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Reinald Koch, Lena Schön

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Taxes and the Investment of Mutual Funds - Evidence from the German Investment Tax Reform

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Reinald Koch[*] [a, b] and **Lena Schön**[a, b]
[a]Catholic University of Eichstaett-Ingolstadt
[b]KU Research Institute for Taxation
[a, b]Auf der Schanz 49
80549 Ingolstadt, Germany

Abstract: This study investigates the impact of dividend taxes on equity mutual fund investments, using the 2018 German Investment Tax Reform as a unique case study. This reform eliminated the foreign tax credit for German fund investors, thereby introducing a new tax planning channel for German equity mutual funds. Analyzing data from 297 German equity mutual funds and comparable non-German equity and bond mutual funds, our findings indicate a significant shift in portfolio allocation post-reform. German equity mutual funds strategically shifted assets to countries with lower withholding tax rates and adjusted investments within countries to avoid taxes after the reform. We also examine the economic impact of the tax reform and find a negative relationship between the tax burden and fund inflows after the reform. Our findings provide valuable perspectives for policymakers, industry practitioners, and researchers by shedding light on the complex interplay between taxes, fund decisions, and investor responses.

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[*] Corresponding author: Reinald Koch, Auf der Schanz 49, 80549 Ingolstadt (Germany), E-Mail: Reinald.Koch@ku.de, Phone: +49 84193721825.

1. Introduction

Mutual fund investments play a central role in both retirement savings for individuals and access to equity capital for the corporate sector. At the end of 2022, regulated open-end funds had a total market capitalization of $60 trillion, representing approximately 60 percent of global GDP (Investment Company Institute, 2023). The importance of mutual funds as investors in public equity markets has grown significantly in recent years, with regulated funds holding approximately 26 percent of the total market capitalization of global equity and bond markets in 2022 – an increase of 5 percentage points over the past decade (Investment Company Institute, 2023).

Despite the significant economic importance of mutual funds, empirical evidence on the impact of tax considerations on the allocation of fund assets across countries remains scarce. While existing studies suggest that fund managers have become more aware of investment-level taxes, particularly over the past 25 years (see Arnott et al., 2018 in comparison to Jeffrey and Arnott, 1993 and Dickson and Shoven, 1995), they primarily focus on strategies such as avoiding investments in high-dividend firms (Gompers and Metrick, 2001; Bennet et al., 2003; Grinstein and Michealy, 2005; Sialm and Stark, 2012), accelerating the realization of capital losses (Bhabra et al., 1999; Gibson et al., 2000), and deferring the realization of capital gains (Huddart and Narayanan, 2002; Fong et al., 2009). However, the incentive for funds to shift equity investments to countries with low dividend tax rates as another possible channel of tax avoidance has been largely neglected so far.[1] Only Chan et al. (2005) consider foreign withholding tax rates as a determinant of fund asset location. Using a global fund sample, they find a negative and statistically significant relationship, which, however, seems to play a minor role

[1] Several studies examine this relationship for foreign portfolio investment without distinguishing between investment types (see, e.g., Bekaert and Wang, 2009; Desai and Dharmapala, 2011; Ammer et al., 2012; Amiram and Frank, 2016). Overall, these studies yield mixed results. However, these findings cannot be directly extrapolated to mutual fund portfolios, as the investment rationale of fund managers, and in particular the consideration of taxes, may differ from that of private or other institutional investors (see, e.g., Perez-Gonzalez, 2002; Grinstein and Michaely, 2005).

compared to other determinants of mutual fund portfolio decisions. The low relevance of withholding taxes in this study may result from fund tax rules in the U.S. and other countries that provide a tax credit for withholding taxes on fund income. In many cases, these withholding taxes, therefore, do not increase the final tax burden of the fund investor.

To address this gap, we analyse the impact of dividend withholding taxes on the location of equity mutual funds' investments, using a natural experiment arising from the 2018 reform of the German Investment Tax Act. This reform, which marked a fundamental overhaul of German fund taxation, introduced non-transparent taxation of income at the fund level and removed the option for fund investors to credit foreign withholding taxes on fund income against their personal tax burden. Our analysis examines whether and to what extent mutual funds restructured their investment portfolios to minimize withholding taxes on dividends after the reform. The answer to this question is not obvious. For example, it is not clear whether fund managers are flexible enough to shift investments across countries and to what extent they take investor taxes into account in their investment decisions. We examine not only the shift in investment patterns but also the impact of the reform on the relationship between the tax burden on fund income and the attractiveness of the fund as reflected in annual fund inflows.

The analyzed setting is unique because of the rarity of such fundamental fund tax reform and the exogenous nature of it caused by the European Court of Justice (ECJ) ruling[2] that necessitated changes to the fund tax regime. Thus, the reform was not primarily motivated by an intention to increase the attractiveness of Germany as a location for investment funds but rather to eliminate the discriminatory treatment of non-German equity mutual funds under the previous regime (Deutscher Bundestag, 2016).[3] The tax treatment of German mutual funds before

[2] Until 2017, the German Investment Tax Act discriminated against foreign investment funds by taxing their income differently from domestic investment funds. Thus, these provisions were incompatible with the free movement of capital under Art. 63 TFEU (ECJ van Caster van Caster decision of October 9, 2014, C-236/12).

[3] Another argument was that the old system was too complex and therefore too costly for the German tax authorities to identify and correct errors in mutual funds' reported taxable income.

and after the reform is representative of the regimes in other major fund jurisdictions. The U.S. applies a transparent fund tax regime with a tax credit for foreign withholding taxes, similar to the German regime before the reform. In contrast, France and Ireland, for example, do not offer such a tax credit as Germany after the reform (Oestreicher and Hammer, 2013 and see Table A.3 in the Appendix for further explanation).

Our empirical analysis is based on a comprehensive dataset that combines information from the annual financial statements of 297 German equity mutual funds and comparable data on 134 non-German equity mutual funds and 232 German bond mutual funds that invest primarily in corporate bonds. Our final data contain a rich set of fund-level information (3,730 fund-year observations) and asset-level information (400,627 fund-asset-year observations).

We use two different identification strategies. First, we use annual country-level data on fund investments to identify shifts in investment to low-withholding countries and compare these effects to two different control groups unaffected by the reform (non-German equity mutual funds and German bond mutual funds). Our results strongly suggest a shift in investments to countries with low dividend withholding tax rates. According to our baseline results, a ten percentage point higher withholding tax rate is associated with a 0.23 to 0.29 percentage point lower share of fund investment in the respective country. These results are robust to the use of two different control groups and to the use of propensity score matching for treatment and control group funds. Second, we exploit within-country heterogeneity to analyze whether German equity mutual funds increased their investment in countries with high (low) withholding tax rates and above (below) average dividend yields after the reform. While we find a statistically significant effect in the expected direction for German equity mutual funds, we do not find a similar shift in investment patterns for non-German funds.

We also examine the heterogeneity of this effect across funds, predicting that the extent of portfolio reallocation depends on fund managers' stock-picking flexibility. Our results confirm this prediction, showing that equity mutual funds with a global geographic focus and no benchmark index reference as well as smaller equity mutual funds increased their investments in countries with low withholding taxes in particular.

Finally, we examine the economic implications of the tax reform and tax-optimal portfolio restructuring and find a negative relationship between the total tax burden and fund inflows after the reform.

Overall, our study makes a significant contribution to the understanding of how mutual funds take taxes into account when structuring their investment portfolios and how fund investors respond to these considerations. We document the difference in relevance of withholding tax rates under a transparent fund tax regime (with withholding tax credits at the investor level) and a non-transparent fund tax regime (without such an option). Our results also support prior findings (Perez-Gonzalez, 2002; Grinstein and Michaely, 2005) that investment heuristics of fund managers differ from private or other institutional investors.

Our results have important implications for policymakers, the fund industry, and other researchers. We inform policymakers that a switch to a fund tax regime without the option of crediting foreign withholding taxes leads to a shift of equity investments from countries with high to low withholding tax rates. This may be an undesirable consequence of the reform if the reforming country itself has a high dividend tax rate. As a consequence of the reform, German equity mutual funds reduced their investment in German assets by 4.6 percentage points on average, which corresponds to an overall outward shifting of €3.7 billion for the 297 German equity mutual funds in our sample.

Fund industry representatives will be interested in the different relevance of the total tax burden on fund income under the different regimes. A reduction in the tax burden on fund income is only associated with an increase in fund inflows under the new regulations, while no similar effect is observed under the prior regime. Based on our findings for the post-reform period, a one percentage point decrease in the total tax burden is associated with a 1.8 percentage point increase in fund inflows, which is equal to about 8 percent of the standard deviation. This finding may have important implications for the design of future investment strategies.

For researchers, the most revealing conclusion from our findings may be that the consideration of taxes in investment decisions differs across investor types. It may, therefore, be worthwhile to differentiate between investor types in future studies, where possible.

The remainder of this paper is organized as follows. The next section discusses the institutional setting and theoretical background. Section 3 presents our empirical strategy. Section 4 describes our data, while Section 5 presents the empirical results. Section 6 concludes the paper.

2. Theoretical background

2.1. Institutional setting

In most countries worldwide, mutual funds are taxed as pass-through conduits, meaning that the funds' ordinary income (e.g., dividend and interest income) and net realized gains are only and ultimately taxed at the investor level (Deutscher Bundestag, 2022).[4] Until 2017, the German fund tax regime was also characterized by such a (partially) transparent approach. Distributed and undistributed fund earnings were taxed at the fund investor's personal income tax

[4] We describe the taxation of mutual funds in some major fund jurisdictions in Table A.3 in the Appendix.

rate.[5] In addition, fund investors were granted a tax credit for withholding taxes collected on foreign ordinary fund income. The overall tax burden on taxable fund income was, thus, at least equal to the investor's personal income tax rate on capital gains, which was uniformly 26.4 percent in the case of a private investor. Foreign withholding taxes up to this rate had the character of an interim tax and did not increase the investor's final tax burden.

The reform under scrutiny introduced a non-transparent tax regime for mutual funds in 2018.[6] The new regulations provide for a taxation of domestic dividend and rental income at fund level at the regular corporation tax rate of 15 percent. Foreign dividend income is regarded as tax-free at the fund level and may only be subject to a foreign withholding tax at the asset level, which now constitutes an ultimate tax burden. A credit of foreign withholding taxes is no longer allowed for German investors. Domestic and foreign investors are subject to an additional tax upon distribution of domestic and foreign fund income. The resulting economic double taxation of fund income is mitigated by a partial exemption of fund distributions, which depends on the fund type (i.e., equity mutual fund, mixed mutual fund, or bond mutual fund) and investor type (i.e., institutional investor or private investor).[7]

The impact of the reform on the overall tax burden depends on the type of fund, mainly because withholding taxes vary by income category. Most countries levy a withholding tax on dividend income but no similar tax on interest income.[8] We calculate the total tax burden on fund income before and after the reform, assuming a German private fund investor and that the

[5] In some countries, mutual funds are required to distribute a certain percentage of their profits to maintain their pass-through tax status. In contrast, German investment funds were not subject to such requirement, but were required to publish their taxable income (broken down into different types of income) in the Electronic Federal Gazette ("Elektronischer Bundesanzeiger") no later than four months after the end of the fiscal year. Although there was no distribution requirement for mutual funds in Germany, the income of mutual funds was still subject to tax at the shareholder level due to a deemed distribution at the end of the fiscal year.

[6] Although the tax reform was announced in December 2015 and the final regulations were published in July 2016, the practical application of the new regulations remained unclear until the beginning of 2018.

[7] According to para. 20 of the German Investment Tax Act, the exemption for equity mutual funds and corporate investors is 80 percent, for individuals holding shares in business assets 60 percent, and for individuals 30 percent. The partial exemption is reduced for mixed funds by half and for German mutual bond funds to zero. For real estate funds, the partial exemption is 60 percent or 80 percent if the real estate held by the fund is primarily located in a foreign country.

[8] Almost half of the countries in our sample have a withholding tax rate of zero percent on interest income. In most of the other countries, the imposition of withholding tax on interest income is limited to rare cases, as we learned from discussions with tax practitioners. Our data can further support this assertion, as we find that only a minority of German bond mutual funds' financial statements include withholding tax. Consequently, the effective tax rate of German bond funds in our dataset is 0.87 percent.

fund income consists entirely of either dividend income (equity mutual funds) or interest income (bond mutual funds) and is distributed in full to the investor. For both types of income, the fund assets may be located either in Germany or abroad. We assume foreign withholding tax rates of 5 or 15 percent for dividends and zero percent for interest income. The results of the calculations are shown in Table 1.

TABLE 1: Taxation of dividend and interest income before and after the German Investment Tax Reform

Taxation of foreign and domestic dividends before and after the German Investment Tax Reform

	Before 2018			After 2017		
	Domestic	Foreign (WHT 5%)	Foreign (WHT 15%)	Domestic	Foreign (WHT 5%)	Foreign (WHT 15%)
Dividend Income	€100.00	€100.00	€100.00	€100.00	€100.00	€100.00
Withholding Tax	€26.38	€5.00	€15.00	€15.00	€5.00	€15.00
Distribution Fund (taxable)	€100.00	€100.00	€100.00	€85.00	€95.00	85.00
- Partial Exemption (30%)				- €25.50	- €28.50	- €25.50
Tax Base	€100.00	€100.00	€100.00	€59.50	€66.50	€59.50
Tax Rate (26.38%)	€26.38	€26.38	€26.38	€15.69	€17.54	€15.69
- Foreign Tax Credit		- €5.00	- €15.00			
Fund investor tax	€26.38	€21.38	€11.38	€15.69	€17.54	€15.69
Total Tax Burden	€26.38	€26.38	€26.38	€30.69	€22.54	€30.69

Taxation of foreign and domestic interest income before and after the German Investment Tax Reform

	Domestic	Foreign	Domestic	Foreign
Interest Income	€100.00	€100.00	€100.00	€100.00
Withholding Tax	€0.00	€0.00	€0.00	€0.00
Distribution Fund (taxable)	€100.00	€100.00	€100.00	€100.00
- Partial Exemption (0 %†)				
Tax Base	€100.00	€100.00	€100.00	€100.00
Tax Rate (26.38%)	€26.38	€26.38	€26.38	€26.38
Shareholder Tax	€26.38	€26.38	€26.38	€26.38
Total Tax Burden	€26.38	€26.38	€26.38	€26.38

This table provides simple examples to illustrate the tax burden calculations (fund level and investor level) for foreign and domestic dividend and interest income before and after the tax reform. † We disregard any partial exemption here since we assume a bond mutual fund for the calculation of the total tax burden on interest income.

Before the reform, fund income was subject to an overall tax burden of 26.4 percent, irrespective of the type of income (dividend or interest income) and the location of fund assets. A higher tax burden would only have resulted from a foreign withholding tax above the 26.4 percent German tax rate. As interest income is assumed not to fall under a withholding tax, the tax burden remains at 26.4 percent after the reform.[9] The tax burden of dividend income of

[9] We assume a German bond mutual fund for the calculation of the total tax burden. According to para. 20 of the German Investment Tax Act, there is no partial exemption on distributed income for investors in bond mutual funds.

funds now depends on the location of assets and the applicable withholding tax rates. For domestic and foreign dividend income with a withholding tax rate of 15 percent, the total tax burden increases to 30.7 percent, whereas a reduction to 22.5 percent results from a withholding tax of 5 percent. The partial exemption of 30 percent of distributed fund income mitigates the differences in total tax burden.

Table A.3 in the Appendix provides a brief description of the tax rules in other major fund jurisdictions (the United States, France, Ireland, and Luxembourg). This overview illustrates the representativeness of the German rules before and after the reform. The U.S. have a fund tax regime that is similar to the pre-reform German regime, in that fund income is taxed transparently at the level of the investor, who can usually credit withholding taxes on fund income. In contrast, other countries, such as France and Ireland, do not allow such credits and are therefore comparable to the new German rules.

2.2. Theoretical Background

Since the 2018 reform of the German Investment Tax Act, German investors in German equity mutual funds have benefited from a minimization of dividend withholding taxes by fund managers, as the example described in Section 2.1 illustrates. Fund managers can exploit these tax advantages for their investors by, for example, shifting equity investments to countries with low dividend tax rates and picking stocks with high (low) dividend yields in countries with low (high) withholding tax rates. Although prior literature has documented that fund managers generally take taxes into account in their investment decisions (Gompers and Metrick, 2001; Bennet et al., 2003; Grinstein and Michealy, 2005; Sialm and Stark, 2012) and that foreign portfolio equity investment is negatively related to dividend withholding tax rates (Chan et al., 2005; Desai and Dharmapala, 2011; Amiram and Frank, 2016), it is not clear ex-ante how fund managers respond to this new incentive.

First, the investment heuristics of fund managers are likely to be different from those of retail or other institutional investors, as shown in previous literature (Perez-Gonzalez, 2002; Grinstein and Michaely, 2005). Fund managers' portfolio choices are influenced by complex regulatory requirements involving the interaction with management companies, custodians, banks, other fund managers, and investors. For example, Dickson et al. (2000) find evidence that the trading behavior of mutual fund managers depends on the decisions of fund investors, as fund managers may be forced to make portfolio adjustments when investors redeem fund shares. Fund managers may also face regulatory constraints, such as those outlined in the fund's prospectus, which may reduce the range of options for their investment decisions (Almazan et al., 2004; Fulkerson and Hong, 2021). These may relate in particular to the international allocation of assets, which may make it easier to avoid withholding taxes by selecting low-dividend stocks.

Second, it is unclear whether fund managers optimize the performance of their funds before or after investor-level taxes, since investors and their tax treatment are largely unknown to fund managers. Besides, Sialm and Zhang (2020) show that tax-efficient portfolios may come at the cost of lower pre-tax performance by limiting the available investment options. Thus, fund managers may only be willing to take taxes at the investor level into account if the positive effect is sufficiently salient to investors. The validity of this assumption is uncertain, given the high complexity of fund taxation.[10]

Third, a proper identification of the true withholding tax rate in the regression is difficult. For many investment countries, the withholding tax rates may be limited by a double tax treaty. Jacob and Todtenhaupt (2023) argue that the actual tax burden of foreign portfolio in-

[10] Frydman and Wang (2020) document the general relevance of salience for investment behaviour.

vestors may differ from the theoretical tax burden (taking into account double tax treaties) because the reclaim of withholding taxes under double tax treaties is uncertain and costly in many cases.[11]

The existing literature has also documented that actively managed equity funds differ in terms of the investment and portfolio management style applied (Petajisto, 2018), which may cause heterogeneity in the reform effect. These differences may reflect fund-specific restrictions on portfolio selection, such as those imposed by regulations in the fund prospectus. Fund managers may be required to invest in certain countries or regions, certain sectors, or certain types of companies and thus may not have sufficient flexibility to allocate investments according to tax incentives. As our analysis focuses on tax optimization through the international allocation of fund assets, we consider any geographic restrictions to be particularly relevant.

If investors consider taxes, then their choice of mutual funds should be based on after-tax returns rather than pre-tax returns. Some previous studies find that accounting for taxes can affect the ranking of funds (Dickson and Shoven, 1995; Bergstresser and Pontiff, 2013), which may have implications for investors' fund choices. Bergstresser and Poterba (2002) directly document a negative relationship between a fund's tax burden and its capital inflows. Moussawi et al. (2022) find evidence that investment advisors of tax-sensitive investors (high-net-worth clients) allocate four times more assets to tax-efficient funds (in this case, ETFs) than other advisors. We expect similar investment patterns for our sample of German equity mutual funds. However, prior to the reform, German equity mutual funds had limited opportunities to reduce their investors' tax burden, which were expanded by the reform. Therefore, we expect that the

[11] We believe their findings are even more relevant to fund investors because the tax status of mutual funds in many countries is highly uncertain (Plowgian et al., 2016).We therefore refer to the tax rates under national tax law in our empirical analysis. We have also estimated the baseline regression taking into account double tax treaty withholding tax reductions. The effects are in the same direction, but are weaker and smaller.

variation in the total tax burden of funds has increased and that the tax burden is now a more relevant determinant of fund inflows.

3. Empirical Strategy

We begin our empirical analysis by examining whether German equity mutual funds adjusted their investment portfolios to the new incentive to reduce dividend withholding taxes after the reform. We employ two different research designs. Our first difference-in-difference regression model uses country-level aggregated data on fund assets. We compare the international asset allocation of German equity mutual funds with the portfolios of two reasonable control groups that were not affected by the reform. Non-German equity mutual funds are our primary control group. We only consider non-German equity mutual funds that are not licensed for distribution in Germany to ensure that they were not affected by the German reform.[12] To ensure comparability with German equity mutual funds, we further restrict the selection of control group funds to those managed by a management company with a German headquarter or subsidiary. This first control group is motivated by the assumption that German and non-German equity mutual funds are subject to the same trends in global equity markets. We refer to German bond mutual funds, which invest mainly in corporate bonds, as our second control group since interest income is usually not subject to foreign withholding tax. Moreover, these funds are subject to the same regulatory environment and are likely to be affected by similar investment preferences (e.g., a home bias for German assets and investor preference for assets in German-speaking or neighboring countries). Equation (1) defines the first regression model.

[12] The reform also changed the taxation for German investors of non-German equity mutual funds.

$$\begin{aligned}\text{Country\_INV}_{ijt} = {} & \alpha_i + \gamma_j + \beta_1 \text{Post2018}_t + \beta_2 \text{German\_EF}_i + \beta_3 \text{WHT}_{jt} \\ & + \beta_4 (\text{Post2018}_t * \text{German\_EF}_i) + \beta_5 (\text{Post2018}_t * \text{WHT}_{jt} \\ & + \beta_6 (\text{German\_EF}_i * \text{WHT}_{jt}) + \beta_7 (\text{Post2018}_t * \text{Treatment}_i * \text{WHT}_{jt}) \\ & + \delta_1 X_{it} + \delta_2 Y_{jt} + \varepsilon_{ijt}. \end{aligned} \quad (1)$$

Our dependent variable *Country_INV*$_{ijt}$ is the market value of mutual fund *i*'s equity or debt holdings in country *j* in a given year *t* scaled by the market value of all equity or debt holdings held by that fund. Altogether, the funds in our sample hold assets in 145 different countries. We calculate *Country_INV*$_{ijt}$ for all possible combinations of *i*, *j,* and *t*.[13]

Post2018$_t$ and *German_EF*$_i$ indicate whether observations belong to the post-reform period (2018 and later) and to the treatment group of German equity mutual funds, respectively. The main explanatory variable of interest is the interaction term between *Post2018*$_t$, *German_EF*$_i$, and *WHT*$_{jt}$. We expect German equity mutual funds to increase (reduce) the share of investments in countries with low (high) dividend withholding tax rates and, therefore, a negative coefficient for this interaction term.

We follow prior literature (Chan et al., 2005; Sialm and Zhang, 2020), in controlling for mutual fund characteristics (X_{it}), such as mutual funds expense ratio (*ExpenseRatio*$_{it}$), lagged age (*FundAge*$_{it-1}$), performance (*Performance*$_{it}$) and net asset value (*Size*$_{it}$) per fund and year. Additionally, we add vector Y_{ij} to control for characteristics of investment countries, including the annual growth in GDP (*GDPGrowth*$_{jt}$), the population (*Population*$_{jt}$), the market capitalization (*MarketCapitalization*$_{jt}$), Moodys' country risk rating (*CountryRisk*$_{jt}$), the financial openness[14] (*FinancialOpenness*$_{jt}$), the S&P Global Equity Index (*GlobalEquityIndex*$_{jt}$) and the annual stock turnover (*StockTurnoverRatio*$_{jt}$) per country and year. We add fund fixed effects α_i

[13] As the majority of mutual funds in our sample do not invest in each of the 145 countries in our sample, about 80 percent of our observations are zero observations. We estimated the baseline regression after dropping all country-fund investments if there is no investment in a specific country over the full observation period. We observe no material changes to our baseline results.

[14] We use a subcomponent of Economic Freedom Index of the Fraser Institute (Fraser Institute, 2022) for measuring financial openness. This sub-component is based on the Chinn-Ito Index of de jure financial openness.

as well as investment country fixed effects γ_j to Equation (1) and cluster standard errors at the fund level.

Our second regression model examines within-country stock selection. We analyze whether German equity mutual funds increased investment in stocks with high (low) dividend yields in countries with low (high) dividend taxes after the reform, which is another possible strategy for funds to reduce their withholding tax burden (see Equation (2)).

$$\begin{aligned}\text{Stock\_INV}_{xit} = {} & \alpha_i + \gamma_j + \beta_1 \text{Post2018}_t + \beta_2 \text{WHT}_{jt} + \beta_3 \text{DividendYield}_{xt} + \beta_4 (\text{Post2018}_t * \text{WHT}_{jt}) \\ & + \beta_5 (\text{Post2018}_t * \text{DividendYield}_{xt}) + \beta_6 (\text{WHT}_{j,t} * \text{DividendYield}_{xt}) \\ & + \beta_7 (\text{Post2018}_t * \text{DividendYield}_{xt} * \text{WHT}_{jt}) + \delta_1 \text{X}_{it} \\ & + \delta_2 \text{Y}_{jt} + \varepsilon_{xit}. \end{aligned} \quad (2)$$

The dependent variable $Stock\_INV_{xit}$ is the market value of mutual fund i's holdings of stock x in year t divided by the total market value of all stocks held by that fund. We include $Post2018_t$, WHT_{jt}, and $DividendYield_{xt}$ as plain variables and all possible interactions as our main explanatory variables. The reform effect is captured by the triple interaction term between $Post2018_t$, $WHT_{jt,}$ and $DividendYield_{xt}$. We expect a negative coefficient if German equity mutual funds adjusted their portfolios to minimize withholding taxes after the reform. Again, we add fund fixed effects (α_i) and investment country fixed effects (γ_j) as well as fund-level controls (X_{it}) and investment country-level controls (Y_{jt}) to our model.

We also test whether the adjustment of investment portfolios after the reform depends on certain fund characteristics that determine the flexibility of fund managers' stock selection. To this end, we estimate Equation (1) using data for German equity mutual funds. However, we use $Flexibility_i$ instead of $German\_EF_i$ as treatment variable, here. Since $Flexibility_i$ is a characteristics that is not directly observable in a fund's published information, we rely on three different fund characteristics (geographical focus, benchmark comparison and fund size), which we assume are associated with more or less flexibility in fund managers' investment decisions.

Finally, we analyze the implications of the reform for the determinants of fund inflows, particularly the relevance of the tax burden on the fund's income. Given the complexity of fund taxation, it is not clear to what extent fund investors are aware of the positive effects of avoiding withholding taxes. We analyze the relationship between the mutual fund's effective tax burden (TB_{it}) and fund net inflows for our sample of German equity mutual funds before and after the reform. We employ the fixed effects regression model described by Equation (3), which is based on the methodology in Bergstresser and Poterba (2002).

$$\begin{aligned}\text{FundInflow}_{it} = {} & \alpha_i + \beta_1 \text{PreTaxReturn}_{it-1} + \beta_2(\text{TB}_{it-1} * \text{Post2018}_t) + \beta_2(\text{TB}_{it-1} * (1 - \text{Post2018}_t) \\ & + \beta_3 \text{ExpenseRatio}_{it-1} + \beta_4 \text{Size}_{it-1} + \beta_5 \text{FundAge}_{it-1} + \varepsilon_{it}. \end{aligned} \quad (3)$$

The dependent variable $FundInflow_{it}$ is calculated as the change in total net asset value of mutual fund *i* in year *t,* excluding growth in total net asset value as a result of fund returns or distribution as a fraction of the beginning-of-year net asset value.[15] $PreTaxReturn_{it-1}$ depicts the fund's total pre-tax return, which we define as the sum of fund's dividend income, realized gains and unrealized gains as a fraction of the beginning-of-year net asset value. We calculate the fund's effective tax burden TB_{it} as the difference between the mutual fund's pre-tax return and after-tax return and consider for this purpose all fund-level and investor-level taxes on fund income.[16] In order to compare the relevance of the tax burden for fund inflows prior to and after the reform, we use interactions of TB_{it} with a pre-reform ($1 - Post2018_t$) and post-reform dummy ($Post2018_t$). We control for the fund's expense ratio ($ExpenseRatio_{it-1}$), the net asset value ($Size_{it-1}$), and the fund age ($FundAge_{it-1}$). Following Bergstresser and Poterba (2002), we used lagged definitions of these independent variables in order to avoid any endogeneity.

[15] Due to data restriction, we estimate fund's net inflow using mutual fund's general development calculation shown in the fund's financial statements. See Table A.5 in the Appendix for further explanation.

[16] We calculate the pre-tax return, after tax return and the total tax burden following Bergstresser and Poterba (2002). However, we modify their calculation for the implications of the German fund tax regime. See for further explanation Table A.5 in the Appendix.

4. Data and Descriptive Analysis

We use data for a sample of 663 actively managed German and European mutual funds obtained from various data sources.

For German equity and bond mutual funds, we manually collect data from annual financial statements for the years 2015 to 2020 and construct a balanced panel.[17] The financial statements of German mutual funds are available in the Electronic Federal Gazette for each year since the fund's launch. For sample selection, we manually reviewed the prospectus of each actively managed German equity and bond mutual fund included in the BaFin mutual fund database and selected relevant funds based on the following criteria. We exclude mutual funds with specific portfolio restrictions (e.g., funds with a specific country focus or specific illiquid investments) as well as ETFs since funds can only respond to the reform if their managers have sufficient flexibility in their investment decisions. We also exclude funds of funds[18], mixed investment funds, and equity mutual funds (bond mutual funds) that invest less than 50 percent in equities (corporate bonds). Our final sample includes 297 German equity mutual funds and 232 German bond mutual funds. We collect information from the balance sheet, income statement, and list of fund holdings from the annual reports of all funds in our sample.

We obtain data on non-German equity mutual funds from Thomson Reuters Mutual Fund Holdings, since we have no access to the annual reports of non-German mutual funds. We use Bloomberg Mutual Fund Screener[19] to preselect all actively managed mutual funds domiciled in the European Union that are not registered for distribution in Germany[20]. We further

[17] The financial statements data is more comprehensive than the Thomson Reuters data for German mutual funds. In addition to holding data, detailed information on individual profit and expense items is included. For this reason, we have chosen to collect data primarily from the annual reports.

[18] Funds of funds are mutual investment funds that only invest in other mutual funds. As they have no impact on the investment decisions of their mutual fund holding, we excluded them from our sample.

[19] We choose these European mutual funds using the Bloomberg Fund Screener and additionally cross-check these results with the open-source list provided by the Germany Federal Financial Supervisory Authority (BaFin), which encompasses all mutual funds distributed in Germany.

[20] This restriction ensures that this fund is not distributed to German fund investors. These funds are therefore unaffected by the German Investment Tax Reform.

restrict our control group to non-German equity mutual funds managed by management companies with a German counterpart in order to make German and non-German mutual funds more comparable. In total, 258 non-German equity mutual funds meet these requirements. We then use the same selection criteria described above for the German mutual funds and also require sufficient information on fund holdings in the Thomson Reuters Mutual Fund Holdings Database. Our final sample of non-German equity mutual funds consists of 134 equity mutual funds domiciled in Austria, France, Ireland, Italy, Luxembourg, or Spain for the years 2015 to 2020.[21]

For both subsamples, we add mutual fund data from Thomson Reuters, such as expense ratios and inception dates. In total, we create a rich panel of mutual fund data. Our final sample contains 3,730 fund-year observations, 383,620 fund-investment country-year observations, and 400,627 fund-asset-year observations for the years 2015 to 2020.

We merge the fund holdings information with Thomson Reuters financial data on fund assets, which we use, for example, to classify holdings as equity (e.g., stocks), debt (e.g., bonds), or other securities, and to calculate the stock-year-specific dividend yield. After merging the data and further classifying the asset types of mutual fund holdings, we calculate the total value of mutual fund investments by asset type (equity, debt, or other security), country, and year. To do this, we use information on each fund's investment portfolio as reported in the fund's financial statement or in the Thomson Reuters Mutual Fund Holdings database as of

[21] Our final dataset contains 134 non-German equity mutual funds with the following distribution to the six different fund domiciles: Austria (4), France (20), Ireland (9), Italy (2), Luxembourg (97), and Spain (2).

year-end. We also add hand-collected information on country-specific withholding tax rates[22] and further country-specific information[23] for each observed year.

Table 2 presents summary statistics for all fund-specific variables included in our analysis for the treatment group (German equity mutual funds) and the two control groups (non-German equity mutual funds and German bond mutual funds). On average, German equity mutual funds have the highest net asset value and the highest variation in fund size. Non-German equity mutual funds offer the highest average fund performance (6.31 percent), measured as the percentage change in fund price, while German bond mutual funds were less profitable. In contrast, the age and expense ratios of the funds are quite similar across the three fund groups.

TABLE 2: Descriptive Statistics

	German Equity Mutual Funds			Non-German Equity Mutual Funds			German Bond Mutual Funds		
	Mean	SD	Median	Mean	SD	Median	Mean	SD	Median
Size (million)	471.199	2486.766	56.390	185.24	273.674	86.576	212.322	735.446	64.642
NAVperShare	188.302	752.010	82.474	284.463	464.853	145.39	407.549	1628.034	69.657
ExpenseRatio	1.516	0.486	1.54	1.709	0.5842	1.79	1.319	.745	1.07
FundAge	15.186	10.284	13.75	14.984	6.841	14.625	14.061	14.700	9.917
Performance	0.0480	0.313	0.029	0.0631	0.147	0.061	.010	.2355	-.0036

This table reports some descriptive measurements of German equity mutual funds, non-German equity mutual funds and German bond mutual funds. Data is obtained from the financial statements of German mutual funds and Thomson Reuters. The observation units are fund-year observations. *NetAssetvalue* is the mutual fund's net asset value per year in € million. *NAVperShar*e is the net asset value divided by the shares outstanding to each business year-end in euro winsorized at 1% level. *ExpenseRatio* and *FundAge* is the funds' expense ratio and the funds' age per mutual fund and year. *Performance* is the change of mutual fund's price to prior year winsorized at 1% level per mutual fund and year. Yearly data from 2015 to 2020.

To make the treatment and control groups more comparable, we also use matched samples of funds. To do this, we select control group funds using a propensity score matching with replacement, with a 0.001 caliper on mutual fund size, expense ratio, age, NAV per share, and

[22] We refer to the withholding tax rates under national tax laws, without regard to any limitations imposed by double tax treaties. We base on the findings of Jacob and Todtenhaupt (2023), who point to the limited relevance of double tax treaties for foreign portfolio investments. We believe that their findings are even more relevant to our setting, since the tax status of mutual funds for double tax treaties is highly uncertain in many countries (see, e.g., Plowgian et al., 2016).

We also estimated the baseline regression taking into account the reduction in withholding taxes due to double tax treaties. The effects point in the same direction, but are weaker and smaller. We obtain our withholding tax data from Withholding Tax Study 2015 to 2020 (KMPG, 2015; 2017; 2018; 2019; 2020), PwC Worldwide Tax summary (PwC, 2023) and the deductible foreign withholding tax tables 2015 to 2020 (German Federal Central Tax Office, 2023). We used KPMG's withholding tax data as our primary source and compared it to withholding tax data from the Federal Central Tax Office. We also used PwC's tax rates and the Global Corporate Tax Handbook (IBFD, 2020) in case of discrepancies or gaps. Discrepancies are mainly due to certain country-specific special rules that should not intended to apply to mutual funds.

[23] We obtain all data for our country-specific control variables for the years 2015 to 2020 from the World Bank database and the Fraser Institute (Fraser Institute, 2022) for measuring financial openness.

number of investment countries, which is considered to be the average value over the pre-reform years. More specifically, the propensity score matching compares all mutual funds in our sample based on these fund characteristics and estimates the conditional probability of being in the treatment group regardless of the actual treatment (German Investment Tax Reform). Our final matched samples consist of 284 (329) funds, 1,674 (1,856) fund years, and 138,420 (196,760) fund country-year observations for using non-German equity mutual funds (German bond mutual funds) as the control group. Table A.4 in the Appendix presents descriptive statistics for the matched samples.

5. Empirical Results

5.1. Taxes and the Asset allocation of German Equity Mutual Funds

5.1.1. International Allocation of Fund Assets

We analyze the extent to which German equity mutual funds have adjusted their portfolios to minimize dividend withholding taxes after the 2018 German Investment Tax Reform. This allows us to assess whether fund managers have considered withholding tax rates differently under the previous transparent fund tax regime than under the new non-transparent approach.

One possible strategy to avoid dividend taxes is to shift investments to countries with low dividend withholding tax rates. We estimate Equation (1) to examine the use of this strategy by German equity mutual funds after the reform relative to non-German equity mutual funds and report the regression results in Table 3. We report regression results for the full sample (column (1)) and for a matched sample of funds obtained from propensity score matching (column (2)).

The dependent variable in Table 3 is $Country\_INV_{ijt}$, the share of investments of fund i in country j, measured by the respective market values of the investments. Several fund and

non-tax country characteristics affect the international allocation of fund assets. Funds in our sample invest significantly more in countries with higher GDP growth, a larger capital market, and a better financial openness score. In addition, fund performance and smaller fund size have a positive effect, indicating that investments are spread across fewer countries.

The tax effect is captured by the variable WHT_{jt} and its various interactions. The baseline effect of WHT_{jt} is insignificant for both the matched and the unmatched panel in columns (1) and (2). Thus, we find no evidence that equity mutual funds in our sample generally shift investments to countries with low dividend withholding tax rates. The interaction term $Post2018_t$ * $German\_EF_i$ * WHT_{jt}, as our main explanatory variable, captures the reform effect. We estimate a significant and negative coefficient of -2.66 (unmatched panel, column (1)) and -2.29 (matched panel, column (2)). This coefficient indicates that German equity mutual funds reduce after the reform the share of their investments in country *j* by 0.27 and 0.23 percentage points (relative to the control group of non-German equity mutual funds) if the withholding tax rate in this country is ten percentage points higher.[24] Thus, based on our analysis, a ten percentage point higher withholding tax rate leads to an outward shift of investments by approximately €0.63 to €0.73 million per German equity mutual fund or an overall lower domestic investment of €185 to €218 million by all 297 German equity mutual funds in our sample.

[24] Note that the average withholding tax rate remains quite similar over the observation periods.

TABLE 3: Non-German Equity Mutual Funds

	With Investment in Fund Domicile		**No Investment in Fund Domicile**	
	Country_INV	Country_INV	Country_INV	Country_INV
	(1)	(2)	(3)	(4)
Post2018	-0.153***	-0.056	0.044	0.045
	(0.048)	(0.045)	(0.047)	(0.047)
WHT	1.655	0.360	-2.613***	-2.903***
	(1.661)	(1.586)	(0.934)	(0.887)
Post2018*German_EF	0.255***	0.144**	-0.012	0.036
	(0.059)	(0.061)	(0.057)	(0.060)
Post2018*WHT	1.769***	1.162***	0.690	1.009**
	(0.437)	(0.397)	(0.536)	(0.507)
German_EF*WHT	5.498***	5.108***	3.198***	4.518***
	(0.925)	(0.966)	(1.209)	(1.334)
Post2018*German_EF*WHT	-2.664***	-2.294***	-0.652	-1.748**
	(0.593)	(0.632)	(0.746)	(0.843)
ExpenseRatio	-0.056	-0.003	0.005	0.098
	(0.066)	(0.097)	(0.074)	(0.099)
$FundAge_{t-1}$	-0.015	-0.004	-0.002	-0.005
	(0.011)	(0.011)	(0.010)	(0.012)
Size	-0.066**	-0.061	-0.076***	-0.061
	(0.026)	(0.039)	(0.028)	(0.043)
Performance	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
GDPGrowth	0.004**	0.003**	0.001	0.001
	(0.002)	(0.003)	(0.001)	(0.002)
Population	0.223	-0.3810	-0.647	-0.904
	(0.591)	(0.582)	(0.561)	(0.662)
Country Risk	-0.001	-0.002	-0.002	-0.002
	(0.006)	(0.006)	(0.005)	(0.006)
MarketCapitalization	0.111***	0.114***	0.036**	0.049**
	(0.025)	(0.025)	(0.017)	(0.019)
FinancialOpenness	0.017*	0.012	-0.001	0.002
	(0.010)	(0.013)	(0.009)	(0.012)
GlobalEquityIndex	0.000	-0.000	0.000*	0.001*
	(0.000)	(0.000)	(0.000)	(0.000)
StocksTurnoverRatio	-0.000	-0.000	-0.001*	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-4.736	5.534	12.531	16.295
	(9.915)	(9.750)	(9.477)	(11.179)
Fund & Country FE	Yes	Yes	Yes	Yes
Control Group	Foreign EF	Foreign EF	Foreign EF	Foreign EF
Sample	Unmatched	Matched	Unmatched	Matched
Observations	96,177	65,458	85,565	58,190
Adj. R-sq	0.363	0.356	0.322	0.340

This table reports the difference-in-difference results for estimating Equation (1) using non-German equity mutual funds as a control group. Specifications (1) and (2) show our baseline estimation, and specifications (3) and (4) disregard investments in fund domiciles. Data is obtained from financial statements of mutual funds and Thomson Reuters. The observational units are fund-investment-country-year observations. The dependent variable *Country_INV* is the ratio of the total market value of equity investment related to a specific country to total equity investment per mutual fund and year. If there is no investment in one of these countries, the variable *Country_INV* equals zero for this specific country. For purposes of a better interpretation, we multiply the calculated ratio by 100. See Table A.1 in the Appendix for further variable definitions. All specifications include fund and investment country fixed effects. Standard errors clustered at fund level in parentheses.* Indicates significance at the 10% level, ** indicates significance at the 5% level, *** indicates significance at the 1% level.

Previous literature (Coval and Moskowitz, 1999; Chan et al., 2005; Hau and Rey, 2008; Maier and Scholz, 2019) has documented a home bias in the portfolios of mutual funds. This effect may affect our findings if mutual funds invest in the home country despite a high withholding tax rate. Therefore, we re-estimate columns (1) and (2) but disregard investment countries that enter our sample as a location of mutual funds.[25] The coefficient for WHT_{jt} is now significant and negative. Thus, we find evidence of a tax-efficient allocation of foreign fund investments, which is similar to the findings of Chan et al. (2005). They demonstrate that withholding tax rates negatively influence foreign mutual fund investment (coefficient -2.58) and argue that countries with lower withholding taxes promote more foreign investments. We also find a statistically significant difference in the level of this effect between German and non-German mutual funds, as indicated by the positive coefficient for $German\_EF_i * WHT_{jt}$. This effect may result from the design of the tax system in the other fund locations that, to some extent, already disallowed the credit of withholding taxes prior to the German reform. The coefficient on $Post2018_t * German\_EF_i * WHT_{jt}$ remains negative and statistically significant, at least for the matched sample (column (4)). The effect size is only slightly smaller (coefficient of -1.75).

In Table 4, we estimate the same regressions for the second control group, German bond mutual funds. The results for this control group confirm the previous findings on the reform effect. The coefficient on $Post2018_t * German\_EF_i * WHT_{jt}$ is negative and statistically significant in all four specifications, and the estimated effect size is even stronger (coefficient between -2.36 and -3.00).

[25] This include the countries Austria, France, Germany, Ireland, Italy, Luxembourg, Spain.

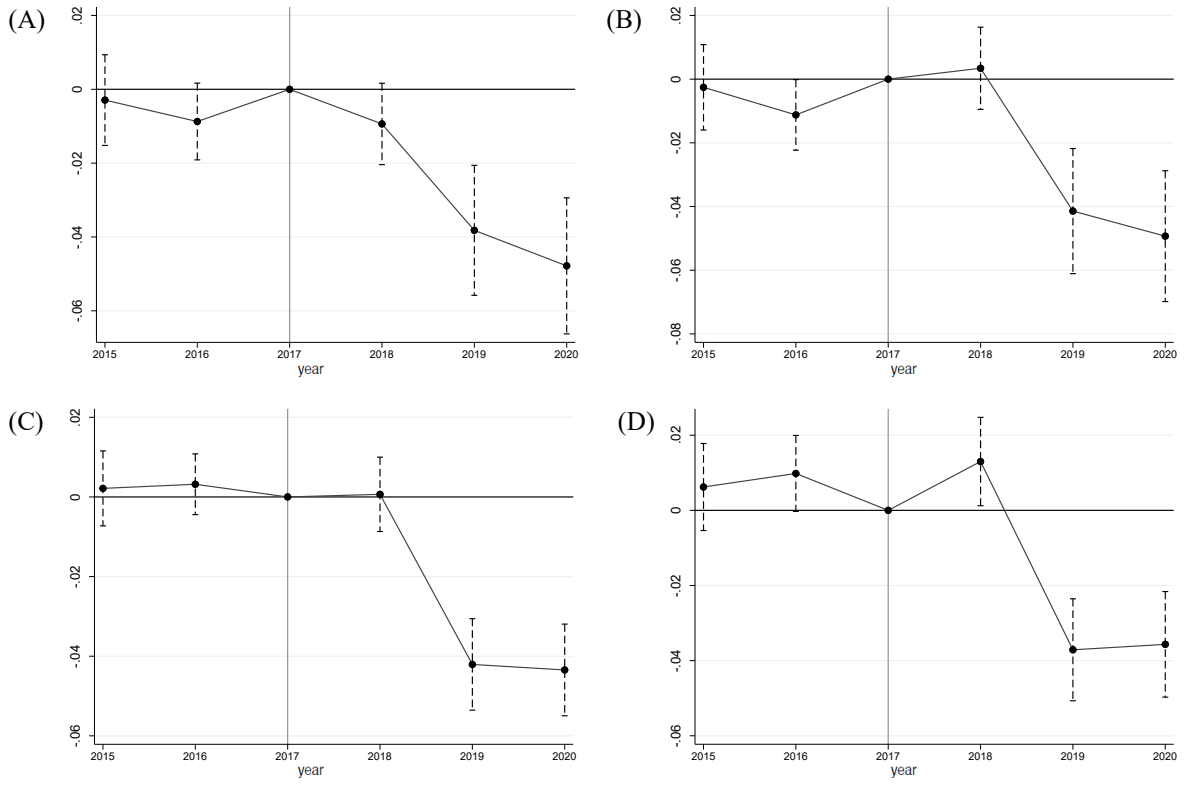
TABLE 4: German Bond Mutual Funds

	With German Investment		**No German Investment**	
	Country_INV	Country_INV	Country_INV	Country_INV
	(1)	(2)	(3)	(4)
Post2018	-0.204***	-0.219***	-0.115***	-0.140***
	(0.034)	(0.044)	(0.025)	(0.033)
WHT	2.045	3.410	-3.770***	-4.461***
	(1.607)	(2.100)	(0.365)	(0.441)
Post2018*German_EF	0.222***	0.176***	0.150***	0.171***
	(0.044)	(0.053)	(0.028)	(0.034)
Post2018*WHT	1.895***	1.703***	1.880***	2.257***
	(0.245)	(0.318)	(0.229)	(0.283)
German_EF*WHT	6.636***	5.817***	6.296***	6.563***
	(0.517)	(0.584)	(0.546)	(0.605)
Post2018*German_EF*WHT	-2.898***	-2.357***	-2.636***	-3.005***
	(0.407)	(0.492)	(0.371)	(0.418)
ExpenseRatio	-0.013	-0.014	-0.006	0.001
	(0.012)	(0.016)	(0.013)	(0.017)
FundAge $_{t-1}$	0.012	0.017	0.010	0.015
	(0.011)	(0.014)	(0.011)	(0.014)
Size	-0.059**	-0.085***	-0.048**	-0.066**
	(0.023)	(0.025)	(0.019)	(0.025)
Performance	0.000***	-0.000***	0.000***	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
GDPGrowth	0.003	0.005*	0.005**	0.006**
	(0.002)	(0.003)	(0.002)	(0.003)
Population	0.803**	1.285***	0.735*	1.281***
	(0.406)	(0.494)	(0.389)	(0.490)
Country Risk	0.007	0.015**	-0.007	-0.001
	(0.006)	(0.007)	(0.005)	(0.006)
MarketCapitalization	0.054**	0.056	-0.007	-0.027
	(0.027)	(0.035)	(0.021)	(0.026)
FinancialOpenness	0.029***	0.030***	0.015**	0.017***
	(0.008)	(0.006)	(0.007)	(0.005)
GlobalEquityIndex	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
StocksTurnoverRatio	-0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
FEDInterestRate	0.012	0.013	0.002	-0.005
	(0.010)	(0.012)	(0.009)	(0.011)
ECBInterestRate	0.484***	0.446**	0.299**	0.374**
	(0.143)	(0.184)	(0.139)	(0.180)
Constant	-13.806**	-21.954***	-10.682*	-19.285**
	(6.716)	(8.029)	(6.415)	(8.071)
Fund & Country FE	Yes	Yes	Yes	Yes
Control Group	German BF	German BF	German BF	German BF
Sample	Unmatched	Matched	Unmatched	Matched
Observations	122,490	78,706	119,921	77,038
Adj. R-sq	0.412	0.430	0.325	0.342

This table reports the difference-in-difference results for estimating Equation (1) using German bond mutual funds as a control group. Specifications (1) and (2) show our baseline estimation, and specifications (3) and (4) disregard German investments. Data is obtained from the financial statements of German mutual funds. The observational units are fund-investment-country-year observations. The dependent variable *Country_INV* is the ratio of the total market value of equity or debt investment related to a specific country to total equity or debt investment per mutual fund and year. If there is no investment in one of these countries, the variable *Country_INV* equals zero for this specific country. For purposes of a better interpretation, we multiply the calculated ratio by 100. See Table A.1 in the Appendix for further variable definitions. All specifications include fund and investment country fixed effects. Standard errors clustered at fund level in parentheses.* Indicates significance at the 10% level, ** indicates significance at the 5% level, *** indicates significance at the 1% level.

The use of a difference-in-difference research design relies on the assumption that parallel trends in the treatment and control group prior to the tax law change would have continued in the absence of the reform. Since we cannot test this assumption directly, we use a difference-in-difference event study design to confirm the parallel trend assumption in our setting. Therefore, we replace $Post2018_t$ in Equation (1) with a year dummy variable and normalize this coefficient to zero in the year before the treatment. Figure 1 plots the estimated coefficient of the interaction of $Year_k$ * $German\_EF_i$ * WHT_{jt}. We test the common trend assumption for both control groups (non-German equity mutual funds and German bond mutual funds) and for both the matched and unmatched samples.

FIGURE 1: Event Studies



Event studies for German equity mutual funds and (A) non-German equity mutual funds (*full sample*), (B) non-German equity mutual funds (*matched sample*), (C) German bond mutual funds (*full sample*), and (D) German bond mutual funds (matched sample) as a control group.

In all four specifications, the coefficients for the years 2015 and 2016 show no significant differences in the shift of investment to low-withholding tax countries and are close to zero. Thus, we do not observe any pre-trends between the treatment and the two control groups, suggesting that the parallel trend assumption is valid.

The event study also sheds light on the dynamics of the response to introducing the non-transparent tax regime without tax credit. As Figure 1 shows, the investments of German equity mutual funds in countries with low withholding taxes remain unchanged in the year immediately following the reform (2018) and increase significantly only with a one-year lag. There are two possible explanations for this lagged response. First, it takes time for mutual fund managers to adjust portfolios to tax law changes, as previous literature has shown (see, e.g., Poterba, 2002; Desai and Dharmapala, 2011). Second, although the change in tax law was announced in late 2016 (Deutscher Bundestag, 2016), uncertainty in practical implementation persisted until the law took effect in 2018, and it was subsequently amended in early 2019 (Deutscher Bundestag, 2019). Therefore, it is reasonable that fund managers only adjusted their investment portfolios with a one-year lag.

5.1.2. Withholding Tax Rates, Dividend Yields, and Allocation of Fund Assets

A second strategy to mitigate the withholding tax burden is to select stocks based on both the dividend yield and the applicable withholding tax rate. Following this strategy, we expect German equity mutual funds to increase their investments in stocks with low (high) dividend yields in countries with high (low) withholding tax rates after the reform. This approach allows mutual funds to minimize the tax burden without shifting investments across countries. We test the use of this strategy by estimating Equation (2). Since we are relying on within-country variation, we do not consider a direct comparison with a control group. Rather, we compare the use of this strategy by German equity mutual funds (columns (1) to (4) of Table 5) and non-German equity mutual funds (columns (5) and (6) of Table 5) in separate regressions.

TABLE 5: Stock Investments

	With German Investment		No German Investment		Non-German Funds	
	Stock_INV	Shares Holding	Stock_INV	Shares Holding	Stock_INV	Shares Holding
	(1)	(2)	(3)	(4)	(5)	(6)
Post2018	0.188***	-0.111	0.231***	-0.009	0.141**	-0.012
	(0.063)	(0.151)	(0.061)	(0.174)	(0.068)	(0.157)
DividendYield	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
WHT	1.356***	-0.527	-0.365	1.098	0.772*	0.270
	(0.351)	(0.899)	(1.820)	(3.024)	(0.419)	(1.082)
Post2018*DividendYield	0.000**	0.000*	0.000***	0.000*	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
DividendYield*WHT	0.000	0.001	0.000	0.001	0.000	0.000
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)
Post2018*WHT	-0.143	0.628*	-0.198	0.599*	-0.035	0.388
	(0.132)	(0.341)	(0.127)	(0.348)	(0.171)	(0.317)
Post2018*DividendYield*WHT	-0.001***	-0.001**	-0.001***	-0.001**	0.000	0.000
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)
ExpenseRatio	-0.121	-0.498	-0.119	-0.410	-0.112	-0.045
	(0.172)	(0.350)	(0.149)	(0.291)	(0.179)	(0.232)
FundAge $_{t-1}$	-0.084***	0.028	-0.092***	-0.015	-0.025	0.002
	(0.022)	(0.038)	(0.022)	(0.042)	(0.021)	(0.072)
Size	-0.094**	0.632**	-0.068	0.681***	-0.085	0.742***
	(0.045)	(0.244)	(0.048)	(0.256)	(0.053)	(0.108)
Performance	0.000***	0.000	0.000***	0.000	-0.095	-0.106
	(0.000)	(0.000)	(0.000)	(0.000)	(0.107)	(0.195)
GDPGrowth	-0.001	-0.003	-0.000	-0.009	0.006*	0.020**
	(0.003)	(0.006)	(0.003)	(0.007)	(0.003)	(0.008)
Population	1.084	-2.393	1.385	-2.046	-0.693	-2.494
	(0.999)	(3.338)	(0.868)	(3.404)	(1.266)	(4.051)
Country Risk	0.043	0.006	0.036	0.005	0.024	0.055
	(0.029)	(0.072)	(0.030)	(0.077)	(0.016)	(0.034)
MarketCapitalization	0.384***	-0.282*	0.298***	-0.291	0.178	-0.356
	(0.101)	(0.163)	(0.095)	(0.205)	(0.131)	(0.298)
FinancialOpenness	-0.107	-0.134	-0.110	-0.119	0.036**	0.017
	(0.152)	(0.175)	(0.151)	(0.172)	(0.015)	(0.029)
GlobalEquityIndex	-0.000	0.001	0.001*	0.001	0.001**	0.001
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
StocksTurnoverRatio	-0.000	0.002***	-0.000	0.002***	-0.000	0.002***
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
Constant	-26.419	55.199	-29.340*	48.131	9.677	50.130
	(18.092)	(60.149)	(16.274)	(61.414)	(23.520)	(75.665)
Fund & Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	67,355	67,353	49,230	49,228	40,087	40,030
Adj. R-sq	0.521	0.884	0.492	0.882	0.369	0.769

This table reports the difference-in-difference results for estimating Equation (2). Specifications (1) and (2) show our baseline estimation, specifications (3) and (4) disregard German investments, and specifications (5) and (6) show the estimation for Non-German equity mutual funds. Data is obtained from the financial statements of German mutual funds and Thomson Reuters. The observational units are fund-asset-investment-year observations. The dependent variable *Stock_INV* is the ratio of the market value of a specific stock holding to total equity investments. For purposes of a better interpretation, we multiply the calculated ratio by 100. *SharesHolding* is the natural logarithm of the mutual fund's holdings of a specific stock holding per mutual fund and year. See Table A.1 in the Appendix for further variable definitions. All specifications include fund and country fixed effects. Yearly data from 2015 to 2020. Standard errors clustered at fund level in parentheses.* Indicates significance at the 10% level, ** indicates significance at the 5% level, *** indicates significance at the 1% level.

We use $Stock\_INV_{xit}$ as the dependent variable in specifications (1), (3), and (5), which measures the ratio of the market value of a specific stock holding to the total market value of equities at the end of the fiscal year for each equity mutual fund. In order to ensure that our

results are not biased through differences in stock price movements of different assets, we also estimate specifications (2), (4), and (6) using $SharesHolding_{xit}$ as the dependent variable. $SharesHolding_{xit}$ is the natural logarithm of the shares of a given equity investment held by the fund in a given year.

Comparing the coefficients for German and non-German equity mutual funds, we find that investment portfolios are similarly affected by non-tax fund characteristics in both fund samples. Although the magnitude of the effect may differ, we find similar influences for the variables $ExpenseRatio_{it}$, $FundAge_{it-1,}$ and $Size_{it}$. These results support our view that the two groups of funds are, in principle, comparable.

We also find no evidence of a general difference in the use of the considered tax planning strategy. Neither $DividendYield_{xt} * WHT_{jt}$ nor $DividendYield_{xt}$ has a significant effect in any of the six specifications.[26] In fact, investments are significantly positively associated with WHT_{jt} in specifications (1) and (5) of Table 5, which again may be related to the home bias of investments in our data. The coefficient for WHT_{jt} turns negative if we disregard domestic investments of German mutual funds (column (3)). We also find that dividend yield has a negative but insignificant effect for both groups of funds.

Our results document clear differences between German and non-German equity mutual funds with respect to the influence of our main independent variable, the interaction term $Post2018_t * DividendYield_{xt} * WHT_{jt}$. The negative coefficient reported in columns (1) to (4) of Table 5 indicates that German equity mutual funds increased (reduced) their investment in stocks with low (high) dividend yields after the reform when the withholding tax rate was high. We do not find a similar effect for the sample of non-German equity mutual funds.

[26] In this respect, our study confirms earlier findings by Del Guercio (1996) who also points to the small relevance of dividend yields for mutual fund investment portfolios.

5.2. Robustness Tests

We test the robustness of our findings from the previous two subsections against three modifications of our sample or our regression approach.

Omitting certain investment locations – We omit investments in the UK and Ireland as the two largest investment locations with a zero withholding tax rate. The corresponding regression results are reported in Table 6, columns (1) to (4) for Equation (1) and Table 7, columns (1) and (2) for Equation (2). This robustness test addresses the concern that our results are driven by the investment in few specific countries. The regression results remain relatively unchanged, especially with respect to the main independent variables $Post2018_t * German\_EF_i * WHT_{jt}$ and $Post2018_t * DividendYield_{xt} * WHT_{jt}$.

Anticipation Effects – Although the German Investment Tax Reform did not take effect until 2018, it was announced already at the end of 2016. Thus, it is possible that German mutual funds anticipated the effects of the reform and restructured their investment portfolios already in 2017. We, therefore, report additional regression results that exclude observations referring to the pre-reform year. These results are reported in Table 6, columns (5) to (8) for Equation (1), and Table 7, columns (3) to (4) for Equation (2). They also confirm our baseline results in terms of both statistical significance and effect size.

Omitting certain fund domiciles – Finally, we also test the extent to which our baseline results are driven by certain fund domiciles included in our sample of non-German equity mutual funds. We re-estimate Equation (1) excluding Luxembourg equity mutual funds, which account for more than half of the non-German equity mutual funds in our sample. We report these results in Table 6, columns (9) and (10). In both specifications, the interaction term $Post2018_t * German\_EF_i * WHT_{jt}$ remains negative and significant, as in the baseline regression.

TABLE 6: Robustness Test Country Investments

	No investment in UK & IE				Without observations of the pre-reform year				Without Luxembourg Funds	
	Country_INV	Country_INV	Country_INV	Country_INV	Country_INV	Country_INV	Country_INV	Country_INV	Country_INV	Country_INV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Post2018	-0.170***	-0.074	-0.189***	-0.196***	-0.077	0.005	-0.434***	-0.393***	-0.166**	-0.081
	(0.049)	(0.046)	(0.034)	(0.043)	(0.057)	(0.052)	(0.104)	(0.141)	(0.074)	(0.074)
WHT	1.671	0.334	2.182	3.574*	1.299	-0.950	2.399	3.470	2.249	-0.427
	(1.675)	(1.596)	(1.607)	(2.099)	(1.923)	(1.982)	(1.795)	(2.300)	(1.990)	(1.877)
Post2018*German_EF	0.260***	0.157**	0.182***	0.132**	0.253***	0.132**	0.258***	0.224***	0.182**	0.076
	(0.062)	(0.064)	(0.044)	(0.052)	(0.065)	(0.065)	(0.048)	(0.058)	(0.078)	(0.082)
Post2018* WHT	1.823***	1.229***	1.790***	1.578***	1.565***	0.975**	1.990***	1.892***	1.952**	1.500**
	(0.447)	(0.405)	(0.242)	(0.311)	(0.477)	(0.439)	(0.271)	(0.356)	(0.772)	(0.755)
German_EF*WHT	5.488***	5.166***	6.392***	5.548***	5.309***	4.896***	6.730***	6.105***	5.531***	5.142***
	(0.964)	(1.007)	(0.516)	(0.575)	(0.938)	(0.972)	(0.514)	(0.582)	(1.107)	(1.141)
Post2018*German_EF*WHT	-2.692***	-2.354***	-2.710***	-2.159***	-2.483***	-2.083***	-3.020***	-2.662***	-2.126**	-1.757**
	(0.610)	(0.653)	(0.408)	(0.488)	(0.637)	(0.665)	(0.433)	(0.526)	(0.842)	(0.868)
Constant	-2.901	6.935	-13.006*	-20.995***	1.183	7.435	-7.905	-15.804*	-9.131	-1.292
	(9.994)	(9.771)	(6.772)	(8.076)	(10.286)	(10.262)	(7.166)	(8.911)	(11.513)	(11.367)
Fund & Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fund & Country Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control Group	Foreign EF	Foreign EF	German BF	German BF	Foreign EF	Foreign EF	German BF	German BF	Foreign EF	Foreign EF
Sample	Unmatched	Matched	Unmatched	Matched	Unmatched	Matched	Unmatched	Matched	Unmatched	Matched
Observations	94,747	64,469	120,846	77,635	80,783	54,966	103,097	66,242	74,296	43,577
Adj. R-sq	0.364	0.357	0.413	0.431	0.360	0.354	0.410	0.426	0.403	0.413

This table reports additional robustness tests for re-estimating Equation (1). Specification (1) to (4) disregard investments in UK and Ireland. Specification (5) to (8) disregard observations in the pre-reform year. Specification (9) and (10) disregard investments of Luxembourg mutual funds. Data is obtained from the financial statements of German mutual funds and Thomson Reuters. The observational units are fund-investment-country-year observations. The dependent variable *Country_INV* is the ratio of the total market value of equity or debt investment related to a specific country to total equity or debt investment per mutual fund and year. If there is no investment in one of these countries, the variable *Country_INV* equals zero for this specific country. For purposes of a better interpretation, we multiply the calculated ratio by 100. See Table A.1 in the Appendix for further variable definitions. All specifications include fund and country fixed effects. Yearly data from 2015 to 2020. Standard errors clustered at fund level in parentheses.* Indicates significance at the 10% level, ** indicates significance at the 5% level, *** indicates significance at 1% level.

TABLE 7: Robustness Test Stock Investments

	Without Investments in UK & IE		**Without observations of the pre-re-form year**	
	Stock_INV	Shares Holding	Stock_INV	Shares Holding
	(1)	(2)	(3)	(4)
Post2018	0.170***	-0.122	0.174**	-0.253
	(0.062)	(0.160)	(0.073)	(0.159)
DividendYield	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
WHT	1.277***	-0.574	1.524***	-0.901
	(0.370)	(0.958)	(0.398)	(1.001)
Post2018*DividendYield	0.000**	0.000*	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
DividendYield*WHT	0.000	0.001	0.000	0.000
	(0.000)	(0.001)	(0.000)	(0.000)
Post2018*WHT	-0.055	0.684	-0.284**	0.536
	(0.160)	(0.425)	(0.140)	(0.481)
Post2018*DividendYield*WHT	-0.001***	-0.001**	-0.001***	-0.002**
	(0.000)	(0.001)	(0.000)	(0.001)
Constant	-26.669	53.113	-30.137	46.798
	(19.382)	(61.028)	(18.399)	(62.266)
Fund & Country FE	Yes	Yes	Yes	Yes
Fund & Country Controls	Yes	Yes	Yes	Yes
Observations	66,341	66,339	54,670	54,668
Adj. R-sq	0.521	0.883	0.522	0.882

This table reports additional robustness tests for re-estimating Equation (2). Specifications (1) and (2) disregard investment in the UK and Ireland. Specification (3) and (4) disregard observations in the pre-reform year. Data is obtained from the financial statements of German mutual funds. The observational units are fund-asset-investment-year observations. The dependent variable *Stock_INV* is the ratio of the market value of a specific stock holding to total equity investments. For purposes of a better interpretation, we multiply the calculated ratio by 100. *SharesHolding* is the natural logarithm of the mutual fund's holdings of a specific stock holding per mutual fund and year. See Table A.1 in the Appendix for further variable definitions. All specifications include fund and country fixed effects. Yearly data from 2015 to 2020. Standard errors clustered at fund level in parentheses.* Indicates significance at the 10% level, ** indicates significance at the 5% level, *** indicates significance at 1% level.

5.3. Relevance of Fund Manager's Flexibility

Fund managers may face different investment restrictions due to fund-specific policies and strategies. We expect that the response of mutual funds to the new tax incentives increases with the flexibility of fund managers in their investment decisions. Therefore, we now turn to the heterogeneity of the reform effect. We estimate variations of Equation (1) based on the sample of German equity mutual funds and use $Flexibility_i$, which identifies funds with high investment flexibility, to define the treatment group.

Flexibility$_i$ is not directly observable in a fund's published information. Therefore, we rely on three fund characteristics that we believe are associated with greater investment flexibility. We consider a fund's geographic scope to be the first such characteristic. A broader geographic scope should give a fund manager more flexibility to select stocks from countries with low withholding tax rates. As described in Section 4, we exclude mutual funds with investment restrictions to a particular country but include mutual funds with a focus on investments in a particular continent. Managers of such funds should have less investment flexibility than managers who can freely choose from any country in the world. We, therefore, define flexibility based on *GeograhicalFocus*$_i$ as a dummy variable that equals one for mutual funds with a global investment focus and zero otherwise.

Although mutual funds are actively managed, their performance may be required by the fund's investment rules to be evaluated by comparing it to a specific benchmark index over the same time period. We expect that mutual funds that explicitly refer to a specific benchmark index in their prospectus may have less flexibility in their stock selection process due to the fund manager's efforts to match the fund's portfolio to the index. Thus, we expect these funds to be less responsive to the newly introduced tax incentives. We define *NoBenchmark*$_i$ as a dummy variable that equals one for mutual funds without any reference to a benchmark index[27] and zero otherwise.

Chen et al. (2004) show how the performance of a mutual fund depends on its size. They find that fund returns, both before and after fees, decline with fund size. One possible explanation for this effect is organizational inefficiency. They argue that small funds are more likely to be managed by a single stock-picking manager, while large funds employ multiple co-managers. Stock picking must then be coordinated among these different agents, which offers less

[27] We obtain these information from the Mutual Fund database of Thomson Reuters. If the management company does not report any benchmark index, we assume that no such benchmark exists for the fund.

flexibility in investment decisions. Another possible explanation for the inverse relationship between fund size and investment flexibility is that larger funds have to allocate their capital across a larger number of different assets. Therefore, following Chen et al. (2004), we consider fund size as a third indicator of investment flexibility. We define $FundSize_{it}$ as a dummy variable that equals one for mutual funds with a net asset value below the bottom quartile (0.25) and zero for those with a net asset value above the top quartile (0.75).[28] Since the results of Chen et al. (2004) also show that fund performance decreases with fund size but increases with the size of the management company, we additionally control for the size of the mutual fund's management company ($FundFamilySize_{it}$).[29]

As expected, we find a negative and statistically significant coefficient for the main explanatory variable $Post2018_t * WHT_{jt} * Flexibility_i$ in all three specifications of Table 8, indicating that mutual funds with more flexibility in their investment strategies respond more to the new incentives. More specifically, mutual funds with no geographical restrictions or no benchmark index increase their investments in countries with low withholding tax rates after the tax law change compared to mutual funds with a continental investment focus or a specific benchmark index in their prospectus. The magnitude of the effect differs between these two definitions of $Flexibility_i$ and is almost three times larger for $GeograhicalFocus_i$ than for $NoBenchmark_i$. A ten percentage point decrease in withholding tax rate is associated with a 0.41 percentage point increase in mutual fund investments in the respective country for funds with no geographical focus.

We also find a negative and statistically significant coefficient for investment flexibility being defined with regard to mutual fund size ($FundSize_{it}$). According to these results in column (3), for smaller funds, a percentage point higher withholding tax rate is associated with a 0.18

[28] We refer to the net asset values from the pre-reform year 2017 in order to determine $FundSize_{it.}$
[29] $FundFamilySize_{it}$ is one for funds of management companies with managed assets above the median and zero otherwise.

percentage point smaller share of the fund's investment in the respective country compared to larger funds.

Overall, the results confirm our expectation that mutual funds that are regulated less restrictive in their investment policies are more responsive to the new tax incentives.

TABLE 8: Mutual Fund Manager Flexibility

	Geographical Focus	**Benchmark**	**FundSize**
	Country_INV	Country_INV	Country_INV
	(1)	(2)	(3)
Post2018	-0.082	-0.121***	-0.173***
	(0.052)	(0.045)	(0.055)
WHT	1.974	6.133***	4.044
	(1.941)	(1.890)	(2.793)
Post2018*Flexibility	0.122*	0.218***	0.440***
	(0.073)	(0.067)	(0.095)
Post2018*WHT	2.701***	0.915**	0.986**
	(0.448)	(0.389)	(0.465)
WHT*Flexibility	8.089***	1.669**	0.529
	(0.640)	(0.740)	(1.029)
Post2018*WHT*Flexibility	-4.146***	-1.481**	-1.828**
	(0.614)	(0.627)	(0.897)
ExpenseRatio	-0.157**	-0.132*	-0.043
	(0.070)	(0.074)	(0.131)
$FundAge_{t-1}$	-0.023*	-0.021*	-0.026
	(0.012)	(0.013)	(0.019)
Size	-0.070***	-0.116***	
	(0.025)	(0.028)	
Performance	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)
FundFamilySize			-0.000
			(0.000)
Constant	-14.806	-14.095	-8.077
	(12.101)	(12.106)	(21.071)
Fund & Country FE	Yes	Yes	Yes
Country Controls	Yes	Yes	Yes
Observations	66,997	66,997	33,784
Adj. R-sq	0.422	0.419	0.424

This table reports additional heterogeneity tests for the difference-in-difference analysis for estimating Equation (1). Data is obtained from the financial statements of German mutual funds. The observational units are fund-investment-country-year observations. The dependent variable *Country_INV* is the ratio of the total market value of equity investment related to a specific country to total equity investment per mutual fund and year. If there is no investment in one of these countries, the variable *Country_INV* equals zero for this specific country. For purposes of a better interpretation, we multiply the calculated ratio by 100. *Flexibility* is an indicator variable that equals one for mutual funds with no specific geographical investment focus in the specification (1), and if a fund is not managed with reference to a specific benchmark index in the specification (2), and zero otherwise in all specifications. In specification (3), *Flexibility* is a dummy variable equals one for mutual funds with a net asset value in the lowest quartile (0.25) and zero for those with a net asset value in the upper quartile (0.75). See Table A.1 in the Appendix for further variable definitions. All specifications include fund and country fixed effects. Yearly data from 2015 to 2020. Standard errors clustered at fund level in parentheses.* Indicates significance at the 10% level, ** indicates significance at the 5% level, *** indicates significance at 1% level.

5.4.Implications of the Reform for Fund Inflows

Our regressions so far demonstrate that German equity mutual fund managers are aware of the new tax planning opportunities and have thus reduced the withholding taxes on dividends after the reform. However, given the high complexity of the mutual fund tax regime, it is not clear whether fund investors are sufficiently aware of these effects. Thus, another empirical question is how mutual fund investors respond to the reform by considering the fund tax burden in their selection of funds.

Bergstresser and Poterba (2002) show that there is a negative relationship between a fund's tax burden and net inflows for U.S. equity mutual funds. They find that a one hundred basis point increase in the tax burden is associated with a 1.8 to 6.7 percent decline in mutual fund inflows. As withholding tax avoidance becomes more important after the reform, we expect fund inflows to depend more on the overall tax burden after 2018. We test this hypothesis by estimating Equation (3). The results are reported in Table 9.

The dependent variable is net fund inflows ($FundInflow_{it}$). In column (1) of Table 9, we analyze the general impact of the tax burden on the inflows of German equity mutual funds independent of the reform. The main explanatory variable is TB_{it-1}. It is defined as the difference between the pre-tax and the after-tax performance of the fund, considering all taxed at the fund and at the investor level (see Table A.5 in the Appendix for details). We find no statistically significant effect. Interacting the tax burden with a pre-reform dummy and a post-reform dummy in specification (2) reveals heterogeneity in this effect. While the pre-reform effect remains insignificant, we now estimate a statistically significant effect of the post-reform tax burden. The findings indicate that a one percentage point decrease in the total tax burden is associated with a 1.8 percentage point increase in fund inflows, which is equal to about 8 percent of the standard deviation.

TABLE 9: Tax Burden and Mutual Fund Inflows

	FundInflow	FundInflow
	(1)	(2)
$PreTaxReturn_{t-1}$	0.237***	0.242***
	(0.075)	(0.075)
TB_{t-1}	-0.957	
	(0.755)	
$TB_{t-1} \times (1 - Post2018_t)$		-0.307
		(0.902)
$TB_{t-1} \times Post2018_t$		-1.864***
		(0.655)
$ExpenseRatio_{t-1}$	0.133*	0.129*
	(0.071)	(0.070)
$FundAge_{t-1}$	-0.007	-0.002
	(0.006)	(0.007)
$Size_{t-1}$	-0.248***	-0.244***
	(0.040)	(0.040)
Constant	4.386***	4.248***
	(0.714)	(0.720)
Fund FE	Yes	Yes
Observations	1,218	1,218
Adj. R-sq	0.308	0.312

This table reports the OLS regression results for Equation (3). Data is obtained from the financial statements of German mutual funds. The observational units are fund-year observations. The dependent variable *FundInflow* is the change in total net asset value excluding growth in total net asset value as a result of fund returns or distribution in % of the total net asset value of the mutual fund. See Table A.1 and Table A.5 in the Appendix for further variable definitions. All specifications include fund fixed effects. Yearly data from 2015 to 2020. Standard errors clustered at fund level in parentheses.* Indicates significance at the 10% level, ** indicates significance at the 5% level, *** indicates significance at 1% level.

Overall, our findings show that shareholders are indeed aware of the implications of the reform and, as a result, are increasing their investments in mutual funds with a low tax burden. Our results suggest that the design of the fund tax regime, such as whether it is transparent or non-transparent and whether it offers withholding tax credits, plays some role in this relationship.

6. Conclusion

In conclusion, our study delves into the complex relationship between mutual fund investments and tax considerations, with a particular focus on the impact of dividend withholding taxes on the location of fund equity investments. The rarity and exogenous nature of the 2018 reform of German investment fund tax law, driven by the ECJ van Caster van Caster decision, provided a unique natural experiment for our analysis.

Our results reveal a remarkable shift in investment patterns, with mutual funds showing a propensity to reallocate their portfolios to countries with lower dividend withholding tax rates. The empirical evidence, based on a comprehensive dataset that includes both German and non-German equity mutual funds and German bond mutual funds, underscores the importance of tax considerations in shaping mutual fund investment decisions.

Furthermore, we extend our analysis to examine the impact of the tax reform on the relationship between the tax burden on fund income and fund attractiveness as reflected in annual fund inflows. The results reveal a negative correlation between the total tax burden and fund inflows after the reform, highlighting the importance of tax-optimal portfolio restructuring in influencing investor behavior.

Our study contributes significantly to the understanding of how mutual funds incorporate taxes into their investment strategies and sheds light on the nuanced differences in investment heuristics between fund managers and other types of investors. The implications of our research extend to policymakers, highlighting the potential consequences of moving to a fund tax system without the ability to credit foreign withholding taxes. For the fund industry, our findings demonstrate the varying importance of the overall tax burden on fund income under different regimes, providing insights that can inform future investment strategies. Finally, our results highlight the importance of controlling for investor type in future studies, providing valuable insights for researchers exploring the intersection of mutual funds and taxation.

In sum, our study not only advances the understanding of the complex interplay between mutual fund investments and tax considerations but also provides practical insights that can inform policy decisions, guide industry practices, and inspire further research in this evolving area.

Appendix

TABLE A.1: Definition of Variables

Variables	Definition	Source
AfterTaxReturn	The return after taxes of a mutual fund.	Annual financial statements of German mutual funds.
Country_INV	The ratio of investments in a specific country of a fund, calculated as the total market value of stock/bond investments per country divided by the accumulated value of total stock/bond holdings and multiplied by 100.	Annual financial statements of German mutual funds and Thomson Reuters Mutual Funds Holdings.
CountryRisk	Moody's risk rating of a country.	World Bank Database.
DividendYield	The dividend yield of a stock, calculated as the accumulated dividend payment per year divided by the average annual stock per year and multiplied by 100.	Thomson Reuters Data.
ECBInterestRate	The ECB key interest rate at year-end.	German Central Bank.
ExpenseRatio	The annual expense ratio of a fund.	Thomson Reuters Data.
FEDInterestRate	The unweighted average spread of the U.S. federal key interest rate at year-end.	Federal Reserve Bank of New York.
FinancialOpenness	The financial openness index of a country as a subcomponent of Economic Freedom Index of the Fraser Institute 2021.	Fraser Institute.
Flexibility	Dummy variable take the value of one for mutual funds with an above-average investment flexibility for its fund manager and zero otherwise.	Thomson Reuters Data (geographical focus and benchmark index) and annual financial statements of German mutual funds (size).
FundAge	The number of years since the oldest share class of the fund launched.	Thomson Reuters Data
FundInflow	The change in total net asset value, excluding growth in total net asset value as a result of mutual fund's returns or distribution as a fraction of the beginning-of-year net asset value.	Annual financial statements of German mutual funds

Variables	Definition	Source
FundFamilySize	The accumulated net asset value of mutual funds being part of a specific management company in million euro.	Annual financial statements of German mutual funds
FundSize	Dummy variable take the value of one for mutual funds with a net asset value in the upper quantile (0.75) and zero for those with a net asset value in the lowest quantile (0.25).	Annual financial statements of German mutual funds and Thomson Reuters Data.
GDPGrowth	The annual change rate of the GDP of a country.	World Bank Database.
GlobalEquityIndex	The annual change of the S&P Global Equity Index of a country.	World Bank Database.
GeographicalFocus	Dummy variable take the value of one for mutual funds with a no geographical investment restrictions and zero otherwise.	Thomson Reuters Data.
MarketCapitalization	The market capitalization of listed domestic stocks.	World Bank Database.
NoBechmark	Dummy variable take the value of one for mutual funds managed with no reference to a benchmark index and zero otherwise.	World Bank Database.
NAVperShare	The net asset value per share of a mutual fund.	Annual financial statements of German mutual funds and Thomson Reuters Data.
Size	The natural logarithm of a mutual fund's net asset value.	Annual financial statements of German mutual funds and Thomson Reuters Data.
StockHolding	The natural logarithm of the shares outstanding of one stock position of mutual fund's portfolio.	Annual financial statements of German mutual funds and Thomson Reuters Mutual Fund Holdings.
Stock_INV	The portfolio weight of a stock position of a mutual fund, calculated as the market value of a specific stock holding divided by the accumulated market value of total equity holdings of mutual and multiplied by 100.	Annual financial statements of German mutual funds and Thomson Reuters Data.

Variables	Definition	Source
StocksTurnoverRatio	The stock turnover ratio of domestic shares in % of a country.	World Bank Database.
Population	The natural logarithm of the population in millions of a country.	World Bank Database.
Post2018	Dummy variable, taking the value of one for observations after 2017 and zero otherwise.	
RealGains	The amount of realized capital gains of a mutual fund.	Annual financial statements of German mutual funds.
Performance	The annual change in mutual fund's net asset value per share.	Annual financial statements of German mutual funds and Thomson Reuters Data.
PreTaxReturn	The return before taxes of a mutual fund.	Annual financial statements of German mutual funds.
PreLumpSum	The tax base for the pre lump sum taxation of a mutual fund.	Annual financial statements of German mutual funds.
TaxPaid	The taxes on domestic dividend income paid by a fund.	Annual financial statements of German mutual funds.
TB	The total effective tax burden (incl. fund and shareholder taxes) of a mutual fund.	Annual financial statements of German mutual funds.
German_EF	Dummy variable, taking the value of one for observations of equity mutual funds and zero otherwise.	
UnrealizedGains	The unrealized capital gains of a mutual fund.	Annual financial statements of German mutual funds.
WHT	Withholding tax rate on dividend income of a country.	KPMG Withholding Tax Rates, PwC Worldwide Tax Summary, and German Federal Central Tax Office.
WHTPaid	The foreign withholding taxes are paid by a mutual fund.	Annual financial statements of German mutual funds.
Year	The year in which the mutual fund's business year-end ends.	

Overview of variables and data sources we use in this paper.

TABLE A.2: Withholding Tax Rates

Country	WHT Rate	Country	WHT Rate	Country	WHT Rate
Albania	2015-2018: 15% 2019-2020: 8%	Gibraltar	0%	Oman	2015-2017: 0% 2018-2020: 10%
Andorra	0%	Greece	10%	Pakistan	2015: 10% 2016-2020: 12.5%
Angola	10%	Grenada	0%	Panama	10%
Argentina	2015-2017: 10% 2018-2020: 7%	Guatemala	5%	Papua New Guinea	2015: 17% 2016-2020: 15%
Armenia	10%	Guernsey	0%	Paraguay	15%
Aruba	2015-2017: 10% 2018-2020: 5%	Honduras	10%	Peru	5%
Australia	30%	Hong Kong	0%	Philippines	15%
Austria	2015: 25% 2016-2020: 27.5%	Hungary	0%	Poland	19%
Azerbaijan	10%	Iceland	2015-2017: 18% 2018-2020: 20%	Portugal	25%
Bahamas	0%	India	0%	Puerto Rico	10%
Bahrain	0%	Indonesia	20%	Qatar	0%
Barbados	15%	Iraq	0%	Romania	2015: 16% 2016-2020: 5%
Belarus	12%	Ireland	0%	Russia	15%
Belgium	2015: 25%, 2016: 27% 2017-2020: 30%	Isle of Man	0%	Rwanda	15%
Belize	0%	Israel	25%	Sao Tome And Principe	15%
Benin	15%	Italy	26%	Saudi Arabia	5%
Bermuda	0%	Ivory Coast	10%	Senegal	10%
Bolivia	12.5%	Jamaica	33.3%	Serbia	0%
Bosnia & Herzegovina	10%	Japan	15.315%	Seychelles	15%
Brazil	0%	Jersey	0%	Singapore	0%
British Virgin Islands	0%	Jordan	0%	Slovakia	2015-2016: 0% 2017-2020: 7%
Bulgaria	5%	Kazakhstan	0%	Tanzania	5%
Cameroon	16.5%	Kenya	10%	Thailand	10%
Canada	25%	Kuwait	0%	Togo	13%
Cayman Islands	0%	Latvia	0%	Trinidad and Tobago	10%
Chile	35%	Lebanon	10%	Tunisia	2015-2017: 5% 2018-2020: 10%
China	10%	Liberia	15%	Turkey	15%
Colombia	2015-2017:0%; 2018: 5%; 2019: 7.5%; 2020: 10%	Liechtenstein	0%	Ukraine	15%
Congo	15%	Lithuania	15%	United Arab Emirates	0%
Costa Rica	5%	Luxembourg	15%	United Kingdom	0%
Croatia	12%	Macau	0%	United States	30%
Curaçao	0%	Macedonia	10%	Uruguay	7%
Cyprus	0%	Malaysia	0%	Uzbekistan	10%
Czech Republic	15%	Maldives	2015-2019: 0% 2020: 10%	Venezuela	0%
Denmark	27%	Malta	0%	Vietnam	0%
Dominican Republic	10%	Marshall Islands	0%	Zambia	2015-2019: 15% 2020: 20%
Ecuador	0%	Mauritius	0%		
Egypt	10%	Mexico	10%		
El Salvador	2015: 5% 2016-2020: 3%	Monaco	0%		
Estonia	0%	Mongolia	20%		
Ethiopia	10%	Montenegro	9%		
Faroe Islands	35%	Morocco	15%		
Fiji	0%	Mozambique	20%		
Finland	2015: 30% 2016-2020: 20%	Namibia	20%		
France	2015-2019: 30% 2020: 28%	Netherlands	15%		
Gabon	20%	New Zealand	30%		
Georgia	5%	Nigeria	10%		
Germany	26.375%	Norway	25%		
Ghana	8%				

Overview of the withholding tax rates for the year 2015 to 2020 and follows KPMG (KMPG, 2015; 2017; 2018; 2019; 2020), PwC tax summaries and PwC Worldwide Tax summary (https://taxsummaries.pwc.com/), the deductible foreign withholding tax tables 2015 to 2020 (German Federal Central Tax Office, 2023) and (IBFD, 2020).

TABLE A.3: Mutual Fund Tax Regimes in Important Non-German Fund Locations

	Mutual Fund Level	Shareholder Level
Ireland	Non-transparent taxation; however, income is tax exempt at fund-level.	Fund distributions and gains/losses from the disposal or redemption of mutual fund shares are subject to a withholding tax of 41% for private investors and 25 % for corporations. Irish Investors are not entitled to credit withholding taxes.
France	Transparent taxation	The fund income is taxed at the investor level based on the classification of the underlying asset. 30% or 60% of dividend income is taxed at the personal income tax rate of the investor. In principle, there is no consideration of taxes withheld at the asset level.
Luxembourg	Transparent taxation; however, mutual fund are subject to a 'tax d'arbonnement' at fund-level, which is equal to 0,05% (0,01% under certain conditions) of the NAV.	Fund distributions and gains/losses from the disposal or redemption of mutual fund shares are taxed at the personal income tax rate in the case of Luxembourg investors. The classification of income conforms to the underlying asset.
United States	Transparent taxation	The income of the mutual fund is taxed at the investor level, dependent upon the classification of the underlying asset. The income is taxed at the personal tax rate of the investor. The tax withheld at asset-level is creditable if the entitlement to credit is forwarded.

Overview of the mutual fund tax regime for the most important fund domiciles worldwide and in Europe, including Ireland, France, Luxembourg (German Bundestag, 2022; Hammer and Oestreicher, 2013) and the United States (Sialm and Starks, 2012; Hammer and Oestreicher, 2013).

TABLE A.4: Descriptive Statistics Matched Sample

	Mean	SD	Median	Mean	SD	Median
	German Equity Mutual Funds			German Bond Mutual Funds		
Size (million)	522.527	2747.127	55.844	216.810	947.197	52.028
NAVperShare	134.372	206.349	84.301	102.735	184.390	63.006
ExpenseRatio	1.522	.461	1.54	1.315	.712	1.07
FundAge	14.978	10.190	13.667	13.212	10.627	9.667
Performance	.048	.311	.031	.0124	.2378	-.0034
	German Equity Mutual Funds			Non-German Equity Mutual Funds		
Size (million)	413.830	1022.788	115.693	185.24	273.674	86.576
NAVperShare	127.047	212.211	75.497	282.883	457.221	145.39
ExpenseRatio	1.558	.3923	1.59	1.709	.5842	1.79
FundAge	21.519	10.211	19.5833	14.984	6.841	14.625
Performance	.0387	.1618	.03644	.0630	.143	.0612

This table reports some descriptive measurements of German equity mutual funds, non-German equity mutual funds, and German bond mutual funds for the matched sample. Data from the financial statements of German mutual funds and Thomson Reuters. The observation units are fund-year observations. *NetAssetvalue* is the mutual fund's net asset value per year in € million. *NAVperShar*e is the net asset value divided by the shares outstanding to each business year-end in euro winsorized at 1% level. *ExpenseRatio* and *FundAge* is the funds' expense ratio and the funds' age per mutual fund and year. *Performance* is the change of mutual fund's price to prior year winsorized at 1% level per mutual fund and year. Yearly data from 2015 to 2020.

TABLE A.5: Calculation of German Mutual Equity Fund's Pretax Return, After-Tax Return, and Tax Burden

	Transparent Tax Regime (Until 2017)	**Non-Transparent Tax Regime (After 2017)**
FundInflow	$\text{FundInflow}_{i,t} = \frac{\text{Size}_t - \text{Size}_{t-1} + \text{Distribution}_{i,t} - \text{DividendIncome}_{i,t} - \text{RealGains}_{i,t} - \text{UnRealGains}_{i,t}}{\text{Size}_{t-1}}$ (A.1)	
PreTaxReturn	$\text{PreTaxReturn}_{i,t} = \text{Dividend}_{i,t} + \text{RealGains}_{i,t} + \text{UnRealGains}_{i,t}$ (A.2)	
AfterTaxReturn (Total Tax Burden)	$\text{AfterTaxReturn}_{i,t} = (\text{ForeignDividend}_{i,t} - \text{WHTPaid}_{i,t}) + (\text{DomesticDividend}_{i,t} + \text{RealGains}_{i,t}) \times (1 - \tau_{SH}) + \text{UnRealGains}_{i,t}$ (A.3)	$\text{AfterTaxReturn}_{i,t} = (\text{Dividend}_{i,t} - \text{WHTPaid}_{i,t} - \text{TaxPaid}_{i,t}) + \text{RealGains}_{i,t} + \text{UnRealGains}_{i,t} - (\text{Distribution}_{i,t} + \text{PreLumpSum}_{i,t}) \times 0.7 \times \tau_{SH}$ (A.4)
TaxBurden	$\text{TB}_{i,t} = \text{PreTaxReturn}_{i,t} - \text{AfterTaxReturn}_{i,t}$ (A.5)	

Further explanations:

- We construct the after tax return using tax rates that apply hypothetical to private investors as shareholders of the fund. Therefore, we assume a shareholder tax (τ_{SH}) of 26.4 percent.
- Realized gains were only subject to taxation when distributed by the fund to its shareholder (until 2017). To ensure comparability between the pre and post-reform settings, we consider a full distribution of fund income, including taxes on realized capital gains, in the total tax burden before 2018.
- Unrealized gains are only taxed if investors sell their shares before and after the tax reform. As we cannot observe this directly, we suppose that investor do not sold their shares within the observation period. By doing so, the tax burden reflects the taxes paid by a long-term fund investor who does not sell their mutual fund position within our observation period (see Sialm and Zhang, 2020).
- *Dividend*$_{i,t}$, *RealGains*$_{i,t}$, and *UnRealGains*$_{i,t}$ depict the dividend income, the realized gains, and the unrealized gains of a mutual fund in a specific year.
- *WHTPaid*$_{i,t}$ and *TaxPaid*$_{i,t}$ depict the withholding tax rate on foreign dividends paid by the funds and the corporate tax rate on domestic dividends paid by the funds after the change in tax law in a specific year.
- *Distribution*$_{i,t}$ is the distribution of mutual funds' to its shareholders of a mutual fund in a specific year.
- *PreLumpSum*$_{i,t}$ is the tax base for the pre lump taxation the legislator introduced due to the German Investment Tax Reform 2018. More specifically, the shareholders have to pay taxes at least for the capital gain of their mutual fund's shares if the distribution of the fund does not exceed a certain basic income. This basic income is calculated by 70 percent of the beginning-of-year net asset value multiplied by a base interest rate, which is defined by the German Government on the 1st January of each year (2018: 0,87%; 2019: 0,52 %; 2020: 0,07 %).

TABLE A.6: Descriptive Summary of Country Variables

	Mean	SD	Median
Population (million)	50.410	172.634	9.771
GDP Growth	1.565	5.158	2.464
Country Risk	12.177	5.427	12
Market Capitalization ($ million)	1,119,244	4,112,760	108,309.9
Financial Openness	5.862	3.814	6.99
Global EquityIndex	2.692	21.856	-.2596
StocksTurnoverRatio	36.897	54.044	20.231

This table reports some descriptive measurements of the country variables, including 145 sample countries, for 2015 to 2020. *GDPGrowth*, *Population*, *CounntryRisk* and *MarketCapitalization* is the annual change rate of the GDP, the natural logarithm of the population in millions, the country-specific risk rating of Moodys and the market capitalization of listed domestic stocks in € million per year and country. *FinancialOpenness*, *GlobalEquityIndex* and *StockTurnover* is a subcomponent of Economic Freedom Index of the Fraser Institute, is the annual change of the S&P Global Equity Index and is the ratio of the stock turnover of domestic shares per country and year.

TABLE A.7: Descriptive Summary of Withholding Tax Rates

	Mean	SD	Median	Min	Max
2015 - 2020	.1064218	.0965164	0.1	0	0.35
2015	.1060483	.0973404	0.1	0	0.35
2016	.1047545	.0968008	0.1	0	0.35
2017	.1051042	.0973089	0.1	0	0.35
2018	.1072021	.0966885	0.1	0	0.35
2019	.107343	.0966641	0.1	0	0.35
2020	.1080785	.0959395	0.1	0	0.35

This table represents some descriptive measurements of the withholding tax rates of the countries in our sample for the years 2015 to 2020.

Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors used ChatGDP, DeepL Pro and Grammerly in order to improve readability and language as well as summarizing the key findings in the conclusion. After using this services, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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Kontaktadresse:
Prof. Dr. Dr. h.c. Dr. h.c. Caren Sureth-Sloane,
Universität Paderborn, Fakultät für Wirtschaftswissenschaften,
Warburger Str. 100, 33098 Paderborn,
www.arqus.info, Email: info@arqus.info

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