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INTERNATIONAL TAXATION AND CROSS-BORDER BANKING

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ABSTRACT

This paper examines empirically how international taxation affects the volume and pricing of cross-border banking activities for a sample of banks in 38 countries over the 1998-2008 period. International double taxation of foreign-source bank income is found to reduce banking-sector FDI. Furthermore, such taxation is almost fully passed on into higher interest margins charged abroad. These results imply that international double taxation distorts the activities of international banks, and that the incidence of international double taxation of banks is on bank customers in the foreign subsidiary country. Our analysis informs the debate about additional taxation of the financial sector that has emerged in the wake of the recent financial crisis.

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1. Introduction

The international tax system tends to discriminate against foreign-owned banks. Specifically, domestic banks are just subject to a local corporate income tax on domestic income, while foreign-owned banks in addition may be subject to non-resident dividend withholding tax in the subsidiary country and corporate income tax on repatriated dividends in the parent country. International double taxation potentially puts international banks at a competitive disadvantage, with implications for the performance as well as the structure of the international banking market.[2] This paper examines empirically the impact of international taxation on bank interest margins and pre-tax profitability as indices of banking-sector performance. Furthermore, we investigate how international taxation affects banking FDI in terms of foreign-bank assets and numbers, as measures of banking-sector structure.

Our study of the international taxation of banking offers insights that are interesting from two main perspectives. First, in the aftermath of the financial crisis of 2008-2009, many countries are thinking of new taxes on their financial systems to help prevent a next crisis and also to raise the overall tax contribution of the financial sector. A main new tax being considered is the Financial Activities Tax, which is a tax on a bank's combined profits and wage bill (see IMF, 2010). In a recent communication, the European Commission (2010) has announced that it is conducting an impact assessment study of the Financial Activities Tax (among other financial taxes), which is potentially followed by a proposal for a European directive to coordinate such taxation in the EU. Our analysis of international income taxation as applied to the banking sector informs about the likely incidence and dislocation effects of a Financial Activities Tax, given that the latter tax also is a tax on income derived from the financial sector. More directly, we gain insight into the impact of the corporate income tax when some firms in a country are subject to a differentially high level of tax – due to international double taxation.

A second reason for studying the international double taxation of banking is that it constitutes a barrier to further banking market integration. Regulatory barriers to international banking have been reduced worldwide, but the drive at banking market unification has so far stopped short of eliminating the international double taxation of banking income. This

[2] International expansion only makes sense for a bank if this provides benefits that exceed the cost of international double taxation. These benefits potentially include being able to serve internationally active customers, diversification gains, economies of scale, access to agglomeration benefits in international financial centers, and international regulatory arbitrage. See McCauley, McGuire and von Goetz (2010), Claessens and Van Horen (2009), and Committee on the Global Financial System (2010).

potentially explains why many countries' banking markets remain dominated by national banks, even if many banking markets have become more international, as measured by the external assets and liabilities of domestic banks as well as the ownership of banks.[3]

Our empirical analysis of the impact of international taxation on banks is based on a sample of individual banks in 38 countries during the 1998-2008 period. We estimate that bank interest margins almost fully reflect the additional international taxation of dividends paid by foreign subsidiaries. The incidence of international taxation thus appears to be on a bank's lending and depositor customers. This result is robust to limiting the sample to intra-EU banking, to limiting the sample to banks that are foreign subsidiaries, and to adjusting the interest margin for a bank's loan loss provisioning as a measure of credit risk.

We do not find that a bank's pre-tax profitability is materially affected by international double taxation of dividend income. This may reflect that higher international taxation of a foreign subsidiary's income triggers more outward profit shifting to the parent bank (and higher tax-deductible costs to hide this profit shifting). Consistent with a profit shifting motive, we further find that a foreign subsidiary's reported profits are positively related to the corporate income tax in the parent country.

Using a gravity model approach, we investigate the impact of international double taxation on banking FDI on a bilateral aggregated basis. We find evidence that international double taxation of dividend income reduces banking-sector FDI in terms of foreign-bank assets. In addition, we find that the number of foreign banks is significantly reduced by international double taxation.

The responsiveness of the number of international banking establishments to international double taxation suggests that banks face a two-step international banking decision: first, they consider whether to set up a foreign subsidiary and, second, they determine the pricing (and quantity) of their foreign financial services. The endogeneity of the initial FDI decision w.r.t. international double taxation implies that the estimation of the impact of such taxation on net interest margins may be biased. We apply a two-stage Heckman estimation to net interest revenue regressions to account for the possible endogeneity of the FDI decision, confirming a major pass through of international double taxation into higher interest margins. Taken together,

[3] See Allen, Beck, Carletti, Lane, Schoenmaker, and Wagner (2011, Table 1.1) for information on the development of the external assets and liabilities of domestic banking systems relative to GDP of BIS reporting countries over the 2002-2009 period.

our results indicate that international double taxation increases interest margins, as it causes foreign-owned firms to reduce their host-country supply of financial services by way of FDI.

Several papers have previously examined the tax and non-tax determinants of bank interest margins and profitability. For a sample of banks in 80 countries over the years 1988-1995, Demirgüç-Kunt and Huizinga (1999) find that interest margins and pre-tax profitability are negatively related to official reserves, which represent a form of implicit taxation. Interest margins and profitability are further positively related to the local corporate tax rate. The estimated coefficient on the corporate tax rate in the profitability regression is consistent with a full pass-through of the corporate tax to bank customers. Demirgüç-Kunt and Huizinga (2001) extend this analysis to distinguish between domestically owned and foreign-owned banks. The profitability of foreign-owned banks is found to rise relatively little with the local corporate tax rate, which can be explained by international profit shifting or by the international double tax relief provided by parent countries. The present paper goes beyond Demirgüç-Kunt and Huizinga (2001) by including in the analysis both host and parent country taxation payable by foreign-owned banks, thus accounting for international double taxation.[4]

An extensive literature, surveyed by Ederveen and de Mooij (2006), examines the impact of taxation on FDI. Several authors have previously found a role for parent-country taxation to affect the location of FDI. For US multinationals, Kemsley (1998) finds that the host country tax only affects the ratio of US exports to foreign production over the period 1984-1992 if the multinationals find themselves in excess credit positions. Analogously, a role of parent-country taxation in affecting FDI into the United States is found by Hines (1996) who shows that foreign countries with worldwide taxation invest relatively much in US states with high state taxes. This reflects that multinationals located in countries with worldwide taxation may be able to obtain foreign tax credits for US state corporate income taxes. Egger, Loretz, Pfaffermayr, and Winner (2009) construct an effective tax rate on a bilateral basis that reflects overall host and parent country taxation, and they find that this bilateral effective tax rate has a negative impact on

[4] Demirgüç-Kunt, Laeven and Levine (2003) examine the impact of bank regulations, market structure and national institutions on the bank net interest margins for a sample of banks from 72 countries over the years 1995-1999 while not considering taxation. Martinez Peria and Mody (2004) examine how foreign bank participation affects interest margins of Latin American banks during the period 1995-2000, distinguishing between individual-bank and banking-system foreign ownership. Maudos and Guevara (2003) examine the impact of bank market power on interest spreads in six large European banking markets in the period 1993-2000. Valverde and Fernandez (2007) examine the impact of a bank's activity mix on bank margins in Europe.

bilateral FDI stocks after controlling for host and parent country unilateral effective tax rates. Barrios, Huizinga, Laeven and Nicodème (2012) examine how international double taxation affects foreign subsidiary location, finding that parent country corporate income taxation discourages subsidiary location. Huizinga and Voget (2009) find a negative impact of international double taxation on headquarter location following international M&As using individual deal as well as aggregated data. The present paper examines the impact of international double taxation on FDI in the banking sector only, using information for all banks rather than just for those that are newly formed through M&As. Focusing on the banking sector has the advantage that bank-level data allow us to identify a price response (through interest margins) and a quantity response (through FDI) to international double taxation.

This paper is organized as follows. Section 2 describes the international tax system, and it provides some summary information on the international tax rates that apply to our sample of banks. Section 3 presents the empirical results on the impact of international taxation on bank interest margins and profitability. Section 4 in turn presents results on how international taxation affects banking sector FDI. This section also examines whether the results on interest margins and bank profitability are robust to controlling for the potential endogeneity of FDI. Section 5 concludes.

2. The international taxation of banks

2.1 The international tax system

In this section, we describe the international tax system that applies to a bank owned by some foreign parent bank. We consider the additional international taxation that is levied on the subsidiary's dividend and also its interest payments to outside investors on the assumption that these payments are first made to the parent firm which then passes them on to final investors. Thus, we will assume that the parent bank pays out any dividends received from the foreign subsidiary as dividends to investors, while any interest received is paid out as interest. We examine the international tax system as it applies to dividend and interest payments in turn. [5]

A bank's income is subject to the local corporate income tax before it can be paid out as dividends. For a domestic bank located in country i, the corporate income tax t_i is the only tax on

[5] See Huizinga, Laeven and Nicodème (2008) for an alternative description of the international tax treatment of the debt and equity finance of a multinational firm.

income paid out as dividends at the corporate level. Table 1 indicates the statutory corporate tax rate on corporate profit in 2008 for the 38 countries in this study, which in addition to many European countries includes Australia, Canada, Japan, Mexico, New Zealand, South Korea and the United States.[6]

Dividends paid out by a foreign subsidiary located in country *i* can be subject to a nonresident dividend withholding tax w_i^e levied by the subsidiary country. Bilateral dividend withholding taxes for our sample of countries in 2008 are presented in Table 2. Among long-standing EU member states, nonresident dividend withholding taxes for payments to parent firms are zero on account of the EU Parent-Subsidiary Directive. Non-EU countries such as Canada, Japan, New Zealand, and the United States maintain non-zero dividend withholding taxes in a considerable number of cases.

The parent country may or may not tax any income generated abroad. In case the parent country operates a territorial or source-based tax system, it effectively exempts foreign-source income from taxation. The effective tax on income generated in country *i* and paid out as dividends in country *p* then is $t_i + w_i^e(1-t_i)$, and the additional tax on account of foreign ownership, denoted τ_i, equals $w_i^e(1-t_i)$.

Alternatively, the parent country operates a worldwide or residence-based tax system. In this instance, the parent country subjects income reported in country *i* to taxation, but it generally provides a foreign tax credit for taxes already paid in country *i* to reduce the potential for double taxation. The OECD model treaty, which summarizes recommended practice, gives countries the choice between an exemption and a foreign tax credit as the only two ways to relieve double taxation (OECD, 1997). The foreign tax credit reduces domestic taxes on foreign source income one-for-one with the taxes already paid abroad. The foreign tax credit can be indirect in the sense that it applies to both any withholding tax and the underlying subsidiary-country corporate income tax, or it is direct and applies only to the withholding tax. In either case, foreign tax credits are generally limited to prevent the domestic tax liability on foreign source income from becoming negative.

In the indirect credit regime, an international bank will pay no corporate income tax in the parent country, if the parent tax rate t_p is less than $t_i + w_i^e(1-t_i)$. The international bank then

[6] The sample is restricted to OECD countries and countries of the European Economic Area due to data availability.

has unused foreign tax credits and is said to be in an excess credit position. Alternatively, t_p exceeds $t_i + w_i^e - t_i w_i^e$. In that instance, the bank pays tax in the parent country at a rate equal to the difference between t_p and $t_i + w_i^e - t_i w_i^e$. The effective, combined tax rate on the dividend income then equals the parent country tax rate, t_p. To summarize, with the indirect credit system, the effective rate on income generated in country *i*, is given by max $[t_p, t_i + w_i^e - t_i w_i^e]$, and the additional tax on account of foreign ownership τ_i, equals max $[t_p - t_i, w_i^e(1-t_i)]$. With a direct foreign tax credit, the international bank pays no corporate income tax in the parent country, if the parent tax rate t_p is less than w_i^e. In the more common case where t_p exceeds w_i^e, the bank instead pays tax in the parent country at a rate equal to $(1-t_i)(t_p - w_i^e)$. The effective, two-country tax rate now is given by $t_i + (1-t_i)\max[t_p, w_i^e]$, and the additional international tax τ_i, equals $(1-t_i)\max[t_p, w_i^e]$. A few countries with worldwide taxation do not provide foreign tax credits, but instead allow foreign taxes to be deducted from the multinational's taxable income. In the scenario, the effective rate of taxation on dividends is given by $1-(1-t_i)(1-w_i^e)(1-t_p)$, and τ_i equals $(1-t_i)[1-(1-w_i^e)(1-t_p)]$.

Columns 2-4 of Table 1 provide information on the double taxation rules applied to incoming dividends in 2008. Several countries are seen to discriminate between international tax treaty partners and non-treaty countries. We have collected information on the existence of bilateral tax treaties to assess the relevant double tax relief method. Also, several EU countries are seen to offer relatively generous double tax relief for intra-EU dividends.

Next, we consider the additional international taxation that may apply to interest payments by a foreign subsidiary bank that reach final investors via an international parent bank. Interest expense on debt is generally deductible from taxable corporate income in the subsidiary country *i*, but the subsidiary country may levy a non-resident withholding tax w_i^d on interest payments to the parent bank in country *p*. As seen in Table 3, bilateral nonresident withholding taxes on interest on interest payments to related parties tend to be zero in the EU on account of the Interest and Royalties Directive, even if non-EU countries such as Canada, Japan and the United States frequently levy positive nonresident interest withholding taxes.

The parent country generally applies corporate income tax to the parent bank's interest receipt from its foreign subsidiary. As before, the parent country has three main options regarding double tax relief: (i) an exemption, (ii) a foreign tax credit, or (iii) a deduction. For each of these three cases, an additional international tax rate on interest on account of the subsidiary's foreign ownership can be derived, and formulae are presented in Table 4. Columns 5 and 6 of Table 1 provide information on the double taxation rules applicable to incoming interest from treaty and non-treaty signatory countries, respectively. As seen in the table, most countries provide a foreign tax credit (to be applied to any nonresident interest withholding tax), a few countries allow a deduction in the absence of a tax treaty, and no country exempts foreign interest income.

2.2 International taxation of banks in the sample

Data on individual banks are taken from Bankscope. This data source provides accounting data on banks worldwide in a standardized format. In addition, Bankscope contains data on ownership relationships among banks. For each bank, Bankscope provides information on major owners (and also information on any owned subsidiaries). Our aim is to have a sample of all the banking establishments that operate in a country, and for each establishment provide information on majority foreign ownership, if any. To construct a comprehensive sample of the banks in a country, we include unconsolidated parent firms and all subsidiaries. The ownership information provided for subsidiaries is then used to see if there is a corporate major shareholder and to find out where such a major shareholder has its residence. Our country coverage is limited to the countries for which we have collected tax information as listed in Table 1. Thus, we include banks that are located in one of these countries and that have majority owners resident in one of these countries. Our sample covers the years 1998-2008.

Table 5 provides a breakdown of our sample of banks by the country of location. Banks located in the US comprise 46% of the sample, or 4462 US banks in an overall sample of 9731. Other countries with at least 400 observations are France, Germany, Italy, Luxembourg and Switzerland. Table 5 also provides information on the share of assets held by foreign-owned banks. The foreign-bank asset share is on average 9.5% internationally. The foreign ownership share by assets is very high in the Baltic states (96.5% in Estonia, 49.7% in Latvia, and 80.0 in Lithuania) and also in Luxembourg (67.2%), while it is lowest in the US at 1.2%.

Table 6 provides information on the local and international tax burdens on banks by country of residence. The host country corporate income tax on average is 36.1% for all banks. The average dividend double tax, corresponding to the expressions in Table 4, is calculated as 0.8% for all banks. The average interest double tax is further shown to be positive only for some banks located in Cyprus and Switzerland. In the empirical work below, we will only consider the international double taxation of dividend income, given the dearth of observations where the international double taxation of interest income is positive. The final two columns of Table 6 provide information on the average international taxes for only the sample of foreign-owned banks. For these banks, the average dividend double tax amounts to 3.5%, to suggest that foreign-owned banks on average face a 10% higher tax than domestic banks that are only subject the local corporate tax rate.

3. Bank interest margins and profitability

In this section, we examine how the international taxation of banks affects bank interest margins and bank profitability. A bank's pre-tax profits are defined by the following accounting identity

Pre-tax profits = Net interest income + Net other operating income – Loan loss provisions – Overhead.

In the empirical work, we will use interest income and profitability measures scaled by total bank assets. Thus, net interest income over assets is a bank's net interest income divided by total assets. Net interest income over assets has a sample mean of 2.8%, as seen in Table 7. Similarly, Pre-tax profits over assets is the ratio of a bank's pre-tax profits to total assets. This profit variable reflects variation in all the various items in a bank's income statement, including its net interest income. The mean of this variable is1.3%. Pre-tax profits over assets can be split into Taxes over assets and Post-tax profits over assets with mean values of 0.4% and 1.0%, respectively. The Taxes over assets variable reflects the taxes paid by the reporting bank, and hence they exclude any corporate taxes to be paid by an international parent bank and any nonresident dividend withholding taxes. These latter taxes are to be paid out of the dividends distributed by the bank.[7]

[7] The Taxes over assets variable similarly excludes any nonresident interest withholding taxes that are to be paid out of interest paid by the bank and received by nonresidents.

The margin and profitability variables will be explained by several tax rate variables in the empirical work. Among these, the local or host country corporate income tax has a mean of 35.2% for the observations in our sample. Next, the parent country tax is the corporate income tax rate in the parent country in case a bank is foreign-owned. This variable is set to zero in case of domestic ownership. The mean of the parent country tax variable is seen to be 7.4%. International double taxation of dividend income has a mean of 0.8%.

The impact of bank taxes on bank net interest revenue and profitability reflects the extent to which these taxes are shifted onto bank customers and other related parties through different price setting. In practice, banks may be able to shift some of their taxes to bank retail customers, other bank liability holders, bank employees and further providers of banking inputs. For instance, a bank could shift some of its taxes to its retail customers in the form of a higher lending rate and a lower deposit rate, giving rise to higher net interest revenues and higher pre-tax profitability.

Banking taxation may also affect the recorded net interest revenue and profitability as a result of international profit shifting within a multinational bank. Higher host country taxation and dividend double taxation, in particular, provide increased incentives to shift profits to an international parent bank, implying lower recorded profitability of a foreign subsidiary bank. International profit shifting thus may lead to a less positive or even negative relationship between the taxation of subsidiary profits and recorded subsidiary profits. At the same time, recorded subsidiary profits may be positively related to the parent country corporate tax rate, if higher parent country taxation causes a multinational firm to shift profits from the parent bank towards its foreign subsidiaries.

Several bank-level and country-level variables are included in the analysis as controls. Assets is the log of total bank assets in real terms to control for bank size. The ratio of earning assets to total bank assets is the share of a bank's assets that generates interest or dividend income, and it proxies for a bank's focus on interest-generating activities as opposed to fee-generating activities. Foreign bank signals ownership by foreign shareholders with at least 50% ownership. Foreign ownership potentially affects net interest revenue and profitability on account of different interest margins and profitability in an economic sense as well as on account of international profit shifting. Bank market share is a bank's total loans as a share of all loans provided by banks located in a certain country. A high bank-level market share may give rise to

market power, leading to higher net interest revenue and profitability. Alternatively, a high market share could reflect bank efficiency, resulting in low interest margins to the extent that bank customers reap the benefits of higher bank efficiency.

Among the country-level controls, the national foreign ownership share is the share of assets of foreign-owned banks in total banking system assets. A high share of foreign ownership nationally suggests free entry of foreign banks, possibly reducing interest margins and profitability. National top five market share is the share of loans of the top five lending banks in total loans provided in a country. A highly concentrated lending market, as indicated by a high top 5 lending share, may explain high interest margins and profitability. GDP per capita is the log of real GDP per capita. Industrial growth rate is the growth rate of industrial production. Strong industrial growth may imply high loan demand, pushing up net interest revenue and profitability. Inflation rate is the rate of change in the consumer price index. High inflation may increase net interest revenue, if lending rates more accurately reflect inflation than deposit rates. Finally, real interest rate is the money market interest rate minus the inflation rate. High real interest rates may reflect plentiful opportunities to invest profitably, pushing up interest margins and bank profitability.

Table 8 shows the results of regressions of the net interest income over assets variable. The regressions include host country and year fixed effects, and standard errors are robust to clustering at the bank level. In regression 1, the host country tax obtains a negative coefficient of -0.015 that is statistically insignificant.[8] The failure of the host country corporate tax to lead to higher interest margins could reflect that higher host country taxation induces outward profit shifting. Alternatively, it reflects that the incidence of the corporate income in open economies is largely on labor, giving rise to lower wages. Consistent with this, Arulampalam, Devereux, and Maffini (2012) estimate that an exogenous rise in the corporate tax of 1$ would reduce the wage bill by 49 cents.

In regression 1, the double dividend tax obtains a coefficient of 0.035 that is significant at the 5% level. Thus, some of the incidence of international double taxation appears to be on the foreign subsidiary's lending and depositor customers and other suppliers of funds. International

[8] The coefficient for the tax rate reflects the long-run effect on the net-interest margin. An explicit modeling of short-run dynamics would require longer time series. See also Verbeek (2008, p. 117-118).

double taxation, unlike host country taxation, is not primarily shifted to labor, as double taxation only applies to a specific set of foreign bank owners rather than to banks generally.

In regression 1 the assets variable obtains a coefficient of -0.002 that is significant at the 1% level. This may reflect that big banks deal with large customers that obtain favorable interest rates. The bank-level foreign ownership dummy enters with a negative coefficient of -0.003 that is significant at 5%. This could equally reflect that foreign-owned banks tend to deal with sophisticated customers, or alternatively that they have to offer more attractive interest terms to their customers on account of lack of information or distrust. Net interest income over assets is further positively and significantly related to the bank's own market share, as a large loan market share may enable it to exercise market power in the loan market. Among the macroeconomic variables, the net interest income relative to assets is positively and significantly related to the growth rate of industrial production and to the rate of inflation.

The estimated coefficient of 0.035 for the double tax variable in regression 1 implies a certain sharing of the incidence of additional international taxation between the bank and its customers. To evaluate this, let n be the net-of-tax net interest margin calculated as $(1-t)b$ where t is the combined national and international tax rate on net interest income and b is the pre-tax interest margin. Tax revenue is denoted r and is equal to tb. A change in the combined tax rate t changes the bank return by $dn/dt = -b + (1-t)*db/dt$, while the change in revenues is given by $dr/dt=b + t*db/dt$. The share of the incidence on the bank is computed as $-(dn/dt)/(dr/dt)$, while the share of the incidence on bank customers equals $(db/dt)/(dr/dt)$. To do the calculation, we set b to its sample mean of 0.028, t is the combined summed mean dividend double tax and mean host country tax of 0.36 (the sum of 0.352 and 0.008), and db/dt is the estimated coefficient of 0.035. The share of the incidence of a higher international double tax on the bank is now calculated to be 13.8%, with the remaining share of 86.2% of the incidence being borne by the bank's loan customers and depositors.

Member states of the EU do not impose discriminatory restrictions on intra-EU foreign banking and they subscribe to a common set of basic minimum standards of bank regulation in areas such as capital adequacy and deposit insurance.[9] In the EU, however, there still is some international double taxation of dividend income, as several EU member states continue to tax the worldwide income of their resident multinational banks. A sample just of EU banks (located

[9] The European Union's Second Banking Directive of 1989 allows EU banks to freely operate throughout the EU.

in the EU and with EU parent firms, if any) provides an interesting setting to test for the impact of international taxation on interest margins and profitability, given that EU banking markets are otherwise relatively uniform. In regression 2, we restrict the sample to only EU banks. The host country tax enters this regression with negative coefficient that is insignificant, while the double tax variable obtains a coefficient of 0.032 that is significant at the 5% level.

Next, in regression 3 we restrict the sample to foreign owned banks, reducing the sample from 9731 observations in regression 1 to 2135 observations. The coefficient for the host country tax is estimated to be insignificant, while the coefficient of 0.038 for the double tax variable is significant at the 5% level.

Regression 4 includes bank fixed effects rather than country fixed effects to account for possible unobserved bank heterogeneity. The host country tax now receives a positive coefficient that is insignificant, while the double tax variable is estimated with a coefficient of 0.026 that is significant at 5%.

Finally, in regression 5 the dependent variable is the interest margin variable adjusted for concurrent loan loss provisioning, to reflect differences across banks in the riskiness of their credit portfolios. The host country tax now enters with a negative coefficient of -0.017 that is significant at 5%. A negative coefficient is consistent with a profit shifting motive. Banks, in particular, have an incentive to transfer questionable credits to high-tax countries before any loan loss provisions are taken to benefit from the tax deductibility of such provisioning (or of the implied subsequent write-offs) at the higher tax rate.

Table 9 presents results of regressions of bank profitability and of the level of host corporate income taxes paid. Specifically, the dependent variables in regressions 1-3 are pre-tax profits over assets, taxes over assets, and post-tax profits over assets, respectively. In all three regressions, the host country tax is seen to enter with negative coefficients that are statistically significant, consistent with an international profit shifting motive. In particular, reported pre-tax profitability would decline with profit shifting on account of the profits actually shifting abroad, and also on account of the various costs the bank incurs to implement and hide the profit shifting.[10] The dividend double tax does not enter any of the three regressions with a statistically significant coefficient, as higher income resulting from a pass through of the tax to bank

[10] These various costs are not reflected in the interest margin variable, which can explain a less negative response of net interest income to the host country tax in the presence of profit shifting that for the case of pre-tax profitability.

customers and other input providers may be offset by increased outward profit shifting and its associated costs.

To further check for the presence of profit shifting, we next include the parent country tax variable in regressions 1-3 of Table 9, with the results reported as regressions 4-6. A higher parent country tax potentially leads to higher reported profitability at pertinent foreign subsidiaries, as this provides a parent bank with the incentive to shift profits to its foreign subsidiaries. In regression 4, pre-tax profitability increases significantly with the parent country tax, consistent with a profit shifting incentive. Correspondingly, in regression 5 corporate taxes paid in the host country are positively and significantly related to the parent country corporate tax, reflecting that higher reported pre-tax profits lead to a higher host country tax liability. In regression 6, post-tax profitability is also related positively to the parent country corporate tax, but the relationship is not statistically significant. The profitability and taxation variables in regressions 4-6 are qualitatively related to the host country tax and dividend double tax variables as in regressions 1-3.

4. FDI in the banking sector

The previous section examined how international taxation affects net interest revenue and bank profitability given the domestic and foreign ownership of banks. The evidence is consistent with a significant pass-through of international taxation into higher interest margins. With elastic demand for financial services, higher net interest revenues relative to assets can only be achieved by cutting back the volume of financial services. Thus, international taxation should have a discernible impact on the quantity of financial services provided by foreign-owned banks. In this section, we estimate the impact of international taxation on the volume of foreign-provided financial services as well on the number of international banking establishments. In addition, we provide two-stage Heckman estimation of some of our bank interest margin and profitability regressions. This accounts for the potential endogeneity of the FDI decision to international double taxation.

Our volume variable is the aggregate assets of foreign-owned banks in a particular country as owned by corporate entities in another country. Aggregate assets of foreign banks on a bilateral basis are expected to decline with dividend double taxation, if the average bank cuts back its activities in countries where dividends are subject to double international taxation. As an

alternative banking FDI variable, we also consider the number of banks in a particular country owned by corporate entities in another country. International taxation may prevent the establishment of foreign ownership relationships between certain pairs of countries, or it may cause highly taxed banks to sell their foreign subsidiaries to bring about a more tax efficient ownership structure, thereby reducing the number of foreign owned banks. We apply a gravity model to estimate the impact of international taxation on our indices of banking-sector FDI. Previously, Wei (2000), Evenett (2003), and Buch, Kleinert and Toubal (2004) have used the gravity model to explain FDI. Further, Di Giovanni (2005) and Huizinga and Voget (2009) have applied the gravity model to the volume of cross-border M&as, while Portes and Rey (2005) have estimated a gravity model of trade in financial assets.

The gravity model relates our measures of cross-border banking to national and international tax rates and to a range of non-tax controls. Among these controls, we include standard gravity model variables such as the bilateral distance, contiguity (a dummy variable signaling that two countries have a common border), and common official language (a dummy variable signaling that two countries have a common official language). Also included are host and potential parent country GDPs which are expected to be positively related to bilateral banking FDI. Finally, we include indices of host and parent countries' regulatory quality, and indices of their use of capital controls. Inward banking FDI may be related negatively and positively to host-country and parent-country regulatory quality respectively, if banking FDI is driven by a need for a parent bank to be located in a country with relatively high regulatory quality. Capital controls generally may discourage banking FDI. Table 11 shows summary statistics for the variables in our banking FDI regressions.

Following the modeling of trade flows in Santos Silva and Tenreyro (2006), Table 11 shows estimation results of Poisson regressions, where the dependent variable is either the total assets of foreign-owned banks or the number of foreign-owned banks on a bilateral aggregate basis.[11] The regressions include host country, parent country, and year fixed effects, and errors

[11] Silva and Tenreyro (2006, p. 645) indicate that the Poisson estimator is consistent if $E[y_i \mid x_i] = \exp(x_i\beta)$ where y_i is the dependent variable and x_i are the independent variables. The corresponding regression in their paper relates the level of y_i to the natural logarithm of each element of x_i. Correspondingly in Table 10, the number of foreign-owned bank and foreign owned assets are reported in levels, while distance, host GDP, and parent GDP are in logs. The estimated coefficients for the logged right-hand-side variables are interpreted as elasticities, while the coefficients on other variables including the tax variable are interpreted as semi-elasticities. Negative binomial regressions are not considered as an alternative to the Poisson regressions because Bosquet and Boulhol (2010) point

are clustered at the host country level. We in turn consider the overall international sample and the sample of only intra-EU banking relationships. In regression 1 for the overall sample, the dependent variable is total assets of foreign-owned banks on a bilateral basis. The dividend double tax obtains a significantly negative coefficient of -7.191. This estimated for the dividend double tax implies that a 1 percentage point increase in this variable reduces bilateral FDI by 7.2%, which is economically significant given a mean dividend double tax of 3.5% for foreign-owned banks as seen in Table 6.

In regression 2 the dependent variable is the number of cross-border banks. The dividend double tax is significantly negative with a coefficient of -3.297. This suggests that a one percentage point increase in the dividend double tax reduces the number of cross-border banks on a bilateral basis by 3.3%.[12] This estimated coefficient of -3.297 is less negative than the estimated coefficient in the corresponding foreign-bank assets regression 1. This suggests that a higher dividend double tax leads to both fewer and smaller cross-border banks.[13]

Next, regressions 3 and 4 of Table 12 reproduce the first two regressions of this table for the intra-EU sample. When FDI is measured in terms of cross-border banking assets, the estimated coefficient for the dividend double tax in regression 3 for the intra-EU sample of -13.639 is more negative than the corresponding coefficient of -7.191 in regression 1 for the wider sample. Thus, intra-EU banking FDI appears to be relatively sensitive to international taxation, perhaps because EU banks from different countries offer similar services giving rise to high demand elasticities at foreign-owned banks inside the EU. On the other hand, when FDI is measured in terms of subsidiary banks abroad, then the estimated coefficient on the dividend double tax for the intra-EU sample in regression 4 of -3.074 is very similar to the estimate of -3.297 in regression 2 for the wider sample, although the coefficient is now insignificant in the smaller sample.

The responsiveness of the number of international banking establishments to international double taxation suggests that banks face a two-step international banking decision: first, they consider whether to set up a foreign subsidiary and, second, they determine the pricing (and

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out that negative binomial regressions with a continuous dependent variable are scale-dependent. Instead, employing robust errors accommodates deviations from the Poisson distribution.

[12] Consistent with this, Barrios, Huizinga, Laeven, and Nicodème (2012) report evidence that the international location decisions of multinational firms reflect international double taxation of corporate income.

[13] Verbeek (2008, p. 250) points out that a selection bias does not arise if selection depends upon the exogenous variables only. Hence, a significant effect of dividend double taxes on the number of cross-border banks does not imply a selection bias for the interest margin regressions in the previous section.

quantity) of their foreign financial services. The endogeneity of the initial FDI decision w.r.t. international double taxation implies that the estimation of the impact of such taxation on net interest margins may be biased, if the errors at the first-stage FDI stage are correlated with the errors at the second-stage pricing stage. To conclude this section, we apply a two-stage Heckman estimation to several of the net interest revenue, profitability and taxation regressions from Tables 8 and 9 where the first-stage regressions are probit specifications estimating positive bilateral banking FDI corresponding to the FDI regression 1of Table 11. Variables at the second stage are aggregated at the bilateral national level on a yearly basis.[14] The results of the second-stage regressions are reported in Table 12. Regression 1 re-estimates the net interest revenue regression 1 of Table 8, yielding an estimated coefficient for the double tax variable of 0.051 that is significant at the 1% level, somewhat higher than the corresponding estimate of 0.035 in Table 8. Regression 2 reproduces the net interest revenue adjusted for loan loss provisioning regression 5 of Table 8, giving rise to an estimated coefficient of 0.050 for the double tax variable that is significant at 1%. Regressions 3-5 of Table 12 redo the pre-tax profitability, taxes paid, and post-tax profitability regressions 1-3 of Table 9. Reported pre-tax and post-tax bank profitability are negatively and significantly related to the host country tax rate in regressions 3 and 5 of Table 12 consistent with a profit shifting motive, but the relationship between taxes paid and the host country tax rate is statistically insignificant in regression 4.

Overall, our estimation results in the net interest revenue regressions of Tables 8 and 12 and the FDI regressions of Table 11 are consistent in that the dividend double tax has statistically significant effects in both settings. Taken together, our results indicate that the dividend double tax increases margins, as it causes foreign-owned firms to reduce their host-country supply of financial services.

5. Conclusions

International double taxation is a remaining barrier to international banking market integration. As a result of such taxation, international banks may face higher corporate income taxation than domestic banks that operate in the same banking market. International double taxation thus provides for variation in the taxation of banks within countries as well as across

[14] The selection model cannot be estimated at the firm level because there is no sample of potential parent firms but only a sample of potential parent countries.

countries. In this paper, we estimate the pricing response – as reflected in interest margins – and the quantity response – as reflected in banking-sector FDI - to variation in international double taxation.

We find that the international double taxation of the dividend income of international banks is almost fully reflected in higher interest margins. Thus, international banks appear to have enough pricing power to pass on their international tax burden to local bank customers. As the revenue of this tax in part accrues to the parent country treasury, the parent country corporate tax appears to be partially exported to the host country banking market. To be able to raise prices, however, banks are shown to restrict the supply of financial service in banking markets subject to higher international double taxation of dividends. Specifically, bilateral aggregate FDI in terms of foreign bank assets is shown to decline with the international double taxation of dividend. The sensitivity of banking-sector FDI to international double taxation implies that such taxation distorts the international banking market. Specifically, the international ownership of banks subject to high international double taxation is discouraged.

True integration of the international banking market requires that discriminatory taxation of international banks is eliminated. This implies that countries eliminate nonresident dividend withholding taxes and exempt the foreign-source income of their resident multinational banks from domestic taxation. In our larger data set, the average rate of international double taxation of dividend income, reflecting both nonresident withholding taxation and home country corporate income taxation, amounts to a substantial 3.5%. In the EU, nonresident dividend taxes on intra-firm dividend payments have been eliminated by the Parent-Subsidiary Directive, but parent country corporate income taxes generally remain. Specifically, EU countries that continue to tax corporate income on a worldwide basis are Bulgaria, Greece, Ireland, Poland, Portugal and Romania. The United Kingdom switched to a territorial tax system in 2009. Worldwide, the US is a major country that continues to tax corporate income on a residence basis.

Our results have implications for the debate on any additional taxation of the financial sector following the financial crisis of 2007-2009. The IMF (2010) discusses a range of options for new tax instruments that would increase the tax burden on the financial sector. These include a Financial Activities Tax, which is a levy on a bank's combined profits and wage bill, and a Financial Stability Contribution, which taxes a bank's liabilities net of its insured deposits. Our results concerning international income taxation as applied to the banking sector inform

especially about the likely incidence and dislocation effects of a Financial Activities Tax given that the latter tax also is a tax on income derived from the financial sector. Our empirical results specifically suggest that a Financial Activities Tax could well be largely passed on to bank customers, and lead to significant dislocation effects of banking activity. This outcome is more likely if a Financial Activities Tax varies widely across countries and possibly within countries in case it were levied on a bank residence-basis. Within-country variation in Financial Activities Tax can be avoided if it levied on a consumption destination basis, as recommended by the IMF. While there are clear parallels between corporate income taxation and a Financial Activities Tax, it remains uncertain to which extent our results on international corporate income taxation and banking carry over to a Financial Activities Tax.

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Table 1. Corporate income taxes and double tax relief in 2008

a: Direct tax credit (only withholding tax), b: If the exemption is not specified in the tax treaty, then only 25% of dividends are exempted, c: Indirect tax credit with tax treaty, d: Three tax treaties (with Brazil, Israel and Mexico) provide for an exemption, otherwise direct credit, e: The tax treaty must include an exchange of information clause.

Country	(1)	(2)	(3)	(4)	(5)	(6)
	Corporate income tax rate	Relief for dividends			Relief for interest	
		With treaty	Without treaty	Intra-EU	With treaty	Without treaty
Australia	0.30	Exemption	Exemption		Credit	Credit
Austria	0.25	Exemption	Exemption		Credit	Credit
Belgium	0.34	95% Exemption	95% Exemption		Credit	Credit
Bulgaria	0.10	Credit[a]	Credit[a]	95% Exemption	Credit	Credit
Canada	0.34	Exemption	Credit		Credit	Credit
Croatia	0.20	Exemption	Exemption		Credit	Credit
Cyprus	0.10	Exemption	Exemption		Credit	Credit
Czech Republic	0.21	Exemption	Deduction	Exemption	Credit	Deduction
Denmark	0.25	Exemption	Exemption		Credit	Credit
Estonia	0.21	Exemption	Exemption		Credit	Credit
Finland	0.26	Exemption[b]	Credit[a]	Exemption	Credit	Credit
France	0.33	95% Exemption	95% Exemption		Credit	Deduction
Germany	0.30	95% Exemption	95% Exemption		Credit	Credit
Greece	0.25	Credit	Credit		Credit	Credit
Hungary	0.16	Exemption	Exemption		Credit	Credit
Ireland	0.13	Credit	Credit		Credit	Deduction
Italy	0.31	95% Exemption	95% Exemption		Credit	Credit
Japan	0.41	Credit	Credit		Credit	Credit
Latvia	0.15	Exemption	Exemption		Credit	Credit
Lithuania	0.15	Exemption	Exemption		Credit	Credit
Luxembourg	0.30	Exemption	Exemption		Credit	Credit
Malta	0.35	Exemption	Exemption		Credit	Credit
Mexico	0.28	Credit	Credit		Credit	Credit
Netherlands	0.25	Exemption	Exemption		Credit	Credit
New Zealand	0.30	Credit	Credit		Credit	Credit
Norway	0.28	Exemption	Exemption		Credit	Credit
Poland	0.19	Credit[c]	Credit[a]	Exemption	Credit	Credit
Portugal	0.25	Credit[d]	Credit[a]	Exemption	Credit	Credit
Romania	0.16	Credit[a]	Credit[a]	Exemption	Credit	Credit
Slovak Republic	0.19	Exemption	Exemption		Credit	Deduction
Slovenia	0.22	Exemption	Exemption		Credit	Credit
South Korea	0.28	Credit	Credit		Credit	Credit
Spain	0.30	Exemption[e]	Credit		Credit	Credit
Sweden	0.28	Exemption	Exemption		Credit	Credit
Switzerland	0.17	Exemption	Exemption		Credit	Deduction
Turkey	0.20	Exemption	Exemption		Credit	Credit
United Kingdom	0.28	Credit	Credit		Credit	Credit
United States	0.39	Credit	Credit		Credit	Credit

Table 2. Nonresident withholding taxes on dividends in 2008

This table provides nonresident withholding taxes on dividends from countries in the left column to countries in the top row.

	AT	AU	BE	BG	CA	CH	CY	CZ	DE	DK	EE	ES	FI	FR	GB	GR	HR	HU	IE
AT		0.15	0	0	0.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AU	0.15		0.15	0.3	0.05	0.15	0.3	0.15	0.15	0.15	0.3	0.15	0.15	0.15	0.05	0.3	0.3	0.15	0.15
BE	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BG	0	0.07	0		0.07	0	0	0	0	0	0	0	0	0	0	0	0.05	0	0
CA	0.05	0.05	0.15	0.1		0.05	0.15	0.05	0.05	0.05	0.05	0.15	0.1	0.1	0.05	0.25	0.05	0.1	0.05
CH	0	0.15	0	0	0.05		0	0	0	0	0	0	0	0	0	0	0.05	0	0
CY	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0
CZ	0	0.15	0	0	0.05	0	0		0	0	0	0	0	0	0	0	0.05	0	0
DE	0	0.15	0	0	0.05	0	0	0		0	0	0	0	0	0	0	0.15	0	0
DK	0	0.15	0	0	0.05	0	0	0	0		0	0	0	0	0	0	0.05	0	0
EE	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0
ES	0	0.15	0	0	0.15	0	0	0	0	0	0		0	0	0	0	0	0	0
FI	0	0.15	0	0	0.1	0	0	0	0	0	0	0		0	0	0	0.05	0	0
FR	0	0.15	0	0	0.1	0	0	0	0	0	0	0	0		0	0	0	0	0
GB	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
GR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0
HR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
HU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0
IE	0	0.15	0	0	0.05	0	0	0	0	0	0	0	0	0	0	0	0.05	0	
IT	0	0.15	0	0	0.15	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0
JP	0.1	0.15	0.05	0.1	0.05	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.05	0.1	0.2	0.2	0.1	0.1
KR	0.05	0.15	0.15	0.05	0.15	0.1	0.25	0.05	0.05	0.15	0.25	0.1	0.1	0.1	0.05	0.05	0.25	0.05	0.1
LT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LU	0	0.15	0	0	0.05	0	0	0	0	0	0	0	0	0	0	0	0.15	0	0
LV	0	0.1	0	0	0.05	0	0	0	0	0	0	0	0	0	0	0	0.05	0	0
MT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NL	0	0.15	0	0	0.05	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0
NO	0	0.15	0	0	0.05	0	0	0	0	0	0	0	0	0	0	0	0.15	0	0
NZ	0.15	0.05	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
PL	0	0.15	0	0	0.15	0	0	0	0	0	0	0	0	0	0	0	0.05	0	0
PT	0	0.2	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0
RO	0	0.05	0	0	0.05	0	0	0	0	0	0	0	0	0	0	0	0.05	0	0
SE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SI	0	0.15	0	0	0.05	0	0	0	0	0	0	0	0	0	0	0	0.05	0	0
SK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TR	0.15	0.15	0.15	0.1	0.15	0.15	0.15	0.1	0.15	0.15	0.1	0.05	0.15	0.15	0.15	0.15	0.1	0.1	0.15
US	0.05	0.05	0.05	0.3	0.05	0.05	0.05	0.05	0	0.05	0.05	0.1	0.05	0.05	0.05	0.3	0.3	0.05	0.05

(Table 2, continued)

	IT	JP	KR	LT	LU	LV	MT	MX	NL	NO	NZ	PL	PT	RO	SE	SI	SK	TR	US
AT	0	0.1	0.05	0	0	0	0	0.05	0	0	0.25	0	0	0	0	0	0	0.25	0.05
AU	0.15	0.15	0.15	0.3	0.3	0.3	0.15	0	0.15	0.15	0.05	0.15	0.3	0.05	0.15	0.3	0.15	0.3	0.05
BE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BG	0	0.07	0.05	0	0	0	0	0.07	0	0	0.07	0	0	0	0	0	0	0.07	0.07
CA	0.15	0.05	0.15	0.05	0.05	0.05	0.15	0.1	0.05	0.05	0.15	0.15	0.1	0.05	0.05	0.05	0.05	0.25	0.05
CH	0	0.1	0.1	0	0	0	0	0.05	0	0	0.15	0	0	0	0	0	0	0.35	0.05
CY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CZ	0	0.1	0.05	0	0	0	0	0.1	0	0	0.15	0	0	0	0	0	0	0.1	0.05
DE	0	0.1	0.05	0	0	0	0	0.05	0	0	0.15	0	0	0	0	0	0	0.15	0.05
DK	0	0.1	0.15	0	0	0	0	0	0	0	0.15	0	0	0	0	0	0	0.15	0.05
EE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ES	0	0.1	0.1	0	0	0	0	0.05	0	0	0.15	0	0	0	0	0	0	0.05	0.1
FI	0	0.1	0.1	0	0	0	0	0	0	0	0.15	0	0	0	0	0	0	0.15	0.05
FR	0	0.05	0.1	0	0	0	0	0.05	0	0	0.15	0	0	0	0	0	0	0.15	0.05
GB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IE	0	0	0	0	0	0	0	0.05	0	0	0	0	0	0	0	0	0	0.2	0
IT		0.1	0.1	0	0	0	0	0.15	0	0	0.15	0	0	0	0	0	0	0.15	0.05
JP	0.1		0.05	0.2	0.05	0.2	0.2	0	0.05	0.05	0.15	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0
KR	0.1	0.05		0.25	0.1	0.25	0.05	0	0.1	0.15	0.15	0.15	0.1	0.07	0.1	0.25	0.05	0.15	0.1
LT	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LU	0	0.05	0.1	0		0	0	0.05	0	0	0.15	0	0	0	0	0	0	0.15	0
LV	0	0.1	0.1	0	0		0	0.1	0	0	0.1	0	0	0	0	0	0	0.1	0.05
MT	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0
MX	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0
NL	0	0.05	0.1	0	0	0	0	0.05		0	0.15	0	0	0	0	0	0	0.15	0.05
NO	0	0.05	0.15	0	0	0	0	0	0		0.15	0	0	0	0	0	0	0.2	0.15
NZ	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15		0.15	0.15	0.15	0	0.15	0.15	0.15	0.15
PL	0	0.1	0.05	0	0	0	0	0.05	0	0	0.15		0	0	0	0	0	0.1	0.05
PT	0	0.2	0.1	0	0	0	0	0.1	0	0	0.2	0		0	0	0	0	0.05	0.05
RO	0	0.1	0.07	0	0	0	0	0.15	0	0	0.15	0	0		0	0	0	0.15	0.1
SE	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
SI	0	0.15	0.05	0	0	0	0	0.15	0	0	0.15	0	0	0	0		0	0.1	0.05
SK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
TR	0.15	0.1	0.15	0.1	0.15	0.1	0.15	0.15	0.15	0.15	0.15	0.1	0.15	0.15	0.15	0.1	0.05		0.15
US	0.05	0	0.1	0.05	0.05	0.05	0.3	0	0.05	0.15	0.15	0.05	0.05	0.1	0.05	0.05	0.05	0.15	

Table 3. Nonresident withholding taxes on interest in 2008

This table provides nonresident withholding taxes on interest from countries in the left column to countries in the top row.

	AT	AU	BE	BG	CA	CH	CY	CZ	DE	DK	EE	ES	FI	FR	GB	GR	HR	HU	IE
AT		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AU	0.1		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
BE	0	0.1		0	0.15	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0
BG	0	0.1	0.1		0.1	0.1	0.07	0.1	0	0	0.1	0	0	0	0	0.1	0.05	0.1	0.05
CA	0.1	0.1	0.15	0.1		0.1	0.15	0.1	0.1	0.1	0.1	0.15	0.1	0.1	0	0.25	0.1	0.1	0.1
CH	0	0.1	0	0	0.1		0	0	0	0	0	0	0	0	0	0	0.05	0	0
CY	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0
CZ	0	0.1	0	0	0.1	0	0		0	0	0	0	0	0	0	0	0	0	0
DE	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0
DK	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0
EE	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0
ES	0	0.1	0	0	0.15	0	0	0	0	0	0		0	0	0	0	0.08	0	0
FI	0	0.1	0	0	0.1	0	0	0	0	0	0	0		0	0	0	0	0	0
FR	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
GB	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0		0	0.1	0	0
GR	0.1	0.25	0.1	0.1	0.25	0.1	0.1	0.1	0.1	0.08	0.1	0.08	0.1	0.1	0		0.1	0.1	0.05
HR	0.05	0.15	0.1	0.05	0.1	0.05	0.15	0	0	0	0.1	0.15	0	0	0.1	0.1		0	0
HU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0
IE	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	
IT	0	0.1	0	0	0.125	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0
JP	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1
KR	0.1	0.15	0.1	0.1	0.15	0.1	0.25	0.1	0.1	0.15	0.25	0.1	0.1	0.1	0.1	0.08	0.25	0	0
LT	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
LU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LV	0	0.05	0	0	0.05	0	0	0	0	0	0	0	0	0	0	0	0.05	0	0
MT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MX	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
NL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NZ	0.15	0.1	0.1	0.15	0.15	0.1	0.15	0.15	0.1	0.1	0.15	0.15	0.1	0.1	0.1	0.15	0.15	0.15	0.1
PL	0	0.1	0.05	0.1	0.15	0.1	0.1	0.1	0.05	0.05	0.1	0	0	0	0	0.2	0.1	0.1	0.1
PT	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1
RO	0.03	0.1	0.1	0.1	0.1	0.1	0.1	0.07	0.03	0.1	0.1	0.1	0.05	0.1	0.1	0.1	0.1	0.1	0.03
SE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SK	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0
TR	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
US	0	0.1	0.15	0.3	0.1	0	0.1	0	0	0	0.1	0.1	0	0	0	0.3	0.3	0	0

(Table 3, continued)

	IT	JP	KR	LT	LU	LV	MT	MX	NL	NO	NZ	PL	PT	RO	SE	SI	SK	TR	US
AT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AU	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
BE	0	0.1	0.1	0	0	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0.15	0.15
BG	0	0.1	0.1	0.1	0.1	0.05	0	0.1	0	0	0.1	0.1	0.1	0.1	0	0.05	0.1	0.1	0.1
CA	0.15	0.1	0.15	0.1	0.1	0.1	0.15	0.15	0.1	0.1	0.15	0.15	0.1	0.1	0.1	0.1	0.1	0.25	0.1
CH	0	0.1	0.1	0	0	0	0	0.15	0	0	0.1	0	0	0	0	0	0	0.35	0
CY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CZ	0	0.1	0.1	0	0	0	0	0.1	0	0	0.15	0	0	0	0	0	0	0.1	0
DE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ES	0	0.1	0.1	0	0	0	0	0.15	0	0	0.1	0	0	0	0	0	0	0.1	0.1
FI	0	0.1	0.1	0	0	0	0	0.15	0	0	0.1	0	0	0	0	0	0	0.15	0
FR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GB	0	0.1	0.1	0	0	0	0	0.15	0	0	0.1	0	0	0	0	0	0	0.15	0
GR	0.1	0.25	0.08	0.1	0.08	0.1	0.1	0.1	0.08	0.1	0.25	0.1	0.1	0.1	0.1	0.1	0.1	0.12	0.25
HR	0.1	0.15	0.15	0.1	0.15	0.1	0	0.15	0	0	0.15	0.1	0.15	0.1	0	0.15	0.1	0.1	0.15
HU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IE	0	0.1	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0.2	0
IT		0.1	0.1	0	0	0	0	0.125	0	0	0.1	0	0	0	0	0	0	0.125	0.125
JP	0.1		0.1	0.2	0.1	0.2	0.2	0.15	0.1	0.1	0.15	0.1	0.2	0.1	0.1	0.2	0.1	0.15	0.1
KR	0.1	0.1		0.25	0.1	0.25	0.1	0.1	0.15	0.15	0.1	0.1	0.15	0.1	0.15	0.25	0.1	0.15	0.12
LT	0.1	0.1	0.1		0.1	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
LU	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0
LV	0	0.05	0.05	0	0		0	0.05	0	0	0.05	0	0	0	0	0	0	0.05	0.05
MT	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0
MX	0.1	0.1	0.1	0.1	0.1	0.1	0.1		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
NL	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0
NO	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0
NZ	0.1	0.15	0.1	0.15	0.15	0.15	0.15	0.15	0.1	0.1		0.1	0.15	0.15	0.1	0.15	0.15	0.15	0.1
PL	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.15	0.05	0	0.1		0.1	0.1	0	0.1	0.1	0.1	0
PT	0.1	0.2	0.15	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1		0.1	0.1	0.1	0.1	0.15	0.1
RO	0.1	0.1	0.1	0.1	0.1	0.1	0.05	0.15	0.03	0.1	0.15	0.1	0.1		0.1	0.05	0.1	0.1	0.1
SE	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0
SK	0	0.1	0.1	0	0	0	0	0.19	0	0	0.19	0	0	0	0	0		0.1	0
TR	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		0.1
US	0.15	0.1	0.12	0.1	0	0.1	0.3	0.15	0	0.1	0.1	0	0.1	0.1	0	0.05	0	0.15	

Table 4. Expressions for international double tax rates

Expressions for the additional taxation of dividend and interest flows to investors on account of foreign ownership of a bank. t_i is the corporate income tax in the subsidiary country. t_p is the corporate income tax in the parent country. w_i^e is the nonresident withholding tax on dividends levied by the subsidiary country. w_i^d is the non-resident withholding tax on interest payments levied by the subsidiary country. Note that the exemption and indirect foreign tax credit as applied to interest flows are not observed in our sample of countries.

Double tax relief metbod	Dividends	Interest
Exemption	$w_i^e - t_i w_i^e$	$w_i^d - t_p$
Indirect foreign tax credit	$\max[t_i + w_i - t_i w_i^e, t_p] - t_i$	$\max[w_i^d, t_p] - t_p$
Direct foreign tax credit	$(1 - t_i)\max[t_p, w_i^e]$	$\max[w_i^d, t_p] - t_p$
Deduction	$(1 - t_i)[1 - (1 - w_i^e)(1 - t_p)]$	$w_i^d - t_p w_i^d$

Table 5. Summary statistics for foreign ownership of banks by country of residence

The national share of foreign ownership is the share of the assets of foreign-owned banks in total assets of banks located in a country.

Country name	Number of observations	National share of foreign ownership
Australia	55	0.023
Austria	321	0.022
Belgium	172	0.240
Bulgaria	74	0.483
Canada	32	0.383
Croatia	79	0.632
Cyprus	20	0.577
Czech Republic	85	0.476
Denmark	62	0.034
Estonia	15	0.965
Finland	12	0.719
France	772	0.077
Germany	815	0.037
Greece	19	0.073
Hungary	63	0.339
Ireland	75	0.146
Italy	491	0.029
Japan	75	0.109
Korea	57	0.109
Latvia	35	0.497
Lithuania	17	0.800
Luxembourg	416	0.672
Malta	3	0.395
Mexico	50	0.065
Netherlands	80	0.035
New Zealand	11	0.017
Norway	18	0.157
Poland	99	0.428
Portugal	59	0.057
Romania	63	0.401
Slovakia	34	0.358
Slovenia	27	0.155
Spain	92	0.020
Sweden	16	0.190
Switzerland	646	0.082
Turkey	39	0.065
United Kingdom	270	0.085
USA	4,462	0.012
Total	9,731	0.095

Table 6. Mean values of tax related variables for banks by country of residence

Host country corporate tax is corporate income tax rate in the bank's country of residence. Dividend double tax is the double tax rate on repatriated dividend income. Interest double tax is double tax rate for interest income.

			All banks		Foreign banks	
Country name	Number of obs.	Host country corporate tax	Dividend double tax	Interest double tax	Dividend double tax	Interest double tax
Australia	55	0.313	0.06	0	0.106	0
Austria	321	0.292	0.007	0	0.047	0
Belgium	172	0.369	0.004	0	0.012	0
Bulgaria	74	0.174	0.055	0	0.095	0
Canada	32	0.339	0.064	0	0.073	0
Croatia	79	0.215	0.025	0	0.039	0
Cyprus	20	0.163	0.034	0.007	0.062	0.017
Czech Republic	85	0.272	0.017	0	0.028	0
Denmark	62	0.274	0.002	0	0.012	0
Estonia	15	0.246	0.022	0	0.022	0
Finland	12	0.265	0	0	0	0
France	772	0.351	0.003	0	0.015	0
Germany	815	0.396	0.004	0	0.022	0
Greece	19	0.293	0.007	0	0.009	0
Hungary	63	0.17	0.044	0	0.05	0
Ireland	75	0.118	0.03	0	0.035	0
Italy	491	0.38	0	0	0.006	0
Japan	75	0.421	0.022	0	0.06	0
Korea	57	0.283	0.017	0	0.076	0
Latvia	35	0.18	0.026	0	0.038	0
Lithuania	17	0.177	0.002	0	0.002	0
Luxembourg	416	0.33	0.012	0	0.013	0
Malta	3	0.35	0	0	0	0
Mexico	50	0.336	0.008	0	0.023	0
Netherlands	80	0.324	0.024	0	0.047	0
New Zealand	11	0.316	0.01	0	0.111	0
Norway	18	0.28	0.006	0	0.027	0
Poland	99	0.218	0.018	0	0.025	0
Portugal	59	0.309	0.003	0	0.013	0
Romania	63	0.217	0.083	0	0.1	0
Slovakia	34	0.215	0.039	0	0.045	0
Slovenia	27	0.244	0.008	0	0.015	0
Spain	92	0.349	0.004	0	0.011	0
Sweden	16	0.28	0.012	0	0.033	0
Switzerland	646	0.235	0.024	0.000	0.052	0.000
Turkey	39	0.26	0.057	0	0.13	0

United Kingdom	270	0.299	0.004	0	0.011	0
USA	4,462	0.394	0.002	0	0.047	0
Total	9,731	0.361	0.008	0.000	0.035	0.000

Table 7. Summary statistics for variables in net interest revenue and profitability regressions

See the Appendix for variable definitions

Variable	Number of observations	Average	Std. dev.	Minimum	Maximum
Net interest revenue over assets	9731	0.028	0.018	-0.019	0.316
Pret-tax profits over assets	8893	0.013	0.017	-0.02	0.263
Taxes over assets	9495	0.004	0.007	-0.1	0.203
Post-tax profits over assets	8739	0.010	0.013	-0.166	0.213
Host country corporate tax	9731	0.352	0.069	0.100	0.501
Parent country corporate tax	9729	0.074	0.144	0	0.501
Dividend double tax	9731	0.008	0.025	0	0.290
Assets	9731	7.024	1.979	-0.819	14.15
Earning assets over total assets	9731	0.920	0.075	0	1
Foreign bank	9731	0.219	0.414	0	1
National share of foreign ownership	9731	0.095	0.189	0	1
Bank market share	9731	0.011	0.046	0	1
National top 5 market share	9731	0.364	0.188	0.138	1
GDP per capita	9731	10.213	0.57	7.388	10.936
Industrial growth rate	9731	0.010	0.019	-0.072	0.350
Inflation	9731	0.028	0.023	-0.009	0.458
Real interest rate	9731	0.021	0.032	-0.148	0.305

Table 8. Results of net interest revenue regressions

The dependent variable is net interest revenue over total assets in columns (1)-(4) and it is net interest revenue net of loan loss provisions over assets in column (5). See the Appendix for variable definitions. Regressions (1)-(3) and (5) include fixed effects for country of residence and year fixed effects. Regression (4) includes bank fixed effects and year fixed effects. Standard errors are robust to clustering at the bank level and provided in parentheses. * denotes significance at 10 %; ** a significance at 5%; *** significance at 1%.

Variables	(1) Benchmark	(2) Only intra-EU	(3) Only foreign owned	(4) Bank fixed effects	(5) Adjusted net interest revenue over assets
Host country corporate tax	-0.015	-0.006	-0.002	0.004	-0.017**
	(0.010)	(0.013)	(0.020)	(0.007)	(0.008)
Dividend double tax	0.035**	0.032**	0.038**	0.026**	0.034**
	(0.016)	(0.015)	(0.019)	(0.013)	(0.015)
Assets	-0.002***	-0.003***	-0.002***	-0.005***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Earning assets over total assets	0.009	-0.002	0.009	0.014**	0.017***
	(0.006)	(0.014)	(0.008)	(0.006)	(0.005)
Foreign bank	-0.003**	-0.002		-0.000	-0.001
	(0.001)	(0.001)		(0.001)	(0.001)
National share of foreign ownership	0.003	0.008**	0.000	0.001	0.001
	(0.003)	(0.003)	(0.004)	(0.002)	(0.003)
Bank market share	0.010*	0.024***	0.008	-0.000	0.010*
	(0.006)	(0.008)	(0.008)	(0.003)	(0.006)
National top 5 market share	0.001	0.003	0.009***	0.003***	0.002
	(0.002)	(0.004)	(0.003)	(0.001)	(0.002)
GDP per capita	0.007	0.007	0.009	0.004	0.019**
	(0.008)	(0.011)	(0.011)	(0.006)	(0.008)
Industrial growth rate	0.117***	0.133*	0.142***	0.090***	0.116***
	(0.028)	(0.069)	(0.045)	(0.028)	(0.023)
Inflation rate	0.079***	0.095	0.046**	0.085***	0.078***
	(0.022)	(0.085)	(0.018)	(0.026)	(0.024)
Real interest rate	-0.009	0.004	-0.004	0.008	-0.001
	(0.008)	(0.014)	(0.012)	(0.006)	(0.009)
Observations	9731	3,588	2,135	9,731	8,894
R-squared	0.268	0.196	0.291	0.117	0.331

Table 9. Results of profitability and taxation regressions

The dependent variables are listed at the top of the table. See the Appendix for variable definitions. Regressions include fixed effects for country of residence and year fixed effects. Standard errors are robust to clustering at the bank level and provided in parentheses. * denotes significance at 10 %; ** a significance at 5%; *** significance at 1%.

Variables	(1) Pre-tax profits over assets	(2) Taxes over assets	(3) Post-tax profits over Assets	(4) Pre-tax profits over assets	(5) Taxes over assets	(6) Post-tax profits over Assets
Host country corporate tax	-0.028***	-0.007**	-0.023***	-0.028***	-0.008**	-0.023***
	(0.008)	(0.003)	(0.006)	(0.008)	(0.003)	(0.006)
Dividend double tax	0.010	-0.004	0.013	0.008	-0.005	0.012
	(0.016)	(0.006)	(0.013)	(0.015)	(0.006)	(0.012)
Assets	-0.001***	-0.000***	-0.001***	-0.001***	-0.000***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Earning assets over total assets	-0.043***	-0.013***	-0.029***	-0.043***	-0.013***	-0.029***
	(0.009)	(0.003)	(0.006)	(0.009)	(0.003)	(0.006)
Foreign bank	0.001	-0.000	0.000	-0.004	-0.002***	-0.003
	(0.001)	(0.000)	(0.001)	(0.003)	(0.001)	(0.002)
National share of foreign ownership	0.003	0.001	0.002	0.003	0.001	0.002
	(0.003)	(0.001)	(0.002)	(0.003)	(0.001)	(0.002)
Bank market share	0.018***	0.002	0.015***	0.018***	0.003	0.015***
	(0.006)	(0.002)	(0.005)	(0.006)	(0.002)	(0.005)
National top 5 market share	0.000	-0.001	-0.000	-0.000	-0.001	-0.001
	(0.003)	(0.001)	(0.002)	(0.003)	(0.001)	(0.002)
GDP per capita	0.007	0.006**	0.002	0.010	0.007**	0.004
	(0.006)	(0.003)	(0.005)	(0.007)	(0.003)	(0.006)
Industrial growth rate	0.040	0.017*	0.012	0.041	0.017**	0.013
	(0.026)	(0.009)	(0.019)	(0.026)	(0.009)	(0.019)
Inflation rate	0.061***	0.027***	0.044***	0.061***	0.026***	0.043***
	(0.019)	(0.008)	(0.015)	(0.019)	(0.008)	(0.015)
Real interest rate	0.022**	0.006	0.013	0.021**	0.005	0.013
	(0.010)	(0.003)	(0.008)	(0.010)	(0.003)	(0.008)
Parent country corporate tax				0.015*	0.006**	0.009
				(0.008)	(0.003)	(0.006)
Observations	8893	9495	8739	8,892	9,493	8,738
R-squared	0.120	0.082	0.121	0.120	0.083	0.121

Table 10. Summary statistics for variables in FDI regressions

See the Appendix for variable definitions.

Variable	Obs	Mean	Std. dev.	Min	Max
Foreign owned banks	11,372	0.199	1.274	0	107
Foreign owned bank assets	11,372	1,627	19,942	0	1,090,878
Host country corporate tax	11,372	0.290	0.077	0.100	0.501
Parent country corporate tax	11,372	0.290	0.078	0.100	0.501
Dividend double tax	11,372	0.059	0.067	0.000	0.310
Distance	11,372	7.779	1.123	4.088	9.883
Contiguity	11,372	0.068	0.251	0	1
Common official language	11,372	0.060	0.238	0	1
Intra EU	11,372	0.520	0.500	0	1
Host GDP	11,372	4.984	1.846	1.298	9.349
Parent GDP	11,372	5.187	1.805	1.727	9.349
Host regulatory quality	11,372	1.171	0.495	-0.119	2.011
Parent regulatory quality	11,372	1.238	0.444	0.045	2.011
Host capital controls	11,372	4.331	2.668	0.800	10.000
Parent capital controls	11,372	4.186	2.523	0.800	10.000

Table 11. Results of banking FDI regressions

The dependent variable in regressions (1) and (3) is assets of banks located in a host country and owned by a parent country in a particular year in millions of constant US 2000 dollars. The dependent variable in regressions (2) and (4) is the number of banks located in a host country and owned by a parent country in a particular year. See the Appendix for variable definitions. All regressions are Poisson regressions accounting for host country, parent country and year fixed effects. Standard errors are robust to clustering at the host country level and provided in parentheses. * denotes significance at 10 %; ** a significance at 5%; *** significance at 1%.

Variables	(1) Assets	(2) Frequency	(3) Assets Intra-EU	(4) Frequency Intra-EU
Host country corporate income	0.806	-1.524	4.376	2.753
tax	(4.599)	(1.867)	(3.312)	(2.222)
Dividend double tax	-7.191***	-3.297**	-13.639**	-3.074
	(2.777)	(1.382)	(6.524)	(2.926)
Distance	-0.722***	-0.666***	-1.083***	-0.860***
	(0.212)	(0.169)	(0.290)	(0.188)
Contiguity	0.687	0.248	0.105	1.003***
	(0.776)	(0.360)	(0.523)	(0.301)
Common official language	-0.015	-0.049	1.794***	-0.338
	(0.586)	(0.146)	(0.663)	(0.338)
Intra EU	-0.049	-0.573**		
	(0.666)	(0.266)		
Host GDP	2.451	3.539***	-2.065	-0.078
	(2.151)	(1.279)	(2.009)	(1.582)
Parent GDP	1.540	1.746*	2.541	-0.101
	(3.744)	(1.003)	(3.478)	(1.277)
Host regulatory quality	-3.620**	-1.156*	-1.168*	-0.815*
	(1.418)	(0.671)	(0.625)	(0.417)
Parent regulatory quality	-1.329	0.019	0.349	0.172
	(1.221)	(0.221)	(1.115)	(0.386)
Host capital controls	-0.143*	-0.039	-0.120	0.015
	(0.086)	(0.036)	(0.079)	(0.047)
Parent capital controls	0.004	-0.016	0.046	0.047
	(0.093)	(0.050)	(0.099)	(0.043)
Number of observations	11372	11372	3428	3428

Table 12. Two-stage regressions of net interest revenue, profitability and taxation

The dependent variables are listed in the top row of the table. See the Appendix for variable definitions. Variables are aggregated at the bilateral national level on a yearly basis. Reported are the second-stage Heckman regressions where the first stage regressions are probit models of the presence of bilateral FDI analogous to regression 1 of Table 11. Reported regressions include fixed effects for country of residence and year fixed effects. Standard errors are robust to clustering at the bank level and provided in parentheses. * denotes significance at 10 %; ** a significance at 5%; *** significance at 1%.

Variables	(1) Net interest revenue over assets	(2) Adjusted net interest revenue over assets	(3) Pre-tax profits over assets	(4) Taxes over assets	(5) Post-tax profits over Assets
Host country corporate tax	-0.007	-0.007	-0.028*	0.002	-0.032**
	(0.022)	(0.018)	(0.016)	(0.009)	(0.015)
Dividend double tax	0.051***	0.050***	0.012	0.002	0.019
	(0.018)	(0.018)	(0.021)	(0.010)	(0.019)
Assets	-0.002***	-0.002***	-0.002**	-0.001*	-0.001*
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Earning assets over total assets	0.010	0.013	-0.034*	-0.008	-0.025**
	(0.010)	(0.011)	(0.018)	(0.007)	(0.012)
National share of foreign ownership	0.002	0.001	0.000	-0.001	-0.001
	(0.006)	(0.006)	(0.004)	(0.001)	(0.004)
Bank market share	0.011	0.007	0.023**	0.008**	0.017*
	(0.010)	(0.011)	(0.009)	(0.003)	(0.010)
National Top 5 market share	0.010***	0.010**	0.001	0.002	-0.002
	(0.004)	(0.005)	(0.004)	(0.001)	(0.004)
GDP per capita	0.012	0.027**	0.022**	0.004	0.017*
	(0.008)	(0.011)	(0.010)	(0.003)	(0.009)
Industrial growth rate	0.160***	0.153***	0.101***	0.041***	0.047**
	(0.033)	(0.033)	(0.031)	(0.009)	(0.023)
Inflation rate	0.057***	0.051***	0.069***	0.019***	0.050***
	(0.011)	(0.014)	(0.018)	(0.006)	(0.018)
Real interest rate	-0.009	-0.000	-0.001	0.002	-0.008
	(0.015)	(0.018)	(0.014)	(0.005)	(0.012)
Observations	11,351	11,359	11,359	11,352	11,359

Appendix. Variable description and data sources

Variable	Definition	Data sources
Net interest revenue over assets	Bank's net interest revenue over total assets	Bureau van Dijk's Bankscope database
Pre-tax profits over assets	Bank's pre-tax profits over total assets	Bureau van Dijk's Bankscope database
Post-tax profits over assets	Bank's post-tax profits over total assets	Bureau van Dijk's Bankscope database
Taxes over assets	Bank's taxes over total assets	Bureau van Dijk's Bankscope database
Host country corporate tax	Corporate income tax rate in bank country of residence	Eurostat (2004), KPMG International (2009), and Loretz (2008)
Parent country corporate tax	Corporate income tax rate in parent firm country of residence	As for the host country corporate income tax
Dividend double tax	Double tax rate on repatriated dividend income	As for the host country corporate income tax plus IBFD (2009a, 2009b, 2009c, 2009d)
Interest double tax	Double tax rate for interest income	As for the dividend double tax
Assets	Bank's total assets in millions of constant 2000 US dollars (logarithm)	Bureau van Dijk's Bankscope database
Earning assets over total assets	Bank's total earning assets over total assets	Bureau van Dijk's Bankscope database
Foreign bank	Dummy variable indicating if at least 50% of shares are owned by shareholders in single foreign country	Bureau van Dijk's Bankscope database
National share of foreign ownership	Share of assets of foreign-owned banks in total banking system assets in a country	Bureau van Dijk's Bankscope database
Bank market share	Bank's total loans as a share of all loans provided by banks in a country	Bureau van Dijk's Bankscope database
National top 5 market share	Loan market share of the 5 largest loan-providing banks relative to all loans provided by banks in a country	Bureau van Dijk's Bankscope database
GDP per capita	Gross domestic product of bank country of residence in billions of constant 2000 US dollars (logarithm)	World Development Indicators 2009, World Bank (2009)
Industrial growth rate	Rate of change of industrial production growth index	International Financial Statistics
Inflation rate	Rate of change in the consumer price index	World Development Indicators 2009, World Bank (2009)
Real interest rate	Money market rate minus inflation rate	World Development Indicators 2009, World Bank (2009)
Foreign owned banks	Number of banks located in a host country and owned by a parent country in a particular year	Bureau van Dijk's Bankscope database
Foreign owned bank assets	Sum of the assets of banks located in a host country and owned by a parent country in a particular year in millions of constant US 2000 dollars	Bureau van Dijk's Bankscope database
Distance	Distance between two countries' most populated agglomerations in km (logarithm)	Head and Mayer (2002)

Contiguity	Dummy variable indicating whether two countries are contiguous	Head and Mayer (2002)
Common official language	Dummy variable indicating whether two countries share a common official language	Head and Mayer (2002)
Intra EU	Dummy variable indicating whether two countries are both EU members in a given year	Head and Mayer (2002)
Host GDP	Gross domestic product of the bank country of residence in billions of constant 2000 US dollars (logarithm)	World Development Indicators 2009, World Bank (2009)
Parent GDP	Gross domestic product of the parent firm country of residence in billions of constant 2000 US dollars (logarithm)	World Development Indicators 2009, World Bank (2009)
Host regulatory quality	Indicator capturing perceptions of the ability of the government of host country to formulate and implement sound policies and regulations that permit and promote private sector development. Values range from -2.5 to 2.5, with higher values corresponding to better perceptions.	Kaufman et al. (2009)
Parent regulatory quality	Indicator capturing perceptions of the ability of the government of the parent firm's country to formulate and implement sound policies and regulations that permit and promote private sector development. Values range from -2.5 to 2.5, with higher values corresponding to better perceptions.	Kaufman et al. (2009)
Host capital controls	Indicator of the percentage of capital controls levied by host country as a share of the total number of capital controls covered by the International Monetary Fund. Values range from 0 to 10, with higher values corresponding with more capital controls.	Gwartney et al. (2009)
Parent capital controls	Indicator of the percentage of capital controls levied by parent firm country as a share of the total number of capital controls covered by the International Monetary Fund. Values range from 0 to 10, with higher values corresponding with more capital controls.	Gwartney et al. (2009)