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Did the Tax Cuts and Jobs Act of 2017 induce a valuation premium on U.S. target firms?

A study on the effects of the TCJA on target valuations in acquisition deals

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Abstract[1]

Our study examines the effect of the 2017 Tax Cuts and Jobs Act (TCJA) on the valuations of U.S. target firms in acquisition deals. The TCJA was the single most extensive revision of the U.S. tax code in more than 30 years and introduced a complete overhaul of the corporate tax system, substantially reducing taxes for U.S. corporations. Using data from Bureau van Dijk's Zephyr and Orbis databases, we match U.S. targets with comparable foreign target firms before and after the implementation of the TCJA using a Propensity Score Matching model. Subsequently, we run a Difference-in-Differences regression on our matched sample to estimate the effect of the TCJA.

We find that the TCJA increased the value of the average U.S. target firm by 32%. Our findings provide evidence that U.S. firms were systematically undervalued relative to their foreign competitors prior to the TCJA and that the reform induced a valuation premium on U.S. firms relative to similar foreign firms. We find no evidence for an increase in target valuations in anticipation of a future tax reform similar to the one observed in public firm valuations (Gaertner et al., 2019; Wagner et al., 2018, 2020). The valuation effect is concentrated among domestic firms as there is no significant increase in the valuations of U.S. multinational corporations. We also find that the valuation increase is greater for manufacturing firms than service providers and that high-value firms likely benefitted the most from the tax reform. Overall, our results provide evidence that the TCJA made U.S. targets more attractive for acquirers.

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1. Introduction

The 2017 U.S. tax reform, known as the "Tax Cut and Jobs Act" (TCJA), is the single most extensive tax reform in the U.S. since 1986. The Act, which was passed by the Senate and House on December 20th and signed into law by President Trump on December 22nd, introduced major changes to the Internal Revenue Code for both individuals and corporations. An overhaul of the corporate tax system was by many considered overdue since the U.S. had one of the highest corporate statutory tax rates among advanced economies and was one of few countries to enforce a worldwide tax system. According to critics, this led U.S. firms to operate with a significant disadvantage in the interconnected global economy. The TCJA aimed to increase the competitiveness of U.S. firms. Some of the most significant changes were a reduction in the federal statutory corporate tax rate from 35% to 21% and a move towards a territorial tax system. The Congressional Budget Office (CBO) and the Joint Committee on Taxation (2017) estimated that the TCJA would save corporations an estimated $644 billion in taxes in the ten years from 2018 to 2027, thus having a large financial impact on U.S. firms.

An anticipated effect of a corporate tax reduction of this magnitude would be an increase in the valuations of U.S. firms. Our study aims to quantify this valuation effect by analyzing data on global acquisitions. This is interesting for two reasons. First, company valuations provide insight into the attractiveness of U.S. firms to investors. An increase in the valuations of U.S. firms following the TCJA would indicate that the reform successfully increased the competitiveness of U.S. firms and reduced the favorability gap between the U.S. and foreign tax systems. While previous studies on the TCJA have primarily focused on the market valuations of public firms (Chen & Koester, 2020; Gaertner et al., 2019; Wagner et al., 2018, 2020), our study contributes to this literature by studying the valuations of U.S. target firms in acquisition deals.

Second, the political motivation of the TCJA's corporate tax reductions was that it would spur economic growth and increase the wages of middle-class Americans (The Council of Economic Advisors, 2017). If the TCJA proves to increase company valuations through tax savings, one of the main beneficiaries will be U.S. firms' owners. Since this group was not publicly announced to be the target for the corporate tax reductions, it will provide interesting insights into how observed consequences of tax policies differ from political goals. Contemporary studies find that the TCJA benefited business owners by increasing dividends and share

repurchases (Kalcheva et al., 2020). Our study contributes to this by examining if U.S. business owners received additional benefits through increased target valuations in acquisition deals.

To estimate the effect of the TCJA on target valuations, we use a global sample of acquisition deals in the period 2010 to 2019 collected from Bureau van Dijk's Zephyr database. Our final sample consists of 4,046 global acquisition deals, of which 782 include U.S. targets. With a Propensity Score Matching (PSM) algorithm, we match each transaction of a U.S. target with a transaction of a comparable foreign target based on company characteristics. This eliminates bias caused by the underlying differences between U.S. and foreign firms that might affect company valuations. Subsequently, we run a difference-in-differences (DiD) regression on the matched sample before and after the TCJA. Consistent with our expectations, we find that the TCJA positively impacted target valuations, increasing their value by 32% on average.

Our results also show that U.S. firms were systematically undervalued relative to foreign firms in the period prior to the reform, possibly providing evidence of an uncompetitive tax system. We also test if the anticipation of a future tax cut already affected target valuations in deals immediately following the 2016 election where the Republicans took control over both the executive (President) and legislative (Congress) branches of government and the likelihood of a corporate tax reform substantially increased. Previous research has shown that the expectations of the TCJA increased valuations in the stock market (Gaertner et al., 2019; Wagner et al., 2018, 2020). We find no such effect for target valuations in acquisition deals, likely because of acquisitions representing long-term business decisions, thus delaying the market reactions.

Noting that there appears to be strong heterogeneity in the impact of the TCJA on different businesses (Amberger & Robinson, 2020; Bennett et al., 2019; Dyreng et al., 2020; Hanlon et al., 2019; Kalcheva et al., 2020; Wagner et al., 2020), we complement our main analysis with several heterogeneity tests. Following Dyreng et al. (2020), we first test whether the valuation effect differed between U.S. domestic- and multinational corporations (MNCs). Our results show that MNCs were mostly unaffected by the tax reform and that domestic firms were the greater beneficiaries of the corporate tax cuts in the TCJA. This is likely due to the new taxes imposed on MNCs through the GILTI, FDII, and BEAT provisions. We also find that the valuation effect of the TCJA is concentrated in the manufacturing sector rather than services, an effect mainly associated with the tax advantages of the new bonus depreciation in the TCJA.

Lastly, we split the sample at the median of deal total target value and find that high-value firms likely benefited more from the TCJA than low-value firms. Thus, our findings complement the research by Wagner et al. (2020) by looking at the TCJA's impact on high- and low-value firms' valuations rather than their effective tax rates only.

We begin in section 2 with an overview of the main changes in the TCJA likely to have the most significant effect on U.S. firms' valuations. We continue in section 3 by developing our hypotheses and reviewing existing literature on valuations and taxes. In section 4, we outline our empirical approach, while section 5 discusses the results of our analyses. Section 6 contains our concluding remarks.

2. Main corporate tax changes of the TCJA

The TCJA altered numerous provisions in the U.S. tax system that might affect the valuations of U.S. firms. As a detailed breakdown of all changes in the TCJA fall beyond the scope of this paper, this section describes the main changes to the U.S. tax system likely to have the biggest effect on the valuations of U.S. firms. Table 1 below summarizes these effects.

Table 1*:* Summary of the most substantial provisions of the TCJA

Below is a summary of the most important provisions assumed to affect the valuations of U.S. firms. Note that the effects are *expected* and will not necessarily affect the valuations in line with the hypothesized effects. The tax bill is more than 500 pages long and contains numerous alterations that could affect corporations differently than expected dependent on firm-specific factors.

TCJA Provision	
Lower federal statutory corporate tax rate	**Short summary:** The corporate income tax rate was reduced from 35% to 21%. **Expected effects on the valuations of U.S. firms:** + U.S. firms pay less tax and become more profitable. Investors are expected to pay more for U.S. firms. + Lower taxes will give U.S. firms more cash that could be spent on acquisitions. + Increased foreign investments in the U.S.
Abolishment of the repatriation tax	**Short summary:** The repatriation tax on foreign income was removed for income earned after the introduction of the TCJA. **Expected effects on the valuations of U.S. firms:** + U.S. firms with accumulated unrepatriated earnings bring the cash back and invest it at home, in addition to engage more in domestic M&As. - Foreign investments previously not profitable become attractive to U.S investors, increasing U.S. firm's desire to invest internationally rather than domestically.
Global intangible low tax income (GILTI)	**Short summary:** The U.S. will tax income accumulated by intangible assets in low-tax countries at a rate of 10.5% **Expected effects on the valuations of U.S. firms:** + Investments in low-tax countries become less profitable. MNCs are expected to invest more domestically, including domestic M&As - GILTI imposes a new tax on U.S. MNCs. This could increase their overall taxation and decrease their valuations.
Foreign-derived intangible income (FDII)	**Short summary:** "Intangible income" earned in foreign countries will be taxed at a discounted rate of 13.125%. **Expected effects on the valuations of U.S. firms:** + U.S. companies are incentivized to serve foreign markets through export of services rather than to invest abroad. + More intellectual property could be located in the U.S., causing a spillover effect on the economy long-term.
Base erosion and anti-abuse tax (BEAT)	**Short summary:** Large MNCs will receive a minimum BEAT tax added to their tax bill if it exceeds their regular tax bill. **Expected effects on the valuations of U.S. firms:** + The benefit of reducing profits in the U.S. through buying services from a foreign owned subsidiary is reduced. This lessens the incentives for MNCs to invest abroad. - BEAT imposes a new tax on large U.S. MNCs. This could increase their overall taxation and decrease their valuations.

Table 1 (continued)

TCJA Provision	
100% first-year bonus depreciation	**Short summary:** The first-year bonus depreciation was increased from 50% to 100% for most depreciable business assets and certain property. **Expected effects on the valuations of U.S. firms:** + The new rules positively impact firms with qualified assets for bonus depreciation (such as manufacturers) due to a significant increase in current-year deductions, more appropriately reflecting the time value of money used for investments.

2.1 The reduction in the federal statutory corporate tax rate

The federal statutory corporate tax rate reduction from 35% to 21% is arguably the biggest change introduced by the TCJA to the U.S. corporate tax system. Prior to the TCJA implementation, the United States corporate tax rate was considered one of the highest in the world. The neoclassical perspective on investments is that investors will seek the most profitable investment opportunities both domestically and globally, determined by the *after-tax* rate of return. Thus, although the statutory tax rate was indeed higher in the U.S. relative to most other countries prior to the TCJA, this rate is not necessarily an appropriate metric to compare the relative attractiveness of the U.S. tax system to potential investors due to the existence of deductions, subsidies, loopholes, and credits.

A commonly used measure for corporations' overall tax burden is the effective average tax rate (EATR), introduced by Devereux and Griffith (2003). In a 2019 report for the European Commission, the EATRs of all EU and some non-EU countries are compared (Heckemeyer et al., 2019). The U.S. EATR was reduced from 36.5% in 2017 to 27.5% in 2019, while the EU EATR[2] fell from 20.0% to 19.7% in the same period. Thus, the TCJA's reduction in the statutory rate also led to a decline in the EATR, significantly reducing the EATR gap between the U.S. and the average EU country. This shows that although the U.S. EATR decreased considerably due to the TCJA, U.S. firms still operate at a disadvantage relative to the average firm in the EU even after the reform.

A review by The Congressional Budget Office (CBO) and the staff of the Joint Committee on Taxation (2017) find that the TCJA will save corporations an estimated $644 billion in taxes in the ten years from 2018 to 2027, contributing to an increase in the deficit of $1,455 billion

[2] The EU EATR is calculated as an arithmetic mean of each EATR of the 28 EU member states (including the United Kingdom). We use the EU EATR as a comparison to the U.S. EATR since the EU is one of the most important trading partners of the U.S. (in addition to China, Mexico, and Canada).

over the next ten years. CBO's estimates proved to be largely accurate for 2018 and 2019, with the federal deficit for fiscal 2019 increasing by 47% to $984 billion compared to 2017, and corporate income tax revenue as a percentage of GDP dropping to 1.1% (Bogusz et al., 2020). Thus, it is clear that the TCJA has indeed constituted a significant decrease in the overall taxation burden for U.S. corporations. This could have increased their relative attractiveness for both domestic and foreign investors, increasing their valuations.

2.2 The abolishment of the repatriation tax

Another major change introduced by the TCJA is the transition from a worldwide tax system to a hybrid between a territorial and a worldwide system. Prior to the TCJA, U.S. MNCs were required to pay taxes on foreign income to the U.S. government. This tax, however, was only payable upon the repatriation of these earnings. The policy discouraged repatriation and placed corporations that wanted to reinvest foreign earnings in the U.S. at a disadvantage. As a result, the Joint Committee on Taxation estimated that U.S. MNCs in 2015 held more than $2.6 trillion overseas (TPC, 2020). The TCJA effectively abolished the old repatriation tax, but to avoid benefiting corporations with accumulated unrepatriated earnings, these earnings were taxed regardless of repatriation. The TCJA required a one-time transition tax of 15.5% on liquid assets and 8% on non-liquid assets, substantially lower than the previous rate of 35% minus applicable foreign tax credits. Data from the Commerce Department (2019) show that more than $1 trillion of overseas profits was brought back in 2018 and 2019, indicating that the new provisions had the expected effect of an increase in repatriation.

On the one hand, the cash brought back following the TCJA could increase U.S. investments, possibly increasing the valuations of U.S. firms. On the other hand, foreign investments are likely to have become more attractive for U.S. firms due to the new hybrid tax system. This could increase U.S. firms' desire to invest internationally rather than domestically, potentially decreasing the valuations of U.S. target firms.

2.3 Global intangible low tax income (GILTI)

The TCJA introduced a hybrid tax system rather than a pure territorial tax system. One of the main alterations forming this hybrid model is the new Global Intangible Low Tax Income

(GILTI) provisions, which were introduced to discourage profit shifting to low-tax countries abroad. GILTI imposes a tax on what is deemed "intangible income" from U.S. MNCs' foreign affiliates, i.e., above-normal returns assumed to be earned from intangible assets such as patents, trademarks, and copyrights (TPC, 2020). The GILTI framework sets the average expected return to 10% on foreign depreciable tangible assets and introduced a 10.5% minimum tax (assuming a foreign tax rate of zero) on any excess returns, payable immediately. Thus, investments in low-tax countries are likely to become less profitable, and U.S. MNCs are expected to invest more domestically, possibly increasing U.S. target valuations. Furthermore, since the GILTI provisions target U.S. MNCs with additional taxes, the valuations of such firms could decrease.

2.4 Foreign-derived intangible income (FDII)

Another important provision in the TCJA, which is closely related to GILTI, is the introduction of a special tax rate for what is considered to be Foreign Derived Intangible Income (FDII). While GILTI *discourages* placing intangible assets abroad through a minimum tax, FDII *encourages* U.S. MNCs to hold valuable intangible assets in the U.S. through a tax deduction. Specifically, FDII establishes a 13.125% maximum tax rate for income[3] exceeding a 10% return on its depreciable tangible assets, significantly lower than the standard rate of 21% (TPC, 2020).

Combined, the GILTI-FDII framework makes foreign investments less attractive, discourages profit-shifting, and incentives corporations to rather serve foreign markets through exports[4]. While the GILTI provisions could *increase* the overall taxation of U.S. MNCs (reducing their valuations), the FDII provisions could *reduce* their overall taxation (increasing their valuations) depending on what portion of their income is foreign-derived and thus qualifies for the reduced tax rate. It is unclear which effect has the strongest impact on valuations as this is determined by firm-specific factors. However, the GILTI-FDII framework is expected to have limited

[3] Only the fraction of the corporation's revenue that is foreign-derived is eligible for the reduced rate. The maximum tax rate rises to 16.406% after 2025.

[4] An increase in the amount of intangible assets being located in the U.S could have a spillover effect on U.S. economic growth in the long term and therefore impact valuations. Studies have shown that intellectual property (IP) rights affect economic growth indirectly by stimulating factor accumulation (Park & Ginarte, 1997). Thus, by having important IP located in the U.S. rather than abroad, they are likely easier to protect from economic aggression such as forced technology transfer, industrial espionage, and conditioned market access from U.S. trading partners, of which China is believed to be the primary IP infringer. While the topic of IP infringement is controversial and used to justify the ongoing trade war between the U.S. and China, a 2018 report from the Office of the U.S. Trade Representative (2018) estimates the annual Chinese theft of American IP to cost the U.S. economy between $225 billion and $600 billion annually, causing major damage to every industry.

impact on domestic target firms, possibly causing a heterogeneous valuation effect between domestic firms and MNCs.

2.5 Base erosion and anti-abuse tax (BEAT)

Another provision contributing to the hybrid tax system is the new Base Erosion and Anti-Abuse Tax (BEAT). As a reaction to the limited effectiveness of the old regulations regarding transfer pricing, the TCJA introduced a domestic add-on minimum tax on deductible payments to foreign affiliates to limit future cross-border profit-shifting. The BEAT disallows certain payments to related foreign parties to be fully deducted as business costs by imposing an alternative minimum tax. U.S. corporations first calculate their regular tax liability using the corporate income tax rate of 21%, and then recalculates their tax using a lower BEAT rate of 10%[5] after adding back the deductible payments to related foreign parties. If the BEAT liability is higher than the regular tax liability, the corporations must pay an add-on tax equal to the amount by which the BEAT exceeds the regular tax (TPC, 2020).

However, this additional tax is only applicable to large MNCs with more than $500 million in gross receipts or that makes more than 3% of their total deductible payments to foreign affiliates. Thus, the BEAT further lessens MNCs' incentives to invest abroad, potentially increasing domestic acquisition activity and target valuations. However, for MNCs with large payments to foreign affiliates, the BEAT could also increase the overall taxation and reduce their valuations. This could strengthen the heterogeneous valuation effect between domestic firms and MNCs potentially caused by the GILTI-FDII framework.

2.6 Bonus depreciation deduction

The TCJA made many changes to eligible tax expenditures for both individuals and corporations. The largest change on the corporate side is considered to be the enactment of a 100% bonus depreciation. The provision temporarily allows 100% immediate expensing of most depreciable business assets and certain property acquired and placed in service after September 27th, 2017 and before January 1st, 2023 (TPC, 2020). The bonus depreciation is

[5] The BEAT rate was 5% in 2018 and will be 10% in 2019 through 2025. From 2026 and beyond, the BEAT rate is 12.5%.

phased down in 20 percentage point increments in the following four years until it is fully eliminated after 2026. Prior to the TCJA, the law only allowed a 50% first-year bonus depreciation in 2017, which would be phased out by the end of 2019.

The new 100% bonus depreciation applies to depreciable business assets with a recovery period of 20 years or less, thus generally including most business assets such as machinery, equipment, and computers (IRS, 2019). It gives corporations the ability to recover the asset cost of new investments quicker, more appropriately reflecting the time value of money. This could reduce the taxation for firms in asset-heavy industries with qualified business assets, increasing their valuations. This could cause a heterogeneous valuation effect between asset-heavy and asset-light firms.

We continue in Section 3 by developing our hypotheses based on related literature on target valuations and taxation and the provisions discussed in this section.

3. Hypothesis development and prior literature

As evident from the previous section, the tax reform is complicated and could affect target valuations differently depending on firm-specific factors. There are two main channels through which the TCJA could affect target valuations. First, the corporate income tax rate reduction will increase the profitability of the targets and thereby their value for potential acquirers. U.S. acquirers will also have more available funds that could be spent on acquisitions. Second, the TCJA could change the behavior of certain U.S. firms. Investments in business assets or property deemed unprofitable in the old tax system can be profitable under the new system and thus be carried out. Ideally, our analysis should catch only the first effect, specifically the increase in valuations due to lower taxes.

3.1 Main hypothesis: the TCJA increased the valuations of U.S. target firms

3.1.1 Increased profitability of U.S. targets

As investors are shown to place a valuation premium on tax avoidance (Wang, 2011), the main driver of a potential increase in valuations is likely to be the significant reduction in the corporate income tax rate. An acquirer will pay less tax on the target's future earnings and thus be expected to pay more in an acquisition of a U.S. target firm. An important contribution to the literature is Huizinga, Voget, and Wagner's (2012) study on who bears the burden of additional taxation in international M&As. They find a one-to-one relationship between increased taxes and reduced deal premiums, suggesting that an extra dollar in taxation is paid fully by the target firm's owners in a multinational deal. Assuming that this relationship holds when the corporate tax rate is reduced, the owners of U.S. firms will be the primary beneficiaries of the tax reductions in the TCJA through higher valuations.

The reduced corporate tax rate could also be a driver for increased valuations of U.S. firms through an increase in foreign investments. While relatively little is known about the TCJA's effects on acquisitions due to its recent passage, research on previous tax reforms provides some insights. Following the Tax Reform Act (TRA) of 1986, the last major overhaul of the U.S. tax system prior to the TCJA, the corporate tax rate was reduced from 50% to 35%. Studies

by Scholes and Wolfson (1990) and Servaes and Zenner (1994) both find that the benefits of foreign acquisitions in the U.S. depend on the U.S. tax system and that the level of foreign acquisitions in the U.S. increased significantly following the enactment of TRA. Since the TRA's corporate tax rate reduction resembles the one in the TCJA, the level of foreign investments in the U.S. is likely to increase following the TCJA. An anticipated effect of this is an increase in the valuations of U.S. firms.

Furthermore, the relationship between taxes and the investment level in a country has been thoroughly studied. Reduced taxes are associated with an increase in cross-border investments as the cost of capital is reduced (Mooij & Ederveen, 2008). Multiple studies that focus on cross-border M&As find that lower corporate taxes lead to an increase in cross-border M&A activity (di Giovanni, 2005; Erel et al., 2012; Rossi & Volpin, 2004). Harris and Ravenscraft (1991) study the effect of cross-border M&As on U.S. firms' valuations by looking at the wealth gains of shareholders. They find that U.S. shareholders' wealth gains were significantly higher in cross-border M&As compared to domestic M&As, implying that an increase in cross-border M&As in the U.S. leads to higher target valuations. As these effects are likely to be transferable to the TCJA due to the significant decrease in corporate taxes, it should increase the value of U.S. firms and possibly induce a valuation premium relative to foreign firms.

3.1.2 Increased funds for U.S. acquirers

The tax cuts can also increase U.S. firms' valuations by stimulating demand through reduced taxes, thus increasing available funds for acquirers. This effect is mainly caused by the significant reduction in the corporate income tax rate, but it is also likely to be affected by the abolishment of the repatriation tax, which could affect U.S. firms' valuations in two different directions.

In 2004, the American Jobs Creation Act (AJCA) introduced a temporary repatriation tax holiday, which led financially constrained U.S. MNCs to increase their domestic investments following the repatriation of foreign earnings (Faulkender & Petersen, 2012). While U.S. corporations brought back an estimated $300 billion during the temporary repatriation tax holiday of AJCA (Browning, 2008), $1 trillion was brought back in the first two years under the TCJA (Commerce Department, 2019). Since the repatriation effects of AJCA and TCJA were similar, the TCJA should increase U.S. firm’s ability and desire to invest domestically if such investments are deemed more beneficial than foreign investments under the new tax system. Early evidence has shown that the TCJA was successful in reducing tax distortions to

outbound M&A activity (Amberger & Robinson, 2020), resulting in an overall decreased probability that a U.S. firm acquires a foreign target after the TCJA. This could increase the valuations of U.S. firms.

However, empirical evidence from the abolishment of the repatriation taxes in the U.K. and Japan indicates that firms in both countries *increased* their foreign investments after the abolishment (Feld et al., 2016). Amberger and Robinson (2020) also find that firms with no significant foreign presence prior to the TCJA were more likely to engage in foreign M&As after the TCJA. Since less than 1% of U.S. companies are considered multinationals (McKinsey, 2010), the TCJA could thus increase the majority of U.S. firms' desire to invest internationally rather than domestically, potentially yielding a negative effect on the valuations of U.S. firms.

It is important to note that an increase in available funds does not necessarily lead to increased acquisition spending. There are many other possible ways for corporations to use additional funds. In a survey of tax executives following the AJCA of 2004, Graham et al. (2010) found that repatriated cash was mainly used in down payments of domestic debt, repurchasing of shares, and capital investment. Empirical studies (Blouin & Krull, 2009; Dharmapala et al., 2011) have found that the main effect of increased repatriations is an increase in payments to shareholders through share buybacks and dividends. However, the decisions to buy back shares or acquire a firm are not mutually exclusive actions. Cash-rich firms are shown to be more likely to pursue acquisitions (Harford, 1999). Consequently, it is reasonable to expect that additional available cash will increase the overall acquisition activity in the U.S.

Of the two effects discussed, U.S. targets' increased profitability is likely to be the primary driver of increased target valuations. Overall, the TCJA is expected to have made U.S. targets more attractive for both domestic and foreign investors. The main hypothesis of this paper is the following:

H1: The Tax Cuts and Jobs Act of 2017 increased the valuations of U.S. target firms in acquisition deals.

3.2 Secondary hypotheses

Previous literature has shown that the effects of the TCJA differ substantially across firms. Hanlon et al. (2019) find that share buybacks increased after the TCJA, but the effect was concentrated among a handful of large firms. Bennett et al. (2019) find a decrease in debt for highly levered firms, while Dyreng et al. (2020) find that U.S. domestic firms received a larger decrease in their effective tax rate than U.S. MNCs. Amberger and Robinson (2020) find that U.S. MNCs were less likely to make foreign acquisitions after the TCJA, while U.S. firms without a foreign presence became more likely to acquire a foreign firm. Kalcheva et al. (2020) and Wagner et al. (2020) both find that highly taxed firms received the greatest benefits from the TCJA.

Since there seems to be strong heterogeneity in the impact of the TCJA on different businesses, we complement our main analysis with several heterogeneity tests. Specifically, we study potential differences between domestic and multinational firms, manufacturers and service providers, and high- and low-value firms. Thus, our analysis could provide additional support for the heterogeneous effects found in other studies.

3.2.1 Domestic vs. MNCs

Multiple provisions in the TCJA only affect multinational firms. The BEAT provisions reduce the incentives for U.S. MNCs to undertake investments that involve outgoing payments from the U.S. since the new provisions limit their ability to erode the U.S. tax base through profit shifting. As a result, it has the potential to impose new taxes on the international income of U.S. MNCs that were previously only taxed at low rates abroad. In addition, foreign-derived income meeting the requirements of the GILTI provisions are taxable immediately.

A recent study found that while both domestic and MNCs benefited from the TCJA, the domestic firms benefited the most (Dyreng et al., 2020). The effect was attributed to an unchanged federal tax burden on foreign earnings due to the new anti-abuse provisions. Consequently, all tax savings for U.S. MNCs came from their domestic activities rather than a reduced effective tax rate on foreign income. Another study found that the TCJA had a net negative short-term impact on the valuations of firms with the greatest foreign exposure (Huang et al., 2020). The effect is attributed to an overall *increase* in the tax liability for such corporations due to the GILTI and BEAT provisions, in addition to loopholes being closed that were previously used in tax minimization strategies. Consequently, the TCJA is likely to affect

the valuations of U.S. domestic corporations more favorably relative to U.S. MNC's. The first secondary hypothesis of this paper is the following:

H2: In acquisition deals following the implementation of the TCJA, U.S. target firms without international activity experienced an increase in valuations relative to U.S. target firms with international activity (MNCs).

3.2.2 Manufacturers vs. service providers

The valuations of U.S. target firms might be affected differentially across sectors. For instance, prior studies find that corporate tax rates are positively correlated with capital investments in machinery and equipment in the manufacturing sector but not with similar investments in the services sector (Djankov et al., 2010). Assuming these investments in machinery and equipment have a positive NPV, one would expect that the corporate tax reduction asymmetrically benefited the manufacturers.

Furthermore, as manufacturing firms are more asset-heavy than services firms, manufacturers are expected to reap most of the benefits of the new 100% first-year bonus depreciation. Due to the new bonus depreciation, the capital recovery provisions are considered more generous in the United States than in many other countries (TPC, 2020). This could further attract investments in the U.S., especially in the manufacturing sector. Ohrn (2019) looks at the relationship between state accelerated depreciation policies and investments in the manufacturing sector and finds that such policies have large effects on investment in the U.S. manufacturing sector. Consequently, the TCJA is likely to affect the valuations of U.S. manufacturers more favorably relative to U.S. service providers. The next secondary hypothesis of this paper is the following:

H3: In acquisition deals following the implementation of the TCJA, U.S. target firms in the manufacturing sector experienced an increase in valuations relative to U.S. target firms in the services sector.

3.2.3 High- vs. low-value firms

Our final heterogeneity test builds on a previous empirical study by Wagner et al. (2020) that analyzes the effects of the TCJA on the ETRs (effective tax rates) of U.S. firms. When estimating the changes in taxes dependent on firms' market value of equity, they find that more valuable firms experienced a larger decrease in ETRs relative to less valuable firms. If these results hold in our study, we should find an increase in the valuations of high-value U.S. target firms relative to low-value U.S. target firms.

A possible explanation for this finding is that high-value firms usually have a broader set of activities than low-value firms. With the help of lawyers, accountants, and other experienced staff, this enables them to organize these activities in ways that achieve optimal tax savings, such as delaying or expediting investments and adjusting leverage. This advantage is further enhanced by the ever-increasing complexity of the U.S. tax system (TPC, 2020). The TCJA aims to balance competing goals such as fairness, enforceability, and subsidies for certain activities, resulting in additional complexity. This puts corporations with vast amounts of recourses at a competitive advantage in the search for tax strategies and potential loopholes that could reduce their ETRs. Consequently, the final secondary hypothesis of this paper is the following:

H4: In acquisition deals following the implementation of the TCJA, high-value U.S. target firms experienced an increase in valuations relative to low-value U.S. target firms.

3.3 Prior literature on the TCJA's effects on U.S. corporations

The literature on the empirical effects of the TCJA is somewhat limited due to its recent passage. Our thesis contributes to a growing field of empirical studies that examine how the markets reacted to the corporate tax overhaul in the TCJA. Existing studies typically look at either stock market valuations or the level of corporate investments, while our thesis investigates the impact on target valuations in acquisition deals.

Generally, the first indications of investors' expectations will be found in the stock markets. Early evidence from 2017 shows significantly positive returns in the U.S. stock market following key dates in the passage of the TCJA (Gaertner et al., 2019). Wagner et al. (2018) present evidence that shares of companies that had high tax liabilities in the years prior to the

TCJA experienced significant abnormal returns in the period immediately following the 2016 election, implying that the market expected future tax cuts long before the TCJA went into effect. Edwards and Hutchens (2020) show similar results when studying the effects of the TCJA on IPO pricing and find an increase in offer prices after the TCJA.

Studies focusing on the period after the TCJA confirm that the passage of the reform had a positive impact on the valuations of listed firms, but that most of the effect first became priced in when the firms released their financial statements in early 2018 (Wagner et al., 2020). Chen and Koester (2020) find similar results by showing that analysts failed to incorporate the majority of the deferred tax adjustments of the TCJA in late 2017. These findings suggest that although the markets reacted to news about the Act, they found it difficult to estimate the full effects of the TCJA during the legislative process. Thus, most of the impact on valuations in the stock markets was seen after the reform came into force on January 1st, 2018.

Our study contributes to the literature on market pricing in response to the TCJA. First, we complement this research by investigating whether the valuation increase found in the stock markets are transferrable to acquisition deals. Second, we analyze whether the *timing* of the effect differs from the stock market by studying if news about the reform during the legislative period had an impact on the valuations of U.S. targets in acquisitions.

While stock prices respond to new information immediately, it typically takes a considerable amount of time to complete an acquisition. Since the data required for studying how the TCJA affects acquisitions takes longer to be publicly available, we are only recently seeing empirical studies on this subject. There are, however, some interesting findings in the literature already. Atwood et al. (2020) study the effect of the reform on U.S. MNCs' domestic acquisition activity and find that MNCs that had previously paid repatriation taxes were more likely to make a domestic acquisition announcement following the TCJA. Amberger and Robinson (2020) study foreign investments of U.S. MNCs and find a decrease in foreign investment after the TCJA. Both of these studies relate to ours; while they study the investment activities of U.S. firms by analyzing transaction *volume*, our study complements these papers by looking at the transaction *value* of deals involving U.S. targets. Thus, we contribute to the literature on how the TCJA affected acquisition deals.

In a broader sense, we also provide additional insight into how the corporate tax changes influenced the behavior of U.S. firms in general. As previously discussed, there are many ways

for corporations to spend additional cash deriving from tax cuts. Consistent with research from prior reforms (Blouin & Krull, 2009; Dharmapala et al., 2011; Graham et al., 2010), recent studies on the TCJA suggest that the reform has led companies to decrease their domestic debt (Bennett et al., 2019; Carrizosa et al., 2019), increase corporate payouts (Kalcheva et al., 2020), and increase capital investments (Hanlon et al., 2019). Our study then contributes to the growing literature on how the TCJA led to changes in the U.S. corporate landscape by influencing firms' behavior.

Lastly, we present evidence that the valuation effects of the TCJA were heterogeneous across different firms. Previous studies have found that the tax reductions for U.S. firms stemming from the TCJA varied significantly across various characteristics (Amberger & Robinson, 2020; Bennett et al., 2019; Dyreng et al., 2020; Hanlon et al., 2019; Kalcheva et al., 2020; Wagner et al., 2020). We add to these findings by researching whether the heterogenous tax reductions led to differences in the valuation effect for targets when controlling for industry, deal total target value, and international activities.

4. Empirical Setup, Data, Sample Selection, and Descriptive Statistics

4.1 Empirical setup

Our study aims to estimate the causal effect of the TCJA (treatment) on the valuations of U.S. firms. To achieve this, we combine a Propensity Score Matching (PSM) model with a difference-in-differences (DiD) regression to estimate the Average Treatment effect on the Treated (ATT) (Lechner, 2010). This method is well suited to estimate the effects of sharp changes in the economic environment or government policy (Angrist & Krueger, 1998), both of which are the case with the TCJA. When estimating the causal effect of a treatment like the TCJA, we face the problem often referred to as the problem of the missing counterfactual. Since all U.S. firms' tax treatments were affected by the TCJA, we do not know what would have been their valuation in an acquisition in the absence of the treatment.

We also encounter both the main types of self-selection bias of concern in DiD studies (Stuart et al., 2014). There is bias across *groups* since U.S. target firms (treated) are likely to be inherently different than foreign firms (controls) due to differences in, e.g., the business- and legal environment. In addition, there is bias across *time* since the composition of our sample firms changes pre- and post-TCJA due to different firms being acquired in each period.

Consequently, an additional complexity of not having a suitable control group is encountered in our analysis. If our analysis does not consider that firm-specific characteristics affect the chance of receiving treatment, it could yield a biased ATT due to confounding variables (Becker & Ichino, 2002). Thus, we risk assigning effects to the TCJA that could be a consequence of other factors. We eliminate these problems by using PSM introduced by Rosenbaum and Rubin (1983).

4.1.1 ATT and the problem of the missing counterfactual

We use the EBITDA multiple of the target as a valuation metric, which is discussed in section 4.2.2. Following Rosenbaum and Rubin (1983), we can denote the individual treatment effect of the TCJA on the EBITDA multiple paid by the acquirer for each acquisition target *i* as:

$$\Delta_i = EBITDA_i^{Affected\ by\ the\ TCJA} - EBITDA_i^{Not\ affected\ by\ the\ TCJA} \quad (1)$$

Any potential difference in the outcome can then be credited to the TCJA, and this parameter is commonly called the average treatment effect (ATE):

$$ATE = E(r_1) - E(r_2) \quad (2)$$

However, as only one of the outcomes in equation (1) can be observed for the same firm at the same time, we face the problem of not being able to estimate this effect. While experimental studies typically overcome this by introducing an intervention to a randomly selected treatment group and then comparing the outcome with a randomly selected control group (Szücs, 2014), we cannot follow a similar strategy since the participation in the treated group is decided by the target location.

The ATE calculates the difference in outcome conditional on participation in the treatment and constitutes the expected effect on any individual in the population that was randomly assigned to the treatment. An issue with the ATE is that it includes the effect of the treatment on individuals the treatment was never intended for in the first place (Heckman, 1997). Since the TCJA is an alteration of the U.S. tax code and thereby tailored to affect U.S. firms, it is less relevant to determine the effect it would have had on foreign firms. To isolate the valuation effect of the TCJA on U.S. firms specifically, we instead use the average treatment effect on the treated (ATT) in our analysis. The ATT is given by

$$ATT = E[Y_{i1} - Y_{i0} | D_i = 1] \quad (3)$$

where D = [0,1] is an indicator variable equal to one if the observation is treated, i.e., the target is located in the U.S.

4.1.2 Propensity Score

To solve the problem of self-selection in non-experimental studies, Rosenbaum and Rubin (1983) suggest using what they introduced as balancing scores b(x). This is a function of observable covariates x such that the conditional distribution of x given b(x) is the same for the treated and control group. An example of such a balancing score is the propensity score, which is defined as the conditional probability of receiving a treatment given pretreatment characteristics:

$$p(X) \equiv \Pr(D = 1|X) = E(D|X) \tag{4}$$

where D = [0,1] is the treatment indicator and X are the relevant pre-treatment characteristics.

Matching treated observations with controls based on this propensity score is commonly referred to as Propensity Score Matching (PSM). The goal of PSM is to achieve balance in the distribution of the covariates between the treated and control group and thus attempt to simulate a randomly selected experiment. Since the U.S. firms exposed to the treatment are likely to vary systematically from foreign firms, we need to create a control group where the decision to be affected by the TCJA is both random and not driven by these differences. If we are successful in doing this, we eliminate the self-selection bias in addition to constructing an appropriate control group on which the ATT can be estimated.

Hence, PSM controls for confounding variables and reduces potential bias in the outcome since the treated and control observations are similar with regard to the characteristics on which the propensity score was calculated. This comparable sample of foreign firms can then be used to evaluate what effect the TCJA had on the valuations of U.S. firms.

4.1.3 The probability of a target's tax treatment to be affected by the TCJA

The first step in PSM is to estimate a logistic regression predicting whether a given target's tax treatment is affected by the TCJA. Our dependent variable, *Treatment*, is an indicator variable equal to one if the target's tax treatment was affected by the TCJA, i.e., a U.S. target firm, and zero for all possible control firms, i.e., a foreign target firm. We model the determinants of a target *i* being treated at the acquisition announcement date *t* using the following covariates:

$$\begin{aligned} &PR(Treatment)_i \\ &= \beta_0 + \beta_1 LN(Revenue)_{i,t-1} + \beta_2 LN(Assets)_{i,t-1} \\ &+ \beta_3 LN(Sfunds)_{i,t-1} + \beta_4 Firm\_age_{i,t} + \beta_5 Listed_{i,t} + \beta_6 MNC_{i,t} \\ &+ \beta_7 Deal\_year_t + \beta_8 High\_earnings_{i,t-1} + \beta_9 LN(Target\_value)_{i,t} \\ &+ \beta_{10} Tar\_ind_{i,t} + \beta_{11} Acq\_ind_t + \varepsilon_{i,t} \end{aligned} \tag{5}$$

When constructing a propensity score matching model, it is important to be conscious of which covariates to include or exclude. As discussed by Caliendo and Kopeinig (2008), only variables that simultaneously influence the participation decision and the outcome variable should be

included. Dehejia and Wahba (2002) add that propensity scores should only be calculated with the characteristics considered important to the analysis. In line with this, we only include variables that are believed to influence both whether or not a target's firm tax treatment is affected by the TCJA *and* the EBITDA multiple paid by the acquirer in an acquisition. A complete description of the covariates included in the PSM is found in Appendix A.

We include covariates for the target's size in our matching regression, covering revenue (*Revenue*), total assets (*Assets*), and shareholders' funds (*Sfunds*), as larger firms are more likely to be located in the U.S. and hence be affected by the TCJA. Naturally, the financial aspects of a target company also influence the EBITDA multiple paid by the acquirer.

We include a covariate for the target firm age (*Firm_Age*), which is the number of years between the acquisition announcement year and the target's year of incorporation. In line with research done by Loderer et al. (2011), established firms tend to be valued at a discount due to their lower growth prospects relative to younger and more innovative firms.

Equation (5) also includes an indicator variable equal to one if the target firm is a publicly listed company (*Listed*) at the acquisition announcement date, and similarly an indicator variable for if the target firm is a multinational corporation (*MNC*). Our analysis includes these variables since U.S. firms are more likely to be listed or multinational relative to foreign firms. Hence, it affects the likelihood of a given target to be affected by the TCJA.

The propensity score model also takes into account the year of the acquisition (*Deal_Year*), in addition to the industry of the target (*Tar_Ind*) and acquirer (*Acq_Ind*). We include these covariates as we want to account for fluctuations in the economy in addition to industry-specific developments that influence both the willingness and ability to engage in an acquisition. These effects vary significantly across different industries and years, and ignoring this could cause bias in our results. Moreover, since the industry composition varies across different countries, the industries of the parties involved in acquisitions should be included in calculating the propensity score as it affects the likelihood of being a U.S. firm affected by the TCJA.

Furthermore, in line with research by Lie and Lie (2002), we include an indicator variable (*High_Earning*) equal to one if the target company has an EBITDA scaled by assets above 0.15 and hence is categorized as high earning. Lastly, we include the total target value (*Target_Value*), which ensures that target firms are matched as closely as possible in terms of their valuation.

4.1.4 Propensity Score Matching: Choice of matching method

After estimating the likelihood of each target's tax treatment to be affected by the TCJA given its pretreatment characteristics, the next step is the choice of matching method. There are many different propensity score matching techniques, and some of the most common are Stratification Matching, Radius Matching, Nearest-Neighbor Matching, and Kernel Matching. Each method has trade-offs between the quality and quantity of the matches, but none of them is considered superior to others (Becker & Ichino, 2002).

In our baseline analysis, we match each treatment firm to a control firm based on the propensity scores from equation (5) using a one-to-one nearest-neighbor (NN) matching algorithm with a caliper of 1% *with* replacement. The NN matching algorithm is frequently used and quite intuitive. Each U.S. target firm is matched with exactly one foreign target firm based on the propensity score, thus yielding a pair of firms that are most similar based on the matching covariates. One of the main advantages of NN matching is that each of the treated observations is assigned a match, given that a control observation is available inside of the defined caliper. This is especially important in our study to obtain an adequate sample size, as the post-TCJA treated group is limited due to the tax reform's recent passage. Since the controls in our study can be chosen more than once (matching *with* replacement), the control group can be smaller than the treated group.

4.1.5 Difference-in-differences regression framework

After creating the relevant control groups, the final step of our analysis is combining the PSM with a difference-in-differences (DiD) regression. While the standard difference-in-differences method uses longitudinal data to compare two groups across two time periods, we have repeated cross-sectional data since the firms (both treated and control) included in our analysis prior to the TCJA will be different than those included post the TCJA. As a result, we essentially have four groups that consist of different observations.

We combine the PSM matched sample before and after the TCJA and estimate the following OLS regression for deal *i* at acquisition announcement date *t*:

$$
\begin{aligned}
&EBITDA\ multiple_{i,t} \\
&= \beta_0 + \beta_1 Post_{\ t} + \beta_2 Treatment_i + \beta_3 Post_t * Treatment_i \\
&+ \beta_4 Hostile\_Takeover_{i,t} + \beta_5 Cash\_deal_{i,t} + \beta_6 Shares\_deal_{i,t} \\
&+ \beta_7 Public\_takeover_{i,t} + \beta_8 Recommended\_offer_{i,t} + \beta_9 PE\_seller_{i,t} \\
&+ \beta_{10} PE\_buyer_{i,t} + Industry\ Fixed\ Effects + \varepsilon_i
\end{aligned} \tag{6}
$$

A detailed description of the covariates included in the DiD is found in Appendix B. The dependent variable is the EBITDA multiple of the target in the deal (*EBITDA multiple*). *Post* is an indicator variable equal to one if the deal is completed or announced after the TCJA and captures the time trend, i.e., aggregate factors that would cause changes in the EBITDA multiple over time even in the absence of the TCJA. *Treatment* is an indicator variable equal to one if the target location is the U.S. and captures any inherent difference between the treatment and control groups prior to the TCJA. By interacting these two variables, we obtain the interaction variable (*Post * Treatment*), which is the DiD-estimate that captures the ATT. Thus, our coefficient of interest is β_3 which can be interpreted as the average causal effect of the TCJA on the EBITDA multiple paid by acquirers of U.S. targets. The difference-in-differences estimate can be denoted as

$$
\beta_3 = \left(EBITDA_{T,1} - EBITDA_{T,0}\right) - \left(EBITDA_{\bar{T},1} - EBITDA_{\bar{T},0}\right) \tag{7}
$$

where T is treatment status (T = U.S. targets and $\bar{T}$ = foreign targets), period 0 is pre-TCJA, and period 1 is post-TCJA.

We include deal-specific covariates, such as payment method and deal-type, in our DiD-model to control for the impact of these characteristics on target valuations. In addition, we include industry fixed effects for both the target and acquirer in our regression using factor variables. In line with our main hypothesis, we expect a positive coefficient on β_3 if the U.S. tax environment in fact became more favorable following the TCJA.

4.2 Data and Sample selection

4.2.1 Data

The dataset used in this study is gathered from Bureau van Dijk's Zephyr database, which contains comprehensive information on worldwide M&A deals, including descriptive

information about the deal itself, pre-deal value multiples, and information on both the acquirer and target.

We identify all acquisitions announced globally between January 1st, 2010, and December 31st, 2019, where the acquirer gains a majority stake in the target due to the deal. Consistent with prior research (Hanlon et al., 2015; Harford, 1999), we use the deal announcement date to determine the time at which the deal was agreed upon. We set the starting point of our analysis in 2010 and the ending point to 2019 to lessen any potential impact of the financial crisis and COVID-19 pandemic, respectively. Next, we link all targets in our sample to the Orbis company database using the identifiers provided by Bureau van Dijk. This allows us to retrieve their date of incorporation, listing status, and main countries of any foreign operations.

4.2.2 Valuation methods of firms

To test our hypotheses, we need a valuation metric that is both publicly available and reliable. There are multiple valuation techniques available, and two methods in particular are commonly used by investors when evaluating a potential investment. Each method differs in terms of assumptions and the data needed to perform the valuation.

The first method is the discounted cash flow (DCF) method, which is considered to be the most important valuation technique in M&As (Marren, 1993). Simply put, the method estimates future cash flows and discounts them with an applicable discount rate to come up with a proper valuation estimate of the target firm. The approach is highly dependent on the acquiring firm's choice of discount rate and assumptions about future profits, growth opportunities, and synergies between the two companies (Mukherjee et al., 2003). Thus, the DCF valuation results from a thorough analysis by the acquirer, and these estimations are seldom publicly available. Due to this, the method is not useful in our study when analyzing aggregate acquisition data.

The second method is the use of market multiples, which are ratios calculated using a combination of market values and items on the financial statement of the company of interest. Thus, multiples have an advantage compared to the DCF method because it is a single metric calculated on financial statement data often publicly available. A common multiple is the Enterprise-Value-to-EBITDA multiple. Many studies have looked at the accuracy of the EBITDA multiple when performing valuations. Baker and Ruback (1999) discuss the advantages and disadvantages of using multiples compared to DCF in valuations and state that

multiples are superior if firms are comparable and if the multiple can be estimated reliably. Lie and Lie (2002) study the accuracy of the EBITDA multiple and other market multiples by comparing their estimates to market valuations of listed firms. They find that the EBITDA multiple performs well across a large sample of medium to high earning firms.

We use the EBITDA multiple as a valuation metric in our study since it is likely to provide accurate valuation estimations on aggregate acquisition data matched on firm characteristics.

4.2.3 Sample selection

A detailed breakdown of the sample selection process is outlined in Table 2 on the following page and discussed below.

Table 2*:* Sample selection – Baseline model

This table shows the sample selection process for the baseline model. We obtain the initial acquisition data sample from Bureau van Dijk's Zephyr database. The final sample consists of 4,046 acquisitions announced between 2010 and 2019, which is used to calculate the propensity scores for both the U.S. and foreign target firms.

		No. of obs. dropped	*No. of obs. remaining*
Initial sample of global acquisitions available in Zephyr on October 5th, 2020			751,647
Less:	Acquisitions outside of period of interest (01.01.2010 – 31.12.2019)	403,367	348,280
Less:	Acquisitions with missing deal value	236,943	111,337
Less:	Acquisitions with missing values on the target's revenue, assets, shareholder funds or EBITDA	96,958	14,379
Less:	Non-takeover acquisitions (defined as a deal where the acquirer already had an initial stake in the target above 50% or a final stake below 50% after the deal)	3,908	10,471
Less:	Acquisitions of a target company located in a country with a non-advanced economy as classified by IMF	2,681	7,790
Less:	Acquisitions of targets classified as a start-up (up to and including three years old) or with missing date of incorporation	1,954	5,836
Less:	Acquisitions of targets with low (<= 0.05) EBITDA scaled on assets	1,238	4,598
Less:	Acquisitions with a deal status other than (1) Announced, (2), Completed, (3) Completed Assumed, or (4) Pending - awaiting regulatory approval	301	4,297
Less:	Acquisitions of targets with shareholder funds below $250,000 or total assets below $500,000	146	4,151
Less:	Duplicated acquisitions	47	4,104
Less:	Acquisitions with missing acquirer or target industry	18	4,086
Less:	Acquisitions with the 1% highest EBITDA multiples	40	4,046
Unmatched sample			**4,046**
	# U.S. targets before the TCJA		**654**
	# U.S. targets after the TCJA		**128**
	# Foreign targets before the TCJA		**2,415**
	# Foreign targets after the TCJA		**849**

The Zephyr database contains information on completed, pending, withdrawn, announced, and rumored deals. Naturally, all completed deals are of interest, but we also include deals that are yet to be completed (announced) as it can take up to several years for a corporate acquisition to be completed and the companies to be legally combined into a single entity. These deals contain valuable information on the effects of the TCJA, and excluding them from our sample could result in valuable information being missed. In addition to completed and announced deals, we also include a subcategory of pending deals. Specifically, we include deals that are

awaiting regulatory approval since these deals are agreed upon by the involved parties and, therefore, likely reflect the targets' true market value. We drop all deals for which pre-deal value multiples on revenue, assets, shareholders' funds, or EBITDA are missing, in addition to any deals with unknown deal value.

Since all deals with a foreign target are part of the control group, and all deals with a U.S. target are part of the treated group, we risk our results being biased since we do not properly account for country-specific factors. This could be especially problematic if some countries have a business- or legal environment that severely differs from the U.S. and thus influences these firms' valuations. An example of this could be differences in the level of corruption. Studies show high levels of corruption greatly increase the risk of investments and affect the willingness to pay for companies located in such countries (Olken & Pande, 2012). To limit any potential omitted-variable bias caused by differences in the target location, we reduce our control group to only include countries with similar political, legal, and economic traits as the U.S. We use a list of advanced economies provided by the International Monetary Fund (2020) and exclude all deals where the target location differs from these countries. The countries included in our sample and their key characteristics, both matched and unmatched, are attached in Appendix C.

Prior research has shown that the EBITDA multiple is very low performing when valuing firms with an EBITDA scaled on assets less than 0.05 (Lie & Lie, 2002). Since the EBITDA multiple is not suited to provide an accurate estimate of the valuations of these low earning firms, we exclude them from our analysis. The multiple also struggles to provide an accurate valuation estimate of start-up firms, as issues with asymmetrical information lead investors to rely on other non-traditional valuation techniques. For instance, venture capitalists often emphasize the qualities of the entrepreneur rather than the firm itself when evaluating a potential investment in a start-up (Festel et al., 2013). We use a general rule that defines companies as start-ups if they are three years or younger (Cockayne, 2019) at the deal announcement date and exclude all observations with target firms classified as start-ups from our analysis.

Following Amberger and Robinson (2020), we exclude observations with target shareholder funds below $250,000 or total assets below $500,000. Furthermore, as discussed by Eberhart (2004), one of the main problems with the use of multiples when valuing firms is that their distribution is positively skewed. This is due to the multiples having a lower boundary of zero but no upper limit. To lessen the effect of this skewness, we emit the top 1% EBITDA

multiples[6]. By doing so, we prevent our analysis from being driven by a few observations with abnormally large EBITDA multiples.

We are left with 4,046 deals (782 U.S. targets and 3,264 foreign targets). This is used to calculate the propensity scores for both the treated and untreated firms, which then serves as the basis for the matching algorithm that selects the control group. As the control group is more than four times larger than the set of U.S. targets and our matching is done with replacement and a caliper of 1%, an adequately close match is likely to be found for each U.S. target.

4.3 Descriptive statistics

Appendix D (Panel A and B) presents descriptive statistics for the *unmatched* data in the pre- and post-TCJA period for both U.S. and foreign firms. It shows that we indeed face self-selection bias since the average U.S. firm differs significantly from the average foreign firm. This difference in means is confirmed by strongly significant t-statistics on nearly all characteristics in both periods. This fundamental difference between U.S. and foreign firms illustrates why Propensity Score Matching is needed to balance the two groups to obtain non-biased effect estimates.

Because of these differences, the likelihood of a target receiving treatment is not random since the average value of a U.S. target in our sample is more than ten times larger than the average foreign target, in addition to U.S. targets being more established with more assets, higher revenue, and higher shareholder funds. The average U.S. target is also more likely to be an MNC in addition to being publicly listed, while the average foreign target firm has a higher EBITDA scaled on assets. The matching procedure's goal is to reduce these differences and achieve covariate balance amongst the observed pre-treatment characteristics included in the analysis.

[6] This constitutes 40 deals with an average EBITDA multiple of 353.9 and a maximum of 2597.3. Some of these outliers are assumed to be misrepresented in the Zephyr database. One such example is a deal from November 23rd, 2016 where L-3 acquired MacDonald Humfrey (Automation) Ltd. The EBITDA multiple reported by Zephyr is 998.23, although the purchase price represents an EBITDA multiple of about 10 considering the business' estimated earnings according to Nasdaq (Zacks, 2016).

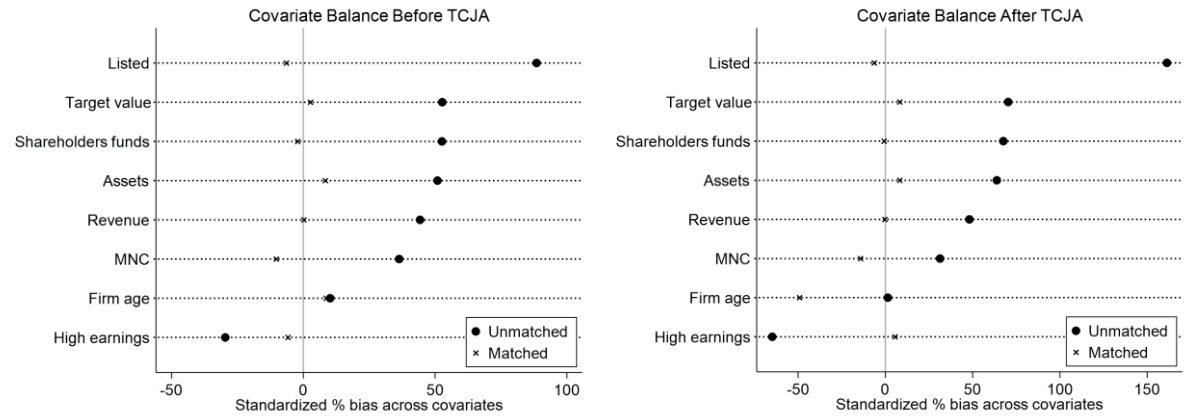
5. Empirical Results

5.1 Matching results

Appendix D (Panel C and D) presents descriptive statistics for the *matched* data in the pre- and post-TCJA period for both U.S. and foreign firms. If the PSM model successfully balances the samples, the t-statistics should be non-significant at the conventional 5% level, indicating that a difference in the means of the characteristics is no longer present. The results show that the PSM model was indeed successful in achieving covariate balance across all characteristics. Figure 1 below displays the reduction in bias graphically. While there is still some bias present, the overall reduction in bias is significant.

Figure 1: Covariate balances in the unmatched and matched samples

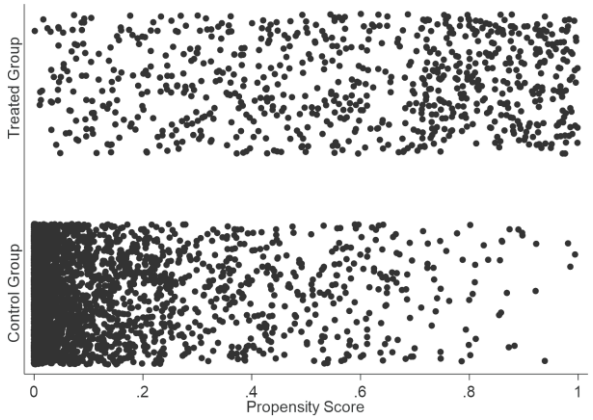
This figure illustrates the balancing of the covariates included the Propensity Score Matching in the unmatched and matched sample. See Appendix A for covariate descriptions. As evident, there is significant standardized bias in the unmatched samples in both periods. The standardized bias is the percentage difference of the sample means in the treated and non-treated sub-samples as a percentage of the square root of the average of the sample variances (Rosenbaum & Rubin, 1985). This bias is significantly reduced across most covariates due to the matching, indicating that our matching is successful in obtaining non-biased covariates.



Due to the 1% caliper in the NN matching, the treated group consists of fewer observations after the matching due to observations off common support being dropped. See Figure 2 on the following page for a definition of common support. This results in the pre-TCJA treated sample being reduced from 654 to 633 observations, and the post-TCJA treated sample being reduced from 128 to 80 observations. Thus, the treated group consists of 713 observations, which will be matched with 713 control observations, yielding a matched sample size of 1,426. While the caliper reduces the sample size and gives more weight to fewer observations, it improves the matching quality as only treated observations that find a control observation with a maximum deviation in the propensity score of 1% are included in the analysis.

Figure 2: Common support – Propensity Score Matching

This figure illustrates the propensity score distribution for the treated and control group before matching (4,046 observations). A risk of NN matching is bad matches if the closest neighbor is far away. This risk factor is largely eliminated by imposing a caliper that only includes a treatment observation if a sufficiently close control observation is found. As evident from the below figure, the propensity scores of the treated observations are fairly spread out while the control observations are particularly dense in the lower end (indicating non-similar firm characteristics to the average U.S. firm). We include a caliper of 1%, which results in a total of 69 observations (~9% of the treated sample of 782) being excluded from the analysis due to being off common support. Most of these excluded observations are in the upper tail of the distribution where a sufficiently close control observation is not available, even when matching with replacement.



5.2 Main hypothesis: the TCJA increased the valuations of U.S. target firms

Table 3 on the following page presents the main results of the analysis described in section 3. The coefficient of interest is the interaction term (*Post*Treatment),* which shows the estimated ATT; the change in target valuations due to the TCJA. Column (1) presents the results of equation (6) and shows a positive coefficient of the interaction term of 5.168, which is significant at the 5% level. According to these estimates, the TCJA increased the EBITDA multiple of U.S. targets by 32% on average (see Figure 3) and thus supports *H1*. Furthermore, the constant is also statistically significant at the 5% level, strengthening the impression that the model fits the data well.

Interestingly, the coefficient of *Treatment* is significant at the 10% level with a negative value of 1.632. This provides evidence that U.S. firms were systematically undervalued relative to their foreign competitors prior to the TCJA, possibly due to an uncompetitive tax system. Overall, the estimates in column (1) support *H1* while implying that the TCJA indeed induced a valuation premium on U.S. firms relative to similar foreign firms.

Table 3: Main results – Baseline model

Below are the results from the DiD regressions of the main model. Column (1) shows the results from the NN matching model described in section 4. In column (2), deal characteristics are excluded to examine the effect of this. Column (3) shows the results of the main model when replacement is not allowed in the NN matching. Column (4) shows the results when the complete dataset (including outliers) is used for the estimations. Lastly, column (5) shows the regression when all deals in the period between the 2016 election (09.11.2016) and the TCJA coming into effect (01.01.2018) are excluded.

	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Post	-2.725	-2.957*	-0.705	-2.923	-2.177
	(-1.51)	(-1.65)	(-0.36)	(-0.97)	(-1.19)
Treatment	-1.632*	-2.240***	-0.067	-1.992	-1.818*
	(-1.78)	(-2.66)	(-0.06)	(-1.31)	(-1.85)
*Post*Treatment*	5.168**	5.413**	1.773	5.571	5.047**
	(2.07)	(2.19)	(0.65)	(1.34)	(1.99)
Hostile takeover	-5.427***		-3.767	-6.535**	-6.861***
	(-2.84)		(-1.42)	(-2.06)	(-3.12)
All-cash deal	-0.747		-0.224	1.650	-1.124
	(-0.84)		(-0.23)	(1.15)	(-1.19)
All-shares deal	-2.861		-1.267	-4.765	-4.042**
	(-1.58)		(-0.52)	(-1.52)	(-2.10)
Public takeover	-2.979*		-3.986**	-1.724	-2.857*
	(-1.87)		(-2.15)	(-0.65)	(-1.72)
Recommended offer	1.805		0.910	-1.556	1.536
	(1.22)		(0.53)	(-0.64)	(0.99)
Private Equity seller	3.224***		3.498***	3.682*	2.842**
	(2.73)		(2.78)	(1.91)	(2.27)
Private Equity buyer	-1.329		-0.322	-1.722	-1.780
	(-0.60)		(-0.14)	(-0.44)	(-0.72)
Constant	20.31**	19.96**	19.17**	11.41	20.63*
	(2.05)	(2.01)	(2.03)	(0.60)	(1.80)
Including outliers?	No	No	No	Yes	No
Matching with replacement?	Yes	Yes	No	Yes	Yes
Including post-election period?	Yes	Yes	Yes	Yes	No
Observations	1426	1426	904	1426[7]	1313
R^2	0.210	0.194	0.161	0.098	0.207

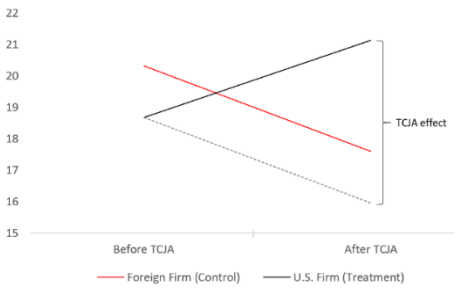
t statistics in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

[7] A total of 40 outliers are excluded in column (1) through (3), of which only three are in the treated sample (U.S.). None of these three outliers are on common support and thus are not included in the matched sample. Because of this, the number of observations does not increase in column (4) although outliers are included.

Figure 3: Difference-in-differences estimates of the EBITDA multiple

The graph below illustrates the EBITDA multiple of U.S. firms (black line) and foreign firms (red line) before and after the TCJA. Under the assumption that the treated observations (U.S. firms) would have experienced the same average change in the outcome variable (EBITDA multiple) as the non-treated observations (foreign firms) over time in the absence of the treatment (TCJA), the EBITDA multiple of U.S. firms would have declined from 18.678 to 15.952 (black dashed line). Instead, the U.S. firms' tax treatments were affected by the TCJA, which increased the EBITDA multiple by 5.168 (β_3) to 21.121. This constitutes an ATT of 32.4%, i.e., that the TCJA increased the average U.S. firm's value by 32.4%. *T-statistics in parentheses*.



EBITDA multiple	$D^{Post} = 0$ (Pre-TCJA)	$D^{Post} = 1$ (Post-TCJA)	Difference $(D^{Post}\|1 - D^{Post}\|0)$
$D^T = 0$ (Control)	β_0 = **20.31** *(2.05)*	$\beta_0 + \beta_1$ $= 20.31 - 2.725$ = **17.585**	$17.585 - 20.31$ = **- 2.725** *(-1.51)*
$D^T = 1$ (Treatment)	$\beta_0 + \beta_2$ $= 20.31 - 1.632$ = **18.678**	$\beta_0 + \beta_1 + \beta_2 + \beta_3$ $= 20.31 - 2.725 - 1.632 + 5.168$ = **21.121**	$21.121 - 18.678$ = **2.443**
Difference $(D^T - D^{\bar{T}})$	$18.68 - 20.31$ = **- 1.632** *(-1.78)*	$21.12 - 17.59$ = **3.536**	β_3 = **5.168** *(2.07)*

Given that the average EBITDA multiple of the 500 largest U.S. companies prior to the TCJA averaged from 12 to 15 (*Siblis Research*, 2020), an average U.S. EBITDA multiple of 18.678 pre-TCJA seems somewhat high. There are, however, large variations between industries. The average EBITDA multiple in the IT & Software industries in the U.S. have been 18-25 in the last years (*Statista*, 2020). As evident from Appendix F, our matched sample contains a large share of companies in these industries. Thus, the EBITDA multiple is inside of a reasonable range of what would be expected given our sample.

Although most deal-specific controls are not statistically significant, their coefficients can still be interpreted and provide insight into the model's overall credibility. As evident, firms acquired by Private Equity buyers are cheaper, while firms sold by Private Equity sellers are statistically more expensive on average. These effects are as expected since the private equity business model depends on improving the target firm's operating financials before exiting the position at an inflated market valuation. Our findings also suggest that firms acquired in a hostile takeover (such as a leveraged buy-out or with a bid not favored by management) are significantly cheaper, which is reasonable given that hostile bids are presented directly to the target firm's shareholders, who may be more prone than the management to focus on short-term profit rather than the long-term valuation and growth prospects of the target firm. The same explanation can be applied to the effect seen with public takeovers. Lastly, deals involving bids favored by management (*Recommended offer*) are more expensive on average, possibly representing bids in which the management recommends the shareholders to accept because it contains a sufficiently high deal premium.

In Column (2), we adjust our main model and exclude the deal characteristics to analyze the extent to which this affects the main findings presented above. The effects remain largely the same, and the interaction term remains significant at the 5% level with a slightly higher coefficient. Interestingly, *Treatment* now becomes significant at a 1% level with a negative coefficient of 2.240. This further supports the notion that U.S. firms were systematically undervalued prior to the TCJA. Overall, the inclusion of deal characteristics has little impact on our findings, and R-squared drops from 21% to 19.4%.

One of the choices mentioned in section 3 is that we allow for replacement in the nearest neighbor PSM. In column (3), we estimate the model from column (1) without allowing for replacement in the matching. With these specifications, we no longer find any significant effect of the TCJA, although the coefficient is still positive. This is likely due to a lack of comparable foreign firms because of the inherent differences between U.S. and foreign firms (see Figure 2). When matching *with* replacement, the foreign target firms with similar characteristics to the average U.S. firms are used multiple times as control observations. When this is not allowed, a sufficiently close match is not found, yielding many observations off common support and less power to the analysis, as evident from the drop in the number of observations and R-squared. This confirms the need for matching *with* replacement in order to achieve an adequate sample size on common support, as our sample contains too few foreign target firms with similar characteristics as the average U.S. firm.

In columns (1) through (3), the top 1% EBITDA multiples are emitted based on the reasoning given by Eberhart (2004) that the distribution of multiples is positively skewed. Column (4) presents the results of the same model as column (1) but including these outliers. While the estimated effect of the interaction term is still roughly the same, it is no longer statistically significant. The constant becomes significantly lower and non-significant, demonstrating one of the main problems with positively skewed data. This results in a few observations with arbitrarily high EBITDA multiples driving our results, making the linear DiD model a bad fit for the data. This is evident from looking at R-squared, which drops to 9.8%. These results support the decision to drop the outliers in our main model.

In columns (1) through (4), we look at the two periods before and after January 1st, 2018, to estimate the effects of the TCJA. As previously discussed, research on market reactions has shown that the expectations of the TCJA increased firm valuations in the stock market (Gaertner et al., 2019; Wagner et al., 2018, 2020). While January 1st, 2018 was the date the tax

reform came into force, one can argue that since the Republicans took control over both the executive (President) and legislative (Congress) branches of government in the 2016 election, the expectations of a future tax reform could have had an effect on target valuations in the period between the 2016 election and the TCJA came into force. Because of this, we would expect a larger effect of the TCJA when excluding these observations from the pre-TCJA sample. To test this hypothesis, we re-estimate the model in column (1) while excluding all observations between November 9th, 2016 (the day after the election) and January 1st, 2018. The results of this estimation are presented in column (5) of Table 3. The effect of the TCJA remains significant at the 5% level with approximately the same coefficient. Given that the coefficient becomes slightly lower in this model, however, our results provide no evidence of an increase in target valuations in anticipation of a future tax reform similar to the one observed in public firm valuations (Gaertner et al., 2019; Wagner et al., 2018, 2020). This supports the findings of Chen and Koester (2020) that analysts failed to incorporate the vast majority of the deferred tax adjustments of the TCJA during the legislative process.

5.2.1 Robustness of main findings

There are three main concerns with our findings. First, the econometric model might not account for all confounding variables, which raises doubts as to whether the findings can be interpreted causally. It is also unclear if U.S. firms would have experienced the same decline in valuations as foreign firms in the absence of the TCJA. Second, there are data restrictions due to the recent passage of the TCJA in addition to questionable outliers in the Zephyr M&A database. Third, our findings may be sensitive to the choice of matching method.

Causal inference

In general, our results can be used for causal inference if the underlying assumptions of both PSM and DiD are met. While PSM helps with the fundamental problem of confounding effects due to the non-randomization of subjects to the treatment group, a critical underlying assumption is the assumption of no unobserved confounders[8]. While randomized experiments can stochastically balance all observed and unobserved covariates, PSM can only achieve balance in the observed covariates (Rubin, 2001). Therefore, this assumption is difficult to meet

[8] There are other underlying assumptions of PSM, but the assumption of no unobserved confounders is assumed to be the most critical. This assumption is referred to (Battistin & Chesher, 2014) as unconfoundedness (Rosenbaum & Rubin, 1983), selection on observables (J. J. Heckman & Robb, 1985) or conditional independence assumption (Lechner, 1999). It can be written $(Y_1, Y_0) \perp D|X$, i.e. that when controlling for X observable covariates, the outcome is independent of treatment status since the assignment to treatment is random. If the assumption is met, an unbiased counterfactual for the treatment group can be constructed (Caliendo & Kopeinig, 2008).

as it states that *all* covariates that are potential confounders must be observed and included in the matching to adjust for them. If successful, the effects seen are then due to the treatment alone rather than other confounding factors, and the results can therefore be used for causal inference.

While our PSM model in equation (5) includes a wide range of pre-treatment firm characteristics such as financials and industries, there are other potential confounders not included, such as the number of patents, number of employees, average wage, debt, and leverage ratios. These variables are not included due to the lack of available data. While there are data available on some of these variables in the Orbis and Zephyr databases, there are too many missing values to yield an adequate sample size for the PSM model. Thus, these covariates may not be balanced between the treatment and control group since they are not included in the analysis. This could affect the propensity scores, resulting in an analysis that effectively compares apples and oranges. Although the most influential pre-treatment firm characteristics for firm valuations are likely included in the PSM, it might not account for *all* confounding variables. Thus, it is not clear if our findings can be interpreted causally.

Furthermore, the most important assumption in DiD is the assumption of parallel trends. It states that in the absence of the treatment, the treatment and control groups would have had the same trend in the outcome variable across time (Stuart et al., 2014). In other words, it assumes that the decline seen in the valuations of foreign firms reflects what would have happened with the valuations of U.S. firms in the absence of the TCJA. If this is true, the DiD method provides unbiased effect estimates that can be used for causal inference. When multiple pre-treatment periods exist, the assumption can be tested by looking for pre-treatment trends in the treatment and control groups. We cannot test the assumption since our analysis only has one pre-treatment period (before the TCJA). Still, the pre-treatment trends are likely to be reasonably similar due to the matching and since only targets in advanced economies (IMF, 2020) are included in our analysis.

Moreover, we hypothesized two main ways in which the TCJA could change the valuations of U.S. firms: the reduction in taxes and a change in firm behavior. While most of the valuation effect found in our study is likely to stem from the former, there could still be some bias from the latter effect present in our analysis. While this bias should be relatively small given the matching, our analysis is unlikely to only catch the effect of lower taxes due to unobserved covariates. Examples of unobserved covariates related to firm behavior include firms changing

their leverage or altering their number of employees due to the TCJA, both of which could affect their valuations. This might result in bias in our model since this change in valuation could be assigned to either the TCJA or other control variables while it was actually due to an unobserved change in firm behavior.

Data restrictions

The second concern with our findings is data restrictions, which are closely related to the first concern. Since the TCJA was recently passed, the sample of acquisitions with U.S. targets in the post-period with the required data is limited. Therefore, the effect of the TCJA is calculated on 80 firms that are not necessarily representative of the average U.S. firm, which could imply that our findings are not transferrable to the general population of U.S. firms. There are also questions to what extent our findings are driven by outliers in either tail. The effect of the TCJA becomes non-significant in Column (4) of Table 3 when outliers are included, indicating that our findings are sensitive to this. In addition, as evident from the outliers removed, there are possibly errors in the Zephyr database, which may further impact our findings.

Sensitivity to matching method

The third concern with our findings is the sensitivity to the matching method and procedure. The PSM estimators differ in three main ways: how the neighborhood of each treated observation is defined, how the common support problem is handled, and which weight is given to the neighbors (Caliendo & Kopeinig, 2008). As evident from Column (3) of Table 3, when matching *without* replacement, the effect of the TCJA is no longer statistically significant when changing how we define common support. Changing how the neighborhood is defined (e.g., Kernel, Radius, or Stratification instead of Nearest Neighbor) could also affect the PSM estimators. While the NN matching with replacement and a caliper of 1% is a well-suited matching procedure given our data sample (see Appendix D or Figure 1), there are essentially unlimited ways of using PSM when altering the three parameters mentioned by Caliendo and Kopeinig. This is a common critique of PSM, which could cause researcher bias. Thus, a concern with our findings is that they are not necessarily constant across different adjustments to the PSM method and procedure.

5.3 Heterogeneity analyses

To narrow down the effects of the TCJA, we do a variety of sample splits designed to detect differences in how valuations are impacted dependent on firm-specific factors. Unfortunately, the small size of our final sample limits the scope for additional heterogeneity analyses. Thus, we split the sample into large subgroups to have enough power to obtain significant results. We proceed with column (1) from Table 3 as this is the best-fitted model for our data given the explanatory power and perform heterogeneity analyses on this model. Table 4 on the following page presents the main results of these heterogeneity analyses.

5.3.1 H2: Domestic target firms experienced an increase in valuations relative to U.S. MNCs

To test *H2*, we re-estimate the main model while only including observations with domestic or multinational target firms. These analyses are shown in columns (2) and (3) of Table 4, respectively. For the domestic firms, the estimated effect of the TCJA remains significant at the 5% level, and the coefficient increases from 5.168 to 6.681. This constitutes an ATT of 50%, implying that the valuation effect is concentrated among the domestic firms. This is supported by the results in column (3), where only MNCs are included. The interaction term's coefficient is 1.307 and no longer significant, suggesting that U.S. MNCs experienced a non-significant valuation increase of 6% due to the TCJA.

Combined, these results are in line with our expectations and imply that the domestic firms were the greater beneficiaries of the corporate tax cuts in the TCJA. This analysis supports *H2* and provides enough evidence to establish that the tax reduction mainly increased the valuations of U.S. domestic firms. Thus, our results support the findings of Dyreng et al. (2020) that the domestic firms benefited the most from the TCJA.

Table 4: Main results – Heterogeneity analyses

Below are the results of the DiD regressions in our heterogeneity analyses. The results from our main model are included in column (1) for comparison. Columns (2) and (3) present the results when including only domestic firms and MNCs, respectively. MNCs are identified as companies with significant foreign operations, as reported by Orbis. Columns (4) and (5) show the results when running the DiD regression on firms classified as manufacturers or service providers using SIC major group (a two-digit SIC code equal to 39 or below are classified as manufacturers, while a two-digit SIC code of 40 and above are classified as service providers). In column (6) and (7), the sample is split using the median deal total target value (see Appendix A).

	(1) Main model	**(2)** Domestic	**(3)** MNCs	**(4)** Services	**(5)** Manu-facturing	**(6)** Low value	**(7)** High value
Post	-2.725	-3.932*	1.972	-0.829	-7.258***	-2.435	-4.629*
	(-1.51)	(-1.87)	(0.47)	(-0.32)	(-2.85)	(-1.10)	(-1.68)
Treatment	-1.632*	-3.440***	0.984	-2.637*	0.228	0.717	-2.878**
	(-1.78)	(-3.06)	(0.53)	(-1.93)	(0.18)	(0.62)	(-2.12)
*Post*Treatment*	5.168**	6.681**	1.307	4.996	8.170**	5.385*	7.521**
	(2.07)	(2.34)	(0.22)	(1.42)	(2.37)	(1.77)	(2.02)
Hostile takeover	-5.427***	-2.020	-7.655**	-6.442**	-4.395	-3.391	-7.134***
	(-2.84)	(-0.81)	(-2.37)	(-2.48)	(-1.56)	(-1.32)	(-2.74)
All-cash deal	-0.747	0.005	-0.236	-1.324	1.277	1.494	-0.552
	(-0.84)	(0.00)	(-0.13)	(-1.01)	(1.05)	(1.40)	(-0.38)
All-shares deal	-2.861	-4.788**	2.221	-6.286**	2.633	-5.806*	-0.361
	(-1.58)	(-2.42)	(0.47)	(-2.26)	(1.10)	(-1.86)	(-0.16)
Public takeover	-2.979*	-2.123	-10.40***	-1.912	-4.618*	-4.250**	-4.588**
	(-1.87)	(-1.15)	(-3.06)	(-0.90)	(-1.92)	(-2.11)	(-1.98)
Recommended offer	1.805	3.351*	2.885	1.099	1.988	1.880	2.779
	(1.22)	(1.92)	(0.96)	(0.54)	(0.92)	(1.02)	(1.28)
Private Equity seller	3.224***	2.599*	4.441*	1.101	6.681***	3.193**	6.102***
	(2.73)	(1.88)	(1.76)	(0.66)	(4.09)	(2.31)	(3.26)
Private Equity buyer	-1.329	-1.619	-2.770	1.407	-7.979**	2.440	-7.018
	(-0.60)	(-0.66)	(-0.55)	(0.49)	(-2.18)	(1.16)	(-1.31)
Constant	20.31**	20.61	19.95*	17.22***	19.40**	31.75*	15.89
	(2.05)	(0.97)	(1.78)	(6.19)	(2.22)	(1.80)	(1.39)
Observations	1426	1036	390	761	665	714	712
R^2	0.210	0.248	0.352	0.270	0.243	0.192	0.432

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5.3.2 H3: U.S. manufacturers experienced an increase in valuations relative to U.S. service providers

Next, we test if there is a heterogeneous valuation effect between manufacturers and service providers. Columns (4) and (5) of Table 4 re-estimate the main model, including only service providers and manufacturers, respectively. For service providers, the effect of the TCJA is positive, with a coefficient of 4.996, suggesting a valuation increase of 36%. This effect, however, is non-significant even at the 10% level. Column (5) shows that the valuation effect of the TCJA is concentrated in the manufacturing sector with a positive coefficient of 8.170, suggesting a significant (at the 5% level) valuation increase of 66%. The overall fit of both models is good, as evident the higher explanatory power than the main model in column (1).

The significant difference between the interaction terms' coefficients is sufficient to establish a heterogeneous valuation effect between service providers and manufacturers. Our study thus complements the research by Ohrn (2019) and Djankov et al. (2010) that the policy of bonus depreciation and a reduction in corporate tax rates have large effects on investments in the U.S. manufacturing sector, making them more attractive in the eyes of acquirers. Our findings support *H3*.

5.3.3 H4: High-value U.S. target firms experienced an increase in valuations relative to low-value U.S. target firms

In the last heterogeneity test, we differentiate between high- and low-value targets by splitting the matched sample at the median of the deal total target value. In our data sample, the deal total target value (see Appendix A) equals the market value of equity used in the study by Wagner et al. (2020). Columns (6) and (7) of Table 4 re-estimate the main model for low- and high-value targets, respectively.

For low-value targets, the effect of the TCJA is 5.385 and significant at the 10% level. Similarly, the effect of the TCJA for high-value targets is 7.521 and significant at the 5% level. Even though this indicates that high-value targets benefitted slightly more from the TCJA than low-value targets, the difference between the interaction terms is minimal. Since there is a positive and significant (at the 10% level) valuation effect present in both groups, we do not find enough evidence to support *H4*.

Even though the analysis cannot establish a significant valuation difference between high- and low-value targets, our findings still compliment the research by Wagner et al. (2020) by looking

at the TCJA's impact on the valuations of high-and low-value firms rather than their effective tax rates only. This provides further evidence on the heterogeneous effects of the TCJA and indicates that the already valuable firms benefitted slightly more from the tax reform.

5.3.4 Robustness of heterogeneity analyses

The concerns of our main model are also present in the heterogeneity analyses. In addition to the same doubts about whether the findings can be interpreted causally and their sensitivity to the choice of matching method, the data restrictions become even stronger when splitting the sample further. Since the post-TCJA treated sample contains only 80 observations, splitting the sample into smaller samples will cause the findings to be driven by even fewer observations. The post-TCJA treated sample contains only 15 MNCs (65 domestic firms) and 34 manufacturing firms (46 service providers), which raises further doubts as to whether the valuation effects of the TCJA on these firms are applicable to the general population of U.S. MNCs and manufacturers.

Even though our findings suggest heterogeneous effects in all three heterogeneity analyses, these results should only be interpreted as indications since analyses on data samples of this size provide limited opportunity to interpret the results causally. In addition, when testing differences in coefficients (in this case, the interaction term) across different subsamples, there is not enough power to reject the test's hypothesis[9] based on data samples of this size. Further analyses on larger datasets are required to confirm these effects statistically.

[9] There are different statistical tests for testing the equality of coefficients from two different regressions. Following Clogg et al. (1995), a possible analysis is a Z-test using $Z = \frac{\beta_1 - \beta_2}{\sqrt{(SE_{\beta_1})^2 + (SE_{\beta_2})^2}}$. Another possibility is the Chow Test (Chow, 1960). Both of these tests yield non-significant p-values (>0.05) for all three heterogeneity analyses. However, because of the low power, it is not feasible to draw any conclusions based on the results of these tests.

6. Conclusion

Tax policy affects all participants in the economy. Changes in taxes influence the behavior of both corporations and individuals, and empirical research is key to understand the consequences of such policy changes. This type of research can help policymakers make more informed decisions on future alterations of the tax code. Our paper contributes to a growing field of literature on the effects of the TCJA by studying target valuations in acquisition deals. The TCJA introduced large changes to the U.S. corporate tax system by reducing the federal statutory corporate tax rate from 35% to 21% and moving from a worldwide to a partially territorial tax system. Our results show that the average U.S. target firm received a significant 32% increase in its valuation following the reform while inducing a valuation premium on U.S. firms relative to similar foreign firms. This finding is in line with our expectations.

While the reduction in the federal statutory corporate tax rate affects all U.S. firms, the TCJA included multiple key provisions that could cause heterogeneous effects between firms. We conducted several heterogeneity analyses to investigate which type of firms that benefitted the most from the TCJA. Our results provide evidence that the valuation effects were not evenly distributed between U.S. firms. The TCJA favored manufacturing firms, possibly due to the tax advantages of assets (Ohrn, 2019) and the reduction in the federal statutory corporate tax rate (Djankov et al., 2010). Consistent with prior research (Dyreng et al., 2020), we find that domestic firms benefitted more from the TCJA than MNCs, likely due to the new GILTI, FDII, and BEAT provisions. We also examined if there were heterogeneous effects depending on deal total target values. Although our results cannot establish a significant valuation difference between high- and low-value firms, they still indicate that the high-value firms benefitted the most from the tax reform.

This paper examines only a small potential effect of the corporate tax changes in the TCJA. Several other interesting topics could be further explored in this field to supplement our findings. Doing a similar study as ours when more data is available would be a natural extension of our study and could provide new insights into the topic. If consistent results are found in the future, it would support the findings of this paper. Another interesting aspect would be how the tax reform affected the financial statements of the acquired firms in our sample. Since the TCJA increased the valuations of U.S. targets, this should be reflected in their future financial statements by an increase in their after-tax income. Thus, a suggestion for a future study is to collect financial data for the firms in our sample and study this panel data to examine

whether the premium paid by the acquirers were reflected in the financial performance of the target firms.

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8. Appendix

Appendix A: Variable Definitions – Propensity Score Matching

Below are the definitions of the variables used in the Propensity Score Matching. The data is gathered from Bureau van Dijk's Zephyr and Orbis databases.

Variable	***Description***	***Source***
LN(Revenue)	The natural logarithm of the target's total revenue in the last available year prior to the deal announcement date.	Zephyr
LN(Assets)	The natural logarithm of the target's total assets in the last available year prior to the deal announcement date.	Zephyr
LN(Sfunds)	The natural logarithm of the target's shareholders' funds in the last available year prior to the deal announcement date.	Zephyr
Firm_age	The number of years the target has been in business at the deal announcement date, calculated using $$\text{Firm age} = \text{Deal announcement year} - \text{Year of incorporation}$$	Zephyr Orbis
Listed	Indicator variable set to one for a target firm which was publicly traded at the deal announcement date, and zero otherwise. A firm is considered listed at the deal announcement date if (1) Orbis reports it as listed with no IPO or delisting date, (2) Orbis reports it as listed with an IPO date prior to the deal announcement date and no delisting date before the deal announcement date, or (3) Orbis reports it as unlisted with an IPO date prior the deal announcement date and a delisting date after the deal announcement date.	Orbis
MNC	Indicator variable set to one for a target considered a multinational corporation. A firm is considered an MNC if Orbis reports one or more countries as its' "Main foreign countries or regions".	Orbis
Deal_year	Factor variable for each year in our sample (2010 – 2019).	Zephyr
High_earnings	Indicator variable set to one for target firms with an EBITDA scaled on assets above 0.15, and zero otherwise. It is calculated using the last available financial figures prior to the deal announcement date as follows: $$\text{EBITDA scaled on assets} = \frac{\text{EBITDA}}{Assets}$$	Zephyr
LN(Target_value)	The natural logarithm of the target value, calculated using $$\text{Deal Total Target Value} = \frac{\text{Deal value}}{\%\ \text{acquired}}$$	Zephyr
Tar_ind *Acq_ind*	Factor variable for the industry of both the target and acquirer, as reported by Orbis as primary BvD industry. If multiple industries are reported for either the target or acquirer, we keep the first. There are 29 unique industries, as evident from Appendix E.	Zephyr

Appendix B: Variable Definitions – Difference-in-Differences regression

Below are the definitions of the variables used in the DiD regressions. The data is gathered from Bureau van Dijk's Zephyr database.

Variable	***Description***	***Source***
EBITDA multiple	The EBITDA multiple of the target at the deal announcement date, calculated using $$\text{EBITDA multiple} = \frac{\text{Enterprise Value}}{EBITDA} = \frac{\text{Deal Total Target Value}}{EBITDA}$$ EBITDA is the target's EBTIDA in the last available year prior to the deal announcement date.	Zephyr
Post	Indicator variable set to one for observations after the TCJA (2018 – 2019), and zero otherwise.	Zephyr
Treatment	Indicator variable set to one for observations with U.S. targets, and zero otherwise.	Zephyr
*Post * Treatment*	Interaction variable between *Post* and *Treatment* (the DiD estimator)	Zephyr
Hostile_ Takeover	Indicator variable set to one for hostile acquisitions, and zero otherwise. We include observations where Zephyr adds "Leveraged buy out" or "Hostile bid" as a sub-deal type. Leveraged buyouts are typically considered a variation of a hostile takeover as it is usually not favored by the current management. "Hostile bids" include public takeovers where the management board of the target company does not recommend the bid to the company's shareholders.	Zephyr
Cash_deal	Indicator variable set to one if the only payment method of a deal is cash, and zero otherwise. We include all three types of cash reported by Zephyr: "Cash", "Cash Reserves" and "Cash assumed".	Zephyr
Shares_deal	Indicator variable set to one if the only payment method of a deal is "Shares", and zero otherwise.	Zephyr
Public_ takeover	Indicator variable set to one for public takeovers, and zero otherwise. We include observations where Zephyr adds "Public Takeover" as a sub-deal type. These are deals in which the acquirer makes a public offer to the shareholders of a listed target company, and the offer results in the acquirer owning all the shares of the target. The target company's shares will then be delisted from its' current stock exchange(s).	Zephyr
Recommen-ded_offer	Indicator variable set to one for a recommended bid, and zero otherwise. We include observations where Zephyr adds "Recommended Bid" as a sub-deal type. These are deals in which the management board of the target company has agreed that the terms of the takeover offer are fair and recommended that their shareholders accept the offer.	Zephyr
PE_seller	Indicator variable set to one if the seller of a company is a Private Equity or Venture Capital company, and zero otherwise. We include observations where Zephyr adds "Exit", "Exit – Partial" or "Exit – New Stake" as a sub-deal type. These are deals in which the Venture Capital/Private Equity company disposes of all its investment in the target company ("Exit"), sells only part of its stake ("Exit – Partial") or sells its stake but also obtains a stake in the company that is acquiring it ("Exit – New Stake").	Zephyr
PE_buyer	Indicator variable set to one if the buyer of a company is a Private Equity or Venture Capital company, and zero otherwise. We include observations where Zephyr adds "Build Up" as a sub-deal type. These are deals in which a Private Equity company builds up the company it owns by acquiring other companies to amalgamate into the larger firm, thus increasing the total value of its investments through synergies between the acquired companies.	Zephyr

Appendix C: Countries included in the analysis

Below is a detailed breakdown of the countries included in our dataset. As evident, we have observations from 32 unique countries in our unmatched sample. In general, observations from countries with a low average deal value is not included in the matched sample as they are too different from the average U.S. firm. Note that the number of observations in the matched sample for some countries is higher than the number of observations in the unmatched sample. This is due to the matching *with* replacement (control observations can be used more than once).

	Unmatched (total) sample			**Matched sample**		
Country	Obs.	Avg. deal value*	Avg. EBITDA multiple	Obs.	Avg. deal value*	Avg. EBITDA multiple
1. Australia	247	586,798	12.89	123	3,343,208	20.06
2. Austria	13	406,269	10.74	2	350,359	10.63
3. Belgium	60	271,980	17.03	7	802,171	20.86
4. Canada	242	973,725	12.56	132	3,352,846	12.75
5. Cyprus	2	207,885	6.33	3	410,953	11.65
6. Czech Republic	49	159,699	8.50	4	1,312,692	8.58
7. Denmark	19	486,311	12.99	1	3,200,457	10.87
8. Estonia	12	50,311	14.72	-	-	-
9. Finland	83	365,017	14.75	16	5,117,801	23.75
10. France	192	461,094	18.70	39	2,822,658	37.40
11. Germany	142	524,995	17.12	46	1,874,229	35.26
12. Greece	23	163,639	13.62	-	-	-
13. Iceland	2	106,911	10.31	-	-	-
14. Ireland	21	2,186,238	17.71	3	42,900,000	16.76
15. Italy	336	303,238	11.30	45	3,801,367	19.21
16. Japan	54	1,129,208	12.39	41	2,443,106	12.79
17. Latvia	1	55,656	4.31	-	-	-
18. Luxembourg	4	236,023	9.24	1	715,723	14.49
19. Netherlands	23	259,581	15.67	2	1,467,584	9.52
20. New Zealand	37	281,445	10.30	6	1,042,878	8.10
21. Norway	79	112,441	10.89	15	246,734	14.91
22. Portugal	63	355,627	12.01	4	1,238,820	21.81
23. Republic of Korea	367	170,695	13.06	56	1,303,291	11.14
24. Singapore	18	436,683	7.24	9	529,098	9.29
25. Slovakia	13	77,837	17.06	2	132,199	17.89
26. Slovenia	40	66,810	7.61	2	105,155	5.08
27. Spain	257	323,753	13.88	18	3,580,724	14.40
28. Sweden	205	80,968	12.10	11	1,231,859	19.38
29. Switzerland	6	8,545,535	12.73	16	34,978,322	13.20
30. Taiwan	22	632,487	13.66	13	4,798,839	6.80
31. United Kingdom	632	278,654	12.81	96	1,668,542	15.40
32. United States of America	782	4,638,740	16.10	713	3,780,747	16.04
Total	4046	1,215,484	13.75	1426	3,646,972	16.92

* *Numbers in thousands*

Appendix D: Descriptive Statistics for Treatment and Control Firms

The below panels show descriptive statistics for the treatment (U.S.) and control (foreign) samples before and after matching. The reported t-statistics are obtained using a two-sample t-test for a difference in means (treatment vs. control sample). Panel A and B show the samples *before* matching. The high t-statistics across most covariates in both periods (except firm age in post-period) indicate a significant difference in the means. This confirms the need for matching. Panel C and D show the samples *after* matching. As evident, the t-statistics are significantly reduced and fall within the default 95% confidence level (t-statistic below 1.96). Thus, there are no longer significant differences in the means, and we achieve covariate balancing due to the Propensity Score Matching.

Panel A: Summary statistics in the pre-period *before* matching

	Treatment sample		**Control sample**		
	Mean	Std.Dev	Mean	Std.Dev	t-statistic
*Revenue**	2,124,891	5,884,618	245,134	1,145,335	14.7
*Assets**	2,948,794	7,245,504	298,312	1,246,182	17.1
*Sfunds**	1,039,420	2,389,931	128,018	528,338	17.3
*Target_value**	4,015,506	9,490,778	410,200	1,832,937	17.5
Firm_age	24.73	20.69	22.72	20.81	2.19
MNC	.2569	.4372	.1193	.3242	8.89
Listed	.5673	.4958	.1764	.3812	21.7
High_earnings	.3394	.4739	.4836	.4998	-6.62
Observations	654		2415		3069

Panel B: Summary statistics in the post-period *before* matching

	Treatment sample		**Control sample**		
	Mean	Std.Dev	Mean	Std.Dev	t-statistic
*Revenue**	3,723,014	10,213,474	226,350	1,077,862	9.65
*Assets**	6,435,848	13,503,742	301,475	1,525,663	12.7
*Sfunds**	2,082,524	4,026,026	135,127	617,428	13.1
*Target_value**	7,823,076	14,965,555	353,031	1,188,575	14.3
Firm_age	24.95	19.98	24.64	22.84	0.14
MNC	.2031	.4039	.0919	.2890	3.83
Listed	.7891	.4096	.1614	.3681	17.7
High_earnings	.1953	.3980	.4888	.5002	-6.34
Observations	128		849		977

Panel C: Summary statistics in the pre-period *after* matching

	Treatment sample		**Control sample**		
	Mean	Std.Dev	Mean	Std.Dev	t-statistic
*Revenue**	2,044,449	5,831,724	2,035,846	3,914,263	0.03
*Assets**	2,825,928	7,046,676	2,392,836	4,563,257	1.30
*Sfunds**	1,015,089	2,397,299	1,052,412	1,874,774	-0.31
*Target_value**	3,815,126	9,111,079	3,631,466	7,546,078	0.39
Firm_age	24.86	20.7	23.06	19.32	1.60
MNC	.2575	.4376	.2970	.4573	-1.57
Listed	.5624	.4965	.5908	.4921	-1.02
High_earnings	.3397	.4740	.3681	.4827	-1.06
Observations	633		633**		1266

Panel D: Summary statistics in the post-period *after* matching

	Treatment sample		**Control sample**		
	Mean	Std.Dev	Mean	Std.Dev	t-statistic
*Revenue**	1,772,534	3,330,321	1,794,269	3,266,133	-0.04
*Assets**	3,423,907	9,450,676	2,634,891	3,460,618	0.70
*Sfunds**	1,097,116	2,435,873	1,119,013	1,333,346	-0.07
*Target_value**	3,508,720	8,791,701	2,640,370	2,654,819	0.85
Firm_age	25.74	20.63	36.29	48.40	-1.79
MNC	.1875	.3928	.2375	.4282	-0.77
Listed	.7000	.4611	.7250	.4493	-0.35
High_earnings	.2125	.4117	.1875	.3928	0.39
Observations	80		80**		160

** Numbers in thousands*

*** Since we are using NN matching with replacement, the control sample will contain duplicated observations. These control samples in the pre- and post-period consist of 299 and 54 unique observations, respectively.*

Appendix E: Industries included in the analysis – unmatched sample

Below is a detailed breakdown of the industry classifications included in our unmatched sample. The industries of the target and acquirer are used as matching covariates in the Propensity Score Matching in addition to industry Fixed Effects in our DiD-regressions. Orbis reports multiple variations of industry classification, including SIC, NACE, NAICS, and BvD industry. Classifying firms based on SIC Major Group (2-digits) is too narrow, and SIC Industry Group (3-digits) is too wide given our sample size. We instead classify the firms according to the BvD major industry as reported by Orbis, consisting of 29 unique industries closely related to the SIC classifications. As evident from the below table, there are large variations in the average deal value and EBITDA multiple across the different industries. As expected, the largest EBITDA multiples are in Biotechnology & Life Sciences and Computer Software, and the most valuable companies are in Computer Hardware, Media & Broadcasting, and Communications.

	Acquirer		**Target**		
Industry	Obs.	Avg. deal Value*	Obs.	Avg. deal value*	Avg. EBITDA multiple
1. Agriculture, Horticulture & Livestock	19	295,022	25	246,351	13.08
2. Banking, Insurance & Financial Services	547	927,437	162	1,698,371	13.22
3. Biotechnology and Life Sciences	37	483,604	44	902,670	22.72
4. Business Services	493	572,603	377	563,339	12.96
5. Chemicals, Petroleum, Rubber & Plastic	267	2,661,915	272	2,501,513	14.70
6. Communications	118	3,652,257	119	1,877,990	11.83
7. Computer Hardware	23	5,627,370	21	5,970,991	13.88
8. Computer Software	339	763,695	449	548,484	19.52
9. Construction	111	367,698	111	352,585	9.38
10. Food & Tobacco Manufacturing	159	1,491,799	172	1,631,869	14.95
11. Industrial, Electric & Electronic Machinery	424	1,170,743	440	1,337,753	15.43
12. Information Services	1	625,328	-	-	-
13. Leather, Stone, Clay & Glass products	33	510,631	38	670,944	13.57
14. Media & Broadcasting	61	1,123,605	80	4,667,460	13.06
15. Metals & Metal Products	78	224,963	95	458,663	10.05
16. Mining & Extraction	200	2,275,501	223	1,989,962	11.00
17. Miscellaneous Manufacturing	20	730,494	27	1,137,335	19.03
18. Printing & Publishing	48	385,038	44	253,157	6.94
19. Property Services	90	1,316,847	90	1,505,231	15.81
20. Public Administration, Education, Health	101	637,519	113	481,546	14.49
21. Retail	126	1,103,013	159	1,233,856	13.35
22. Textiles & Clothing Manufacturing	40	389,055	48	571,200	17.00
23. Transport Manufacturing	92	1,910,277	85	1,156,693	11.36
24. Transport, Freight & Storage	135	1,277,448	162	1,114,126	11.26
25. Travel, Personal & Leisure	123	644,837	208	573,065	13.65
26. Utilities	136	1,926,699	186	1,570,299	10.25
27. Waste Management & Treatment	18	201,582	35	201,106	13.13
28. Wholesale	151	735,705	191	586,543	9.98
29. Wood, Furniture & Paper Manufacturing	56	1,193,843	70	710,961	10.11
Total	4046	1,215,484	4046	1,215,484	13.75

** Numbers in thousands*

Appendix F: Industries included in the analysis – matched sample

Below is a detailed breakdown of the industries of the control and treatment groups in the matched sample. As evident from each industry's percentage of the total sample, the matching procedure achieves a good balance between the industries of the control and treatment observations. There are large variations in the average deal value and EBITDA multiples across the different industries. The sample contains a high share of high-tech industries such as Computer Software and Industrial, Electric & Electronic Machinery with high average EBITDA multiples.

	Control				**Treatment**			
Industry	Obs	% of total	Avg. deal Value*	Avg. EBITDA multiple	Obs	% of total	Avg. deal value*	Avg. EBITDA multiple
1. Agriculture, Horticulture & Livestock	1	0.1%	526,071	40.45	2	0.3%	1,231,318	17.63
2. Banking, Insurance & Financial Services	21	2.9%	746,472	12.64	19	2.7%	3,130,071	13.61
3. Biotechnology and Life Sciences	5	0.7%	2,079,097	36.12	12	1.7%	1,879,324	21.29
4. Business Services	59	8.3%	2,376,128	11.21	46	6.5%	2,131,243	14.07
5. Chemicals, Petroleum, Rubber & Plastic	53	7.4%	13,116,848	21.58	55	7.7%	9,130,738	15.39
6. Communications	15	2.1%	7,122,357	10.61	24	3.4%	4,380,666	14.11
7. Computer Hardware	8	1.1%	708,567	11.14	8	1.1%	15,414,509	15.11
8. Computer Software	103	14.4%	1,718,317	30.60	89	12.5%	1,219,786	26.24
9. Construction	6	0.8%	1,938,777	10.84	6	0.8%	2,437,738	11.70
10. Food & Tobacco Manufacturing	26	3.6%	4,392,121	12.30	24	3.4%	8,183,448	15.68
11. Industrial, Electric & Electronic Machinery	125	17.5%	3,253,003	16.44	115	16.1%	2,872,697	19.34
12. Leather, Stone, Clay & Glass products	9	1.3%	2,107,007	6.59	6	0.8%	1,096,879	14.39
13. Media & Broadcasting	14	2.0%	3,381,237	12.53	12	1.7%	12,894,787	7.88
14. Metals & Metal Products	12	1.7%	830,850	16.05	17	2.4%	1,345,079	10.42
15. Mining & Extraction	48	6.7%	2,836,387	13.90	43	6.0%	4,895,800	12.57
16. Miscellaneous Manufacturing	5	0.7%	350,521	31.25	9	1.3%	425,103	16.44
17. Printing & Publishing	6	0.8%	1,118,692	9.05	8	1.1%	930,461	9.01
18. Property Services	14	2.0%	1,142,905	15.58	27	3.8%	2,508,405	16.20
19. Public Administration, Education, Health	24	3.4%	1,870,964	40.84	24	3.4%	1,503,817	13.22
20. Retail	30	4.2%	5,361,046	14.55	31	4.3%	3,450,279	14.33
21. Textiles & Clothing Manufacturing	6	0.8%	1,927,513	26.88	11	1.5%	1,282,628	13.38
22. Transport Manufacturing	16	2.2%	1,410,314	14.86	14	2.0%	3,992,155	11.79
23. Transport, Freight & Storage	13	1.8%	1,756,143	16.45	23	3.2%	5,205,761	12.45
24. Travel, Personal & Leisure	40	5.6%	3,705,005	11.59	24	3.4%	1,240,197	9.68
25. Utilities	24	3.4%	1,351,555	9.14	32	4.5%	6,406,140	10.77
26. Waste Management & Treatment	2	0.3%	439,257	15.23	2	0.3%	115,468	8.52
27. Wholesale	22	3.1%	6,028,903	10.28	20	2.8%	2,880,663	14.93
28. Wood, Furniture & Paper Manufacturing	6	0.8%	1,209,056	10.62	10	1.4%	3,346,836	11.89
Total	713	100%	3,513,196	17.79	713	100.0%	3,780,747	16.04

* *Numbers in thousands*