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# THE IMPACT OF THE TAX CUTS AND JOBS ACT ON FOREIGN DIRECT INVESTMENT IN THE UNITED STATES

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ABSTRACT

The 2017 Tax Cuts and Jobs Act (TCJA) sharply reduced effective corporate income tax rates on equity-financed US investment. This paper examines the reform's impact on inbound foreign investment, allowing for variation by investor country, method of finance, and industry. Preliminary findings indicate that, while foreign investment in US property, plant and equipment increased following TCJA, this appears to have been driven by macroeconomic factors, with tax policy providing no marginal stimulation. However, there is some evidence that foreign corporations increased their retained earnings in response to the lower US tax rates. These findings are consistent with other early studies of the effect of TCJA on US investment.

# 1. INTRODUCTION

This paper examines the early reaction of foreign investment in the United States to the 2017 Tax Cuts and Jobs Act (TCJA), which took effect at the beginning of 2018. TCJA made radical changes to the US corporate income tax, including a 14-point cut in the statutory rate and temporary full expensing of equipment investment ("bonus depreciation"). These measures were viewed by many as likely to increase corporate investment in the US. The Congressional Budget Office (CBO), for example, increased its estimate of real private nonresidential investment by an average of 3.8 percent per year for 2018-2027 following the passage of TCJA (CBO 2017 and 2018). Foreign investment by multinational enterprises (MNEs), being internationally mobile, is particularly sensitive to corporate income taxes.

This paper analyzes several measures of foreign investment published by the US Bureau of Economic Analysis (BEA). Investment in property, plant and equipment (PPE), which is gathered by survey of multinational enterprises (MNEs), is available by selected industry and country of ultimate beneficial ownership (UBO). Foreign direct investment (FDI), which is drawn from balance of payments statistics, is available by country of immediate origin (CIO)[1], method of finance, and selected industries. "New FDI", also from balance of payments statistics, is available by country of UBO and transaction type.

The tax measures used are forward-looking corporate-level effective tax rates (marginal and average) on inbound foreign investment generated by the Urban-Brookings Tax Policy Center's international investment and capital model (IICM). The model calculates rates specific to investor country, finance method, and industry. Disaggregation of FDI and effective tax rates by method of finance, investor country and industry permit exploration of which tax rates most influence inbound US FDI: marginal or effective average tax rates, and US-level or bilateral?

A modified gravity model was applied, in which the different FDI measures were regressed on US and bilateral effective tax rates as well as a set of macroeconomic controls for home and host country GDP and US bilateral exchange rates. Lagged investment stock or a lagged dependent variable were also included in random effects or Arellano-Bond GMM models, respectively.

Regression results indicate that the change in US corporate effective tax rates due to TJCA did stimulate foreign investment in US PPE as well as FDI financed out of retained earnings. However, the stimulatory effect of tax rates on PPE investment is not robust to controlling for macroeconomic factors that also affect investment. Once home and host country gross domestic product (GDP) and exchange rates are included as controls, effective tax rates demonstrate no marginal effect on inbound FDI. This suggests that the growth in US inbound investment following enactment of TCJA was driven by general economic growth, with the TCJA tax rate reduction playing no marginal role in stimulating investment. However, reduced US tax rates do appear to have increased retained earnings by foreign investors, even when controlling for home and host country macroeconomic factors.

Total FDI, which is dominated by acquisitions of existing US companies, appears to relate positively to US effective tax rates, since it fell from historic highs prior to TCJA to lower levels after the reform. However, this positive correlation is driven by "inversion" transactions—mergers and acquisitions in which a US-headquartered MNE becomes a foreign MNE, or vice versa. Once the FDI by UBO series is adjusted for inversions, there is no longer a significant effect of US tax rates on total FDI. Similarly, no direct or indirect effect of US tax rates is found for FDI by CIO financed out of debt or new equity.

The following section reviews the literature on taxation and foreign investment in the US. Section 3 reviews the various measures of FDI, and section 4 presents effective tax rates calculated by the IICM. Section 5 presents the estimation models and results, and section 6 concludes. A reference list of acronyms is provided in Appendix A.

## 2. LITERATURE REVIEW

There is a large literature on the effect of taxes on cross-border investment, which is reviewed in Feld and Heckemeyer (2011) and de Mooij and Ederveen (2008). These meta-studies find an average tax semi-elasticity—that is, percentage change in foreign investment with respect to the percentage point change in tax rate—of roughly -3, with results varying according to measures of FDI and tax rates used.

De Mooij and Ederveen (2008) find an average semi-elasticity of foreign direct investment with respect to EMTRs of -2.8; however, studies using EATRs generally find significantly higher semi-elasticities averaging -5.2. The authors also find that studies analyzing PPE (which all use US inbound or outbound data) yield semi-elasticities averaging -4.8 for EMTRs or -7.2 for EATRs. Studies that use corporate microdata tend to find smaller tax elasticities than studies based on aggregate investment measures, which are sometimes disaggregated at the industry level.

Feld and Heckemeyer (2011), who control for a wider variety of study characteristics as well as publication bias, also find an average semi-elasticity of foreign investment to tax rates of -2.8. Correction for publication bias reduces this estimate slightly to about -2.5, depending on the correction method used. Although Feld and Heckemeyer do not find a greater effect for EATRs generally, they do find higher semi-elasticities for bilateral tax rates—both EMTRs and EATRs, with the effect of the latter being substantially larger (-0.8 and -3.4, respectively).

Regarding non-tax controls, gravity models controlling for the geographical distance, GDP and population of home and host countries are common, while time-invariant country characteristics are often absorbed by country fixed or random effects. Bilateral exchange rates, which effect the price of acquisitions, are also often found to be significant.

Within the FDI and taxation literature, a small number of papers examine the effect of corporate taxes on inbound investment into the United States. Early studies of US inbound investment tended to use backward-

looking average or statutory tax rates, while more recent research uses effective marginal or average tax rates. More recent studies, beginning with Blonigen and Davies (2004), often incorporates bilateral tax rates, either by controlling for the home country regime (worldwide or territorial[2]) with a dummy variable or by directly incorporating cross-border withholding taxes (WHTs) into effective tax rate calculations.

The seminal work on US inbound investment, Hartman (1984), examines the relationship between aggregate annual inbound FDI and average tax rates (ATRs)—the ratio of corporate income and property tax revenues to corporate profits. Hartman considers separately the influence of tax on retained earnings and new transfers from the home country and finds the tax elasticity of the former to be higher.

Slemrod (1990) advances the literature by incorporating effective marginal tax rates (EMTRs), home-country tax regimes, and non-tax controls. In contrast to Hartman (1984), Slemrod finds that the US EMTR negatively impacts new FDI transfers, but not investment financed with retained earnings. He also finds no consistent evidence that home country tax rates or regime type impact foreign investment in the US.

Auerbach and Hassett (1993) examine the impact of EMTRs on inbound FDI following the Tax Reform Act of 1986. They point out that FDI, which consists predominantly of foreign acquisitions of US companies, is unlikely to respond to forward-looking effective tax rates; rather, it is more likely to be driven more by equity market valuations and exchange rates. They therefore focus on investment in PPE by foreign multinationals, which better captures the type of investment affected by effective tax rates. However, they find little empirical evidence to support their hypotheses of the relationship between taxes and different types of foreign investment, and they therefore conclude that the post-1986 wave of inbound acquisitions was not primarily tax motivated.

Swenson (1994) was the first study of inbound US investment to examine sectoral rather than aggregate investment. Comparing the relationship between FDI and both average and marginal tax rate measures, she finds that investment in non-financial sectors responds positively to ATRs, especially investment from home countries with worldwide tax systems. This is consistent with the general equilibrium result that US investment from MNEs based in countries with worldwide tax systems, whose tax burdens are relatively invariant to US tax rates, increases when higher US tax rates drive up the pre-tax return to US assets.

Blonigen and Davies (2004) is the first paper to explore the effect of bilateral tax treaties (BTTs) on US inbound & outbound investment stocks. They do not find treaties to be of significance, which may be due to data limitations: Presence of a treaty is represented by an indicator variable, so the positive and negative effects of treaties—which both lower WHTs and increase information exchange to promote enforcement—may cancel each other out.[3] Also, older BTTs, (which tend to be with OECD countries) have a large positive intercept, but their marginal effect can't be gauged given the limited time series data on FDI, so measurement of marginal effects is limited to more recent treaties.

Agostini (2007) examines the distribution of foreign FDI across US states in reaction to local corporate income tax rates, using BEA data on investment in property, plant and equipment. His approach highlights the importance of controlling for foreign MNEs' option of investing outside the US: Controlling for this option, he finds an investment tax elasticity of about -1, whereas without this control the elasticity falls to about -0.7. Agostini also finds no significant difference between investment from territorial and worldwide countries.

Wijeweera, Dollery and Clark (2007) compare the elasticities of US inbound investment with respect to statutory and effective tax rates, while also controlling for home country tax rates. It is the first study on inbound US investment to incorporate Devereux and Griffith's (2003) effective average tax rates, in addition to EMTRs. The authors find an elasticity of about -1 for statutory tax rates, as well as a small positive effect of home country rates when controlling for effective tax rates.

Several early studies of the 2017 TCJA constructed forward-looking effective tax rates based on the statutory changes, and some made projections regarding their likely effect on cross-border investment.

Lyon and McBride (2018), DeBacker and Kasher (2018), Beer et al. (2018), Heinemann et al. (2018), and Gravelle and Marples (2019) all estimate that the 14-point drop in the US statutory rate, combined with accelerated depreciation and limitations on interest deductions, reduced effective marginal and average tax rates on equity-financed investment by 11-13 percentage points.[4] They also find that the rate cut , combined with the limitations on interest deductions, sharply increased effective tax rates on debt-financed investment. Studies that analyze the effect of the reform on different asset classes find that, under the general regime, equipment investment received the largest reduction in its effective tax rate, while intellectual property (IP) received the smallest.

As post-reform data become available, an increasing number of empirical studies examine TCJA's impact on total US investment and its composition among assets and industries. Gravelle and Marples (2019) find that, despite TCJA's sharp reduction in corporate tax rates, investment did not respond as robustly as historical elasticities would suggest. They also find that asset-specific investment patterns did not match asset-specific changes in effective tax rates: Post-TCJA investment favored IP-intensive industries, which received a smaller tax cut than machinery and equipment.

Kopp et al. (2019) find that, although investment grew strongly after TCJA, it was driven largely by demand growth, rather than reduced tax rates. The authors attribute the muted investment response to increasing market power and monopolization in the US economy. Similarly, Gale and Haldeman (2021) find that the TCJA tax cuts did not drive post-reform investment growth, which seems to have been better explained by oil prices. Like Gravelle and Marples (2019), they note that the strongest investment growth was in IP, which received the lowest tax cut under TCJA.

Several other post-reform papers—Dharmapala (2018), Dowd et al. (2020), Dyreng et al. (2020), Amberger and Robinson (2021) and Joint Committee on Taxation (2021)—evaluate the early effects of TCJA's corporate

tax changes, but they do not focus on how the act affected inbound direct investment. To the best of the author's knowledge, this is the first paper to evaluate the impact of TCJA specifically on foreign PPE investment in the US.

## 3. FOREIGN INVESTMENT

Inbound investment by foreign-owned multinationals accounts for a significant share of US economic activity. According to the US Bureau of Economic Analysis (BEA), foreign-owned companies account for roughly 16 percent of US private business capital investment, 15 percent of research and development, 7 percent of business value added, and 6 percent of private-sector employment.[5] According to data reported by the Internal Revenue Service's Statistics of Income Division, foreign-owned corporations also account for about 15 percent of corporate income tax revenue.

This paper considers several different measures of foreign investment in the US published by the BEA.[6]

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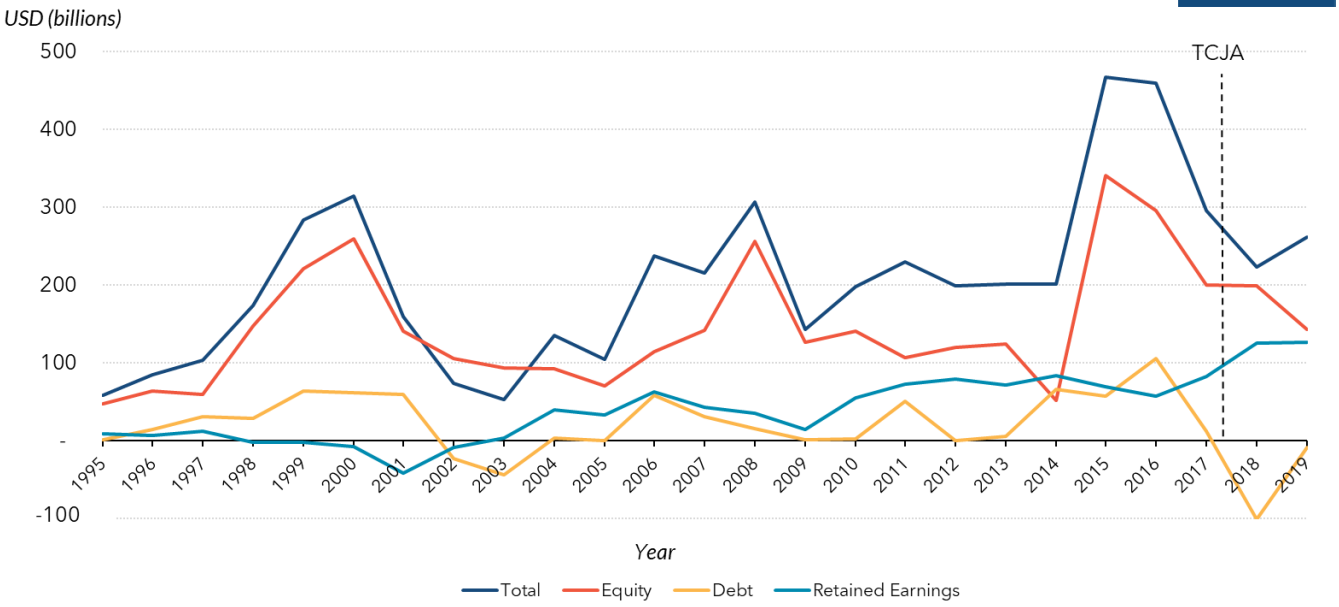
1. Data on FDI by CIO (Figure 1), which derive from balance of payments statistics, are available by method of finance (new equity, debt, and retained earnings) and selected industries. This series dates back more than two decades, and the latest available year is 2019.
2. Investment in PPE (Figure 2) by majority foreign-owned US affiliates comes from survey data reported by MNEs. These data are available for selected industries and seven UBO countries—Canada, France, Germany, Great Britain, Japan, the Netherlands, and Switzerland—and the series covers 2007-2019. These data, while of the same magnitude as cross-border FDI, do not all represent cross-border transactions, but include domestically financed investment (for example, from borrowing within the US or use of retained earnings).
3. Data on FDI by country of UBO (Figure 2), which also derive from balance of payments data, are available by transaction type--acquisition, new establishments and expansion of existing establishments—and selected industries. This relatively new series is available only for 2014-2019.

FIGURE 1

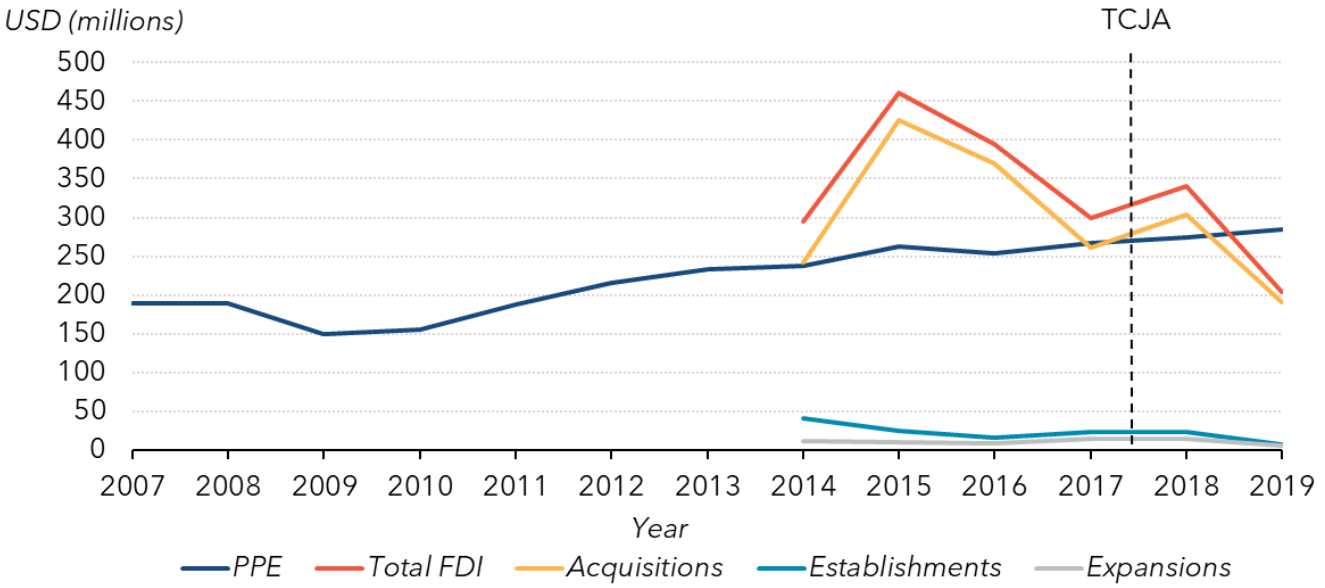
## FDI by Country of Immediate Origin




**Source**: Bureau of Economic Analysis
**Note:** FDI by country of immediate origin

FIGURE 2

## PPE and FDI by UBO



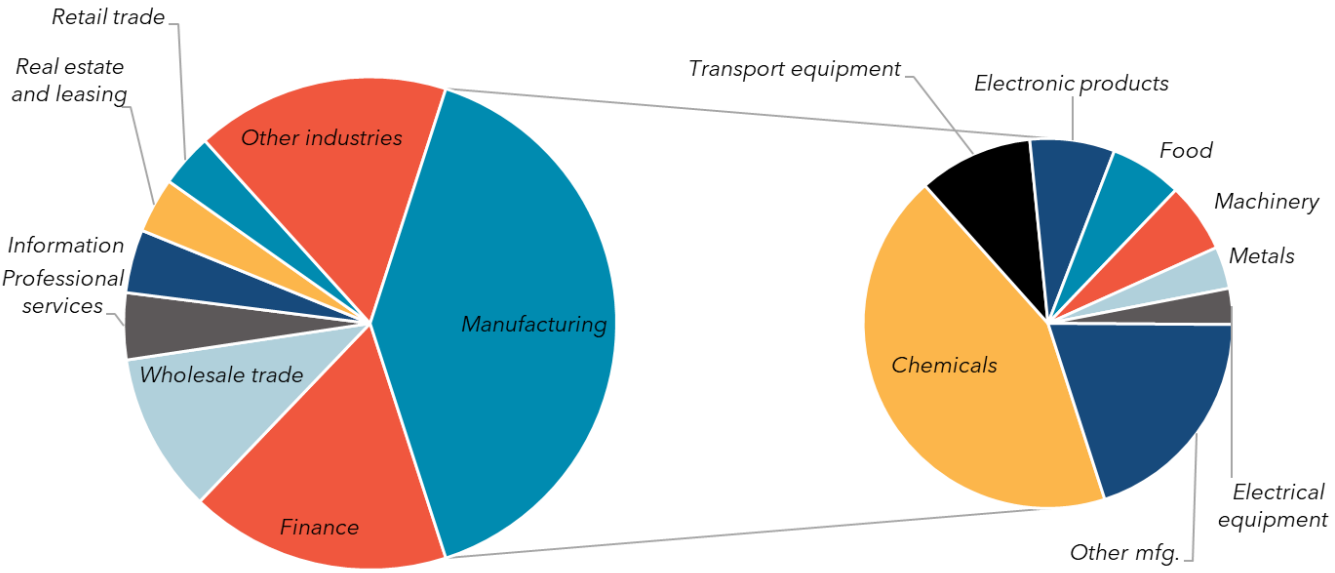

**Source**: Bureau of Economic Analysis
**Note:** FDI by country of ultimate beneficial owner

Figure 2 shows that acquisitions dominate greenfield establishments and expansions of existing foreign-owned US affiliates by a wide margin. During 2014-2019, acquisitions of existing US businesses accounted for an average of 90 percent of new inbound FDI, with the remainder split about equally between new establishments and expansions. While all three types of investment may be financed with new equity, debt, and/or retained earnings, comparison of figures 1 and 2 suggests that equity financed FDI and acquisitions are closely correlated. Further, FDI and investment in PPE by foreign-owned US affiliates appear not to be strongly correlated. While equity-financed FDI and acquisitions are quite volatile, PPE investment shows a steady upward trend since the 2008 financial crisis that is similar to that of FDI financed out of retained earnings.

Figure 3 shows the 2019 stock of FDI investment, broken out by industry categories for which annual flow data are available at the country-by-industry level. The largest sector for inbound FDI is manufacturing, which accounts for about 40 percent of total FDI. Finance is the next largest sector, with 17 percent of investment. Within manufacturing, the largest investment subsector is chemicals, of which about two thirds is pharmaceutical manufacturing, which accounts for 17 percent of the total inbound FDI stock. Transportation equipment (mostly car manufacturing) is the next largest category, accounting for about 4 percent of the inbound FDI stock.

FIGURE 3

## US Inbound FDI Stock by Sector, 2019




**Source**: Bureau of Economic Analysis

## 4. EFFECTIVE TAX RATES

TCJA made sweeping changes to corporate taxation, including the following changes that were integrated into the effective tax rates calculated by the Tax Policy Center's international investment and capital model (IICM)[7]:

- The federal statutory tax rate was reduced from 35 percent to 21 percent
- "Bonus depreciation" (expensing) of assets with lives of up to 20 years was increased from 50 percent to 100 percent during 2018-2022 and then phased down by 20 percent per year during 2023-2027.
- Interest deductions were limited to 30 percent of earnings before interest, taxes, depreciation, depletion and amortization (EBITDA) during 2018-2021, and 30 percent of earnings before interest and taxes (EBIT) beginning in 2022.

The IICM calculates corporate-level effective marginal tax rates (EMTRs) and effective average tax rates (EATRs) for US corporations based on the methodology described in Devereux and Griffith (2003). The EMTR measures the "tax wedge" on a marginal investment that just breaks even after taxes. The EATR—the ratio of the present value of corporate income taxes to the present value of pre-tax profits—captures the average tax liability over the life of a an investment that earns profits exceeding the normal return to capital, or "rents".

The EATR was modelled to better reflect the extensive investment decisions of multinational enterprises, which select among various jurisdictions for the location of projects that often yield economic profits. As

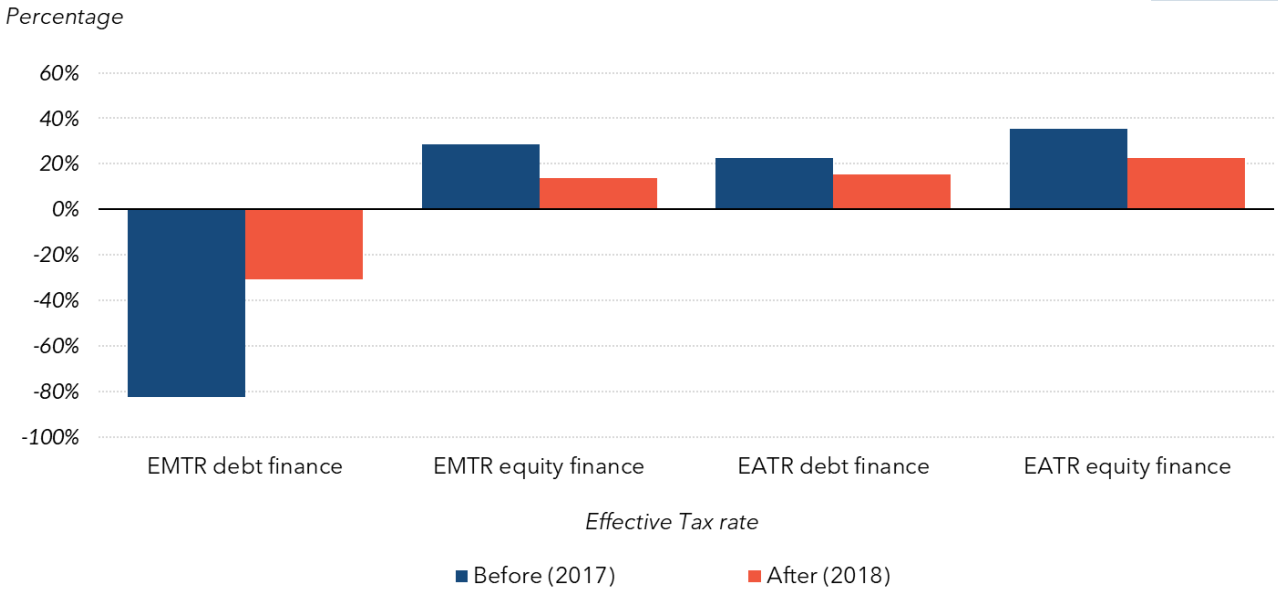
described in Devereux and Griffith (2003), a corporate-level EATR can be interpreted as a weighted average of the corresponding EMTR and the statutory corporate tax rate, with the weight depending on the level of profitability: As the level of profitability falls toward the marginal break-even level, the EATR approaches the EMTR, and as profitability rises, the EATR approaches the statutory rate.

The IICM's standard assumptions are an inflation rate of 2 percent, a nominal interest rate of 7 percent, and a nominal profit rate of 20 percent for calculation of EATRs. The present value of depreciation allowances is based on detailed US Bureau of Economic Analysis (BEA) data on asset stocks by industry, classified into the depreciation categories of the US modified accelerated cost recovery system (MACRS). For a detailed description of the IICM, see Matheson (2021).

The main effect of TCJA on corporate effective tax rates was to substantially reduce marginal tax rates on equity-financed investment and to increase marginal tax rates on debt-financed investment (Figure 4).[8] Between 2017 and 2018, the EMTR on equity finance fell almost 15 percentage points, while the EMTR on debt finance rose more than 50 percentage points (but remained negative). Effective tax rates on equity-financed investments were reduced by both a lower statutory rate and the movement from accelerated depreciation to full expensing of machinery and equipment. Prior to TCJA, debt financing was deeply subsidized at the margin due to the high statutory rate and minimal restrictions on interest deductions; following TCJA, this subsidy was sharply reduced due to both the lower statutory tax rate and stricter limits on interest deductibility.

FIGURE 4

## US Effective Tax Rates Before and After TCJA




**Source**: TPC IICM

By contrast, for investments earning economic profits, EATRs on both debt- and equity-financed investment are both positive for the profit levels considered, and the EATR on debt falls in response to TCJA. The higher the level of profitability, the more the change in the EATR on debt-financed investment resembles the EATR on equity-financed investment. For companies earning a 20 percent rate of return, the EATR on equity financed investment also fell about 13 percentage points, and the EATR on debt fell by about 7 percentage points over the same period.

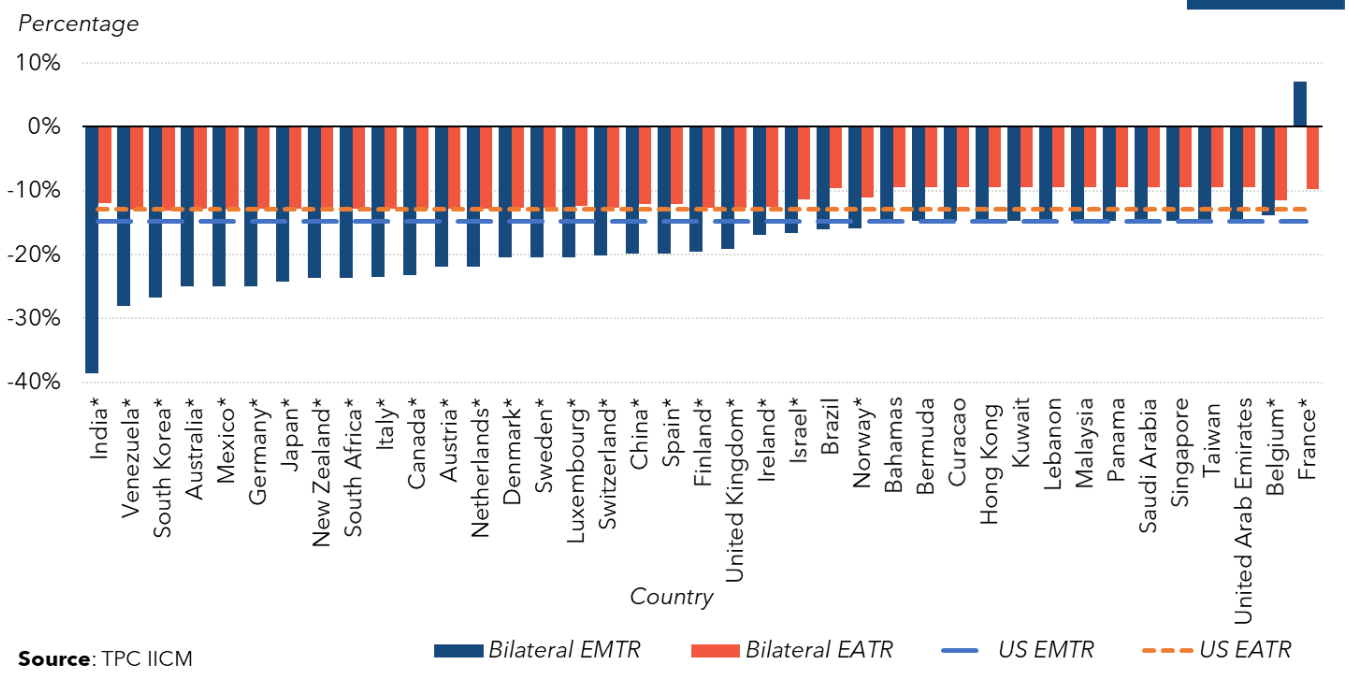
All else equal, TCJA should have reduced the "debt bias" of the US corporate tax, triggering a shift from debt finance to equity finance. This effect should be strongest for marginally profitable companies or intensive investment decisions, since the differential between debt and equity EATRs declines much less than for EMTRs. Since most MNEs are assumed to earn economic profits over the course of the business cycle, the effect of TCJA on the financial composition of cross-border investment may therefore be attenuated.

Effective tax rates calculated by the IICM vary by investor country, depending on cross-border withholding taxes on interest and dividends as well as home country corporate income tax rates. For equity-financed investment, the investor-level dividend tax rate equals the cross-border withholding tax rate on dividends specified by either US domestic law or by a US bilateral tax treaty, where applicable. While most investor countries exempt foreign earnings either *de jure* or *de facto*,[9] interest income distributed by US foreign-owned affiliates is usually taxable in the investor country. For debt-financed investment, the investor-level debt tax rate is therefore the greater of the cross-border withholding tax rate on interest and the home-country corporate

FIGURE 5

## Change in Effective Rates on Equity-Financed Inbound Investment

By country, 2017-2018




**Source**: TPC IICM

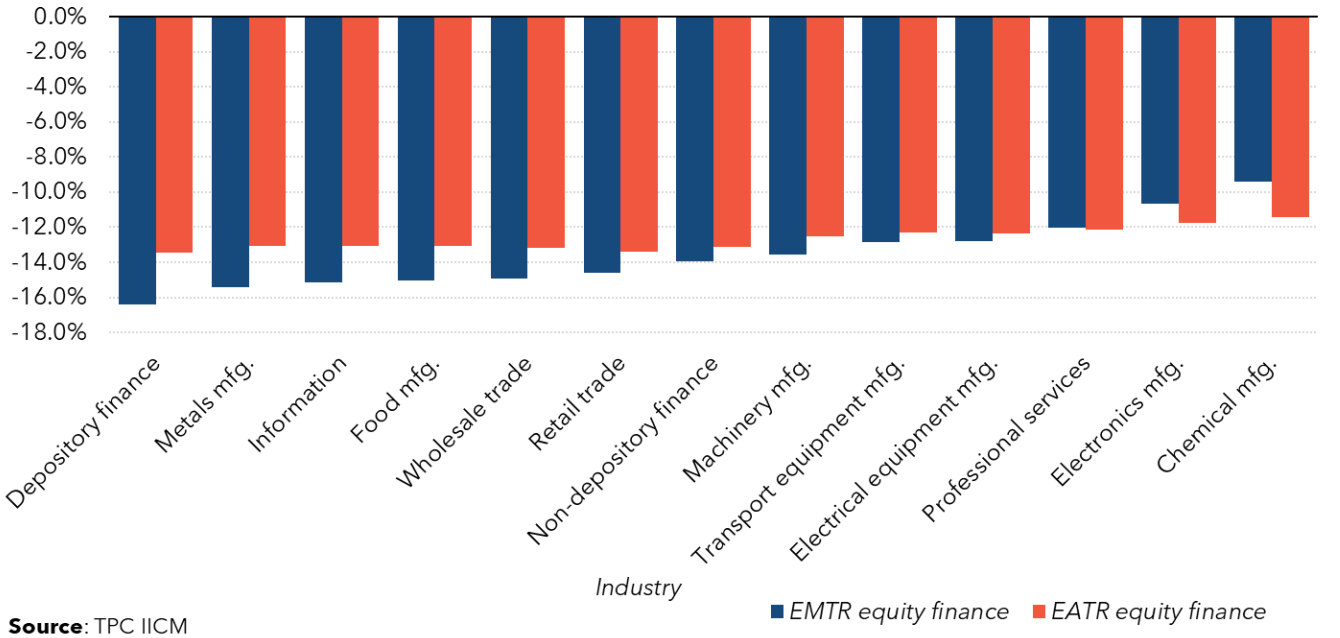
income tax rate (inclusive of the average subnational corporate tax rate, where applicable). The US domestic law cross-border withholding tax rate on both dividends and interest is currently 30 percent, but that rate is usually substantially lower for countries with bilateral US tax treaties.

Figure 5 shows the country-level changes in equity ETRs induced by TJCA for countries included in the BEA FDI data (with a comparison to US level only changes). All countries experienced declines in EATRs for equity-financed investments, and countries that have BTTs with the US (designated by an asterisk) experienced greater declines in their EATRs than countries without a tax treaty due to their lower cross-border WHTs. All countries except France also experienced a decline in their EMTRs. Generally, bilateral EMTRs relate negatively to home-country CIT rates due to the CIT rate's effect on corporate discount rate, which is equal to the nominal interest rate (7 percent) multiplied by one minus the greater of the cross-border withholding tax on interest and the home-country CIT rate.[10] The increase in France's EMTR is thus driven by the 10-point reduction in its own CIT rate, which took effect in 2018. Countries with higher CIT rates, such as India (35 percent), experienced greater reductions in their EMTRs.

Effective tax rates (and their change in response to TCJA) also vary by industry, driven by industries' different asset compositions. In general, industries that invest relatively heavily in equipment (in contrast to structures and intellectual property) benefitted more from TCJA's expansion of bonus depreciation. Figure 6 shows effective tax rates for equity-financed investment for industry groups detailed in the BEA FDI data. Although all sectors benefitted from reduced tax rates under TCJA, the sectors that benefitted the least (i.e., had the largest increase in the debt EMTR and the smallest decline in their equity EMTR) rely heavily on

FIGURE 6

## Change in Effective Tax Rates by Industry, 2017 - 2018




**Source**: TPC IICM

intellectual property investment. These sectors include chemical manufacturing (mostly pharmaceuticals), electronics, and professional services. Sectors whose tax rates fell most as a result of TCJA were bank, metals manufacturing and information.

## 5. MODELS AND DATA

FDI is often evaluated using a "gravity model" (e.g., Dharmapala 2018), according to which bilateral investment is a function of two economies' size (GDP) and geographical distance, often with the inclusion of additional controls such as tax rates, infrastructure and education level. This paper therefore examines investment as a function of home and host country GDP, bilateral exchange rates, and US or bilateral effective tax rates. Time-invariant (and slow-moving) country characteristics including distance are subsumed in country-level random or fixed effects.[11]

Two different regression structures are used: an error component model and a generalized method of moments (GMM) dynamic model. Since capital projects often unfold over the course of multiple years, cross-border investment may be sequentially correlated. In the error components model, this is addressed by controlling for the previous period capital stock. Though technically not a lagged dependent variable, the lagged capital stock clearly relates to past values of investment, raising concern about potential bias in error component model estimators. To address this, a dynamic panel model—the Arellano and Bond (1991) version of GMM—was also estimated. In most cases, both models yield similar results.

For the error component model, Hausman tests (Hausman, 1978) were conducted to determine whether there were systematic differences between the random- and fixed-effects estimators. For almost all specifications, the null hypothesis of no systematic correlation was not rejected, so the study presents random effects results. Since the variance of the observation-specific error term may differ across countries (or country-industry pairs), robust standard errors clustered at the country or country-industry level are presented.

FDI, GDP and the dollar exchange rate are in logs, while the effective tax rate is in percentage points. The coefficient on the effective tax rate is therefore the semi-elasticity of investment with respect to the tax rate. To focus on the impact of TCJA and keep the time frame consistent across series,[12] the FDI regressions are confined to data from 2014-2019.[13]

Several different measures of the effective tax rate are used for each dependent variable to gauge their relative effects. All dependent variables are regressed on both US and bilateral effective tax rates. PPE, total FDI by UBO, and equity- and retained earnings-financed FDI by CIO are regressed on both EMTRs and EATRs. Given results from the literature, the coefficient on EATRs is expected to be larger. Debt-financed FDI by CIO is regressed only on US and bilateral EMTRs, since the share of debt finance chosen for a given investment should depend on the EMTR only. For FDI by CIO, the effective tax rates in each model reflect the relevant financing

method: equity (ETR on new shares), retained earnings, or debt.[14] The expected sign of the coefficient on all tax terms is therefore negative.

Two different versions of each regression model are presented: a univariate model that controls only for the relevant tax rate (and, in the GMM models, the lagged dependent variable), and a multivariate model that also controls for home and host country GDP and the bilateral exchange rate. The expected sign on US GDP is positive: a stronger US economy should encourage inbound GDP. The sign on the home-country GDP is indeterminate, since a stronger home economy could either encourage or discourage outbound investment. Likewise, the coefficient on the US exchange rate could be either positive or negative: a stronger US dollar, which increases the ratio of foreign currencies to US dollar, could discourage inbound investment by making US assets more expensive or encourage it by raising the value of future earnings.

Summary statistics of regression variables are shown in Table 1. The mean bilateral EMTR is lower than the mean US-level EMTR, despite the added layer of cross-border taxation, because all tax rates are limited to the corporate level only. Therefore, the discount rate used to calculate the US EMTR is the nominal interest rate, while the foreign discount rate is the nominal interest rate multiplied by one minus the maximum of the home-country CIT rate and the bilateral WHT on interest. Bilateral EATRs can also be below US EATRs for this reason,

TABLE 1

Descriptive Statistics of Country-level Regression Variables

| Variable | No. Obs. | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| | | | Units | | |
| EMTR equity US | 210 | 0 | 0 | 0 | 0 |
| EMTR equity bilateral | 210 | 0 | 0 | (1) | 0 |
| EATR equity US | 210 | 0 | 0 | 0 | 0 |
| EATR equity bilateral | 210 | 0 | 0 | 0 | 0 |
| Dollar exchange rate | 204 | 87 | 312 | 1 | 1,508 |
| | | | USD Billions | | |
| Property Plant and Equipment (PPE) | 190 | 8 | 14 | 0 | 65 |
| Retained earnings-financed FDI | 143 | 3 | 5 | (5) | 21 |
| Equity-financed FDI | 135 | 8 | 20 | (108) | 123 |
| Debt-financed FDI | 185 | 1 | 7 | (33) | 50 |
| FDI by UBO | 121 | 12 | 22 | 0 | 176 |
| Adjusted FDI by UBO | 121 | 11 | 19 | (29) | 109 |
| Lagged PPE stock | 254 | 52 | 101 | 0 | 452 |
| US GDP | 210 | 19,300 | 1,351 | 17,500 | 21,400 |
| Foreign country GDP | 194 | 1,438 | 2,263 | 6 | 14,400 |

**Source:** Social Security Administration, Annual Statistical Supplement to the Social Security Bulletin, 2014, Tables 4.A1 and 4.A2.

but on average they are higher.

## 6. REGRESSION RESULTS

Tables 2-5 present the results examining investment in PPE, which as Auerbach and Hassett (1993) point out is the measure of FDI most likely to respond to changes in effective tax rates. A similar pattern of ETR significance is seen across all four sets of regressions—random effects and GMM evaluations of country-year and country-industry-year panels: The estimated tax semi-elasticities are negative and significant in all of the univariate regressions, with the sole exception of the GMM bilateral EMTR country-by-industry model (Table 5, column 3). As the literature would predict, the semi-elasticities are higher for EATRs than for EMTRs: EMTR semi-elasticities range from -0.8 to -2.6, while EATR estimates range from -1.5 to -2.9. They are thus comparable though somewhat below average relative to semi-elasticities estimated in the literature. The semi-elasticities in the random effects regressions are generally somewhat larger in absolute value than in the corresponding GMM models. However, the estimated semi-elasticities are quite similar comparing corresponding models of the country-year and country-industry-year models.

By contrast, in all of the multivariate models including macroeconomic controls, the tax term is insignificant. The macroeconomic variables are not generally individually significant, with two exceptions: In the country-year GMM models (Table 3), home country GDP is positive, indicating that stronger home-country growth spurred outbound investment; and in the random effects country-industry-year models (Table 4), the bilateral exchange rate is positive and significant, indicating that countries whose USD exchange rate weakened invested more in the US. In all models, the lagged PPE stock or dependent variable is generally positive and significant, indicating that foreign PPE investment is positively serially correlated.

This consistent pattern suggests that, while foreign investment in US PPE increased following TCJA, that increase was not expressly driven by lower taxes, but by macroeconomic factors. Once changes in US and foreign GDP and exchange rates are taken into account, tax rates played no marginal role in stimulating investment (although they may have played an indirect role by stimulating economic growth). This result echoes the findings of Kopp et al. (2019).

TABLE 2

Dependent variable: Investment in Property, Plant and Equipment by Country Random Effects

2014-2019

| Regressor | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| EMTR equity US | -1.99*** (0.56) | -0.48 (0.81) | | | | | | |
| EMTR equity bilateral | | | -1.30*** (0.4) | 0.19 (0.29) | | | | |
| EATR equity US | | | | | -2.27*** (0.64) | -0.55 (0.93) | | |
| EATR equity bilateral | | | | | | | -2.62*** (0.69) | 0.11 (0.72) |
| Lagged PPE stock | | 0.98*** (0.05) | | 0.98*** (0.05) | | 0.98*** (0.05) | | 0.98*** (0.06) |
| US GDP | | -0.07 (0.89) | | 0.56 (0.67) | | -0.08 (0.89) | | 0.42 (0.76) |
| Home country GDP | | 0.05 (0.07) | | 0.06 (0.07) | | 0.05 (0.07) | | 0.06 (0.07) |
| Bilateral exchange rate | | 0.03 (0.03) | | 0.03 (0.03) | | 0.03 (0.03) | | 0.03 (0.03) |
| No. obs. | 190 | 171 | 190 | 171 | 190 | 171 | 190 | 171 |
| R-squared (overall) | 0.01 | 0.95 | 0.21 | 0.95 | 0.01 | 0.95 | 0.28 | 0.95 |

Standard errors in parentheses.
* = Significant at 10% level; ** = significant at 5% level; ***=significant at 1% level.

TABLE 3

Dependent variable: Investment in Property, Plant and Equipment by Country GMM

2014-2019

| Regressor | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| EMTR equity US | -1.32*** (0.32) | -0.38 (0.71) | | | | | | |
| EMTR equity bilateral | | | -0.82*** (0.26) | 0.07 (0.44) | | | | |
| EATR equity US | | | | | -1.52*** (0.37) | -0.43 (0.82) | | |
| EATR equity bilateral | | | | | | | -1.66*** (0.41) | -0.38 (0.84) |
| Lagged dependent variable | 0.2 (0.15) | 0.31*** (0.12) | 0.30** (0.15) | 0.32*** (0.11) | 0.2 (1.15) | 0.31*** (0.12) | 0.19 (0.15) | 0.30*** (0.12) |
| US GDP | | -1.54 (1.81) | | -1.12 (1.53) | | -1.54 (1.81) | | -1.49 (1.74) |
| Home country GDP | | 2.37* (1.41) | | 2.24* (1.31) | | 2.38* (1.41) | | 2.41* (1.41) |
| Bilateral exchange rate | | 2.31 (1.66) | | 2.04 (1.48) | | 2.31 (1.66) | | 2.32 (1.62) |
| No. obs. | 183 | 170 | 183 | 170 | 183 | 170 | 183 | 170 |
| Autocorrelation z-value | 0.15 | 0.17 | 0.11 | 0.17 | 0.15 | 0.17 | 0.16 | 0.18 |

Standard errors in parentheses.

* = Significant at 10% level; ** = significant at 5% level; ***=significant at 1% level.

TABLE 4

Dependent variable: PPE Investment, Country by Industry Random Effects

2014-2019

| Regressor | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| EMTR equity US | -2.63*** (0.84) | -0.3 (0.63) | | | | | | |
| EMTR equity bilateral | | | -1.31*** (0.47) | 0.17 (0.24) | | | | |
| EATR equity US | | | | | -2.75*** (0.96) | -1.29 (0.74) | | |
| EATR equity bilateral | | | | | | | -2.87*** (0.99) | -0.85 (0.62) |
| Lagged PPE stock | | 0.80*** (0.07) | | 0.80*** (0.07) | | 0.80*** (0.07) | | 0.80*** (0.07) |
| US GDP | | 0.93 (0.96) | | 1.36 (0.99) | | 0.19 (0.95) | | 0.55 (0.94) |
| Home country GDP | | -0.08 (0.10) | | -0.05 (0.11) | | -0.08 (0.10) | | -0.09 (0.10) |
| Bilateral exchange rate | | 0.07** (0.03) | 0.07** (0.03) | 0.07** (0.03) | 0.07** (0.03) | 0.07** (0.03) | 0.07** (0.03) | 0.07** (0.03) |
| No. obs. | 451 | 403 | 451 | 403 | 451 | 403 | 451 | 403 |
| R-squared (overall) | 0.00 | 0.69 | 0.00 | 0.69 | 0.01 | 0.69 | 0.01 | 0.69 |

Standard errors in parentheses.

* = Significant at 10% level; ** = significant at 5% level; ***=significant at 1% level.

TABLE 5

Dependent variable: PPE Investment, Country by Industry GMM

2014-2019

| Regressor | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| EMTR equity US | -1.41*<br>(0.79) | 0.62<br>(0.91) | | | | | | |
| EMTR equity bilateral | | | -0.53<br>(0.42) | -0.32<br>(0.35) | | | | |
| EATR equity US | | | | | -1.50*<br>(0.84) | -0.46<br>(0.98) | | |
| EATR equity bilateral | | | | | | | -1.46*<br>(0.86) | -0.55<br>(0.94) |
| Lagged dependent variable | -0.10<br>(0.41) | 1.21**<br>(0.51) | 0.06<br>(0.42) | 1.20**<br>(0.50) | -0.08<br>(0.40) | 1.21**<br>(0.51) | -0.07<br>(0.40) | 1.17**<br>(0.49) |
| US GDP | | -1.26<br>(3.47) | | -0.97<br>(3.28) | | -1.11<br>(3.47) | | -1.16<br>(3.43) |
| Home country GDP | | 2.84<br>(4.39) | | -0.32<br>(0.35) | | 2.87<br>(4.41) | | -0.55<br>(0.94) |
| Bilateral exchange rate | | 1.68<br>(4.40) | | 1.5<br>(4.32) | | 1.63<br>(4.42) | | 1.74<br>(4.39) |
| No. obs. | 387 | 387 | 387 | 387 | 387 | 387 | 387 | 387 |
| Autocorrelation z-value | 0.99 | 0.27 | 0.70 | 0.25 | 0.99 | 0.27 | 0.94 | 0.26 |

Standard errors in parentheses.

* = Significant at 10% level; ** = significant at 5% level; ***=significant at 1% level.

Turning from PPE to FDI, we examine the traditional FDI by CIO data, broken out by method of finance. In general, tax terms in regressions of equity-financed FDI and debt-financed FDI are insignificant. These results are therefore relegated to Appendix A. The only exception to this generality is the univariate random effects regressions of equity-financed FDI using bilateral tax rates (Table 14, columns 3 and 6); but even in these cases, the estimated semi-elasticities are very small (-0.3 to -0.2) and not robust to inclusion of macroeconomic controls.

By contrast, effective tax rates appear to have a significant—though somewhat inconsistent—influence on FDI financed out of retained earnings (Tables 6-9). Similar to PPE, tax terms in univariate country-level regressions of retained earnings-financed FDI (Table 10 and 11) are significantly negative and of similar magnitude to those found elsewhere in the literature. In the random effects regressions, this significance is generally lost in the multivariate models, with the exception of the model using bilateral EATRs (Table 10, column 8). In the GMM regressions, however, tax terms remain significant in the multivariate models, becoming larger in absolute value (though diminishing in the level of their significance). In the univariate models with significant tax coefficients estimated semi-elasticities range from -1.8 to -3, while in the multivariate regressions with significant tax coefficients estimated semi-elasticities range from -2 to -5.8.

Other controls in the retained earnings-financed FDI do not display strong significance patterns, with the exception of lagged PPE stock, which has an estimated elasticity of about 0.2. However, the lagged dependent variable in the GMM regressions is usually not significant. Home country GDP is significant in the random effects regressions only, with an estimated elasticity of about -0.1.

The performance of the tax terms in the country-by-industry regressions (Tables 12 and 13) varies greatly between the random effects and GMM models. In the latter, they are insignificant in both univariate and multivariate models. In the former, however, the semi-elasticities are robustly significant and of the expected negative sign, although smaller in absolute value than those found in the literature, with an average value of about -0.7. It appears, however, that this result is at least partially driven by sample constriction. Country-by-industry PPE stock data is available for only a small number of major US investor countries: Canada, France, Germany, Japan, the Netherlands, Switzerland and the UK. For corporations headquartered in these countries, at least, the reduced ETRs resulting from TCJA appear to have triggered significantly higher earnings retention within the US. Lack of data availability makes replication of the full-sample random effects model at the country-industry level impossible; however, the results of a such a model without the lagged PPE stock control (Table 17, Appendix B) show a similar pattern of tax term significance as the random effects country-level regressions in Table 10, but with much smaller elasticities (average value of about -0.2).

Overall, there is some evidence that the lower ETRs resulting from TCJA led to greater earnings retention by US subsidiaries of foreign-owned multinationals. On average, a one percentage point decline in a country's ETR corresponds to a 3 percent increase in FDI financed with retained earnings. This correlation is much weaker at the industry level, however, echoing Gravelle and Marples (2019) finding that post-TCJA investment did not correlate strongly with sector-specific declines in effective tax rates.

Finally, we consider total FDI by country of UBO (Tables 10-11). As previously noted, this series is dominated by acquisitions (expansions and new establishments constituting only about 10 percent of the total) and closely correlated in aggregate with equity-financed FDI by CIO. As for PPE, tax terms are only significant

TABLE 6

Dependent variable: Retained Earnings-financed FDI by Country Random Effects

| Regressor | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| EMTR equity US | -1.77***<br>(0.72) | -4.77<br>(3.66) | | | | | | |
| EMTR retained earnings bilateral | | | -0.24<br>(0.30) | -0.52<br>(0.33) | | | | |
| EATR equity US | | | | | -2.02**<br>(0.83) | -5.47<br>(4.20) | | |
| EATR retained earnings bilateral | | | | | | | -3.04***<br>(0.71) | -2.87***<br>(0.94) |
| Lagged PPE stock | | 0.20***<br>(0.06) | | 0.22***<br>(0.05) | | 0.20***<br>(0.06) | | 0.16***<br>(0.06) |
| US GDP | | -3.43<br>(3.42) | | 0.03<br>(0.61) | | -3.44<br>(3.43) | | -0.99<br>(0.73) |
| Home country GDP | | -0.09*<br>(0.05) | | -0.10**<br>(0.05) | | -0.09*<br>(0.05) | | -0.10***<br>(0.04) |
| Bilateral exchange rate | | 0.05<br>(0.05) | | 0.04<br>(0.05) | | 0.05<br>(0.05) | | 0.05<br>(0.05) |
| No. obs. | 143 | 127 | 143 | 127 | 143 | 127 | 143 | 127 |
| R-squared (overall) | 0.02 | 0.12 | 0.00 | 0.10 | 0.02 | 0.12 | 0.06 | 0.11 |

Standard errors in parentheses.
* = Significant at 10% level; ** = significant at 5% level; ***=significant at 1% level.

in the univariate regressions (Table 10, columns 1 and 5, and the odd-numbered columns of Table 11). However, they have the opposite sign than expected and are fairly large, ranging from 2.5 to 4.7. Although the tax coefficients are insignificant in the multivariate regressions, their positive correlation with foreign investment in the univariate models invites further investigation.

TABLE 7

Dependent variable: Retained Earnings-financed FDI by Country GMM

| Regressor | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| EMTR equity US | -2.01***<br>(0.58) | -4.42*<br>(2.50) | | | | | | |
| EMTR retained earnings bilateral | | | -1.30***<br>(0.43) | -2.00*<br>(1.19) | | | | |
| EATR equity US | | | | | -2.30***<br>(0.67) | -5.06*<br>(2.86) | | |
| EATR retained earnings bilateral | | | | | | | -2.72***<br>(0.80) | -5.81*<br>(3.00) |
| Lagged dependent variable | 0.07<br>(0.10) | -0.05<br>(0.06) | 0.16<br>(0.04) | -0.04<br>(0.07) | -0.07<br>(0.10) | -0.05<br>(0.06) | 0.09*<br>(0.06) | -0.05<br>(0.06) |
| US GDP | | -2.9<br>(3.28) | | -0.99<br>(2.26) | | -2.9<br>(3.29) | | -3.16<br>(3.19) |
| Home country GDP | | 0.02<br>(1.10) | | -0.65<br>(0.93) | | 0.02<br>(1.09) | | 0.14<br>(1.16) |
| Bilateral exchange rate | | 1.37<br>(2.02) | | 0.23<br>(1.43) | | 1.36<br>(2.02) | | 1.60<br>(1.99) |
| No. obs. | 100 | 96 | 100 | 96 | 100 | 96 | 100 | 96 |
| Autocorrelation test z-value | 0.39 | 0.27 | 0.65 | 0.25 | 0.39 | 0.27 | 0.46 | 0.27 |

Standard errors in parentheses.
* = Significant at 10% level; ** = significant at 5% level; ***=significant at 1% level.

TABLE 8

Dependent variable: Retained Earnings-financed FDI, Country by Industry Random Effects
2014-2019

| Regressor | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| EMTR equity US | -0.67***<br>(0.23) | -0.57**<br>(0.23) | | | | | | |
| EMTR equity bilateral | | | -0.28*<br>(0.08) | -0.24***<br>(0.08) | | | | |
| EATR equity US | | | | | -0.79***<br>(0.26) | -0.75**<br>(0.30) | | |
| EATR equity bilateral | | | | | | | -0.88***<br>(0.27) | -1.00***<br>(0.34) |
| Lagged PPE stock | | 0.04**<br>(0.01) | 0.04**<br>(0.01) | 0.04**<br>(0.01) | 0.04**<br>(0.01) | 0.04**<br>(0.01) | 0.04**<br>(0.01) | 0.04**<br>(0.01) |
| US GDP | | 0.18<br>(0.24) | | 0.36<br>(0.23) | | 0.07<br>(0.30) | | -0.10<br>(0.31) |
| Home country GDP | | -0.02<br>0.03 | | -0.05*<br>0.03 | | -0.02<br>0.03 | | -0.03<br>0.03 |
| Bilateral exchange rate | | 0.02<br>(0.01) | | 0.02<br>(0.01) | | 0.02<br>(0.01) | | 0.02<br>(0.01) |
| No. obs. | 233 | 233 | 233 | 233 | 233 | 233 | 233 | 233 |
| R-squared (overall) | 0.04 | 0.16 | 0.06 | 0.18 | 0.03 | 0.15 | 0.05 | 0.17 |

Standard errors in parentheses.
* = Significant at 10% level; ** = significant at 5% level; ***=significant at 1% level.

Figures 1 and 2 clearly indicate that US inbound FDI was higher before the 2017 tax reform than afterwards, despite the sharp reduction in US corporate rates that the reform introduced. Tabova (2020) points out that this drop in inbound FDI was nonetheless driven by changes in US tax policy. Record FDI inflows in 2015 and 2016 were driven largely by corporate "inversion" transactions, in which US corporations merged with or were acquired by foreign multinationals in order to escape (at least partially) the tax burden imposed by the US high-rate "worldwide"[15] corporate tax. TCJA did not fully repeal the US worldwide tax, replacing it with the global intangible low-tax income (GILTI) regime that taxes foreign income in excess of a 10 percent return on foreign tangible assets at a sharply reduced rate. However, the combination of the TJCA reform and tighter regulation of inversion transactions successfully stemmed inversions after 2016. Tabova (2020) finds that adjusting the FDI data for inversion transactions by subtracting out the market value of acquired firms results in an upward-sloping time series.

TJCA reform and tighter regulation of inversion transactions successfully stemmed inversions after 2016. Tabova (2020) finds that adjusting the FDI data for inversion transactions by subtracting out the market value of acquired firms results in an upward-sloping time series.

We reproduced Tabova's adjustment by subtracting the market value of inverted firms from the inbound FDI data, according to the home country of the new corporate parent. Adjusting the data in this manner eliminates the positive tax term coefficients in the univariate regressions (Table 12-13). However, while the sign of the coefficients becomes negative (as expected), they do not become significant.

TABLE 9

Dependent variable: Retained Earnings-financed FDI by Country GMM

| Regressor | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| EMTR equity US | 0.02<br>(0.05) | -0.01<br>(0.06) | | | | | | |
| EMTR retained earnings bilateral | | | 0.01<br>(0.03) | -0.002<br>(0.01) | | | | |
| EATR equity US | | | | | 0.03<br>(0.05) | -0.01<br>(0.07) | | |
| EATR retained earnings bilateral | | | | | | | 0.02<br>(0.07) | -0.01<br>(0.07) |
| Lagged dependent variable | -0.33<br>(0.23) | -0.17<br>(0.17) | -0.42*<br>(0.24) | -0.15<br>(0.17) | -0.22<br>(0.20) | -0.17<br>(0.17) | -0.39*<br>(0.22) | -0.17<br>(0.17) |
| US GDP | | -0.05<br>(0.07) | | -0.03<br>(0.07) | | -0.04<br>(0.07) | | -0.04<br>(0.07) |
| Home country GDP | | 0.00<br>(0.01) | | 0.00<br>(0.01) | | 0.001<br>(0.01) | | 0.001<br>(0.01) |
| Bilateral exchange rate | | 0.04<br>(0.04) | | 0.02<br>(0.04) | | 0.03<br>(0.04) | | 0.03<br>(0.04) |
| No. obs. | 1006 | 888 | 1022 | 903 | 1006 | 888 | 1022 | 888 |
| Autocorrelation test z-value | 0.64 | 0.24 | 0.85 | 0.23 | 0.44 | 0.24 | 0.75 | 0.23 |

Standard errors in parentheses.
* = Significant at 10% level; ** = significant at 5% level; ***=significant at 1% level.

TABLE 10

## Dependent variable: Total FDI by Country of UBO Random Effects

2014-2019

| Regressor | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| EMTR equity US | 2.53*<br>(1.50) | 2.74<br>(2.28) | | | | | | |
| EMTR equity bilateral | | | 0.76<br>(0.92) | -0.39<br>(1.05) | | | | |
| EATR equity US | | | | | 2.89*<br>(1.71) | 3.13<br>(2.62) | | |
| EATR equity bilateral | | | | | | | 2.04<br>(1.84) | 0.38<br>(2.81) |
| Lagged PPE stock | | 0.93***<br>(0.22) | | 0.95***<br>(0.21) | | 0.93***<br>(0.22) | | 0.94***<br>(0.22) |
| US GDP | | -0.54<br>(2.34) | | -3.32*<br>(1.86) | | -0.54<br>(2.34) | | -2.64<br>(2.22) |
| Home country GDP | | 0.05<br>(0.19) | | -0.01<br>(0.21) | | 0.05<br>(0.19) | | 0.04<br>(0.21) |
| Bilateral exchange rate | | -0.07<br>(0.08) | | -0.07<br>(0.07) | | -0.07<br>(0.08) | | -0.07<br>(0.08) |
| No. obs. | 121 | 111 | 121 | 111 | 121 | 111 | 121 | 111 |
| R-squared (overall) | 0.00 | 0.56 | 0.05 | 0.56 | 0.00 | 0.56 | 0.07 | 0.56 |

Standard errors in parentheses.
* = Significant at 10% level; ** = significant at 5% level; ***=significant at 1% level.

TABLE 11

## Dependent variable: FDI by UBO Arellano Bond GMM

2016-2019

| Regressor | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| EMTR equity US | 4.04*<br>(2.24) | 2.72<br>(2.39) | | | | | | |
| EMTR equity bilateral | | | 2.54*<br>(1.54) | 1.05<br>(1.30) | | | | |
| EATR equity US | | | | | 4.63*<br>(2.56) | 3.10<br>(2.74) | | |
| EATR equity bilateral | | | | | | | 4.67*<br>(2.75) | 2.99<br>(2.81) |
| Lagged dependent variable | -0.18<br>(0.25) | -0.22<br>(0.22) | -0.16<br>(0.24) | -0.23<br>(0.22) | -0.18<br>(0.25) | -0.22<br>(0.22) | -0.15<br>(0.23) | -0.23<br>(0.22) |
| US GDP | | 6.42<br>(6.93) | | 4.70<br>(6.28) | | 6.40<br>(6.94) | | 6.16<br>(6.90) |
| Home country GDP | | -8.07<br>(5.73) | | -7.95<br>(5.88) | | -8.07<br>(5.73) | | -8.18<br>(5.76) |
| Bilateral exchange rate | | -3.53<br>(5.26) | | -2.63<br>(5.07) | | -3.52<br>(5.25) | | -3.35<br>(5.19) |
| No. obs. | 51 | 49 | 51 | 49 | 51 | 49 | 51 | 49 |
| Autocorrelation z-value | 0.15 | 0.19 | 0.21 | 0.34 | 0.15 | 0.19 | 0.16 | 0.22 |

Standard errors in parentheses.
* = Significant at 10% level; ** = significant at 5% level; ***=significant at 1% level.

TABLE 12

Dependent variable: FDI by Country of UBO Adjusted for Inversions Random Effects

2016-2019

| Regressor | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| EMTR equity US | -0.75<br>(1.09) | 0.18<br>(0.80) | | | | | | |
| EMTR equity bilateral | | | -0.81<br>(0.57) | -0.48<br>(0.39) | | | | |
| EATR equity US | | | | | -0.86<br>(1.25) | 0.20<br>(0.92) | | |
| EATR equity bilateral | | | | | | | -2.40<br>(1.53) | -1.64<br>(1.39) |
| Lagged PPE stock | | 0.21***<br>(0.06) | | 0.21***<br>(0.05) | | 0.21***<br>(0.06) | | 0.19***<br>(0.05) |
| US GDP | | 0.95<br>(0.78) | | 0.30<br>(0.80) | | 0.94<br>(0.78) | | -0.30<br>(0.52) |
| Home country GDP | | 0.04<br>(0.05) | | 0.003<br>(0.04) | | 0.04<br>(0.05) | | 0.01<br>(0.04) |
| Bilateral exchange rate | | 0.02<br>(0.03) | | 0.01<br>(0.03) | | 0.02<br>(0.03) | | 0.02<br>(0.03) |
| No. obs. | 121 | 111 | 121 | 111 | 121 | 111 | 121 | 111 |
| R-squared (overall) | 0.00 | 0.10 | 0.03 | 0.10 | 0.00 | 0.10 | 0.05 | 0.11 |

Standard errors in parentheses.

* = Significant at 10% level; ** = significant at 5% level; ***=significant at 1% level.

TABLE 13

Dependent variable: FDI by UBO Adjusted for Inversions Arellano Bond GMM

2016-2019

| Regressor | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| EMTR equity US | -1.45<br>(1.65) | 6.95<br>(6.74) | | | | | | |
| EMTR equity bilateral | | | -1.02<br>(1.15) | 2.83<br>(3.00) | | | | |
| EATR equity US | | | | | -1.66<br>(1.90) | 7.95<br>(7.72) | | |
| EATR equity bilateral | | | | | | | -1.78<br>(2.03) | 8.31<br>(8.12) |
| Lagged dependent variable | -0.05***<br>(0.01) | -0.10*<br>(0.05) | -0.05***<br>(0.01) | -0.10**<br>(0.05) | -0.05***<br>(0.01) | -0.10*<br>(0.05) | -0.05***<br>(0.01) | -0.10*<br>(0.05) |
| US GDP | | 10.45<br>(11.18) | | 6.9<br>(8.41) | | 10.43<br>(11.17) | | 10.58<br>(11.46) |
| Home country GDP | | 2.16<br>(3.57) | | 3.40<br>(3.90) | | 2.17<br>(3.57) | | 2.16<br>(3.70) |
| Bilateral exchange rate | | -4.98<br>(7.05) | | -3.83<br>(6.15) | | -4.98<br>(7.05) | | 8.31<br>(8.11) |
| No. obs. | 51 | 49 | 51 | 49 | 51 | 49 | 51 | 40 |
| Autocorrelation z-value | 0.62 | 0.67 | 0.62 | 0.68 | 0.62 | 0.67 | 0.62 | 0.68 |

Standard errors in parentheses.

* = Significant at 10% level; ** = significant at 5% level; ***=significant at 1% level.

# 7. CONCLUSIONS

This study finds that majority foreign-owned US subsidiaries increased their investment in PPE following enactment of TJCA, but it is not clear that the increase was driven primarily by lower effective tax rates. In univariate regressions of PPE on US effective tax rates on equity-financed investment, the estimated semi-elasticity was similar to the magnitude found in other studies, though somewhat below average at -1.5 for EMTRs and -2.1 for EATRs. Similar elasticities were found for annual PPE disaggregated at the country and country-by-industry levels. However, in multivariate regressions controlling for other macroeconomic factors affecting foreign investment—US and home-country GDP and the bilateral USD exchange rate—effective tax rates invariably become insignificant. While the TCJA tax cut may have played a role in stimulating economic growth, once that growth is controlled for, effective rate rates had no marginal influence on foreign PPE investment.

There is some evidence that the lower effective tax rates introduced by TCJA induced foreign investors to retain more earnings of their US subsidiaries within the country. However, it is sensitive to regression model, level of disaggregation and sample selection. At the country level, GMM results show a robustly negative correlation between FDI financed out of retained earnings and effective tax rates, even controlling for macroeconomic factors. The average estimated semi-elasticities, -2.4 for EMTRs and -4.0 for EATRs, are similar to average values found the literature. Random effects models, however, show a weaker pattern of significance, with only one model (bilateral EATR) finding a significant negative correlation even in the presence of macroeconomic controls. At the country-by-industry level, conversely, GMM models show no significant effect of ETRs in any specification, while random effects models show a strong pattern of significance for the subset of major investor countries for which industry-disaggregated PPE stock is available. The estimated elasticities were, however, much smaller than at the aggregate level, with an average value of -0.4 for EMTRs and -0.9 for EATRs.

We find no evidence that FDI financed with new equity or debt responded to the changes in effects tax rates introduced by TJCA. The positive correlation between aggregate FDI by country of UBO and US effective tax rates can be explained by the prevalence of corporate inversions prior to the TCJA reform. Once FDI numbers are adjusted for the market value of those inversions, the semi-elasticities of FDI with respect to tax rate changes also become insignificant.

Overall, these findings are consistent with those found in other studies of TCJA's early effects on investment. Kopp et al. (2019) find that US investment following TCJA was driven largely by growth in aggregate demand, rather than directly by tax reductions. Gravelle and Marples (2019) find that, although TCJA prompted a wave of foreign earnings repatriations by US multinationals (due largely to its retrospective repatriation tax provision), real foreign investment as measured by the current account balance barely responded. They also find that sectoral-level investment did not correlate with asset-level tax reductions but was stronger for assets (such as IP) that benefitted less from tax reductions. Similarly, Gale and Haldeman (2021)

find that, although US investment grew following enactment of TCJA, that growth was driven by oil prices and IP investment rather than the reduction in US business tax rates.

Kopp et al. (2019) attribute the weak investment response following TCJA to growing market power in the US economy. Monopolistic competition increases the share of economic profits ("rents") in corporate earnings, so that the corporate income tax evolves toward a rent tax. Another factor contributing to this effect is the structure of the US CIT itself: Even prior to TCJA, features such as 50 percent bonus depreciation and R&D expensing and tax credits emulated a rent tax. Since rent taxes affect investment behavior less than income taxes (due to zero or very low EMTRs), investment rises less in response to a reduction in rent tax rates. Further, investors could have doubted the longevity of TCJA, especially in the case of a large, irreversible investment.

Another cause for the lack of investment response to TCJA could have been the law's implementation late in business cycle. By 2018 the US economy had been expanding consistently for 8 years, so corporate investment may already have peaked. Given that the study only includes the first two years of data post TCJA, it is also possible that a greater investment response could emerge later—assuming that the law remains stable. Future years' data could reveal whether a higher level of foreign investment might eventually emerge—for example, if the stronger growth in IP investment seen in 2018 and 2019 lays the groundwork for later physical investment. However, the large effects of the Covid 19 pandemic and associated fiscal policies will be difficult to disentangle from those of TCJA itself.

# APPENDIX A – ADDITIONAL REGRESSION RESULTS

TABLE 14

Dependent variable: Equity-financed FDI by Country of Immediate Origin Random Effects
2014-2019

| Regressor | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| EMTR equity US | -0.78<br>(0.86) | 2.72<br>(2.65) | | | | | | |
| EMTR equity bilateral | | | -0.24**<br>(0.12) | -0.49<br>(0.33) | | | | |
| EATR equity US | | | | | -0.89<br>(0.99) | 3.11<br>(3.04) | | |
| EATR equity bilateral | | | | | | | -0.33**<br>(0.16) | -0.58<br>(0.37) |
| Lagged PPE stock | | -0.02<br>(0.07) | | -0.04<br>(0.08) | | -0.02<br>(0.07) | | -0.03<br>(0.07) |
| US GDP | | 4.28<br>(4.31) | | 1.40<br>(1.72) | | 4.28<br>(4.31) | | 1.53<br>(1.91) |
| Home country GDP | | -0.03<br>(0.03) | | -0.05<br>(0.04) | | -0.03<br>(0.03) | | -0.04<br>(0.03) |
| Bilateral exchange rate | | 0.03<br>(0.03) | | 0.03<br>(0.03) | | 0.03<br>(0.03) | | 0.03<br>(0.04) |
| No. obs. | 135 | 122 | 135 | 122 | 135 | 122 | 135 | 122 |
| R-squared (overall) | 0.00 | 0.03 | 0.00 | 0.03 | 0.00 | 0.03 | 0.00 | 0.02 |

Standard errors in parentheses.
* = Significant at 10% level; ** = significant at 5% level; ***=significant at 1% level.

TABLE 15

Dependent variable: Equity-financed FDI by CIO GMM
2014-2019

| Regressor | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| EMTR equity US | -0.93<br>(0.82) | -2.31<br>(2.23) | | | | | | |
| EMTR equity bilateral | | | -0.70<br>(0.64) | -1.57<br>(1.52) | | | | |
| EATR equity US | | | | | -1.07<br>(0.94) | -2.65<br>(2.56) | | |
| EATR equity bilateral | | | | | | | -1.23<br>(1.09) | -3.09<br>(2.95) |
| Lagged dependent variable | -0.02***<br>(0.005) | -0.11***<br>(0.03) | -0.02***<br>(0.005) | -0.11***<br>(0.03) | -0.02***<br>(0.005) | -0.11***<br>(0.03) | -0.02***<br>(0.005) | -0.12***<br>(0.03) |
| US GDP | | -0.71<br>(1.41) | | -0.18<br>(1.08) | | -0.71<br>(1.42) | | -0.81<br>(1.51) |
| Home country GDP | | -2.11<br>(1.74) | | -1.57<br>(1.52) | | -2.11<br>(1.74) | | -2.11<br>(1.74) |
| Bilateral exchange rate | | 1.82<br>(2.18) | | 1.56<br>(1.97) | | 1.82<br>(2.18) | | 1.89<br>(2.25) |
| No. obs. | 100 | 95 | 100 | 95 | 100 | 95 | 100 | 95 |
| Autocorrelation z-value | 0.30 | 0.32 | 0.29 | 0.32 | 0.30 | 0.32 | 0.29 | 0.32 |

Standard errors in parentheses.
* = Significant at 10% level; ** = significant at 5% level; ***=significant at 1% level.

# APPENDIX A – ADDITIONAL REGRESSION RESULTS

TABLE 16

Dependent variable: Debt-financed FDI by Country

2014-2019

| Regressor | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| | Random Effects | | | | GMM | | | |
| EMTR debt US | -0.49<br>(0.32) | -0.83<br>(0.64) | | | -0.86<br>(0.59) | -1.05<br>(0.68) | | |
| EMTR debt bilateral | | | -0.71<br>(0.47) | -1.28<br>(0.83) | | | -1.65<br>(1.18) | -1.66<br>(1.05) |
| Lagged PPE stock | | -0.06<br>(0.05) | | -0.07<br>(0.06) | | | | |
| Lagged dependent variable | | | | | -0.26***<br>(0.03) | -0.23***<br>(0.04) | -0.46***<br>(0.05) | -0.24***<br>(0.04) |
| US GDP | | 1.08<br>(1.09) | | 0.65<br>(0.69) | | 0.82<br>(1.21) | | 0.59<br>(1.09) |
| Home country GDP | | -0.11<br>(0.09) | | 0.12<br>(0.10) | | -0.83<br>(1.15) | | -0.81<br>(1.14) |
| Bilateral exchange rate | | 0.01<br>(0.01) | | 0.01<br>(0.01) | | -0.11<br>(0.99) | | -0.09<br>(0.97) |
| No. obs. | 185 | 182 | 185 | 182 | 162 | 149 | 162 | 149 |
| R-squared (overall) | 0 | 0 | 0 | 0 | | | | |
| Autocorrelation Z-value | | | | | 0.29 | 0.33 | 0.22 | 0.33 |

Standard errors in parentheses.
* = Significant at 10% level; ** = significant at 5% level; ***=significant at 1% level.

TABLE 17

Dependent variable: FDI financed with Retained Earnings

Country by Industry Random Effects, 2014-2019

| Regressor | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| EMTR equity US | -0.13**<br>(0.05) | -0.17<br>(0.11) | | | | | | |
| EMTR equity bilateral | | | -0.03**<br>(0.02) | -0.03<br>(0.02) | | | | |
| EATR equity US | | | | | -0.17***<br>(0.06) | -0.43<br>(0.30) | | |
| EATR equity bilateral | | | | | | | -0.24***<br>(0.05) | -0.30***<br>(0.07) |
| US GDP | | -0.07<br>(0.13) | | 0.04<br>(0.07) | | -0.25<br>(0.26) | | -0.12<br>(0.08) |
| Home country GDP | | 0.01***<br>(0.004) | | 0.01***<br>(0.004) | | 0.01***<br>(0.004) | | 0.006<br>(0.005) |
| Bilateral exchange rate | | 0.001<br>(0.003) | | 0.001<br>(0.003) | | 0.002<br>(0.003) | | 0.003<br>(0.003) |
| No. obs. | 1579 | 1418 | 1591 | 1430 | 1579 | 1418 | 1591 | 1430 |
| R-squared (overall) | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.01 | 0.01 | 0.01 |

Standard errors in parentheses.
* = Significant at 10% level; ** = significant at 5% level; ***=significant at 1% level.

# APPENDIX B – INVERSION TRANSACTIONS

TABLE 18

## Inversions

2014-2019

| Company | Country | Year | Market capitalization (USD millions) |
|---|---|---|---|
| Broadcom[a] | Singapore | 2,018 | 105,170 |
| Adient Plc | Ireland | 2,016 | 4,614 |
| Arris International PLC | England | 2,016 | 4,370 |
| CardTronics | England | 2,016 | 1,524 |
| IHS Markit Ltd. | England | 2,016 | 7,205 |
| Johnson Controls International Plc | Ireland | 2,016 | 18,500 |
| Waste Connections Inc. | Canada | 2,016 | 6,892 |
| Broadcom | Singapore | 2,015 | 32,299 |
| C&J Energy Services Ltd. | Bermuda | 2,015 | 1,450 |
| Civeo Corp. | Canada | 2,015 | 438 |
| Energy Fuels Inc. | Canada | 2,015 | 107 |
| Livanova Plc | England | 2,015 | 1,723 |
| Medtronic Plc | Ireland | 2,015 | 102,137 |
| Mylan NV | Netherlands | 2,015 | 21,150 |
| Steris PLC | England | 2,015 | 21,567 |
| Wright Medical Group NV | Netherlands | 2,015 | 1,399 |
| Endo International Plc | Ireland | 2,014 | 7,725 |
| Horizon Pharma Plc | Ireland | 2,014 | 509 |
| Multi Packaging Solutions Int. Ltd. | Bermuda | 2,014 | 1,150 |
| Paragon Offshore Plc | England | 2,014 | 265 |
| Restaurant Brands Int. Inc. | Canada | 2,014 | 7,655 |
| Theravance Biopharma Inc. | Cayman | 2,014 | 478 |

**Note:** Note here.
(a) Disinversion

# APPENDIX C – ACRONYMS

ATR – average tax rate

BEA – Bureau of Economic Analysis

BTT – bilateral tax treaty

CBO – Congressional Budget Office

CIO – country of immediate origin

CIT – corporate income tax

EATR – effective average tax rate

EBIT – earnings before interest and taxes

EBITDA – earnings before interest, taxes, depreciation and amortization

EMTR – effective marginal tax rate

ETR – effective tax rate

FDI – foreign direct investment

GDP – gross domestic product

IICM – international investment and capital model

MNE – multinational enterprise

PPE – property, plant and equipment

TJCA – Tax Cuts and Jobs Act

TPC – Tax Policy Center

UBO – ultimate beneficial owner

US – United States

WHT – withholding tax

# NOTES

[1] So, for example, if a French MNE invests in the US through a subsidiary in the Cayman Islands, CIO data would show the investment as originating in the Cayman Islands.

[2] Worldwide corporate income tax regimes subject the active earnings of the controlled foreign corporations (CFCs) of domestically headquartered MNEs to the domestic corporate income tax, usually giving a credit for foreign taxes paid and often allowing for deferral of taxation until foreign income is repatriated to the domestic parent as a dividend. Territorial regimes, by contrast, exempt active foreign earnings from domestic taxation.

[3] Bilateral effective tax rates incorporating cross-border withholding taxes specified in BTTs were introduced to the literature on FDI determinants by Egger et al. (2009). Feld and Heckemeyer's meta-study finds bilateral EATRs to be a highly significant determinant of cross-border investment.

[4] However, Beer et al. (2018) found that the equity-financed EMTR fell by only about 5 percentage points.

[5] See https://www.bea.gov/international/di1fdibal.

[6] Generally, FDI is defined as investment that establishes an at least 10 percent ownership stake in the target entity. However, our analysis of BEA survey data on property, plant and equipment focuses on US affiliates that are majority-owned by foreign corporations.

[7] TCJA introduced two additional special regimes that apply to domestic investment: the foreign-derived intangible income (FDII), which applies a reduced tax rate to income from exports that exceeds a 10 percent return on US tangible assets, and the base-erosion anti-abuse tax (BEAT), an alternative minimum tax levied at a 5-12.5% rate that disallows deduction of certain payments to foreign related parties. The effective tax rates calculated by the IICM and presented in this paper reflect the standard corporate tax regime only.

[8] Tax rates depicted in figure 1 incorporate average state-level corporate tax rates. They portray corporate-level income taxes only and do not take into account investor-level taxes on capital income.

[9] See PricewaterhouseCoopers (2013).

[10] See Matheson (2021).

[11] Over short time periods, such as the 6-year period examined in this study, human and public capital endowments do not vary much, so they are absorbed by country fixed effects. Time fixed effects are not included, since they would be collinear with US GDP.

[12] New FDI data by country of UBO are only available from 2014.

[13] Since data on FDI by UBO are available for only 2014-2019, the GMM models of FDI by UBO, which use two years of lags as instruments, cover only 2016-2019.

[14] For US-level ETRs, the tax rates on new shares and retained earnings are identical, since the ETRs reflect only corporate-level taxes.

[15] Under a worldwide tax system, the active foreign earnings of domestically headquartered multinationals are subject to domestic income taxation, usually with a foreign tax credit allowed for income taxes paid in foreign source countries. By 2015, the US was the only major capital-exporting country to implement such as system. Most other developed countries had gravitated toward a "territorial" system that exempts foreign earnings from further taxation at the domestic level. For more detail, see PricewaterhouseCoopers (2013).

# REFERENCES


Agostini, C. (2007). "The Impact of State Corporate Taxes on FDI Location," Public Finance Review, 35(3): 335-360.

Amberger, H. and L. Robinson (2021). "The Effect of US Tax Reform on Foreign Acquisitions".

Arellano, M. and S. Bond (1991). "Some Tests of Specification for Panel Data: Monte Carol Evidence and an Application to Employment Data." *Review of Economic Studies*, 58: 277-297.

Auerbach, A. and K. Hassett (1993). "Taxation and Foreign Direct Investment in the United States: A Reconsideration of the Evidence," *Studies in International Taxation*, A. Giovannini, ed. University of Chicago Press.

Beer, S., A. Klemm and T. Matheson (2018). "Tax Spillovers from US Corporate Income Tax Reform." IMF working paper 18/166.

Blonigen, B. and R. Davies (2004). "The Effects of Bilateral Tax Treaties on US FDI Activity," *International Tax and Public Finance* (11): 601-622.

Congressional Budget Office (2017), 10-Year Budget Projection, June 2017 https://www.cbo.gov/about/products/budget-economic-data#3

Congressional Budget Office (2018), 10-Year Budget Projection, April 2018 https://www.cbo.gov/about/products/budget-economic-data#3

DeBacker, J. and R. Kasher (2018). "Effective Tax Rates on Business Investment Under the Tax Cuts and Jobs Act." American Enterprise Institute.

De Mooij, R. and S. Ederveen (2008). "Corporate Tax Elasticities: A Reader's Guide to Empirical Findings." Oxford Review of Economic Policy 24(4): 680-697.

Devereux, M. and R. Griffith (2003). "Evaluating Tax Policy for Location Decisions". *International Tax and Public Finance*. 10:107-126.

Dharmapala, D. (2018). "The Consequences of the TCJA's International Provisions: Lessons from Existing Research".

Dowd, T., C. Giosa, and T. Willingham (2020). "Corporate Behavioral Response to TCJA for Tax Years 2017-2018".

Dyreng, S. F. Gaertner, J. Hoopes, and M. Vernon (2020). "The Effect of US Tax Reform on the Taxation of US Firms' Domestic and Foreign Earnings."

Egger, P., S. Loretz, M. Pfaffermayr, and H. Winner (2009). "Bilateral Effective Tax Rates and Foreign Direct Investments". *International Tax and Public Finance* 16:822-849.

Feld, L. and J. Heckemeyer (2011). "FDI and Taxation: A Meta-Study". Journal of Economic Surveys. 25(2): 233-272.

Gale, W. and C. Haldeman (2021). "Taxing Business under the Tax Cuts and Jobs Act", https://privpapers.ssrn.com/sol3/papers.cfm?abstract_id=3280582.

Gravelle, J. and D. Marples (2019). "The Economic Effects of the 2017 Tax Revision: Preliminary Observations." Congressional Research Service report #45736.

Hartman, D. (1984). "Tax Policy and Foreign Direct Investment in the United States." National Tax Journal (4): 475-487.

Hausman, J. (1978). "Specification Tests in Econometrics". *Econometrica* 46: 1251-1271.

Heinemann, F., M. Olbert, O. Pfeiffer, T. Schwab, C. Spengel and K. Stutzenberger (2018). "Implications of the US Tax Reform for Transatlantic FDI". Leibniz Information Center for Economics.

Joint Committee on Taxation (2021). "US International Tax Policy: Overview and Analysis," Report JCX-16-21, March 19.

King, M., and D. Fullerton (1984). The Taxation of Income from Capital. Chicago: University of Chicago Press.

Kopp, E., D. Leigh, S. Mursula, and S. Tambunlertchai (2019). "US Investment Since the Tax Cuts and Jobs Act of 2017." IMF working paper 19/120.

# REFERENCES


Lyon, A. and W. McBride (2018). "Assessing US Global Tax Competitiveness after Tax Reform," PricewaterhouseCoopers LLP.

Matheson, T. (2021). "Tax Policy Center International Investment and Capital Model: Corporate Income Tax Project Technical Brief". https://www.taxpolicycenter.org/sites/default/files/publication/161983/tax-policy-center-international-investment-and-capital-model_2.pdf.

PricewaterhouseCoopers (2013). "Evolution of Territorial Tax Systems in the OECD."

http://www.techceocouncil.org/clientuploads/reports/Report%20on%20Territorial%20Tax%20Systems_20130402b.pdf

Slemrod, J. (1990). "Tax Effects on Foreign Direct Investment in the United States: Evidence from a Cross-Country Comparison," *Taxation in the Global Economy*, A. Razin and J. Slemrod, eds. University of Chicago Press.

Swenson, D. (1994). "The Impact of US Tax Reform on Foreign Direct Investment in the United States," *Journal of Public Economics* (54): 243-266.

Swenson, D. (2001). "Transaction Type and the Effect of Taxes on the Distribution of Foreign Direct Investment in the United States." *International Taxation and Multinational Activity*, J. Hines, ed. University of Chicago Press.

Tabova, A. (2020). "What Happened to Foreign Direct Investment in the United States?" FEDS Notes. Washington: Board of Governors of the Federal Reserve System, February 13, 2020, https://doi.org/10.17016/2380-7172.2499.

Wijeweera, A., B. Dollery and D. Clark (2007). "Corporate Tax Rates and Foreign Direct Investment in the United States", *Applied Economics*, 39:109-117.

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