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Working Papers / Documents de travail

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WP 2025 - Nr 23

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June 18, 2025

Abstract

The 2014 Automatic Exchange of Information (AEoI) represents the most comprehensive global effort to combat tax evasion by enabling cross-border information exchange on financial assets. We examine how this policy shifted offshore investment behavior. While the AEoI mandates reporting of financial assets, it excludes real estate holdings. Using administrative data on UK real estate purchases by foreign companies, we show that offshore users substituted financial assets for real estate in response to the new transparency regime. Our findings suggest that real estate assets now account for a growing share of offshore portfolios, partly due to their exclusion from the AEoI.

Keywords: Tax Enforcement, Real Estate, Hidden Wealth

JEL Codes: D31, R30, H26

*This paper has previously been circulated as "Will We Ever be Able to Track Offshore Wealth? Evidence from the Offshore Real Estate Market in the UK". We are very grateful to Daniel Reck and Gabriel Zucman for valuable guidance, discussions and comments at different stages of this work. We also thank Arun Advani, Antoine Bozio, Felipe Carozzi, Elian Carsenat, Matt Collin, Maxime Ferrer, Cecilia García Peñalosa, Sebastian Gazmuri-Barker, Yajna Govind, Christian Hilber, Niels Johannesen, Andres Knobel, Antoine Levy, Clara Martínez-Toledano, Jakob Miethe, Panayiotis Nicolaides, Thomas Piketty, Stefan Pollinger, Max Risch, Jean-Marc Robin, Andy Summers, Maxime Vaudano for helpful discussions and comments, as well as participants of seminars at PSE, Sciences Po, LSE, UC Berkeley, King's College London and AMSE. Elian Carsenat generously helped us using *Namsor*. The project leading to this publication has received funding from the French government under the "France 2030" investment plan managed by the French National Research Agency (reference: ANR-17-EURE-0020), from Excellence Initiative of Aix-Marseille University - A*MIDEX, from the Investissements d'Avenir program LIEPP (ANR-11-LABX-0091, ANR-11-IDEX-0005-02) of the Université de Paris IdEx (ANR-18-IDEX-0001), and from the Research Council of Norway, grant no. 341289.

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1 Introduction

Tax havens have long undermined governments' ability to enforce taxes on cross-border investments. Estimates indicate that 8% of household financial wealth is held in tax havens (Zucman, 2013), with a substantial portion historically evading taxation (Alstadsæter, Johannesen and Zucman, 2019; Guyton et al., 2021; Londoño Vélez and Ávila-Mahecha, 2021; Londoño Vélez, 2022). In the 2010s, however, a major policy initiative to tackle tax evasion was implemented on a global scale: the Automatic Exchange of Information. Under this policy, tax authorities started to exchange automatically information about financial accounts of non-residents. This model of international third-party reporting greatly reduces the possibility for taxpayers to hide wealth and income abroad: it is designed to bring an end to bank secrecy. More than 100 countries—including major tax havens—participate to these agreements today, making it the most comprehensive policy ever enacted to enhance tax transparency. One major loophole of the Automatic Exchange of Information, however, is that it only covers financial assets. This creates new incentives for evaders to invest their offshore holdings in non-financial assets, in order to avoid the reporting requirements introduced by AEoI.

In this paper, we study the extent to which investors responded to the new transparency policy by substituting their offshore investments toward real estate. We do so by analyzing one of the most popular cross-border property markets globally, the United Kingdom.[1] To identify the effects of AEoI on real estate investments, we draw on unique administrative data on UK properties held by foreign companies: The Overseas Companies Ownership Dataset (OCOD). Crucially, most of these companies are located in secrecy jurisdictions, enabling their ultimate owners to remain anonymous (Tax Transparency UK, 2015). We manage to pierce this veil of secrecy by combining property ownership data with extensive beneficial ownership information from the Offshore Leaks (including the Panama Papers, the Pandora Papers, and other leaks) and various corporate registries.

We find that offshore investors responded to the introduction of Automatic Exchange of Information by shifting their investments to real estate. Our identification strategy exploits variation in both the timing of countries' commitment to the transparency policy and investors' preferential use of specific tax havens. Using difference-in-differences analysis, we document a sharp increase in real estate purchases by companies registered in tax havens commonly used by early-committing countries. The magnitude is substantial: the response to the AEoI accounts for approximately 2% of all UK residential property transactions in the post-AEoI period. This also represents a significant global portfolio rebalancing, as we estimate that about 9% of the offshore financial capital that flowed out of tax havens due to increased transparency was redirected to UK real estate. These findings highlight the role of real estate as a critical blind spot in

[1]Even though there is uncertainty on the exact share held by the UK in the global cross-border real estate market, anecdotal evidence suggests that the UK is one of the most popular destinations globally, as it would be the first destination for cross-border real estate in Europe and the second one at a global scale, behind the United States. Estimates for Europe are based on BNP Paribas Real Estate analysis of 2019, https://www.realestate.bnpparibas.com/sites/default/files/2019-10/AAG%20Capital%20Flows%20Q2%202019.pdf, retrieved on the 27/08/21. Estimates for the United States come from Tranio analysis, professional cross-border real estate broker,https://tranio.com/articles/investment-flows-around-the-globe-cross-border-property-transactions-in-2016_5321/, retrieved on the 27/08/21.

international tax transparency today. As such, the exclusion of non-financial assets from the reporting requirements is an important design flaw of the Automatic Exchange of Information.

The first section of the paper provides new evidence on the size and the nature of the offshore real estate market in the UK. Drawing on multiple data sources, we examine foreign ownership of real estate—referred to as *offshore* real estate—held both directly and through shell companies. We show that this segment of the UK real estate market is substantial: foreign entities held nearly $240 billion worth of properties in 2018, accounting for about 4% of the total UK real estate stock. Corporate structures held 60% of this wealth, while individuals directly owned the remaining 40%. London dominates this market, with approximately two-thirds of foreign-owned properties concentrated in the city, worth a total of about $150 billion.[2]

The UK offshore real estate market is also highly secretive. In 2018, more than 75% of foreign-owned properties were held through a tax haven, primarily through Jersey and the British Virgin Islands. This concentration is even more pronounced in corporate ownership, where more than 94% of foreign companies holding UK real estate are incorporated in tax havens. To identify the ultimate owners behind these structures, we match the administrative transaction data with the Offshore Leaks and other corporate ownership registers. The Offshore Leaks data are particularly valuable as they can be seen as random events that offshore users could not anticipate, thus minimizing selection bias concerns. Through this matching process, we successfully trace the ultimate owners of over 20% of properties in our sample. Strikingly, residents of the United Kingdom constitute by far the main group of owners, using offshore corporate vehicles to structure their domestic investments. Beyond domestic investors, property owners from the Middle East (Arabian Peninsula, Israel, Jordan) and South East Asia constitute a significant share of the market.

In the second part of the paper, we show that the introduction of the Automatic Exchange of Information triggered an increase in offshore real estate investments. In 2013 and 2014, a group of sixty-seven countries—the "early adopters"—committed to implement the Automatic Exchange of Information in a near future. Analysis of over one million shell companies from the Offshore Leaks and other corporate registries reveals that investors from these early-adopting countries tend to locate their companies in some tax havens more than others. For instance, European countries—which committed to AEoI in 2013/2014—frequently incorporate companies in Luxembourg but rarely in the Seychelles or Cayman Islands. We exploit this heterogeneity to identify the tax havens most affected by the Automatic Exchange of Information, constructing an "AEoI exposure" measure for each jurisdiction based on the proportion of company owners residing in early-adopting countries. Importantly, this exposure measure is independent of whether the tax haven itself committed to the AEoI, as shell companies with affected investors are expected to respond regardless of their incorporation location.

Using the Overseas Companies Ownership Dataset, we then study how UK property purchases by foreign com-

[2]To put this number in perspective, Alstadsæter et al. (2022) estimate that foreign-owned real estate in Dubai also amounted to around $150 billion in 2020.

panies evolved after the early adopters' commitment to AEoI.[3] Using a difference-in-differences design with AEoI exposure as a continuous treatment variable, we find that higher exposure leads to significantly higher real estate investments after 2013. The difference in investments between fully exposed havens and those with zero exposure averages approximately £159 million per quarter in the post-AEoI period. This surge in property purchases persists until 2017, the end of our baseline specification period. As expected, extending the sample period reduces the investment gap between highly exposed and other jurisdictions, as new jurisdictions commit to the AEoI over time. We show that this investment surge primarily involves high-value properties above £1 million, consistent with recent evidence that offshore users typically come from the top of the income and wealth distribution (e.g. Alstadsæter, Johannesen and Zucman, 2019; Guyton et al., 2021).

Our results hold across a variety of robustness checks. The first series of tests examines our AEoI exposure measure. While the baseline measure relies on companies appearing in leaked corporate registries, we show that using cross-border bank deposit data from the Bank for International Settlements (BIS) to compute exposure yields similar estimates. Additionally, we confirm that defining the exposure measure based on companies incorporated after 2013, rather than before, does not affect our findings. Second, we address a potentially serious confounder: tax changes affecting the UK property market over the period. The UK implemented several tax reforms targeting foreign property ownership during our sample period. These changes primarily targeted residential properties, while leaving commercial properties largely unaffected. We study separately the evolution of residential and commercial property purchases, and find that there was an increase in offshore investments in both types of assets following the introduction of AEoI. This suggests that the surge in property purchases is not driven by UK property tax reforms.

The shift of offshore investments toward real estate appears substantial. Back-of-the-envelope calculations indicate that approximately $45 billion were invested in England and Wales real estate over the 2013-2016 period in response to the AEoI. To gain insight into the magnitude of the offshore portfolio reallocation overall, we compare this figure to the estimated effect of the AEoI on financial assets. Several papers have studied the effects of AEoI on cross-border bank deposits held in tax havens, using macroeconomic statistics (Menkhoff and Miethe, 2019; Casi, Spengel and Stage, 2020; O' Reilly, Ramirez and Stemmer, 2021; Beer, Coelho and Leduc, 2019). Comparing our results with findings from this literature, we estimate that around 9% of the offshore financial capital that flowed out of tax havens due to increased transparency was ultimately reinvested in real estate in the UK.[4] This finding has important implications for understanding wealth composition at the top of the distribution. Given that offshore wealth is heavily

[3] We leave aside direct ownership of offshore real estate. Beyond the fact that data on *indirect* ownership is much richer and more granular than data on *direct* ownership, investors willing to keep their identity hidden are more likely to invest through a (shell) company rather than directly in their own name.

[4] Where did the rest of the money go? Part of it was repatriated through voluntary disclosure schemes implemented in various countries. Additionally, while the UK serves as a significant cross-border real estate market, it is likely that other property markets such as the US, Dubai, and others have also absorbed shifted wealth. Evidence suggests that tax evaders have implemented alternative evasion strategies, beyond real estate investments, following the introduction of the CRS. For instance, some individuals have relocated unreported assets to the US (Casi, Spengel and Stage, 2020) or have taken advantage of citizenship-by-investment programs (Langenmayr and Zyska, 2023). The use of trusts also offers opportunities to evade reporting under the CRS (Knobel and Meinzer, 2014).

concentrated among wealthy households (Alstadsæter, Johannesen and Zucman, 2019; Guyton et al., 2021; Londoño Vélez and Ávila-Mahecha, 2021; Lejour et al., 2023), our results suggest that previous estimates may have significantly understated the real estate component in top wealth portfolios.

Offshore real estate ownership can serve legitimate purposes. However, there are concerns that it may also enable illegal activities. While the surge in investments through secretive and low-tax jurisdictions in response to the AEoI suggests tax evasion as one important motive, investors may also seek offshore secrecy for other illicit purposes, including money laundering, sanctions evasion, or other financial crimes (Transparency International UK, 2015; Collin, Hollenbach and Szakonyi, 2022). The asset rebalancing we document likely reflects a range of secrecy motives to hold wealth offshore, with tax evasion being a prominent but not exclusive driver. Although we cannot precisely quantify the relative importance of different motives, offshore investors from high-tax countries systematically favor properties with lower tax burdens—a clear indication of tax evasion's role in the rebalancing response we identify. These findings challenge the benign view of tax havens as neutral locations for financial vehicles that simply avoid double taxation without harming other jurisdictions' ability to tax. Instead, our findings suggest that a substantial share of havens' business is driven by the provision of secrecy, enabling individuals to evade taxes in other jurisdictions.

Our paper contributes to the growing literature on tax transparency policies and their impact (see Slemrod (2019) for an overview). Since the early 2000s, efforts to fight offshore tax evasion have intensified through various financial transparency initiatives. Early policies, including the European Savings Directive and Information on Request treaties, achieved limited success due to their narrow scope and the ease with which they could be circumvented (Johannesen, 2014; Johannesen and Zucman, 2014; Menkhoff and Miethe, 2019; Martínez-Toledano and Roussille, 2023). A nascent literature has examined newer automatic exchange initiatives—both the U.S. Foreign Account Tax Compliance Act (FATCA) and its multilateral counterpart, the Common Reporting Standard (CRS) (De Simone, Lester and Markle, 2020; Casi, Spengel and Stage, 2020; O' Reilly, Ramirez and Stemmer, 2021; Alstadsæter et al., 2023; Langenmayr and Zyska, 2023; Bomare and Collin, 2024; Boas et al., 2024; Baselgia, 2025). However, with the exception of De Simone, Lester and Markle (2020), who find indirect evidence that American taxpayers may have responded to FATCA by acquiring properties or artworks, previous studies have largely overlooked the role of real estate in the responses to the AEoI.

Our main contribution is to provide the first direct evidence of investors shifting their offshore portfolios toward real estate in response to the Automatic Exchange of Information. Understanding this emerging role of real estate as an offshore asset is crucial for several reasons. Properties are typically the largest component of household wealth and offshore investors have been shown to significantly affect local house prices (Badarinza and Ramadorai, 2018; Johannesen, Miethe and Weishaar, 2022). Given that our documented asset rebalancing accounts for 2% of all UK residential property transactions in the post-AEoI period, this shift likely impacts local populations through increased housing costs. Moreover, unlike many financial assets, real estate wealth is generally easier for tax authorities to

identify and monitor. Offshore property owners in the UK, for example, are subject to a range of taxes that can't be evaded. Consequently, the response to AEoI documented in this paper may have a distinct impact on (i) overall tax revenue and (ii) the distribution of these revenues across countries, compared to other types of behavioral responses.

Second, our paper contributes to research on offshore wealth and its distribution (Zucman, 2013; Pellegrini, Sanelli and Tosti, 2016; Vellutini et al., 2019; Henry, 2012; Alstadsæter, Johannesen and Zucman, 2018, 2019; Guyton et al., 2021; Londoño Vélez and Ávila-Mahecha, 2021; Lejour et al., 2023; Johannesen et al., 2020, 2023). We expand this literature by highlighting the significance of real estate in offshore portfolios. An emerging literature studies some aspects of foreign ownership of real estate in Norway, (Alstadsæter and Økland, 2022), Dubai (Alstadsæter et al., 2022), France (Morel and Uri, 2021), or the UK (Bomare, 2019; Johannesen, Miethe and Weishaar, 2022; Bourne, Ingianni and McKenzie, 2022). Our analysis provides a comprehensive assessment of offshore ownership in the United Kingdom, encompassing both residential and commercial properties, as well as direct and indirect ownership structures.

Finally, we also contribute to a literature studying the drivers and the effects of foreign investment in real estate markets (e.g. Badarinza and Ramadorai, 2018; Sá, 2016; Cvijanovic and Spaenjers, 2020; Hilber and Vermeulen, 2016). A set of studies focuses in particular on the effects of transparency measures on real estate markets (Collin, Hollenbach and Szakonyi, 2022; Johannesen, Miethe and Weishaar, 2022; Collin, Hollenbach and Szakonyi, 2023; Argawal, Chia and Sing, 2020). Our contribution to this literature is to study the effect of a global tax enforcement shock, which partially alleviates concerns about external validity that often arise when examining shocks limited to a single country. We also make a methodological contribution by developing a novel approach to trace capital flows to their ultimate source. This methodology reveals that a substantial portion of apparently foreign investment in UK real estate originates from domestic individuals, an approach that can be applied to other contexts where investor identities are obscured.

The paper proceeds as follows. Section 2 presents the institutional context of the Automatic Exchange of Information. Section 3 describes our data. Section 4 provides descriptive evidence on the UK offshore real estate market. Section 5 examines how corporate real estate investments responded to the AEoI. Section 6 presents robustness checks of our main results, while section 7 explores key mechanisms. Section 8 estimates the rebalancing from financial to UK real estate assets. Section 9 concludes.

2 Institutional Context

2.1 The Automatic Exchange of Information

In September 2013, G20 leaders endorsed the automatic exchange of information (AEoI) as the new global standard for cross-border information exchange on financial accounts. Under this standard, financial institutions in participating

countries are required to collect detailed information about their non-resident clients, including their identity, country of residence, account balances and financial capital income. This information is then shared annually and automatically with the tax authorities of the account holder's country of residence.[5] In 2014, the OECD established the operational framework for the implementation of the AEoI: the Common Reporting Standard (CRS). The CRS defines the scope of the information collected, the participating financial institutions and the reporting mechanisms. By mid-2014, sixty-seven countries—including most major tax havens—had committed to the CRS, making it the most comprehensive global initiative ever implemented to enhance tax transparency.

The CRS, however, has several limitations. First, while more than 100 jurisdictions have agreed to exchange information under the CRS today, its coverage remains incomplete, with some jurisdictions still outside the framework.[6] Second, taxpayers can exploit legal loopholes to avoid reporting, such as using citizenship-by-investment programs to obscure their tax residence (Langenmayr and Zyska, 2023). Most critically, the CRS only applies to financial assets, leaving real estate entirely outside its scope. This exclusion represents a significant loophole, as it allows tax evaders to restructure their offshore portfolios by shifting wealth from financial assets, which are subject to reporting, into real estate, which is not.

2.2 New Trade-Off for Tax Evaders

From a theoretical perspective, the CRS changes the trade-off faced by non-compliant taxpayers. Assuming that the AEoI eliminates the possibility to hide financial wealth or income, tax evaders are left with two possibilities.[7] They can start to report their previously undisclosed financial assets or income, which means that they will have to pay back taxes evaded, start paying higher taxes, usually pay an additional penalty and sometimes face criminal charges. Non-compliant taxpayers can also respond to the transparency policy by revising their evasion strategy in order to reduce their detection probability. One straightforward way for taxpayers to adapt their investment strategy is to restructure their offshore portfolios away from financial assets towards real estate, i.e. to substitute offshore financial assets for properties held abroad.[8] The appeal of real estate as alternative offshore asset stems from its relatively stable value over time and opportunities for anonymous ownership in countries with weak property registers (Alstadsæter et al., 2024).

[5] For example, if a taxpayer from country A holds an account in country B, the tax authorities in country B will automatically and annually report details of the account and its owner to the tax authorities in country A.

[6] Casi, Spengel and Stage (2020) study the effects of the CRS on financial assets. They find suggestive evidence that a proportion of cross-border bank deposits were relocated to the United States, which does not commit to the CRS, following the implementation of the policy.

[7] Consistent with this idea, Boas et al. (2024) find that today, a large share of financial wealth directly held offshore by Danish taxpayers is compliant.

[8] Why is the portfolio rebalancing response a key channel to study in this context? In practice, there are three main ways to adapt to new tax enforcement rules. It is possible to reorganize the way one holds assets offshore, for example by transferring the ownership of one's assets to a shell company instead of owning them directly (Johannesen, 2014; Omartian, 2017). An alternative is to switch the location of the offshore assets, toward a tax haven not participating in the new policy (Johannesen and Zucman, 2014; Casi, Spengel and Stage, 2020). The broad scope of the CRS and the fact that it covers financial assets held both directly and indirectly greatly limit the possibilities for non-compliers to use these first two strategies. In contrast, a third strategy is to rebalance the portfolio toward non-reportable assets. Considering the rules of the CRS, this seems like the most straightforward way to bypass the reporting requirements, and therefore particularly important to study.

Ultimately, the new portfolio allocation of offshore investors will depend on two key factors: i) the degree of substitution between real estate and financial assets, and ii) the relative costs associated with each strategy. Evidence indicates that households' portfolio decisions between real estate and financial assets are sensitive to their relative prices (Martínez-Toledano, 2022; Le Guern Herry, 2024). Consequently, tax evaders are likely to shift their offshore portfolios toward real estate wealth whenever the tax liabilities from holding offshore financial assets exceed those from investing in real estate (assuming similar rates of return). Additionally, some investors may seek secrecy for reasons beyond tax evasion (Transparency International UK, 2015; Harrington, 2016; Collin, Hollenbach and Szakonyi, 2022), suggesting they could respond to the CRS even when their tax liabilities are relatively low. In Section 7, we examine the tax implications of investing in UK real estate for offshore investors during the CRS implementation period to discuss whether their response to the CRS is primarily driven by tax incentives or by secrecy concerns.

3 Data

The United Kingdom—and particularly London—is a popular destination for global real estate investments (Sá, 2016; Badarinza and Ramadorai, 2018). This section outlines the data sources we use to study the offshore real estate market in the UK, i.e. UK real estate held from abroad and/or through a foreign vehicle. First, we gather information on foreign ownership of real estate, held both directly and through shell companies. Second, we complement these datasets with corporate registries and leaks, enabling us to identify the residence country of the property owners when this information is hidden by the use of offshore intermediaries.

3.1 Foreign Ownership of Properties in the UK

Indirect ownership of property. Our primary data source is the Overseas Companies Ownership Dataset (OCOD), managed by the Land Registry. It provides comprehensive snapshots of real estate ownership by foreign companies in England and Wales. The dataset includes information on the date and location of purchases, the recorded price (available in 30% of cases), tenure classification (Freehold or Leasehold), and detailed information about the corporate buyer, including its name, country of incorporation, and registered address. The first available snapshot dates back to November 2015 and includes information on all properties that have been bought and kept by their owner until that date.[9] Snapshots are updated quarterly until November 2017, transitioning to monthly updates thereafter. We focus on transactions made from 2000 until the end of 2020.

We use a processing algorithm relying on machine learning techniques developed by Bourne, Ingianni and McKenzie (2022) to parse the property addresses and classify them between residential and commercial properties. The

[9]This means that we have exhaustive data on transactions made by foreign companies after November 2015, but only observe a transaction made before this date if the property has not been sold since. For our identification, this would only be an issue if the probability that a transaction is observed in November 2015 is correlated to the exposure of the buying country to AEoI, which is highly unlikely.

outcome is a dataset structured at the property level. To recover price information when missing, we make use of another dataset managed by the Land Registry, the Price Paid Data (PPD).[10] The PPD provides details on the majority of residential and some non-residential property purchases in the UK since 1995, including price, address, and transaction date. After standardizing address information in both datasets, we match the OCOD to the PPD using the property's address and postcode. The matching process allows us to recover the price of an additional 24% of the transactions.[11] Exploiting the properties' characteristics, we predict the price of the remaining 46% of the purchases using the sample of transactions where the price is available. We provide details of our extensive processing work in Appendix section B.

Descriptive statistics. Our final sample consists of 103,848 transactions conducted over the period from 2000 to 2020. Table 1 displays the characteristics of the properties bought by foreign companies. Around 75% of the properties are residential, with the remainder being commercial. Overall, the average value of UK properties purchased through foreign companies is high. The average price in our sample is approximately £1.1 million, and reaches £1.7 million when restricting to prices directly observed in the OCOD and the PPD.[12] The average price of residential properties is around £850,000, meaning that residential properties purchased through foreign entities are transacted at prices more than three times higher than the average residential property price in the UK over the same period (£230,000 according to the PPD). Appendix figure A.1a compares the price distribution of residential transactions involving an offshore entity to the full price distribution in the UK residential market. The price distribution of properties purchased by offshore entities exhibits a notably thicker right tail, indicating that more expensive properties attract a relatively larger share of offshore buyers. Unsurprisingly, London is particularly attractive to these investors: we find that almost 50% of UK properties purchased by foreign companies are located in the Greater London area. As a way to visualize the geographical concentration of these transactions, Figure 1 displays the relative share of offshore buyers by local authority (England and Wales) and ward (London) over the 2000-2019 period.[13] Purchases through foreign companies are concentrated in Greater London, in the Liverpool-Manchester area, the Birmingham area and, to a lesser extent, near the border with Scotland. Zooming into London, we observe a relatively higher share of offshore buyers in the Center and the North-West, which corresponds to the most expensive parts of the city.

[10] The price information may be missing for several reasons. First, HM Land Registry only started collecting price data for transactions involving non-private buyers from October 2013 (for some transactions happening before that date, the price information can be non-missing if the applications were lodged for registration to the Land Registry after 2013. Second, companies often purchase portfolios of properties, and if the price paid for each property is not specified in the transaction document (Form TR5: Transfer of a portfolio of titles (whole or part)), the Land Registry excludes the price information from the register.

[11] The matching rate is not 100% because the PPD excludes a substantial share of properties present in the OCOD, including most non-residential properties. Moreover, addresses have different structures in both datasets and we adopt a conservative matching technique to avoid false positives.

[12] This is partly due to our conservative price prediction method which is likely to provide a lower bound for the true price (the transaction prices we use for the prediction are winsorized at the 97% level). In the main analysis, we show that our results are robust to the price inference, as they are qualitatively similar when restricting the estimation sample to transactions with non-missing price information.

[13] We compute this figure excluding transactions from 2020 because some transactions that will appear in the OCOD are registered with a long delay. Note that the OCOD includes both commercial and residential transactions, while we show the percentage of transactions of the OCOD over the number of residential transactions only. This is because the Price Paid Dataset provides extensive information on residential transactions, and there is no equivalent for commercial transactions to our knowledge.

Direct ownership of property. Foreign investors may also purchase UK properties directly rather than through a corporate structure. To capture these holdings, we use data on direct foreign ownership obtained by the Centre for Public Data (CFPD).[14] It provides information on the number of property titles held in England and Wales by individuals with an overseas correspondence address, by local geographic areas. It consists of snapshots available every two years between January 2010 and January 2020 (with a final snapshot in August 2021).

The last snapshot reveals that more than 180,000 properties were registered by individuals with an overseas correspondence address, which represents 0.7% of all registered titles in England and Wales.[15] This figure has more than doubled since 2010 and now surpasses the number of properties owned by foreign companies. It thus constitutes a very important element of the UK offshore real estate market. Unfortunately, the data provides no information on the properties' value. Thus, we estimate the price of each property based on the average price of residential properties in the district at the time of the snapshot, using data from the Office for National Statistics. Given that foreign owners are likely to buy more expensive properties than the average—even after controlling for location—our estimates of the value of direct ownership of properties from abroad are likely to be conservative.

3.2 Beneficial Ownership Data

Corporate ownership datasets. To get more information on the owners of UK real estate through foreign companies, we use several files leaked from offshore service providers between 2013 and 2021. These files include the Offshore Leaks, the Bahamas Leaks, the Paradise Papers, the Panama Papers, and the Pandora Papers. Originating from law firms and offshore financial institutions, these documents reveal data on the beneficial owners of thousands of shell companies created or managed for their clients. The International Consortium of Investigative Journalists analyzed the files and published the names, addresses, and countries of residence of the entities' owners. Additionally, we draw on data leaked in 2019 from the Cayman National Bank and Trust in the Isle of Man (CNBIOM), a financial institution that managed accounts for approximately 1,400 companies.[16] Finally, we incorporate data from the OpenLux database, an investigative project led by the French newspaper *Le Monde*. OpenLux offers a snapshot of the Luxembourg beneficial ownership registry as of December 2019 and provides information on 260,000 Luxembourg companies and over 70,000 company owners. Throughout this paper, we collectively refer to these datasets—comprising both the leaked files and the OpenLux database—as the beneficial ownership data or the Leaks data. We use these datasets to infer the countries of residence of UK property owners who invest through offshore entities.

Table A.2 provides a summary of the characteristics of the beneficial ownership data sources. The table includes information on the time coverage of the data, and the number of companies and unique beneficial owners observed. In

[14] The data is accessible at `https://www.centreforpublicdata.org/property-data-overseas-individuals`.

[15] "New data on property in England and Wales owned by overseas individuals", Centre for Public Data analysis, November 2021, last consulted on July 15, 2023.

[16] The complete CNBIOM data have been thoroughly analyzed in Collin (2021), to offer a comprehensive picture of offshore users in the Isle of Man. Bomare and Collin (2024) use this dataset to analyze the effects of the CRS on offshore clients.

total, we have an insight into the structure of more than one million companies and the holdings of more than 500,000 identified beneficial owners.[17] The three most comprehensive data sources are the Panama Papers, the Paradise Papers and OpenLux.

The foreign ownership datasets display patterns in the use of tax havens across regions. Figure 2 shows where companies owners in the main tax havens appearing in the leaks data come from, by world region.[18] The largest share of individuals creating shell companies originates from the Asia-Pacific region (28%), followed by Western Europe (23%), and North America along with other English-speaking countries (10%). Notably, the United Kingdom alone accounts for 8% of all shell company owners. The graph highlights the heterogeneity of tax haven use, by world region. While jurisdictions like the British Virgin Islands, the Bahamas and Malta attract investors from many different regions, it appears clearly that some tax havens tend to be more used by investors from specific areas. For example, a large share of company owners from Asia-Pacific incorporate companies in Samoa and the Seychelles while British investors tend to favor the Isle of Man and Jersey. Similarly, Luxembourg is particularly used by Western Europeans and the Cook Islands attract a relatively high number of individuals from North American and English speaking countries. Geographical proximity and historical and cultural links thus seem to play an important role in explaining these heterogeneous tax haven preferences.

Register of Overseas Entities. The Register of Overseas Entities (ROE) was established following the enactment of a UK law in Spring 2022, requiring all foreign entities holding UK properties to disclose the identities of their beneficial owners. The data is managed and published by Companies House, which also oversees the UK companies register. For beneficial owners who are individuals, the register includes their name, date of birth, nationality, and correspondence address. For corporate beneficial owners, the register provides the company's name, address, and country of incorporation. As of August 2023, almost 29,000 companies have registered some information with Companies House, covering more than 140,000 properties held at that date. Despite the fact that the ROE still has major gaps that allow the real property owners to remain hidden (Advani et al., 2023), this data source helps us trace the ultimate ownership of a significant share of UK properties in the Land Registry dataset.[19]

[17] Note that we do not have information about the beneficial owners of all the companies listed in the leaks and the OpenLux data; sometimes we only have access to the identity of the administrators, the directors, or no information at all about their ownership/management.

[18] We group countries by region of the world. We draw on the groups defined in Badarinza and Ramadorai (2018), who study foreign real estate investments in London, and we create finer sub-groups to reflect the importance of the countries we identify as buying UK properties in section 4.3.2. We therefore create 11 groups: the United Kingdom alone, the Arabian Peninsula, the rest of the Middle East, North America and the English world (including South Africa), Africa (excluding South Africa), Asia-Pacific, Western Europe (excluding the UK), South Asia, Southern Europe, Eastern Europe and South and Central America.

[19] Some of the most important gaps of the ROE include the 25% threshold to qualify as a beneficial owner, which makes it easy to divide ownership between e.g. several members of a family to not be reported; and the fact that trust structures information is not being made available to the public. Moreover, a substantial portion of foreign companies did not comply with their reporting obligations: about 10% of properties held in the UK in August 2023 are owned by companies that failed to register their beneficial owners. Advani et al. (2023) estimate that because of both design flaws and non-compliance, essential beneficial ownership information for more than 71% of properties owned by foreign companies are still missing or publicly unavailable. In addition, the ROE does not provide a random picture of the offshore world. It only includes companies owning properties and the UK, and it is not a random event; registration of foreign entities has been discussed in the UK for several years, and individuals who wished to avoid being reported on could have taken steps to restructure their offshore affairs. As such, we do not use the ROE to gather information on the heterogeneous use of tax havens by country. We only use it to identify a sub-sample of companies appearing in the OCOD dataset.

4 The UK Offshore Real Estate Market

Offshore real estate is a blind spot in international tax transparency today. This section presents descriptive evidence on the scale, the composition and the ownership of offshore real estate in the United Kingdom.

4.1 Size of the Offshore Real Estate Market in the UK

In this paper, we define offshore real estate as real estate held by foreign individuals or through foreign entities. By combining data on UK properties held by foreign entities and foreign individuals in January 2018, we estimate that almost $240 billion worth of real estate in England and Wales was owned from abroad at that time. This figure comes from around 90,000 properties held by foreign entities and about 150,000 title owned by individuals with a foreign address.[20]

How large are these numbers relative to the UK property market as a whole? To answer this question, we construct estimates of total real estate wealth owned by corporations and households in the UK based on national balance sheet estimates published by the Office for National Statistics (ONS). These national accounts statistics provide information on the net worth of assets owned in the UK by type of asset and category of owner. We build estimates of total residential and commercial real estate owned both directly and through corporations in England and Wales in 2018.[21] We describe our methodology in more detail in Appendix section C.

Figure 3a shows the size of the real estate market in England and Wales by type of ownership (corporate, direct and total) and displays the share held from abroad. In total, we estimate that the aggregate value of real estate owned by individuals and private corporations in England and Wales in 2018 was around $6,000 billion. 75% of this wealth is held directly—i.e. by households—while the rest is held by corporations. We estimate that the $240 billion worth of real estate held from abroad represent around 4% of the stock of properties owned in England and Wales at this time. About 60% of this real estate wealth is held through foreign corporations, while 40% is held directly by individuals with a foreign correspondence address. The share of foreign ownership is also significantly higher for corporate ownership than for properties held by households (9% vs. 2%). Appendix figure A.1b breaks down real estate wealth in England and Wales by type of property. Residential real estate wealth is estimated to lie around $5,270 billion in total in 2018, 15% of which being held by foreign and domestic corporations. The commercial real estate market is much smaller, totaling $730 billion, with 96% of it owned by corporations.

To the best of our knowledge, our study is the first to propose an estimation of the overall size of the offshore real estate market in the UK, taking into account both residential and commercial real estate, and both direct and corporate ownership. Two studies provide estimates of the value of residential properties (excluding commercial properties) held

[20] The characteristics of 90,000 properties held by foreign entities in 2018 are comparable to that of the average property purchased over the period 2000-2020 (see Appendix table A.3 for a comparison).

[21] This means that we only focus on real estate assets owned by households and private corporations (both financial and non-financial).

by foreign corporations in England and Wales (Johannesen, Miethe and Weishaar (2022) for December 2019) and in London only (Bourne, Ingianni and McKenzie (2022) for January 2022). In Appendix figure A.1c, we compare their estimates with our own, focusing on the same segment of the real estate market.[22] Overall, the figures are of the same order of magnitude across all three studies. On the one hand, our estimates for England and Wales are higher than those of Johannesen, Miethe and Weishaar (2022) ($90 billion vs. $70 billion). The difference is mostly due to methodological choices when classifying properties as residential, as Johannesen, Miethe and Weishaar (2022) use a more conservative classification rule.[23] On the other hand, when focusing on housing wealth held in London, we get lower estimates than Bourne, Ingianni and McKenzie (2022). The two studies thus provide bounds on our estimates of offshore real estate and confirm that the order of magnitude we provide is likely correct.

4.2 Comparison With Other Offshore Real Estate Markets

The overall size of the global offshore real estate market remains uncertain, despite increasing evidence of its importance. Figure 3b compares our estimates for England and Wales to studies focusing on other locations. In the global cross-border real estate market, the United Kingdom, as proxied by England and Wales, stands out due to its substantial size. Morel and Uri (2021) focus on France and find that $140 billion of French domestic real estate was owned from abroad at the end of 2019, directly and through corporations. This represents less than 60% of our estimates for England and Wales in January 2018. Note however that our figures include both residential and commercial real estate while estimates for France only capture residential real estate.[24] Alstadsæter and Økland (2022) combine for the first time residential and commercial real estate and find that at the end of 2017, about $20 billion worth of Norwegian real estate was owned by non-residents. Exploiting data on 800,000 properties in Dubai, Alstadsæter et al. (2022) show that around $150 billion in wealth is invested in the Dubai property market by non-nationals, which is comparable to our estimates for offshore real estate held in London.

4.3 Who Owns Offshore Real Estate in the UK?

4.3.1 Immediate Ownership

We first provide evidence of total ownership of UK real estate by country of *immediate ownership*. Country of immediate ownership corresponds to the country of residence of the buyer, when the purchase is made by an individual (direct ownership) or to the country of incorporation of the company, when the purchase is made by a foreign entity

[22] We express all estimates in January 2018 dollars.

[23] We describe in Appendix section B the method used to classify the properties by type. Johannesen, Miethe and Weishaar (2022) consider as residential the properties from the OCOD register that match a transaction in the Price Paid Data (on address and timing of the transaction), which is more restrictive than our method.

[24] Data on direct ownership of UK properties do not provide information on the type of property, so we don't have estimates of how much residential real estate wealth is owned from abroad in aggregate. However, when focusing on corporate ownership, about 62% of total foreign-owned UK real estate is residential.

(indirect ownership). Figure 4 shows estimates of the value of the stock of real estate held by the top 20 countries of immediate ownership. Several clear patterns emerge. First, ownership is very concentrated. The top 5 countries own about 50% of total foreign-owned real estate wealth, the top 10 countries own 65% and the top 20 own more than 80%. Second, the seven most important owners are often classified as tax havens.[25] In total, more than 74% of foreign investment in UK real estate goes through tax havens when including both properties purchased by individuals and corporations.

Appendix figures A.2a and A.2b break down these estimates. Figure A.2a focuses on properties held by individuals with a foreign correspondence address. Two-thirds of UK real estate directly held from abroad is linked to a dozen of countries, and more than 80% is owned by the top 20 countries. The main countries of residence are located in South-East Asia, including two tax havens, Hong Kong and Singapore. Other important countries are the United States, countries from the Arabian Peninsula (United Arab Emirates, Kuwait, Saudi Arabia), some European countries (Ireland, France, Italy) and Australia.

Figure A.2b provides estimates of ownership by country for corporate owners only. Indirect ownership is even more concentrated than direct ownership: the top 5 countries own almost 80% of indirectly held UK real estate in 2018. Ownership is also more concentrated among tax havens, as more than 94% of the properties in the register are owned through companies incorporated in tax havens. The four most important buyers also have particularly strong links with the UK: the Channel Islands (Jersey and Guernsey), the British Virgin Islands and the Isle of Man. Jersey is the most popular jurisdiction for this type of investment, accounting for more than 25% of all foreign corporate purchases in the UK. Ownership from non-havens is mainly coming from the Netherlands, the United States, and Germany.[26]

4.3.2 Identifying the Ultimate Beneficial Owners of UK Properties

Immediate vs. ultimate ownership. If the majority of foreign-owned UK real estate is held from tax havens, it is unlikely that the ultimate beneficial owners of these properties are effectively residents of these countries. Indeed, the population of places such as Jersey, the British Virgin Islands or Guernsey barely exceeds 100,000 inhabitants.[27] Therefore, these territories are probably used as conduits for offshore real estate investments, with the real ultimate owners residing in another country.

This additional layer between an investor and their ultimate assets makes it harder to determine who owns real estate in the UK. To formalize the problem, consider first that the total value of UK real estate wealth ultimately owned from country c through foreign companies is equal to I^c. Define Ω^O as the set of firms appearing in the OCOD and

[25] There is no consensus on which countries should be considered as tax havens. We use the list of tax havens of Menkhoff and Miethe (2019), which is obtained by combining the lists of Gravelle (2009) and Johannesen and Zucman (2014). They classify 58 countries as tax havens, which are listed in Appendix table A.6.

[26] Note that in the list of tax havens we follow (Menkhoff and Miethe, 2019), the Netherlands is not considered as a tax haven.

[27] The number of inhabitants in Jersey in 2018 was less than 110,000, while the British Virgin Islands and Guernsey have even fewer inhabitants.

Ω_h^O a subset of Ω^O composed of all firms incorporated in jurisdiction h. Then, let us define as P_i the total value of UK properties owned by company i and as ϕ_i^c the share of owners of company i who are residents from country c. I^c is equal to $\sum_{i \in \Omega^O} \phi_i^c \cdot P_i$. If the jurisdiction of incorporation of company i and the country of residence of its owner are the same, namely if $c = h$, ϕ_i^c is equal to 1 for $c = h$ and 0 otherwise and I^c is simply equal to $\sum_{i \in \Omega_c^O} P_i$ which is directly observable in the OCOD. However, c and h do not coincide in most cases, in particular when h is a tax haven. Thus, as the OCOD provides information on the companies buying UK real estate but not on the owners of the companies, we lack information on ϕ_i^c.

Method. To identify the beneficial owners of companies purchasing UK properties, we rely on information from the leaks and the additional beneficial ownership data detailed in Section 3. Specifically, we match the OCOD transaction data with the beneficial ownership data using the company name and its country of incorporation. The details of our matching algorithm are provided in Appendix Section C.2. This approach aims to observe ϕ_i^c for a subset of companies, and to use these values to estimate the geographical distribution of the ultimate owners of UK real estate.

Table 2 summarizes the matching results, while Appendix Table C.1 presents the results by data sources. Overall, we identify ownership information for approximately 45,000 transactions, representing 49% of the property transactions in our sample. Many of the matched companies list other companies, rather than individuals, as their beneficial owners. After excluding these cases, the share of properties for which we identify ultimate individual owners drops to 20%, accounting for 21% of the total property value. For London specifically, the results are similar, with individual ultimate owners identified for 22% of properties (see Appendix Table C.2). A significant share of properties are matched to owners linked to a tax haven.[28] In our benchmark scenario, we allocate all owners linked to a tax haven to their most probable country of residence. We do so by exploiting information on individuals' nationality (Register of Overseas Entities) or by predicting individuals' residence country through a name analysis (Leaks data).[29] We provide details of this reassignment exercise in Appendix section C.3.

Results. Appendix figure A.3a presents the results of our matching process for the main countries of ultimate owners buying in the UK. The blue bars show our benchmark scenario results while the red bars display the raw results, before the reallocation of the matches linked to tax havens. Residents of the United Kingdom constitute by far the main group of buyers through offshore companies. This may be due to tax planning, as buying the shares of a company holding a property rather than the property directly allows one to avoid the property transaction tax. As the Stamp Duty Land

[28] Two elements can explain this result. First, in the Register of Overseas Entities, individuals have to provide a correspondence address and not a residence address. Some individuals likely delegate the management of their company to corporate service providers, some of them are based in tax havens. Second, in the Offshore Leaks data, individuals are linked to countries based on all information available, including business addresses and addresses of intermediaries, likely resulting in individuals being linked to tax havens even though they live elsewhere.

[29] We use information on individuals' nationality when it is available, namely for matches obtained from the Register of Overseas Entities. When this piece of information is not available, we conduct a name analysis of individuals identified through the Leaks data using a software predicting the most probable country of residence given the name of a person. Appendix Figures A.3b and A.3c present the results of this allocation separately for the Register of Overseas Entities and for the Offshore leaks matches, respectively.

Tax, the UK property transaction tax, is substantial, this is a way to avoid substantial tax payments, particularly for expensive properties. Although recent reforms have reduced the advantages of corporate ownership compared to direct ownership, these benefits remained substantial until 2017, especially for commercial properties.[30] The large number of UK residents among shell companies' owners is also consistent with many UK tax evaders circumventing the CRS by investing anonymously in domestic properties. Finding a relatively large number of UK ultimate owners is suggestive of a "home bias" in the individuals' investment decisions (Coeurdacier and Rey, 2013). We discuss in section 7 the extent of the reallocation response to the CRS that can be attributed to UK investors. Beyond UK residents, investors from the Middle East—particularly the United Arab Emirates—account for a large share of identified ultimate owners. Given that residents in these countries often face very low or even zero effective tax rates on income and wealth, it is likely that their use of shell companies is motivated by secrecy concerns rather than tax avoidance.[31] Other significant investor groups include residents of the United States, South Africa—both of which have strong historical ties to the UK—and China.

4.3.3 The Geographic Distribution of the Offshore Real Estate Market in the UK

The goal of this subsection is to show the geographic distribution of total foreign ownership of UK real estate, including both direct and corporate ownership. To do so, we allocate the unmatched properties in the OCOD property register to their most probable owners' residence country based on the distribution we observe in the sample of matched properties from section 4.3.2. Combining the matched and unmatched properties, we obtain an estimate of the distribution for *corporate* ownership of properties. Second, we correct the ownership country for *direct* ownership when the correspondence address is in a tax haven by predicting the most probable true residence country of the owner. We describe our methodology in detail in appendix section C.4.

Combining corporate and direct ownership, figure 5 presents our estimates of the distribution of UK real estate ownership, by ultimate owners' country of residence. Appendix figures A.2c and A.2d show these estimates separately for directly and indirectly held properties. The distribution of ownership is very similar to what is presented in Appendix figure A.3a. The United Kingdom remains the largest group of buyers through foreign vehicles, followed by countries from the Arabic Peninsula. South East Asia countries also make up for a large share of real estate owners, which is driven by their importance in directly held properties. Appendix Figure A.4a shows the robustness of our estimates to assumptions on the country of residence of owners from tax havens, corporate owners and how we compute the residence country of ultimate owners. Appendix Figure A.4b proposes an alternative way to allocate the

[30] See Appendix Section D for a detailed discussion on the tax implications of purchasing properties through foreign companies versus directly for UK residents.

[31] Non-tax related motivation include money laundering, evading international sanctions, or other financial crimes. Moreover, for high-net-worth individuals in politically unstable countries, protecting assets from political reprisals is often cited as a key reason for making use of tax havens (Harrington, 2016).

unidentified sample of properties, using the leaks data.[32] All specifications produce similar results, with a comparable amount of wealth allocated to the main countries of residence. In particular, the United Kingdom is always the most important investor.

5 The Effect of the AEoI on the Demand for Offshore Real Estate

The main goal of this section is to test the assumption that taxpayers responded to the introduction of Automatic Exchange of Information by rebalancing their offshore portfolio towards real estate assets. To do so, we build a measure of exposure to the CRS at the jurisdiction level and show that companies incorporated in the most exposed jurisdictions increased their investments in UK properties significantly more than their less exposed counterparts.

5.1 Empirical Strategy

The early adopting countries. A total of sixty-seven countries committed to the AEoI in 2013 or 2014. This process began with the G20's endorsement of automatic information exchange in September 2013, followed by a March 2014 joint statement by 44 jurisdictions and the OECD's May 2014 Declaration. We refer to the 2014 commitments to the CRS as the "Joint Announcement" in the rest of the paper. We call the 67 countries the "early-adopters", as opposed to countries that will adopt the CRS later, or never. The lists of participating countries for each of these events are presented in table A.4. Main early-adopters include European Union countries, Canada, and China while non-adopters include the United States (which implements its own bilateral exchange of information policy), the United Arab Emirates and Qatar.[33]

Data and sample restrictions. We rely on the full register of UK property transactions available in the OCOD dataset and presented in section 3.1. This dataset is particularly relevant for studying the behavior of investors willing to circumvent the AEoI, as most of the intermediaries are located in tax havens, thus providing a layer of anonymity. We exclude from the dataset the small set of properties acquired by companies incorporated in non-haven countries, and transactions made after 2017 as new jurisdictions start to commit to the AEoI over time.[34] We pool all purchases at the jurisdiction-quarter level. Our sample is a balanced panel of 50 tax havens over the 2000-2017 period.

[32] This alternative allocation uses the full information available in the leaks data, including both the country of incorporation of the company and the country of residence of the owner. We provide more details in Appendix section C.4.

[33] The relevant timing of the information exchange depends on the date at which both the residence country of the ultimate owner and the country where offshore assets are held enter the AEoI. This is because participating countries will start to exchange information with each other when they both enter the agreement. As some of the most important offshore financial centers are among the early-adopters (e.g. Switzerland), the date at which residence countries commit to the AEoI provides a good approximation of the timing of treatment for individuals. Note that individuals from early-adopting countries will be affected by the AEoI even if the offshore assets are held through a shell company incorporated in a non-participating country. In this case, the bank in which the assets are held will have to gather and exchange information on the ultimate owner of the assets, whether or not the shell company is incorporated in a country participating to the AEoI.

[34] In the robustness section, we show that the difference in investments between the highly exposed vs. less exposed jurisdictions decreases in the most recent years, as we would expect as new jurisdictions commit to exchange information and the differences in AEoI exposure diminishes.

Constructing a measure of exposure to the CRS. The OCOD provides information on the country of incorporation of the purchasing companies but not on the country of residence of their owners. Thus, it is not possible to estimate the response to the AEoI directly by comparing the evolution of property purchases from residents of countries adopting the CRS to investments from residents of non-adopting countries.[35] To circumvent this issue, we leverage the country-specific tax haven preferences as documented in Figure 2. More precisely, using the Leaks data, we construct a measure of "CRS exposure" for each jurisdiction, equal to the proportion of company owners who are resident from early-adopting countries. This measure of CRS exposure is built using companies incorporated before or during the second quarter of 2013, so before the transparency shocks that we exploit. If a jurisdiction does not appear in the leaks or the OpenLux data as an incorporation country (or if less than 10 entities are incorporated in this country), we consider that its exposure to the CRS is null.[36] This continuous measure of exposure to the CRS goes from 0 (0% of company owners in that jurisdiction come from early-adopting countries or that jurisdiction hosts less than 10 shell companies in the beneficial ownership data) to 1 (100% of company owners are residents from early-adopting countries).

Figure 7 illustrates the distribution of CRS exposure among tax havens in our sample, focusing on the 30 most important buyers (99.6% of all investments). There is a clear connection between the CRS exposure shown here and the variation in tax haven usage across world regions, as depicted in Figure 2. For instance, jurisdictions like Jersey, Luxembourg, and Malta attract a relatively large number of European investors and are therefore highly exposed to the CRS, given that most European countries were early-adopters of the policy. In contrast, territories such as the British Virgin Islands, Cayman Islands, and the Bahamas draw investors from a more diverse range of regions, including those that did not commit to the AEoI in 2014, resulting in lower CRS exposure. If investors seeking to circumvent the AEoI allocate part of their offshore wealth to real estate through shell companies incorporated in their preferred tax havens, we would expect an increase in purchases routed through the most exposed jurisdictions. Conversely, investments from less exposed tax havens are likely to be less responsive to the AEoI, as these jurisdictions also attract many investors unaffected by the policy. As a result, real estate investments channeled through these countries should exhibit a weaker reaction to the implementation of the AEoI.

Difference-in-differences specification. We estimate the response to the CRS in a difference-in-differences setting using CRS exposure as the treatment. The treatment is thus defined at the jurisdiction level, and is continuous. We estimate the following equation:

[35] Note that the data we exploit in this section include all transactions in the OCOD register, both when the ultimate owner is known and when it is unknown. In the robustness section, we show additional results based on the sample of identified buyers only, in which the treatment group is composed of identified owners residing in early adopting countries.

[36] In total twenty-six havens have a CRS exposure of zero. We show later on that our results are robust to restricting the sample to keep tax havens for which we observe at least 10 corporations in the leaks or OpenLux.

$$Y_{hq} = \gamma_h + \eta_q + \sum_{j \neq 2013q2} \beta^q \cdot Q_{j=q} \cdot Exposure_h + v_{hq} \quad (1)$$

where Y_{hq} denotes the real estate investment outcome for tax haven h in quarter q (in 3-quarters moving average). We consider several outcome variables: investment in value (million Pounds), investment in value scaled by pre-AEoI investment (2012q3-2013q2) and number of transactions. $Q_{j=q}$ is a quarter dummy equal to one when the quarterly date is equal to q. $Exposure_h$ is the continuous measure of exposure to the CRS, going from 0 (0% of company owners in that jurisdiction come from early adopter countries) to 1 (100% of company owners are residents from early adopter countries). The reference period is the second quarter of 2013; i.e. a quarter before the endorsement of AEoI by G20 countries. We control for country-specific links to the UK real estate market by including country fixed effects γ_h, and for common changes in the UK real estate market by including quarter fixed effects η_q. These time trends capturing the evolution of the dynamics of the UK real estate market as well as tax changes are identified from tax havens with a CRS exposure of zero. v_{hq} is the error term. The treatment variable being continuous, a coefficient $\hat{\beta}^q$ of 100 in quarter q means that the average difference in real estate investment between fully exposed tax havens (exposure of one, meaning that the jurisdiction is only used by residents from early-adopting countries) and non-exposed tax havens (exposure of zero) is higher by £100 million in quarter q compared to the reference period.

5.2 Results

Highly exposed vs. the rest. As first descriptive evidence, Figure 6 shows total real estate investments from firms incorporated in "highly-exposed" tax havens, defined as jurisdictions with a CRS exposure higher than 75%, and from firms incorporated in all other tax havens. The flows of investments follow each other closely during a very long period spanning from 2000 to mid-2013 before diverging sharply in the third quarter of 2013, right when the G20 countries endorse automatic exchange of information. From this period, we observe a large jump in real estate investments from highly-exposed jurisdictions, that is not matched by investments from the other tax havens.

Investment in value. Panel A of figure 8 displays the coefficients $\hat{\beta}^q$ estimated from equation 1. The figure confirms that there is no significant pre-trend between 2000 and the second quarter of 2013. Immediately after the G20 endorses automatic exchange of information, there is a sharp increase in the level of investments coming from tax havens with a higher exposure to the CRS. After September 2013, the difference in the value of purchases made by fully exposed havens and the havens with exposure of zero surges and reaches an average of about £159 million until the end of 2017.

Investment relative to pre-reform levels. A potential concern raised by outcome variables in level is that large variations from a small subset of countries can significantly affect the results. The fact that the outcome variable is often equal to zero in our estimation sample prevents us from dealing with this issue by using a log transformation. Instead,

we scale the outcome variable for each jurisdiction by its value before the announcement of AEoI. More specifically, we scale quarterly investment of country h by the average quarterly investment from country h between the third quarter of 2012 and the second quarter of 2013.[37] Results are shown in figure 8, Panel B. As for the specification in levels, there is no significant difference in real estate investments before the AEoI, but a sharp divergence in investments from September 2013 onwards. A coefficient of 1 in quarter q means that the difference in investment between tax havens with an exposure of 1 and tax havens with an exposure of 0 in quarter q exceeds the difference in investment in the reference period by 1 time the average pre-AEoI investment in the fully exposed group. The average of the post-AEoI coefficients is 1.3, indicating that the average increase in real estate investments due to the CRS is equivalent to more than the average amount invested one year before the policy change.

Number of transactions Next, we study how the total number of transactions evolves around 2013 and 2014. Appendix Figure A.5a shows the results of the estimation. The number of properties purchased from differently exposed tax havens was not following similar trends before the AEoI. To investigate the channels behind the surge in investment, we study separately transactions for which the price is respectively below and above £1 million. Figure 9 displays the estimates obtained from equation 1. Panel A shows the results for property transactions below £1 million. The number of relatively less expensive purchases channeled through differently exposed havens is following the same pattern than all transactions, with a significantly increasing trend before 2013. Panel B shows the same specification for transactions above £1 million. In this case, the pattern in real estate investments is very close to what we observe when considering the value of transactions, with parallel trends before the AEoI, divering sharply after the G20 commitment to the policy. Taken together, these findings suggest that the increase in real estate investments channeled through tax havens that are mostly used by AEoI-adopting countries is driven by the purchase of relatively expensive properties. This is what we would expect if the AEoI was pushing offshore users to invest in the real estate market, as they are more likely to come from the top of the wealth and income distribution (Alstadsæter, Johannesen and Zucman, 2019; Guyton et al., 2021; Londoño Vélez and Ávila-Mahecha, 2021).

6 Robustness Checks

6.1 Alternative Measures of Exposure to the CRS.

Persistence of tax haven use by country of ultimate ownership. Our analysis relies on the key assumption that tax haven use by country of ultimate ownership is persistent, and in particular that it does not change as a consequence of the AEoI. This assumption is plausible because while the CRS has been shown to have an impact on the location of offshore bank deposits (see Casi, Spengel and Stage (2020)), it has not altered the incentives associated with the

[37] The scaled values are winsorized at the top at the 95% level. The results are robust to other pre-AEoI periods.

choice of country of incorporation for holding vehicles. To further validate this assumption, we construct an alternative exposure measure based only on shell companies that were incorporated after the implementation of the CRS. Appendix figure A.5b shows the results of estimating equation 1 using this alternative measure of exposure. The results are qualitatively and quantitatively similar to when we compute tax haven preferences before the commitment to the policy.

Selection bias in the leaks. Our identification strategy also relies on our measure of heterogeneous use of tax havens across countries built from the beneficial ownership data, mostly composed of leaked datasets. The key strength of such leaks is that they can be seen as random events that offshore users could not predict, alleviating the concern of a strong selection bias. This randomness has allowed researchers to exploit leaked data in order to study the distribution of tax evasion (Alstadsæter, Johannesen and Zucman, 2019; Londoño Vélez and Ávila-Mahecha, 2022; Collin, 2021). Yet, being based on individuals who used specific offshore service providers, the leaked data only provide a partial picture of the offshore world.[38]

To address this concern, we construct an alternative measure of tax haven preferences based on data from the Bank for International Settlements (BIS). The BIS data offer insights into cross-border bank deposits on a bilateral basis for 48 reporting countries. Leveraging this data, we construct an alternative CRS exposure measure for each tax haven based on the jurisdiction's proportion of deposits held by residents from early-adopting countries. Appendix Figure A.5c presents the results obtained when estimating equation 1 using this alternative exposure measure. The findings closely align with those obtained from our main specification, ruling out the concern that a strong selection in the leaks would bias our measure of CRS exposure.

Another potential issue with the Leaks and OpenLux data is that we only observe companies incorporated in a selected sample of tax havens. When constructing the main measure of exposure to the CRS, we consider that tax havens that host less than 10 companies have an exposure of zero. While this assumption seems reasonable in practice, we could misclassify some tax havens that are actively used by AEoI-adopting countries, because of data limitations. We check that this is not driving our results by restricting our estimation sample to tax havens with at least 10 incorporated entities. This refinement reduces our sample size by half, from 50 countries to 24. Appendix Figure A.5d presents the results obtained when estimating equation 1 using this restricted sample. Although the confidence intervals are wider due to the smaller sample size, the qualitative findings remain largely unchanged.

Register of Overseas Entities weights. Little is known about whether the ownership structure of offshore depends on the type of asset held. In particular, real estate offshore assets might be structured differently from financial offshore assets. To address this potential issue, we exploit the Register of Overseas Entities, which provides information on

[38] Note that this is not the case for the Bahamas Leaks, as they are a sample of files taken from the company register of the Bahamas.

foreign companies holding real estate assets specifically.[39] We use the complete Register data to build another exposure measure for each tax haven, based on the proportion of company owners resident in early-adopting countries. Results of the difference-in-differences estimation using these weights are presented in Appendix Figure A.6a. Because United Kingdom company owners are probably over-represented in the Register (see section 3.2 and 4.3), there is less variation in treatment intensity across jurisdictions, leading to less precise estimates. However, the results are qualitatively similar to our main specification.

6.2 Sample of Identified Owners

The causal analysis so far has relied on the full OCOD register, which includes both transactions where the ultimate owner is identified and those where it is not. As a robustness check, we focus on the subset of transactions where the ultimate owner can be observed in the Leaks and Register of Overseas Entities data, enabling us to define treatment at the residence country level rather than the incorporation country level.[40] Specifically, we implement a new difference-in-differences specification with a binary treatment variable set to one if the property is purchased by a resident of an early-adopting country and zero otherwise. We study property transactions from 2005 and stop in 2016 because the Panama Papers, one of the most important leaks of the last decade, were published in April 2016.[41] As the sample size is much smaller than before, we aggregate observations at the country-semester level. The model is defined as:

$$Y_{is} = \gamma_i + \eta_s + \sum_{j \neq 2013_{s1}} \beta^s \cdot S_{j=s} \cdot Treat_i + v_{is} \tag{2}$$

where Y_{is} denotes the amount in million Pounds invested in real estate by residents from country i in semester s, $Treat_i$ is a dummy equal to 1 when country i commits to the AEoI in 2013 or 2014, γ_i is a country fixed effect, η_s a semester fixed effect and v_{is} an error term. The difference-in-differences coefficient β^s captures the effect of country i committing to AEoI on real estate investments from residents of country i during semester s, relative to the pre-reform semester 2013_{s1}.

Results, presented in Appendix Figure A.6b, confirm that the increase in property purchases documented in the previous section is effectively driven by individuals affected by the CRS. Indeed, while there is no statistically significant difference in real estate investments between treated and control groups between 2005 and September 2013, there is a relative increase in real estate investments by the treatment group immediately after the endorsement of the AEoI by G20 countries. The difference in investments between control and treatment group increases and becomes

[39] These companies can hold other types of assets as well, but their holding portfolio always includes real estate assets.

[40] For this exercise, we match the entire OCOD register to the Leaks and Register of Overseas Entities, while before we only matched the OCOD as of January 2018 to get a snapshot of ownership of offshore real estate in the UK. As before, we discard matches where companies declare beneficial owners that are companies themselves. In total, we match about 19% of the transactions over the period or 23% of the values of the properties bought. Appendix Figure A.8a presents the rate of matching over time. Importantly, the geographic distribution of clients is very similar to what we find for properties held in January 2018 only. Here, we assume that the owners of a given company have not changed between the transaction date and the date of the leak or the date of release of the ROE.

[41] For visibility, our analysis period starts in 2005 but starting in 2000 does not change the results at all.

significant in the second semester of 2015. Even if these results are to be interpreted with caution due to the small size of our identified sample, they indicate that individuals react to their country of residence committing to automatically exchange information by increasing their UK real estate investments through shell companies.

6.3 Tax Reforms

Since 2012, the UK has introduced several tax reforms affecting the purchase and ownership of properties by companies. These reforms, detailed in Appendix Section D, include changes to Stamp Duty Land Tax (SDLT), the introduction of the Annual Tax on Enveloped Dwellings (ATED), the expansion of Capital Gains Tax (CGT), and the broadening of the Inheritance Tax (IHT) base. While these reforms likely affected offshore investors' decisions to purchase UK properties, they are unlikely to pose a significant issue in our analysis for two reasons. First, for these reforms to confound our results, they would need to have a differential impact on investors with relatively higher versus lower exposure to the CRS. Second, as these changes generally *increase* the tax liabilities for UK property owners, it is reasonable to think that if anything, the observed rebalancing response to the AEoI would have been even larger in the absence of these reforms.

Moreover, these tax changes primarily affect residential properties while the incentives to acquire or hold commercial properties remain largely unaffected.[42] Thus, we test for the potential confounding effect of the tax reforms further by estimating the response to the AEoI separately for residential and commercial properties. More specifically, we estimate the following equation:

$$Y_{hqt} = \gamma_h + \eta_q + R_t + \sum_{j \neq 2013q2} \beta^q \cdot Q_{j=q} \cdot Exposure_h + \sum_{j \neq 2013q2} \beta^{qt} \cdot Q_{j=q} \cdot Exposure_h \cdot R_t + v_{hqt} \quad (3)$$

where Y_{hqt} denotes the investment (in million Pounds) in property of class t (residential (R) or commercial (C)) from tax haven h in quarter q. $Exposure_h$ is the continuous measure of exposure to the CRS, R_t is a dummy equal to one when the property is of residential class, $Q_{j=q}$ is a quarter dummy, γ_h is a country fixed effect, η_q a quarter fixed effect and v_{hqt} an error term.

[42] Commercial properties are still affected by some of these tax changes. First, an important tax change for commercial properties happened in 2019, with the extension of the Non-Resident Capital Gains Tax to commercial properties. However, we stop our analysis of the responses to the AEoI in 2018. Second, the business rates multipliers, which determine the business rates bill that the occupier of a non-domestic property will have to pay annually, are updated every year. The national multipliers go from 45.8p in 2012/13 to 49.7p in 2016/17. Special cases apply to the City of London, but we exclude this area in our sample (see Appendix section B). Third, the schedule of the Stamp Duty Land tax for non-residential properties changed in March 2016, increasing the tax liabilities for relatively more expensive properties (and reducing it for lower-value properties). However, this is a modest change relative to the evolution of the Stamp Duty Land tax schedule for residential properties.

Appendix Figure A.6c presents the results. There is a clear effect of the AEoI both for residential and commercial properties, alleviating the concerns for a strong confounding effect of the tax reforms.

6.4 Further Robustness Checks

Large havens. A relatively small number of tax havens make up for the majority of purchases made on the real estate market: more than 60% of the transactions over the period we study are made by companies incorporated in Jersey, the British Virgin Islands and Guernsey. To check that purchases from these countries are not driving our results, we estimate equation 1 excluding these transactions from our sample. Appendix figure A.6d presents the results. When removing these countries from the sample, the estimated response to the AEoI is somewhat more modest but our results stay qualitatively similar.

What happens when more countries join the AEoI? As more and more countries join the AEoI over time, one would expect the treatment effect to vanish as the control group starts responding as well. As depicted in Appendix figure A.7a, the difference in purchases between the most exposed jurisdictions and the others diminishes over time. Nonetheless, the effect does not go back to zero by the end of 2019—the last year with the full record of transactions in our data—as some countries stay out of the CRS.

Missing prices. Finally, 46% of the transaction prices in the estimation sample are inferred (see section 3.1). To address concerns about the potential impact of inferring prices on our results, we conduct additional tests presented in Appendix figure A.7b and A.7c. In Figure A.7b, we estimate equation 1 using a restricted estimation sample that includes only transactions where the price is observed. Results are similar to our benchmark specification. Then, we investigate in Figure A.7c whether CRS exposure is correlated with the purchase of properties with missing prices, both before and after the implementation of AEoI. We find no significant correlation between CRS exposure and the likelihood of purchasing properties with missing prices. Taken together, these findings show that the inclusion of inferred transaction prices in the analysis does not substantially impact the robustness and validity of our main results.

7 Mechanisms

7.1 Tax Incentives vs. Secrecy Motives

Foreign property owners in the UK are subject to a range of taxes which might affect investors' incentives. Here, we focus on the main taxes and their evolution for properties held through offshore entities, which is the central focus of this paper. Additional details on these taxes, including how tax liabilities differ when the immediate owner is an individual rather than a company are provided in Appendix Section D. During the period covered in this study, offshore

ownership offered notable tax advantages. These included avoiding Stamp Duty Land Tax (SDLT) and the Capital Gains Tax (CGT) by purchasing or selling shares in a foreign company holding the property rather than the property itself, exemptions from inheritance tax (IHT) on UK properties held through offshore companies (until 2017) for UK "non-domiciled" taxpayers and for non-residents,[43] and a flat 20% tax rate on rental income, which is often more favorable than the progressive income tax rates faced by individual owners. However, these advantages were increasingly counter-balanced by the introduction of new taxes such as the Annual Tax on Enveloped Dwellings (ATED) in 2013, which is an annual lump-sum charge on high-value residential properties held through companies, and the extension of the capital gains tax (CGT) to non-resident companies in 2015. Despite these reforms, offshore ownership could remain a relatively attractive option during the study period, particularly for commercial properties, which were exempt from ATED, CGT and IHT (until 2019) and were subject to lower SDLT rates. These advantages imply that in a post-AEoI world, owning unreported UK properties may sometimes result in lower tax liabilities than owning financial assets, especially for commercial properties.

Domestic tax liabilities from holding offshore financial assets is more likely to be superior to tax liabilities from investing in UK real estate for residents of high-tax countries. Consequently, following the introduction of the AEoI, taxpayers from these countries are more likely to be investing in offshore real estate for tax evasion reasons, while those from low-tax countries may be more likely to seek secrecy for other reasons. Non-tax related motives for holding offshore real estate include money laundering, evading international sanctions, or other financial crimes, all of which share a common reliance on secrecy (Transparency International UK, 2015; Collin, Hollenbach and Szakonyi, 2022). In practice, the overall reallocation response to the AEoI documented in this paper is likely driven by a combination of tax incentives and other secrecy motives. Although it is not possible to formally quantify the relative importance of each channel, the differing tax treatment of residential and commercial properties in the UK provides some key insights.

First, the effect of the AEoI policy is large for commercial real estate (55% of the total effect), which is consistent with the presence of a strong tax evasion motive. Second, since tax evaders are expected to favor the most tax-advantaged assets, a tax-driven response to the AEoI would imply a correlation between a country's tax level and its propensity to invest in the least-taxed real estate asset: commercial properties. To explore this, we analyze for each country the correlation between the share of commercial real estate in total UK real estate investments and the top marginal income tax rate. This analysis—conducted at the level of the ultimate owners' countries—uses the 2018 stock of UK properties held through foreign firms with identifiable ownership from the Leaks data (subsection 4.3.2) and top marginal income tax rates by country in 2014, reflecting conditions at the time of the Joint Announcement.[44] Appendix

[43] Non-domiciled UK taxpayers, or "non-doms" are residing in the UK for tax purposes, but are not domiciled there. This tax status allows them to not pay taxes on their foreign income, as long as it is not repatriated to the UK. Non-doms are mostly found at the top of the income distribution (Advani et al., 2022).

[44] We use the 2014 rates from the individual income tax rate table compiled by KPMG, available at https://home.kpmg/sa/en/home/services/tax/tax-tools-and-resources/tax-rates-online/individual-income-tax-rates-table.html.

Figure A.8b shows a positive correlation between the share of investment in commercial real estate in 2018 and the level of taxation in 2014, consistent with offshore investors from high-tax countries reallocating their portfolios to minimize tax liabilities. All in all, the combination of a series of tax increases on residential properties and the implementation of the AEoI may explain partly the importance of foreign-owned commercial real estate in the UK today.[45]

7.2 British Investors

The descriptive analysis in this paper has highlighted the significant concentration of property ownership through tax havens by UK investors. In this subsection, we examine the contribution of British residents to the estimated causal effect of the AEoI. Understanding the extent to which the reallocation can be attributed to UK investors is crucial for both the credibility of our research design and the interpretation of the response to the AEoI.

We use results from Bomare (2025), who uses a random forest model to predict the most probable ultimate owner for each transaction appearing in the OCOD register. The model is calibrated using the matched sample of ultimate beneficial owners whose identity is known, and leverage available data on the characteristics of purchase: type of property (residential or commercial), tenure (freehold of leasehold), number of corporate owners jointly purchasing the property, country of incorporation of the purchasing company, number of offshore properties held by this company, available information on the name and the type of purchasing company, and the number of other companies sharing the same address of incorporation. The model also includes variables capturing the dynamics of the local housing market: granular information on the location of the property (lower layer super output area indicator, and postcode indicator), overall number of residential purchases in the Lower layer Super Output Area over the year and its growth rate, yearly number of purchases made by UK companies in the area, as well as month and year of the purchase, and date the property is next sold. These variables capture the fact that owners from different countries could purchase properties of distinct types, price, and at different locations and different times. They also take leverage information about the state of the housing market, at a very granular level.

Appendix Figure A.8c illustrates the evolution of the share of the value of OCOD transactions attributed to UK residents between 2010 and 2022, shown separately for London and the rest of the UK. If the AEoI response were primarily driven by UK investors, we would expect this share to increase over time. The data shows that the share of UK property owners stays roughly constant over time despite some period-to-period volatility: between 35% and 45% in the Greater London area, and between 60% and 70% in the rest of England and Wales for most of the period. Thus, this suggests that the relative contribution of UK investors to the reallocation responses is comparable in magnitude to that of non-UK buyers. Nonetheless, given that the baseline share of the offshore property market attributed to UK owners is large, UK owners contribute to a large extent to the overall reallocation in absolute terms.

[45] In 2020, overseas capital is estimated to represent 51% of all investment in UK commercial real estate.

8 Estimating the Rebalancing Response to the AEoI

The aim of this section is to assess the extent of the rebalancing response to the AEoI. To do so, we quantify the increase in real estate investments in the UK due to the CRS and compare this amount to the effect of the policy on offshore financial wealth estimated in the existing literature. While this is a back-of-the-envelope calculation which should be interpreted with caution, this exercise is useful to get a sense of the magnitude of the rebalancing response to the AEoI.

8.1 Effect of automatic information exchange on the Offshore Real Estate Market in the UK

The total effect of the AEoI on UK real estate investments is computed by summing the estimated coefficients ($\hat{\beta}$) from equation 6.3 over the post-AEoI period (third quarter of 2013 to the fourth quarter of 2016), separately for commercial properties and for residential properties, and multiplying the obtained quantity by the average exposure to the CRS (0.286) and the number of tax havens in the sample (50).[46] The results are presented in Table A.1. According to our calculations, the commitment to the AEoI in 2013 and 2014 resulted in an increase of approximately $45 billion in investments in the UK real estate market through shell companies incorporated in tax havens. Commercial properties account for 55% of the total effect, and residential properties for 45%. This estimated effect is substantial. When considering residential investment alone, the introduction of the AEoI explains approximately 2% of the overall investment in the UK residential market over the same period.[47]

8.2 Effects of the AEoI on Offshore Financial Wealth

Total offshore financial wealth that flowed out of tax havens in response to the AEoI is estimated in two steps: i) we estimate the amount of offshore financial wealth owned by residents of early-adopting countries in 2013, and ii) we apply to this stock estimates from the literature on the impact of the AEoI on offshore deposits.

For the first step, we draw on country-by-country estimates of offshore wealth obtained by Alstadsæter, Johannesen and Zucman (2018). They update the global offshore wealth measure of Zucman (2013) and construct a time series of the evolution of offshore wealth from 2001 to 2015. Then, they allocate this amount to each of the world's countries, for the year 2007.[48] The amounts of offshore wealth held by residents of each country are very heterogeneous, amounting to the equivalent of 60% of GDP for countries like Russia, and to only a few percentage points for countries like Japan or Denmark. To get estimates for 2013, we allocate their 2013 estimates of global offshore wealth ($7.7 trillion) to each country, according to the country-by-country shares of 2007. The underlying assumption is that the geographic

[46] Note that the tax havens investing the most in the UK property market have on average a higher exposure to the CRS (exposure of 0.55 for the top 10 buyers) leading to a conservative estimate of the total reallocation.

[47] Using transactions listed in the Price Paid Data as a proxy for all residential transactions over the period.

[48] The complete results of this allocation are available in appendix table A.3 of their paper.

distribution of offshore wealth remained unchanged between 2007 and 2013. The total stock of offshore financial wealth owned by the early-adopters in 2013 is obtained by simply adding the figures for all non-haven countries committing to the AEoI in 2013 or 2014.[49] We find that these countries were holding more than $ 4.5 trillion in tax havens that year.

Second, we build on O' Reilly, Ramirez and Stemmer (2021), who estimate that the Joint Announcement of March 2014 led to a reduction of approximately 11% in bank deposits held in tax havens. This figure is based on a two-period difference-in-differences model using Bank for International Settlements (BIS) cross-border deposits data. While other papers studied the effect of the AEoI on offshore bank deposits (Menkhoff and Miethe, 2019; Casi, Spengel and Stage, 2020; Beer, Coelho and Leduc, 2019), O' Reilly, Ramirez and Stemmer (2021) is to the best of our knowledge the only paper studying specifically the effect of the Joint Announcement, which is the event we exploit in our paper together with the previous commitment to the AEoI of G20 countries. By applying the 11% effect of the AEoI to the stock of offshore financial wealth held by residents of early-adopting countries in tax havens in 2013, we obtain an estimate of the policy's impact on offshore financial wealth. Our calculations indicate that the Joint Announcement resulted in a decrease of approximately $506 billion in the offshore financial wealth held by residents of participating countries.

8.3 Magnitude of the Rebalancing Response to the AEoI

Comparing the effect of the AEoI on real estate investments in the UK to its effect on offshore financial wealth, we find that the equivalent of about 9% of the observed reduction in offshore financial assets caused by the Joint Announcement was ultimately invested in UK properties. Results are presented in Table 4. This finding suggests that around 9% of the financial assets held in tax havens before the implementation of exchange of information were shifted to UK real estate assets as a way to evade the reporting requirements of the transparency policy. Investing in real estate assets would thus constitute a significant margin of evasion for the AEoI.

Even though there is uncertainty on the exact share held by the UK in the global cross-border real estate market, anecdotal evidence suggests that the UK is one of the most popular destinations globally, as it would be the first destination for cross-border real estate in Europe and the second one at a global scale, behind the United States.[50] It is likely that similar asset-shifting responses to the AEoI also occurred in other countries' real estate markets, albeit potentially to a lesser extent, given the special role played by London in high-net-worth individuals locations' choices (DeVerteuil and Manley, 2017).

[49] Out of the 67 countries from the G20 (excluding the US and Russia) or participating either to the Joint Announcement or the OECD Declaration on Tax Matters, we only keep the 42 non-haven countries (using the list from Menkhoff and Miethe (2019)). We do not keep Greenland and Faroe Islands either, as we do not have information on the amount of offshore financial wealth they own in Alstadsæter, Johannesen and Zucman (2018). Thus, we are left with 40 countries.

[50] Estimates for Europe are based on BNP Paribas Real Estate analysis of 2019, https://www.realestate.bnpparibas.com/sites/default/files/2019-10/AAG%20Capital%20Flows%20Q2%202019.pdf, retrieved on the 27/08/21. Estimates for the United States come from Tranio analysis, professional cross-border real estate broker,https://tranio.com/articles/investment-flows-around-the-globe-cross-border-property-transactions-in-2016_5321/, retrieved on the 27/08/21.

The 9% estimate should be interpreted with caution for at least two reasons. First, there is no unanimity about how the AEoI affected offshore deposits. Estimates of the magnitude of the response to the AEoI vary substantially depending on the study. Available papers focus on various sets of countries and sample periods and find estimates ranging from 11.5% to 31.8%. In appendix table A.5, we show that our estimate of the rebalancing response ranges from 3% to 9% depending on the estimate we consider. Second, previous studies focused on the effect of the AEoI on bank deposits rather than total financial wealth. If the effect of the AEoI varies across different types of financial assets, aggregate rebalancing responses to the AEoI may differ from the estimates based on bank deposits alone.

Overall, despite some uncertainties, our estimate of 9% suggests that a significant portion of assets targeted by the AEoI were shifted into real estate globally to be shielded from reporting obligations.

9 Conclusion

The Automatic Exchange of Information constitutes a credible threat for offshore users who do not declare their financial assets and income to the tax authorities. Its multilateral nature makes it challenging for individuals to relocate their assets to non-cooperative tax havens, as more than 100 jurisdictions are now automatically exchanging information with each other. As such, it has decreased the amount of bank deposits that were held in tax havens. However, by only targeting financial assets, this policy leaves the door open for new evasion strategies to develop. In its current form, it creates incentives for non-compliant taxpayers to restructure their offshore portfolios away from financial assets and toward real estate.

In this paper, we provide evidence that this new international transparency initiative played an important role in the growth of the offshore real estate market in the UK over the last decade. We show that it led to an inflow of investments of around $45 billion over the 2013-2016 period, suggesting that substantial investments have been made in properties to circumvent the new reporting obligations. By documenting a substantial reshuffling response to the AEoI, our results imply that excluding real estate assets from the reporting requirements is an important design flaw of this policy.

This paper demonstrates the necessity of implementing more comprehensive and ambitious automatic exchange of information agreements. To effectively combat tax evasion, a global information exchange treaty that covers all types of assets, including non-financial ones, is necessary. Recognizing real estate's growing importance as a tax evasion vehicle, the OECD has recently proposed several approaches to enhance transparency on cross-border property ownership (OECD, 2023). By expanding the scope of the reporting requirements to encompass a wider range of assets, policymakers can aim to minimize the potential for new evasion strategies to emerge and ensure a more robust and effective framework for international tax transparency.

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Tables and Figures

Variable	Total	Commercial	Residential
All transaction prices (GBP)	1,123,968	2,039,686	851,483
Observed transaction price (GBP)	1,768,254	4,372,988	1,243,283
London	48%	43%	49%
Freehold	52%	69%	47%
Share of indicated price	54%	39%	58%
Number of transactions	103,848	23,815	80,033
		(23%)	(77%)

Table 1: **Characteristics of the Properties Purchased**

Notes: This table displays the characteristics of the properties of the Overseas Companies Ownership Dataset we use in our analysis. The first column presents the characteristics of our full sample, while columns "Commercial" and 'Residential" show the characteristics of respectively commercial and residential properties. The row "All transaction prices (GBP)" gives the average price (observed + predicted) in the sample. The row "Observed transaction price (GBP)" presents the observed price, either directly (OCOD data) or indirectly (PPD data). The row "London" displays the share of transactions taking place in the Greater London area. The row "Freehold" shows the percentage of freehold properties in each categories, the rest of the transactions corresponding to Leasehold titles. The last row "Share of indicated price" presents the percentage of transactions for which we recover a purchase price, either through the OCOD or the PPD. The rest of the prices are estimated as described in Appendix section B.

Source	Number of Transactions	Amount Invested (£billion)	Fraction of Total Transactions	Fraction of Total Amount Invested
Full Dataset	93,332	102	100%	100%
Matched	45,409	44.500	48.7%	43.6%
Identified	19,056	21.400	20.4%	21.0%

Table 2: **Percentage of Companies Matched and Identified in the OCOD Sample**

Notes: This table shows the number of OCOD properties held by foreign firms in 2018 that we manage to link with their ultimate beneficial owners' using the Bahamas Leaks, the Offshore Leaks, the Paradise Papers, the Panama Papers, the Pandora Papers, OpenLux, CNBIOM data and the Register of Overseas Entities. Note that the sample is slightly different from the one presented in table 1, as it is restricted to properties held in 2018 rather than all properties transacted over the 2000-2020 period. Columns 2 and 3 show the raw number of transactions and their value in the full and matched samples, while columns 4 and 5 show the corresponding percentages the matched transactions represent. The "Matched" row shows these figures for all companies we find in one of these datasets. The "Identified" row shows these figures excluding companies whose beneficial owners are other companies we do not know the owners of.

Property type	In billion GBP	In billion USD
Residential	13	21
Commercial	16	25
All	30	46

Table 3: **Effect of the CRS on the UK Real Estate Market - 2013-2016**

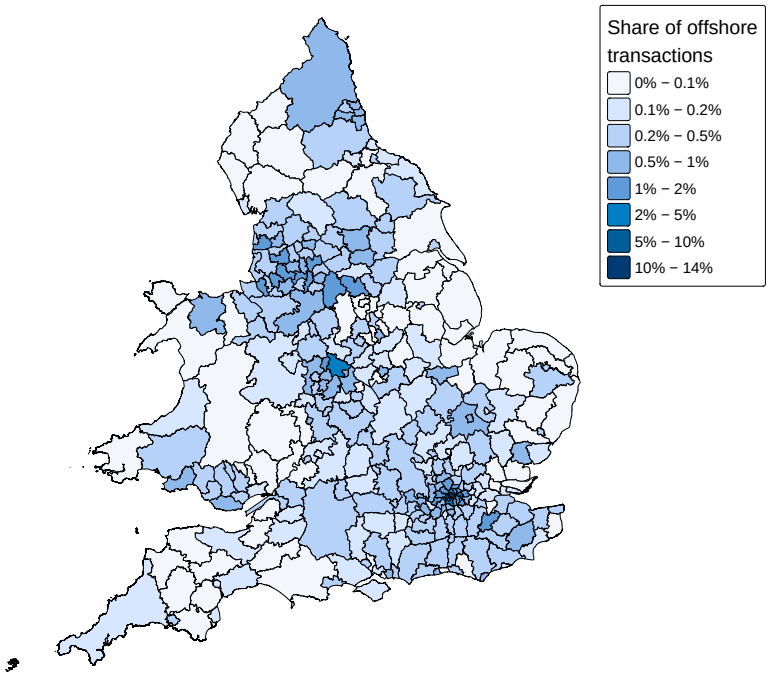
Notes: This table shows the estimates obtained when computing the effect of the CRS based on the estimated $\hat{\beta^{qt}}$ from equation 6.3, average exposure to the CRS (0.286) and number of tax havens in the sample (50). These estimates are for the period 2013q3-2016q4. The GBP - USD exchange rate used is from January 2015. Note that totals may not add up due to rounding.

	(1)	(2)	(3)
Paper	Estimates	Wealth decrease (USD billion)	Asset shifting
O'Reilly et al. (2019)	11%	506	9%

Table 4: **Estimation of Asset Shifting Responses to the CRS**

Notes: This table compares the effect of the CRS on real estate investments we estimate in our paper to the amount of offshore financial wealth that left tax havens due to the transparency shock as estimated in O' Reilly, Ramirez and Stemmer (2021). Column "Estimates" presents estimates of the reduction in offshore financial wealth caused by the CRS, as computed in O' Reilly, Ramirez and Stemmer (2021). Column "Wealth decrease" presents a computation of the stock of offshore financial wealth that flew out of tax havens from 2013 because of the CRS. It is computed using estimates of the stock of offshore financial wealth held by CRS early-adopting countries in tax havens measured in Alstadsæter, Johannesen and Zucman (2018), multiplied by the estimated CRS financial effect of column (1). Column "Asset shifting" computes the ratio of our real estate effect for the UK ($45 billion) over the offshore wealth decrease of column (2).

(a) England and Wales



(b) Greater London

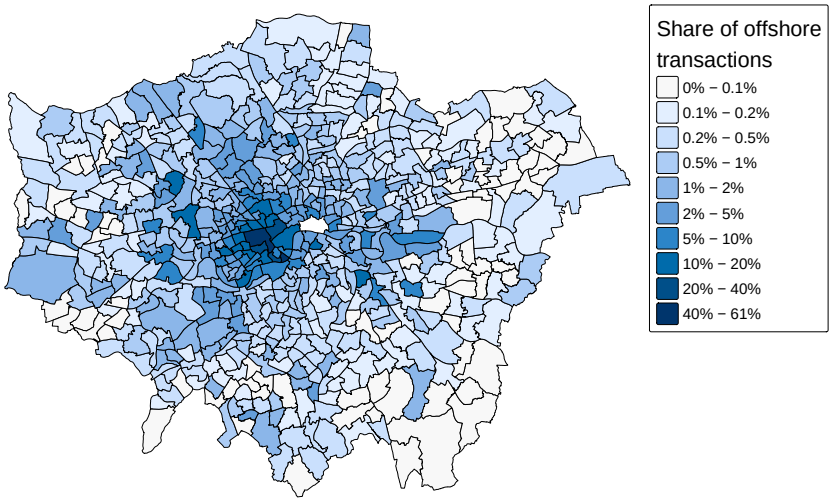


Figure 1: **Share of Residential Purchases from Foreign Companies in Total Residential Purchases**

Notes: This figure shows the ratio of residential real estate purchases made by foreign companies in England and Wales over all residential property purchases. Panel A shows this ratio over England and Wales by local authority, and Panel B in Greater London only, by ward. This share is computed over the 2000-2019 period. Residential real estate purchases made by foreign companies are identified through the OCOD, while residential purchases are computed using the Price Paid Data. Commercial real estate purchases made by foreign companies are excluded from the sample. The City of London local government is excluded because the Price Paid Data does not provides information on purchases made in the City.

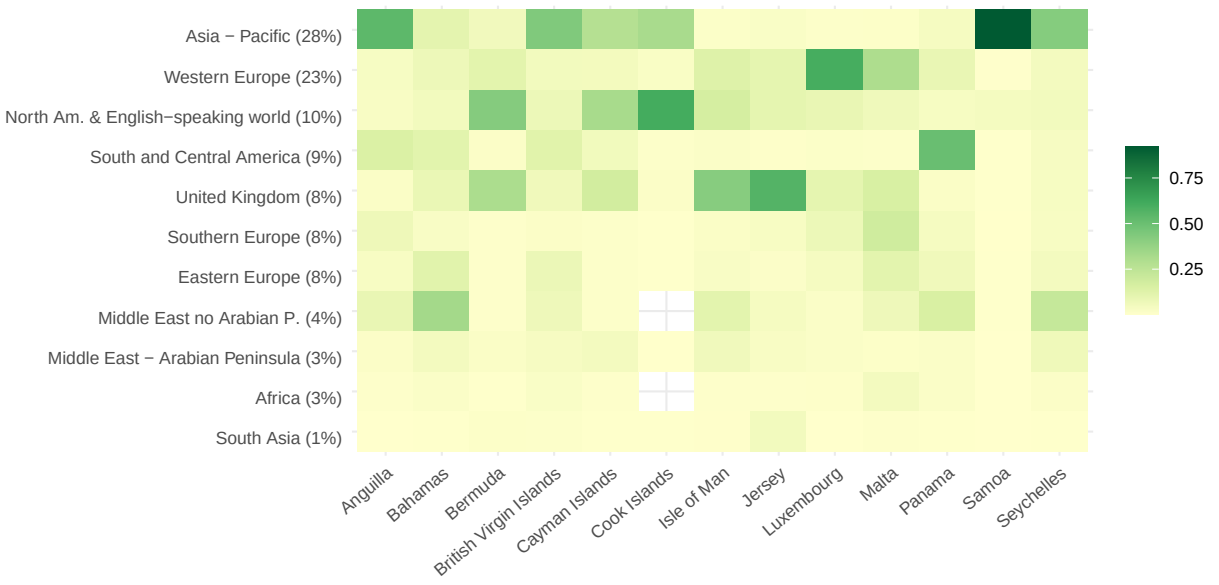
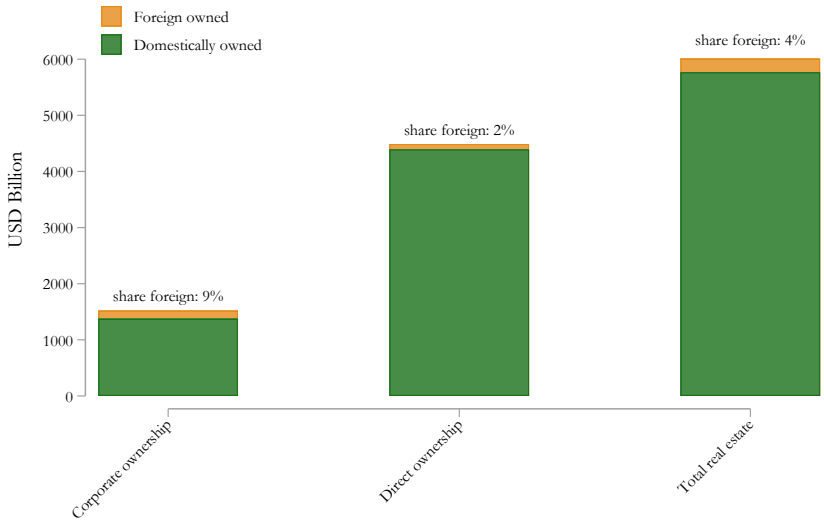


Figure 2: **A Heterogenous Use of Tax Havens Across World Regions**

Notes: This figure illustrates how investors from different world regions choose distinct jurisdictions for incorporating their companies. It focuses on the 13 most common jurisdictions of incorporation in the leaks (used by over 1,000 company owners). The figure is a matrix of ownership shares, meaning that for each jurisdiction of incorporation, the total ownership is fully allocated across all world regions. The data underlying the figure come from the Bahamas Leaks, Offshore Leaks, Panama Papers, Pandora Papers, Paradise Papers, CNBIOM leaks, and OpenLux database. The percentages in parentheses next to each world region indicate the relative share of company owners from that region in the leaks. These percentages are calculated after excluding beneficial owners who are corporate entities and those linked to tax havens. Note that totals may not sum to 100% for some entries due to rounding.

(a) Share of Foreign Ownership in Real Estate



(b) Offshore Real Estate Wealth in Other Countries

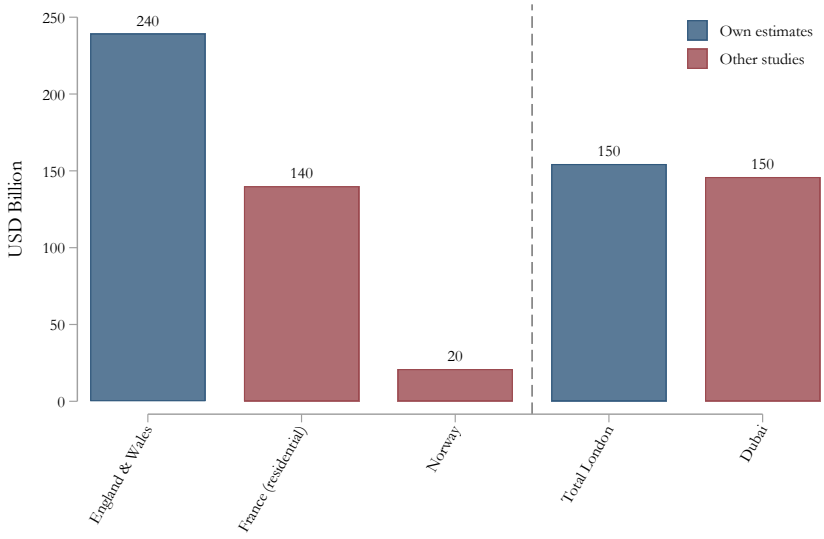


Figure 3: Offshore Real Estate Market in the UK and in Other Countries

Notes: Panel a) shows the share of real estate wealth owned in England and Wales by type of ownership and provides estimates of how much is owned from abroad, in 2018. Total real estate wealth is estimated using balance sheet estimates. Our method is detailed in Appendix section C. Foreign real estate wealth is estimated using the Overseas Companies Ownership Dataset (for corporate ownership) and data from an FOI request made by the Centre for Public Data (for direct ownership). The property prices are expressed in 2018 value. The value of directly owned properties is computed using the number of properties held by individuals with foreign correspondence addresses, multiplied by the average price in the first quarter of 2018 of the district where they are located. Average house prices by local authorities are published by the ONS and available here. The 2018 value of corporately owned properties are displayed in table A.3 and are estimated from the district specific house price evolution between the date of transaction and the first quarter of 2018. All values are expressed in dollars (January 2018's exchange rate). Panel b) compares our estimates of real estate wealth owned from abroad to offshore real estate wealth estimates for other countries. We express our estimates in January 2018 dollars. Estimates for France, Norway and Dubai are from Morel and Uri (2021), Alstadsæter and Økland (2022) and Alstadsæter et al. (2022) respectively. For France, we use the same dollar estimates as Alstadsæter et al. (2022). We keep the other studies' estimates, which are already expressed in dollars.

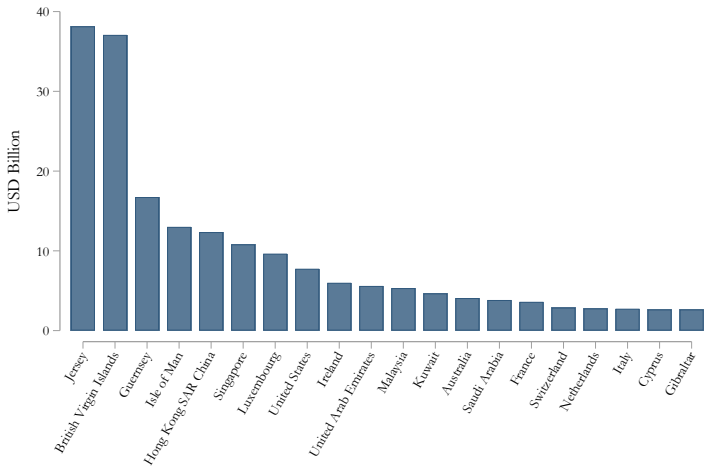


Figure 4: **Country of UK Real Estate Owners, by Immediate Ownership**

Notes: This figure displays the size of foreign owned real estate wealth by country of immediate ownership for the top 20 owners. Immediate ownership country is defined as the jurisdiction of incorporation for corporate ownership and as the country of correspondence address for direct ownership. Estimates are computed using the Overseas Companies Ownership Dataset (corporate ownership) and data on properties held by overseas individuals from the Centre for Public Data (direct ownership). All values are expressed in dollars (January 2018's exchange rate).

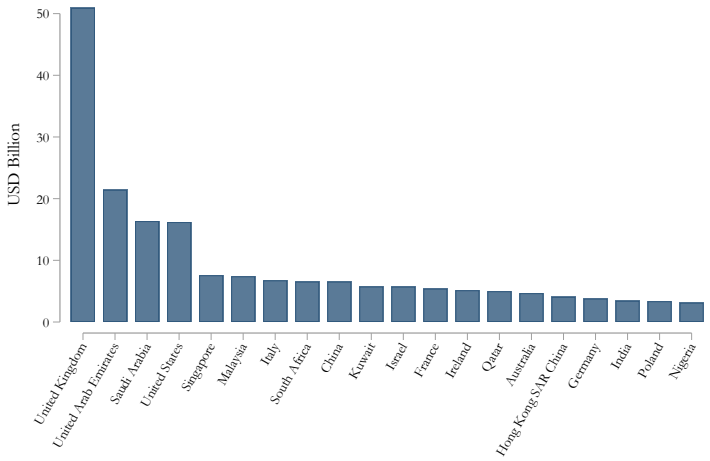


Figure 5: **Country of UK Real Estate Owners, by Ultimate Ownership**

Notes: This figure displays estimates of the size of foreign owned real estate wealth in England and Wales by country of ultimate ownership for the top 20 owners. We compute these estimates using the Overseas Companies Ownership Dataset (for properties held by foreign companies) and data from an FOI request made by the Centre for Public Data (for properties held by individuals with foreign correspondence addresses). The estimates are for January 2018. Ultimate ownership country refers to the property ultimate owner's country of residence. It includes both properties held through foreign companies, and properties held by individuals with a foreign correspondence address. Ultimate ownership of properties held through foreign companies is estimated by matching the Overseas Companies Ownership Dataset with the Register of Overseas Entities and the beneficial ownership data (Panama Papers and other leaks, and OpenLux data). The distribution of real estate wealth non-matched to these datasets is estimated using the distribution of properties matched to the beneficial ownership data (i.e. excluding the matches from the Register of Overseas Entities). Ultimate ownership of properties held by individuals with foreign correspondence addresses is estimated by allocating ownership from individuals with addresses i tax havens to the most probable "true" residence country of the owners using Register of Overseas Entities data. All values are expressed in dollars (January 2018's exchange rate).

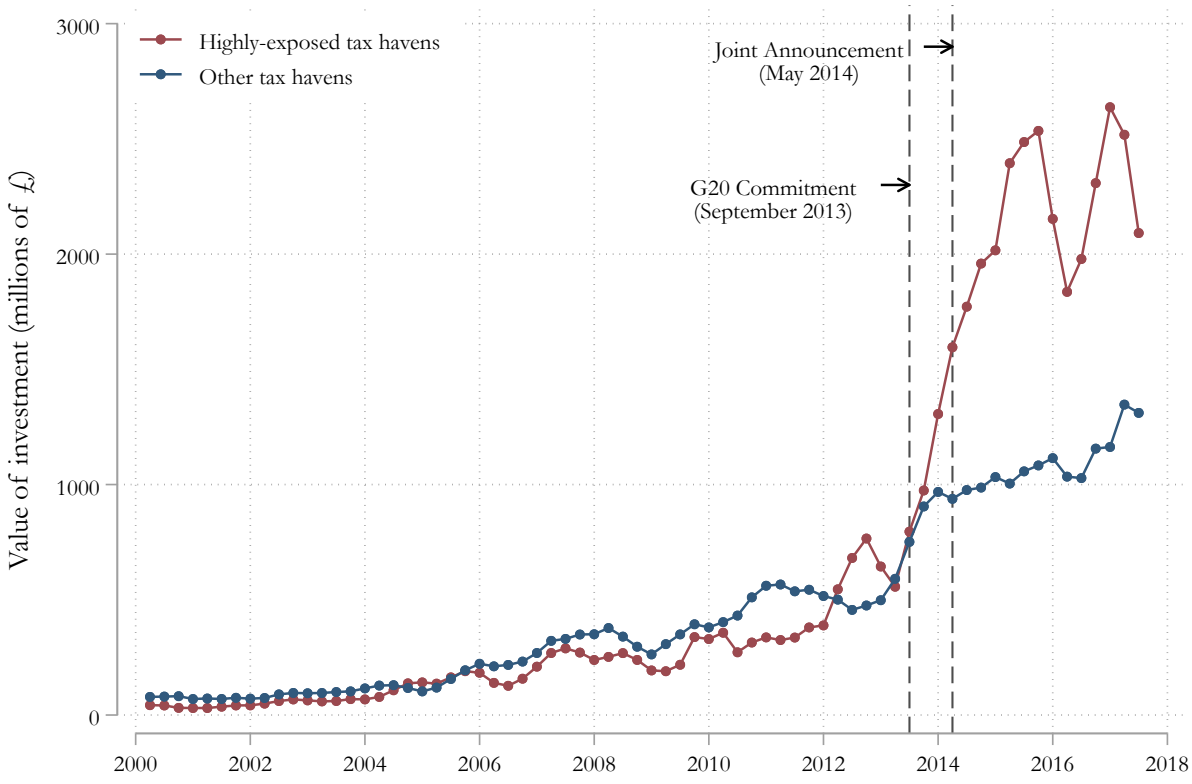


Figure 6: **Total Value of Transactions from Companies Incorporated in "Highly-Exposed" Tax Havens vs Other Havens**

Notes: This figure presents the aggregated amounts invested in England and Wales by companies incorporated in "highly-exposed" tax havens vs. companies incorporated in the other havens, over the period 2000-2017. It is based on the Overseas Companies Ownership Dataset. The measure of exposure to the CRS is computed using the beneficial ownership dataset (leaks data and OpenLux data). For each jurisdiction of incorporation h, we compute the proportion of company beneficial owners coming from countries adopting the CRS in 2013 or 2014. Highly-exposed havens are defined as havens with more than 75% of company owners coming from early-adopting countries. Other havens include all havens with less than 75% of company owners coming from early-adopting jurisdictions, or havens that host less than 10 shell companies in the beneficial ownership data. Investment is expressed in 3-quarters moving averages. Number of "highly exposed" tax havens: 9. Number of other tax havens: 41.

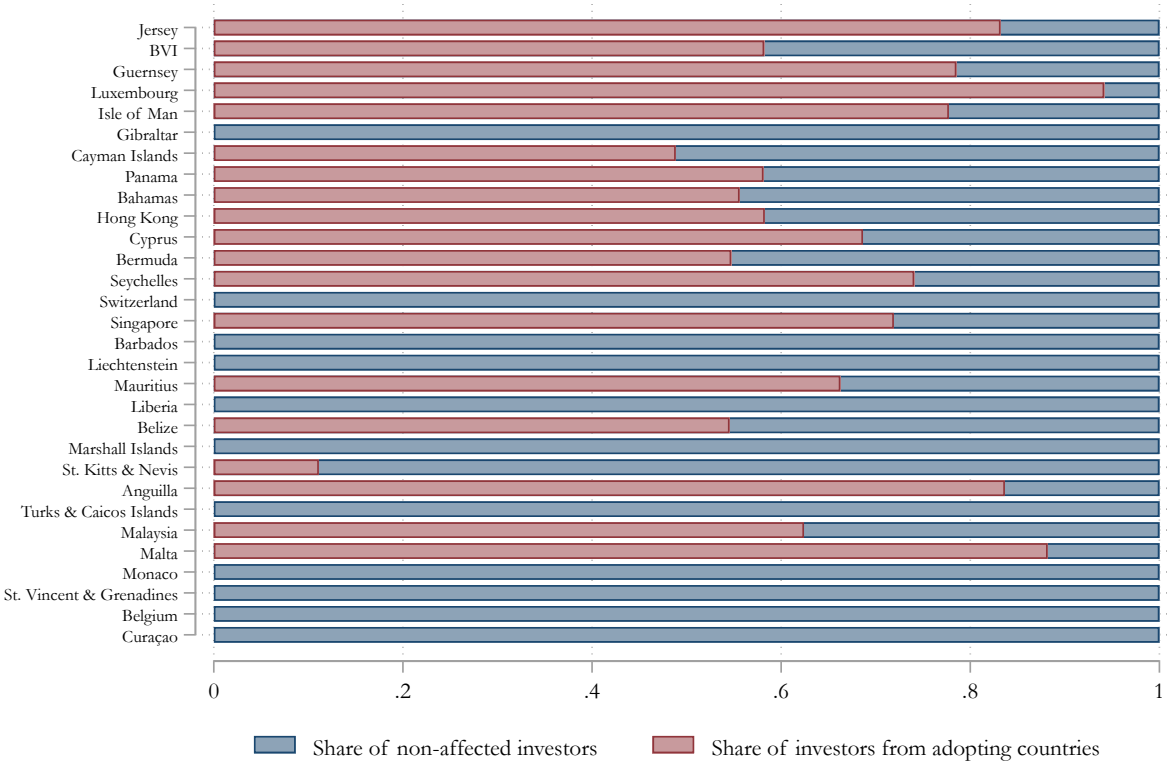
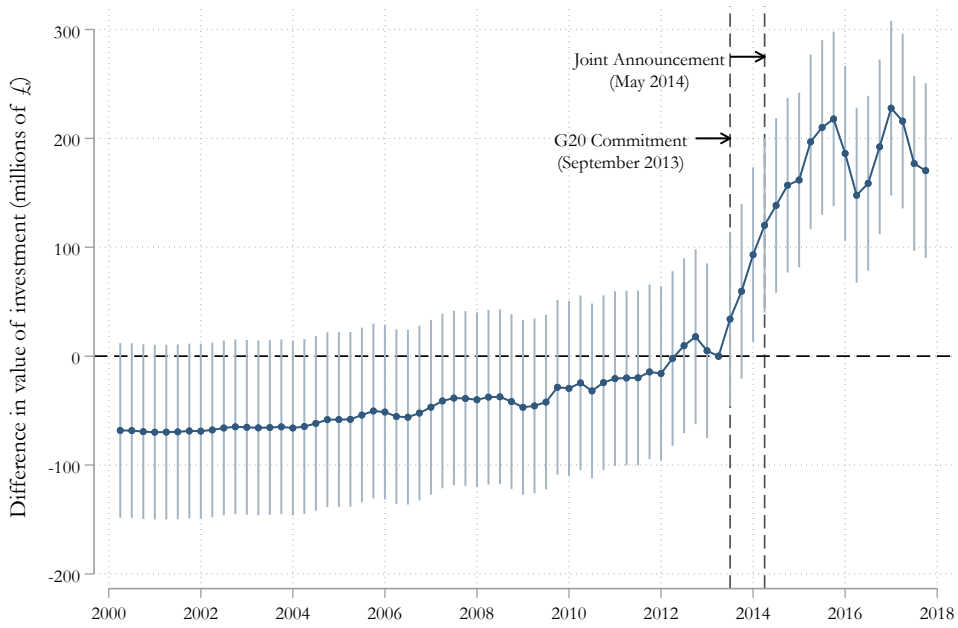


Figure 7: **Distribution of CRS Exposure Amongst the Top 30 Tax Havens**

Notes: This figure shows the distribution of exposure to the Common Reporting Standard for the 30 tax havens that channel the most UK real estate investment. Exposure to the CRS is defined as the share of investors affected by the CRS. It is computed using the Leaks data and the OpenLux data. We build it by computing, for each tax haven, the total share of individuals owning companies in that haven who reside in a country committing to the CRS early. A treatment intensity of e.g. 0.5 indicates that 50% of all company owners in the tax haven reside in countries participating to the Joint Announcement. Tax havens are ordered according to their importance in terms of flows of investments in the English and Welsh real estate market (e.g. Jersey is the most important buyer and it comes first).

(a) Real Estate Investment in Value



(b) Real Estate Investment Scaled by Pre-AEOI Value

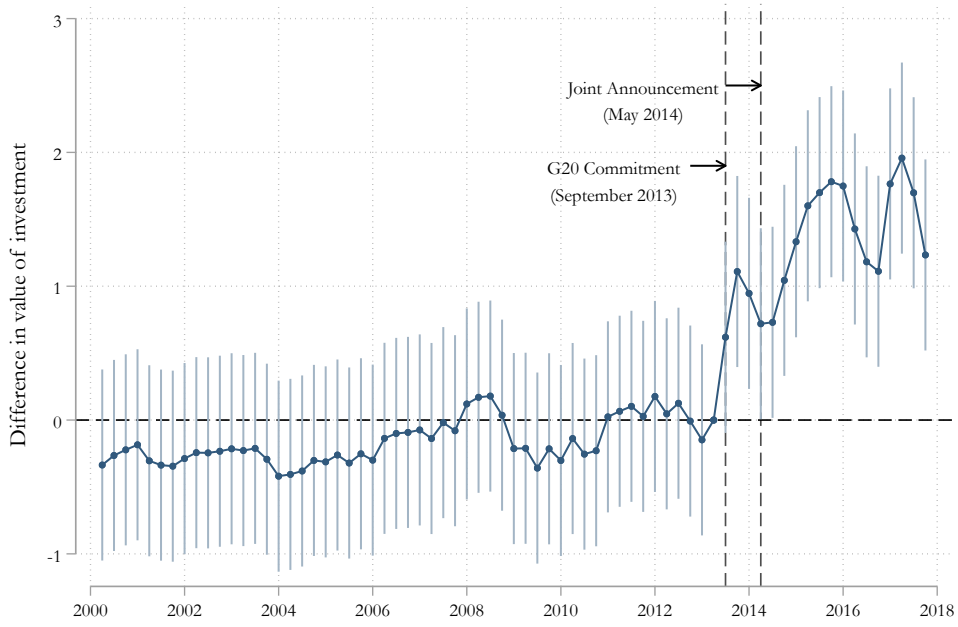
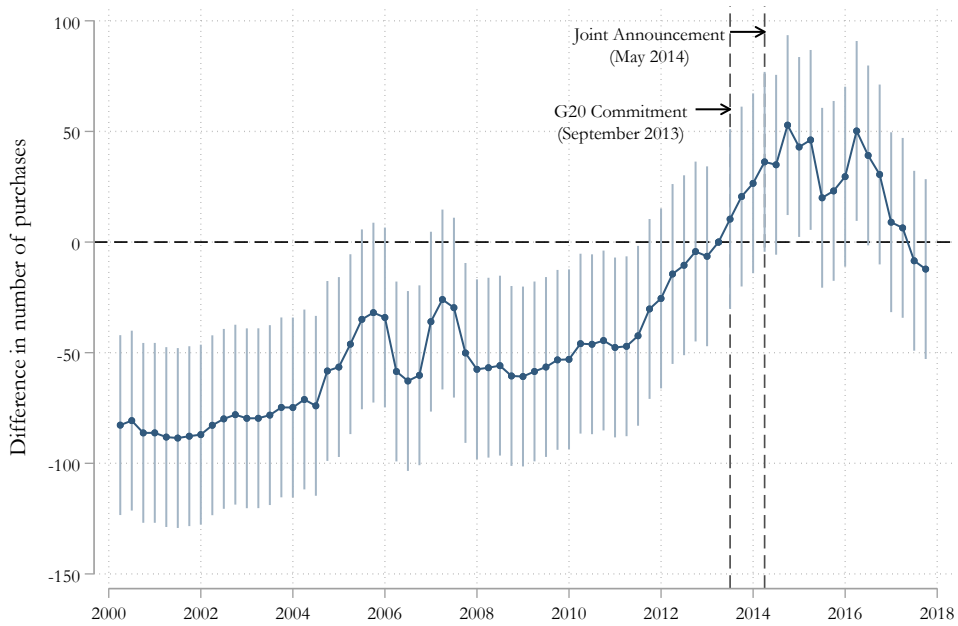


Figure 8: **Difference-in-Differences with Continuous Treatment - Amount Invested**

Notes: This figure plots the path of estimated β^q and their 95 percent confidence interval band from the difference-in-differences model summarized by equation 1. In this equation, the treatment is continuous and captures the exposure of each tax haven to the Common Reporting Standard. The outcome variables –expressed in 3-quarters moving average– are investment in million Pounds (Panel A) and investment scaled by country average investment one year before AEOI endorsement i.e. the period between the 3rd quarter of 2012 and the 2nd quarter of 2013 (Panel B). The pre-CRS coefficient β^{2013q2} is normalized to zero such that estimates can be interpreted relative to before commitment to the CRS. The estimation is based on investments made by tax havens in England and Wales, as captured in the Overseas Companies Ownership Dataset. Number of tax havens: 50.

(a) Number of Transactions - Below £1 Million



(b) Number of Transactions - Above £1 Million

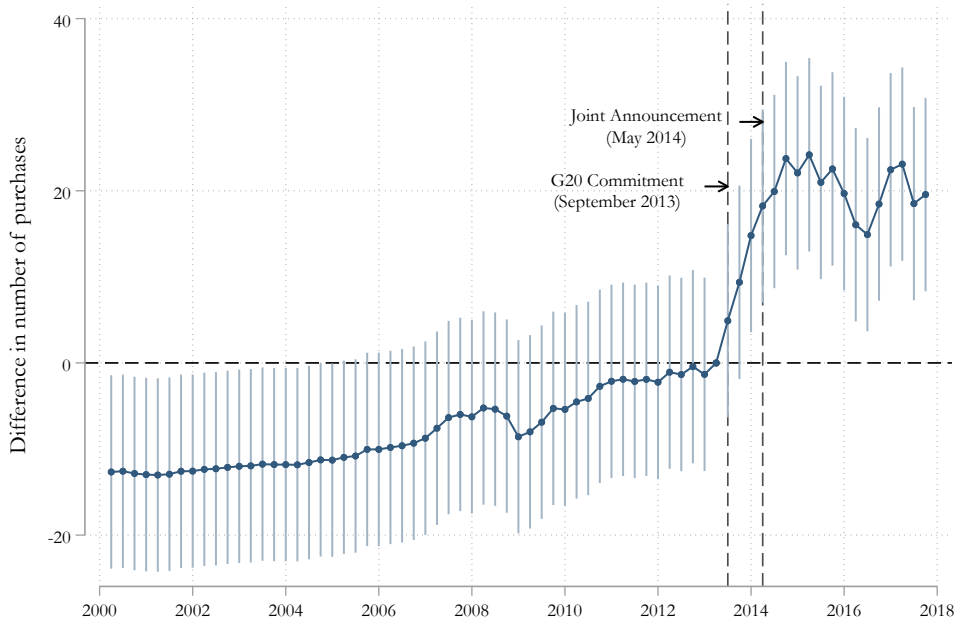


Figure 9: **Difference-in-Differences with Continuous Treatment - Number of Transactions**

Notes: This figure plots the path of estimated β^q and their 95 percent confidence interval band from the difference- in-differences model summarized by equation 1. In this equation, the treatment is continuous and captures the exposure of each tax haven to the Common Reporting Standard. The outcome variables –expressed in 3-quarters moving average– are number of properties costing less than £1 million (Panel A) and number of properties costing more than £1 million (Panel B). The pre-CRS coefficient β^{2013q2} is normalized to zero such that estimates can be interpreted relative to before commitment to the CRS. The estimation is based on investments made by tax havens in England and Wales, as captured in the Overseas Companies Ownership Dataset. Number of tax havens: 50.

Additional Materials for

Avoiding Transparency through Offshore Real Estate: Evidence from the United Kingdom

Jeanne Bomare Ségal Le Guern Herry

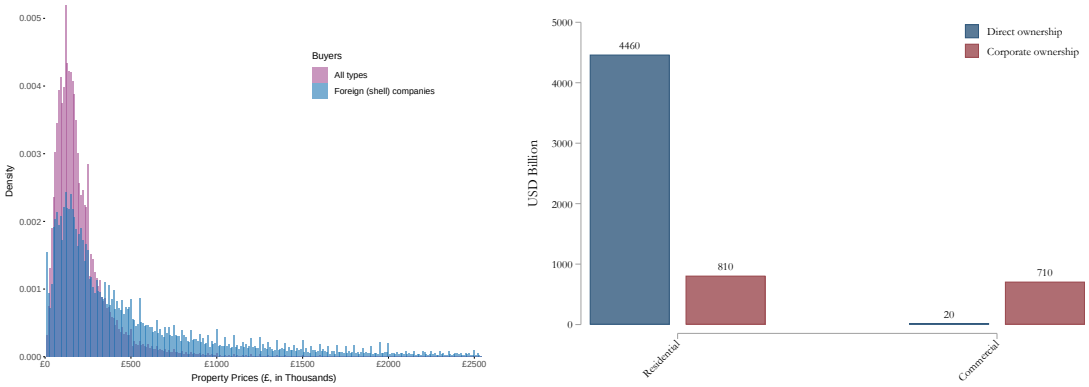
This appendix provides: (A) additional figures and tables supporting the descriptive and causal analysis; (B) details on the construction of the OCOD dataset; (C) documentation on how the dataset is combined with complementary sources to estimate offshore real estate wealth; and (D) information on the tax treatment of UK real estate ownership.

List of Appendices

A Additional Figures and Tables

(a) Price Distributions - Offshore vs. Total

(b) Residential vs. Commercial Real Estate by Type



(c) Comparison With Other Studies

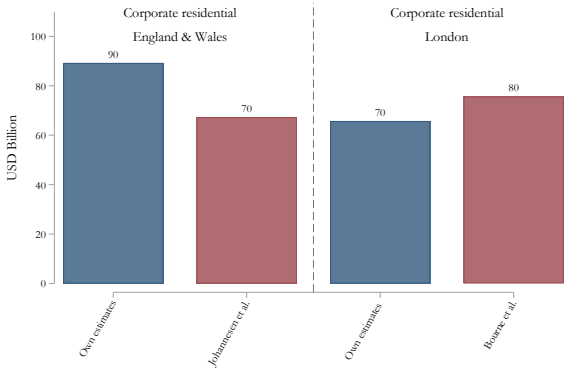


Figure A.1: **The UK Property Market**

Notes: Panel (a) of this figure compares the distribution of prices of English and Welsh properties bought through foreign companies (in blue), and the distribution of prices of all residential properties bought in England and Wales (in red) over the 2000-2020 period. It is constructed using the Overseas Companies Ownership Dataset, keeping only transactions for which the transaction price is observed, and the Price Paid Data. Both datasets come from the UK Land Registry. For better visibility, the prices are capped at 99.8% of the price distribution of the Price Paid Data. Panel (b) shows the size of residential and commercial real estate wealth owned in England and Wales, by type of ownership. The estimates are based on UK national balance sheet for 2018. Residential real estate is composed of dwellings and land underlying them. Commercial real estate is defined as other buildings and land underlying them. Direct ownership refers to properties owned by households. Corporate ownership refers to properties owned by private corporations. We provide details on how the figures are computed in Appendix section C. All values are expressed in dollars (January 2018's exchange rate). Panel (c) compares our estimates of real estate wealth owned by foreign corporations based in the Overseas Companies Ownership Dataset to what is found in other studies. We restrict our estimates to the same segment of the real estate market to make the comparisons meaningful. For the comparison with Johannesen, Miethe and Weishaar (2022), we focus on residential properties only and for the comparison with Bourne, Ingianni and McKenzie (2022), we focus on residential properties held in London only. Our estimates are for January 2018, while Johannesen, Miethe and Weishaar (2022)'s figure is estimated for December 2019 and Bourne, Ingianni and McKenzie (2022)'s for January 2022. All values are expressed in dollars (January 2018's exchange rate).

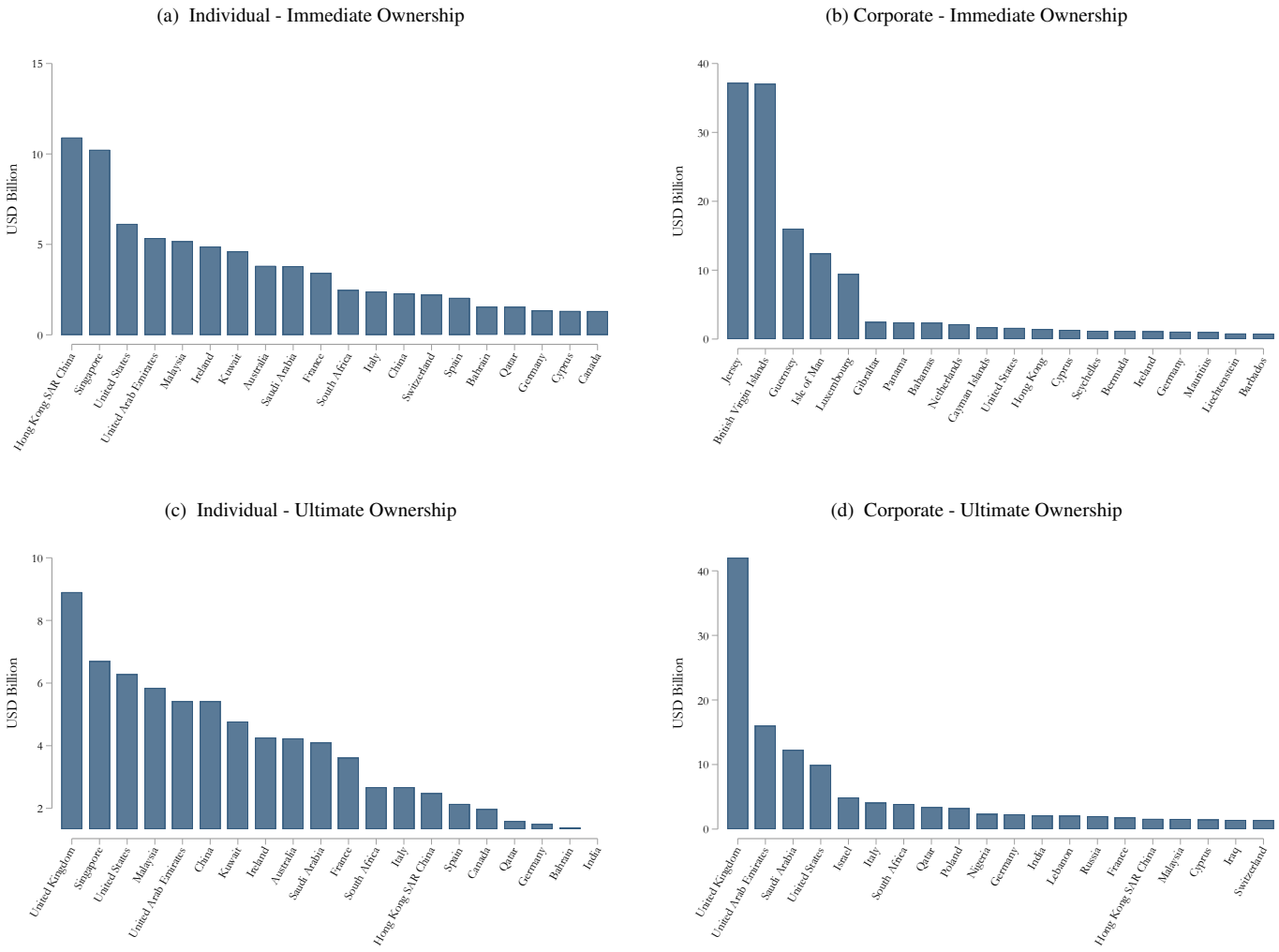
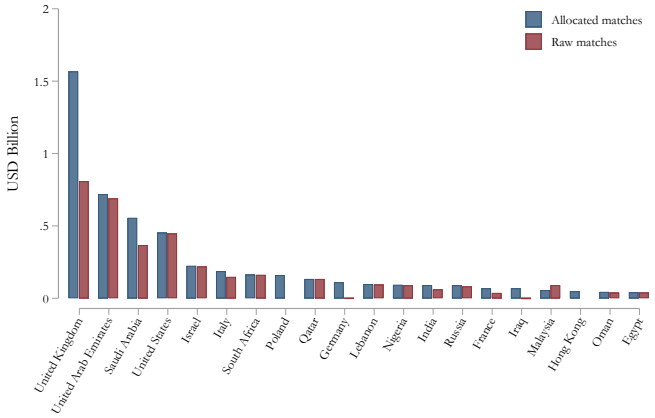


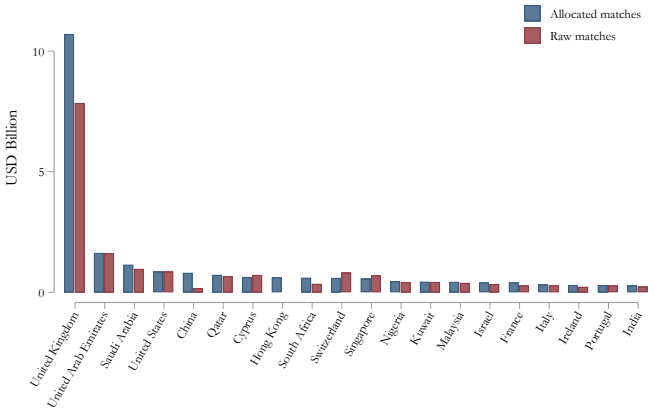
Figure A.2: **Foreign Real Estate Ownership in the UK, Immediate and Ultimate Ownership**

Notes: Panel (a) and (b) of this figure show estimates of the size of foreign owned real estate wealth by country of immediate ownership for the top 20 owners. Foreign owned real estate includes both properties held by individuals with foreign correspondence addresses and by foreign companies. In Panel (a), individual (or direct) ownership estimates are computed using a Freedom of Information Request established by the Centre for Public Data. The country of immediate ownership is computed using the country of correspondence address of individuals. In Panel (b), corporate (or indirect) ownership estimates are computed using the Overseas Companies Ownership Dataset. Immediate ownership country is defined as the jurisdiction of incorporation of the purchasing companies. Panel (c) and (d) show estimates by country of ultimate ownership. We compute these estimates using the Overseas Companies Ownership Dataset (for properties held by foreign companies) and data from an FOI request made by the Centre for Public Data (for properties held by individuals with foreign correspondence addresses). The estimates are for January 2018. Panel (c) presents estimates of ultimate ownership for properties held by individual with foreign correspondence addresses. We reallocate addresses in tax havens to the most probable "true" residence country of the owners using Register of Overseas Entities data. The reallocation procedure is detailed in the text. Panel (b) shows estimates of ultimate ownership of properties held through foreign companies. It is estimated by matching the OCOD with the Register of Overseas Entities and the Leaks data. we allocate the companies we did not find in the ROE or the Leaks according to the geographic distribution of UK real estate ownership estimated through matches with the Leaks data. Estimates are for January 2018 and all values are expressed in dollars (January 2018's exchange rate).

(a) Main Identified Investors in the UK - All



(b) Main Identified Investors in the UK - Register of Overseas Entities Only



(c) Main Identified Investors in the UK - Leaks

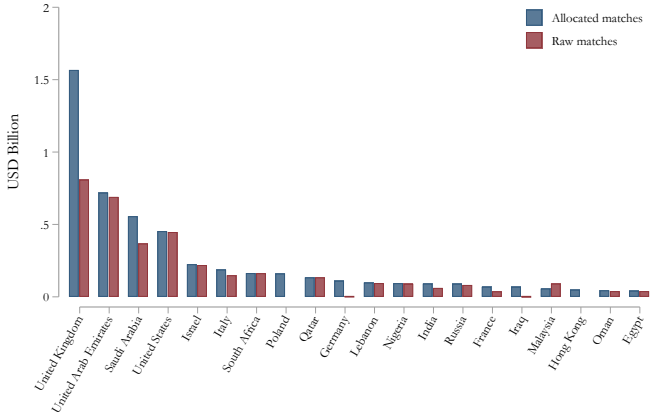


Figure A.3: **Country of Origin of Identified Owners Buying Properties in the UK**

Notes: This figure shows the distribution of country of residence of identified beneficial owners of companies holding real estate in England and Wales in January 2018. Data from companies holding properties in England and Wales comes from the Overseas Companies Ownership Dataset (OCOD) maintained by the Land Registry. We identify beneficial owners of these companies matching the OCOD with the Leaks Data (Bahamas Leaks, Offshore Leaks, Panama Papers, Pandora Papers, Paradise Papers, and OpenxLux and CNBIOM Leaks) and the Register of Overseas Entities (ROE). We match companies based on their name, country of incorporation and date of incorporation. The blue bars show the raw results we obtain after the matching process, using the address country as declared in the ROE and country linked to the beneficial owner as per the Offshore Leaks. The red bars display the allocation after allocating all owners from tax havens to their most probable country of residence. Panel (a) shows all identified owners, Panel (b) displays results of the matching process with the Leaks data only (which include Bahamas Leaks, CNBIOM data, Offshore Leaks, OpenLux data, Panama Papers, Pandora Papers, Paradise Papers). In Panel (c), we present the results of the matching process with the ROE data only. For matches with the ROE, owners from tax havens are allocated by selecting the country of citizenship of the individual instead of the address country. This information, however, is not available in the Leaks data. As a result, we use a software predicting the most likely nationality according to the name to assign a country of residence to owners linked to a tax haven. The matching is based on the property stock of the UK as of January 2018, and all values are expressed in dollars (January 2018's exchange rate).

(a) Country of Ultimate Ownership - Robustness I

(b) Country of Ultimate Ownership - Robustness II

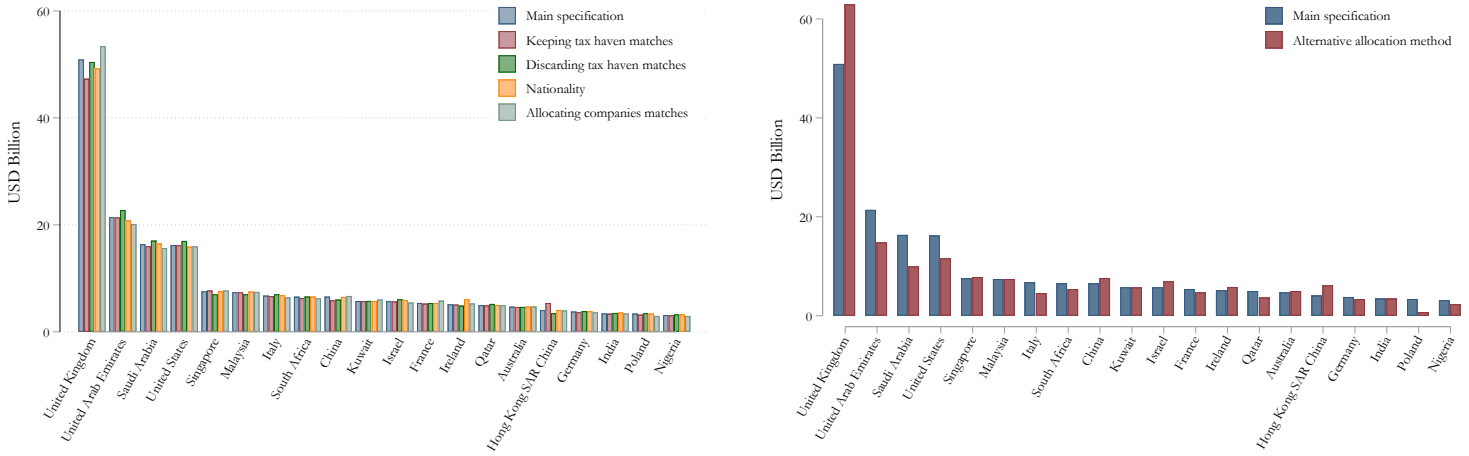


Figure A.4: **Foreign Real Estate Ownershiop in the UK, Robustness**

Notes: This figure displays different estimates of the size of foreign owned real estate wealth by country of ultimate ownership for the top 20 owners. We compute these estimates using the Overseas Companies Ownership Dataset (for properties held by foreign companies) and data from an FOI request made by the Centre for Public Data (for properties held by individuals with foreign correspondence addresses). Ultimate ownership country refers to the property ultimate owner's country of residence. It includes both properties held through foreign companies, and properties held by individuals with a foreign correspondence address. Estimates are for January 2018 and all values are expressed in dollars (January 2018's exchange rate).
Panel (a) shows that the various assumption we make for our baseline estimates (in blue) has little effect on the overall picture. Our baseline is based on the distribution of owners identified through the Register of Overseas Entities and the beneficial ownership data, where individuals linked to tax havens are allocated to their most probably country of residence based on either their country of citizenship or their name. The first alternative specification (in red) keep these tax havens as the ultimate country of residence of the owners, instead of predicting the residence. The second specification (in green) discard these matches altogether. The third specification (in yellow) takes the country of citizenship as the country of origin of company owners (or the most probably country of citizenship based on names, for matches with the leaks data). The last specification (in grey) includes matches in the OCOD where the ultimate beneficial owner is a company. To distribute the value of companies matched to corporate owners, we proceed in the following way. We leverage the full Register of Overseas Entities data, which provides information on the country of residence of a significant share of foreign companies holding properties in the United Kingdom. For each country of incorporation h of these companies, we compute the distribution of owners residing in each country c. Then, we allocate these weights to the corporate beneficial owners identified in the matching process. For example, in the Register, we find that 18.9% of individuals owning a company incorporated in Hong Kong are residents of China. Then, when the matching process shows that the beneficial owner of a company is another company incorporated in Hong Kong, we allocate 18.9% of the value of the corresponding property to China.
Panel (b) compares the baseline (in blue) to results obtained using an alternative method to allocate the ownership of properties for which the owner is unknown (in red). In the main specification, properties held through unmatched companies are allocated using the country distribution found in the subsample identified thanks to the Leaks data. This means that as in the sample of OCOD companies matched to the leaks, 26.7% of the real estate wealth is owned by the United Kingdom, we allocate 26.7% of the unidentified wealth to the United Kingdom. In the alternative allocation method (in red), we exploit information on country distribution identified through the leaks for each country of incorporation of companies. This means that as according to matches between the OCOD and the Leaks e.g. 16% of owners of companies incorporated in the Bahamas are from the United Kingdom, we allocate 16% of the unidentified sample of Bahamas companies to the United Kingdom. We repeat this exercise for each country of incorporation.

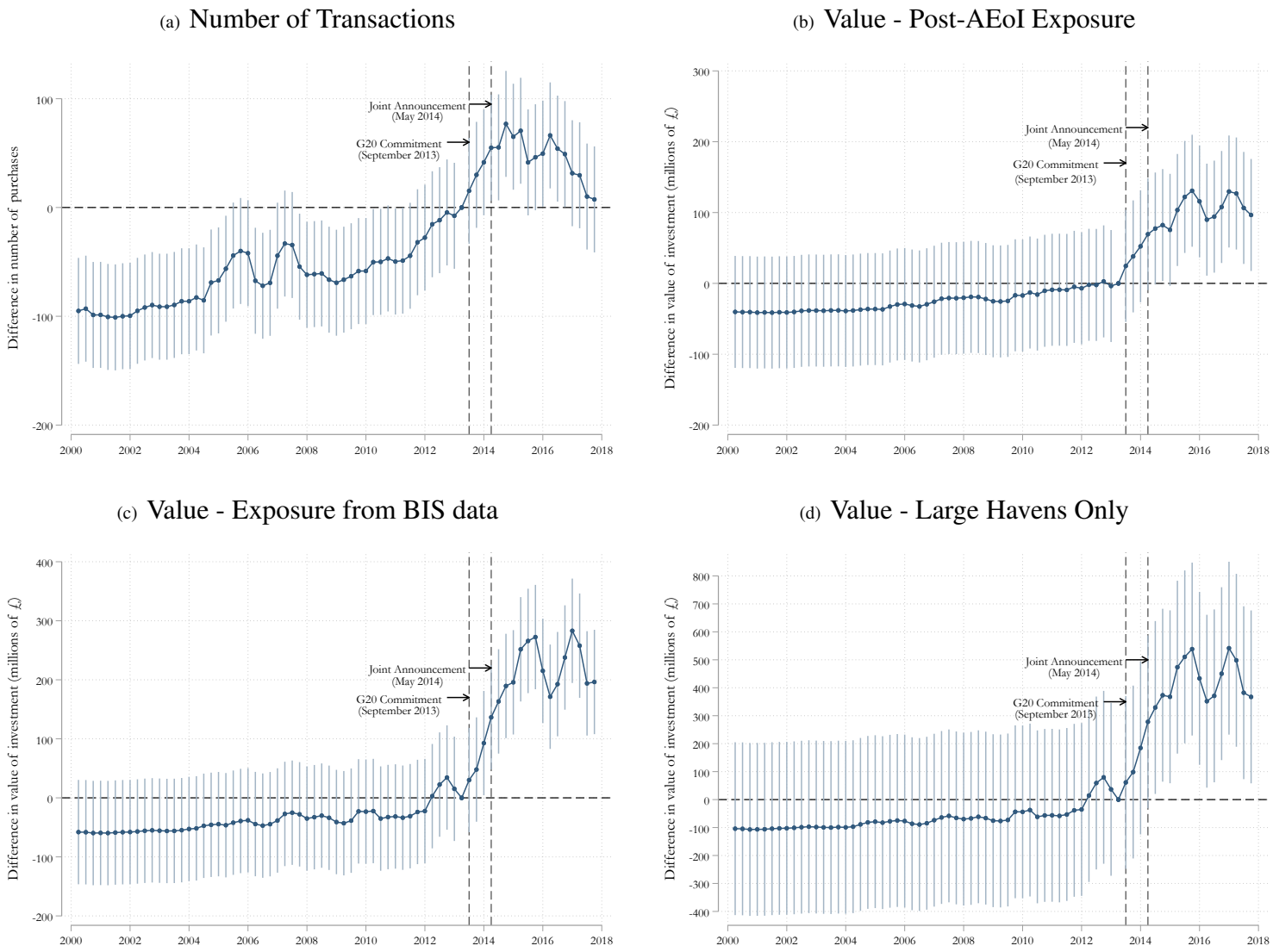
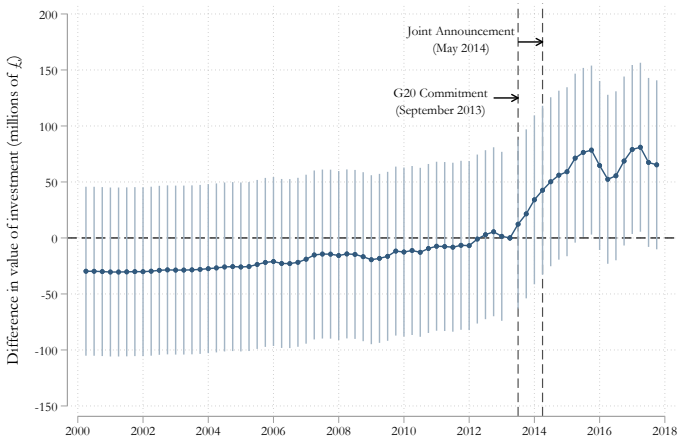


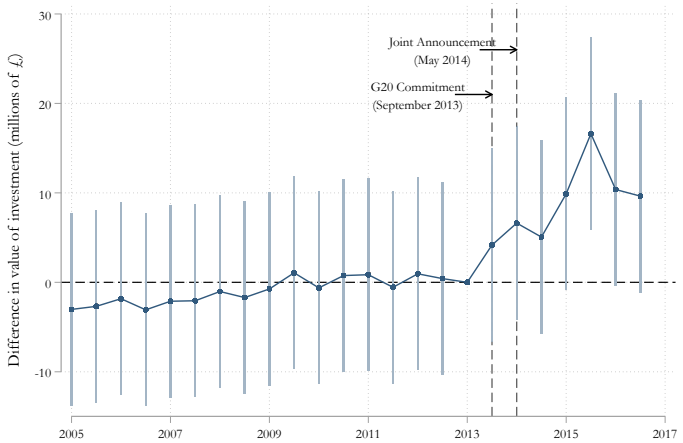
Figure A.5: **Difference-in-Differences with Continuous Treatment - Robustness**

Notes: This figure displays the estimated coefficients β^q and their 95% confidence intervals from the difference-in-differences model described in Equation 1, across various outcome variables and specifications. Panel (a) shows the evolution in the number of transactions. Panel (b) uses an alternative exposure measure based on shell companies created after the introduction of AEoI. Panel (c) relies on an exposure measure constructed from cross-border bank deposit data from the Bank for International Settlements (BIS). Panel (d) restricts the estimation sample to large tax havens-those where more than 10 corporations had been incorporated before Q3 2013. In all panels, treatment is continuous and reflects each tax haven's exposure to the Common Reporting Standard (CRS). The outcome variable is expressed as a three-quarter moving average. The coefficient for 2013q2, the quarter before the CRS commitment, is normalized to zero, so estimates can be interpreted relative to the pre-policy baseline. Estimates are based on investments by tax havens in England and Wales, as recorded in the Overseas Companies Ownership Dataset (OCOD). The sample includes 50 tax havens in panels (a), (b), (c), and 24 tax havens in panel (d).

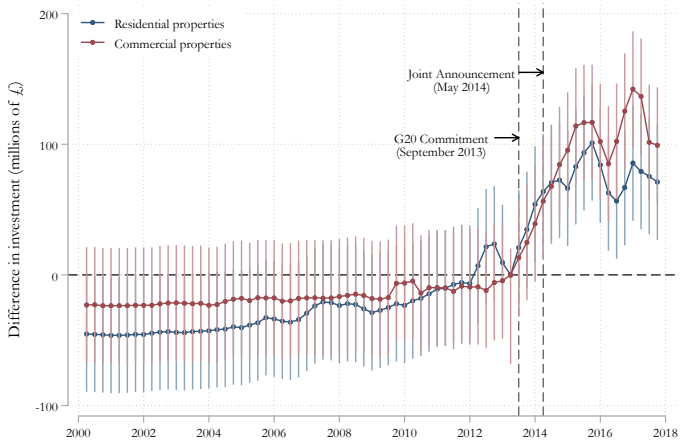
(a) Value - Exposure from ROE data



(b) Value - Identified Owners



(c) Value - By Property Class



(d) Value - Excluding Jersey, BVI and Guernsey

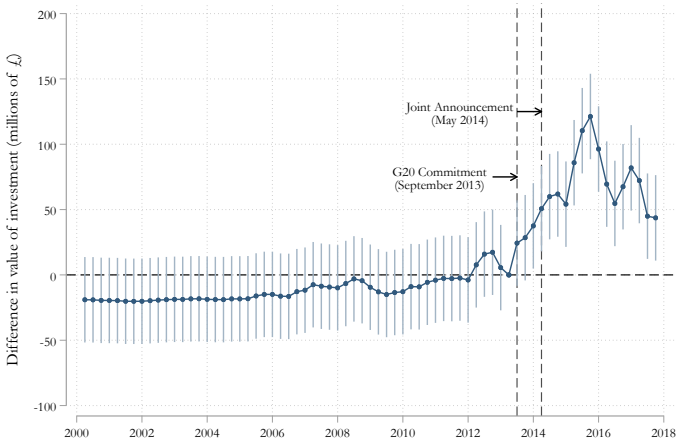


Figure A.6: **Difference-in-Differences - Robustness**

Notes: This figure displays the estimated coefficients β^q and their 95% confidence intervals from the difference-in-differences model described in Equation 1, across various outcome variables and specifications (for Panels a, c and d). Panel (a) relies on an exposure measure constructed from data from the Register of Overseas Entities (ROE). Panel (c) presents the amount invested in residential and commercial properties, respectively Panel (d) displays estimates obtained after excluding purchases made by companies incorporated in Jersey, the British Virgin Islands or Guernsey i.e. the three largest buyers in our sample. In these panels, treatment is continuous and reflects each tax haven's exposure to the Common Reporting Standard (CRS). The outcome variable is expressed as a three-quarter moving average. The coefficient for 2013q2, the quarter before the CRS commitment, is normalized to zero, so estimates can be interpreted relative to the pre-policy baseline. Estimates are based on investments by tax havens in England and Wales, as recorded in the Overseas Companies Ownership Dataset (OCOD). Figure in Panel (b) plots the path of estimated β^q and their 95 percent confidence interval band from the difference-in-differences model summarized by equation 2. In this version of the equation, we use a binary treatment variable taking 1 if a country commits to the Common Reporting Standard in 2013 or in 2014. The control group is composed of countries adopting the CRS later, or never adopting it. The outcome variable is investment in million Pounds. The pre-CRS coefficient β^{2013h1} is normalized to zero such that estimates can be interpreted relative to before commitment to the CRS. The estimation is based on investments made by tax havens in England and Wales, as captured in the Overseas Companies Ownership Dataset. The graphs start in 2005 for visibility, but the results are unchanged when including the 2000-2005 period.

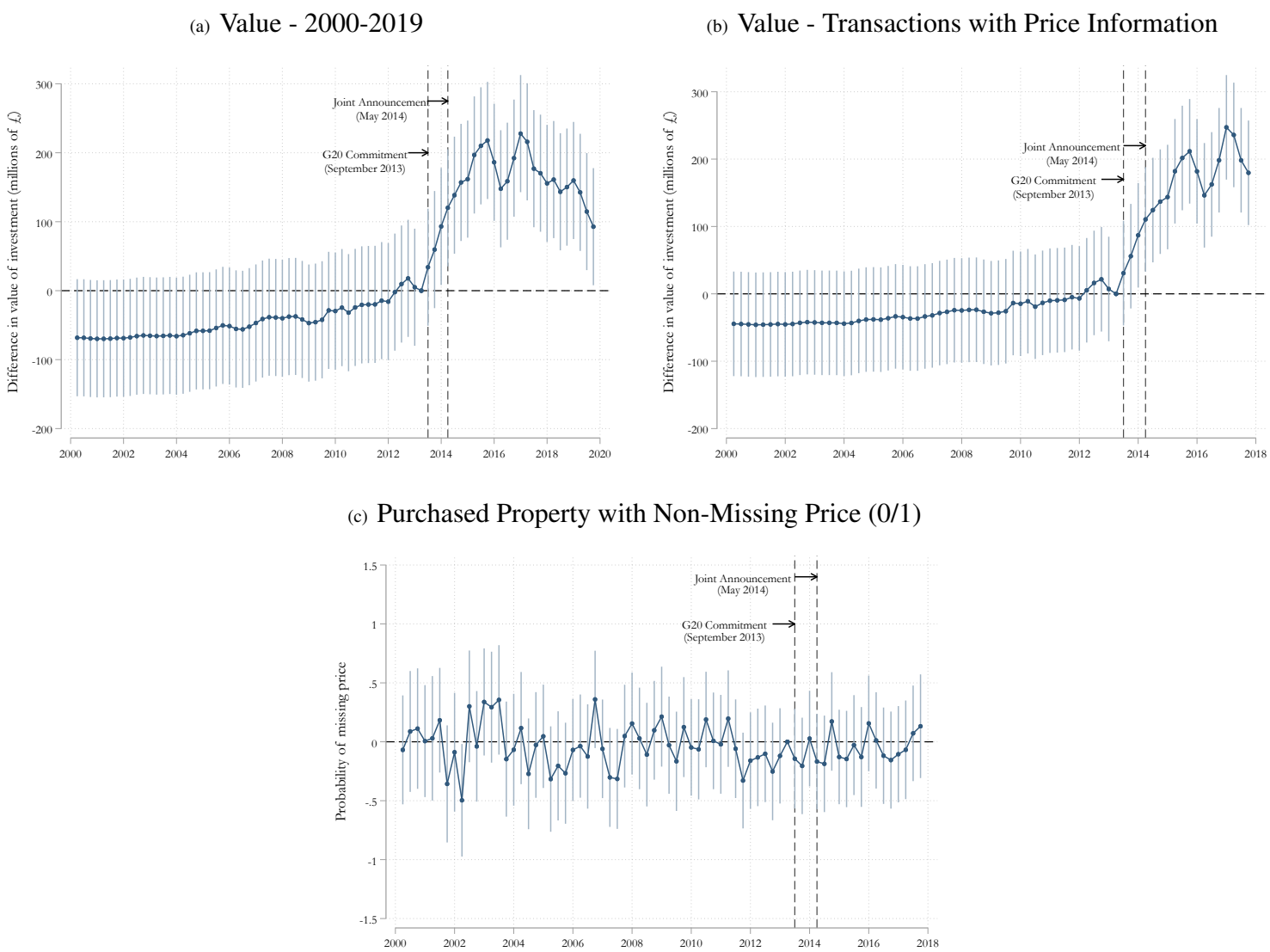
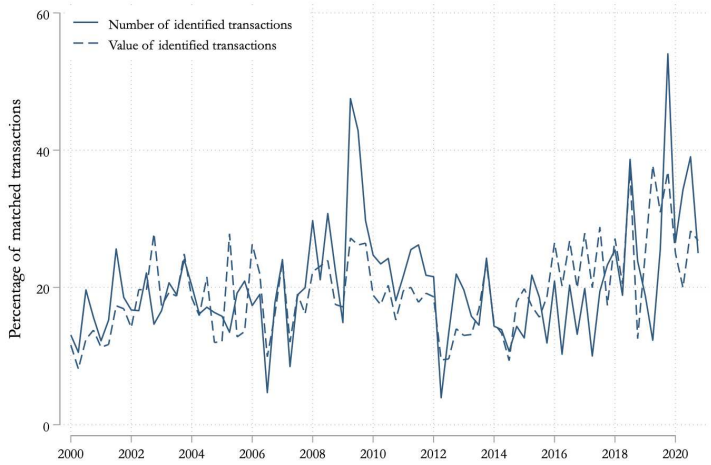


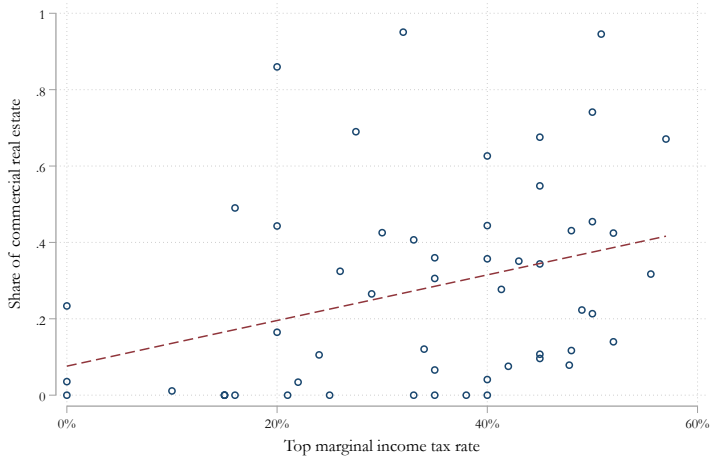
Figure A.7: **Difference-in-Differences - Robustness**

Notes: This figure displays the estimated coefficients β^q and their 95% confidence intervals from the difference-in-differences model described in Equation 1, across various outcome variables and specifications. Panel (a) over the 2000-2019 period. Panel (b) restricts the estimation sample to transactions with non-missing price information. Panel (c) shows estimates from a specification of equation 1 where the outcome variable is the probability that a transaction price is missing in our full OCOD estimation sample. The treatment is continuous and reflects each tax haven's exposure to the Common Reporting Standard (CRS). The outcome variable is expressed as a three-quarter moving average. The coefficient for 2013q2, the quarter before the CRS commitment, is normalized to zero, so estimates can be interpreted relative to the pre-policy baseline. Estimates are based on investments by tax havens in England and Wales, as recorded in the Overseas Companies Ownership Dataset (OCOD). The sample includes 50 tax havens.

(a) Matching Rate With Leaks and ROE



(b) Tax Rate and Share of Commercial Real Estate



(c) Share of UK Ultimate Owners

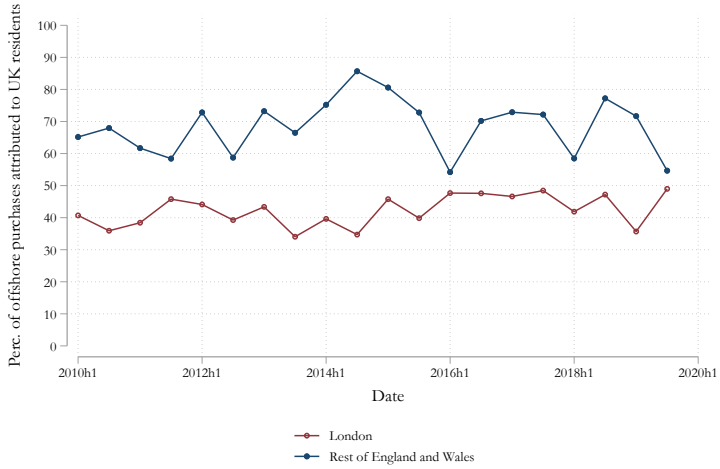


Figure A.8: **Robustness and Mechanisms**

Notes: Panel (a) presents the matching rates of the Overseas Companies Ownership Dataset with the Leaks, the OpenLux and the Register of Overseas Entities over time. We match companies based on their name, their country of incorporation, and their date of creation. We discard matched companies whose owner is another company. We present the matching rate both for the number of transactions per period, and for the value of these transactions. Panel (b) plots the correlation between correlation between a country's tax level and the share of its UK real estate wealth held in commercial properties. The share of UK real estate held in commercial properties is estimated based on the stock of UK properties held through foreign firms for which ownership can be identified from the Leaks data as presented in subsection 4.3.2. The level of taxation is proxied by the top marginal income tax rate in 2014, taken from the individual income tax rate table built by KPMG and available at `https://home.kpmg/sa/en/home/services/tax/tax-tools-and-resources/tax-rates-online/individual-income-tax-rates-table.html`. Panel (c) presents estimates of the share of UK owners among all ultimate owners purchasing UK real estate through foreign companies, for the Greater London area and for the rest of England and Wales. The estimates are for the flows of real estate purchased throughout the period 2010-2019. The predictions are made using a random forest model, as detailed in Bomare (2025).

Property type	In billion GBP	In billion USD
Residential	13	21
Commercial	16	25
All	30	46

Table A.1: **Effect of the CRS on the UK Real Estate Market - 2013-2016**

Notes: This table shows the estimates obtained when computing the effect of the CRS based on the estimated $\hat{\beta^{qt}}$ from equation 6.3, average exposure to the CRS (0.286) and number of tax havens in the sample (50). These estimates are for the period 2013q3-2016q4. The GBP - USD exchange rate used is from January 2015. Note that totals may not add up due to rounding.

Data source	Period covered	Number of companies	Number of unique beneficial owners
Bahamas Leaks	1919-2016	175,888	6
CNBIOM	2007-2019	1,406	927
OpenLux	1907-2020	261,249	70,795
Offshore Leaks	1918-2010	105,516	75,948
Panama Papers	1936-2015	213,634	238,055
Pandora Papers	1905-2019	29,221	41,745
Paradise Papers	1865-2017	290,086	133,555
Total		1,077,000	561,031

Table A.2: **Number of Companies and Ultimate Beneficial Owners by Source**

Notes: This table details the characteristics of the seven corporate ownership datasets we exploit in our analysis. For each of the datasets, it presents the period covered, the number of companies and the number of unique beneficial owners we get information on.

	Descriptive sample			Estimation sample		
Variable	Full	Commercial	Residential	Full	Commercial	Residential
All transaction prices (GBP)	894,310	1,904,632	649,753	1,123,968	2,039,686	851,483
Observed transaction price (GBP)	1,446,028	4,046,359	990,966	1,768,254	4,372,988	1,243,283
London	47%	48%	47%	48%	43%	49%
Freehold	56%	68%	53%	52%	69%	47%
Share of residential	81%	-	-	77%	-	-
Share of indicated price	44%	34%	47%	54%	39%	58%
Number of transactions	93,332	18,189	75,143	103,848	23,815	80,033

Table A.3: **Characteristics of the Properties Purchased**

Notes: This table displays the characteristics of the properties of the Overseas Companies Ownership Dataset we use to describe the offshore real estate market in the UK (Descriptive sample, properties held by foreign companies in 2018) and to analyze the effect of the CRS on this market (Analysis sample, all transactions over the 2000-2020 period). The first column presents the characteristics of our full sample, while columns "Commercial" and 'Residential" show the characteristics of respectively commercial and residential properties. The row "All transaction prices (GBP)" gives the average price (observed + predicted) in the sample. The row "Observed transaction price (GBP)" presents the observed price, either directly (OCOD data) or indirectly (PPD data). The row "London" displays the share of transactions taking place in the Greater London area. The row "Freehold" shows the percentage of freehold properties in each categories, the rest of the transactions corresponding to Leasehold titles. The row "Share of residential" displays the percentage of residential transactions in the two samples. The last row "Share of indicated price" presents the percentage of transactions for which we recover a purchase price, either through the OCOD or the PPD. The rest of the prices are estimated as described in Appendix section B.

Country	Declaration	Joint Ann.	Country	Declaration	Joint Ann.
Anguilla		x	Latvia	x	x
Argentina	x	x	Liechtenstein		x
Australia	x		Lithuania	x	x
Austria	x		Luxembourg	x	
Belgium	x	x	Malaysia	x	
Bermuda		x	Malta		x
Brazil	x		Mauritius		x
British Virgin Islands		x	Mexico	x	x
Bulgaria		x	Montserrat		x
Canada	x		Netherlands	x	x
Cayman Islands		x	New Zealand	x	
China	x		Norway	x	x
Chile	x		Poland	x	x
Colombia	x	x	Portugal	x	x
Costa Rica	x		Romania		x
Croatia		x	San Marino		x
Cyprus		x	Saudi Arabia	x	
Czech Republic	x	x	Seychelles		x
Denmark	x	x	Singapore	x	
Estonia	x	x	Slovak Republic	x	x
Faroe Islands		x	Slovenia	x	x
Finland	x	x	South Africa	x	x
France	x	x	Spain	x	x
Germany	x	x	Sweden	x	x
Gibraltar		x	Switzerland	x	
Greece	x	x	Turkey	x	
Greenland		x	Turks & Caicos Islands		x
Guernsey		x	United Kingdom	x	x
Hungary	x	x			
Iceland	x	x			
India	x	x			
Indonesia	x				
Ireland	x	x			
Isle of Man		x			
Israel	x				
Italy	x	x			
Japan	x				
Jersey		x			
Korea	x	x			

Table A.4: **List of CRS Early Adopters**

Notes: This table shows the list of countries participating to the Declaration on Automatic Exchange of Information (May 2014) and to the Joint Announcement (March 2014). Note that the United States signed the May 2014 Declaration but do not participate to the Common Reporting Standard, and are therefore excluded from this table. We add The Faroe Islands, Greenland, Korea, Mauritius, San Marino and the Seychelles to the list of countries signing the Joint Announcement as they appear in the Joint Statement by the early adopter group in October 2014.

Paper	(1) Estimates	(2) Wealth decrease (USD billion)	(3) Asset shifting
Casi et al. (2020)	11.5%	534	8%
Menkhoff and Miethe (2019)	31.8%	1463	3%
Beer at al. (2019)	29.6%	1362	3%
O'Reilly et al. (2019)	11%	506	9%

Table A.5: **Estimation of Asset Shifting Responses to the CRS**

Notes: This table compares the effect of the CRS on real estate investments we estimate in our paper to the amount of offshore financial wealth that left tax havens due to the transparency shock as estimated in the literature. Column "Estimates" presents estimates of the reduction in offshore financial wealth caused by the CRS. The estimate for Casi, Spengel and Stage (2020) comes from column 1, table 4 from their paper, for Menkhoff and Miethe (2019), from column 2, table 5 and for Beer, Coelho and Leduc (2019), from column "Model 4", table 3. Column "Wealth decrease" presents a computation of the stock of offshore financial wealth that flew out of tax havens from 2013 because of the CRS. It is computed using estimates of the stock of offshore financial wealth held by CRS early-adopting countries in tax havens measured in Alstadsæter, Johannesen and Zucman (2018), multiplied by the estimated CRS financial effect of column (1). Column "Asset shifting" computes the ratio of our real estate effect for the UK ($45 billion) over the offshore wealth decrease of column (2).

Country	Menkhoff and Miethe (2019)	Hines and Rice (1994))	Consensus list
Andorra	x	x	
Anguilla	x	x	
Antigua and Barbuda	x	x	x
Aruba	x		
Austria	x		
Bahamas	x	x	x
Bahrain	x	x	x
Barbados	x	x	x
Belgium	x		
Belize	x	x	x
Bermuda	x	x	x
British Virgin Islands	x	x	x
Cayman Islands	x	x	x
Chile	x		
Cook Islands	x	x	x
Costa Rica	x		
Cyprus	x	x	x
Dominica	x	x	
Gibraltar	x	x	x
Grenada	x	x	x
Guernsey	x	x	x
Hong Kong SAR China	x	x	x
Ireland	x	x	
Isle of Man	x	x	x
Jersey	x	x	x
Jordan	x	x	
Lebanon	x	x	
Liberia	x	x	x
Liechtenstein	x	x	x
Luxembourg	x	x	x
Macao SAR China	x	x	
Malaysia	x		
Maldives	x	x	
Malta	x	x	
Marshall Islands	x	x	
Mauritius	x		
Monaco	x	x	
Montserrat	x	x	x
Nauru	x		
Netherlands Antilles	x	x	x
Niue	x		
Panama	x	x	x
Samoa	x		
San Marino	x		
Seychelles	x		
Singapore	x	x	x
St. Kitts and Nevis	x	x	x
St. Lucia	x	x	
St. Vincent and Grenadines	x	x	x
Switzerland	x	x	x
Tonga	x		
Trinidad and Tobago	x		
Turks and Caicos Islands	x	x	x
U.S. Virgin Islands	x		
Uruguay	x		
Vanuatu	x	x	x

Table A.6: **Lists of Tax Havens used in the Analysis**

Notes: This table shows the list of tax havens we use in our analysis (column (1) Menkhoff and Miethe (2019)) and compares it to the list used by Hines and Rice (1994), which excludes 18 countries categorized as tax havens by Menkhoff and Miethe (2019). Column (3) shows a "consensus" list of tax havens. This list is compiled by Menkhoff and Miethe (2019) by choosing the 29 countries that all appear in most recent studies on tax evasion (see Menkhoff and Miethe (2019), appendix A.2).

B Data Construction

The primary data source in our paper is the Overseas Companies Ownership Dataset (OCOD). Making use of this dataset requires a heavy data processing work that we detail here.

Obtaining a Dataset at the Transaction Level First, the raw OCOD data is at the stock level, meaning that if a property is bought by a company, for example, *Cyprus Investment Ltd* in April 2013 and sold in September 2019, it will appear as owned by *Cyprus Investment Ltd* in all registers between November 2015 and August 2019. If the property is sold to a UK company or a private individual, it will not appear in the subsequent snapshots. Conversely, if the property is sold to another foreign company, the new entity becomes the designated owner in the OCOD registers from September 2019 onward. While registration is mandatory, there may be a lag between the actual transaction date and its inclusion in the OCOD register because of registration delays. We build a dataset at the transaction level by combining all the stock-level registers.

Parsing Properties Addresses If a single buyer purchases multiple properties, the register may list all the properties in the same entry, resulting in nested properties where the address information refers to a group of properties, such as "113, 115, 117 Morning Lane, London (E9 6LH)". To address this, we use an algorithm developed by Bourne, Ingianni and McKenzie (2022) designed to parse and clean the OCOD dataset. This algorithm transforms the raw data into an enhanced dataset where each observation corresponds to a single property purchased on a specific date. Table B.1 provides an example of the output from this method for highly nested addresses. The table shows how the method enables us to convert a row that corresponds to the purchase of a bundle of properties with multiple nested addresses into multiple rows that each represent a unique address. For instance, in the OCOD data, one of the address entries reads as "flats 1-56, counter house, park street, london (sw6 2fl), flats 1-84, compass house, park street, london (sw6 2fb) and flats 1-143, doulton house, 11 park street, london (sw6 2ft)". Using the algorithm developed by Bourne, Ingianni and McKenzie (2022), this single adress entry can be transformed into a 283 distinct addresses, each corresponding to a flat ID located in either Counter House, Compass House, or Doulton House on Park Street, London. However, some addresses in the OCOD data are incomplete, and remain so after the data parsing. Thus, we only keep properties where the street name and street number are non-missing, or when the street name and building name is non-missing.

Unit id	unit type	building name	street number	street name	postcode	city
1		counter house		park street	SW6 2FL	london
...		counter house		park street	SW6 2FL	london
56		counter house		park street	SW6 2FL	london
1		compass house		park street	SW6 2FB	london
...		compass house		park street	SW6 2FB	london
84		compass house		park street	SW6 2FB	london
1		doulton house	11	park street	SW6 2FT	london
...		doulton house	11	park street	SW6 2FT	london
143		doulton house	11	park street	SW6 2FT	london

Table B.1: **Example of an Enhanced Address Using Bourne et al. (2022) Algorithm**

Notes: This table displays the outcome of the address parsing process developed by Bourne, Ingianni and McKenzie (2022) and adapted for our dataset. The parsing process converts a single, composite address: "flats 1-56, counter house, park street, london (sw6 2fl), flats 1-84, compass house, park street, london (sw6 2fb) and flats 1-143, doulton house, 11 park street, london (sw6 2ft)" into 283 unique addresses.

Importantly, we exclude from our analysis instances where a single proprietor purchases more than 100 properties on the same date, removing about 39,000 transactions from our sample. This is because although it is mandatory for buyers to register their purchases with the Land Registry, there is no formal time limit to do so. Therefore, we suspect that some highly-active buyers register their purchases in bulk, even though they happened on different dates. Excluding these transactions enhances the reliability of our final dataset, but our results are robust to this sample restriction.

Classifying Properties The OCOD register does not contain information on the type of properties owned, such as whether a property is residential, commercial, or a piece of land. We use the same property type classification method as the one developed in Bourne, Ingianni and McKenzie (2022). Their method is described in their appendix, and can be summarized as follows: a property will be classified as "business" if the address contains keywords related to business (such as "sho" or "restaurant"), if the property is matched (on street number, street name and district) to the Valuation Office Agency (VOA) rating list (which is used by local councils to charge business rates),[51] or if there is a business located in the same building. A property is classified as "residential" if its address contains keywords related to domestic properties (such as "flat" or "apartment"), if there are no businesses in the same geographic area (Output Area or Lower Layer Super Output Area), or if there is a match with the Price Paid Data. This classification method

[51] Business rates are a tax charged on most non-domestic properties. This typically includes shops, offices, pubs, warehouses, factories, holiday rental homes or guest houses.

is hierarchical, which means that if two different rules leading to conflicting property types are satisfied by a property, the rule that comes first takes precedence and the property is classified accordingly.

Using this method, the OCOD properties are classified into five categories: land (10%), parking spaces (2%), air spaces (1%), residential (71%) and commercial (15%). 1% of the property types remain unknown. To focus our analysis on the effects of tax transparency on real estate markets, we only keep in our sample residential and commercial properties.

Inferring Missing Prices Approximately 70% of the transactions in the dataset do not include information on the price paid. This can happen for several reasons. First, HM Land Registry only started collecting price data for transactions involving non-private buyers from October 2013.[52] Second, companies often purchase portfolios of properties, and if the price paid for each individual property is not specified in the transaction document,[53] the Land Registry excludes the price information from the register. To recover missing price information, we follow (Johannesen, Miethe and Weishaar, 2022) and make use of another dataset managed by the Land Registry, the Price Paid Data (PPD). We predict the price of the remaining 46% of the purchases using the sample of transactions where the price is available.

Complementing the OCOD Dataset With the PPD Dataset: The PPD provides details on the majority of residential and some non-residential property purchases in the UK since 1995, including price, address, and transaction date. After standardizing address information in both datasets, we match the OCOD to the PPD using the property's address and postcode.

Several attempts to match the Price Paid Data to the Overseas Companies Ownership Dataset have been made before us (see Bourne, Ingianni and McKenzie (2022); Johannesen, Miethe and Weishaar (2022)). Our own attempt is similar to what was done in Johannesen, Miethe and Weishaar (2022). Specifically, we focus on properties for which postcode information is available. We first match on simple addresses (street number, street name, and postcode). Then, we add properties where some information on the unit type (typically "flat") and unit number is available. It is important to note that transactions involving a corporate buyer do not appear in the Price Paid Data before October 2013. Therefore, for all OCOD transactions that occurred before that date, a match is possible only if the same property was traded either before by a private individual or later by any kind of buyer. In this case, the date of the transaction appearing in both datasets will be very different. Contrary to Johannesen, Miethe and Weishaar (2022), we decide to keep these matches[54] and to use the price information from the Price Paid Data, and adjust for within-district house price inflation between the two dates of purchase. We were able to match 49% of the OCOD transactions to a Price Paid

[52] For some transactions happening before that date the price information can be non-missing if the applications were lodged for registration to the Land Registry after 2013.

[53] Form TR5: Transfer of a portfolio of titles (whole or part).

[54] Johannesen, Miethe and Weishaar (2022) exclude matches when the transaction date as registered in OCOD and in PPD is more than four months apart.

Data transaction when restricting the sample to properties classified as residential and where the postcode information was not missing.

Several reasons can explain why the match between the PPD and OCOD is not 100%. First, before Oct. 2013, if the buyer is a firm, the sale does not appear in the Price Paid Data. Thus, if a property is purchased by a company before Oct. 2013, the property appears in the Price Paid Data only if it has been purchased before[55] by a private individual or if there is a new transaction for this property later on. This condition therefore excludes potentially many properties we observe in OCOD from the Price Paid Data.[56] Then, the Price Paid Data gathers information mostly on residential properties, even though some non-residential properties also appear in the data set. Therefore, most commercial properties appearing in the OCOD are likely to have no match in the PPD. Finally, even after 2013, there are a number of exclusions from the price paid data set, including, among others, some cases where a portfolio of properties is transferred.[57]

Prediction of the remaining missing prices: 46% of the OCOD estimation sample has missing price information, either because the information is missing in the OCOD dataset or because the property does not match to any property in the Price Paid Data. We predict missing prices using the sample of transactions where the price is available. Properties situated in the city of London are excluded as we lack any precise price information for this area. Let us denote Z_i a set of properties' characteristics that we observe in our sample. We can express the properties' (log) prices as

$$p_i = \beta Z_i + \epsilon_i \tag{4}$$

Where ϵ_i is the price component not captured by the set of predictors that we assume to be orthogonal to Z_i. Prices are winsorized at the 97% level, which is the level where the root mean square error is minimized. We estimate β from equation (4) using the subsample where the price is indicated, and the missing prices are then predicted using the resulting $\hat{\beta}$ as

$$\hat{p_i} = \hat{\beta} Z_i \tag{5}$$

The prediction model is estimated by OLS, using 5-fold cross-validation. The set of predictors includes the property tenure (leasehold, freehold), a postcode fixed effect,[58] a quarter fixed effect and a dummy variable for residential. Using the Price Paid Data, we also include as predictors for each property the number of sales that occurred in the same

[55] but after 1995, when the Price Paid Data start.

[56] For transactions happening before Oct. 2013 that still match a PPD transaction (because the same property is traded later or before by a private individual), we still use the price information appearing in the Price Paid Data. In this case, the date of transaction recorded in the OCOD and Price Paid Data will be different and so we adjust for within district house price inflation between the two dates of purchase.

[57] "Vesting Deeds Transmissions or Assents of more than one property".

[58] When we observe less than 6 transactions in a given postcode, we use a higher level of aggregation, until at least 6 transactions are observed in the considered area. We start by "output area", then use "middle layer super output area" and finally "district".

postcode area, and the average price.[59] The $\hat{\beta}$ are estimated on a training sample composed of 80% of the transactions, and the quality of the predictions is evaluated with a test sample built with the 20% remaining observations. Table B.2 displays information on our out-of-sample fit (computed with our test sample). The adjusted R^2 is 0.69, the root mean square error (RMSE) is 0.86 and the mean absolute error (MAE) is 0.52.

RMSE	Rsquared	MAE
0.86	0.69	0.52

Table B.2: **Price Prediction - All**

Notes: This table describes the quality of our price inference and gives the value of the root mean squared error (RMSE), the R^2 and the mean absolute error (MAE) obtained when we regress p_i on Z_i (equation 4) using the full OCOD sample.

(a) Price Distributions (b) Predicted vs. Observed Prices

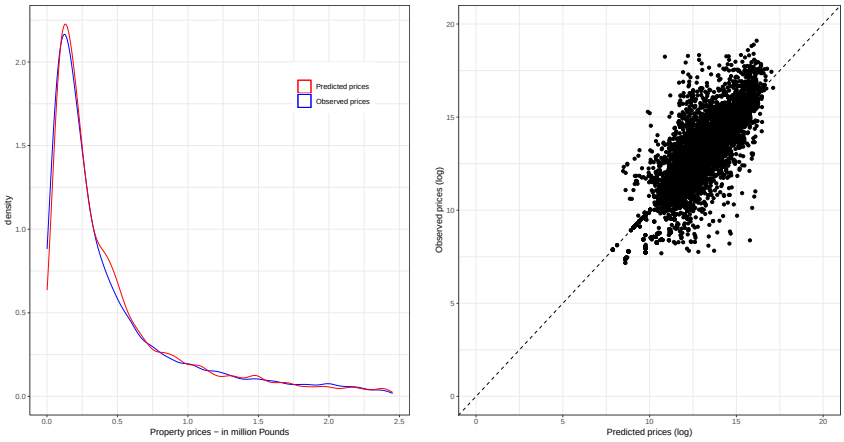


Figure B.1: **Quality of the Predictions of Transaction Prices**

Notes: Panel a) displays the distribution of observed and predicted prices in the test sample. This sample is selected by randomly picking 20% of the transactions for which we have price information. It is not used to estimate equation (4) but only to test the quality of our price prediction. For better visibility, we cut the distribution at the 90th percentile. In panel b), the scatterplot displays the predicted against observed prices (in log) in the test sample, depending on whether we have information on the property size or not. If a point lies on the 45 degrees line, it means that the predicted and observed prices correspond exactly.

In figure B.1b, we plot the predicted against the observed price in log for each transaction from the test sample. The smaller the distance between a point and the 45 degree line, the better the prediction. The figure shows that while some points are well above or below the 45 degree line, there is no evidence of systematic over- or underestimation of the true prices.

[59] In case the postcode x quarter of a given transaction in the OCOD data does not match to any transactions in the Price Paid data, we use information on average price by Ward, which is a greater level of aggregation.

C Offshore Real Estate Wealth

C.1 Estimates of Real Estate Wealth Owned in England and Wealth

Estimates presented in section 4 combine data on foreign ownership of real estate with estimates of the UK national balance sheet in 2018.[60] We compute total real estate wealth in England and Wales as the sum of residential and commercial real estate owned by (domestic + foreign) households and corporations.[61] We proceed in three steps. First, we compute the value of total commercial and residential wealth for the UK as a whole. Residential real estate wealth is simply the sum of the value of "dwellings" and "land underlying dwellings".[62] Commercial real estate is approximated in our paper by the category "other buildings" from the National Accounts.[63] Other buildings consist in fact of all buildings that are not dwellings and include commercial buildings, industrial buildings and buildings used to provide public services.[64] Since we ultimately discard properties owned by the government, the latter category is likely to be marginal in our estimates. However, our definition of commercial real estate will include some industrial properties (such as warehouses) and should therefore be considered as an upper bound for commercial real estate wealth. The ONS provides estimates of land underlying other buildings and structures. We allocate the value of land underlying other buildings proportionally to the value of other buidlings relative to the total of other buildings and structures.[65]

Then, following Johannesen, Miethe and Weishaar (2022), we scale our estimates by the land share of England and Wales (61.7%) in order to obtain estimates of the value of residential and commercial properties owned in England and Wales. Finally, the national accounts statistics provide information on who owns the assets (households, corporations, government), but the estimates for the value of the land owned are aggregated, thus the distinction between the value of the land underlying dwellings and underlying other buildings is not provided. In order to estimate how much is owned by households and (private) corporations only (thus discarding assets owned by the government or non-profit), we allocate the total value (buildings + land) obtained for the whole economy proportionally to the value of dwellings and other buildings owned by households and corporations in the total for all sectors, respectively.

C.2 Matching Between OCOD Dataset and Beneficial Ownership Data

To learn more about the beneficial owners of UK properties, we match the OCOD data (2018 snapshot) to beneficial ownership data, namely we merge the January 2018 OCOD snapshot to the Leaks, the OpenLux and the CNBIOM data presented earlier. We conduct the matching in several steps:

[60] National balance sheet estimates can be found here.
[61] Correspondence with the ONS taught us that UK real estate wealth owned by non-residents are included in the UK national balance sheet.
[62] The ONS provides details on the value of land underlying dwellings and land underlying other buildings and structures here.
[63] System of National Accounts 2008 gives some example of other buildings: they can refer to "warehouses and industrial buildings, commercial buildings, buildings for public entertainment, hotels, restaurants, schools, hospitals, prisons etc.".
[64] Source: here.
[65] Note that by doing so, we are somewhat underestimating land underlying buildings (relative to structures) since buildings are likely located in areas where the land has a higher value.

Source	Number of companies	Number of properties	Number of UBO
CNBIOM	29	66	36
OpenLux	151	288	197
Offshore Leaks	50	87	86
Panama Papers	995	1,905	1,636
Pandora Papers	334	554	466
Paradise Papers	146	424	530
Register	10,188	42,085	56,566
Total	11,893	45,409	59,517

Table C.1: **Number of Companies, Transactions and Ultimate Beneficial Owners Matched to Leaks and OpenLux Data**

Notes: This table shows by data source the number of companies, of transactions and of ultimate beneficial owners in our matched sample, obtained after matching the OCOD dataset to the beneficial ownership registry based on the name of the companies and country of incorporation. We do not identify any beneficial owners using the Bahamas Leaks, hence we do not show it in the data sources.

1. We use standardized companies names to match beneficial ownership data to the OCOD. [66]
2. We keep only companies for which the country of incorporation is the same in both datasets.
3. We keep companies that were active at the time of the purchase.[67]
4. If a matched company appears to be owned by another company instead of a real person, we go one layer further and look for the owners of this second company in the leaks data. We repeat the operation four times in order to identify the "true" UBO of as many matched companies as possible.[68]
5. We drop the "true" UBOs that still appear to be companies.[69]
6. We allocate the shares of the companies identified. If a matched company is owned by n identified owners, we allocate $\frac{1}{n}$ share to each UBO.

C.3 Reallocating owners from tax havens to their most probable country of residence

The country information we have used comes from the beneficial ownership data. It encompasses the Offshore leaks and OpenLux databases, and the Register of Overseas Entities. However, information on country of residence could be erroneous for at least two reasons. First, in the Register of Overseas Entities, the country of residence variable is

[66] For example, we replace all the occurrences of "Ltd" by "Limited", "Corp" by "Corporation" etc.

[67] We have access to the company's status over the years.

[68] In some cases, the owners of a given company do not remain the same throughout the whole period. For cases when a person owns a company through different layers of companies, we impose the restriction that the owner owns each company at least over the period 2013-2015, which is the key period of interest for the CRS.

[69] We exclude UBOs with the following words in their name: "COMPAGNIE", "CORPORATION", "COMPANY", "INCORPORATED", "TRUST", "LTD", "BUSINESS", "LIMITED", "LLC", "FUND", "INTERNATIONAL", "EUROPE", "FONDATION", "FOUNDATION", "INVESTMENT", "CAPITAL", "BANK", "INC", "LP", "ACTION", "ACTIVITY", "HOLDING", "GMBH", "LLP", "PLC", "LTDA", "GROUP", "MANAGEMENT", "SA".

Source	Number of transactions	Amount invested (extsterling billion)	Fraction of total transactions	Fraction of total amount invested
Full dataset	43,915	72.3	100%	100%
Matched	19,417	32.4	44.2%	44.7%
Identified	9,437	17.0	21.5%	23.5%

Table C.2: **Percentage of Companies Identified in the London OCOD Sample**

Notes: This table shows the number of OCOD transactions located in London we manage to link with their ultimate beneficial owners' using the Bahamas Leaks, the Offshore Leaks, the Paradise Papers, the Panama Papers, the Pandora Papers, OpenLux, CNBIOM data and the Register of Overseas Entities. Columns 2 and 3 show the raw number of transactions and their value in the full and matched samples, while columns 4 and 5 show the corresponding percentages the matched transactions represent. The "Matched" row shows these figures for all companies we find in one of these datasets. The "Identified" row shows these figures excluding companies whose beneficial owners are either i) from a tax haven ii) another company.

built using the correspondence address that beneficial owners are providing when the company is registered. They could choose to provide the address of their corporate service provider, or their wealth manager, services that are often provided in tax havens. For the Leaks, owners are linked to countries using all available information. This could lead to owners being wrongly associated to tax havens, if the only information available pertain to their offshore affairs and not to their true country of residence.

To gather the most accurate information on the residence of individuals purchasing real estate through companies in the United Kingdom, we reallocate company owners from tax havens to their most probable country of residence. We proceed in two different ways. For matches with the Register of Overseas Entities, we have access to information on the nationality of the owners, in addition to their correspondence addresses. When the correspondence address is in a tax haven, we then reallocate the owner to their country of citizenship.

Appendix Figure A.3b displays the effects of this reallocation on estimates of real estate wealth by country in the identified sample. As expected, the value of properties attributed to owners from tax havens decreases significantly. Individuals from Hong Kong and from Switzerland in particular, are estimation to own a significantly smaller share of real estate than before. The value of properties allocated to individuals from the United Kingdom, on the other hand, increases significantly. This might be an overestimation, as some United Kingdom nationals residing in tax havens such as Switzerland, or Hong Kong, will wrongly be reassigned.

We then turn to owners identified thanks to the Leaks. One caveat of this data is that we do not have information on the country of citizenship of the owners of shell companies. However, we know the names of the owners. We leverage the fact that names credibly predicts the country of origin of a person. We use *Namsor*, a software able to predict the most probable country of origin given the name of a person.[70] We are able to analyze the names of the 2,915 company owners from the beneficial ownership data that appear to own a UK property in 2018.[71] Appendix Figure A.3c shows the results of this reallocation of owners from tax havens. As per the register leaks, the amount of real estate wealth attributed to tax havens decreases substantially. On the other hand, property wealth of UK owners

[70]The tool is available here: `https://namsor.app/`.

[71]This sample of 2,915 refers to the UBO of all matched companies, except the one from the CNBIOM where we don't observe UBO names.

and of other European countries increases significantly.

C.4 Allocating Offshore Ownership of Real Estate

We identify 21% of the value of properties held by foreign companies in the United Kingdom. In addition, some individuals with a foreign correspondence address holding properties in the UK provide an address in a tax haven. This section describes our method to allocate the value unidentified properties to the most probable country of residence of their owners.

Corporate ownership First, we focus on properties held through foreign companies. To formalize the problem, consider first that the total value of UK real estate wealth ultimately owned from country c through foreign companies is equal to I^c. Define Ω^O as the set of firms appearing in the OCOD dataset and Ω^O_h a subset of Ω^O composed of all firms incorporated in jurisdiction h. Then, let us define as P_i the total value of UK properties owned by company i and as ϕ^c_i the share of owners of company i who are residents from country c. I^c is equal to $\sum_{i\in\Omega^O} \phi^c_i \cdot P_i$. Decomposing I^c, we get:

$$I^c = \sum_{i\in\Omega^O} \phi^c_i \cdot P_i \tag{6}$$

$$= \frac{\sum_{i\in\Omega^O} \phi^c_i \cdot P_i}{\sum_{i\in\Omega^O} P_i} \cdot \sum_{i\in\Omega^O} P_i \tag{7}$$

$$= \rho^c \cdot \sum_{i\in\Omega^O} P_i \tag{8}$$

With ρ^c, equal to $\frac{\sum_{i\in\Omega^O} \phi^c_i \cdot P_i}{\sum_{i\in\Omega^O} P_i}$, being the share of corporately owned UK real estate in the OCOD dataset that ultimately belongs to owners from country c.

After our matching procedure, we observe the value of ρ^c for a subsample of companies Ω^B matched through the beneficial ownership data. These companies are either from the Register of Overseas Entities (Ω^R) or the Leaks data (Ω^L). In order to estimate I^c, we assume that the unmatched properties follow the country-by-country distribution of ultimate ownership observed in the sample identified through the leaks, i.e. through companies Ω^L. In other words, we assume that for the unidentified sample, ρ^c is equal to $\hat{\rho^c}$, with $\hat{\rho^c} = \frac{\sum_{i\in\Omega^L} \phi^c_i \cdot P_i}{\sum_{i\in\Omega^L} P_i}$. This means that, as in the sample of OCOD companies matched to the leaks, 26.7% of the real estate wealth is owned by the United Kingdom, we allocate 26.7% of the unidentified wealth to the United Kingdom. We use the country distribution identified through the leaks data but not from the Register of Overseas Entities because the Register of Overseas Entities is likely to provide a biased picture of the offshore real estate market. As it is a UK policy, we are probably over-estimating the share of UK owners purchasing UK properties through shell companies, because UK residents would be more likely to comply

with their reporting requirements. It probably also under-estimates the amount of properties held by e.g. Russians, as the Register was enforced following the sanctions taken against Russian individuals in February 2022. On the other hand, the Offshore Leaks are an event that can be considered as random from the point of view of the users of shell companies, who could not predict the disclosure of their ownership of these companies. As a result, they probably provide a more accurate picture of the origin of investments through shell companies in the UK. We show in Appendix figure A.4b that allocating ultimate ownership for each incorporation country barely affects our results.[72]

Direct ownership Next, we "correct" the ownership country of UK properties held by individuals when the correspondence address is in a tax haven by predicting the most probable true residence country of the owner. As shown in figure A.2a, an important share of the owners appears to be tax havens residents. However, it is likely that the true investors behind directly owned UK properties are mostly non tax havens residents and that either the "correspondence address" is not the the true address of the owner or individuals appearing as tax havens residents are nominees and not the true beneficial owners of the asset. To allocate direct ownership from tax havens to the most probable "true" residence countries of the owners, we exploit the Register of Overseas Entities data. Indeed, the Register provides information on both the nationality of the owners of overseas companies owning properties in the UK, and their correspondence address. Let us define $\hat{D^c}$ as the value of UK properties directly held by residents from country c. Then, let us define ρ_h^{*c} as the share of all individuals with a correspondence address in jurisdiction h that are citizens from country c as observed in the register data. For example, we observe in the Register data that 24.8% of the individuals with a correspondence address in Hong Kong are Chinese nationals. ρ_h^{*c} is thus equal to 0.248 when country c is China and country h is Hong Kong. [73] Then, defining as Q^c the value of all directly owned properties by residents from country c and TH as the set of tax haven jurisdictions, we estimate D^c for each country c as:

$$\hat{D^c} = Q^c \cdot \mathbb{1}_{\{c \notin TH\}} + \sum_{h \in TH} \rho_h^{*c} \cdot Q^h \tag{9}$$

This means that we reallocate ownership from tax havens to the most likely country of residence of the individuals, but we consider that individuals with a correspondence address in a non-haven are residents from this country.

Combining $\hat{I^c}$ and $\hat{D^c}$, we present in figure 5 our estimates of the geographic distribution of UK real estate ownership, by ultimate owners' country of residence.

Alternative method for corporate ownership We also estimate the geographical distribution of ultimate ownership using the full information available in the leaks data, including both the country of incorporation of the company and

[72] Instead of only considering the country distribution of owners identified through the leaks as in the main specification, we consider the country distribution identified through the leaks for each country of incorporation of a company. This means that as according to matches between the OCOD and the leaks e.g. 16% of owners of companies incorporated in the Bahamas are from the United Kingdom, we allocate 16% of the unidentified sample of Bahamas companies to the United Kingdom. We repeat this exercise for each country of incorporation.

[73] Here, we exploit information contained in the full Register data rather than in the matched sample only.

the country of residence of the owner. Instead of only considering the country distribution of owners identified through the leaks as in the main specification, we consider the country distribution identified through the leaks for each country of incorporation of a company. This means that as according to matches between the OCOD and the leaks e.g. 16% of owners of companies incorporated in the Bahamas are from the United Kingdom, we allocate 16% of the unidentified sample of Bahamas companies to the United Kingdom. We repeat this exercise for each country of incorporation. Results—very similar to those obtained with our baseline method—are provided in Appendix Figure A.4a.

D Taxes and UK Real Estate Ownership

The goal of this section is to better understand how the cost of investing in UK real estate evolved around the introduction of the CRS for different groups of buyers. First, we provide an overview of the main taxes applicable when purchasing or owning properties in the UK. Then, we highlight key tax changes and their implications for households investing in the UK property market through foreign (shell) companies. Finally, we highlight the key tax implications of owning UK properties depending on the location (UK/abroad) and status (individual/company) of the owner. While documenting the trade-offs faced by non-compliant households at the time of the CRS, this section also sheds light on the tax implications of the reallocation response to the CRS for UK tax revenues.

D.1 Main Taxes

Owners of UK properties typically face several key taxes, depending on their residency status, property type, and usage. These taxes include the following:

- **Stamp Duty Land Tax (SDLT):** Paid upon purchase, with progressive rates based on the property price. The top marginal rate was 12% in 2021, with additional surcharges of 3% for second homes and buy-to-let properties and 2% for non-resident buyers. Reliefs are available for first-time buyers.

- **Income Tax or Corporation Tax on Rental Income:** Rental income is subject to UK tax. Individuals pay income tax at progressive rates (20%, 40%, 45%), non-resident companies (until 2020) pay income tax at a flat 20% rate, and domestic companies (and non-resident companies from 2020) pay Corporation Tax.[74]

- **Inheritance Tax (IHT):** UK property held by non-UK residents or UK residents is subject to IHT at 40% for estates exceeding a nil rate band (which has been fixed at £325,000 since 2009/10), even when held through foreign companies (since 2017). Since April 2017 there is also an additional residence nil rate band (with a value of £175,000 since 2020/21) when the main residence of a deceased is inherited by their direct descendants.

- **Council Tax:** An annual local tax for residential properties, calculated based on the property's valuation band and local council rates. The person living in the property is generally responsible for paying Council Tax, whether they are the homeowner or tenant. For vacant or second homes, the owner may be responsible. The equivalent for commercial properties is business rates (although based on an estimation of the properties annual rent, instead of value).

- **Annual Tax on Enveloped Dwellings (ATED):** An annual tax payable by companies owning UK residential property valued above £2M in 2013 (the threshold has been reduced since April 2016 to £500,000), although

[74] From 2011 to 2017, the main Corporation Tax rate decreased from 28% to 19%. In 2023, the main rate was increased to 25%.

relief is available for properties rented out to unconnected person. The tax schedule is designed in 6 bands, with a progressive fixed charge applying per band, ranging from £3,700 (for properties valued below £1M) to £237,400 (for properties valued above £20M) in 2021-2022. ATED-related Capital Gains Tax (CGT) was introduced in 2013, applying a 28% CGT rate on disposals of properties subject to the ATED regime.

- **Capital Gains Tax (CGT):** Applies to gains from the sale of UK property, but gains on main residency of the taxpayer are tax exempt (although the relief is usually not available to non-residents). From 2016/17 to 2023/24 rates were 18% for basic-rate taxpayers and 28% for higher-rate and additional rate taxpayers. From 2024/2025 rate for residential property owned by higher- and additional-rate taxpayers was reduced to 24%. From October 2024 rates on residential and non-residential properties have been equalized to 18% for basic-rate taxpayers and to 24% for higher- and additional-rate taxpayers. Non-residents were taxed only on gains accrued from April 2015 (residential) or April 2019 (commercial). After 2015, non-resident CGT applies instead of ATED-related CGT in many cases.

D.2 Tax Reforms

Since 2012, several major tax reforms have targeted foreign companies holding UK properties, primarily to increase tax transparency and reduce tax avoidance through corporate "wrappers". These reforms significantly impacted investors owning UK properties through foreign companies during the 2012–2017 period:

- **March 2012:** A 15% SDLT rate was introduced for corporate entities (vs. a top rate of 7% for individual buyers) purchasing residential properties valued over £2M. This threshold was lowered to £500,000 in 2014.
- **April 2013:** ATED was introduced, imposing an annual charge on high-value residential properties held by corporate entities. Rates ranged from £15,000 (properties between £2M and £5M) to £140,000 (properties above £20M). The ATED threshold was reduced to £500,000 in April 2016. ATED-related CGT was also introduced, applying a 28% CGT rate on disposals of ATED-subject properties.
- **April 2015:** Non-resident companies became subject to pay corporation tax at a 20% rate on gains on disposals of UK residential property. This marked the first time non-residents were broadly taxed on UK property gains. In April 2019, tax on non-resident's gains was extended to all UK land and properties and indirect disposals, such as selling shares in companies deriving at least 75% of their value from UK property.
- **April 2017:** Non-residents and non-domiciled lost their IHT exemption on residential properties held through offshore companies. IHT now applies to the fraction of a company's value attributable to UK residential property.

To summarize, from the 2014 Joint Announcement to 2017, the tax benefits of holding UK residential properties through foreign companies were reduced by several measures, including: (i) lowering the SDLT threshold for the 15%

rate (2014); (ii) extending to non-residents the taxation of gains from residential property (2015); (iii) lowering the ATED threshold (2016); and (iv) extending IHT to offshore-held properties (2017). However, these reforms primarily targeted residential properties. Commercial properties remained subject to lower SDLT rates, were exempt from ATED and exempt from tax on the gain on their disposal (until 2019), and continued to offer IHT benefits for offshore owners (in part repealed in 2019). Post-2017 reforms have further diminished the tax advantages of offshore UK property ownership, leaving limited benefits today, such as IHT relief for commercial properties held through offshore entities in some specific cases.

D.3 Direct, Indirect, Domestic and Foreign Ownership of Real Estate

The tax implications for owning UK property vary significantly based on the investor's residency status, whether the property is held by an individual or a company, and whether the property was used for residential or commercial purposes. In the following, we highlight the key tax implications of purchasing and owning a UK property:

- for foreign corporate vs. non-resident individual investors,
- for non-resident vs. domestic individuals, and
- for foreign vs. domestic firms.

As many tax reforms altered the relative advantages of ownership schemes and residency statuses, we describe the main differences based on the January 2015 legislation and mention some of the subsequent changes.

Non-resident direct vs. foreign corporate ownership

Holding UK property through a foreign company rather than as a non-resident individual offers several benefits:

- First, purchasing shares in a foreign company holding UK property avoids Stamp Duty Land Tax (SDLT), as share transactions are not subject to SDLT, unlike direct property acquisitions.
- Second, until 2019, selling shares in a foreign company eliminated Capital Gains Tax (CGT) liabilities that apply to direct property sales.[75]
- Third, prior to 2017, holding UK property through a foreign company allowed non-residents (and non-domiciled) to avoid Inheritance Tax (IHT), as only company shares were transferred rather than the property itself. This exemption was removed for residential properties in April 2017, but remained for commercial properties.

[75] From 2019, indirect disposals of interests in "property rich entities" became subject to non-resident CGT if the non-resident investor holds or has held a 25% or greater interest in the company. "Property rich entities" are companies where at least 75% of gross asset value comes from UK property, whether residential or commercial.

- Fourth, rental income from properties held by foreign companies was taxed at a flat 20% income tax rate, often more favorable than the progressive income tax rates faced by individuals (up to 45%).[76]

However, indirect corporate ownership also has drawbacks compared to direct ownership:

- Corporate buyers of residential properties face higher SDLT rates: 15% vs. 12% (top rate) for direct buyers in 2015.[77]
- Since 2013, foreign corporate owners have been subject to the Annual Tax on Enveloped Dwellings (ATED), applying to high-value residential properties. ATED rates depend on property value, ranging from £3,700 (for properties below £1M) to £237,400 (for properties above £20M) in 2021–2022.[78] Importantly, ATED does not apply to commercial properties.

In summary, while the advantages of corporate ownership have declined over time, they remained significant during the study period, particularly for commercial properties.

Foreign vs. domestic individuals

Non-resident individuals benefited from key advantages over UK residents, particularly with respect to CGT. While UK residents paid CGT on all gains, non-residents were exempt until 2015 and were only taxed on gains accrued after 2015. Gains on commercial properties became taxable only from 2019, and only on gains accrued after that date. However, non-residents do not usually qualify for Private Residence Relief (PRR), which exempts gains on primary residences from CGT. Additionally, a 2% SDLT surcharge for non-resident buyers was introduced in 2021, which is however outside of our sample period.

Foreign vs. domestic firms

The key advantage for non-resident over resident firms before 2017 was in Inheritance Tax (IHT): UK residential property held through a foreign company could avoid IHT liabilities for non-residents and non-domiciled individuals, as only the shares of the company were transferred (which were not considered to be UK assets), not the property itself. Conversely, UK property held directly through a UK company triggered IHT on the death of a shareholder. This distinction ended in 2017 for residential properties. From 2021, non-resident firms became subject to a 2% SDLT surcharge on residential properties, which does not apply to UK firms.

Before 2020, rental income taxation further distinguished UK-resident and non-resident firms. Non-resident firms paid Income Tax on rental income at a 20% tax rate, whereas UK firms rather than paid Corporation Tax at a 19% rate.

[76] The owner of the company may also pay taxes on dividends received.

[77] For companies running a property rental business, the 15% SDLT rate did not apply until April 2016, when a 3% surcharge for second homes was introduced.

[78] Properties let to unconnected parties qualify for relief and are exempt from ATED charges.

This affected available deductions and reliefs. From April 2020, non-resident firms were aligned with UK companies under the Corporation Tax regime, providing greater flexibility in claiming deductions and offsetting losses.

D.4 Tax Incentives of Owning UK Offshore Real Estate for UK Owners

One key advantage of using shell companies to invest in UK real estate is the ability for investors to keep their identities hidden.[79] Since investment in UK real estate through offshore entities may result in lower tax liabilities for non-residents compared to UK residents, some UK residents holding offshore property and seeking to evade taxes may have concealed their country of residence to claim similar tax benefits as non-resident investors. This is particularly relevant in the case of UK taxpayers reallocating their offshore portfolios toward UK real estate as a way to circumvent the CRS. Thus, when assessing the tax advantages for UK residents to invest in UK properties through offshore entities rather than directly, we can consider that these advantages are similar to those faced by non-residents although in many cases entailing tax evasion with the corresponding risk of detection.

During our sample period, regardless of whether the owner was a UK resident or not, the trade-off between foreign corporate ownership and direct ownership of UK properties was similar for many taxes (see above). Although the advantages of corporate over direct ownership diminished over time, they remained significant until 2017, particularly for commercial properties. Moreover, UK residents were subject to CGT throughout the period for direct ownership (except for primary residences), while non-residents were exempt until 2015 for residential properties and 2019 for commercial properties (and then still exempt from tax on gains accrued before those dates). This element made the advantages of foreign corporate ownership over direct ownership even more pronounced for UK residents during this period.[80]

[79] This advantage was largely reduced in 2022–2023 with the implementation of the Register of Overseas Entities (ROE). From this date, all foreign entities holding UK properties were required to report the identity of their beneficial owner—even though important loopholes remain.

[80] This is no longer the case, especially following the introduction of the 2% SDLT surcharge for non-resident buyers in 2021.