaries to maintain significant trade credit accounts for all of their transactions.

2.4 Empirical Implications

Firms have incentives to use trade credit arrangements to reallocate capital from low-return to high-return affiliates. Since low tax rates encourage high investment levels that reduce marginal returns, and high tax rates discourage investments and thereby elevate marginal returns,

it follows that net working capital positions should be generally higher for affiliates located in low tax jurisdictions. It is noteworthy that these conditions carry implications for net working capital rather than accounts receivable and accounts payable separately – though either or both of accounts receivable and accounts payable must of course be affected by taxation in order for there to be any effect on net working capital. Affiliates engaged in extensive trade with others may be unable to increase net working capital without taking actions that increase both accounts receivable and accounts payable, so it is possible for tax rate differences to influence one of the components of net working capital in a direction that moves against any total effect on net working capital.

The effect of tax rate differences on investment returns may vary with affiliate circumstances, and its impact on trade credit amounts presumably depends in part on the capital needs of other parties with which a firm transacts. Consequently, the strongest prediction of a tax-based theory of trade credit is for transactions among related parties of the same firm with common firm-wide capital availability and whose affiliates in different jurisdictions do not face unusual short-term capital needs. The empirical tests presented in sections 3.2, 3.3, and 3.4 analyze the effects of tax rate differences on the use of trade credit and consider how these effects vary across different kinds of affiliates.

A temporary legislative change offers a separate test of the effect of taxes on the use of trade credit to reallocate capital. The 2004 Homeland Investment Act allowed U.S. multinationals to exclude from U.S. tax 85 percent of foreign dividends repatriated in 2005. The benefit of the repatriation tax holiday was strongly concentrated among U.S. firms with foreign affiliates that had lightly taxed foreign earnings and limited prospects for profitable future foreign investments. It is noteworthy that firms with foreign affiliates satisfying these conditions have incentives to use trade credit arrangements to reallocate capital to more productive uses elsewhere, particularly those in high-tax locations such as the United States. Hence a tax-based theory of trade credit use predicts that those foreign affiliates making net loans with trade credit arrangements prior to 2005 are the most likely to take advantage of the repatriation tax holiday. In addition, the net working capital positions of affiliates in low tax jurisdictions should fall at the time of the tax holiday on repatriations. Section 3.5 presents the results of tests of these ideas.

2.5 *Transfer Pricing Considerations*

In addition to using trade credit to reallocate capital, firms have incentives to use trade credit terms to reallocate taxable income between related parties subject to different tax rates. This can be accomplished through the choice of prices used in intercompany transactions, including the implied interest rates on trade credit balances. If an affiliate in a high tax location sells goods to a related party in a low tax location, then the highly taxed affiliate could reallocate taxable income to the lightly taxed affiliate by granting additional time to pay at a low implied interest rate. Alternatively, the highly taxed affiliate could give the lightly taxed affiliate a large discount for prepayment. Tax rules require intracompany transactions to be conducted at arm's length prices, those that unrelated parties use in similar transactions, but in practice the imprecision of this standard may leave taxpayers some discretion to choose trade credit terms among those within a reasonable range. As a result, taxpayers who benefit from reallocating taxable income to operations in jurisdictions with lower tax rates can be expected to select trade credit terms that reallocate income in that direction, subject to scrutiny by tax authorities. It is also noteworthy that, as the example illustrates, there is not a clear implied association of tax rates and net working capital positions, since an affiliate's taxable income can be reduced with transactions that either increase or decrease its net working capital.

Perhaps the strongest implication of the ability to adjust trade credit terms to reallocate taxable income is that it gives firms incentives to make significant use of trade credit, regardless of which entities are borrowing or lending. Greater use of trade credit increases the scope of transactions the terms of which may be chosen – within a range – in a tax-sensitive manner. The pattern depicted in Figure 1 strongly suggests that affiliates in low-tax locations make greater use of trade credit than do other affiliates, which could be very indirect evidence of taxpayer attempts to reallocate taxable income to lightly taxed affiliates.

3. *Evidence from U.S. multinational firms*

3.1. *Data and Descriptive Statistics*

The data used to analyze the financing and operations of U.S. firms are drawn from the BEA annual survey of U.S. direct investment abroad. The BEA survey provides a panel of data on the activities of U.S. multinational firms operating abroad. The survey defines U.S. direct investment abroad as the direct or indirect ownership or control by a single U.S. legal entity of at

least ten percent of the voting securities of an incorporated foreign business enterprise or the equivalent interest in an unincorporated foreign business enterprise. A U.S. multinational entity is the combination of a single U.S. legal entity that has made the direct investment, called the U.S. parent, and at least one foreign business enterprise, called the foreign affiliate. As a result of confidentiality assurances and penalties for noncompliance, BEA believes that coverage is close to complete and levels of accuracy are high.

The survey forms that U.S. multinational enterprises are required to complete cover both domestic and foreign operations; survey information varies depending on the year, the size of the affiliate, and the U.S. parent's percentage ownership of its affiliate. Although many data items, such as sales, are collected for a broad sample on an annual basis, detailed data on trade credit are only available for larger affiliates in 1982, 1989, 1994, 1999, and 2004, years in which BEA conducted benchmark surveys. In these years, surveys captured information on current trade accounts and trade notes receivable as well as current trade accounts and trade notes payable.⁵ In the analysis below, these measures are scaled by sales.⁶ The framework developed above emphasizes predictions concerning net trade credit positions. These are measured in the data as differences between accounts receivable and accounts payable scaled by sales.

In addition to tracking basic income statement, balance sheet, and cash flow items such as total income, cash holdings, capital expenditures, and total liabilities, the BEA survey captures information that allows for characterization of the extent to which affiliates transact with their U.S. parents. The data include total values of U.S. exports of goods to each affiliate and values shipped by the affiliate's U.S. parent. The detailed sales data also cover affiliate sales to the U.S. parent.

Data on foreign income taxes paid and net income can be used to calculate foreign corporate income tax rates; each affiliate's average tax rate is the ratio of foreign income tax payments to the sum of net income and foreign income tax payments. Countries are then

⁵ In 1982, 1989, and 1994, all affiliates with an absolute value of sales, assets, or net income in excess of \$3, \$15, and \$50 million respectively were required to report accounts receivable and accounts payable. In 1999 and 2004, all majority owned affiliates with an absolute value of sales, assets, or net income in excess of \$100 million and \$150 million respectively were required to report accounts receivable and accounts payable.

⁶ To reduce the potential impact of outliers, accounts receivable/sales, accounts payable/sales, and net working capital/sales are winsorized at the 2.5% level in each tail of the distribution.

assigned tax rates equal to median tax rates among local U.S. affiliates. This tax burden measure has the disadvantage of being partly a function of the average behavior of U.S. investors, but offers the advantage of reflecting not only statutory corporate tax rates but also the values of tax depreciation and other business deductions, tax credits, tax holidays, and other features of national tax systems that can significantly influence tax obligations; as a result, it is widely employed by studies of U.S. multinationals (e.g., Desai, Foley and Hines 2001, 2004, 2006; Blouin et al. 2014) that use the BEA data.⁷

Several data items that are tracked annually by BEA are used to study responses to the Homeland Investment Act. The analysis uses two measures of affiliate dividend repatriations to U.S. parent companies covering 1999-2005: a dividend dummy equal to one for years in which affiliates repatriate profits, and a more continuous measure, namely the ratio of dividends to sales. The Homeland Investment Act changed incentives to pay dividends from affiliates to their U.S. parents, but many foreign affiliates are indirectly owned by other foreign affiliates. Fortunately, the BEA data include information on parent company ownership of affiliates; this information is used to identify affiliates most directly affected by the repatriation tax holiday. Precise measures of accounts receivable and accounts payable are not available in the BEA data on an annual basis to examine how the net working capital positions change around the time of the tax holiday. However, a broader measure is available annually for the years 1999-2007: the ratio of current assets minus current liabilities and long term debt to current assets plus current liabilities and long term debt. Unlike the measure of net working capital used in prior tables, this measure is not scaled by sales. The broader measures of assets and liabilities on which the ratio is based do not relate closely to sales and scaling the difference in the numerator by sales yields many outliers. By scaling the difference in the numerator by the sum of the components, the measure is restricted to lie between -1 and 1. Table 1 presents means and standard deviations of variables used in the regressions that follow.

3.2. Trade Credit and Local Tax Rates

⁷ The regressions presented in Tables 2, 3, 4 and 6 were re-run using three additional tax rate measures: statutory corporate tax rates; average tax rates faced by U.S. affiliates as reported in the BEA data; and (affiliate-specific) average tax rates faced by U.S. firms other than the affiliate whose behavior the regression model predicts. Estimated tax effects in the regressions using these alternative measures, available from the authors, look similar to those reported in Tables 2, 3, 4 and 6.

Table 2 presents regressions that explore the impact of local tax rates on trade credit use by U.S. multinational affiliates in foreign countries between 1982 and 2004. As noted in Section 2, there is reason to expect affiliates in low-tax countries to have significantly larger net working capital positions than do otherwise-similar affiliates in high-tax countries. The dependent variable in the regression presented in column 1 of Table 2 is the ratio of net working capital to affiliate sales. All of the regressions presented in Table 2 include parent company fixed effects and year fixed effects. Specifications also control for the log of affiliate assets, the log of country GDP per capita, and non trade account leverage – which is measured as current liabilities and long term debt less current trade accounts payable, scaled by sales. The negative sign on the coefficient on the local tax rate indicates that affiliates in low tax countries have larger net working capital positions than do affiliates in high tax countries. Specifically, the -0.1430 coefficient suggests that ten percent lower tax rates are associated with net working capital positions that are 1.4 percent greater as a fraction of sales.

This effect of low tax rates on net working capital positions reflects the much greater impact of low tax rates on accounts receivable than on accounts payable. The dependent variable in the regression reported in column 2 of Table 2 is the ratio of accounts receivable to sales. The -0.3393 coefficient indicates that ten percent lower tax rates are associated with accounts receivable balances that are 3.4 percent greater as a fraction of total sales. The association between tax rates and accounts payable is of the same sign but of considerably smaller magnitude and statistically insignificant, as indicated by the -0.0647 coefficient in column 3. Despite the small magnitude and statistical insignificance of this coefficient, it is striking that lower tax rates might be associated with greater accounts payable. This pattern may reflect that some buy-and-sell business operations in low-tax jurisdictions entail significant accounts receivable and payable; and that other affiliates with large accounts receivable need to maintain at least some accounts payable for cash management purposes. From a tax standpoint what matters is the net working capital position, so it may be worth accumulating some accounts receivable in a low-tax location in order also to accumulate accounts payable.

The regressions presented in columns 4-6 analyze differences between affiliates located in foreign jurisdictions identified as tax havens by Hines and Rice (1994) and affiliates located elsewhere. U.S. multinational firms commonly use affiliates located in tax havens to facilitate indirect ownership of other foreign affiliates and to serve as intermediaries in trade between

related parties. Consequently, the trade credit positions of these affiliates are particularly likely to be influenced by tax rate differences.⁸ The 0.0660 coefficient in column 4 of Table 2 indicates that tax haven affiliates have significantly larger net working capital positions than do affiliates located elsewhere. The difference in magnitudes of working capital positions between affiliates located in tax havens and affiliates located elsewhere is substantial, equal to roughly 6.6 percent of sales. The regressions reported in columns 5 and 6 identify the trade credit components that make up these net working capital positions. The 0.1260 coefficient reported in column 5 indicates that affiliates in tax havens have accounts receivable that are 12.6 percent larger as a fraction of sales than do affiliates located outside of tax havens. The dependent variable in the regression reported in column 6 is accounts payable as a fraction of local sales; the 0.0103 coefficient in this regression is much smaller in magnitude than the corresponding coefficient in column 5, and not statistically different from zero, suggesting that accounts payable are much less strongly associated with tax haven location than are accounts receivable.

The evidence in Table 2 indicates that there is greater trade account borrowing in high-tax locations. Multinational firms commonly also do more non-trade account borrowing in high-tax locations than in low-tax locations, reflecting the benefits of interest expense deductions in high-tax environments. Desai, Foley and Hines (2004) find that, in the BEA data, 10 percent higher foreign tax rates are associated with non-trade account borrowing by foreign affiliates of U.S. multinational firms that is 1.6 percent higher as a fraction of assets;⁹ since the mean ratio of non-trade account borrowing to assets in that sample is 0.35, this is a difference equal to 4.7 percent of average borrowing. Since the -0.1430 coefficient in column 2 of Table 2 implies that 10 percent higher tax rates are associated with 1.4 percent greater net borrowing through trade accounts as a fraction of sales, and Table 1 indicates that mean non-trade account borrowing as a fraction of sales is 0.28, it follows that the tax effect on net working capital equals 5.1 percent of

⁸ Tax haven affiliates account for 13.4 percent of total affiliate sales in the sample; the ratio of aggregate tax haven affiliate account receivables to aggregate sales is 29.3 percent, and the ratio of aggregate tax haven affiliate account payables to aggregate sales is 23.5 percent, the difference reflecting the use of trade accounts to do net lending from these locations. By contrast, the ratio of aggregate account receivables to aggregate sales is 32.3 percent for affiliates other than those in tax havens, and their ratio of aggregate account payables to aggregate sales is 32.1 percent. Tax rate differences between affiliates located in tax havens and those located elsewhere provide much of the variation that makes it possible to identify tax effects on net working capital positions.

⁹ The magnitude of the estimated tax effect is typical of those reported elsewhere in the literature; see, for example, Huizinga, Laeven and Nicodeme (2008).

non-trade account borrowing. This is roughly equal in magnitude to the effect of tax rate differences on more conventional borrowing other than through trade accounts.

3.3. *Whole Ownership, Trade with Parent Companies, and Trade Credit*

The use of trade credit to reallocate capital in response to tax incentives is likely to be most easily facilitated when these entities are under common control and transact with one another. Although the data do not indicate if net working capital positions are attributable to related party transactions, it is possible to infer indirectly the impact of related party trade on the trade credit positions of foreign affiliates of U.S. companies. The BEA data include the degree of parent company ownership of U.S.-controlled foreign affiliates and also provide some information on the fraction of an affiliate's sales and purchases that are represented by trade with the parent company.¹⁰ The ability to derive advantage by adjusting the terms of related-party trade is likely to be greatest for wholly-owned affiliates and those with extensive trade with parent companies. Consequently, interacting these indicators with tax variables used in the regressions reported in Table 2 offers the prospect of identifying the extent to which higher levels of control and intrafirm trade precipitate the tax effects evident in the Table 2 regressions.

Table 3 presents regressions in which the dependent variable is the ratio of an affiliate's net working capital position to its sales. All of the regressions include as controls parent company fixed effects, year fixed effects, the log of affiliate assets, non trade account leverage, and the log of local per capita GDP. The regression reported in column 1 of Table 3 presents estimated coefficients from a regression that includes a dummy variable for wholly-owned affiliates and an interaction of this dummy variable and the local tax rate; the regression is otherwise identical to that reported in column 1 of Table 2. The 0.0650 coefficient on the whole ownership dummy indicates that wholly-owned affiliates have significantly greater net working capital positions than do partially-owned affiliates. The -0.1012 coefficient suggests that wholly-owned affiliates in low tax countries have much larger working capital positions than do wholly-owned affiliates elsewhere – though this tax effect is only statistically significant at the 10% level. It is noteworthy that the -0.0538 coefficient on the uninteracted tax rate is quite small and

¹⁰ The data do not provide complete information on intrafirm transactions, as they do not capture affiliate purchases from other related affiliates. Affiliate purchases from their U.S. parent and from other U.S. entities are measured as the value of U.S. exports of goods from the parent to the affiliate and the value of U.S. exports of goods from other U.S. entities to the affiliate.

statistically insignificant, implying that tax rate differences have little discernible effects on working capital positions of partially-owned affiliates. The regression reported in column 2 of Table 3 uses a tax haven dummy variable in place of the local tax rate, the 0.0866 coefficient indicating that wholly-owned affiliates in tax havens have net working capital positions that are 8.6 percent larger as a fraction of sales than those elsewhere. The net working capital positions of partially owned affiliates in tax havens do not differ from the positions of partially owned affiliates located in high-tax countries.

The regressions reported in columns 3 and 4 of Table 3 evaluate the role of trade with parent companies. The -0.1146 coefficient reported in column 3 indicates that, even among affiliates that do not trade with their parent companies, those located in low tax countries have larger net working capital positions than those located in high tax countries: ten percent tax rate differences are associated with working capital that is 1.1 percent greater as a fraction of sales. The -0.3608 coefficient in column 3 implies that this tax effect is much larger for affiliates with significant trade with their parent companies. For example, the association between local tax rates and affiliate net working capital positions is twice as large among affiliates selling 32 percent of their output to parent companies than it is among affiliates that do not trade with their parent companies. The regression reported in column 4 similarly suggests that affiliates located in tax havens have larger net working capital positions if they trade extensively with their parent companies than if they do not, though the estimated coefficient on the interaction of the tax haven dummy and the share of trade with the parent company is only statistically significant at the 10% level.

Taken as a whole, the evidence presented in Table 3 is generally consistent with intrafirm transactions playing an important role in the association of local tax rates and net working capital positions. Wholly-owned affiliates, and those with extensive trade with parent companies, exhibit the strongest positive relationships between local tax rates and net working capital positions. The regressions indicate that there is a much milder, though still positive, association between tax rates and net working capital positions of affiliates that do not trade with their parent companies, which is consistent with their tax incentives together with greater costs of adjusting transaction terms with unrelated parties.

3.4. Investment Opportunities and Working Capital

The regression coefficients presented in Table 2 are consistent with affiliates reallocating capital from low-productivity uses in low tax countries to higher-productivity uses in high-tax countries. This central tendency presumably reflects the aggregate behavior of firms in widely differing circumstances. Affiliates that face what appear to be highly attractive investment opportunities are unlikely to prefer to extend large amounts of trade credit, regardless of local tax rates, because their capital has the potential to earn high returns in local investments. While it is not possible to identify directly the quality of an affiliate's perceived investment opportunities, the affiliate's investment behavior offers an indirect, albeit endogenous, indicator. Specifically, affiliates with significant expenditures on property, plant and equipment are likely to face more attractive investment opportunities than are affiliates without such expenditures. Similarly, affiliates with significant cash holdings can be presumed to have fewer burning investment opportunities than do other affiliates.

The regressions presented in Table 4 use these indicators of investment opportunities to explore the net working capital implications of the interaction between tax incentives and investment opportunities. The dependent variable in these regressions is the ratio of net working capital to affiliate sales; all of the regressions include controls for logs of affiliate assets, non trade account leverage, the log of local per capita GDP, and parent company and year fixed effects. The regression reported in column 1 includes a dummy variable that takes the value one if an affiliate's capital expenditure to asset ratio lies above the sample median; the dummy variable is zero otherwise. As indicated by the -0.1277 coefficient in column 1, affiliates with above-median capital expenditure to asset ratios have substantially smaller net working positions, reflecting some combination of their demand for, and availability of, investible funds. The -0.1940 coefficient in column 1 indicates that affiliates in low tax countries have much higher net working capital positions than do affiliates in high tax countries, but the 0.1762 coefficient reveals that this tax correlation entirely disappears among affiliates with significant capital expenditures. Hence it appears that tax rate differences are much more strongly associated with net working capital account differences in the part of the sample without extensive demand for capital expenditures.

A similar pattern appears in the regression reported in column 2 of Table 4, in which the capital expenditure dummy variable is interacted with a dummy for tax haven location. The 0.0779 coefficient on tax haven location indicates that affiliates in tax havens have significantly

larger net working capital accounts than do affiliates located elsewhere, and the -0.0709 coefficient on the interaction reveals that this effect again disappears for affiliates with significant capital expenditures.

The regressions reported in columns 3-4 of Table 4 use cash balances rather than capital expenditures to indicate investment opportunities. The -0.0733 coefficient in the regression reported in column 3 indicates that affiliates with substantial cash balances have smaller net working capital accounts, largely reflecting the accounting reality that cash not deployed as net working capital is cash on hand. The -0.1353 coefficient in column 3 indicates that the negative association of local tax rates and net working capital positions is stronger for affiliates with significant cash holdings, though this effect is not statistically significant. The regression reported in column 4 considers the impact of tax haven location, and here the 0.0710 coefficient on the cash balance interaction indicates that tax haven location is more strongly associated with net working capital positions for affiliates holding greater amounts of cash. The evidence on cash balances reported in columns 3-4 is consistent with the capital expenditure evidence reported in columns 1-2 and with the interpretation that tax effects on net working capital positions are significantly influenced by other capital demands that firms face.

The evidence presented in Table 4 offers some guidance in interpreting the evidence of the association between tax rates and net working capital positions, but it is important to bear in mind that capital expenditures and cash balances are jointly determined with working capital positions and therefore not strictly exogenous to them. The regressions in Table 4 therefore serve largely as robustness tests of tax effects on working capital positions and offer evidence consistent with the notion that affiliates without strong investment opportunities might exhibit especially strong repatriation responses to the Homeland Investment Act.¹¹

3.5. Net Working Capital and Dividend Repatriations under the Homeland Investment Act

Firms without attractive foreign investment opportunities, but with foreign profits that would be subject to high rates of U.S. tax if repatriated, stood to benefit more than others from the 2005 repatriation tax holiday. These firms also had the strongest incentives to use trade credit arrangements to reallocate capital from foreign affiliates prior to the holiday. The

¹¹ Among other additional robustness tests, the results of which are available from the authors, adding fixed effects for affiliate industries does not significantly change the pattern of tax effects reported in Tables 2-4.

regressions presented in Table 5 evaluate the extent to which foreign affiliates with positive net working capital positions prior to 2005 took advantage of the repatriation tax holiday to remit dividends to U.S. parent companies. For this purpose, it is necessary to focus on foreign affiliates directly owned by their U.S. parent companies because dividend payments by indirectly owned affiliates would be received by entities other than U.S. parent companies and, therefore, possibly not included among 2005 repatriations eligible for the tax holiday.

The dependent variable in the regressions reported in columns 1-3 of Table 5 is a dummy equal to one if an affiliate pays a dividend. The independent variable “Directly Owned with Positive Net Working Capital” is a dummy equal to one for affiliates that are directly owned and have accounts receivable exceeding accounts payable in 2004. The -0.0269 coefficient in column 1 indicates that affiliates that are directly owned and have positive net working capital positions in 2004 are less likely to pay dividends than are other affiliates. The 0.0620 coefficient on the interaction of this variable with a dummy for year 2005 indicates that directly owned affiliates with positive net working capital positions were more likely to pay dividends during 2005 than in other years; these affiliates were indeed more likely to pay dividends in 2005 than are typical affiliates in typical years, as reflected by the positive sum of the -0.0269 and 0.0620 coefficients. The regression reported in column one controls for ratios of net income to sales, whether the affiliate paid a dividend in the previous year, and year effects. The specification reported in column 2 adds parent fixed effects, and the specification in column 3 includes affiliate fixed effects instead of parent fixed effects, in both cases without changing significantly the estimated effect of the 2005 repatriation holiday.

Columns 4-6 of Table 5 present estimated coefficients from similar regressions in which the dependent variable is the ratio of dividends to affiliate sales. The interaction of direct parent ownership, positive net working capital position in 2004, and the observation year 2005 is again positive and significant, suggesting that those affiliates using trade credit to reallocate capital prior to the 2005 repatriation holiday used the 2005 opportunity to repatriate unusually large dollar volumes of dividends.¹²

¹² Additional regression specifications, the results of which are available from the authors, compare the behavior of directly owned affiliates with positive net working capital positions to the behavior of indirectly owned affiliates with positive net working capital positions, finding that the directly owned affiliates significantly increased their

By offering a one-time low cost means of moving capital out of low tax jurisdictions, the Homeland Investment Act reduced the incentive for affiliates to use net working capital positions for this purpose. The regressions presented in Table 6 test the hypothesis that affiliates in low tax jurisdictions reduced their net working capital positions in response to the 2005 holiday. The dependent variable is the ratio of current assets minus current liabilities and long term debt to current assets plus current liabilities and long term debt. The regressions use two indicators of low tax jurisdictions: a dummy equal to one for affiliates based in countries with tax rates in the bottom quartile of rates prior to the holiday, and a dummy equal to one for affiliates based in tax havens. Each specification includes year fixed effects.

In the regression presented in column 1 of Table 6, the 0.0945 coefficient on the dummy for affiliates based in low tax countries indicates that these affiliates tend to have higher working capital positions than do other affiliates. The -0.0399 coefficient on the interaction of this dummy and the dummy for years 2005, 2006, and 2007 indicates that these affiliates reduce their working capital positions relative to other affiliates immediately following the tax holiday.¹³ The specification in column 2 includes parent fixed effects, and the specification in column 3 includes affiliate fixed effects, with estimated coefficients on the interaction of low tax rates and years 2005-2007 that are quite similar to that reported in column 1. It is noteworthy that the -0.0403 coefficient on the interaction term in the regression reported in column 3 implies that affiliates in low tax jurisdictions reduced their working capital positions more than other affiliates did during 2005-2007. The regressions presented in columns 4-6 repeat this analysis using the haven dummy as an indicator of a low tax location, with results that are very similar to those reported in columns 1-3.¹⁴

4. Conclusion

dividend payouts in 2005 whereas the indirectly owned affiliates did not. Similarly, directly owned affiliates with positive net working capital positions significantly increased their dividend payouts in 2005 whereas directly owned affiliates with negative net working capital positions did not.

¹³ Table 6 reports standard errors that are clustered by affiliate. Clustering by country does not materially change the significance of the results.

¹⁴ One of the challenges in interpreting the results in Table 6 is that the reduction in net working capital observed at the time of the holiday could reflect reduced affiliate cash holdings, which are a part of current assets. It is possible to construct a dependent variable that is defined using a measure of current assets that excludes cash, for firms that report cash holdings. Similar results are obtained with this approach but sample sizes are smaller.

Although there is extensive analysis of the effects of taxation on many aspects of corporate financial policy including borrowing and dividend distributions,¹⁵ little previous attention has been paid to the effects of corporate income taxes on trade credit practices. This paper develops the idea that trade credit allows firms to reallocate capital in response to tax differences. Managers have incentives to set accounts receivable and accounts payable in a manner that reallocates capital from lightly taxed operations where investment opportunities have dissipated to highly taxed operations where profitable opportunities remain. This mechanism implies that net working capital positions, or the difference between accounts receivable and accounts payable, should be higher for firms facing lower tax rates.

The empirical analysis uses detailed data on the foreign affiliates of U.S. multinational firms. The virtue of these data is that it is possible to observe affiliates of the same firm operating in different countries and therefore facing different corporate income tax rates. Several patterns suggest that firms use working capital positions to reallocate capital in response to taxation. The data indicate that affiliates in low tax jurisdictions have higher net working capital positions than do other affiliates. The tax pattern is strongest among affiliates that have the greatest opportunities to use trade credit to reallocate capital and for affiliates that do not appear to have attractive investment opportunities, specifically those with low capital expenditures and high cash holdings. Further evidence of the use of trade credit to reallocate capital comes from an analysis of firm responses to the Homeland Investment Act, which reduced the tax costs of repatriating foreign earnings in 2005. Foreign affiliates with positive net working capital positions were the most likely to increase their repatriations that year, and the net working capital positions of affiliates in low tax jurisdictions fell at the time of this tax holiday. These findings suggest that affiliates used trade credit arrangements to reallocate capital prior to the tax holiday.

Although the evidence in this paper considers the behavior of U.S. multinational firms, the benefits of reallocating capital through the use of trade credit are likely to materialize in many settings, including trade between unrelated parties. Petersen and Rajan (1997) note that lower income firms, despite their limited liquidity and high monitoring costs, are more likely than others to lend to unrelated parties via trade credit. One reason may be that lower income firms, with their greater likelihood of tax losses, in expectation face lower marginal tax rates than

¹⁵ For a review of this literature, see Graham (2006).

others and might therefore find it profitable to use trade credit to reallocate capital to firms with higher tax rates and higher pretax marginal products of capital.

High tax rates encourage borrowing through trade accounts just as high tax rates encourage more conventional forms of borrowing such as bank loans and debt issuance. The evidence in this paper suggests that the additional trade account borrowing associated with higher tax rates is similar in magnitude to the additional conventional borrowing associated with higher tax rates. Concerns over high tax rates encouraging excessive corporate borrowing, with resulting prospects for bankruptcy, are commonly directed at conventional borrowing rather than borrowing through trade accounts. Similarly, thin capitalization rules that limit the tax deductibility of interest expenses of heavily indebted corporations (Buettner et al. 2012; Blouin et al. 2014) seldom apply to debt that takes the form of trade credit, since the interest expenses associated with trade credit are typically buried inside transaction prices. Given the evident association of higher tax rates and greater borrowing through trade accounts, policies designed to limit the effect of taxation on corporate indebtedness might pay greater attention to trade account borrowing.

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Figure 1. This figure displays mean measures of trade credit use by foreign affiliates of U.S. firms in countries with differing corporate tax rates. Accounts Receivable/Sales is the ratio of total current accounts receivable to total annual sales; Accounts Payable/Sales is the ratio of total current accounts payable to total sales; and Net Working Capital/Sales is the ratio of the difference between total current accounts receivable and current accounts payable to total sales. Ratios are computed using the publicly available BEA country-level data for the 1982, 1989, 1994, 1999, and 2004 benchmark years that cover nonbank majority owned affiliates of nonbank parents. Average tax rates are calculated as ratios of total income tax payments to total pretax income. The leftmost set of bars depicts ratios for U.S. multinational affiliates located in countries with average corporate tax rates below 15 percent. The second set of bars depicts ratios for U.S. multinational affiliates located in countries with tax rates greater than or equal to 15 percent and less than 30 percent. The third set of bars depicts ratios for U.S. multinational affiliates located in countries with tax rates greater than or equal to 30 percent and less than 45 percent, and the rightmost set of bars depicts ratios for U.S. multinational affiliates located in countries with tax rates greater than or equal to 45 percent.

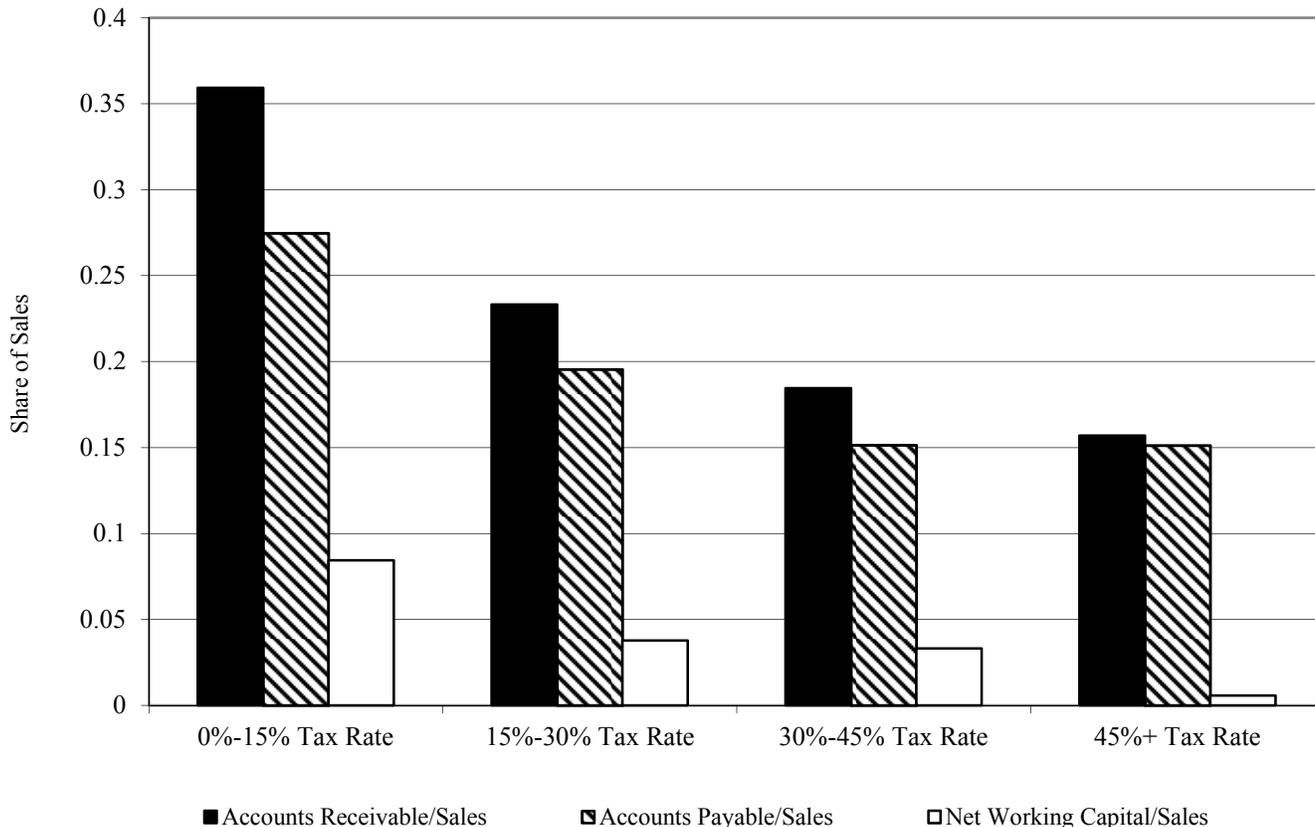


Figure 2. This figure displays aggregate dividend payout ratios for two groups of foreign affiliates of U.S. multinational firms in 2004 and in 2005. Dividend payout ratios are ratios of aggregate dividends paid by U.S. multinational affiliates to aggregate net income of U.S. multinational affiliates. The two leftmost bars depict dividend payout ratios of foreign affiliates that are directly owned by U.S. parent companies and that have positive net working capital positions in 2004. The two rightmost bars depict dividend payout ratios of other affiliates. The shaded bars present 2004 dividend payout ratios, and the unshaded bars present 2005 dividend payout ratios.

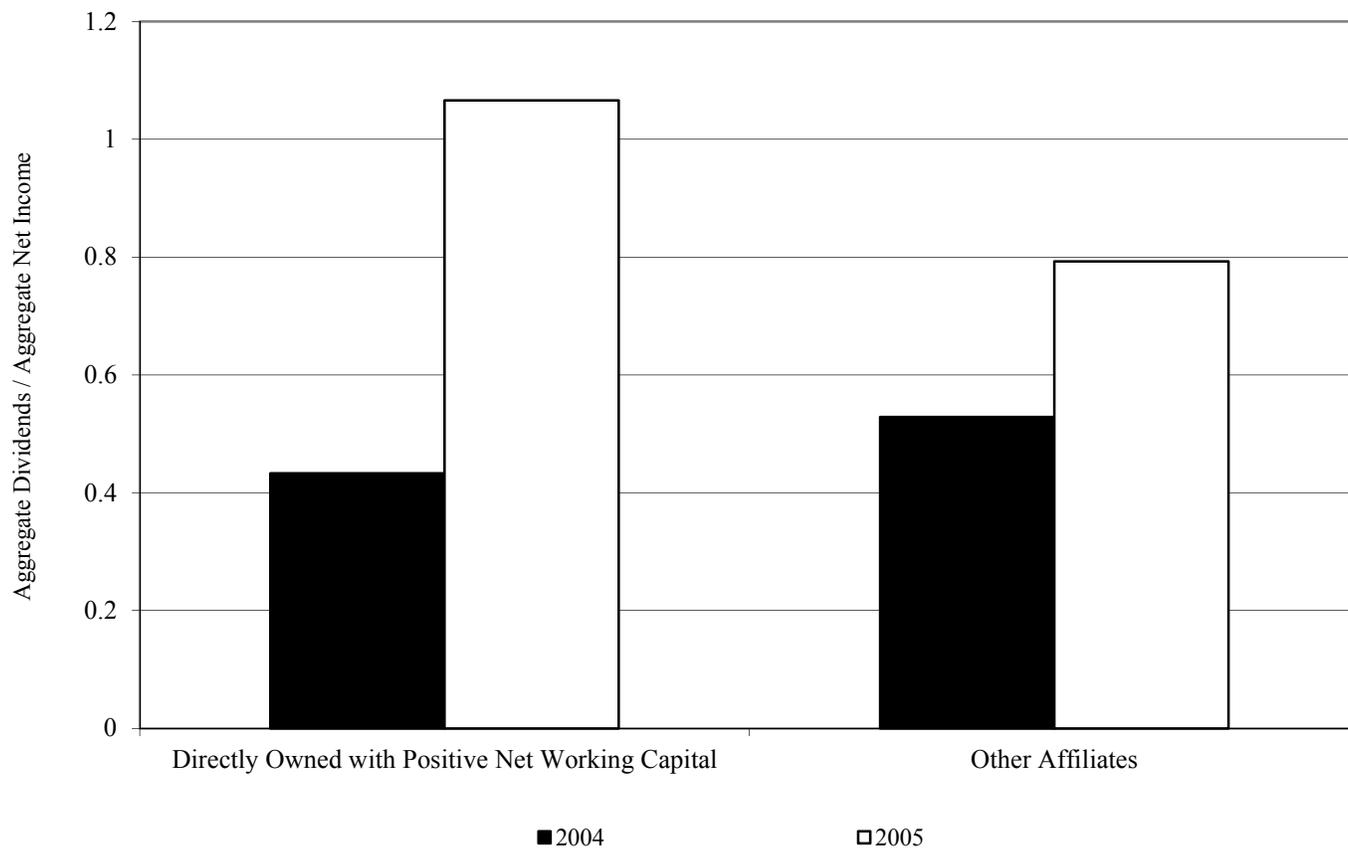


Table 1
Descriptive Statistics

This table presents descriptive statistics for the main variables used in the analysis presented in the subsequent tables. Net Working Capital/Sales is the ratio of the difference between current accounts receivable and current accounts payable to sales. Median Country Tax Rate is the median value of the ratio of affiliate income tax payments to pretax income in the affiliate's host country. Haven Dummy equals one for foreign affiliates located in countries identified as tax havens by Hines and Rice (1994). Log of Assets is the log of total affiliate assets, and Non Trade Account Leverage is the ratio of the difference between current liabilities and long term debt and current trade accounts payable to sales. Log of GDP Per Capita is the log of per capita GDP of the country in which an affiliate is located. Whole Ownership Dummy is a dummy equal to one for affiliates that are wholly owned by their U.S. parent companies. Share of Trade with Parent is a ratio; the numerator is the sum of annual affiliate sales to its U.S. parent company and sales by the U.S. parent company to the affiliate and the denominator is the sum of total affiliate sales and total sales of all U.S. entities to the affiliate. Cash/Sales is the ratio of affiliate yearend cash holdings to sales. Dividend dummy takes the value one for affiliates paying positive dividends and zero otherwise. Dividends/Sales is the ratio of affiliate dividend payments to total affiliate sales. Directly Owned with Positive Net Working Capital is a dummy equal to one for affiliates that are directly owned by their U.S. parent companies and that have current accounts receivable that exceed current accounts payable in 2004. Net Income/Sales is the ratio of net income to sales. $(\text{Current Assets} - \text{Current Liabilities and Long Term Debt}) / (\text{Current Assets} + \text{Current Liabilities and Long Term Debt})$ is a measure of net working capital computed using the terms listed that is available on an annual basis.

	<u>Mean</u>	<u>Standard Deviation</u>
<u>Tables 2-4</u>		
Net Working Capital/Sales	0.0433	0.5044
Accounts Receivable/Sales	0.3643	0.8794
Accounts Payable/Sales	0.3066	0.7628
Median Country Tax Rate	0.3357	0.1333
Haven Dummy	0.1334	0.3401
Log of Assets	10.6473	1.8786
Non Trade Account Leverage	0.2823	0.2958
Log of GDP per Capita	9.2287	1.0386
Whole Ownership Dummy	0.7783	0.4154
Share of Trade with Parent	0.1118	0.2168
Cash/Sales	0.1487	0.4243
<u>Table 5</u>		
Dividend Dummy	0.2467	0.4311
Dividends/Sales	0.0316	0.0820
Directly Owned with Positive Net Working Capital	0.2513	0.4338
Net Income/Sales	0.0648	0.4292
<u>Table 6</u>		
$(\text{Current Assets} - \text{Current Liabilities and Long Term Debt}) / (\text{Current Assets} + \text{Current Liabilities and Long Term Debt})$	0.0231	0.5264
Haven Dummy	0.1568	0.3636
Log of Assets	12.6659	1.3412
Log of GDP per Capita	9.8820	1.0337

Table 2
Taxes and Net Working Capital Positions

This table presents estimated coefficients from regressions explaining the net working capital, accounts receivable, and accounts payable of foreign affiliates of U.S. multinational firms in 1982, 1989, 1994, 1999, and 2004. The dependent variable in columns 1 and 4 is the ratio of the difference between current accounts receivable and current accounts payable to sales. In columns 2 and 5, the dependent variable is the ratio of current accounts receivable to annual sales, and in columns 3 and 6 the dependent variable is the ratio of current accounts payable to annual sales. Median Country Tax Rate is the median value of the ratio of affiliate income tax payments to pretax income in the affiliate's host country. Haven Dummy equals one for foreign affiliates located in countries identified as tax havens by Hines and Rice (1994). Log of Assets is the log of total affiliate assets, and Non Trade Account Leverage is the ratio of the difference between current liabilities and long term debt and current trade accounts payable to sales. Log of GDP Per Capita is the log of per capita GDP of the country in which an affiliate is located. All regressions are estimated by ordinary least squares and include fixed effects for each parent firm and for each year. Standard errors that correct for clustering of errors by country are presented in parentheses. Asterisks denote two-tailed significance levels: * denotes coefficients significant at 90%; ** denotes coefficients significant at 95%; and *** denotes coefficients significant at 99%.

<i>Dependent Variable:</i>	Net Working Capital/Sales	Accounts Receivable/Sales	Accounts Payable/Sales	Net Working Capital/Sales	Accounts Receivable/ Sales	Accounts Payable/Sales
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-0.1409 (0.0610)**	-0.1847 (0.1066)*	0.1037 (0.1303)	-0.1248 (0.0557)**	-0.1509 (0.1061)	0.1137 (0.1305)
Median Country Tax Rate	-0.1430 (0.0495)***	-0.3393 (0.0928)***	-0.0647 (0.0696)			
Haven Dummy				0.0660 (0.0229)***	0.1260 (0.0437)***	0.0103 (0.0261)
Log of Assets	0.0027 (0.0036)	0.0434 (0.0071)***	0.0334 (0.0087)***	0.0028 (0.0034)	0.0437 (0.0071)***	0.0336 (0.0087)***
Non Trade Account Leverage	0.2489 (0.0196)***	0.0600 (0.0247)**	-0.3047 (0.0326)***	0.2508 (0.0193)***	0.0616 (0.0246)**	-0.3055 (0.0325)***
Log of GDP per Capita	0.0161 (0.0043)***	0.0162 (0.0088)*	-0.0092 (0.0097)	0.0103 (0.0043)**	0.0034 (0.0086)	-0.0120 (0.0099)
Parent Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
No. of Obs.	37,693	37,693	37,693	37,711	37,711	37,711
R-Squared	0.1583	0.2302	0.2653	0.1591	0.2303	0.2649

Table 3
Effects of Whole Ownership and Trade with Parent

This table presents estimated coefficients from regressions explaining the net working capital of foreign affiliates of U.S. multinational firms in 1982, 1989, 1994, 1999, and 2004. The dependent variable is the ratio of the difference between current accounts receivable and current accounts payable to sales. Median Country Tax Rate is the median value of the ratio of affiliate income tax payments to pretax income in the affiliate's host country. Haven Dummy equals one for foreign affiliates located in countries identified as tax havens by Hines and Rice (1994). Whole Ownership Dummy is a dummy equal to one for affiliates wholly owned by their U.S. parent companies. Share of Trade with Parent is a ratio; the numerator is the sum of annual affiliate sales to its U.S. parent company and sales by the U.S. parent company to the affiliate, and the denominator is the sum of total affiliate sales and total sales of all U.S. entities to the affiliate. Log of Assets is the log of total affiliate assets, and Non Trade Account Leverage is the ratio of the difference between current liabilities and long term debt and current trade accounts payable to sales. Log of GDP Per Capita is the log of per capita GDP of the country in which an affiliate is located. All regressions are estimated by ordinary least squares and include fixed effects for each parent firm and for each year. Standard errors that correct for clustering of errors by country are presented in parentheses. Asterisks denote two-tailed significance levels: * denotes coefficients significant at 90%; ** denotes coefficients significant at 95%; and *** denotes coefficients significant at 99%.

<i>Dependent Variable:</i>	Net Working Capital/Sales			
	(1)	(2)	(3)	(4)
Constant	-0.1848 (0.0652)***	-0.1382 (0.0550)**	-0.1584 (0.0717)**	-0.1185 (0.0626)*
Median Country Tax Rate	-0.0538 (0.0426)		-0.1146 (0.0506)**	
Haven Dummy		-0.0140 (0.0202)		0.0510 (0.0162)***
Whole Ownership Dummy	0.0650 (0.0246)***	0.0218 (0.0073)***		
Share of Trade with Parent			0.1127 (0.0636)*	-0.0475 (0.0296)
Median Country Tax Rate * Whole Ownership Dummy	-0.1012 (0.0588)*			
Median Country Tax Rate * Share of Trade with Parent			-0.3608 (0.1355)***	
Haven Dummy * Whole Ownership Dummy		0.0866 (0.0319)***		
Haven Dummy * Share of Trade with Parent				0.1325 (0.0739)*
Log of Assets	0.0030 (0.0036)	0.0029 (0.0034)	0.0054 (0.0037)	0.0055 (0.0034)
Non Trade Account Leverage	0.2488 (0.0195)***	0.2510 (0.0192)***	0.2506 (0.0206)***	0.2513 (0.0201)***
Log of GDP per Capita	0.0142 (0.0042)***	0.0094 (0.0042)**	0.0135 (0.0052)**	0.0068 (0.0051)
Parent Fixed Effects?	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes
No. of Obs.	37,693	37,711	33,283	33,299
R-Squared	0.1588	0.1597	0.1637	0.1647

Table 4
Capital Expenditures and Cash Holdings

This table presents estimated coefficients from regressions explaining the net working capital of foreign affiliates of U.S. multinational firms in 1982, 1989, 1994, 1999, and 2004. The dependent variable is the ratio of the difference between current accounts receivable and current accounts payable to sales. Median Country Tax Rate is the median value of the ratio of affiliate income tax payments to pretax income in the affiliate's host country. Haven Dummy equals one for foreign affiliates located in countries identified as tax havens by Hines and Rice (1994). High Capital Expenditure Dummy is a dummy equal to one for observations in which the ratio of affiliate capital expenditures to affiliate assets exceeds the sample median. Cash/Sales is the ratio of affiliate cash holdings to sales. Log of Assets is the log of total affiliate assets, and Non Trade Account Leverage is the ratio of the difference between current liabilities and long term debt and current trade accounts payable to sales. Log of GDP Per Capita is the log of per capita GDP of the country in which an affiliate is located. All regressions are estimated by ordinary least squares and include fixed effects for each parent firm and for each year. Standard errors that correct for clustering of errors by country are presented in parentheses. Asterisks denote two-tailed significance levels: * denotes coefficients significant at 90%; ** denotes coefficients significant at 95%; and *** denotes coefficients significant at 99%.

<i>Dependent Variable:</i>	Net Working Capital/Sales			
	(1)	(2)	(3)	(4)
Constant	-0.0461 (0.0584)	-0.0814 (0.0549)	-0.1240 (0.0603)**	-0.0893 (0.0535)*
Median Country Tax Rate	-0.1940 (0.0603)***		-0.1683 (0.0518)***	
Haven Dummy		0.0779 (0.0282)***		0.0691 (0.0226)***
High Capital Expenditure Dummy	-0.1277 (0.0219)***	-0.0558 (0.0061)***		
Cash/Sales			-0.0733 (0.0298)**	-0.1352 (0.0197)***
Median Country Tax Rate * High Capital Expenditure Dummy	0.1762 (0.0541)***			
Median Country Tax Rate * Cash/Sales			-0.1353 (0.1048)	
Haven Dummy * High Capital Expenditure Dummy		-0.0709 (0.0261)***		
Haven Dummy * Cash/Sales				0.0710 (0.0325)**
Log of Assets	0.0038 (0.0036)	0.0038 (0.0032)	0.0032 (0.0037)	0.0033 (0.0034)
Non Trade Account Leverage	0.2514 (0.0194)***	0.2533 (0.0192)***	0.2473 (0.0196)***	0.2501 (0.0192)***
Log of GDP per Capita	0.0100 (0.0042)**	0.0070 (0.0043)	0.0162 (0.0044)***	0.0083 (0.0040)**
Parent Fixed Effects?	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes
No. of Obs.	37,693	37,711	37,693	37,711
R-Squared	0.1620	0.1624	0.1650	0.1664

Table 5
Tax Holiday and Repatriations

This table presents estimated coefficients from regressions explaining dividend payments by foreign affiliates of U.S. multinational firms. The dependent variable in the regressions reported in columns 1-3 is a dummy equal to one if an affiliate pays a dividend, and zero otherwise. The dependent variable in the regressions reported in columns 4-6 is the ratio of affiliate dividend payments to sales. Directly Owned with Positive Net Working Capital is a dummy equal to one for affiliates that are directly owned by their U.S. parent companies and that have current accounts receivable that exceed current accounts payable in 2004. The 2005 Dummy is equal to one for observations in 2005. Net Income/Sales is the ratio of net income to sales. The Lag Dividend Dummy takes the value one for observations in which an affiliate paid a dividend in the previous year, and zero otherwise. Lag Dividend/Sales is the previous year's ratio of affiliate dividend payments to annual sales. All regressions are estimated by ordinary least squares and include year fixed effects. Regressions reported in columns 2 and 5 include parent firm fixed effects, and the regressions reported in columns 3 and 6 include affiliate fixed effects. Standard errors that correct for clustering of errors by affiliate are presented in parentheses. Asterisks denote two-tailed significance levels: * denotes coefficients significant at 90%; ** denotes coefficients significant at 95%; and *** denotes coefficients significant at 99%.

<i>Dependent Variable:</i>	Dividend Dummy			Dividends/Sales		
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.2024 (0.0110)***	0.2046 (0.0091)***	0.3157 (0.0105)***	0.0222 (0.0018)***	0.0309 (0.0019)***	0.0452 (0.0022)***
Directly Owned with Positive Net Working Capital	-0.0269 (0.0078)***	-0.0305 (0.0097)***		-0.0061 (0.0013)***	-0.0062 (0.0018)***	
Directly Owned with Positive Net Working Capital * 2005 Dummy	0.0620 (0.0178)***	0.0655 (0.0182)***	0.0564 (0.0216)***	0.0110 (0.0037)***	0.0124 (0.0038)***	0.0107 (0.0045)**
Net Income/Sales	0.0940 (0.0075)***	0.0858 (0.0081)***	0.0646 (0.0127)***	0.0337 (0.0025)***	0.0318 (0.0026)***	0.0199 (0.0038)***
Lag Dividend Dummy	0.4599 (0.0099)***	0.3566 (0.0108)***	-0.0173 (0.0123)			
Lag Dividend/Sales				0.3915 (0.0159)***	0.3269 (0.0166)***	-0.0376 (0.0173)**
Parent Fixed Effects?	No	Yes	No	No	Yes	No
Affiliate Fixed Effects?	No	No	Yes	No	No	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
No. of Obs.	17,833	17,833	17,833	17,764	17,764	17,764
R-Squared	0.2223	0.2898	0.5165	0.1803	0.2319	0.4812

Table 6
Tax Holiday and Net Working Capital

This table presents estimated coefficients from regressions explaining the net working capital positions of affiliates of U.S. multinational firms using data covering 1999-2007. The dependent variable is a ratio; the numerator is equal to current assets minus current liabilities and long term debt and the denominator is equal to the sum of current assets, current liabilities, and long term debt. Low Median Country Tax Rate Dummy is a dummy equal to one for affiliates based in countries in the lowest quartile when ranked by the median value of the ratio of affiliate income tax payments to pretax income, averaged over the 1999-2004 period. 2005-2007 Dummy is a dummy equal to one in the years 2005, 2006, and 2007. Haven Dummy equals one for foreign affiliates located in countries identified as tax havens by Hines and Rice (1994). Log of Assets is the log of total affiliate assets, and Log of GDP Per Capita is the log of per capita GDP of the country in which an affiliate is located. All regressions are estimated by ordinary least squares and include year fixed effects. The regressions in columns 2 and 5 include parent fixed effects and those in columns 3 and 6 include affiliate fixed effects. Standard errors that correct for clustering of errors by affiliate are presented in parentheses. Asterisks denote two-tailed significance levels: * denotes coefficients significant at 90%; ** denotes coefficients significant at 95%; and *** denotes coefficients significant at 99%.

<i>Dependent Variable:</i>	(Current Assets - Current Liabilities and Long Term Debt)/ (Current Assets + Current Liabilities and Long Term Debt)					
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.5175 (0.0593)***	0.7500 (0.0599)***	0.3081 -0.2445	0.7003 (0.0630)***	0.8176 (0.0604)***	0.3504 (0.2444)
Low Median Country Tax Rate Dummy	0.0945 (0.0128)***	0.0764 (0.0123)***				
Low Median Country Tax Rate Dummy * 2005-2007 Dummy	-0.0399 (0.0154)***	-0.0345 (0.0149)**	-0.0403 (0.0152)***			
Haven Dummy				0.1510 (0.0156)***	0.1214 (0.0153)***	
Haven Dummy * 2005-2007 Dummy				-0.0438 (0.0185)**	-0.0440 (0.0180)**	-0.0376 (0.0181)**
Log of Assets	-0.0491 (0.0036)***	-0.0452 (0.0036)***	-0.0297 (0.0078)***	-0.0493 (0.0036)***	-0.0446 (0.0036)***	-0.0296 (0.0078)***
Log of GDP per Capita	0.0077 (0.0046)*	-0.0116 (0.0046)**	0.0145 (0.0232)	-0.0012 (0.0048)	-0.0191 (0.0047)***	0.0100 (0.0231)
Parent Fixed Effects?	No	Yes	No	No	Yes	No
Affiliate Fixed Effects?	No	No	Yes	No	No	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
No. of Obs.	49,009	49,009	49,009	49,012	49,012	49,012
R-Squared	0.0195	0.1980	0.6876	0.0234	0.1999	0.6875