The Consequences of Territorial and Worldwide Systems of International Taxation

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I. Introduction

There is currently great dissatisfaction with the operation of the U.S. system of international taxation. Observers are dismayed by the vast complexity, the near impossibility of coherent administration, the excessive compliance costs, and the fact that the system does not satisfy any common metrics of efficiency. Further, the U.S. corporate tax rate is higher than that of almost all of our trading partners, and yet the U.S. system raises revenue (scaled by GDP) that is below the average of other OECD countries.

One defining characteristic of the U.S. system is that it attempts to tax the worldwide income of its resident firms, allowing a tax credit for income taxes paid abroad; this system is commonly referred to as a *worldwide* (or *credit*) system. A frequently proposed change it to move to a *territorial* (or *exemption*) system of taxing multinational firms.[1] Indeed, many other countries already employ such a system. Amongst OECD countries, some use an exemption system, some use a credit system, and some employ hybrid systems with characteristics of both systems.

Some analysts argue that the existence of tax credit limits, cross-crediting, and deferral (under the credit system) blur the distinction between the two systems, and thus the choice of tax system will have relatively minor effects on economic variables and firm behavior. Others emphasize the theoretical expectation that firms from territorial countries will behave differently than those residing in credit countries. However, there is only limited systematic empirical analysis of the consequences of this policy choice.

[1] Henceforth, the terms worldwide/credit and territorial/exemption will be used interchangeably.

This paper examines the consequences of tax system choice, focusing on two key considerations. First, multinational firms residing in exemption countries may be more sensitive to foreign tax rates in their foreign direct investment decisions. Second, multinational firms may be more likely to undertake headquarters activities in exemption countries. Although there are other important considerations in tax system choice (such as revenue and administrative concerns), these two matters have particularly important economic consequences.

The data set used to analyze these questions is more comprehensive than that found in most prior studies. It includes 30 OECD countries as sources of foreign direct investment, 79 receiving countries, and covers the period 1985 to 2007. Preliminary findings indicate that exemption and hybrid countries are more sensitive to destination country tax rates in their foreign direct investment patterns, suggesting that tax system choices do have important consequences. However, evidence regarding headquarters locations is presently inconclusive.

II. Background

The current U.S. system of taxation is a *credit* system (also called a *worldwide* system). Consider a U.S. based multinational firm that has affiliates in two foreign countries, a low-tax country with a tax rate of 10% and a high-tax country with a tax rate of 40%. The U.S. corporate tax rate is 35%. Assume for now that all foreign income is immediately repatriated to the United States.

Since the U.S. based firm is taxed on worldwide income, it would owe U.S. tax on its foreign income, although it would receive a tax credit for taxes paid to foreign

governments. However, the foreign tax credit is limited to the U.S. tax liability. Thus, since the high-tax country's tax rate is higher than that in the United States, the firm would not receive a rebate for the "extra" tax that it paid to the high-tax country government. However, it could use this excess credit to offset tax due on its low-tax country income, reducing the U.S. tax liability accordingly. This process is known as cross-crediting.

This example is made more complicated by a number of features. Of these, perhaps the most important is deferral, which enables firms to delay U.S. taxation on foreign income until that income is repatriated. Thus, if the firm in the above example did not repatriate the low-tax country income, the income would grow tax-free abroad until it was repatriated. This feature creates a substantial incentive to earn income in low-tax countries.[2]

While the U.S. government employs a tax credit system, many other countries exempt foreign income. In a strict exemption system, current world tax liabilities on foreign income would be zero, even if the foreign income were repatriated immediately. Also, some countries employ a hybrid system with characteristics of both credit and exemption systems; under a hybrid system, some income earned in foreign countries may be subject to domestic taxation. Under an exemption (or hybrid) system, there may be stronger incentives for earning income in low-tax countries. However, this remains an empirical question, as some authors (such as Altshuler (2000) and de Mooij and Ederveen (2003)) have argued that the existence of cross-crediting and deferral blur any distinction between the two systems.

[2] Some provisions of U.S. tax law limit the use of deferral, such as subpart F. Also, the American Jobs Creation Act of 2004 provided a purportedly one-time tax holiday for repatriating funds from low-tax countries, spurring large repatriations in 2005.

Theoretical Distinctions Between Systems

The existing literature has devoted a great deal of attention to these systems of international taxation, but much of that work is theoretical. As far back as Richman (1963), the literature has emphasized a tradeoff between the policy goals implicit in the two types of tax systems. One important goal is efficient capital allocation. Under a *pure* credit system, absent deferral, limited tax credits, and cross-crediting, there is no tax incentive to favor investments in low-tax countries. Multinational firms allocate investment irrespective of tax treatment, achieving *capital export neutrality*. Thus, investment decisions are made based on a comparison of before-tax rates of return, and investment flows toward those locations with the highest return, providing the greatest economic gain from a worldwide efficiency perspective. Further, there is no incentive to shift income to more lightly-taxed locations, as all locations are taxed equally from an investor's perspective.

Of course, neither the typical credit system nor an exemption system meets this description. Under the U.S. system, for example, tax credits are not unlimited, and foreign income is not taxed currently, but upon repatriation. These two features make investors responsive to tax rates differences across countries in both their real and financial decisions. Under an exemption system, foreign income is not taxed at all, further heightening the incentive to respond to tax differences across countries.

It is also important to note that the globalization of capital markets implies that a given investor may not necessarily finance a foreign direct investment in their home country; they instead frequently raise funds in the foreign location. While that may alter the size of the foreign direct investment flow, it need not affect the tax considerations

outlined above, as residents are still be taxed on their worldwide income under a credit system. However, firms also have some flexibility regarding the location of their headquarters, and it may be possible to undertake corporate restructuring in order to improve the tax treatment of worldwide income.

A second important policy goal concerns the competitiveness of U.S. multinational firms. This goal is particularly important if U.S. based multinational firms generate external benefits for the U.S. economy that are not fully captured by market participants. As one example, a firm headquartered in the United States may undertake research and development that generates learning that is not fully appropriated by the investing firm. If these types of effects are important, it may be sensible to favor foreign income in order to assure that U.S. based multinational firms are not at a disadvantage relative to competitor firms from other countries that tax foreign income more lightly or not at all.

An exemption system may be suitable for meeting such goals. Such a system meets the standards of *capital import neutrality*, ensuring that all firms in a given location are treated equally for tax purposes. If home countries do not tax the foreign income of their multinational affiliate firms, then affiliate firms will not be disadvantaged when competing with other firms in low-tax countries.

Finally, Desai and Hines (2004) advocate focusing instead on the concept of *capital ownership neutrality*, which would require that tax rules do not distort ownership patterns. They argue that such a goal is consistent with theories of multinational activity that focus on ownership advantages as a key impetus for foreign direct investment.

Conformity among tax systems would promote capital ownership neutrality, although conformity could take several forms.

Empirical Work

Altshuler and Grubert (2001) examine the consequences of adopting an exemption system for the United States. They compare U.S. based multinational firm foreign direct investment destinations (in manufacturing) to those from two exemption countries, Canada and Germany. Using data from U.S. tax returns (comparing excess and deficit credit firms), they consider how effective tax rates would change under exemption, and then estimate how location decisions will be affected. They conclude that location changes are not clearly affected.

This finding is collaborated by Hajkova et al (2006), who do not find tax rate elasticities that vary among exemption and credit countries. Hajkova et al use a data set of 28 OECD countries over the period 1991 to 2000, finding no statistically significant difference in the tax elasticity of FDI from exemption and credit source countries. That finding supports earlier work by Slemrod (1990), Wei (2000) and Benassy-Quere et al (2003) that reaches similar conclusions.

De Mooij and Ederveen (2003) perform a meta-analysis of 25 studies of foreign direct investment tax elasticities over the period 1984 to 2001. Their analysis indicates that elasticities in studies where FDI flows originate in exemption countries are no larger than those in studies where the investment originates in credit countries. This result is limited to the subset of the analysis that removes extreme observations.

Still, there is some evidence that tax system choices may be important. Hines (1996) exploits differences between exemption and credit countries in his analysis of

foreign investment response to U.S. state tax rates. He finds that state corporate tax rates are associated with changes in investment shares of credit-country investors relative to exemption-country investors, implying a differential tax rate responsiveness of the two groups. He uses data from 1987 and 1991, and he focuses on seven countries that account for 78% of manufacturing investment in the United States at the time.[3]

Wijerweera et al (2007) consider how FDI flows into the United States depend on tax rates and the tax system of the sender country using a panel data set of FDI originating from nine countries over the period 1982 to 2000. The countries are Australia, Belgium, Canada, France, Germany, Italy, Japan, the Netherlands and the UK; Belgium, Italy, Japan and the UK are coded as credit countries and the others are coded as exemption. They estimate the model separately for foreign direct investment that originates in credit and exemption countries, finding that exemption sources are more sensitive to tax rate differences. Gropp and Kostial (2000) also show some limited evidence of differences in foreign direct investment patterns among credit and exemption countries, focusing on 19 OECD countries over the period 1988 to 1997.

Finally, some studies have analyzed the tax determinants of headquarters location, including three recent papers that employ firm-level data: Barrios et al (2009), Huizinga and Voget (2009), and Voget (2009). Barrios et al use data from the Amadeus database for European firms over the period 1999-2003. They analyze how home and host country taxation as well as withholding taxes affect the location of new foreign subsidiaries. They find a large influence of both host and home country taxation, but no evidence of withholding tax effects. A similar paper by Huizinga and Voget (2009) finds that the

[3] The countries are Australia, Canada, France, Germany, Japan, Switzerland, and the UK; of these, Japan and the UK are tax credit countries and the remainder are considered exemption countries.

structure of parent-subsidiary organization following mergers and acquisitions is influenced by the tax rates and tax systems of the two countries in question; firms systematically choose arrangements that reduce their worldwide tax liabilities, avoiding headquartering firms in countries with high international tax burdens. Voget (2009) analyzes data on firms from the Orbis and Zephyr databases over the period 1997 to 2007, studying in particular the subset of multinational firms that have relocated their headquarters. Both CFC legislation (such as subpart F) and increased repatriation tax rates are found to increase the likelihood of multinational firm relocation.

III. Effects of Tax Systems on Foreign Direct Investment Patterns

This analysis considers the effects of tax systems on foreign direct investment pattern using a comprehensive data set of 30 source countries investing in 79 host countries over the period 1985 to 2007. Table 1 summarizes the data set. The data set is far more comprehensive in both country coverage and time period than previous studies. In addition, the coding of tax systems is more nuanced.

The 30 source countries are the members of the OECD, and these countries are carefully distinguished based on whether they have a pure exemption system (such as France), a pure credit system (such as the United States), or a hybrid system with features of both systems. Several countries that are classified as hybrid countries allow some (but not all) types of foreign income to be exempt. Tax treatment is based on the nature of bilateral tax treaties, whether the income is passive or active, or whether the tax rate or the tax system in the foreign country is sufficiently similar to the source country's tax rate or tax system. As such, the coding of this variable is at times ambiguous, so I

experiment with specifications that distinguish pure credit from other (exemption or hybrid) tax systems, and specifications that distinguish pure credit, hybrid, and pure exemption systems. I also include a dummy variable that indicates whether countries have controlled foreign corporation (CFC) laws; these laws are employed to counter abusive profit shifting by multinational firms. All the data sources are discussed in more detail in the data appendix.

The first part of the analysis considers how the tax system may affect the overall level of outward foreign direct investment flows from a particular country. Figure 1 shows the data in a simple bar chart, covering the overall sample period (1985-2007), as well as three sub-periods: 1985-1992, 1993-2000 and 2001-2007. In all periods, the outward flow of foreign direct investment relative to GDP is higher for exemption countries than for hybrid or credit countries. In the most recent period, 2001-2007, exemption and hybrid countries have FDI outflows that average about 4.8% of their GDP, whereas credit countries average FDI outflows equal to 1.9% of GDP.

To further consider this question, it is important to control for other variables that may affect outward foreign direct investment flows. The following specification controls for the tax rate of the home country, the presence of CFC laws, the economic size of the home country (GDP), how rich the country is (GDP per-capita), and the geographic proximity of the country to other countries (remoteness). Following, i indicates source countries and t indicates time.

$$\ln(\text{FDI-Out Measure})_{it} = \alpha + \beta_1 \text{ Tax System Dummy(ies)}_{it} + \beta_2 \text{ Tax Rate}_{it}^{+} \beta_3 \text{ CFC dummy}_{it} + \beta_4 \ln(\text{GDP}_{it}) + \beta_5 \ln(\text{GDP per-capita}_{it}) + \beta_6 \text{ Remoteness Measure}_{i} + \upsilon_{it}$$

It is expected that economically large, rich, and proximate countries will generate larger FDI outflows. It is also expected that countries with high tax rates may be more likely to invest abroad.[4] Thus, the remoteness coefficient is expected to be negative, and the tax rate, GDP, and GDP per-capita coefficients are expected to be positive. It is also expected that exemption countries will invest more abroad, relative to the other groups, and that hybrid countries will invest more abroad than credit countries. Further, the existence of CFC laws may reduce the attractiveness of some types of foreign direct investment. Since these specifications are looking at *total* foreign direct investment, they do not consider the tax rate of receiving countries; the subsequent analysis will consider this variable in detail.

Table 2 shows the results. Column 1 shows the baseline regression. The tax system, tax rate, and CFC law variables are not statistically significant. GDP, GDP per-capita, and remoteness all have the expected sign and are statistically significant. Column 2 considers exempt and hybrid countries together as one group of "non-credit" tax systems; the overall results remain the same. Columns 3 and 4 employ a random effects specification; the random effects specification utilizes both within and between country variation in the estimate, and results are generally consistent with those in earlier columns.[5]

While this analysis is a starting point, it does not address the fundamental question raised in section II regarding whether exemption-country investors are more

[4] However, this effect may be ambiguous if low tax rates facilitate income shifting away from high-tax foreign direction investment destinations. This possibility is considered in Overesch (2009), which finds some empirical support for this consideration.

[5] A fixed effects specification was considered but is not reported here. In the fixed effects specification, the remoteness coefficient can not be estimated, since only within-country variation is utilized in the estimates (and there is no within-country variation in remoteness). In fact, with this type of variation, all estimated coefficients lose their statistical significance aside from the exemption system dummy, and that coefficient is likely unduly influenced by the very few countries that changed tax system status during this time period.

sensitive to destination country tax rates than are credit-country investors. For this question, data on *bilateral* foreign direct invest flows are utilized; the destination country tax rate is an important explanatory variable. Figure 2 shows the relationship between destination country tax rates and the amount of foreign direct investment received from OECD countries. Low-tax countries receive FDI from OECD countries that averages about 17% of their GDP over the entire time period, reaching 25% by 2001-2007. Other countries average less than 5% of GDP in FDI from OECD countries across all time periods.

Figure 3 considers how the pattern of foreign direct investment outflows to low, medium, and high-tax countries varies with respect to the tax system of the investing country. Figure 3 indicates that exemption countries have a higher share of their total foreign direct investment outflows destined for low-tax countries and a lower share of their total direct investment outflows destined for high-tax countries, in comparison to credit countries. The pattern for hybrid countries lies in between. This figure provides a visual confirmation of the expectation that investors based in exemption countries will be more tax-sensitive than those in credit countries, although it is important to also control for other variables.

The regression analysis considers the following baseline specification, where i indicates source countries, j indicates receiving countries, and t indicates time.

$$\begin{aligned}\ln(\text{FDI-Out Measure})_{ijt} = {} & \alpha + \beta_1 \text{ Tax Rate}_{it} + \beta_2 \text{ Tax Rate}_{jt} + \beta_3 \text{ Exemption Tax System}_{it} * \text{Tax Rate}_{jt} + \beta_4 \text{ Hybrid Tax System}_{it} * \text{Tax Rate}_{jt} + \beta_5 \\ & \text{CFC dummy}_{it} + \beta_6 \text{ CFC Dummy}_{it} * \text{Tax Rate}_{jt} + \beta_7 \ln(\text{GDP}_{it}) + \\ & \beta_8 \ln(\text{GDP per-capita}_{it}) + \beta_9 \ln(\text{GDP}_{jt}) + \beta_{10} \ln(\text{GDP per-capita}_{jt}) + \beta_{11} \ln(\text{Distance}_{ij}) + \upsilon_{ijt}\end{aligned}$$

It is expected that β_7, β_8, and β_9 will be positive. Larger economies are expected to both send and receive more foreign direct investment, and richer economies are expected to send more foreign direct investment. The predicted sign of β_{10} is unclear; whether richer destination countries receive more foreign direct investment depends on whether the FDI is primarily intended to serve the local market (implying a positive effect of GDP per-capita) or to employ inexpensive labor (implying a negative effect). It is expected that larger distances between countries will deter foreign direct investment flows, ceteris paribus, so β_{11} should be negative.

It is expected β_1 will be positive, as the tax rate of the source country (i) will be positively related to foreign direct investment between countries i and j, although footnote 4 applies here as well. Also, β_2 is expected to be negative, as higher tax rates in the destination country (j) will deter foreign direct investment between i and j. However, if country i has an exemption system, it is hypothesized that they will be more responsive to the destination country tax rate, in comparison to credit countries. Therefore, β_3 is expected to be negative. Since credit countries are the implicit comparison groups, β_4 should also be negative, although less so than β_3. In addition, β_5 and β_6 are included to control for the influence of CFC laws. If CFC laws reduce the potential for income shifting, they may lower tax sensitivity, in which case the expected sign of β_6 is positive.

In the case of low-tax host countries, firms based in exemption countries will have a tax advantage since the resulting profits will not be taxed by their home governments. In the case of high-tax host countries, exemption country firms may be particularly discouraged from investing, as firms from credit countries may be able to use the tax credits generated from high-tax host country operations to offset taxes due in other

countries, lowering the disincentive associated with high rates of taxation. (This assumes that firms from credit countries do not already have excess foreign tax credits. If they have excess credits, there is no difference.) Thus, the pattern of foreign direct investment across countries should be influenced by the tax systems of source countries.

Table 3 shows results. Equation 1 is the baseline, estimated by OLS. The tax rate of the home country is statistically significantly positive, and the tax rate of the destination country is negative and also statistically significant. For bilateral FDI flows originating in hybrid countries, there is a larger negative effect of host country taxation, as shown by the interaction term coefficient. For exemption countries, there is no statistically significant difference in tax responsiveness in comparison with credit countries, although the point estimate of this interaction term is negative and statistically significant with a lower (90%) confidence threshold. Somewhat surprisingly, the hybrid tax interaction term is larger than the exemption term.

In column 2, the exemption and hybrid countries are combined into one group, non-credit countries. Destination country tax rates have a negative influence on FDI outflows originating in both credit and non-credit system OECD countries, although the negative effects of host country taxation are larger for non-credit system country investors. Control variables have their expected signs: larger and richer source country economies are associated with larger FDI outflows, and larger destination country economies also receive more FDI. More distant countries have fewer FDI flows between them, and there is not a statistically significant effect of destination country GDP per-capita.

Column 3 also includes a dummy variable for the presence of CFC laws, and there is an interaction term to capture the effect of CFC laws on the tax sensitivity of FDI. While the CFC dummy coefficient is statistically indistinguishable from zero, the interaction term is statistically positive, implying a lower tax sensitivity for countries with CFC laws. Columns 4 and 5 include fixed effects for (a) receiving countries, and (b) country pairs; most key results are unchanged although the CFC interaction term becomes statistically insignificant in column 5.

To check the robustness of the results, I also ran specifications that employed effective tax rates instead of statutory tax rates. The general pattern of results is similar. Also, I ran specifications where the dependent variable is limited to those observations where foreign direct investment flows are positive.[6] This improves the overall fit of the regression model substantially; the adjusted R^2 increases four-fold. Although the statistical significance of the main control variables (GDP, GDP per-capita, and distance) increases substantially, the overall pattern of the coefficients and the findings remains unchanged.

IV. Headquarters Activities and Tax Systems

It has often been suggested that territorial systems may benefit home country multinational firms, enabling them to be more successful in third country markets. Some have argued that footloose firms may have an incentive to incorporate and perform more headquarters-related activities in countries with territorial tax systems. Headquarters activities may be particularly economically valuable, as they are more likely to generate

[6] In the baseline specifications, negative FDI flows are included. For the negative observations, the natural log transformation is performed by taking the negative of the natural log of the absolute value of FDI.

high-wage jobs, high-technology jobs, learning, productivity growth, and other beneficial (and often external) effects.

I consider two data sets that measure headquarters activities. The first source is from Forbes, an annual ranking of the world's top 2000 public firms. This list has been published since 2003, and it is based on four measures of firm size: revenue, profits, assets, and market value. Currently (2009), the world's top ranked firm is General Electric, with $182 billion in revenue, $17 billion in profit, $798 billion in assets, and a market value of $89 billion. General Electric is headquartered in the United States. The world's second and third largest firms are Royal Dutch Shell and Toyota, headquartered in the Netherlands and Japan, respectively.

Figure 4 shows three measures of headquarters activities for the years where Forbes provides data and we have tax system data. Panel (A) shows a simple count of the number of firms that are headquartered in credit and exemption/hybrid (or "non-credit") countries. In 2003 and 2004, there are more firms headquartered in credit countries, but this pattern is reversed in 2005-2007. These numbers are scaled by GDP to account for the fact that one would expect larger economies to have more top-2000 firms than smaller economies. For this period, credit countries average about 44 top-2000 firms per $1 trillion in GDP; non-credit countries average 48 top-2000 firms per $1 trillion in GDP.

Panel (B) shows the market value of countries' top-2000 firms per $100 of GDP. It is calculated by summing the market value of all top-2000 ranked firms for each country, and then taking the ratio of that market value to GDP. For this period, credit countries average $44 in market value per $100 in GDP; non-credit countries average

$61. Market value is rising relative to GDP over the period 2003-2007, but non-credit countries have higher ratios in every year.

Panel (C) shows a similar series that is based on summing the sales of top-2000 ranked firms for each country, and then taking the ratio of total sales to GDP. For this period, credit countries average $37 in sales per $100 in GDP; non-credit countries average $48, and the relative pattern is the same in all years.

Table 4 performs a simple regression analysis of various Forbes headquarters measures, controlling for other factors that are likely to be influential. The typical specification is as follows, where i indicates an OECD country and t indicates years.

$$\ln(\text{Headquarters Measures})_{it} = \alpha + \beta_1 \text{ Tax System}_{it} + \beta_2 \text{Tax Rate}_{it}^{+} \beta_3 \text{CFC dummy}_{it} + \beta_4 \ln(\text{GDP}_{it}) + \beta_5 \ln(\text{GDP per-capita}_{it}) + \beta_6 \text{ Remoteness Measure}_i + \upsilon_{it}$$

The headquarters measures that are considered are (a) the number of firms headquartered in a particular country that are in the top 2000 on the Forbes list, (b) the sum of the inverse rank (2000-rank) of top-2000 firms, a measure that weighs higher ranked firms with a larger number, (c) the total market-value of all top-2000 firms in a particular country, and similarly, (d) the total profits of all top-2000 firms, (e), the total assets all top-2000 firms, and (f), the total sales all top-2000 firms.

Of the 12 coefficients on tax system variables, six are statistically significant, and all are negative, indicating that exemption and hybrid countries have fewer headquarters activities, controlling for other variables. Initially, I suspected that this result was skewed by the inclusion of the United States. However, repeating the analysis without the United States produced the same pattern of tax system coefficients. Higher tax rates are

negatively associated with most of the headquarters measures, although in only two cases do the coefficients show conventional (95%) levels of statistical significance. In two cases, coefficients are significant at the 90% level. As suspected, both the GDP and the GDP per-capita of a country are positively associated with headquarters measures in all specifications. In the one equation where the variable is statistically significant, remoteness reduces headquarters activities; multinational firms may want to be located in locations that are geographically proximate to major markets.

OECD Science Measures

The argument that headquarters activities are economically desirable is often related to the idea that these activities generate beneficial external effects that are not entirely appropriated by the market participants themselves. Research and development may be a particularly valuable activity to have in the domestic economy for this reason. The OECD collects several data series that measure scientific activities in member countries, over the period 1985-2006. Three of these series are shown in Figure 4.

Panel (A) shows country patents. I have scaled the data by country GDP (in constant dollars) since larger economies are likely to generate more patent activity. The solid line shows patents per trillion dollars of GDP for non-credit countries, and the dashed line shows the same measure for credit countries. While non-credit countries have more patents per GDP than credit countries, the difference between the two groups narrows over time, particularly in recent years.

Panel (B) shows business sector research and development expenditure, scaled by GDP. Here credit and non-credit countries appear similar, overall. Panel (C) shows

business sector research and development personnel (full-time equivalent) per 1,000 people. Non-credit countries average a higher ratio of R&D employees than do credit countries, particularly in the later years of the sample.

Table 5 reports regressions similar to those of Table 4, using the OECD science measures data. In columns 1 and 2, countries with exemption or hybrid tax systems appear to have more patents. Larger and richer economies also generate more patents, as do countries where businesses invest more in research in development (included as an explanatory variable in column 2). In column 3, the dependent variable is the share of total OECD patents originating in a particular country; here exemption and hybrid countries have a lower patent share. This regression was also considered without the inclusion of the United States; the exemption dummy loses its statistical significance in that case. The United States has 32% of OECD patents in 2006; the average (non-U.S.) OECD country has 2.3%.

In columns 4 and 5, business R&D expenditure and business R&D employment show no relation to either tax rates or tax systems. Column 6 considers an OECD data series that measures technology products balance of payments, as technology related receipts minus technology related payments. The negative coefficients on the tax system variables may reflect the importance of the United States, an outlier. If the United States is omitted from the analysis, the tax system dummies lose their statistical significance. In 2006, the U.S. technology balance of payments was about $40b; for the typical OECD country, the technology balance of payments averaged about $1.5 billion.

VI. Discussion and Conclusions

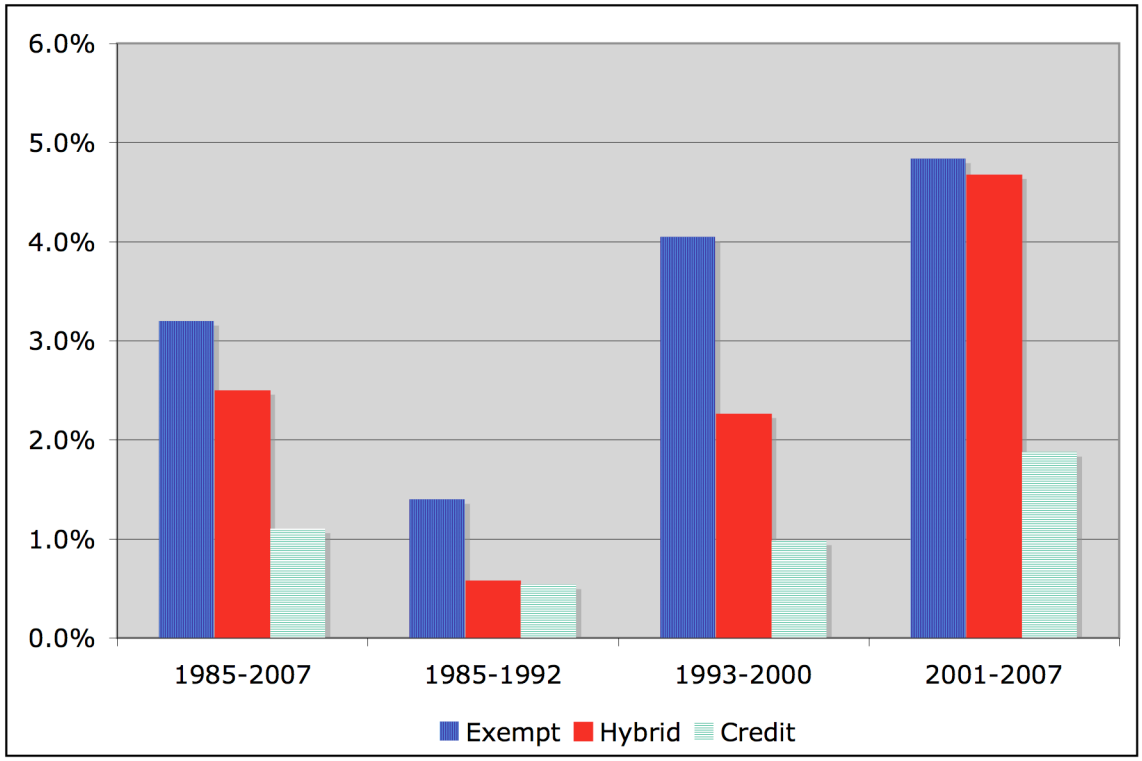
The desirability of tax system choices likely depends on several factors that are not considered in the present analysis. First, tax revenue may be an important consideration. Since credit systems have a broader reach than exemption systems, one might presume that they would raise more revenue. However, if more economic activity is in the corporate sector in exemption countries, which is possible if firms are more competitive in such countries, that could be a countervailing factor that increases corporate tax bases. While the present analysis does not consider corporate tax revenues, an earlier analysis in Clausing (2008) found that corporate tax revenues (relative to GDP) were higher in countries with tax credit systems, controlling for the tax rate, the tax rate squared, and various macroeconomic variables.

Second, the desirability of tax systems also depends crucially on questions concerning administration, compliance, and complexity. Here the distinction between types of tax systems may depend to a great extent on the details of law and administration. Finally, the efficiency properties of the tax systems are also essential, but there are several different (and conflicting) efficiency metrics. Therefore, this issue is difficult to summarize with one simple set of statistics.

The above analysis suggests that foreign direct investment flows are sensitive to both tax rates and tax systems in ways that are compatible with a priori expectations. Investors are sensitive to tax rates in host countries, and the above evidence suggests that tax sensitivity is particularly large for foreign direct investment from exemption or hybrid countries.

Evidence on headquarters activities is mixed at present. The raw data suggests that the world's top-2000 firms have both more market value and more sales (relative to country GDP) in non-credit countries. Still, the regression evidence (which controls for other variables) does not support large differences in headquarters presence between territorial and worldwide countries. To the extent that there are differences, credit countries show greater headquarters activities. Similarly, evidence on scientific measures from the OECD does not present a clear picture of tax system effects, although such effects may be difficult to discern amongst myriad important influences that are likely dominant in these data.

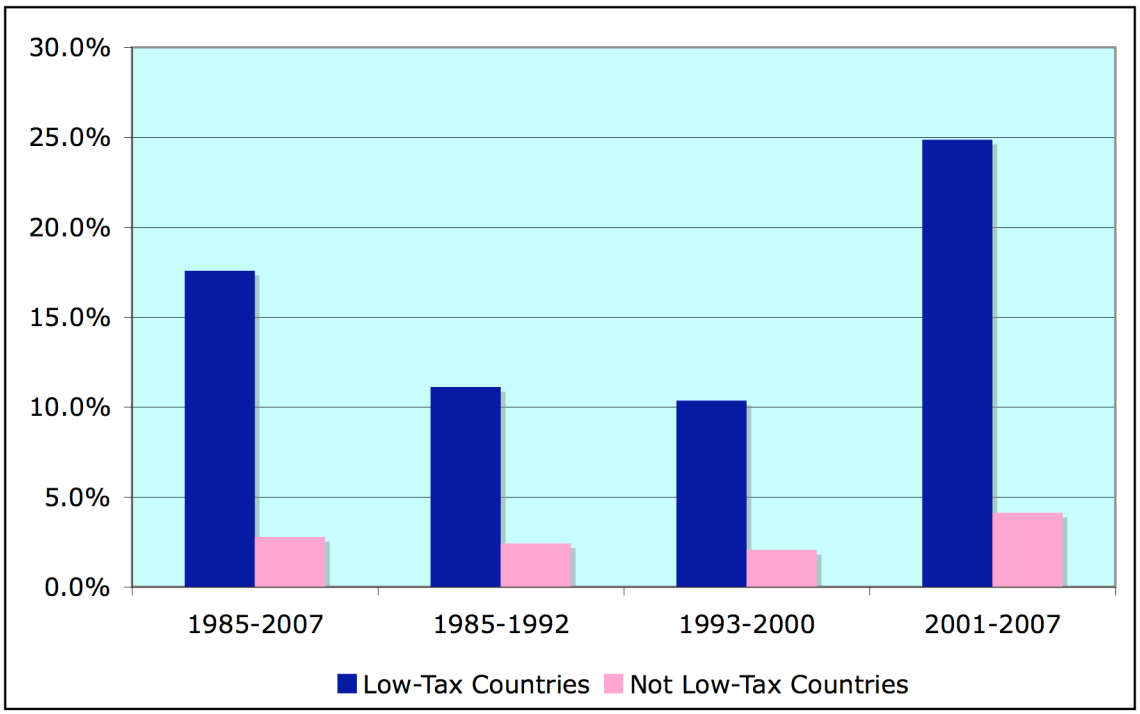
Figure 1: FDI/GDP Ratios for OECD Countries, by Tax System



Data Table: FDI Outflows/GDP for OECD Countries, by Tax System

System	1985-2007	1985-1992	1993-2000	2001-2007
Exempt	3.2%	1.4%	4.0%	4.8%
Hybrid	2.5%	0.6%	2.3%	4.7%
Credit	1.1%	0.5%	1.0%	1.9%

Figure 2: FDI Flows Received relative to GDP, by time period



Note: Low-tax countries are defined as those with a statutory tax rate less than 16%. A similar pattern is revealed if one instead contrasts countries listed as tax havens with those that are not listed.

Figure 3: Share of Total FDI Sent to Low (15% or less), Medium (15-30%) and High (>30%) Tax Countries, by Tax System of Investing Country

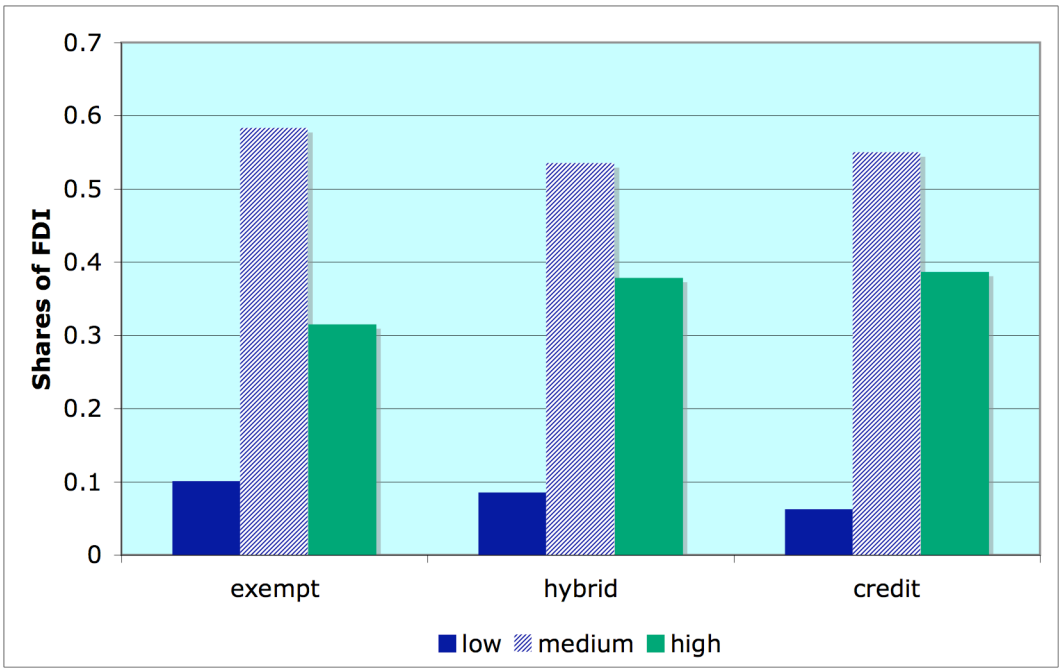
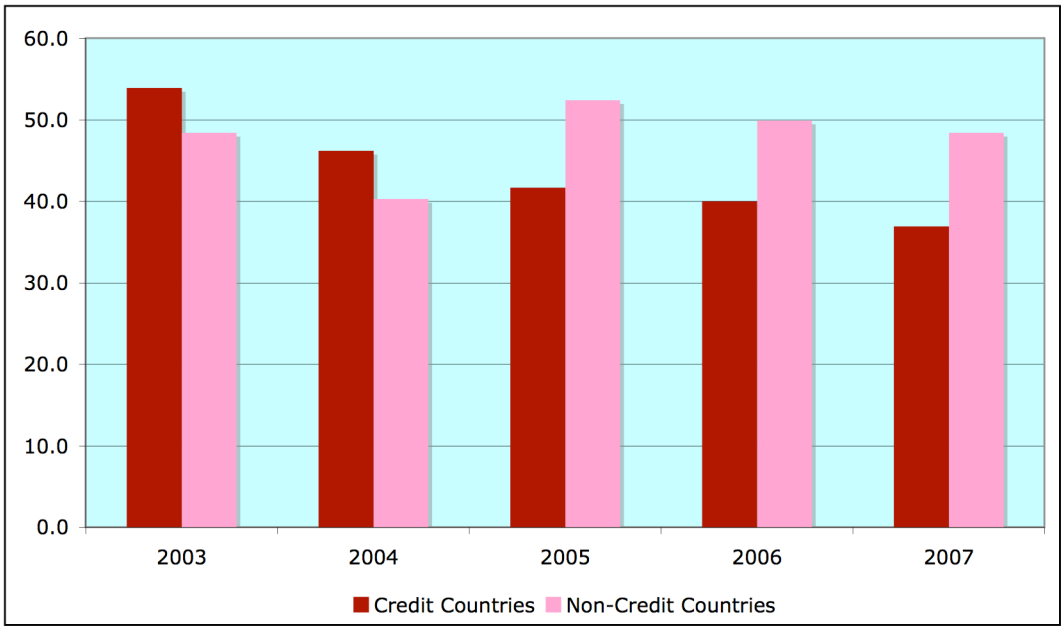


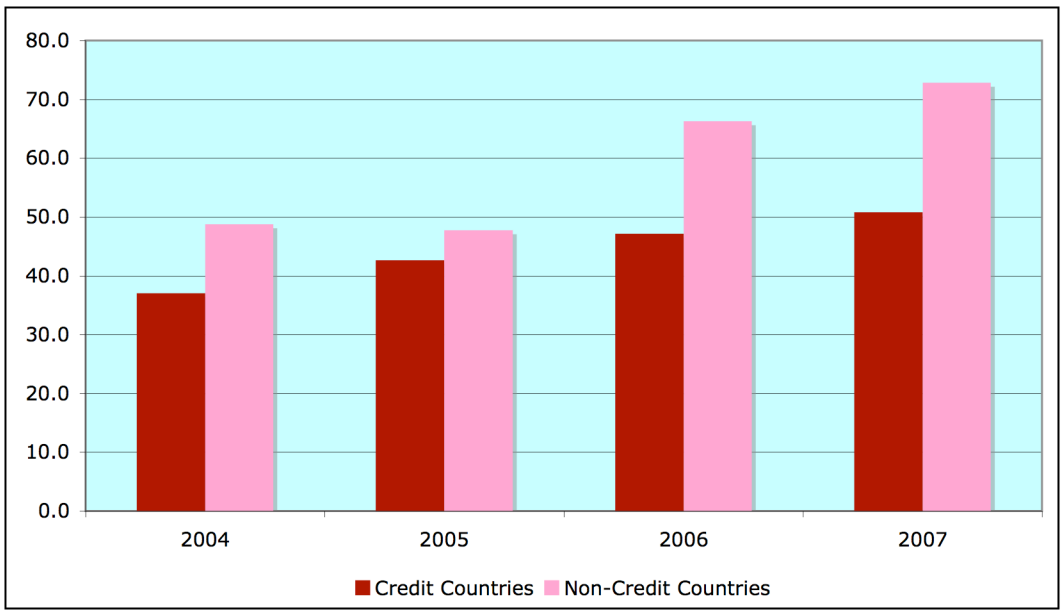
Figure 4: Forbes Measures of Headquarters Activity, Credit and Non-Credit Countries, 2003-2007

(A) Number of Top 2000 Firms in a Country per $1 trillion GDP



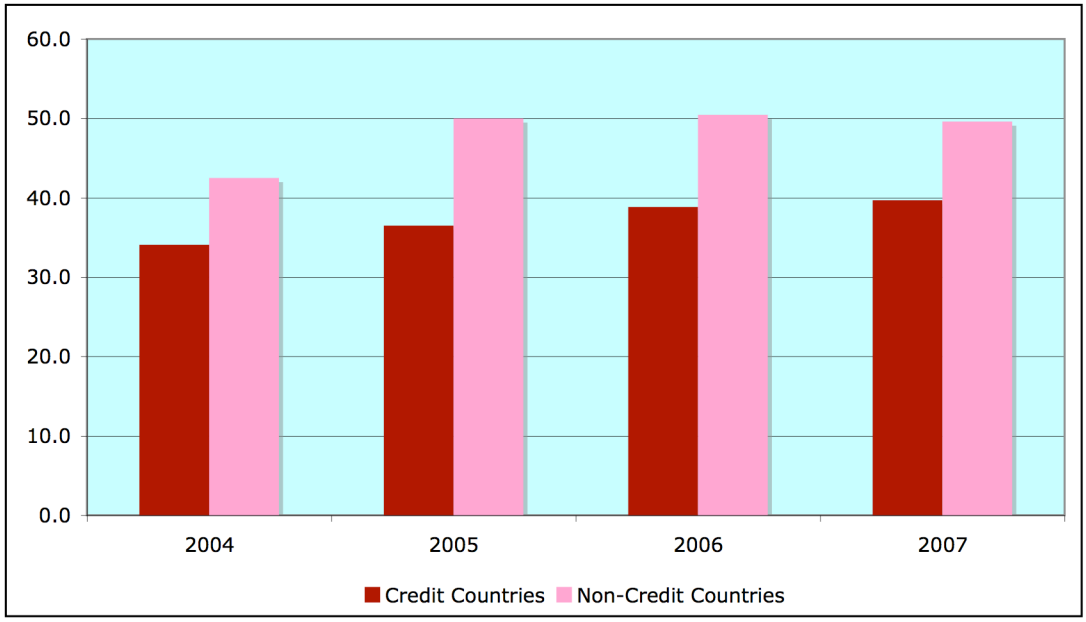
For this period, credit countries average 44 top 2000 firms per $1 trillion in GDP; non-credit countries average 48 top 2000 firms per $1 trillion in GDP.

(B) Market Value of Top 2000 Firms in a Country per $100 of GDP



For this period, credit countries average $44 in market value of top 2000 firms per $100 in GDP; non-credit countries average $61 in market value of top 2000 firms per $100 in GDP.

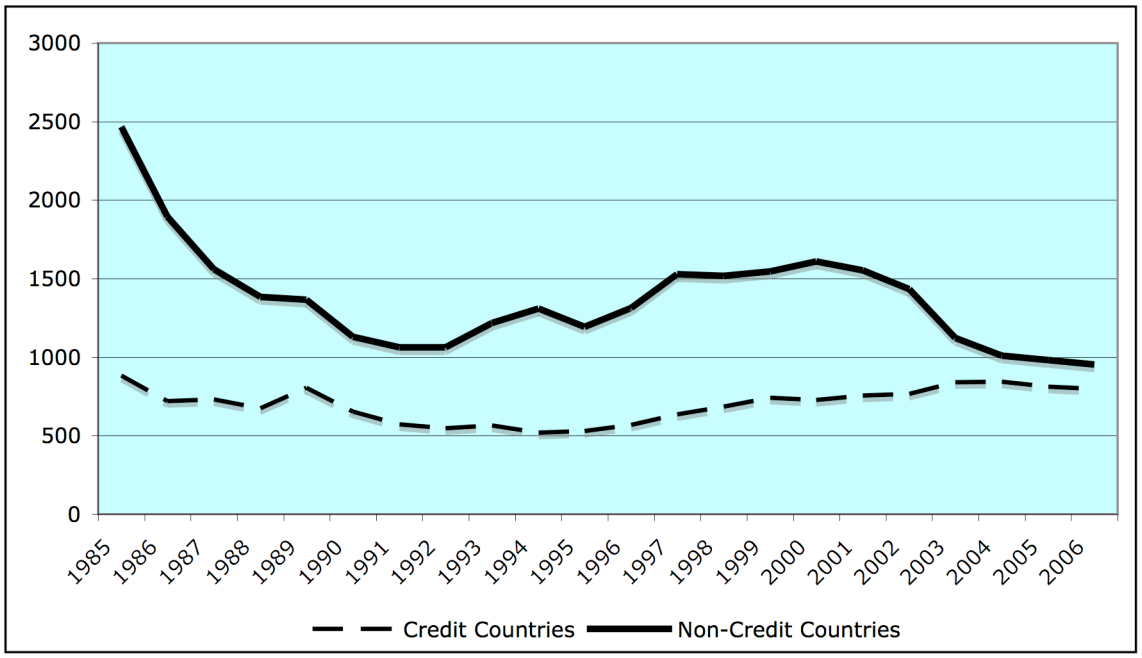
(C) Sales of Top 2000 Firms in a Country per $100 of GDP



For this period, credit countries average $37 in sales of top 2000 firms per $100 in GDP; non-credit countries average $48 in sales of top 2000 firms per $100 in GDP.

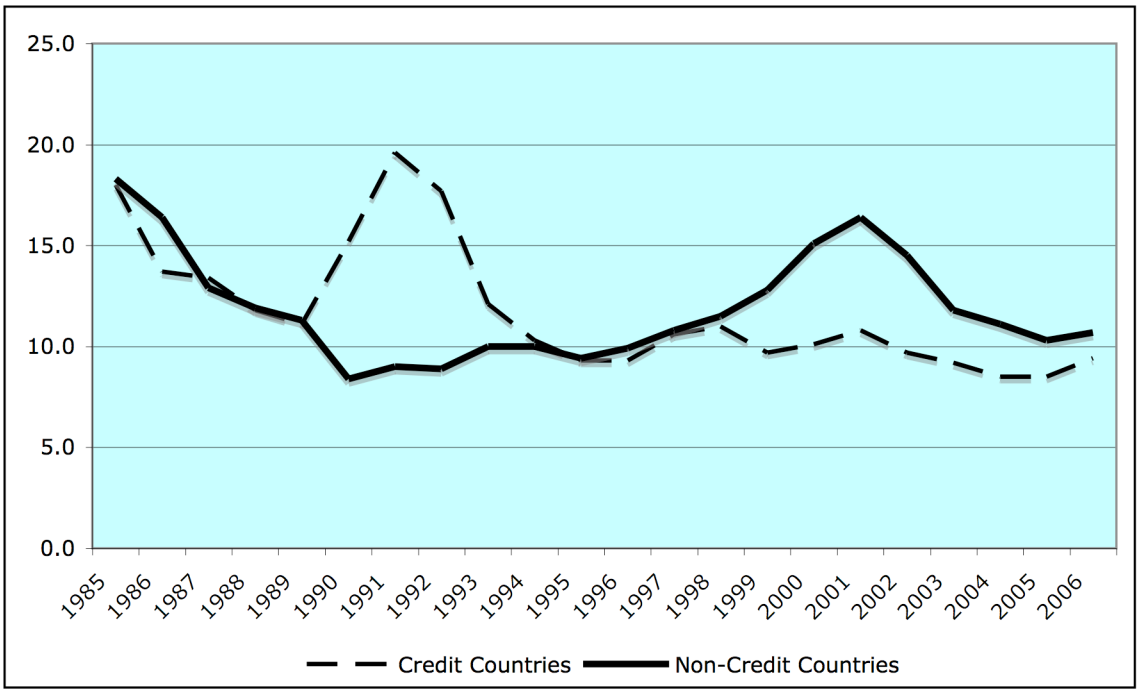
Figure 5: OECD Science Measures, 1985-2006

(A) Patents per trillion dollars GDP



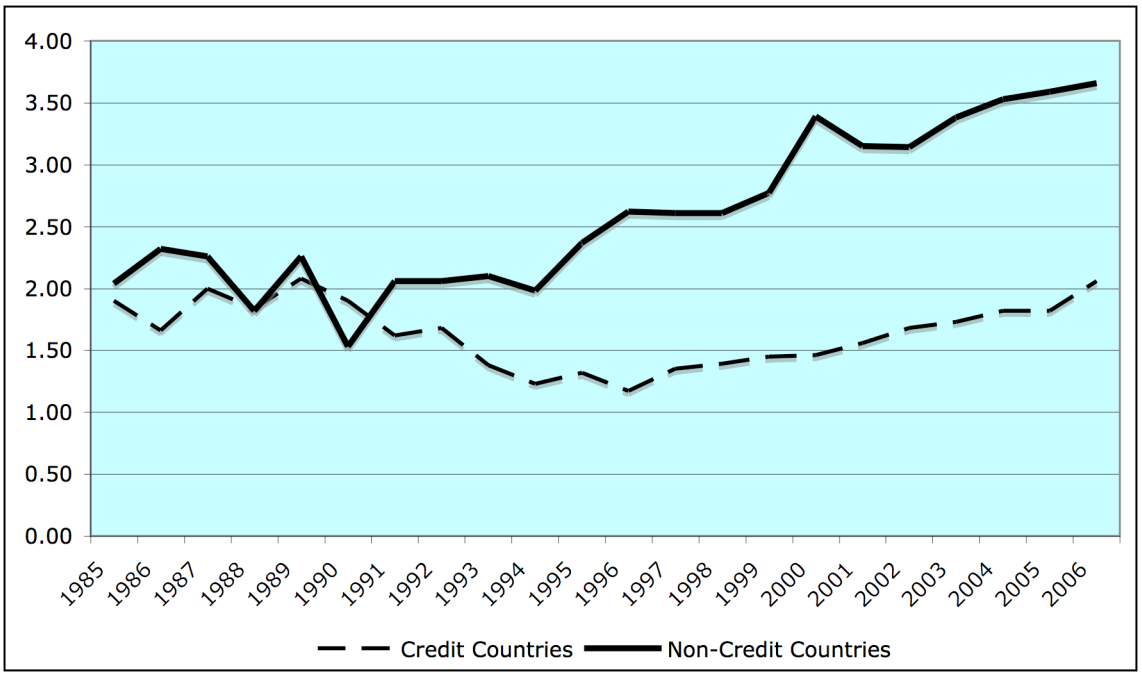
For the entire period, credit countries average 698 patents per $1t in GDP, and non-credit countries average 1,350 patents per $1t in GDP.

(B) Business Sector R&D Expenditure per thousand dollars GDP



For the period, credit countries average $11.2 in business R&D per $1000 in GDP, and non-credit countries average $11.8 in business R&D per $1000 in GDP.

(C) Business Sector R&D fte Personnel per 1000 People



For the period, credit countries average 1.6 business R&D personnel per 1,000 in population, and non-credit countries average 2.7 business R&D personnel per 1,000 in population.

Table 1: Summary Statistics

Variable	Mean	St. Dev.
Bilateral FDI, million $	622	3,427
GDP, billion $	373	1,130
GDP per-capita, $	11,980	13,460
Distance between FDI Partners, in km	6,840	4,720
Statutory Tax Rate	.306	.106
Number of Top-2000 Firms Headquartered in Country	36.5	98.6
Total Market Value of Top-2000 Firms in Country, in billion $	521	1,630
Total Sales of Top-2000 Firms in Country, in billion $	456	1,330
Number of Patents	972	2,690
Patent Share	0.033	0.078
Business R&D Expenditure, bil $	12.7	31.4
Business Sector R&D FTE, thousands	91.3	166.4
Technology Balance of Payments, mil $	1,163	5,527

Table 2: Total FDI Outflows for OECD Countries, 1985-2007

		1	2	3	4
exempt		0.555			1.255
		(0.396)			(0.708)
hybrid		-0.101			0.149
		(0.325)			(0.556)
exempt or hybrid			0.11	0.419	
			(0.303)	(0.810)	
tax rate		-2.257	-1.62	-0.436	-0.934
		(1.73)	(1.69)	(0.240)	-1.863
CFC law		0.089	0.105	0.304	0.337
		(0.339)	(0.34)	(0.720)	(0.427)
ln(gdp)		1.165	1.192	0.956	0.886
		(0.123)**	(0.122)**	(4.64)**	(0.213)**
ln(gdp p.c.)		1.29	1.273	1.313	1.348
		(0.242)**	(0.243)**	(3.72)**	(0.359)**
ln(remote)	-1.781		-1.945	-2.108	-1.906
	(0.505)**		(0.498)**	(2.23)*	(0.979)
Observations		478	478	478	478
R-squared		0.36	0.36		
Panel Data Techniques				Random Effects	Random Effects

Dependent variables are in natural log form. Standard errors in parentheses. * (**) indicates statistical significance at 5% (1%).

Table 3:
Bilateral FDI Flows Between OECD Countries and 79 Host Countries, 1985-2007

	1	2	3	4	5
tax rate, home	2.174 (0.401)**	2.447 (0.396)**	2.409 (0.398)**	2.081 (0.404)**	2.943 (0.410)**
tax rate, host	-0.986 (0.384)*	-1.024 (0.384)**	-1.912 (0.542)**	-1.26 (0.590)*	-1.261 (0.612)*
exempt * host tax rate	-0.426 (0.249)				
hybrid * host tax rate	-1.427 (0.245)**				
exempt/hybrid *host tax rate		-0.94 (0.215)**	-0.827 (0.219)**	-0.834 (0.218)**	-0.659 (0.282)*
CFC law			-0.32 (0.206)	-0.324 (0.206)	-0.027 (0.229)
CFC law *host tax rate			1.451 (0.635)*	1.493 (0.633)*	0.595 (0.701)
ln(gdp), home	0.663 (0.026)**	0.69 (0.025)**	0.671 (0.028)**	0.699 (0.028)**	0.579 (0.035)**
ln(gdp p.c.), home	0.767 (0.060)**	0.752 (0.060)**	0.742 (0.060)**	0.789 (0.060)**	0.746 (0.069)**
ln(gdp), host	0.594 (0.021)**	0.588 (0.021)**	0.59 (0.021)**	0.562 (0.030)**	0.549 (0.027)**
ln(gdp p.c.), host	-0.045 (0.027)	-0.048 (0.027)	-0.048 (0.027)	-0.065 (0.040)	-0.026 (0.035)
lndis	-0.617 (0.028)**	-0.626 (0.028)**	-0.63 (0.028)**	-0.748 (0.034)**	-0.62 (0.038)**
Observations	16013	16013	16013	16013	16013
No. receiving dummies				77	
No. pair dummies					1466
R-squared	0.13	0.13	0.13		

Dependent variables are in natural log form. Standard errors in parentheses. * (**) indicates statistical significance at 5% (1%).

Table 4: Determinants of Headquarters Activities, Forbes 2000 List

	# of 2000	Sum of Ranked Firms	Total Market Value	Total Profits	Total Assets	Total Sales
exempt	-0.611	-0.649	-0.386	-0.553	-0.213	-0.177
	(0.153)**	(0.173)**	(0.185)*	(0.233)*	(0.250)	(0.211)
hybrid	-0.322	-0.342	-0.073	-0.143	-0.22	-0.246
	(0.105)**	(0.119)**	(0.129)	(0.158)	(0.174)	(0.146)
tax rate	-1.125	-1.872	-1.781	-1.641	-3.086	-1.901
	(0.793)	(0.898)*	(0.989)	(1.222)	(1.338)*	(1.125)
CFC law	-0.284	-0.244	-0.245	-0.124	-0.287	-0.233
	(0.131)*	(0.148)	(0.160)	(0.197)	(0.216)	(0.182)
ln(gdp)	1.075	1.142	1.277	1.104	1.417	1.383
	(0.045)**	(0.052)**	(0.056)**	(0.070)**	(0.075)**	(0.063)**
ln(gdp p.c.)	0.797	0.824	1.105	1.075	1.479	1.13
	(0.076)**	(0.086)**	(0.094)**	(0.116)**	(0.127)**	(0.106)**
ln(remote)	0.202	-0.312	-0.177	-0.006	-0.913	-0.427
	(0.197)	(0.223)	(0.242)	(0.308)	(0.327)**	(0.275)
year 2003	0.488	0.553				
	(0.145)**	(0.165)**				
year 2004	0.189	0.264	-0.23	-0.998	0.082	0.09
	(0.144)	(0.163)	(0.158)	(0.201)**	(0.214)	(0.18)
year 2005	0.223	0.314	0.014	-0.353	0.246	0.174
	(0.14)	(0.159)*	(0.153)	(0.19)	(0.207)	(0.174)
year 2006	0.187	0.296	0.116	-0.072	0.244	0.196
	(0.14)	(0.158)	(0.153)	(0.19)	(0.206)	(0.174)
obs.	141	141	113	110	113	113
R-squared	0.89	0.88	0.91	0.85	0.88	0.90

Dependent variables are in natural log form. Standard errors in parentheses. * (**) indicates statistical significance at 5% (1%).

Table 5: Determinants of Headquarters Activities, OECD Data on Science Measures

	ln(patents)	ln(patents)	patent share	ln (bus. R&D)	ln (bus. R&D fte)	ln(tech. bop)
exempt	1.323	0.774	-4.142	0.364	0.307	-2.065
	(0.338)**	(0.199)**	(1.494)**	(0.225)	(0.225)	(1.785)
hybrid	0.788	0.201	-5.276	0.263	0.162	-3.19
	(0.280)**	(0.159)	(1.236)**	(0.180)	(0.177)	(1.486)*
tax rate	1.574	0.149	9.434	1.018	0.057	26.053
	(1.30)	(0.793)	(5.748)	(0.902)	(0.873)	(7.376)**
CFC law	-0.046	-0.187	-0.861	-0.02	0.196	-0.33
	(0.299)	(0.175)	(1.323)	(0.20)	(0.194)	(1.655)
ln(gdp)	1.16	-0.396	3.341	1.129	0.953	0.413
	(0.097)**	(0.114)**	(0.429)**	(0.067)**	(0.069)**	(0.563)
ln(gdp p.c)	0.934	0.639	2.561	0.192	0.056	4.007
	(0.175)**	(0.114)**	(0.774)**	(0.129)	(0.126)	(0.994)**
ln(remote)	-0.06	0.491	3.582	-0.301	-0.417	0.664
	(0.426)	(0.254)	(1.883)	(0.289)	(0.278)	(2.588)
ln(bus rd)		1.452				
		(0.087)**				
obs.	135	110	135	110	103	91
R-squared	0.77	0.94	0.58	0.85	0.8	0.32

Standard errors in parentheses. * (**) indicates statistical significance at 5% (1%).
Data are panel data from 1985, 1990, 1995, 2000, and 2005.

Data Appendix

Prior studies often classify countries as either credit or exemption countries, yet even with the more refined classification here, substantial ambiguities remain. For example, the French system, which is classified here as a pure territorial system, also includes controlled foreign company rules (effective from 2006) that stipulate that income earned by a French firm through a foreign firm may be taxed in France if such income is subject to an effective tax rate that is less the 50% the French effective tax rate on similar income.[7] For Germany, also classified as a territorial country, corporations are subject to German tax on worldwide income; yet, tax treaties provide an exemption from German taxation for income from foreign permanent establishments. Due to these ambiguities, specifications were tried that simply distinguished "pure" credit countries from other countries, grouping together hybrid and exemption countries.

Statutory ax rate data are from various sources, including PricewaterhouseCoopers *Corporate Taxes: Worldwide Summaries*, Ernst and Young's *Worldwide Corporate Tax Guide,* and Deloitte and Touche's *International Tax Source* on-line.[8] Data on effective tax rates are calculated from the taxes paid by U.S. multinational foreign affiliates relative to their net (before tax) income; these data are from the U.S. Bureau of Economic Analysis, which conducts annual surveys of U.S. multinational firms. Data on CFC laws are from Voget (2009).

Data on foreign direct investment are from the OECD, which provides measures of outward foreign direct investment flows from all OECD countries to a large number of receiving countries, including the 79 countries included in this analysis. Data on GDP

[7] See Ernst and Young, *Worldwide Corporate Tax Guide*, 2007.
[8] They have matrixes of country tax rates from recent history. See http://www.dits.deloitte.com/.

and GDP per-capita come from the World Bank's *World Development Indicators Database*, and data on geographic distances between countries are taken from the website of Kristian Skrede Gleditsch at the University of Essex.[9]

Remoteness is defined as the average distance to other countries in the sample. While the sample itself distorts this variable, it still shows a sensible pattern in the data. For example, New Zealand is more remote than the United States, which in turn is more remote than Belgium. Also, the sample is comprised of the 79 economies that are both major participants in the world economy and have available data, so this remoteness measure captures remoteness in relation to economically important countries. Thus, a country in central Africa is likely to be more remote than a country in central Europe, in part due to a greater distance from parts of Asia, but also because there are more sample countries in Europe than in Africa.

[9] http://privatewww.essex.ac.uk/~ksg/

References

Altshuler, Rosanne. "Recent Developments in the Debate on Deferral." *Tax Notes* (2000): 255-68.

Altshuler, Rosanne, and Harry Grubert. "Where Will They Go If We Go Territorial? Dividend Exemption and the Location Decisions of U.S. Multinational Corporations." *National Tax Journal* 54, no. 4 (2001): 787-809.

Barrios, Salvador, Harry Huizinga, Luc Laeven, and Gaetan Nicodème. "International Taxation and Multinational Firm Location Decisions." In Taxation Papers. Luxembourg: European Commission, 2009.

Bénassy-Quéré, and et al. "Foreign Direct Investment and the Prospects for Tax Co-Ordination in Europe." In *CEPII Working Paper no. 2000-06*, 2000.

de Mooij, Ruud A. , and Sjef Ederveen. "Taxation and Foreign Direct Investment: A Synthesis of Empirical Research." *International Tax and Public Finance* 10, no. 6 (2003): 673-93.

Desai, Mihir A., and Jr. James R. Hines. "Old Rules and New Realities: Corporate Tax Policy in a Global Setting." In *Ross School of Business Paper No. 920*, 2004.

Gropp, Reint, and Kristina Kostial. "The Disappearing Tax Base: Is Foreign Direct Investment Eroding Corporate Income Taxes?" In European Central Bank Working Paper Series, 2000.

Hajkova, Dana, and et al. "Taxation, Business Environment, and FDI Location in OECD Countries." In *OECD Economics Department Working Paper*, 2006.

Hines, Jr., James R. "Altered States: Taxes and the Location of Foreign Direct Investment in America." *American Economic Review* 86, no. 5 (1996): 1076-94.

Huizinga, Harry, and Johannes Voget. "International Taxation and the Direction and Volume of Cross Border M&As " *Journal of Finance* LXIV, no. 3 (2009): 1217-49.

Overesch, Michael. "The Effects of Multinationals' Profit Shifting Activities on Real Investments." *National Tax Journal* 62, no. 1 (2009): 5-23.

Richman, Peggy. *Taxation of Foreign Income: An Economic Analysis*. Baltimore: John Hopkins Press, 1963.

Slemrod, Joel. "Tax Effects on Foreign Direct Investment in the United States: Evidence from a Cross-Country Comparison." In *Taxation in the Global Economy*, edited by Assaf Razin and Joel Slemrod, 79-117. Chicago: U of Chicago Press, 1990.

Voget, Johannes. "Headquarters Relocations and International Taxation." Centre for Business

Taxation, Oxford University, 2009.

Wei, Shang-Jin. "How Taxing Is Corruption on International Investors?" *Review of Economics and Statistics* LXXXII, no. 1 (2000): 1-11.

Wijeweera, Albert, Brain Dollery, and Don Clark. "Corporate Tax Rates and Foreign Direct Investment in the United States." *Applied Economics* 39, no. 1 (2007): 109-17.