The Impact of the 2017 Tax Cuts and Jobs Act on U.S. Multinationals' Intangible Assets

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Abstract

This article investigates the impact of the 2017 Tax Cuts and Jobs Act (TCJA) on the intangibles of U.S. multinationals. We develop a theoretical model that incorporates key provisions of the TCJA—Global Intangible Low-Taxed Income (GILTI) and Foreign-Derived Intangible Income (FDII)—and derive testable implications for changes in licensing and patent transfer patterns. Using data on international royalty flows and patent assignments, we test the model's predictions. Our findings suggest that the TCJA may have impacted profit-shifting strategies through intangibles, aligning with our model's predictions.

1. INTRODUCTION

Intellectual property (IP) has become a key driver of innovation and economic growth in the increasingly technology-driven global economy. For multinational corporations (MNCs), intangibles such as patents, trademarks, copyrights, and trade secrets are highly valuable and mobile, making them an attractive tool for profit shifting. Profit shifting is a practice in which MNCs move their profits from high- to low-tax countries to lower their overall tax burden. One of the most common forms of this practice is the transfer of IP. MNCs can license their IP to foreign entities and receive royalty payments taxed at the domestic rate, or they can transfer ownership of the IP to foreign affiliates, often at a discounted rate, and have the royalty payments taxed at the foreign rate. The decision between these two options is largely influenced by differences in corporate tax rates across countries. By strategically allocating their profits to subsidiaries or affiliates located in these low-tax jurisdictions, MNCs can significantly reduce their overall tax burden, even if the majority of their economic activity occurs in higher-tax countries.
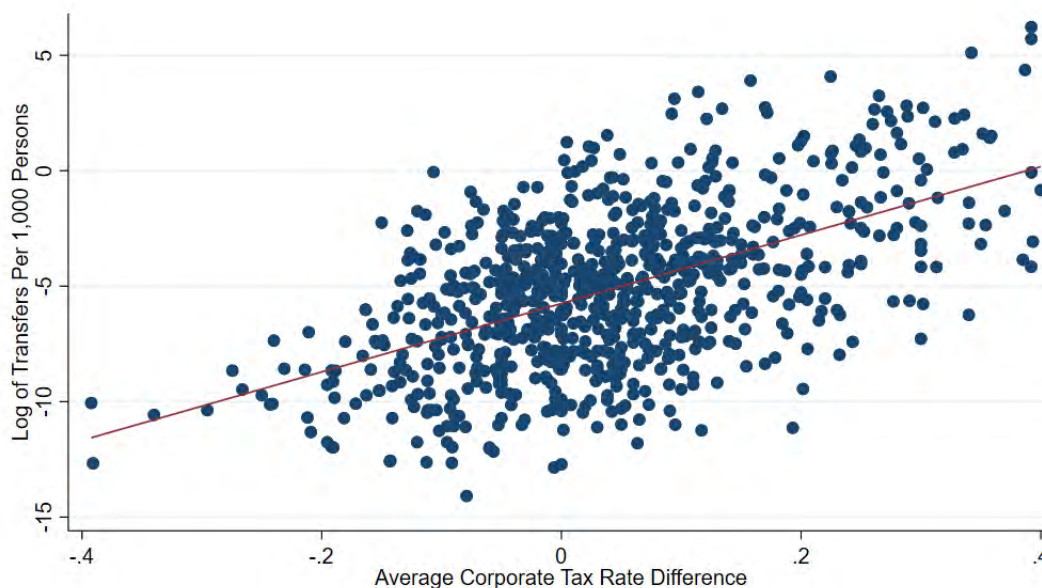
The sensitivity of MNCs to corporate tax rates has led to a global race to the bottom where countries compete with each other to attract MNCs by progressively lowering their corporate tax rates. Consequently, average corporate tax rates have fallen from 49 to 24 percent between 1985 and 2018 (Tørsløv, Wier, and Zucman, 2023). Countries like Ireland and Bermuda have leveraged this trend by establishing themselves as

Figure 1
Patent Transfers: 2001–15

NOTE: The data include only transfers that originate from non-tax havens. Each point represents a specific country-pair, and corporate tax differences are calculated using the average tax rate over the entire sample period, 2001 to 2015.
SOURCE: Bass, Santacreu, and LaBelle (2023).

tax havens, offering extremely low or even zero corporate tax rates. These tax havens enable MNCs to engage in tax avoidance by engaging in profit-shifting activity.

The link between corporate tax rates and MNC behavior is evidenced by the positive correlation between patent transfers and corporate tax differences, as illustrated in Figure 1. The larger the difference in corporate tax rates between countries, the greater the incentive for MNCs to engage in these cross-border IP transfers. This correlation, while based on raw data and not accounting for other potential factors, suggests that corporate taxation is a critical factor in MNCs' decisions regarding IP transfers and profit shifting.

Moreover, empirical evidence from Santacreu and LaBelle (2023) shows that, since 1980, the U.S. has been selling an increasing number of patents to tax havens compared with non-havens (see Figure 2), which indicates a potential channel through which MNCs may engage in profit-shifting activities is via transactions involving intangibles.

The impact of profit shifting on the U.S. has been significant, with Kimberly A. Clausing (2020) estimating that one-third of U.S. corporate income taxes, equivalent to $100 billion in revenue, are lost annually due to this practice. Tørsløv, Wier, and Zucman (2023) estimate that the United States loses about 15 percent of its corporate tax revenue due to the relocation of profits to low-tax places. The rise of tech companies has exacerbated the issue. In particular, Apple strategically avoided billions in U.S. taxes by registering profits in Ireland despite having proportionately fewer employees and consumers there.

To address the taxation of foreign profits from technology licensing and to discourage profit shifting, the U.S. Congress passed the Tax Cuts and Jobs Act (TCJA) in 2017. The TCJA introduced several key provisions, including the Global Intangible Low-Taxed Income (GILTI) and the Foreign-Derived Intangible Income (FDII) regimes, which aim to incentivize firms to keep intangible assets in the U.S. and transfer back ownership of previously shifted technology. GILTI imposes an additional tax on supernormal returns, which are all profits in excess of 10 percent of the tangible assets owned by an MNC's foreign subsidiary. By using this methodology, GILTI focuses on reincorporating foreign profit earned through intangible assets while aiming to increase the foreign income tax burden on firms, thereby reducing the incentive to shift profits to low-tax jurisdictions.[1]

FDII, on the other hand, provides a tax break for companies by allowing them to deduct 37.5 percent of

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1. For more information on GILTI, visit the Tax Foundation.

Figure 2
Intellectual Property Transfers from the U.S.
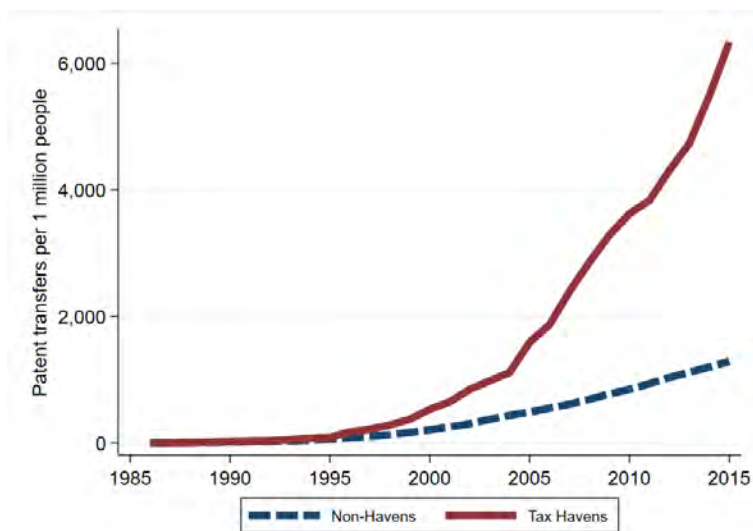
SOURCE: ktMINE and Santacreu and LaBelle (2023).

their foreign-derived profits related to the export of intangible goods or services, lowering the effective tax rate. This provision, similar to "patent box" policies, encourages U.S. MNCs to keep their IP within the U.S. by offering a reduced tax rate on royalty payments received from foreign firms using their IP.[2]

In this article, we examine potential changes in profit-shifting behavior through IP movements following the TCJA reforms by analyzing data on royalty payments and patent transfers. We begin by developing a theoretical framework that models the profit-shifting decisions of U.S. MNCs in response to corporate tax differentials. Using this model, we examine how global tax policies might change these profit-shifting decisions. Our model considers three countries: the United States, a tax haven, and the rest of the world. U.S. firms are innovators, creating patents for intermediate goods production, and aim to maximize the value of their ideas through global royalty payments. While royalties are taxed at U.S. rates, multinationals can reduce tax burdens by transferring IP ownership to affiliates in tax havens at a discount. This strategy, though costly, potentially increases global profits by leveraging lower tax rates.

The optimal fraction of technologies transferred through profit shifting depends on the corporate tax differential, the discount rate for technology sales to foreign affiliates, and transfer costs. In other words, firms balance the benefits of higher post-tax royalties against the costs of IP transfers when making profit-shifting decisions. Our model incorporates the TCJA's key provisions, GILTI and FDII, which modify the effective tax rates for U.S. multinationals' foreign and domestic income, respectively. These changes decrease the optimal fraction of technologies transferred to foreign affiliates, potentially reducing incentives for profit shifting. As a result, more IP is retained domestically.[3] While our analysis suggests changes in multinational behavior following the TCJA, establishing a direct causal relationship between the act and observed shifts in royalty flows presents significant challenges. Various confounding factors, including global economic trends, changes in other countries' tax policies, and firm-specific strategies, may also influence these patterns.

The model yields several testable implications regarding the TCJA's potential impact on profit-shifting behavior and international technology licensing: First, the model predicts an overall increase in U.S. royalty receipts from foreign firms licensing U.S.-owned IP. Second, it anticipates a decrease in royalty payments from U.S. MNCs to their affiliates in tax havens. Third, the model suggests an increase in U.S. royalty receipts specifically from tax haven countries. Finally, it predicts changes in U.S. MNCs' IP trade patterns with tax havens, including shifts in both the volume and direction of IP asset transfers.

To empirically test these implications, we use data from multiple sources. We gather information on global patent transfers from ktMINE, a comprehensive platform that tracks IP transactions worldwide, which covers the period 1980–2015. These data allow us to examine changes in the volume and direction of patent transfers

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2. For more information on FDII, visit the Tax Foundation.
3. However, because these decisions are made on a period-by-period basis, the model does not predict existing IP returning to the U.S.

between the U.S., tax havens, and other countries before and after the TCJA's implementation. Additionally, we use data on bilateral royalty payments and licensing fees reported in the OECD's Balanced Trade in Services (EBOPS) dataset. This dataset, which covers the period from 2005 to 2021, provides detailed information on cross-border transactions related to the use of IP. These data allow us to analyze changes in royalty flows between the U.S., tax havens, and the rest of the world, testing whether the TCJA has led to the expected shifts in these flows. Finally, we incorporate revenue data from the Bureau of Economic Analysis (BEA) regarding the sale of proprietary rights. These data help us to evaluate the overall impact of the TCJA on U.S. MNC revenues from IP licensing and to reinforce our findings from the patent transfer and royalty payment analyses.

Our analysis reveals changes in intangible asset patterns, including shifts in IP trade and royalty flows, following the TCJA's implementation, which align with the model's predictions. The data suggest a delayed response, with significant shifts becoming more apparent several years after the reform's enactment in 2017. This lag may be attributed to the time required for U.S. MNCs to adjust their profit-shifting strategies in response to the new tax provisions. The delayed nature of these changes is consistent across multiple indicators, including U.S. royalty receipts and payments involving tax havens. These results do not appear to be driven by global trends or confounding factors, as evidenced by the robustness of other high-tax countries during the same period.

A few important observations emerge from our analysis. Notably, Ireland plays a disproportionate role in driving the observed changes in royalty flows, which reflects the complexity of international tax dynamics and the importance of considering country-specific factors when interpreting the TCJA's effects. While the overall trends align with our model's predictions, the outsized influence of Ireland suggests the need to consider factors beyond just U.S. tax policy changes when interpreting the results. For instance, changes in Ireland's own tax policies during this period may have interacted with the effects of the TCJA, further complicating the analysis. Recent research has estimated that firms using the Double Irish arrangement redirected $59 billion in royalty payments to the United States in 2020, the first year of full closure (Samarakoon, 2023). These findings highlight the complex nature of international tax policy and its effects on MNC behavior.[4]

While our analysis suggests certain trends in the behavior of U.S. multinationals following the TCJA's implementation, it is crucial to interpret these findings with caution. As Kimberly A Clausing (2024) emphasizes, the full effects of the TCJA are complex and still unfolding. Our model and data indicate potential shifts in royalty flows and IP ownership patterns, but these changes must be contextualized within broader trends in corporate taxation and profit shifting. The TCJA's impact on overall corporate tax revenues, competitiveness of U.S. multinationals, and domestic investment has been mixed and, in some cases, less pronounced than initially anticipated. Furthermore, establishing definitive causal links between the TCJA and observed changes in multinational behavior remains challenging due to various confounding factors and the relatively short post-reform period analyzed. It is also important to consider how the TCJA interacts with global efforts to address profit shifting, such as the Pillar Two international tax agreement. Given these complexities and uncertainties, our findings should be viewed as preliminary evidence of the TCJA's impact on profit-shifting strategies. Further research is needed to fully understand the long-term effects of this significant tax reform and its implications for U.S. and global corporate taxation.

Our article contributes to several recent strands of literature. First, it contributes to a growing literature exploring the connection between corporate taxation and movements of IP. Using firm-level data, Karkinsky and Riedel (2012), Bharanidaran (2024), and Griffith, Miller, and O'Connell (2014) find that firms in high-tax countries tend to transfer technology ownership to affiliates in low-tax countries, with the counterpart of these transactions reflected in cross-border royalty payments. Recently, Tørsløv, Wier, and Zucman (2023) and Guvenen et al. (2022) argue that locating IP in low-tax jurisdictions has become one of the main channels of profit shifting. The former estimates that 36 percent of all profits worldwide are shifted to tax havens, while the latter finds that 38 percent of foreign income reported by the U.S. is generated in the U.S. Dyrda, Hong, and Steinberg (2022) and Santacreu (2023) explore, through the lens of quantitative static models, the role of differences in corporate taxation on profit shifting. They find that profit shifting erodes the tax bases of high-tax countries and that countries with higher corporate income taxes relative to their trading partners tend to receive fewer royalty payments.

Second, our article contributes to a strand of literature analyzing the TCJA's effect on the profit-shifting strategies of U.S. MNCs. Several studies find only a minimal effect on international profit shifting (see Gale and Haldeman, 2021 and Atwood and Johnson, 2021). Krull and Wu (2022) find that only firms facing foreign tax rates between 21 and 35 percent changed their profit-shifting behavior. These "mid-tax" firms shifted 80 percent less income out of the U.S. following the act. However, Garcia-Bernardo, Janský, and Zucman (2022) estimate that the share of profits booked abroad by U.S. multinationals fell 3 to 5 percentage points, largely due

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4. See https://www.stlouisfed.org/on-the-economy/2024/aug/unpacking-discrepancies-american-irish-royalty-reporting.

to repatriations of IP to the U.S. However, their findings reveal that the share of foreign profits booked in tax havens remained stable between 2015 and 2020. Kimberly A. Clausing (2020) suggests that the complexity of the tax law changes and the interactions among them make it difficult to draw conclusions regarding the impact of the TCJA. We contribute to this ongoing debate by providing a comprehensive analysis of the TCJA's impact on intangible assets, specifically examining changes in IP trade patterns and royalty flows. Our approach offers new insights into the complex effects of the TCJA on profit-shifting strategies, potentially reconciling some of the mixed findings in the existing literature.

Finally, this article relates to the literature analyzing the impact of the TCJA on tangible investment. Chodorow-Reich et al. (2024) find that the TCJA led to a 7.4 percent long-run increase in domestic corporate tangible capital, with multinational firms experiencing even larger increases of 14 to 18 percent. In contrast, we examine the TCJA's impact on intangible assets and royalty flows, finding evidence of increased repatriation of intangible assets to the United States. Similar to Chodorow-Reich et al. (2024), we observe a delayed response to the TCJA, with the effects becoming more pronounced several years post-reform, suggesting that adjusting corporate strategies for both tangible and intangible assets requires time. The impact of the TCJA on both tangible and intangible investment by U.S. multinationals suggests complementarity between these types of capital.

The rest of this article is organized as follows. Section 2 outlines our theoretical model. Section 3 discusses the data and their limitations. We then use the data to evaluate the reforms though the lens of the model.

2.   A THEORY OF MNCS, PROFIT SHIFTING THROUGH IP, AND THE 2017 TCJA REFORM

To explore the profit-shifting strategies employed by U.S. multinationals, we provide a theory of their behavior and incentives to engage in profit shifting. We consider a three-country model consisting of the U.S., a tax haven (TH), and the rest of the world (ROW). The model is based on Santacreu (2023). U.S. multinationals invest resources to create new ideas (patents), which are blueprints used to produce intermediate goods. For simplicity, we assume that the U.S. is the only innovator in this model. The other countries do not engage in innovation themselves and instead rely on licensing to produce intermediate goods. The innovator's objective is to maximize the value of their ideas, which is given by the total amount of royalty payments received from the world (i.e., from both domestic and foreign firms using their IP).

Under the current U.S. tax system, royalty payments are taxed at the U.S. rate. However, multinationals can reduce their tax burden by selling the ownership of their ideas to affiliates in tax haven countries, which face lower tax rates. By doing so, the affiliates receive the royalty payments and pay taxes at the lower tax haven rate, thereby increasing multinationals' global profits. This profit-shifting strategy results in lower tax revenues for the U.S. government, but it allows multinationals to increase the value of their innovation, as ideas are nonrival and can be used anywhere regardless of ownership. Transferring the ownership of IP is a costly activity, as multinationals must hire lawyers and accountants and pay legal fees to do so. When choosing their optimal strategy between licensing and IP transfers, U.S. MNCs consider the trade-offs between receiving higher post-tax royalty payments from licensing and incurring increased costs associated with transferring IP ownership to foreign subsidiaries.

We extend the model developed by Santacreu (2023), focusing on the equations most relevant to our analysis.

Technology Licensing, Profit Shifting, and Global Profits.   A U.S. MNC develops and patents Z ideas in each period, which can be normalized to $Z = 1$. The firm's objective is to maximize global profits by licensing these ideas worldwide in exchange for royalties, subject to the cost of developing the ideas.[5]

The MNC has two options for commercializing its IP worldwide. First, it can license technologies directly to other countries in exchange for royalty payments V, which are taxed at the U.S. corporate tax rate, τ_{US}. Alternatively, the U.S. parent can sell the IP ownership to its affiliate located in a tax haven for a transfer price T, incurring a cost. The portion of domestic profits associated with the transfer price, net of the costs, will be taxed at the U.S. tax rate. The affiliate owning the IP will receive royalty payments V, which will be taxed at the affiliate's corporate tax rate, τ_{TH}.[6]

The MNC chooses the fraction of ideas λ to transfer in order to maximize global profits. If it licenses the idea, it receives

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5. This model focuses on licensing activities, though the firm can also commercialize technology through exports, foreign direct investment, and other means.

6. We assume that the royalty payments received for an idea generated by a U.S.-headquartered MNC will be the same, before taxes, whether the idea is licensed from the U.S. or from the tax haven affiliate.

$$(1 - \tau_{US})V.$$

If it instead transfers the IP ownership to a foreign affiliate that then licenses the technology, it receives

$$(1 - \tau_{US})(T - C(\lambda)T) + (1 - \tau_{TH})V,$$

where $C(\lambda)$ is the cost of transferring the ownership of a patent.

Global profits are the sum of the profits that are booked and taxed in the U.S. and those booked and taxed in the tax haven. They are given by

$$(1) \qquad \Pi_{US}^{MNC} = \Big[\underbrace{(1 - \lambda)(1 - \tau_{US})V + (1 - \tau_{US})\lambda(T - C(\lambda)T)}_{\text{US profits}} + \underbrace{(1 - \tau_{TH})\lambda V}_{\text{Foreign profits}} \Big].$$

Next, we determine the transfer price at which a U.S. multinational sells IP to its tax haven affiliate. Multinationals often sell IP to tax haven affiliates at a discount to shift profits, allowing them to report lower profits in high-tax jurisdictions and shift a larger portion of their profits to low-tax jurisdictions. We assume that the price is set as a fraction ψ of the royalties the MNC would receive from licensing the technology instead. Hence,

$$T = \psi V.$$

Moreover, following Santacreu (2023), we assume the functional form for the cost of transferring the ownership of $C(\lambda) = 1 + \frac{1-\lambda}{\lambda} \log(1 - \lambda)$. This functional form implies that the cost is increasing in λ, is bounded between 0 and 1, and ensures that the fraction of licensed technologies is between 0 and 1.[7]

The optimal fraction of technologies transferred through profit-shifting practices is given by

$$(2) \qquad \lambda = 1 - \exp\left(-\frac{1 - \psi}{\psi} \frac{\tau_{US} - \tau_{TH}}{1 - \tau_{US}} \right)$$

if $\tau_{US} > \tau_{TH}$ and 0 otherwise. The share of technologies transferred to a foreign affiliate depends on three factors: (1) the corporate tax difference between the U.S. and the tax haven, $\tau_{US} - \tau_{TH}$; (2) the discount rate, ψ; and (3) the tax rate of the U.S., $1 - \tau(US)$. When tax rates are identical or $\psi = 1$, there is no incentive for profit shifting. Selling technology at a discount ($\psi < 1$) allows multinationals in the U.S. to increase global post-tax profits by reallocating profits to tax havens. The costly technology transfer prevents corner solutions, ensuring that firms do not transfer all new technologies abroad.

The TCJA Reform and Model Implications. The 2017 TCJA introduced two key provisions that affect the incentives for profit shifting: GILTI and FDII. GILTI imposes a minimum tax on foreign income earned by U.S. multinationals, while FDII provides a lower tax rate for U.S. multinationals' domestic income derived from exports. In the context of our model, a higher share of technologies transferred to foreign affiliates (λ) results in more royalty payments for the tax haven and less for the U.S., leading to lower tax revenues for the U.S. government. The introduction of GILTI and FDII alters the optimal transfer of technologies by modifying the effective tax rates faced by U.S. multinationals.

Global profits under the TCJA would be

$$(3) \qquad \begin{aligned} \Pi_{US}^{MNC,TCJA} = \big[&(1 - \lambda)(1 - \tau_{US}(1 - \tau_{FDII}))V \\ &+ (1 - \tau_{US}(1 - \tau_{FDII}))\lambda(T - C(\lambda)T) \\ &+ (1 - \tau_{TH}(1 + \tau_{GILTI}))\lambda V \big]. \end{aligned}$$

The optimal fraction of technologies transferred under the TCJA becomes

$$(4) \qquad \lambda_{TCJA} = 1 - \exp\left(-\frac{1 - \psi}{\psi} \frac{\tau_{US}(1 - \tau_{FDII}) - \tau_{TH}(1 + \tau_{GILTI})}{1 - \tau_{US}(1 - \tau_{FDII})} \right)$$

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7. The model normalizes the number of ideas to $Z = 1$, making λ both the proportion and the absolute number of ideas transferred. This simplification allows for clearer analysis of the trade-offs involved in profit shifting.

if $\tau_{US}(1 - \tau_{FDII}) > \tau_{TH}(1 + \tau_{GILTI})$ and 0 otherwise. Here, τ_{FDII} represents the tax rate reduction for U.S. multinationals' domestic income derived from exports, and τ_{GILTI} denotes the minimum tax rate on foreign income earned by U.S. multinationals. The FDII provision reduces the effective U.S. tax rate, making it more attractive for U.S. multinationals to keep IP ownership domestic. Conversely, GILTI increases the effective tax rate in tax havens, reducing the incentive to transfer IP to foreign affiliates.

The TCJA's FDII and GILTI provisions aim to reduce the incentives for profit shifting by U.S. multinationals. Through the lens of the model, this should lead to a lower optimal share of technologies transferred to foreign affiliates (λ_{TCJA}) compared with the pre–TCJA scenario. As a result, we expect to observe the following changes in the data on licensing and patent transfers:

1. An increase in U.S. royalty receipts: With a lower λ_{TCJA}, more IP will be retained in the U.S., leading to an increase in royalty receipts from foreign entities licensing the technology from the U.S. parent company.
2. A decrease in royalties received by tax havens: As U.S. multinationals reduce their profit-shifting activities, tax havens should experience a decline in royalty receipts from U.S. companies.
3. An increase in U.S. royalty receipts from tax havens: With the reduced incentive to transfer IP to tax havens, U.S. multinationals may license more technology directly from the U.S. to entities in tax havens, resulting in an increase in U.S. royalty receipts from these jurisdictions.
4. A decrease in IP transfers from the U.S. to tax havens: The TCJA should lead to a decrease in the sale of IP from U.S. multinationals to their affiliates in tax havens. Additionally, some companies may choose to buy back previously transferred IP from their tax haven affiliates and relocate the IP to the U.S. to benefit from the FDII provision. However, it is important to note that this is not a direct implication of our model, which is solved period by period. Rather, this trend is likely to be observed in the data as firms adjust their strategies in response to the TCJA over time, despite not being captured in our static model framework.

To test these implications empirically, we analyze data on royalty payments, patent transfers, and IP ownership before and after the TCJA's implementation.[8]

3.   EVIDENCE ON THE IMPACT OF THE 2017 TCJA REFORM

This section examines data on international technology licensing and patent transfers before and after the 2017 TCJA reform to test the model's implications. We focus on three country groups: tax havens, low-tax countries, and non–havens. While often used interchangeably in the literature, we distinguish between low-tax countries and tax havens. Tax havens are smaller nations or territories with little financial regulation and economic activity, whereas low-tax countries offer competitive corporate tax rates but are still considered innovative. Our country classification follows Tørsløv, Wier, and Zucman (2023), with a complete list of tax havens and low-tax countries provided in the appendix.

3.1   Data

We explore the evolution of patent transfers using IP transactions data from the platform ktMINE. In our analysis, the assignor is the country in which the multinational selling the patent is located, while the assignee is the country to which ownership is transferred. Data on global patent transactions are available for 1980–2022, featuring over 141 million patents for 146 countries. We end our sample in 2015 due to data inconsistencies. Post-2015, we observed unexplained fluctuations and gaps in patent transfer data, particularly for key countries including tax havens. These inconsistencies could not be reconciled with other sources or economic trends.

To ensure data reliability, we limit our analysis to the pre-2015 period, allowing us to describe patterns of IP transfers before the reform. While this data source limitation hinders our ability to examine patent transfers post-reform, it provides insight into patent locations at the time of the reform's passage. For many MNCs, patent transfers comprise a large proportion of all IP transactions. Therefore, tracking the movement of IP such as patent transfers helps inform our understanding of the flow of royalty payments in the pre- and post-2017 periods. Typically, the primary assignees of U.S. patents would be large exporters of technology (i.e., large recipients of royalty payments), particularly back to the states.

With this in mind, we take advantage of data on royalty payments and licensing fees reported in the OECD's EBOPS to follow the flow of royalties before and after the TCJA. Bilateral royalty and license fees are available for over 200 countries for the period 2005–21. They are recorded in the balance of payments of a country as a trade in services and include (1) charges for the use of proprietary rights, such as patents, trademarks,

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8. The model sets $Z = 1$ for simplicity, treating the total number of ideas as fixed. In reality, tax changes might affect Z, but this is not captured in our model. This approach lets us focus on how royalties and profits are distributed, though it does not account for possible changes in overall innovation levels.

copyrights, industrial processes and designs, trade secrets, and franchises, where rights arise from research and development; and (2) charges for licenses to reproduce and distribute IP embodied in produced originals or prototypes (copyrights on books and manuscripts, computer software, etc.). This is the most comprehensive longitudinal dataset on royalty and license fees, with the highest coverage in terms of the number of countries and time period.

Finally, we supplement the above information with sales revenue data from the BEA. The data can be found in Table 2.2. U.S. Trade in Services, by Type of Service and by Country or Affiliation and are reported as the "Sale of proprietary rights arising from research and development," which includes patents, industrial processes, and trade secrets. One drawback of the BEA data is that for many individual countries, the data are reported as a value between $0 and +/– $500,000, presumably to protect firm identity. This makes it difficult to know the true value of sales between the United States and other countries, especially smaller countries like tax havens. We opt to focus on aggregate sales revenue both earned and spent by the U.S., as these values inform us of the success of the TCJA in bringing IP back to the United States.

3.2 An Empirical Evaluation of Model Implications

Here we test some of the predictions on international technology licensing and IP transfer predicted by the model. Specifically, we examine four key implications: (1) an increase in U.S. royalty receipts, (2) a decrease in royalty payments to tax havens, (3) an increase in U.S. royalty receipts from tax havens, and (4) shifts in U.S. IP ownership involving tax havens. For each implication, we analyze relevant data and compare the observed patterns to the model's predictions. This empirical analysis allows us to assess the extent to which the TCJA's provisions may have influenced the behavior of U.S. multinationals with respect to their intangible assets and profit-shifting strategies.

Increase in U.S. Royalty Receipts.   The two provisions introduced by the 2017 TCJA—FDII and GILTI—aimed to encourage U.S. MNCs to maintain their IP ownership within the United States. The FDII provision offers a reduced tax rate on income generated from exports that are based on IP owned by U.S. entities.[9] As a result, we would expect the United States to experience an increase in royalty receipts following the implementation of these provisions in 2017.

In Figure 3, using data on royalty payments and licensing fees, we observe that, beginning in 2015, the U.S. experienced a shift in royalty receipts with foreign-derived profits falling below what would be expected based on prior trends. We take this result as suggestive evidence that the U.S. MNCs may have begun to shift profits abroad. Additionally, there is not an immediate increase in U.S. royalty receipts after 2017, and the U.S. continues to receive fewer royalty payments than possibly expected. However, in 2020, the share of royalty payments being subject to U.S. taxes sharply rises. While the data are currently available only until 2021, this sudden change could suggest a short-term lag in the policy's impact.

Interestingly, we do not observe the same patterns for other high-income countries (see the appendix). The royalty payments and licensing fees for these countries remain relatively stable throughout the period, without exhibiting the distinct shift seen in the U.S. data. This suggests that the changes in the U.S. royalty receipts may be attributed to country-specific factors, such as the implementation of the new tax provisions, rather than a global trend affecting all high-income nations.

While these provisions create a favorable tax environment for repatriating IP to the United States, the data suggest that the process of actually moving IP ownership may require more time. As a result, the expected increase in U.S. royalty receipts following the implementation of these provisions in 2017 may not be immediately evident and could take several years to materialize.

Decrease in Royalty Payments to Tax Havens.   The GILTI provision of the TCJA imposes a minimum tax on the foreign earnings of U.S. multinationals above a certain threshold, reducing the incentive to shift profits to low-tax jurisdictions like tax havens. Consequently, the model predicts that tax havens would receive a smaller share of royalty payments from U.S. multinationals after the TCJA's implementation in 2017.

Figure 4 illustrates that countries receiving more patent transfers from the U.S. between 1980 and 2015 (before the reform) experienced larger declines in royalty payments in the four years following the reform. The largest recipients of U.S. IP, particularly Bermuda, the Cayman Islands, Barbados, Luxembourg, and American Samoa, saw the most significant declines in royalty payments. Interestingly, low-tax countries like Switzerland and Ireland, which also received a large number of patent transfers per capita, were minimally affected by the reform.[10]

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9. Likewise, the GILTI provision creates an incentive for companies to bring their IP back to the U.S. from low-tax jurisdictions.
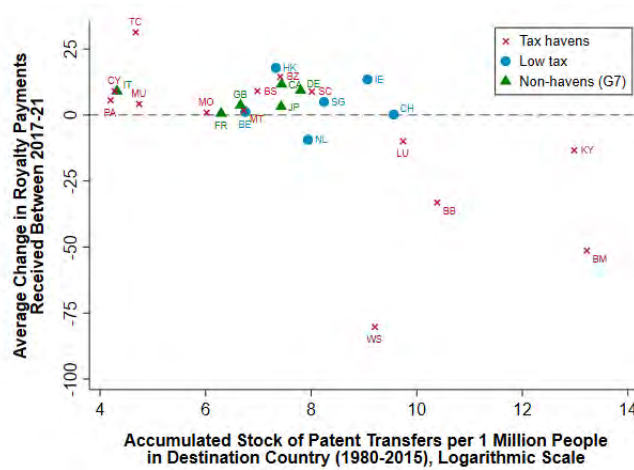
10. The appendix includes scatter plots for Germany, UK, Japan, and France. Initially intended for robustness, these plots show significant

Figure 3
U.S. Royalty Receipts from the Rest of the World
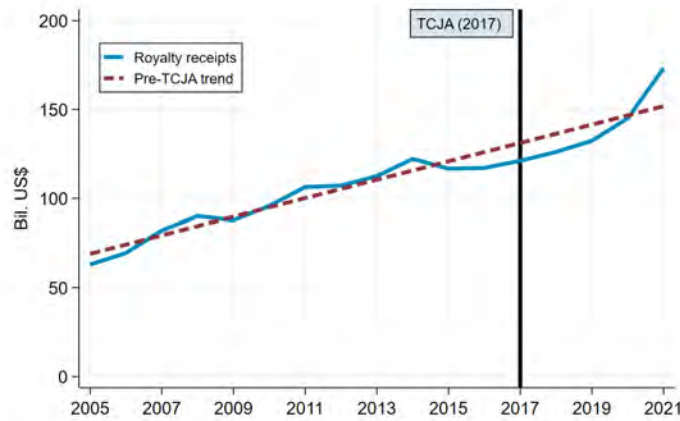
SOURCE: OECDstat EBOPS 2010.

Figure 4
Royalty Receipts from the U.S. Post-TCJA

NOTE: We aggregate U.S.-assigned patent transfers over the entire sample period. We calculate transfers per capita using the average population of each destination country. Our country classifications come from Tørsløv, Wier, and Zucman (2023).
SOURCE: ktMINE and OECDstat EBOPS 2010.

Increase in U.S. Royalty Receipts from Tax Havens. With the reduced incentive for U.S. multinationals to transfer IP ownership to tax haven affiliates due to GILTI and FDII, we would expect a larger share of royalty payments from tax havens to the United States after 2017. This implication can be tested by examining the post–2017 royalty receipts of the U.S. specifically from tax haven countries.

Figure 5 shows that the U.S. experienced a decline in royalty receipts from tax havens between 2014 and 2017. However, around the time of the reform's implementation, this number began to rise again. By 2021, royalty payments had nearly doubled, increasing from $51.9 billion to $98.7 billion. Similar to the trend observed in Figure 3, the rise in foreign-derived income is more pronounced a few years after the TCJA was enacted. This result suggests a delayed impact of the reform on royalty payments, possibly due to the time required for companies to adjust their IP strategies and transfer pricing arrangements.

Furthermore, between 2019 and 2021, tax havens were collectively responsible for nearly 89 percent of the increased share of royalty payments received by the United States. This evidence supports recent findings by

overlap in tax haven usage with the U.S., limiting their utility for independent verification of U.S. tax reform impacts.

Figure 5
U.S. Royalty Receipts from Tax Havens
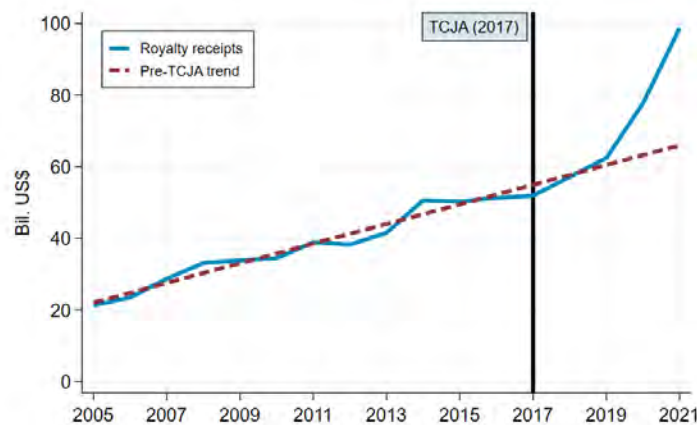
NOTE: We aggregate royalty receipts from all tax havens and low-tax countries without distinguishing between classifications. The notable increase in receipts from 2019 onward is primarily driven by "low-tax" countries: Belgium, Switzerland, Hong Kong, Ireland, the Netherlands, and Singapore.
SOURCE: OECDstat EBOPS 2010.

Santacreu (2023), who conducts a policy analysis focusing on the GILTI provision and finds that tax havens were the primary source of the increased royalty payments to the U.S.

We explore further what may be explaining the sharp increase in U.S. royalty receipts observed after the TCJA's implementation. While our initial analysis showed a significant rise in royalty payments from tax havens collectively, a closer examination reveals that this trend is primarily driven by a single country: Ireland. The country has long been known for its unique tax regime, which has made it a preferred location for many MNCs to base their IP holdings. The country's tax policies, including the now–phased–out Double Irish arrangement, have historically provided significant tax advantages for companies managing their global IP from Ireland. Given the country's outsized role in global IP management, we decided to examine the data excluding it from our sample of tax havens (Santacreu, 2023).

When Ireland is removed from the dataset, the observed increase in royalty payments from tax havens to the U.S. becomes notably muted, suggesting that the TCJA's effects on IP location and royalty payment patterns may be more complex than initially apparent (Figure 6). Moreover, this observation underscores the importance of examining policy changes not only in the U.S. but also in key partner countries. For instance, Ireland's decision to eliminate tax avoidance techniques, such as the Double Irish arrangement by changing corporate residency rules in 2019, may have interacted with the effects of the TCJA, further complicating the interpretation of the trends we observe.

While our findings still provide evidence of the TCJA's impact on tax revenue and royalty flows, the dominant role of Ireland in driving these changes cautions against broad generalizations about the reform's effects across all tax havens.

Shifts in U.S. IP Ownership Involving Tax Havens. The FDII provision of the TCJA incentivizes keeping IP ownership within the United States, while the GILTI provision increases the tax burden on foreign profits. Considering the combined impact of these two provisions, U.S. MNCs have strong incentives to reassign ownership of their IP back to the United States, where they could be eligible for the tax break provided by the FDII. In other words, post-TCJA implementation in 2017, we would expect an increase in U.S. patent buybacks from tax havens and a decrease in initial patent sales to these jurisdictions.

To examine the direction of IP flows to the U.S. in both the pre- and post-TCJA periods, we can turn to BEA sales data. Figure 7 reveals intriguing patterns in U.S. imports of proprietary rights from research and development, with notable increases in 2017 and 2022. The 2017 spike likely represents an immediate response to the TCJA, as companies rushed to repatriate IP in anticipation of new tax rules. The subsequent period of relative stability may reflect a phase of adjustment as companies evaluated their long-term strategies under the new tax regime. The 2022 increase could be attributed to a combination of factors: a delayed, more substantial

Figure 6
The Role of Ireland
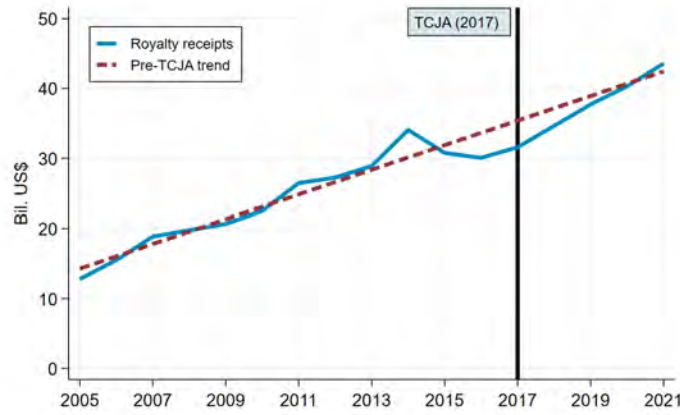
NOTE: Ireland's unique tax regime makes it a complex case and stand out as an outlier, so we exclude it from the sample. Royalty receipts are calculated as the aggregate of all tax havens and low-tax countries (excluding Ireland). We do not distinguish between the different classifications.
SOURCE: OECDstat EBOPS 2010.

Figure 7
U.S. IP Trade Patterns: Imports of Proprietary Rights from Research and Development
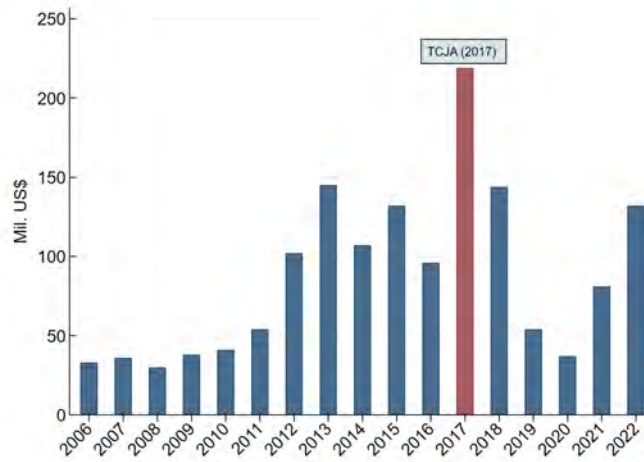
NOTE: Due to the significant number of missing values for individual countries in the BEA data, a detailed analysis of the U.S.'s trade patterns with specific nations is not feasible. Instead, we focus on examining U.S. trade patterns using the available aggregated data.
SOURCE: BEA and Santacreu and LaBelle (2023).

response to the TCJA as companies finalized their global IP strategies; reactions to the 2021 global minimum tax agreement; post-COVID-19 business reorganizations; or anticipation of future policy changes. However, due to data limitations in the BEA dataset, it is challenging to determine the exact origins and destinations of U.S. proprietary IP trade. Without this detailed breakdown, drawing strong conclusions becomes difficult. Nevertheless, the data indicate changes in U.S. IP trade patterns following the TCJA's implementation. These findings align with those in Santacreu (2024) and Santacreu and LaBelle (2023).

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APPENDIX

To strengthen our findings on the TCJA's effect on the intangible assets of U.S. MNCs, we conduct a robustness analysis by comparing measures of technology licensing and IP transfers involving other high-tax countries besides the United States. We focus on Germany, France, Japan, and the United Kingdom, which have been identified by Tørsløv, Wier, and Zucman (2023) as countries that engage in significant profit-shifting activity. This analysis helps to isolate the impact of the TCJA from other potential confounding factors and provides additional evidence for our conclusions.
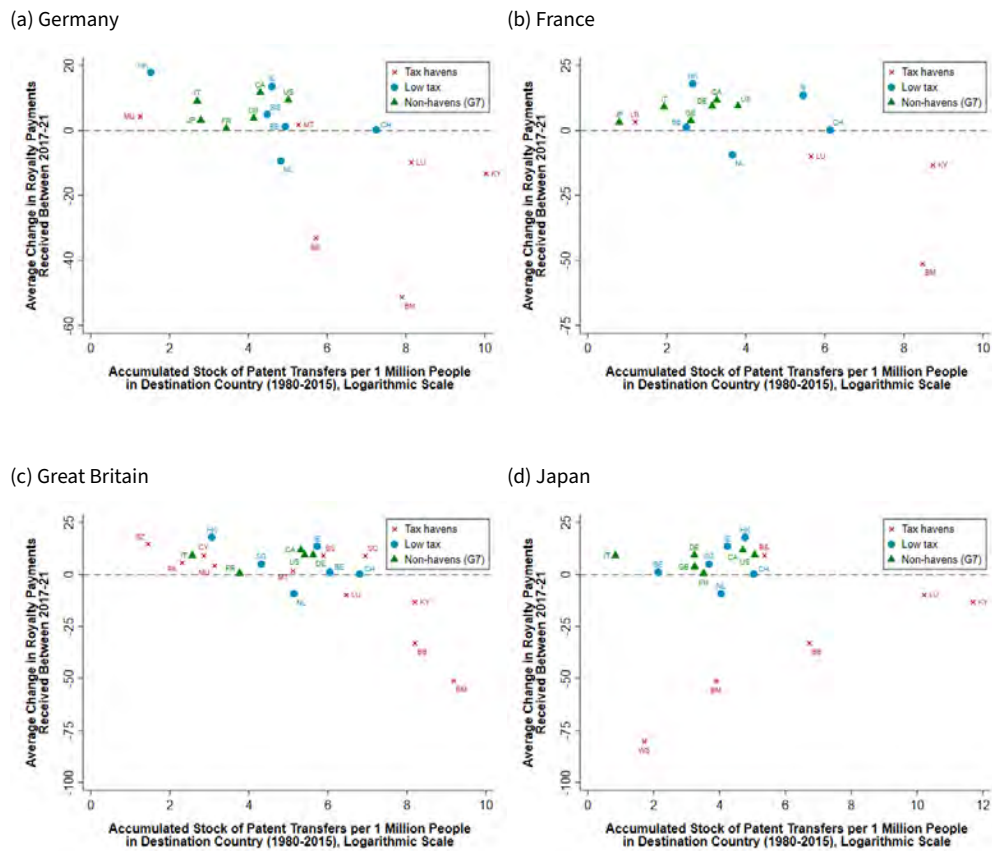
Figure 8

Other Countries with High Tax Rates and their International Royalty Payments after 2017
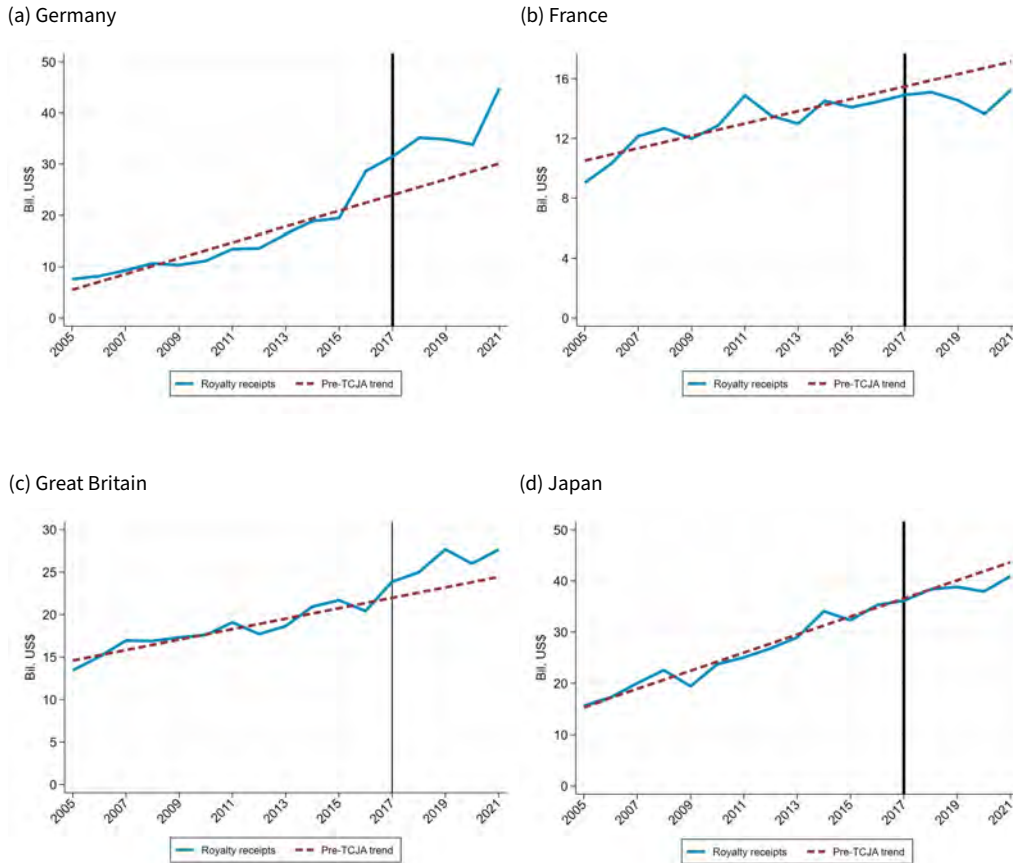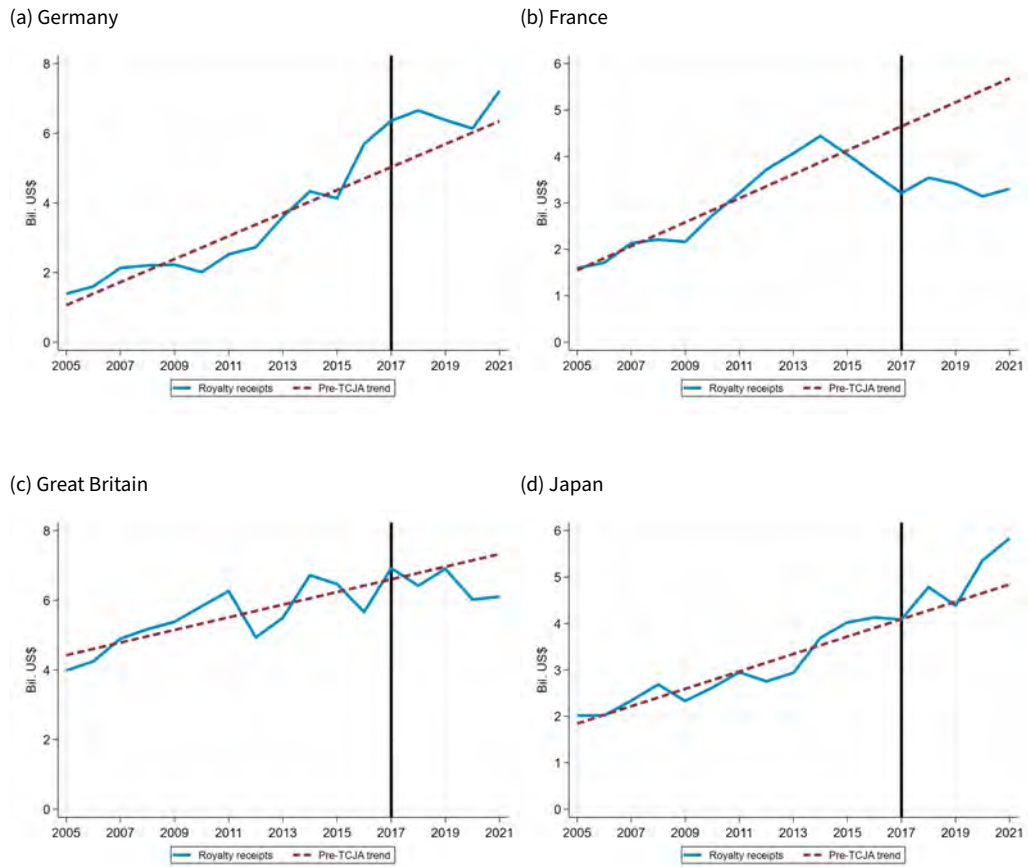

SOURCE: OECDstat EBOPS 2010.

Figure 9

Tax Haven Patterns in IP-related Royalty Payments Following High-Tax Country Transfers

(a) Germany

(b) France

(c) Great Britain

(d) Japan

NOTE: We aggregate patent transfers assigned by each specified country over the entire sample period. Per capita transfers are calculated using the average population of destination countries. Our country classifications come from Tørsløv, Wier, and Zucman (2023). SOURCE: ktMINE and OECDstat EBOPS 2010.

Figure 10
High-Tax Countries And Royalty Payment Flows From Tax Haven Jurisdictions

(a) Germany

(b) France

(c) Great Britain

(d) Japan

NOTE: Royalty receipts are calculated as the aggregate of all tax havens and low-tax countries. We do not distinguish between the different classifications.
SOURCE: OECDstat EBOPS 2010.

Table 1
Country Groups

Tax havens	Low-tax countries
Andorra	Belgium
Antigua & Barbuda	Switzerland
Anguilla	Hong Kong
Netherlands Antilles	Ireland
Aruba	Netherlands
Barbados	Singapore
Bermuda	
Bahamas	
Belize	
Cyprus	
Grenada	
Guernsey	
Gibraltar	
Isle of Man	
Jersey	
Saint Kitts & Nevis	
Cayman Islands	
Lebanon	
Saint Lucia	
Liechtenstein	
Luxembourg	
Monaco	
Marshall Islands	
Macao	
Malta	
Mauritius	
Panama	
Puerto Rico	
Seychelles	
Turks & Caicos	
Saint Vincent & the Grenadines	
British Virgin Islands	
Vanuatu	
Samoa	