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Tax Complexity and Inward Investment

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Abstract

The negative relationship between host-country tax rates and FDI has been tested in a large number of papers. This paper looks at a different channel through which tax systems could affect FDI, namely the complexity of the tax system. Complying with tax authority requirements can be extremely time consuming for business and this implies an additional cost for more complex tax systems. We use measures of the time taken to deal with tax obligations and the number of tax payments for a representative firm compiled by the World Bank to examine their effect on FDI selection and flows from 16 OECD FDI-source countries to 57 host countries. We find a negative and significant effect of tax rates in line with other studies. In addition, the tax complexity measures are found to have a significant inhibiting effect on the presence of FDI for a country pair, but have little impact on the level of the FDI flow once it is established. In other words, the complexity measures affect FDI primarily through the extensive margin. A 10% reduction in tax complexity is found to be comparable in its effect on FDI to a one percentage point reduction in the effective corporate tax rate. The results are robust to the inclusion of other proxies for bureaucracy in the host country.

Non-Technical Summary

The influence of taxes on foreign direct investment may be more complicated than a simple comparison of rates across countries. This paper adds a further dimension to the effect of taxes on bilateral FDI flows by including measures of the complexity of the tax code. Highly complex tax systems impose costs on firms that have to understand and comply with all of the various requirements. For multinational firms that are making a decision about where to locate, the costs associated with a complicated tax code might offset to some extent attractions of a lower tax rate. This paper examines how measures of tax complexity affect the existence and level of bilateral FDI relationships for 16 OECD FDI-source countries and 57 host countries.

We use data from the World Bank's Doing Business survey to examine the effect on FDI flows of the time and transactions burdens associated with paying taxes. These data provide two measures that proxy for the complexity of complying with tax regulations across countries. The first is a measure of the amount of time it takes a representative firm to process their taxes. The second is the number of payments the firm has to make. The time required to comply with tax rules varies from 12 hours in the United Arab Emirates to 2600 hours in Brazil, while the number of payments involved ranges from 3 in Norway to 98 in Ukraine.

A large number of the potential source-host country pairs do not have any FDI flows between them. In examining the determinants of FDI flows, it is therefore important to control for the number of zeros in the data. For this reason, we use a Heckman selection model of FDI participation and flows, following the approach of the papers by Razin and co-authors (2004, 2005, 2007 and 2008).

The number of payments and time to comply with tax obligations variables are found to have significant negative effects on whether FDI flows are present, although they do not significantly impact the level once the FDI relationship has been established. This result holds even when a range of country specific controls are added, including other indicators of the level of bureaucracy. In terms of its economic significance, we estimate that a 10% reduction in tax complexity is approximately comparable to a one percentage point reduction in the effective corporate tax rate. Either of these changes would raise total FDI inflows by approximately 6%.

1 Introduction

The negative effect of tax rates on the ability of countries to attract foreign direct investment (FDI) has been the topic of considerable research.[1] Beyond the tax rate faced by the multinational firm, a highly complex tax system imposes costs on firms that have to understand and comply with all of the various requirements. For multinational firms that are making a decision about where to locate, the costs associated with a complicated tax code might offset to some extent attractions of a lower tax rate. This paper examines how measures of tax complexity affect the existence and level of bilateral FDI relationships for 16 OECD FDI-source countries and 57 host countries.

We use data from the World Bank's Doing Business survey to examine the effect on FDI flows of the time and transactions burdens associated with paying taxes. These data provide two measures that proxy for the complexity of complying with tax regulations across countries. The first is a measure of the amount of time it takes a representative firm to process their taxes. The second is the number of payments the firm has to make. The time required to comply with tax rules varies from 12 hours in the United Arab Emirates to 2600 hours in Brazil, while the number of payments involved ranges from 3 in Norway to 99 in Ukraine.

Djankov, Ganser, McLiesh, Ramalho and Shleifer (2008) use the World Bank data on taxes and the number of tax payments to explain a range of country-level outcomes, including total FDI inflows. They find that both statutory and effective tax rates have negative effects on FDI inflows, investment and entrepreneurship. They do not find any significant relationship between the number of tax payments and total FDI inflows.[2] However, focusing on total FDI as they do may miss some important information on the factors that affect the establishment of FDI links between countries. Looking at bilateral patterns of FDI flows, we observe a large number of zero values in the data. If tax complexity works mainly by inhibiting the formation of FDI links, this effect may not be apparent in an analysis of total FDI.

In this paper we use OECD data to examine bilateral FDI flows, controlling for zero flows. We use a gravity model specifiation relating the bilateral FDI to host and source country characteristics, an approach shown by Razin, Sadka and Tong (2008) to work well

[1] See Blonigen (2005) for a review of the literature on determinants of FDI.

[2] They do find a significant negative relationship between number of payments and domestic entrepreneurship measures.

empirically and which is consistent with their theoretical framework. This is then extended to include different measures of tax rates and the proxies for the complexity of the tax system.

Controlling for selection into a bilateral FDI relationship generates quite different results from those of Djankov et al (2008) - the number of payments and time to comply with tax obligations variables are found to have significant negative effects on whether FDI flows are present. The effect of tax complexity is mainly through this extensive margin (whether a FDI-pair exists) and the subsequent intensive margin (level of FDI once a pair exists) is not significantly affected by the complexity variables. This result holds even when a range of country specific controls are added, including other indicators of the level of bureaucracy. In terms of its economic significance, we estimate that a 10% reduction in tax complexity is approximately comparable to a one percentage point reduction in the effective corporate tax rate. Either of these changes would raise total FDI inflows by approximately 6%.

Very little research to date has looked at the potential effects of tax complexity on FDI. One exception is a study by Edmiston, Mudd and Valev (2003), who found that tax code complexity and uncertainty had a negative relationship with FDI inflows to the countries of the former Soviet Union and Central and Eastern Europe. They used measures taken directly from the tax legislation such as number of rates and number of lines in the description of the tax base, whereas the Doing Business data are measured on the basis of a representative firm's experience of the operation of the tax system.

In a related strand of the literature, the negative effect of time and bureaucratic delays has been examined in the context of international trade and business start-up. Djankov, Freund and Pham (2006) found that a 10% saving of time in exporting increased exports by 4%. The number of procedures and days to establish a business are examined by Djankov, la Porta, Lopez-de-Silanes and Shleifer (2002), who find that these measures of bureaucracy are associated with significant costs to business.

The structure of this paper is as follows. Section 2 describes the data. Section 3 presents benchmark results of a gravity model of the factors determining FDI flows. Section 4 then extends the analysis by including the tax rates and complexity measures from the Doing Business survey. Section 5 examines the economic significance of the results by simulating changes in the tax complexity measures and Section 6 concludes.

2 Data

2.1 Data on Tax Rates and Complexity

The data on tax rates and proxies for the complexity of the tax system come from the World Bank Doing Business survey, described in detail in Djankov et al. (2008). The data were compiled through a survey of accountants and tax lawyers in 85 countries in cooperation with PricewaterhouseCoopers. To ensure comparability across countries, the data are based on a case study of a hypothetical representative firm examined across countries. A range of assumptions were made about the structure of the business and hypothetical financial accounts were presented to the survey respondents to enable them to calculate the company's tax liabilities and costs of compliance.

The representative business is assumed to be a limited liability company operating in the country's largest city. It is entirely domestically owned and operates only in the domestic market (no imports or exports). The firm has five owners and sixty employees. It is involved in general manufacturing activities; specifically, it produces ceramic flowerpots and sells them at retail. It does not handle any products that might be subject to a special tax regime. The components of the financial accounts are constructed as multiples of the country's income per capita in local currency. Start-up capital is 102 times income per capita and turnover is 1050 times income per capita. The company's gross pretax margin is 20 percent.

The tax measures used in this paper are the statutory corporate tax rate and the first-year effective tax rate. The statutory tax rate is the highest bracket of all taxes on corporate income.[3] The effective tax rate is obtained by dividing the total corporate tax the firm pays by its pretax earnings.

The Doing Business survey also includes measures of the complexity of the tax system for the representative firm. The two measures used are the length of time the firm must spend to meet its tax obligations and the number of payments that have to be made. More specifically, the time variable records how many hours it takes the firm to prepare, file and pay its corporate income tax, sales tax and labour taxes. This includes the time taken to complete all necessary tax forms, time to prepare accounts or calculations for tax purposes that would not be covered by regular accounting work and the time need to

[3]If there are different corporate taxes (for instance federal, state and local), the deductibility of one or more of those taxes is taken into account when computing the tax base for corporate income.

make the payment online or at the tax office. The tax payments indicator reflects the total number of taxes and contributions to be paid, the method and frequency of payment and the number of agencies involved for the case of this standardised firm.

Figure 1 shows the length of time required to comply with the tax codes in the countries used in this paper. The average number of hours is 388. The responses range from a low of 12 hours in the United Arab Emirates to 2600 in Brazil. If the outlying observations of Ukraine and Brazil are excluded then the average falls to 306 hours, with the longest amount of time being in the Czech Republic where it takes 930 hours. The average number of tax payments that have to be made is 30. The number of payments ranges from a high of 98 (in the Ukraine) to a low of 3 payments (Norway). The two measures of complexity are positively, but not very highly correlated, as shown in Figure 2. The correlation coefficient between the two measures is 0.33.

In order to check if the tax complexity variables are proxying for more than a general level of bureaucracy in the host country, we also include an additional measure of red tape unrelated to taxes for robustness. The variable used is business start-up costs, defined as the cost of registering a new business as a percentage of per capita income. This variable also comes from the World Bank Doing Business data (see Djankov, La Porta, Lopez-de-Silanes and Shleifer 2002). Table 1 provides a list of all the variables used and their sources.

2.2 FDI and Country Variables

The main variable of interest is bilateral FDI flows. The FDI data are cross-sectional for 2002 and come from the OECD International Direct Investment report (converted into US dollars). The 16 FDI source countries are all OECD members, while the 57 host countries include both OECD and non-OECD members. The full list of source and host countries is given in Table 2. A considerable number of the country pairs have no FDI flows - just over forty percent of the observations in the total data have bilateral FDI of zero. FDI flows are more likely when the host country is also in the OECD, with seventy percent of these observations being positive, compared to forty-four percent positive observations when the host country is not in the OECD.

In addition to the tax rate and tax system complexity variables, a range of country specific factors are also controlled for in the empirical approach. We use some standard gravity-style variables to capture market size and trading costs between the source and host

countries. The data on GDP (in US dollars) and population come from the Penn World Tables (Heston, Summers and Aten, 2006). Distance is measured as between capital cities and a dummy variable for a common official language in the two countries is also used. The data for these two variables is sourced from Jon Haveman's website, a standard data source for gravity regressions.[4] As a measure of the relative skill levels of the countries, we use the difference in years of schooling between source and host countries. This comes from the Barro-Lee data on educational attainment.

3 Benchmark Specification

As we discussed in the description of the FDI data, a relatively large number of the potential source-host country pairs do not have any FDI flows between them. In examining the determinants of FDI flows, it is therefore important to control for the number of zeros in the data. For this reason, we use a Heckman selection model of FDI participation and flows, following the approach in papers by Razin and co-authors (2004, 2005, 2007 and 2008).

The selection margin is modeled in Razin, Rubinstein and Sadka (2004) as resulting from unobserved set-up costs in the FDI decision. Productivity shocks are added in Razin, Sadka and Tong (2008) and the effects of taxes are examined in Razin, Rubinstein and Sadka (2005) and Razin and Sadka (2007). The empirical methodology in each of the papers is to control for the selection into FDI using the Heckman approach and to include a range of country variables commonly used in the gravity specification for estimating trade flows. They find that this two stage approach of modelling initial selection into FDI and then controlling for selection, when modelling the bilateral FDI flows, provides a significant improvement on specifications that do not make this adjustment.

To estimate the determinants of the FDI flows, we use a Heckman selection model which controls for the firm's endogenous selection into FDI. The first stage of the estimation is the decision to establish a FDI flow. The profit-maximising multinational firm in the source country makes this decision based on expected profits from locating in the host country, taking into account the fixed costs of entering the new market. If the expected profits are positive, then the firm will locate in the new country and FDI flows between the source and host country will be observed at the aggregate level. The FDI relationship status of

[4] http://www.macalester.edu/research/economics/PAGE/HAVEMAN/Trade.Resources/Data/Gravity/dist.txt

the two countries s and h is denoted by $FDIdummy_{sh}$ where

$$FDIdummy_{sh} = 1 \text{ if } bZ_s + cZ_h + \epsilon_{sh} > 0 \quad (1)$$

$$= 0 \text{ otherwise} \quad (2)$$

The source country will invest in the host country if its expected current and future profits from doing so are greater than the costs involved. These profits depend on both source and host country-specific factors denoted by Z_s and Z_h that include variables such as market size, distance between them and the costs of doing business, including the tax regime. The residual term is e_{sh}. Once an FDI flow has been established, the second stage is deciding on its level. In the second stage, where the determinants of the FDI are modelled, the firms's endogenous selection into FDI is controlled for by including a Inverse Mill's ratio generated in the first stage. The FDI level equation for observed FDI (FDI^*) is estimated as

$$FDI^*_{sh} = bX_s + bX_h + \upsilon_{sh} \quad (3)$$

With:

$$FDI_{sh} = FDI^*_{sh} \text{ if } FDIdummy_{sh} = 1 \quad (4)$$

$$FDI_{sh} = 0 \text{ if } FDIdummy_{sh} = 0 \quad (5)$$

The observed FDI level is zero if no FDI relationship exists. If the FDI decision has been made in favour of investing in the host country, its level will be determined by a vector of source and host country characteristics and by other effects captured by the error term u_sh. The vector of country characteristics included in the FDI level equation, X_s and X_h, can include some of the same variables as Z_s and Z_h in the selection equation. However, in order to identify the equations, an additional variable is ideally required in the selection equation. The correlation between the error terms $(\epsilon_{sh}, \upsilon_{sh})$ is given by ρ, and the two decisions (i.e. to establish FDI and how much) are related if ρ is not equal to zero. In such a case, estimating only the market coverage equation would induce a sample selection bias, which is avoided by estimating both equations as proposed by Heckman (1979). Empirically the two stages are estimated jointly using the maximum likelihood method.

The benchmark specification without tax variables is presented in Table 3. The dependent variable in the selection equation is a dummy variable that is equal to 1 if there is a positive FDI relationship between the source and host countries, and 0 otherwise. In the second stage, the dependent variable is the log of the FDI flow. As the Heckman approach

requires different variables in the selection and flow equations for identification, we use a very general strategy where source country dummies are included in the first stage to pick up all source country variation. The second stage then restricts the source country variables to GDP per capita and population. This allows us to focus on the effects in both stages on characteristics of the host country and host-source links.

GDP per capita in the host country is significantly and positively associated with both the existence and the level of FDI flows. The same is true of the host country population and sharing a common language, while distance is negatively associated with both FDI selection and flows. In the first specification, source country GDP per capita and population are positively associated with FDI flows. However, when we add the difference in schooling variable in the second specification, source country GDP per capita is no longer significant. The population effect remains significant. A dummy variable to describe if the host country is in the OECD is significant for the selection equation (final column) but does not impact the amount. In this, and all subsequent specifications, we find a significant positive coefficient for the Inverse Mills ration (or Heckman correction) λ, indicating that the unobservables in the selection and flow equations are positively correlated with one another and that not controlling for the selection effect creates a bias.

The systematically positive coefficients on schooling differences between the source and host country are the most notable difference between these and the Razin results, where the education variables tend to be insignificant or negative except in Razin and Sadka (2007). *A priori* the schooling differences could work in either direction, depending on the type of FDI involved. Markusen and Maskus (2002) and Davies (2008) use endowments of skilled labour to distinguish between the horizontal and vertical motivations for FDI. Horizontal FDI is higher between countries of similar skill levels since this facilitates production of the multinational's product in both countries, whereas vertical investment would be expected to be higher if there are larger skill differences (and hence greater differences in factor prices) between the source and host countries.

4 Tax Rates and Complexity Measures

4.1 Results

Tax rates are added to the benchmark specification in Table 4. The first panel includes the top statutory rate of corporate tax in the host country. We find that this tax rate has a significantly negative effect on both FDI selection and on subsequent FDI flows. The second panel finds a similar result using the effective corporate tax rate as an alternative measure. The coefficients for both the selection and flow equations of the effective tax rate is slightly lower compared to when the statutory rate was used. The combined economic impact of the selection and flow coefficients will be discussed in the next section. The inclusion of the tax measures does not have any appreciable effect on the magnitudes of the standard gravity variables that were included in the benchmark specification.

The next specification adds the time spent on complying with tax requirements. The first column of Table 5 reports results from a OLS regression that does not control for selection into having a positive FDI flow. In this specification there is no significant effect on FDI from the time variable, which is consistent with the aggregate results of Djankov, Ganser, McLiesh, Ramalho and Shleifer (2008). In the next panel of Table 5 we use the Heckman selection technique to control for the large number of zero observations in the bilateral data. When this selection control is added, we find that the time to comply variable is significantly negatively related to both selection and subsequent FDI flows. However, when the statutory and effective tax rates are included (in the third and fourth panels respectively), we find that the time variable no longer affects the intensive margin of FDI but it remains highly significant in the selection equation. The negative coefficients on the tax rates are slightly lower when we control for the complexity of the tax system, but there is no qualitative change in any of the other control variables.

The alternative proxy for tax complexity is the number of payments that have to be made by the representative firm. The results for this measure are presented in Table 6 and are broadly similar to those for the time measure. The basic OLS specification does not find any significant effect but when selection is controlled for we find that the payments variable negatively effects the establishment of a FDI relationship between countries. Both measures of complexity are significant for the selection into FDI, but not for the subsequent FDI flows once they are observed. Therefore, the main impact of both the complexity measures is to inhibit FDI flows from occurring. This finding implies that a high level of

tax complexity can be thought of as analogous to a fixed cost that firms must decide to cover before establishing a FDI flow. As with any fixed cost, it affects the set-up decision but not the subsequent flows. Tax rates on the other hand look more like variable costs, being proportional to the level of activity.

4.2 Alternative Specifications

It is possible that the measures of tax complexity included above are actually proxying for a broader concept of administrative bureaucracy in the host country. To check if this is the case, Table 7 adds a further measure of "red tape" to examine the robustness of the tax complexity results. The measure used is the costs involved in registering a new business. The wide variation in how much it costs to establish a new business and the extent to which this is correlated with other measures of bureaucracy and governance is examined by Djankov, La Porta, Lopez-de-Silanes and Shleifer (2002). Although this indicator is itself negative and significant, it does not change the effect of the tax complexity variables.[5]

Figure 2 showed that the two complexity measures were positively but not very strongly correlated. Table 8 presents regression results when both measures are entered simultaneously. The basic result is unchanged, with both proxies for complexity negatively and significantly affecting the extensive FDI margin. Table 8 also shows the results from using relative measures of tax complexity; we include time and payments of the FDI-host country relative to those of the source country. One might expect firms from a low-complexity country to only consider those that are less complex than their home country. The relative time variable is indeed negative and significant, once again working primarily through the selection effect. The relative payments variable, on the other hand, does not have any significant effect.

A number of further robustness checks were carried out. The regressions were run omitting the two main outliers (Brazil and Ukraine) but the results were qualitatively unchanged. Additionally, we tried including interactions terms between the complexity measures and tax rates to see if they reinforced or offset one another but the results were not significant.

[5]Other measures such as time and number of procedures to establish a business were also tried, but the results were unchanged.

5 Economic Significance

5.1 Economic Significance: Total Effects

The regression results show that the tax complexity measures are statistically significant in the FDI selection equation. This section examines the economic significance of the results and asks how much additional FDI could a country expect to receive if they reduced the complexity of their tax system. To do this, we compute the predicted values of the probability of observing a FDI flow and of the value of the FDI for different levels of the tax rate and tax complexity.

$$\hat{fdi} = \hat{p}.\hat{value}$$

More specifically, the estimated FDI flows $\hat{fdi}$ are the product of the linear prediction of the probability of a FDI relationship being established $\hat{p}$ (from the selection equation) and the predicted value of the FDI amount $\hat{value}$ (from the second stage of the Heckman regressions). The fitted values from the original data are used to measure the effects of simulated changes in the levels of complexity. For comparison, a change in the tax rate is also simulated. The fitted values for the hypothetical reductions in the tax complexity variables or tax rates are calculated using the same coefficients as the fitted values from the regression output and keeping the values of all other variables unchanged.

The first row in Table 9 estimates the effect of a one percentage point reduction in the effective corporate tax rate would be to increase total FDI inflows by 5.8%.[6] Comparing this to previous evidence on the effect of tax rates shows that this is a somewhat stronger effect than average but well within the bounds previously found in the literature: A meta-analysis of the effect of corporate tax rates on FDI by de Mooij and Ederveen (2008) found an average semi-elasticity of -3.3. The standard deviation of the 427 papers that they include in the analysis was 4.4.

The effect on total FDI of reducing tax complexity by 10% is similar in magnitude to a reduction in the corporate tax rate of 1 percentage point. Reducing the time taken to comply with tax requirements by 10% is predicted to increase FDI by 6.3%.[7] The effect of reducing the number of tax payments by 10% is predicted to increase FDI by 5.5%, a

[6] The coefficients used in the prediction are from the final panel of Table 5.

[7] The coefficients used in the prediction are from the final panel of Table 5.

slightly smaller effect than reducing taxes or time.[8]

The second panel in Table 9 compares the average predicted probabilities of a FDI relationship existing between two countries (calculated from a linear prediction of the selection stage). A 10% reduction in either time or number of payments increases this probability by 1.2 percentage points. The effect of a change in the tax rate on the probability of a FDI-pair is lower (0.8 percentage points), although the total effect on FDI was similar. This is because the tax change affects both the selection and flow equations, whereas changes in the tax complexity variables worked mainly through their effect on selection.

5.2 Economic Significance: Country Examples

The effects reported in Table 9 are for the entire sample. As the effect of changing tax complexity levels on individual countries works through both the probabilities of entering into FDI relationships as well as the subsequent amounts, the combined impact is not linear. Table 10 gives some individual examples for four countries with different complexity levels and how the reductions in tax complexity and tax rates would affect their total FDI and the changes in their probabilities of having positive FDI pairings.

The representative countries are one with a very low current level of the time measure of complexity (Ireland; 76 hours), a country with approximately average time to comply (USA; 325 hours), a relatively high complexity country (China; 872 hours) and the extreme outlier (Brazil; 2600 hours).

The effect of changes in complexity varies by the initial level, with a greater estimated return for reducing complexity going to countries where the current level is highest. In the example of reducing the time taken to comply with tax requirements by 10%, total FDI is estimated to increase by 4.2% in Ireland, which has a particulaly low starting complexity level. The same change in time to comply would increase total FDI in the average complexity country, the USA, by 6.9% and around the same for the higher complexity country of China (a 6.1% increase), holding all other factors constant. Reducing the time by 10% in Brazil gets the largest payoff, increasing predicted FDI by 9.3%. A similar pattern applies to increases in the average probability of positive FDI matches - the change in Ireland is 1 percentage point (pp), 1.2pp for the USA and China and 1.2pp for Brazil.

Halving the time taken to complete tax obligations would increase FDI by approximately

[8] The coefficients used in the prediction are from the final panel of Table 6.

one-third for countries with average-to-high initial time requirements (35.4% for the USA and 31.9% for China). The increase for Brazil is 46.2% if time requirements were reduced by 50%.

The pattern of effects for reducing the number of payments by 10% or 50% is similar, although the magnitudes of the changes are smaller. China has the highest original number of payments of the four representative examples (48 payments); a 50% reduction would increase total FDI to China by 31.1%. The same percentage reduction in Ireland, with an initial 8 tax payments, would increase FDI by 21.3%.

For comparison with the complexity predictions, the final panel of Table 10 presents the predicted effects of a 1 percentage point reduction in effective corporate tax rates. Consistent with the aggregate results, the average-to-high complexity countries of the USA and China show that the effects of a 1pp change in tax rates are almost identical in magnitude to a 10% reduction in time - either change would predict a 6.9% increase in FDI for the USA for example. For the higher complexity example country, Brazil, the impact on FDI of reducing the tax rate (8%) would be less than if it reduced the time requirement (increase in FDI of 9.3%). Only for Ireland, where the initial tax complexity measure is extremely low, is the impact on FDI of reducing taxes (5.1%) greater than the impact of reducing the time requirement (4.2%), despite the fact that Ireland also has a very low initial effective corporate tax rate. These examples show that tax complexity exerts a strong disincentive to FDI and that reducing this complexity could yield significant returns in increased FDI. This is particularly the case for countries with higher initial levels of tax complexity.

6 Conclusions

The influence of taxes on foreign direct investment may be more complicated than a simple comparison of rates across countries. The importance of distinguishing effective tax rates from statutory rates for example is well known. This paper adds a further dimension to the effect of taxes on bilateral FDI flows by including measures of the complexity of the tax code.

We use the World Bank Doing Business proxies for tax complexity of the time (in hours) required for a standardised firm to comply with its tax obligations and the number of separate payments it would have to make. Both measures are significantly and negatively related to the existence of a FDI relationship between countries, although they do not sub-

sequently have a strong effect on the level of the FDI flows. In other words, the complexity measures affect FDI primarily through the extensive margin.

The measures of tax complexity are robust to the inclusion of a range of country level variables and a further proxy for the general level of bureaucracy. In terms of its economic significance, we estimate that a 10% reduction in tax complexity is approximately comparable to a one percentage point reduction in the effective corporate tax rate. Either of these changes would raise total FDI inflows by approximately 6%.

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Table 1: Data Sources

Variable	Source	Definition
FDI	OECD International Direct Investment	Bilateral FDI flows in 2002 in US$ between OECD countries and from OECD to non-OECD.
GDP	Penn World Tables	Gross Domestic Product in US$.
Population	Penn World Tables	Population
Distance	Jon Haveman website*	Great circle distance in km between Investment cities.
Language	Jon Haveman website*	Dummy variable equal to one if host and source countries have a common official language.
Education	Barro-Lee dataset	Average years of schooling in total population.
Statutory tax	Djankov et al. (2008)	Tax rate (%) for highest bracket of all taxes on corporate income.
Effective tax	Djankov et al. (2008)	Tax rate (%) given by dividing total corporate tax company pays by its pretax earnings.
Tax time requirement	World Bank Doing Business data	Time (in hours per year) to prepare, file and pay corporate, sales and labor taxes.
Tax payments	World Bank Doing Business data	Indicator reflects total number of taxes paid, method of payment, frequency of payment and number of agencies involved.
Start costs	World Bank Doing Business data	Cost of registering a new business as % per capita income.

*Available at:
http://www.macalester.edu/research/economics/PAGE/HAVEMAN/Trade.Resources/TradeData.html

Table 2: List of Countries

Source Countries	Host Countries		
Australia	Algeria	Hong Kong	Poland
Austria	Argentina	Hungary	Portugal
Belgium-Lux	Australia	Iceland	Romania
Denmark	Austria	India	Russia
Finland	Belgium-Lux	Indonesia	Saudi Arabia
France	Brazil	Ireland	Singapore
Germany	Bulgaria	Israel	SlovakR
Italy	Canada	Italy	Slovenia
Japan	Chile	Japan	South Africa
Korea	China	Korea	Spain
Netherlands	Colombia	Kuwait	Sweden
Spain	Costa Rica	Malaysia	Switzerland
Sweden	CzechR	Mexico	Thailand
Switzerland	Denmark	Morocco	Turkey
UK	Egypt	Netherlands	UAE
USA	Finland	New Zealand	UK
	France	Norway	Ukraine
	Germany	Panama	USA
	Greece	Philippines	Venezuela

Table 3: Benchmark Gravity Model of FDI Selection and Flows

	Selection	Ln(FDI)	Selection	Ln(FDI)	Selection	Ln(FDI)
Ln GDP per capita: Host	0.43***	1.95***	0.62***	2.26***	0.47***	2.21***
	(0.08)	(0.15)	(0.14)	(0.22)	(0.15)	(0.23)
Ln Population: Host	0.32***	0.81***	0.33***	0.81***	0.30***	0.78***
	(0.04)	(0.09)	(0.04)	(0.10)	(0.04)	(0.10)
Ln Distance	-0.34***	-0.78***	-0.24***	-0.74***	-0.14**	-0.72***
	(0.05)	(0.10)	(0.06)	(0.10)	(0.07)	(0.10)
Language	0.70***	1.35***	0.62**	1.26***	0.70***	1.24***
	(0.26)	(0.35)	(0.26)	(0.34)	(0.26)	(0.34)
Schooling Difference	-	-	0.03	0.14***	0.07*	0.15***
	-	-	(0.04)	(0.05)	(0.04)	(0.05)
Host in OECD	-	-	-	-	0.54***	0.08
	-	-	-	-	(0.17)	(0.28)
Ln GDP per capita: Source	-	2.06***	-	0.71	-	0.67
	-	(0.67)	-	(0.86)	-	(0.86)
Ln Population: Source	-	0.78***	-	0.80***	-	0.79***
	-	(0.10)	-	(0.09)	-	(0.08)
Source country dummy	Yes	No	Yes	No	Yes	No
Lambda		1.09***		1.07***		-1.56***
		(0.29)		(0.34)		(0.26)
Log likelihood		-1265		-1055		-1049
Observations		784		644		644

Notes: Standard errors in parentheses.

*** indicates significance at 1% level, ** at 5% and * at 10%.

Table 4: FDI and Tax Rates

	Selection	Ln(FDI)	Selection	Ln(FDI)
Statutory Tax Rate	-3.64***	5.96***	-	-
	(1.02)	(1.76)	-	-
Effective Tax Rate	-	-	-3.32***	-5.08***
	-	-	(1.10)	(1.86)
Ln GDP per capita: Host	0.62***	2.39***	0.48***	2.13***
	(0.16)	(0.24)	(0.16)	(0.23)
Ln Population: Host	0.31***	0.92***	0.23***	0.76***
	(0.06)	(0.11)	(0.05)	(0.09)
Ln Distance	-0.18**	-0.73***	-0.16**	-0.70***
	(0.07)	(0.10)	(0.07)	(0.10)
Language	0.71***	1.25***	0.72***	1.27***
	(0.27)	(0.34)	(0.27)	(0.34)
Schooling Difference	0.14***	0.19***	0.13***	0.17***
	(0.04)	(0.05)	(0.04)	(0.05)
Host in OECD	0.42**	0.14	0.49***	0.25
	(0.18)	(0.28)	(0.19)	(0.29)
Ln GDP per capita: Source	-	0.18	-	0.34
	-	(0.86)	-	(0.86)
Ln Population: Source	-	0.82***	-	0.82***
	-	(0.08)	-	(0.08)
Source country dummy	Yes	No	Yes	No
λ		1.09***		1.08***
		(0.28)		(0.29)
Log likelihood		-996		-999
Observations		588		588

Notes: Standard errors in parentheses.

*** indicates significance at 1% level, ** at 5% and * at 10%.

Table 5: FDI and Time to Comply with Taxes

	OLS	Selection	Ln(FDI)	Selection	Ln(FDI)	Selection	Ln(FDI)
Ln Time to Comply	-0.12	-0.44***	-0.33**	-0.38***	-0.19	-0.42***	-0.25
	(0.15)	(0.11)	(0.17)	(0.11)	(0.16)	(0.11)	(0.16)
Statutory Tax Rate	-	-	-	-2.86***	-5.28***	-	-
	-	-	-	(1.06)	(1.76)	-	-
Effective Tax Rate	-3.03*	-	-	-	-	-2.83**	-4.45**
	(1.74)	-	-	-	-	(1.12)	(1.84)
Ln GDP per capita: Host	1.99***	0.31**	2.06***	0.48***	2.28***	0.35**	2.03***
	(0.23)	(0.16)	(0.24)	(0.17)	(0.25)	(0.16)	(0.24)
Ln Population: Host	0.67***	0.36***	0.82***	0.34***	0.92***	0.28***	0.79***
	(0.08)	(0.05)	(0.10)	(0.06)	(0.11)	(0.06)	(0.09)
Ln Distance	-0.60***	-0.13**	-0.71***	-0.18**	-0.72***	-0.16**	-0.70***
	(0.09)	(0.07)	(0.10)	(0.07)	(0.10)	(0.07)	(0.10)
Language	1.13***	0.63**	1.16***	0.63**	1.19***	0.64**	1.19***
	(0.32)	(0.27)	(0.33)	(0.28)	(0.33)	(0.28)	(0.33)
Schooling Difference	0.17***	0.11***	0.17***	0.18***	0.20***	0.17***	0.19***
	(0.05)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Host in OECD	0.05	0.61***	0.10	0.44**	0.14	0.52***	0.23
	(0.28)	(0.17)	(0.28)	(0.19)	(0.28)	(0.19)	(0.29)
Ln GDP per capita: Source	0.52	-	0.48	-	0.09	-	0.21
	(0.83)	-	(0.85)	-	(0.86)	-	(0.86)
Ln Population: Source	0.67***	-	0.78***	-	0.82***	-	0.81***
	(0.07)	-	(0.08)	-	(0.08)	-	(0.08)
Source country dummy	No	Yes	No	Yes	No	Yes	No
λ	-		0.87***		1.03***		1.00***
	-		(0.37)		(0.29)		(0.31)
Log likelihood	R^2=0.46		-1040		-990		-992
Observations	372		644		588		588

Notes: Standard errors in parentheses.

*** indicates significance at 1% level, ** at 5% and * at 10%.

Table 6: FDI and Number of Tax Payments

	OLS	Selection	Ln(FDI)	Selection	Ln(FDI)	Selection	Ln(FDI)
Ln Number Tax Payments	0.15	-0.51***	-0.18	-0.38***	-0.08	-0.39***	-0.05
	(0.14)	(0.10)	(0.18)	(0.10)	(0.16)	(0.10)	(0.16)
Statutory Tax Rate	-	-	-	-2.58**	-5.57***	-	-
	-	-	-	(1.07)	(1.75)	-	-
Effective Tax Rate	-3.63**	-	-	-	-	-2.30**	-4.66**
	(1.77)	-	-	-	-	(1.14)	(1.83)
Ln GDP per capita: Host	2.17***	-0.04	2.02***	0.23	2.28***	0.11	2.07***
	(0.25)	(0.18)	(0.26)	(0.20)	(0.27)	(0.19)	(0.26)
Ln Population: Host	0.65***	0.27***	0.75***	0.29***	0.90***	0.22***	0.74***
	(0.08)	(0.05)	(0.09)	(0.06)	(0.11)	(0.05)	(0.09)
Ln Distance	-0.59***	-0.17**	-0.72***	-0.21***	-0.74***	-0.20***	-0.71***
	(0.09)	(0.07)	(0.10)	(0.07)	(0.10)	(0.07)	(0.10)
Language	1.16***	0.67**	1.21***	0.68**	1.24***	0.69**	1.25***
	(0.32)	(0.27)	(0.33)	(0.27)	(0.33)	(0.27)	(0.33)
Schooling Difference	0.17***	0.06	0.15***	0.12***	0.18***	0.12**	0.17***
	(0.05)	(0.04)	(0.05)	(0.05)	(0.05)	(0.04)	(0.05)
Host in OECD	0.02	0.63***	0.05	0.45**	0.12	0.51***	0.20
	(0.28)	(0.18)	(0.29)	(0.19)	(0.28)	(0.19)	(0.29)
Ln GDP per capita: Source	0.57	-	0.72	-	0.26	-	0.42
	(0.83)	-	(0.85)	-	(0.86)	-	(0.85)
Ln Population: Source	0.69***	-	0.77***	-	0.82***	-	0.81***
	(0.07)	-	(0.09)	-	(0.08)	-	(0.08)
Source country dummy	No	Yes	No	Yes	No	Yes	No
λ	-		0.83**		1.06***		1.03***
	-		(0.40)		(0.28)		(0.30)
Log likelihood	R^2=0.48		-1035		-989		-991
Observations	372		644		588		588

Notes: Standard errors in parentheses.

*** indicates significance at 1% level, ** at 5% and * at 10%.

Table 7: Tax Complexity and Start-up Costs

	Selection	Ln(FDI)	Selection	Ln(FDI)
Ln Start-up cost	-0.19***	-0.10	-0.17**	-0.15
	(0.07)	(0.10)	(0.10)	(0.10)
Ln Time to comply	-0.33***	-0.19	-	-
	(0.11)	(0.16)	-	-
Ln Number of Payments	-	-	-0.30***	0.05
	-	-	(0.11)	(0.17)
Effective Tax Rate	-3.20***	-4.04**	-2.75**	-4.50**
	(1.15)	(1.88)	(1.20)	(1.88)
Ln GDP per capita: Host	0.15	1.90***	-0.02	1.94***
	(0.18)	(0.26)	(0.20)	(0.28)
Ln Population: Host	0.26***	0.74***	0.21***	0.72***
	(0.06)	(0.09)	(0.05)	(0.09)
Ln Distance	-0.21***	-0.71***	-0.23***	-0.72***
	(0.08)	(0.10)	(0.08)	(0.11)
Language	0.59**	1.16***	0.63**	1.19***
	(0.28)	(0.33)	(0.27)	(0.33)
Schooling Difference	0.22***	0.21***	0.16***	0.20***
	(0.05)	(0.06)	(0.05)	(0.06)
Host in OECD	0.61***	0.25	0.59***	0.24
	(0.20)	(0.29)	(0.20)	(0.29)
Ln GDP per capita: Source	-	-0.05	-	0.003
	-	(0.88)	-	(0.87)
Ln Population: Source	-	0.80***	-	0.81***
	-	(0.09)	-	(0.09)
Source country dummy	Yes	No	Yes	No
λ		0.85***		0.91***
		(0.36)		(0.34)
Log likelihood		-967		-967
Observations		575		575

Notes: Standard errors in parentheses.

*** indicates significance at 1% level, ** at 5% and * at 10%.

Table 8: Alternative Specifications

	Selection	Ln(FDI)	Selection	Ln(FDI)	Selection	Ln(FDI)
Ln Time to comply	-0.36***	-0.24	-	-	-	-
	(0.11)	(0.16)	-	-	-	-
Ln Number of Payments	-0.34***	-0.02	-	-	-	-
	(0.11)	(0.16)	-	-	-	-
Relative Time	-	-	-0.07**	0.04	-	-
	-	-	(0.03)	(0.05)	-	-
Relative Payments	-	-	-	-	-0.03	-0.003
	-	-	-	-	(0.02)	(0.03)
Effective Tax Rate	-2.02*	-4.23**	-3.51***	-4.80**	-3.25***	-4.98***
	(1.15)	(1.83)	(1.11)	(1.86)	(1.11)	(1.87)
Ln GDP per capita: Host	0.05	2.01***	0.50***	2.14***	0.41**	2.13***
	(0.19)	(0.27)	(0.16)	(0.23)	(0.17)	(0.23)
Ln Population: Host	0.28***	0.77***	0.26***	0.74***	0.23***	0.76***
	(0.06)	(0.09)	(0.06)	(0.09)	(0.05)	(0.09)
Ln Distance	-0.19**	-0.70***	-0.14*	-0.69***	-0.17**	-0.70***
	(0.07)	(0.10)	(0.07)	(0.10)	(0.07)	(0.10)
Language	0.62**	1.18***	0.69**	1.26***	0.72***	1.27***
	(0.28)	(0.33)	(0.28)	(0.33)	(0.27)	(0.34)
Schooling Difference	0.16***	0.18***	0.16***	0.17***	0.12***	0.17***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	(0.05)
Host in OECD	0.54***	0.19	0.48**	0.23	0.49**	0.24
	(0.20)	(0.29)	(0.19)	(0.29)	(0.19)	(0.29)
Ln GDP per capita: Source	-	0.27	-	0.30	-	0.34
	-	(0.85)	-	(0.85)	-	(0.87)
Ln Population: Source	-	0.80***	-	0.81***	-	0.76***
	-	(0.08)	-	(0.08)	-	(0.09)
Source country dummy	Yes	No	Yes	No	Yes	No
λ		0.95***		0.97***		1.05***
		(0.32)		(0.33)		(0.32)
Log likelihood		-986		-994		-999
Observations		588		588		588

Notes: Standard errors in parentheses.

*** indicates significance at 1% level, ** at 5% and * at 10%.

Table 9: Predicted Economic Effects of Reducing Tax Complexity

	Predicted Percentage Change Total FDI	Change in Average Probability of FDI Match
Reduce tax rate by 1pp	0.058	0.008
Reduce time by 10%	0.063	0.012
Reduce payments by 10%	0.055	0.012

Table 10: Predicted Effects on FDI for Selected Countries

	Ireland	USA	China	Brazil
Current Time to Comply	76	325	872	2600
10% Reduction in Time				
Predicted Percentage Change in Total FDI	4.2	6.9	6.1	9.3
Change in Average Probability of FDI Match	1.0	1.2	1.2	1.4
50% Reduction in Time				
Predicted Percentage Change in Total FDI	22.8	35.4	31.9	46.2
Change in Average Probability of FDI Match	5.8	7.4	7.6	8.9
Current Number of Payments	8	10	48	23
10% Reduction in Payments				
Predicted Percentage Change in Total FDI	4.1	5.6	6.0	5.5
Change in Average Probability of FDI Match	1.0	1.1	1.2	1.0
50% Reduction in Payments				
Predicted Percentage Change in Total FDI	21.3	28.3	31.1	27.6
Change in Average Probability of FDI Match	6.4	6.5	7.6	6.4
Current Effective Tax Rate	9.6	18.2	15.7	15.5
1 Percentage Point Reduction in Tax				
Predicted Percentage Change in Total FDI	5.1	6.9	6.2	8.0
Change in Average Probability of FDI Match	0.7	0.8	0.9	1.0

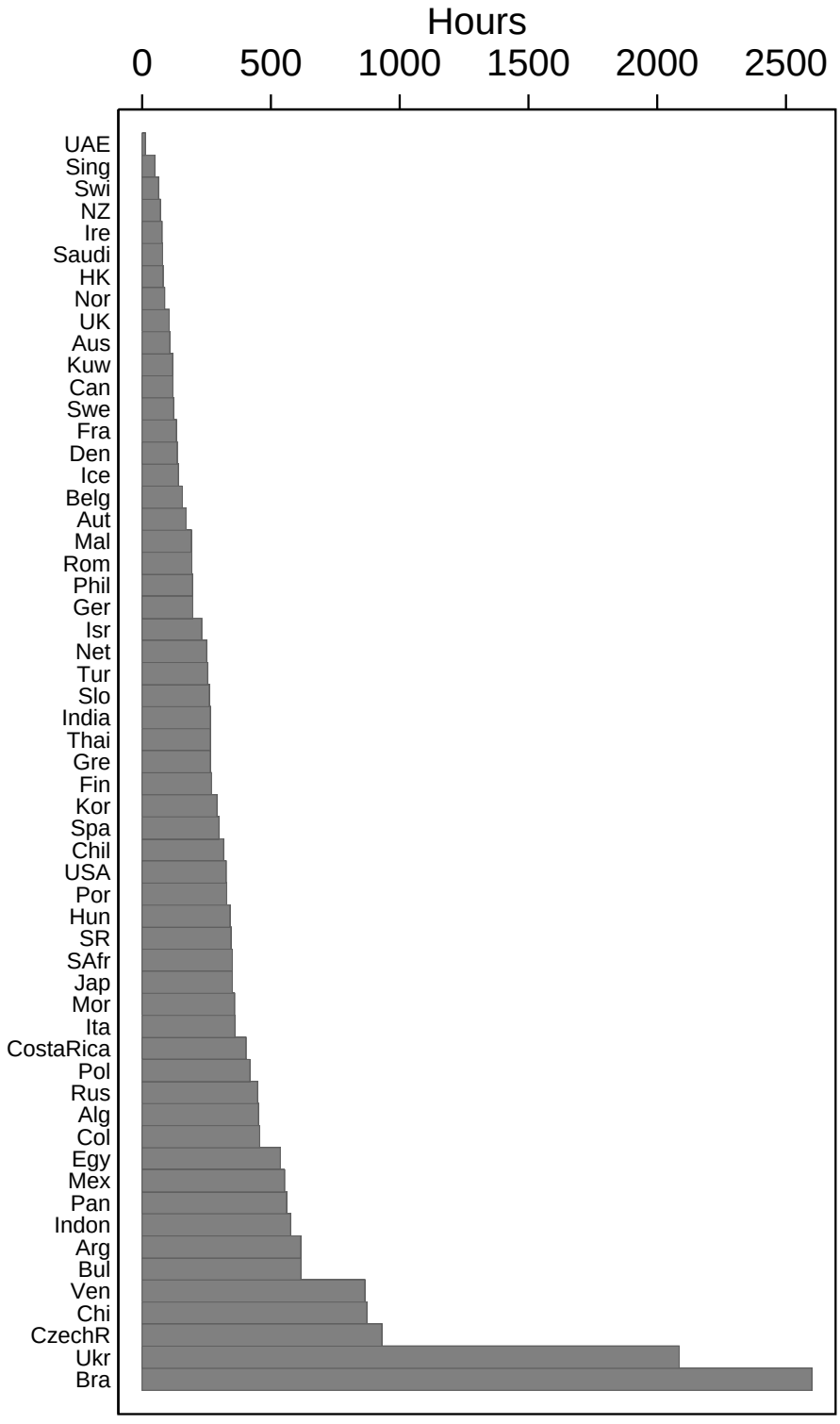

Figure 1

Time Required to Complete Taxes

Figure 2

Tax Time and Payments