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Elite Capture of Foreign Aid: Evidence from Offshore Bank Accounts*

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Abstract

Do elites capture foreign aid? This paper documents that aid disbursements to highly aid-dependent countries coincide with sharp increases in bank deposits in offshore financial centers known for bank secrecy and private wealth management, but not in other financial centers. The estimates are not confounded by contemporaneous shocks such as civil conflicts, natural disasters, and financial crises, and are robust to instrumenting using predetermined aid commitments. The implied leakage rate is around 7.5% at the sample mean and tends to increase with the ratio of aid to GDP. The findings are consistent with aid capture in the most aid-dependent countries.

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1 Introduction

The effectiveness of foreign aid remains controversial. A large literature studies how aid is spent (Werker et al., 2009); how it is absorbed in the domestic economy (Temple and van de Sijpe, 2017); and how much it ultimately stimulates growth (Dalgaard et al., 2004), improves human development outcomes (Boone, 1996), and reduces poverty (Collier and Dollar, 2002). In light of the evidence, some scholars assert that aid plays a pivotal role in promoting economic development in the poorest countries (Sachs, 2005) while others are highly skeptical (Easterly, 2006). Many studies emphasize that aid effectiveness depends crucially on the quality of institutions and policies in the receiving countries (Burnside and Dollar, 2000).

A concern often voiced by skeptics is that aid may be captured by economic and political elites. The fact that many of the countries that receive foreign aid have high levels of corruption (Alesina and Weder, 2002) invokes fears that aid flows end up in the pockets of the ruling politicians and their cronies. This would be consistent with economic theories of rent seeking in the presence of aid (Svensson, 2000) and resonate with colorful anecdotal evidence about failed development projects and self-interested elites (Klitgaard, 1990). Yet, there is little systematic evidence on aid capture.

In this paper, we study aid diversion by combining quarterly information on aid disbursements from the World Bank (WB) and foreign deposits from the Bank for International Settlements (BIS). The former dataset covers all disbursements made by the World Bank to finance development projects and provide general budget support in its client countries. The latter dataset covers foreign-owned deposits in all significant financial centers, both havens such as Switzerland, Luxembourg, Cayman Islands and Singapore whose legal framework emphasizes secrecy and asset protection, and non-havens such as Germany, France and Sweden.

Equipped with this dataset, we study whether aid disbursements trigger money flows to foreign bank accounts. In our main sample comprising the 22 most aid-dependent countries in the world (in terms of WB aid), we document that disbursements of aid coincide, in the same quarter, with increases in the value of bank deposits in havens. Specifically, aid disbursements equivalent to 1% of GDP are associated with a statistically significant increase in deposits in havens of 3.4%. By contrast, there is no increase in deposits held in non-havens. While other interpretations are possible, these findings are consistent with elite capture: diversion of aid disbursements, or of other funds freed up by the aid disbursements, to private accounts in havens.[1]

[1] A rich literature in development economics documents that aid is frequently fungible (e.g. Pack and Pack,

One may be concerned that the results are confounded by factors affecting both aid inflows and capital outflows. We address this potential endogeneity in three ways. First, we augment the baseline model with leads and lags of the aid variable. Reassuringly, we find no differential trends in deposits during the quarters prior to aid disbursements. Second, we instrument disbursements using pre-determined aid commitments, which are plausibly exogenous to contemporaneous shocks (Kraay, 2012, 2014). Third, we exclude observations where specific events such as wars, natural disasters and financial crises might cause both inflows of aid and outflows of domestic capital and introduce controls for potential confounders such as oil prices and exchange rates. We also estimate specifications with country-year fixed effects where identification comes exclusively from variation in the timing of disbursements within the year. The main results are robust to all these tests.

While our results document cleanly and robustly that aid disbursements are associated with wealth accumulation on offshore accounts, the macro nature of our deposit information represents an important limitation: since we do not observe *who* stores wealth in havens in periods with large aid disbursements, we cannot directly infer the economic mechanism underlying this correlation. Despite this inherent limitation, it is almost certain that the beneficiaries of the money flowing to havens at the time of aid disbursements belong to economic elites. Recent research using micro-data from data leaks and administrative sources documents that offshore bank accounts are overwhelmingly concentrated at the very top of the wealth distribution (Alstadsæter et al., 2019; Londoño-Vélez and Ávila-Mahecha, 2021). By contrast, the poorest segments in developing countries often do not even have domestic bank accounts (World Bank, 2017) and it is entirely implausible that they should control the money flows to havens.

It is more difficult to identify the precise mechanism by which aid inflows cause capital outflows to havens; however, aid capture by ruling elites is a salient and plausible one. First, it can explain why the trail leads to havens rather than non-havens: if the money derives from corruption and embezzlement, we should not be surprised to see it flowing to jurisdictions with legal institutions emphasizing secrecy.[2] Second, it can explain why we observe a sharp and immediate increase in deposits in the disbursement quarter with no increases in subsequent quarters: to the extent political elites divert aid to foreign accounts, either directly or through kickbacks from private sector cronies, aid inflows and capital outflows should occur almost simultaneously.

1993).

[2]Havens are often associated with the laundering of proceeds from high-level corruption. For instance, a report by the Financial Action Task Force describes 32 cases of grand corruption of which 21 involved bank accounts in havens (FATF, 2011).

Third, it is consistent with the estimated heterogeneity across countries and projects: we find that aid disbursements are associated with larger increases in haven deposits when countries are more corrupt and have less democratic checks and balances and when projects have unsatisfactory outcomes according to the World Bank's ex post evaluation. The heterogeneity is often economically meaningful, but generally not statistically significant.

An alternative mechanism that could potentially explain our results is that local contractors receive payments when aid is disbursed and immediately transfer some of these funds to foreign accounts. While a simple cash management motive fails to explain why money only flows to places like Zurich, the global center for bank secrecy and private wealth management (Zucman, 2017), and not to other international banking centers like New York, London and Frankfurt, other motives such as tax evasion and mitigation of expropriation risks might. However, these explanations are all at odds with our finding that aid causes *smaller* flows to havens when local contractors account for *more* of the procurement relative to foreign contractors whose deposits are excluded from our analysis by construction.[3] They are also inconsistent with our finding that aid disbursements trigger larger flows to havens when perceived expropriation risks are low and with the stylized fact that firms in developing economies have ample scope for tax evasion through simple misreporting without any use of offshore accounts (e.g. Best et al., 2014). Finally, they fail to explain the important finding that aid flows to projects with unsatisfactory ex post outcomes are associated with particularly large flows to havens, which is a key implication of elite capture. Ultimately, we find the local contractor mechanism harder to reconcile with all the patterns in the data.

There are other mechanisms that we can more confidently rule out. First, multinational firms shifting profits to affiliates in low-tax countries cannot explain our results because deposits belonging to foreign affiliates are excluded from our outcome variable by construction.[4] Second, aid may increase income more broadly by stimulating aggregate demand and may therefore indirectly increase evasion of personal income taxes through havens; however, our model accounts for aggregate income dynamics by conditioning on GDP growth and the sharp increase in haven deposits in the disbursement quarter does not mirror the protracted expansionary effect of economic stimulus (Kaplan and Violante, 2014). Third, aid may allow governments to relax capital controls and, thus, induce households to transfer money to foreign accounts, but

[3] If aid to Tanzania finances purchases from a South African firm that channels the proceeds to a Swiss bank account, South Africa's haven deposits, not Tanzania's, increase.

[4] If a Tanzanian firm shifts profits to a Bermuda affiliate, it may increase Bermuda's foreign deposits (to the extent the affiliate's account is in a non-Bermudan bank), but not Tanzania's.

our main result remains when we discard all episodes with changes in capital controls. Finally, we can exclude that portfolio adjustments by commercial or central banks affect the results as our deposit variables only include foreign deposits belonging to non-banks.

The leakage rate implied by our baseline estimates is around 7.5%.[5] The 22 countries in the sample are highly aid-dependent, with annual disbursements from the World Bank exceeding 2% of GDP, but account for a modest share of all disbursements.[6] By varying the sample, we document that the leakage rate exhibits a strong gradient in aid-dependence. On the one hand, lowering the threshold to 1% of GDP (46 countries), the leakage rate is around 4% and we cannot reject the null hypothesis of no leakage. On the other hand, raising the threshold to 3% of GDP (7 countries), we find a substantially higher leakage rate of around 15%. This pattern suggests that the average leakage rate across all aid-receiving countries is much smaller than in the main sample. Moreover, it is consistent with existing findings that the countries receiving the most aid are not only among the least developed but also among the worst governed (Alesina and Weder, 2002) and that very high levels of aid might foster corruption and institutional erosion (Knack, 2000; Djankov et al., 2008).

The estimated leakage rates represent a lower bound in the sense that they only include money diverted to foreign accounts and not money spent on real estate, luxury goods and pet projects (Dreher et al., 2019). More subtly, due to the way the BIS statistics are constructed, the estimates do not include money flowing to foreign accounts held through offshore intermediaries. If a person in Tanzania sets up a shell corporation in Panama as the nominal owner of a bank account in Switzerland, the BIS statistics assign ownership of the Swiss account to Panama, and any aid diverted from Tanzania to the account will not enter our estimates. There is evidence that offshore intermediaries are easily accessible (Sharman, 2010) and play an important role in strategies to hide and launder assets (Zucman, 2017).

To address this limitation of the BIS statistics, we analyse leaked data on offshore corporations published by the International Consortium of Investigative Journalists (e.g. "Panama Papers"). The leaked records derive from corporate service providers and corporate registries in havens such as the British Virgin Islands, Panama and Bahamas. The records include information about the corporations themselves and about individuals controlling the corporations. We study offshore incorporations in the exact same empirical framework that we developed to

[5]Evaluated at the sample mean where haven deposits stand at 2.2% of GDP, the baseline estimate implies that aid disbursements equivalent to 1% of GDP are associated with an increase in haven deposits equivalent to 0.075% of GDP. We find a similar leakage rate, but with large standard errors, when we modify the empirical framework to estimate it in a single step.

[6]Our main sample jointly absorbs around 10% of all World Bank disbursements in the sample period.

study foreign deposits and find qualitatively similar results: Aid disbursements are associated with a sharp increase in the number of offshore corporations controlled by individuals in the receiving country and the increase is larger when countries are more corrupt, when projects have unsatisfactory outcomes, and when local contractors account for a smaller part of the procurement. While this finding is consistent with aid diversion through offshore intermediaries above and beyond the transfers to foreign accounts detected in the main analysis, we are unable to quantify leakage through this channel as we have no information about the assets of offshore corporations.

Finally, as the comprehensive deposit dataset employed in the main analysis is restricted and subject to confidentiality requirements, we also study publicly available series recently released by the BIS. This allows us to investigate deposits in a handful of individual havens. We find that bank accounts in Switzerland and Luxembourg contribute significantly to the correlation between aid disbursements and haven deposits whereas accounts in Belgium and Jersey do not. The public series also allow us to extend the sample period to more recent years where financial transparency has improved significantly. We find similar point estimates before and after the global push for information exchange with offshore financial centers in 2009 (Johannesen and Zucman, 2014) suggesting that the relationship between aid and offshore wealth accumulation is unchanged. While the estimates for shorter subperiods are imprecise, the finding resonates with the widely held concern that enhanced financial transparency has not effectively curbed illicit flows from low-income countries (OECD, 2017).

The paper contributes to the understanding of aid effectiveness by empirically identifying and quantifying a mechanism that may render aid ineffective: elite capture. In doing so, we contribute to literatures on the distributional effects of aid (Bjørnskov, 2010); hidden wealth and its origins (Zucman, 2013); capital flight (Cobham and Janský, 2020) and the broader literature on political corruption (Olken and Pande, 2012). Our results are most closely related to previous work showing that petroleum rents are partly shifted to bank accounts in havens when political institutions are weak, with an implied leakage rate of 15% (Andersen et al., 2017). The lower leakage rate found in the present context suggests that aid, plausibly because of donors' monitoring and control, is not directly comparable to natural resources as a source of sovereign rents (Collier 2006; Djankov et al 2008). This is notably true when also considering less aid-dependent countries where leakage to foreign accounts appears to be limited.

The paper proceeds in the following way. Section 2 describes the data. Section 3 explains the empirical strategy. Section 4 presents the results. A final section concludes.

2 Data

2.1 Cross-border bank deposits

We use data on foreign bank deposits from the Locational Banking Statistics of the Bank for International Settlements (BIS). This quarterly dataset has information on the value of bank deposits in 45 financial centers owned by residents of around 200 countries. The deposit information is at the bilateral level, e.g. the value of deposits in Swiss banks owned by residents of Tanzania, and builds on confidential reports from individual banks on their foreign positions. Deposits are assigned to countries based on immediate ownership rather than beneficial ownership; hence, if a Tanzanian firm has a subsidiary in Bermuda, which holds a Swiss bank account, the account is assigned to Bermuda in the BIS statistics.[7]

The dataset covers the vast majority of the world's cross-border bank deposits: all significant banking centers contribute to the dataset and within each banking center, the coverage is typically nearly 100% (BIS, 2016). This is one of the most reliable sources for information about foreign assets and is therefore frequently used by central banks to construct capital accounts; by macroeconomists to gauge net wealth positions (Lane and Milesi-Ferretti, 2007; Zucman, 2013); and by public finance economists to study offshore tax evasion (Johannesen, 2014; Johannesen and Zucman, 2014; Menkhoff and Miethe, 2019).

While the BIS generally makes deposit information publicly available at the country level (e.g. deposits held by Tanzanians in all foreign banking centers combined and deposits held in Cayman banks by all foreigners combined), it has traditionally restricted access to deposit information at the bilateral level (e.g. deposits held by Tanzanians in Cayman banks) to central bank staff and external researchers working under a confidentiality agreement with the BIS. In the main analysis, we use a dataset with restricted information at the bilateral level up until 2010, which allows us to break down each country's total foreign deposits into deposits in havens and deposits in non-havens. In an auxiliary analysis, we exploit recently released information at the bilateral level for selected banking centers. While the public dataset is less comprehensive than the restricted one, it allows us to extend the sample period beyond 2010 and to show results for individual havens, which is prohibited under the confidentiality agreement governing the restricted data.

Among the 45 financial centers contributing to the Locational Banking Statistics, we classify

[7]To be precise, our analysis concerns cross-border liabilities, a broader concept than cross-border deposits, because data on liabilities is available for a longer time period. In our sample, the two concepts are nearly identical and we refer to both as deposits. For the subperiod where data on both liabilities and deposits is available, 1995-2010, the correlation between them is 0.998.

17 as havens and the remaining 28 as non-havens, as detailed in Table A1.[8] Havens generally have institutional characteristics that make them attractive places to hide and launder funds: bank secrecy rules that ensure strict confidentiality and legal arrangements that facilitate asset protection by enabling investors to nominally transfer asset ownership to a third party while retaining full control (e.g. trusts or fiduciary arrangements).[9] Important havens in our dataset include Switzerland, which accounts for as much as 40% of the wealth management industry (Zucman, 2013; Zucman, 2017), as well as Luxembourg, Cayman Islands, Bahamas, Hong Kong and Singapore.

We define $Haven_{it}$ as deposits owned by country i in the 17 havens in quarter t, and similarly $Nonhaven_{it}$ as deposits in one of the other financial centers. We exploit the sectoral breakdown in the BIS statistics to exclude interbank deposits from these measures.[10] The BIS statistics do not look through chains of ownership to the ultimate owners of deposits and our deposit measure therefore does not include accounts held through offshore intermediaries (Omartian, 2017; Zucman, 2017), which is likely to reduce the estimated leakage rates. We address this limitation by studying offshore incorporations around aid disbursements using data leaks from corporate service providers and corporate registers (see below). The BIS dataset at our disposal spans the period 1977-2010, but we discard observations before 1990 because of a major data break in 1989.[11]

Table 1 presents summary statistics on the deposit measures in Columns (1)-(4). Average haven deposits range from $4 million in Sao Tome and Principe to almost $200 million in Madagascar and generally constitute around one third of all foreign deposits. Annual growth rates in haven deposits average 8% over the sample period, which is higher than the growth rate in non-haven deposits and GDP. The distribution of quarterly growth rates in haven deposits, our main outcome variable, is displayed in Figure A1 in the Online Appendix.

[8] Our classification of financial centers as havens and non-havens follows Andersen et al. (2017): to the set of financial centers blacklisted by the OECD in 2008 for not providing bank information to foreign governments on request, we add Macao (SAR China) and Hong Kong (SAR China) that were also non-compliant with OECD's standards.

[9] In response to strong international pressure, legal institutions in havens have changed considerably in the past decade. Starting around 2009, all havens committed to some measure of information exchange with other countries for tax enforcement purposes (Johannesen and Zucman, 2014).

[10] This also excludes foreign deposits held by central banks, which is important to avoid confounding effects through placement of foreign reserves.

[11] Until 1989, the Locational Banking Statistics did not include fiduciary deposits in Swiss banks, the lion's share of foreign-owned deposits in Switzerland, as they were considered off-balance sheet items by the BIS.

2.2 Foreign aid

We construct a project-level database of aid disbursements from the World Bank through its two principal institutions, the International Development Association (IDA) and the International Bank for Reconstruction and Development (IBRD). From the World Bank Project Database, we obtain information on the approval date, commitment amount, sector and instrument type for each project.[12] We combine this dataset with project-level information on disbursements.[13] We also add ex post project evaluations from the Independent Evaluation Group (IEG) categorizing project outcomes as either "satisfactory" or "unsatisfactory".[14]

We draw on this database to construct our main aid variable, Aid_{it}, which aggregates disbursements from the World Bank across all projects in a given country i in a given quarter t. Analogously, we create variables that aggregate aid disbursements by project characteristics such as instrument type, evaluation outcome and sector. These auxiliary aid variables allow us to test whether the effect of aid disbursements on money flows to havens varies systematically with project characteristics.

We emphasize that our aid measures only include disbursements from the World Bank and thus exclude aid from other sources, such as humanitarian assistance and development aid from individual countries as well as debt relief. We focus on aid from the World Bank because we have information on the precise timing of the disbursements and are able to tie disbursements to project-level information. Both features play a key role in our identification strategy. Data on other sources of aid, including the leading aggregate measure of development aid Official Development Assistance (ODA), is typically only available at the annual frequency and disbursements cannot generally be linked to individual projects.[15]

In our main sample, we include the 22 countries that receive annual disbursements from the World Bank equivalent to at least 2% of GDP on average over the sample period 1990-2010.[16] As shown in Table 1, annual aid disbursements from the World Bank are almost 3% of GDP on

[12]The two instrument types are Development Policy Financing (DPF) that fund government policy programs and Investment Project Financing (IPF) that fund specific investment projects.

[13]We use data from Kersting and Kilby (2016) for the period until 2011 and from the World Bank for the period after 2011. In both cases, the ultimate source is the World Bank Project Database.

[14]The IEG is an independent unit within the World Bank, which is responsible for evaluating the bank's programs and activities. The IEG evaluates the extent to which projects attained their intended development objectives and issues one of the following ratings: "Highly satisfactory", "Satisfactory", "Moderately satisfactory", "Moderately unsatisfactory", "Unsatisfactory" and "Highly unsatisfactory". We refer to the former three as "Satisfactory" and the latter three as "Unsatisfactory". While the ratings are imperfect indicators of project success or failure, they are a widely used metric of project effectiveness (Denizer et al., 2013), both inside and outside the World Bank

[15]Some donors now publish project-level data, but this data typically has a short timespan.

[16]In extensions, we also study a broader set of countries with annual disbursements above 1% of GDP.

average (Column 5) whereas development aid from all sources exceeds 10% of GDP on average (Column 6). Foreign aid thus constitutes a major source of income within this sample. As shown in Figure A2 in the Online Appendix, there is significant variation in the size of aid disbursements from the World Bank across countries and over time.

Aid disbursements are potentially endogenous to contemporaneous economic shocks and, building on Kraay (2012, 2014), we therefore construct an instrument that exploits the time lag between commitments and disbursements of aid.[17] After a World Bank project is approved, disbursements are usually spread out over many quarters at different stages of the project. Actual disbursements may deviate substantially from the originally planned disbursement schedule; for instance, disbursements may be accelerated in response to natural disasters or delayed in the face of civil conflict. However, the amount of aid disbursed in a given quarter is largely the result of project approvals made in previous quarters, which creates variation in disbursements that is arguably exogenous to contemporaneous shocks.

Following Kraay (2012, 2014), we build an instrument by predicting quarterly disbursements for each project based on the initial commitment and the average disbursement schedule across all other projects implemented in the same sector and the same geographical region. Summing over predicted disbursement at the project-level, we predict aggregate disbursements for each country and quarter. We never use predicted disbursements for the commitment quarter as an instrument since it suffers from the same potential endogeneity as the actual disbursements. In the most rigorous tests, we only use predicted disbursements related to projects approved at least 4 quarters before as an instrument to strengthen the case for exogeneity.

2.3 Offshore corporations

We compile a dataset on offshore incorporations from the leaked files published by the International Consortium for Investigative Journalists (ICIJ). The files concern four distinct leaks: *Offshore Leaks*, *Panama Papers*, *Bahamas Leaks* and *Paradise Papers*. They comprise leaked records from four distinct corporate service providers headquartered in the British Virgin Islands, Panama and Bermuda and from the corporate registries in Aruba, Bahamas, Barbados, Nevis, Cook Islands, Malta and Samoa. Although there are some differences across the leaks, the records generally contain basic information about the corporations (e.g. name, date of in-

[17] Existing studies have used other instruments for aid. Werker et al. (2009) use oil price variation to instrument aid provided by OPEC members. Galliani et al. (2017) exploit the crossing of the IDA eligibility threshold to assess the impact of aid on growth. While these are compelling instruments, they have relatively limited temporal variation and are only available for a limited subset of aid dependent countries.

corporation, date of closure) and about the "officers" of the corporations (e.g. shareholders, directors, beneficiaries).[18]

Based on these records, we construct a variable $Corporations_{it}$ that captures the number of active offshore corporations with links to country i in quarter t. By a link between a corporation and a country, we mean that the corporation has an officer in the country. We do not distinguish between different types of officers since there is often no clear distinction between, for instance, shareholders and directors in the context of closely held offshore corporations.[19]. As a corporation can have multiple officers, we allow corporations to have links to multiple countries. When constructing $Corporations_{it}$, we cumulate the number of incorporations as far back as the leaked records go while adjusting for corporations that close.

We emphasize that the dataset on offshore corporations has several limitations. First, since the leaks concern a small subset of the offshore corporate service providers and corporate registers in the world, they convey a partial and not necessarily representative picture of the offshore world. Second, the leaked records have no information about the assets and activities of the offshore corporations and while the journalists behind the leaks have been able to tie some of them to illicit financial flows, there is no presumption that this applies to all. It follows that cross-country differences must be interpreted with caution, as they may reflect that one country's offshore corporations are more represented in the leaks than another's or that one country has more foreign economic activity than another.

Indeed, as shown in Table 1, the number of offshore corporations in the leaks varies significantly across the 22 countries in the sample from 0 for Burundi to 343 for Ghana (Column 7). We provide more descriptive statistics in the Online Appendix: the evolution in the number of offshore corporations aggregated over all countries in the sample (Figure A3) and the distribution of the quarterly growth rate in the number of offshore corporations (Figure A4).

2.4 Other variables

We collect information about events that may be associated with simultaneous changes in aid disbursements and cross-border capital flows: Wars from the PRIO Armed Conflict Dataset; Coups from Powell and Thyne (2011); Natural disasters from the International Disaster Database; Financial crises from Laeven and Valencia (2012); Petroleum rents and financial sector devel-

[18]The data sources differ, for instance, as to what they record (if anything) when corporations cease their operations. We treat inactivations, strike-offs, closures indiscriminately and refer to them all as closures.

[19]In many cases, local employees of the offshore service provider nominally serve as directors and our approach thus creates many links to offshore jurisdictions; however, such appointments do not affect the measurement of links for the aid-dependent countries in our sample.

opment from World Development Indicators (WDI). We also collect information on country characteristics that may mediate the effect of aid disbursements on haven deposits: Control of corruption from Worldwide Governance Indicators (WGI); Disclosure requirements for members of parliament from Djankov et al. (2010); Capital account openness from Chinn and Ito (2006); Political regime characteristics from the Polity IV Project; Nationality of firms awarded aid-sponsored contracts from the World Bank's Major Contract Awards database; and Expropriation risk from the International Country Risk Guide (ICRG). We provide summary statistics for these variables in Table A2 in the Online Appendix.

3 Empirical strategy

To assess whether disbursements of aid are accompanied by money flows to havens, we estimate the following baseline model:

$$\Delta \log(Haven_{it}) = \beta Aid_{it} + \gamma X_{it} + \mu_i + \tau_t + \epsilon_{it} \tag{1}$$

where $\Delta \log(Haven_{it})$ approximates the growth rate in haven deposits owned by country i in quarter t, Aid_{it} measures aid disbursements to country i in quarter t as a share of GDP, X_{it} is a vector of control variables (including GDP growth) and μ_i and τ_t represent country and time fixed effects respectively.[20] Conceptually, the equation thus relates two flows of money: aid inflows from the World Bank on the right-hand side and (net) outflows to foreign bank accounts on the left-hand side.

The main parameter of interest, β, expresses the percentage change in haven deposits associated with an aid disbursement equivalent to one percent of GDP. It is measured relative to the counterfactual change in haven deposits predicted by the other variables in the model: the country's long-run average growth rate in haven deposits (captured by country fixed effects), global shocks to haven deposits (captured by the time fixed effects) and local shocks to income (captured by the control for GDP growth). The presence of country fixed effects implies that β is identified exclusively from within-country variation. We are effectively asking whether haven deposits grow more than the country average in quarters where aid exceeds the country average while absorbing the global trend in cross-border capital flows and the effect of the local business cycle.

[20] In the main specification, deposit and aid variables are winsorized at the 1%/99% level to reduce the impact of extreme values. We obtain similar results using non-winsorized variables as shown in Table 3.

To distinguish between cross-border money flows motivated by secrecy and asset protection and those motivated by other concerns, we also estimate the baseline model using the growth rate in deposits in non-havens, $\Delta \log(Nonhaven)$, as dependent variable. We compare the estimated coefficients on *Aid* in the two regressions and, as a more formal test for differential growth rates in haven and non-haven deposits induced by aid disbursements, additionally estimate the baseline model using the differential growth rate, $\Delta \log(Haven) - \Delta \log(Nonhaven)$, directly as dependent variable. This specification identifies the impact of aid on haven deposits while absorbing any shocks to cross-border flows that are shared between haven and non-haven accounts.

The main threat to identification in the baseline model is the potential endogeneity of aid. There could be macroeconomic shocks, such as financial crises or famine, that simultaneously cause capital flight and a surge in foreign aid, leading to a spurious positive correlation between aid disbursements and foreign deposits. Alternatively, opportunistic behavior by politicians could result in capital flight and induce foreign donors to cut back on aid suggesting that the correlation between aid and haven deposits might be spuriously negative.

We address this potential endogeneity problem in three ways. First, we exploit the high-frequency nature of our data and test for pre-existing differential trends in haven deposits by adding leading values of aid disbursements to the estimating equation. Non-zero coefficients on the leading disbursements are suggestive of endogeneity. Second, we instrument aid disbursements with their predetermined component as described in the previous section (Kraay, 2012, 2014). The exclusion restriction requires the predetermined component of aid flows, resulting from aid commitments in earlier quarters, to be uncorrelated with contemporaneous shocks to haven deposits (conditional on controls). Third, we exclude observations where specific events such as wars, natural disasters and financial crises might confound the inference; introduce controls for potential confounders such as oil prices and exchange rates; and augment the model with country-year fixed effects that restrict the identifying variation to changes in disbursements within the year.

An important feature of our model is the log-transformation of foreign deposits, which captures the statistical assumption that shocks to foreign deposits are (approximately) proportional to the stock of deposits. This assumption has strong economic foundations. First, absent withdrawals and new deposits, compound interest at a uniform rate mechanically makes account balances grow exponentially.[21] Second, many theoretical models will predict that changes in

[21]For instance, if banks apply a uniform deposit rate of 5% in a given period, compounding increases the value of all countries' deposits by 5%. This variation is absorbed by the model's time fixed effects.

deposits in response to changes in the economic environment, e.g. business cycles and policy interventions, are proportional to the stock of deposits.[22]

The main disadvantage of the log-transformation is that the resulting model does not deliver the structural parameter of interest, the leakage rate, directly. It is therefore natural to consider alternative specifications, for instance to use the change in foreign deposits scaled by GDP as the dependent variable. With this modification, the coefficient on the aid variable expresses the leakage rate. However, it does not preserve the model's ability to absorb exponential shocks, which may cause the estimated effect of aid to be biased (to the extent that unabsorbed shocks correlate with aid) or imprecise (to the extent that unabsorbed shocks increase the model's residual variation).[23] Moreover, scaling both sides of the estimating equation with GDP introduces a mechanical correlation.

In light of these considerations, our main approach to estimating the leakage rate is *indirect*. Our estimate of β approximates the net change in haven deposits (relative to the level of haven deposits) associated with an increase in aid (relative to the level of GDP). Hence, we can retrieve the leakage rate for the average country as the product of β and the ratio of haven deposits to GDP evaluated at the sample average. Despite the limitations discussed above, we also report estimates of the leakage rate based on the *direct* approach that delivers the leakage rate in one step.

4 Results

4.1 Main Findings

We present the main results from our baseline model in Table 2. As shown in Column (1), an aid disbursement equivalent to one percent of GDP in a given quarter induces a statistically significant increase in haven deposits of around 3.4%.[24] By contrast, as shown in Column (2), the analogous effect on non-haven deposits is a statistically insignificant decrease of around 1.5%.[25] The final result follows intuitively from the two previous ones: an aid disbursement

[22]Such considerations have led almost three decades' of literature on foreign deposits to estimate models in log-levels (Alworth and Andresen, 1992; Huizinga and Nicodeme, 2004; Johannesen, 2014; Johannesen and Zucman, 2014; Menkhoff and Miethe, 2019) or log-differences (Andersen et al., 2017).

[23]Consider two countries that exhibit a ratio of haven deposits to GDP of 2% and 4% respectively. If banks apply a uniform deposit rate of 5% in a given period, compounding increases the ratio of haven deposits to GDP in the two countries by 0.1 and 0.2 percentage points respectively. This variation is not absorbed by the model's time fixed effects.

[24]Figure A5 in the Online Appendix illustrates this result in a scatterplot of the deposit and aid variables (both residualized).

[25]The effect on non-haven deposits becomes less negative, and in some specifications slightly positive, when aid disbursements are instrumented, as shown below. This may suggest that the negative OLS estimate reflects

equivalent to one percent of GDP is associated with a differential increase in haven deposits, over and above the increase in non-haven deposits, of around 5%, as shown in Column (3).[26]

The results are consistent with aid capture by ruling elites: diversion to secret accounts, either directly or through kickbacks from private sector cronies, can explain the sharp increase in money held in foreign banking centers specializing in concealment and laundering. If the transfers to havens were caused by confounding shocks correlating with aid disbursements, we should expect to see similar transfers to other foreign banking centers; however, there is no evidence of such responses.[27]

It is instructive to compare the effect of aid on foreign deposits to the effect of income from other sources. The point estimates reported in Columns (1)-(3) suggest that GDP growth increases deposits in havens and non-havens in almost exactly the same proportions. In other words, the asymmetry in responses, money flowing to havens but not to non-havens, is specific to aid disbursements and does not generalize to other types of income. This is consistent with the notion that "unearned income", government resources not deriving from domestic taxation, is easier to appropriate for self-interested political elites (Ahmed, 2012).

As a first robustness check of the baseline results, we re-estimate the model while replacing the continuous aid measure with a discrete variable indicating quarters with particularly large aid inflows: disbursements from the World Bank in excess of 2% of GDP. The results are qualitatively similar to those obtained with the continuous aid measure. Haven deposits increase by around 10% in quarters with a large disbursement relative to the counterfactual with no large disbursement (Column 4). By comparison, the effect on non-haven deposits is a statistically insignificant decrease of around 3% (Column 5) while the differential growth rate in haven deposits is around 14% (Column 6).[28]

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the endogeneity of aid.

[26]The sample sizes are slightly different for the three outcomes; however, the estimates remain almost unchanged when we use the exact same sample for each of the three outcomes, as shown in Table A3 in the Online Appendix.

[27]It would be useful to investigate the effect of aid disbursements on a broader range of capital flows; however, data is extremely scarce for the low-income countries in our sample, which highlights the unique coverage and quality of the BIS data. For instance, none of the countries in our sample reports information on foreign portfolio investments to the Coordinated Portfolio Investment Survey and mirror data is generally available from only a handful of counterpart countries. We have constructed a quarterly dataset on greenfield foreign direct investment for a shorter time period based on the *fDi Markets* database. As shown in Table A4 in the Online Appendix, we find no significant effect of aid disbursements on this type of capital outflows, which is consistent with the notion that the net flow to havens around aid disbursements does not reflect a broader outflow of capital.

[28]Table A5 in the Online Appendix shows how the results vary with the threshold defining large disbursements. With a threshold of 1.5%, large disbursements increase haven deposits by 6%; with a threshold of 2.5%, the increase is 15%.

4.2 Endogeneity concerns

Our first approach to addressing the potential endogeneity of aid is to estimate quarterly changes in foreign deposits in a two-year window around aid disbursements. Specifically, starting from the baseline model, we add four leads and four lags of the aid variable. As shown in Figure 1, aid is associated with a sharp increase in haven deposits precisely in the quarter of the disbursement, with a point estimate close to the baseline estimate, while the analogous effects in the four quarters before and after the disbursement are all economically small and statistically indistinguishable from zero. This implies an unusually large net flow to havens in the disbursement quarter, which is not subsequently reversed. As shown in Figure 2, aid is not associated with significant changes in non-haven deposits, neither in the disbursement quarter nor in the four quarters before and after. It follows intuitively from these patterns, and this is shown formally in Figure 3, that there is a sharp increase in haven deposits over and above the increase in non-haven deposits precisely in the disbursement quarter.[29]

These results have several important implications. First, the finding that aid disbursements are not preceded by changes in haven deposits attenuates the concerns about endogeneity. If haven deposits were increasing already before the disbursement quarter, one may have worried that the same factors causing this increase were also causing the increase in the disbursement quarter. The observed pattern supports a causal interpretation of the results. Second, the finding that haven deposits increase precisely in the disbursement quarter and not in the following quarters is consistent with elite capture, but not with all other possible mechanisms. If the correlation between aid and money flows to foreign accounts reflected that aid raises incomes by stimulating aggregate demand, we would have expected a protracted response mirroring the slower dynamics of a typical business cycle.

To further address concerns about endogeneity, we instrument actual aid disbursements with predicted disbursements, as described above. Table 3 first reiterates the results from the baseline OLS specification for ease of comparison (Column 1) and then shows results for the IV specification where the instrument excludes one quarter (Column 2) and three quarters (Column 3) respectively. In both cases, the first stage of the IV is very strong with a Kleibergen-Paap test statistic for weak instruments of almost 100. Moreover, both specifications yield an estimate of the effect of aid on haven deposits that is statistically significant (in the latter specification only at the 10% level) and comparable to the OLS baseline estimate.[30]

[29] We find similar dynamic patterns when we use the dummy measure of large aid disbursements as shown in Figure A6 in the Online Appendix.

[30] We provide more details on the IV estimation in the Online Appendix. Figure A7 illustrates the first stage

We conduct a number of additional robustness tests of the relationship between aid disbursements and haven deposits. First, we exclude country-quarters with wars (Column 4), coups (Column 5), natural disasters (Column 6), financial crises (Column 7) and all of these events (Column 8). Each of these restrictions reduces the sample size considerably, reflecting that the countries in our sample frequently suffer severe shocks; however, the coefficient on aid disbursements does not change much and remains statistically significant in all cases. Second, we augment the model with country-year fixed effects (Column 9). Strikingly, the estimated effect of aid on haven deposits remains almost unchanged when identified exclusively from variation in disbursements within the year although the precision of the estimate decreases. Third, we show that the baseline result is robust to controls for exchange rate movements (Column 10)[31] and resource rents (Column 11)[32] and that it does not depend on the winsorization procedure employed to limit the effect of extreme observations (Column 12).

4.3 Mechanisms

This section studies the mechanisms underlying the effect of aid disbursements on money flows to havens. While the sharp increase in haven deposits around aid disbursements is consistent with capture by corrupt elites, as argued above, there are alternative mechanisms that cannot be ruled out a priori. First, local contractors may transfer funds received under procurement contracts to foreign accounts. Second, aid inflows may induce governments to relax capital controls, which could trigger money flows abroad. Our main empirical approach to studying mechanisms is to analyse how the effect of aid disbursements varies with the characteristics of countries (Table 4) and projects (Table 5). While the estimated differences are often informative and economically meaningful, they are not generally statistically significant.

with a scatter-plot of aid and predicted aid (conditional on controls). Table A6 shows the first-stage results and second-stage results for the growth in non-haven deposits and the differential growth in haven deposits. Table A7 shows how the results vary with the number of quarters excluded when constructing the instrument

[31] Changes in exchange rates can cause changes in our deposit measures because they aggregate different currencies into USD equivalents using contemporaneous exchange rates. We control for exchange rate movements by including a variable that expresses the mechanical change in deposits following from exchange rate changes. We construct this variable as the average percentage change in exchange rates (relative to USD) weighted by country-specific currency shares in deposits. In addition to the mechanical exchange rate effects, theory suggests that aid disbursements may cause an appreciation of the currency of the receiving country, which may in turn induce potentially confounding behavioral responses: households and firms may move funds to accounts in foreign banks (denominated in foreign currencies) in response to a strengthening of the domestic currency. However, the best available evidence does not provide much support for the hypothesis that aid disbursements are associated with large systematic exchange rate movements (Jarotschkin and Kraay, 2013).

[32] Andersen et al. (2017) show that rents from petroleum production are associated with money flows to havens in countries with poor democratic governance. We control for resource rents by including the interaction between the time dummies and an indicator for petroleum producing countries.

Country characteristics

As corruption features prominently among the possible mechanisms underlying our baseline result, we first allow the effect of aid to vary across countries with more and less *control of corruption*. Column (1) in Table 4 shows that a given aid disbursement is associated with smaller increases in haven deposits when countries have more control of corruption. While the baseline results suggested that receiving aid equivalent to 1% of GDP caused an increase in haven deposits of 3.4%, these results suggest that the increase is 2.2% and 4.5% respectively for countries with more and less control over corruption than the median. The difference is suggestive that corruption is an important mechanism through which aid increases wealth in havens.

We split the sample in two other dimensions to further probe the elite capture mechanism. Column (2) shows that the effect varies with *institutional quality*: it is larger in more autocratic countries suggesting that the checks-and-balances embedded in democratic institutions constrain aid capture by ruling elites.[33] Column (3) shows that the effect of aid on haven deposits is larger in the presence of *disclosure rules* for politicians. This may reflect that disclosure rules create stronger incentives for politicians to hide diverted funds in havens rather than keeping them in the domestic financial system where they are disclosed.

The main alternative mechanism comes in at least two versions: local contractors may transfer payments from aid-sponsored projects to foreign accounts for cash management purposes, which is more likely when domestic banks are underdeveloped, or for asset protection purposes, which is more likely when they perceive a risk that governments will seize domestic assets (Earle et al., 2020).[34] We conduct three additional splits to probe these potential mechanisms. Column (4) shows that the effect of aid on haven deposits is larger when the *domestic financial sector* is undeveloped. This is consistent with cash management through foreign accounts although it does not explain why money only flows to havens around disbursements and not to international banking centers with less financial secrecy. Column (5) shows that the effect of aid on haven deposits is larger when the *expropriation risk* is low, which is the opposite of what should be expected if local contractors shifted funds to haven accounts to protect them against government appropriation. Column (6) shows that the effect of aid on haven deposits is larger when *domestic firms* account for a smaller share of aid-sponsored procurement. Again, if the baseline result were driven by domestic firms placing payments received under procurement contracts

[33]This finding resonates with Andersen et al (2017) who find that institutions mediate the transformation of petroleum rents to political rents.

[34]A third version holds that local contractors transfer funds to havens to evade taxes.

on foreign accounts, we should have expected the reverse pattern.

Project characteristics

Next, we exploit the detailed information in the World Bank Project Database to explore differences in the effect of aid disbursements on haven deposits by project characteristics. Column (1) in Table 5 distinguishes between two types of *aid instruments*: Development Policy Financing (DPF) supporting policy programs and Investment Project Financing (IPF) supporting investment projects (World Bank, 2017). While both types of instruments are potentially prone to elite capture, one may have expected that the latter instrument, tied to specific expenditure and disbursed over longer time horizons, is more difficult to divert than the former, subject to fewer constraints and disbursed more quickly. However, the results indicate that aid supporting investment projects produces the largest money flows to havens. Column (2) distinguishes between projects with different *outcomes* in the ex post evaluation. Disbursements to projects with unsatisfactory outcomes are associated with larger increases in haven deposits. The finding is clearly consistent with the elite capture mechanism: when resources are diverted from a development project, it is less likely to meet its objectives. By contrast, it is not straightforward to reconcile the finding with the alternative local contractor mechanism: it is unclear why projects would perform poorly when contractors hold money on foreign accounts. Column (3) distinguishes between four broad aid-receiving sectors. The increase is largest for aid flows to "Sustainable development" (e.g. energy distribution) and "Infrastructure" while there appears to be no effect of aid flows to "Human development" (e.g. social protection). These patterns do not provide clear insights about mechanisms, but they provide some guidance to donors and practitioners about the broad sectors where diversion of aid is the biggest cause of concern.[35]

Capital controls

Finally, we examine the hypothesis that capital controls mediate the effect of aid on money flows to havens and report the results in Table A9. We find some evidence that aid disbursements are associated with a higher probability of changes in capital controls, positive as well as negative changes (Columns 1-3). However, re-estimating the baseline model while excluding episodes with any change in capital controls does not weaken the association between aid disbursements and haven deposits (Column 4). Rather, the estimated coefficient on aid disbursements is

[35] Table A8 illustrates the heterogeneous effect on haven deposits by other project characteristics: the estimated effect is larger for projects with a medium-term disbursement horizon (3-5 years as opposed to shorter and longer horizons and for projects that are small and large in terms overall disbursement amounts (less than $50 million and more than $100 million) whereas there is no clear correlation with cost overrun.

slightly higher than the baseline result (3.9 compared to the baseline of 3.4). This result also holds when we exclude episodes with positive and negative changes in capital controls separately (Column 5-6). Overall, the evidence is not consistent with the effect of aid on haven deposits operating through changes in capital controls.

4.4 Leakage rate

In this section, we provide estimates of the leakage rate: the increase in haven deposits associated with the disbursement of $1 dollar of aid. This is ultimately the main parameter of interest because it summarizes the likely scale of diversion through offshore accounts in an intuitive way. Our main approach is indirect: we back out the leakage rate that is implied by the parameters estimated in the baseline model. However, we also take an alternative approach and estimate the leakage rate directly in a regression framework.

We first compute the leakage rate for the *average country*. The baseline model implies that disbursements corresponding to 1% of GDP are associated with an increase in haven deposits of around 3.4%. At the sample mean, where the stock of deposits in havens is around 2.2% of GDP, this increase in haven deposits corresponds to around 0.075% of GDP. It follows that the implied leakage rate for the average country is around 7.5%.

From the perspective of a multilateral development bank, such as the World Bank, a more relevant metric is leakage out of the *average disbursement*. When weighted by the fraction of aid received over the sample period, the stock of deposits in havens is around 1.4% of GDP. Hence, a 3.4% increase in haven deposits corresponds to around 0.05% of GDP for the average disbursement. The implied leakage rate for the average disbursement is thus around 5%.

We also take an alternative direct approach to estimating leakage rates.[36] We first regress $\Delta Haven$ on Aid, both scaled by GDP, while conditioning on the usual set of controls. The estimated coefficient on Aid is around 0.09 (s.e. 0.06), which expresses the leakage rate. The estimate is close to the leakage rates implied by the main regression results, but not significantly different from zero. We obtain similar point estimates when we re-estimate the model without scaling; when we augment the models with country-year fixed effects; and when we only consider flows to havens in excess of what should be expected given their portfolio share in total foreign deposits.[37] The imprecision of the direct estimates is consistent with the argument that models

[36]The regression results are reported in Table A10.

[37]Rather than using total net flows to haven accounts, $\Delta Haven$, as dependent variable, this regression uses excess net flows defined as $(Haven_{i,t-1}+Nonhaven_{i,t-1})(\phi_{i,t}-\phi_{i,t-1})$ where $\phi_{i,t}$ is the fraction of haven deposits in total foreign deposits in period t.

without the log-transformation absorb less residual variation.[38]

The leakage estimates suggest that elite capture may contribute to the low effectiveness of aid found in some studies, but also that the vast majority of aid is not diverted to foreign bank accounts. The estimated leakage rate can be compared to Andersen et al. (2017) who find that 15% of petroleum rents in countries with poor governance are diverted to bank accounts in havens; a leakage rate that is 2-3 times larger than the one we estimate in the context of aid disbursements. The difference may be due to the fact that foreign aid is generally subject to monitoring and control by the donors whereas there are no external constraints on the use of petroleum rents. This comparison suggests that aid is not equivalent to natural resources as a source of sovereign rents (Collier 2006; Djankov et al 2008).

The computations are a useful way to assess the quantitative importance of aid leakage through elite capture, but also have several limitations. Most importantly, we underestimate the total leakage rate by not including funds invested in real estate, spent on luxury goods, allocated to pet government projects (Dreher et al., 2019), or diverted through offshore intermediaries (to be analyzed below). In principle, we could overestimate the leakage rate to the extent that aid from the World Bank crowds in bilateral aid; however, we find no evidence of such crowding-in in the data.[39]

4.5 Aid dependence

We investigate whether there are systematic differences in the effect of aid disbursements on haven deposits across countries that differ in aid-dependence.[40] While the baseline analysis focused exclusively on the sample of 22 countries with average annual aid disbursements from the World Bank above 2% of GDP, we now re-estimate the baseline model while varying this threshold. The point estimates on aid disbursements, illustrated by the blue bars in Figure 4, suggest a strong positive correlation between aid-dependence and aid diversion. One the one hand, when we lower the threshold to 1% (sample of 46 countries), the point estimate falls to around 1.8%, which is not significantly different from zero. On the other hand, raising the

[38] We make this point more formally by regressing the outcome in each of the three specifications – $\Delta \log(Haven)$ (baseline model), $\Delta Haven/GDP$ and $\Delta Haven$ – on the controls alone: country fixed effects, time fixed effects and the GDP growth rate. The controls are jointly significant in the former case (p-value: 0.00) while they are jointly insignificant in the two latter cases (p-values: 0.13 and 0.23).

[39] As reported in Table A11 in the Online Appendix, we regress non-WB aid on WB aid (including country and time fixed effects) and find a point estimate on WB aid very close to zero (with large standard errors). However, we cannot exclude that this annual-level regression conceals a stronger within-year correlation.

[40] Table A12 in the Online Appendix reports descriptive statistics similar to Table 1 for the 24 countries that are not part of the baseline analysis (because their ratio of annual aid from the World Bank to GDP is below 2%) but enter this analysis (because their ratio of annual aid from the World Bank to GDP is above 1%)

threshold to 3% (sample of 7 countries), the point estimate increases to a highly significant 6%. The implied leakage rates, illustrated by the red line in Figure 4, exhibit an even stronger gradient: from a leakage rate of around 4% with a threshold of 1% to more than 15% with a threshold of 3%.[41]

The steep gradient in leakage rates has several important implications. First, it suggests that our estimate of leakage out of aid disbursements to the main sample of highly aid-dependent countries is a poor estimate of leakage out of aid disbursements more generally. The 22 highly aid-dependent countries in our main sample account for around 10% of the aid disbursed by the World Bank and the results in Figure 4 suggest that leakage rates are much lower (if not zero) for less aid-dependent countries. Second, it constitutes novel evidence that aid capture may be more prevalent in underdeveloped and poorly governed countries, which are also most in need of development assistance (Alesina and Weder, 2002). While this association may simply reflect that the combination of poor development and bad governance stimulates foreign aid, it is also consistent with the view that very high levels of aid may foster corruption and institutional erosion (Knack, 2000; Djankov et al., 2008).

4.6 Offshore intermediaries

A key limitation of the data on haven deposits is that they do not capture accounts held through offshore intermediaries. To address this limitation, we conduct a complementary analysis of offshore incorporations using leaked data from offshore corporate service providers and offshore corporate registers. The analysis covers the period 1986-2015.

The results from the baseline model indicate that aid disbursements are associated with a statistically significant increase in offshore incorporations. Specifically, as shown in Column (1) in Table 6, aid disbursements equivalent to one percent of GDP in a given quarter induce an increase in the number of offshore corporations in the same quarter of 1.1%.

The result is consistent with diversion of aid through offshore intermediaries. If corrupt elites set up corporations in jurisdictions such as Panama, Bermuda and the British Virgin Islands to accommodate funds diverted from aid projects, it can explain the increase in offshore corporations associated with aid disbursements. The offshore corporations may simply serve as holding companies that nominally own financial accounts and conceal the identity of the beneficial owner. Moreover, they may serve as fronts for the purposes of receiving kickbacks from private sector cronies.

[41] Not only does the point estimate on aid increase as we raise the threshold, the ratio of haven deposits to GDP also increases, which implies a higher leakage rate for a given point estimate.

We employ our usual battery of robustness tests to address the potential endogeneity of aid disbursements. First, we augment the baseline model with four leads and four lags of the aid variable and plot the results in Figure 5. There is a clear spike in the disbursement quarter and the magnitude is consistent with the estimate in the baseline model. While there is some volatility in the pre-disbursement quarters, there is no clear trend that would be indicative of endogeneity. Second, the estimated coefficient on aid is almost unchanged and remains statistically significant in a specification with country-year fixed effects where the effect of aid is identified solely from the timing of disbursements within the year (Column 2, Table 6). Third, the estimate drops only slightly when we exclude all the country-years with major events that could create a spurious correlation between aid and capital flight: wars, coups, natural disasters and financial crisis (Column 3). Fourth, we obtain a larger estimate of 2.2 when we instrument aid disbursements, but standard errors widen considerably and we cannot reject a zero coefficient (Column 4).

Finally, we study heterogeneity in key dimensions of country and project characteristics. The results show that the effect of aid disbursements on offshore incorporations is larger in countries with low control of corruption (Column 5); with a less developed financial sector (Column 6) and with a low share of local contractors in procurement (Column 7). In all three cases, the difference is at least borderline statistically significant (p-values reported at the bottom of the table). Moreover, aid disbursements to projects with an unsatisfactory outcome have a larger effect on offshore incorporations (Column 8) while there is no meaningful difference across aid instruments (Column 9).[42] Overall, the heterogeneous effects by country and project characteristics are very similar to what we found for haven deposits and, for the same reasons, suggest that elite capture is a more plausible mechanism than local contractors.

4.7 Publicly available deposit data

Up to this point, we have conducted the analysis with a restricted dataset from the BIS that allows us to break down each country's total foreign deposits, which is public information, into deposits in havens and deposits in non-havens, which is not publicly available. To enhance transparency and to facilitate work by other researchers, we show that results similar to our main results can be obtained with a publicly available dataset from the BIS. This recently released data includes quarterly data on cross-border deposits at the bilateral level for a selected group of banking centers, as detailed in Table A1 in the Online Appendix.

[42] We report the full set of heterogeneity results in Table A13 in the Online Appendix

We summarize the coverage of the publicly available information in Table A14 in the Online Appendix. In our main sample of 22 highly aid-dependent countries (Column 1), the average of total foreign deposits taken across all quarters in the sample period 1990-2010 stands at $196 million. With the public dataset, around 30% of these deposits can be assigned to seven havens (Switzerland, Liechtenstein, Luxembourg, Belgium, Jersey, Guernsey and the Isle of Man) and around 55% can be assigned to 11 non-havens. Among the havens, for which bilateral deposit information is publicly available, Switzerland is by far the most important. Less than 15% of the total foreign deposits cannot be assigned to individual banking centers. Hence, even if all these unallocated deposits are held in havens like Cayman Islands, Singapore and the Bahamas where public data is not available at the bilateral level, the public series still allocate two thirds of all haven deposits to individual havens for this particular sample.[43]

We first re-estimate the baseline model with the (incomplete) measures of haven deposits based on publicly available information while using the same sample period as in the baseline analysis, 1990-2010. As shown in Column (1) of Table 7, aid disbursements equivalent to one percent of GDP in a given quarter induce a statistically significant increase in haven deposits of around 2.5%. This is similar to the baseline estimates based on restricted deposit information (Columns 1, Table 2), but somewhat smaller. A possible interpretation is that the havens not allowing for public release of bilateral deposit data are also the havens where deposit responses to aid disbursements are largest. Extending the sample period to include the most recent observations in the data yields almost identical results, as shown in Column (2).

Next, we show results by individual banking centers; an exercise we are not allowed to conduct with the restricted dataset due to confidentiality requirements.[44] As shown in Columns (3)-(6), the overall increase in haven deposits around aid disbursements is driven by accounts in Switzerland (combined with Lichtenstein) and Luxembourg while the responses in Belgium and Jersey (combined with Guernsey and Isle of Man) exhibit statistically insignificant changes. This is consistent with the notion that the increase in haven deposits around aid disbursements reflect diversion to secret private accounts. Throughout the period 1990-2010, Switzerland was a leading haven with some of the strictest bank secrecy rules in the world and a share of the global market for private wealth management of around 40% (Zucman, 2013; Zucman, 2017). There is evidence that as much as 90-95% of the wealth managed in Switzerland is hidden from

[43]For the rest of the world (Column 2), the coverage of the publicly available deposit information is lower with around 35% that cannot be allocated to individual banking centers.

[44]A limitation of this analysis is that the total deposits owned by small and relatively poor countries in small and relatively unimportant banking centers are not rarely zero, which translates into missing observations with our log-transformation of the dependent variable.

the authorities in the owners' home country (Alstadsæter et al., 2019).

Finally, we exploit the public dataset to examine whether the correlation between aid and haven deposits has diminished in the most recent years. Since around 2009, all havens have enhanced financial transparency in response to pressure by international organizations like the OECD (Johannesen and Zucman, 2014) and individual countries like the United States (Johannesen et al., 2020). In the same period, a number of data leaks by whistleblowers in the wealth management industry, e.g. the *Panama Papers*, have increased the risk of exposure for public figures with undeclared money on foreign accounts (Johannesen and Stolper, 2017). However, as shown in Column (7), there are only very weak signs that aid disbursements are associated with smaller increases in haven deposits in the period with more financial transparency: the interaction between aid disbursements and an indicator for the post-2009 period is only slightly negative and clearly insignificant. In principle, it may be possible to conduct more high-powered tests of the effects of financial transparency on aid diversion, exploiting country-level or even bilateral variation in information exchange, but we leave such analysis for future research.

5 Concluding remarks

We document that aid disbursements to the most aid-dependent countries coincide with significant increases in deposits held in offshore financial centers known for bank secrecy and private wealth management and provide comprehensive evidence supporting a causal interpretation. Aid capture by ruling politicians, bureaucrats and their cronies is most consistent with the totality of the observed patterns: it can explain why aid does not trigger flows to non-havens, why the capital outflows occur precisely in the same quarter as the aid inflows, why the effects are larger for countries with more corruption and weaker institutional checks and balances and why the effects are larger for projects that ultimately have unsatisfactory outcomes. Other explanations are possible but we find them harder to reconcile with all the patterns in the data. We cannot exclude that domestic contractors receive payments in quarters with aid disbursements and deposit the funds with foreign banks; however, this mechanism cannot explain why money only flows to havens and it seems inconsistent with the finding that the estimated effects are larger when domestic firms account for a smaller share of the procurement contracts. It seems even less likely that the results reflect profit shifting by multinational firms, the effect of aid on income through aggregate demand, the effect of relaxed capital controls, and portfolio adjustments by commercial and central banks. Our estimates suggest a leakage rate of around 7.5% for the average highly aid-dependent country.

References

Ahmed, F.Z., 2012. "The perils of unearned foreign income: Aid, remittances, and government survival." *American Political Science Review* 106(1), p. 146-165.

Alesina, Alberto and Beatrice Weder. 2002. "Do Corrupt Governments Receive Less Foreign Aid?" *American Economic Review* 92(4), p. 1126 – 1137.

Alstadsæter, Annette, Niels Johannesen, and Gabriel Zucman. 2017. "Tax Evasion and Inequality." *American Economic Review* 109(6), p. 2073-2103.

Alworth, Julian and Andresen, S., 1992. "The determinants of cross-border non-bank deposits and the competitiveness of financial market centers. " *Money Affairs* July-December, p. 105-133.

Andersen, Jørgen J., Niels Johannesen, David D. Lassen, and Elena Paltseva. 2017. "Petro Rents, Political Institutions, and Hidden Wealth: Evidence from Offshore Bank Accounts." *Journal of the European Economic Association* 15(4), p. 818 – 860.

Best, M.C., Brockmeyer, A., Kleven, H.J., Spinnewijn, J. and Waseem, M., 2015. "Production versus revenue efficiency with limited tax capacity: theory and evidence from Pakistan." *Journal of Political Economy* 123(6), p.1311-1355.

Boone, Peter. 1996. "Politics and the Effectiveness of Foreign Aid." *European Economic Review* 40, p. 289 – 329.

Burnside, Craig and David Dollar. 2000. "Aid, Policies, and Growth." *American Economic Review* 90(4), p. 847 – 868.

Bjørnskov, Christian. 2010. "Do elites benefit from democracy and foreign aid in developing countries?" *Journal of Development Economics* 92(2), p. 115-124

Denizer, C., Kaufmann, D. and Kraay, A., 2013. "Good countries or good projects? Macro and micro correlates of World Bank project performance." *Journal of Development Economics* 105, p. 288-302.

Chinn, Menzie D. and Hiro Ito (2006). "What Matters for Financial Development? Capital Controls, Institutions, and Interactions." *Journal of Development Economics* Volume 81, p. 163-192.

Cobham, A. and Janský, P., 2020. "Estimating Illicit Financial Flows: A Critical Guide to the Data, Methodologies, and Findings." Oxford University Press.

Collier, Paul and David Dollar. 2002. "Aid Allocation and Poverty Reduction." *European Economic Review* 46, p. 1475 – 1500.

Collier, P., 2006. "Is aid oil? An analysis of whether Africa can absorb more aid." *World development* 34(9), p. 1482-1497.

Dalgaard, Carl-Johan, Henrik Hansen and Finn Tarp, 2004. "On The Empirics of Foreign Aid and Growth." *Economic Journal* 114, p. 191-216.

Djankov, S., Montalvo, J.G. and Reynal-Querol, M., 2008. "The curse of aid." *Journal of economic growth* 13(3), p. 169-194.

Djankov, Simeon, Rafael La Porta, Florencio Lopez-de-Silanes and Andrei Shleifer, 2010. "Disclosure by Politicians." *American Economic Journal: Applied Economics* 2(2), p. 179-209.

Dreher, A., Fuchs, A., Hodler, R., Parks, B.C., Raschky, P.A. and Tierney, M.J., 2019. African leaders and the geography of China's foreign assistance." *Journal of Development Economics* 140, p. 44-71.

Easterly, William. 2006. "The Big Push Déjà Vu: A Review of Jeffrey Sachs's The End of Poverty: Economic Possibilities for Our Time." *Journal of Economic Literature* XLIV, p. 96 – 105.

Earle, J.S., Gehlbach, S., Shirikov, A. and Shpak, S., 2020. "The Oligarch Vanishes: Defensive Ownership, Property Rights, and Political Connections." Working Paper. Available at `https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3683924`.

FATF. 2011. "Laundering the Proceeds of Corruption." Financial Action Task Force, OECD, Paris.

Galiani, Sebastian, Stephen Knack, Lixin Colin Xu, and Ben Zou. 2017. "The Effect of Aid on Growth." *Journal of Economic Growth* 22(1), p. 1 – 33.

Huizinga, Harry and Gaetan Nicodeme, 2004. "Are international deposits tax-driven." *Journal of Public Economics* 88, p. 1093-1118.

Jarotschkin, A. and Kraay, A., 2013. "Aid, disbursement delays, and the real exchange rate." Working Paper. Available at `https://doi.org/10.1596/1813-9450-6501`.

Johannesen, Niels. 2014. "Tax Evasion and Swiss Bank Deposits." *Journal of Public Economics* 111, p. 46-62.

Johannesen, Niels and Gabrial Zucman. 2014. "The End of Bank Secrecy? An Evaluation of the G20 Tax Haven Crackdown." *American Economic Journal: Economic Policy* 6(1), p. 65 – 91.

Johannesen, N. and Stolper, T., 2017. "The deterrence effect of whistleblowing–an event study of leaked customer information from banks in tax havens." Working Paper

Johannesen, N., Langetieg, P., Reck, D., Risch, M. and Slemrod, J., 2020. "Taxing hidden wealth: the consequences of US enforcement initiatives on evasive foreign accounts." *American Economic Journal: Economic Policy* 12(3), p. 312-46.

Kersting, Erasmus K. and Christopher Kilby. 2016. "With a Little Help from My Friends: Global Electioneering and World Bank Lending." *Journal of Development Economics* 121, p. 153 – 165.

Klitgaard, Robert. 1990. "Tropical Gangsters". New York: Basic Books.

Knack, S., 2000. "Aid dependence and the quality of governance: a cross-country empirical analysis." The World Bank.

Kraay, Aart. 2012. "How Large is the Government Spending Multiplier?" *Quarterly Journal of Economics* 127(2), p. 829 – 887.

Kraay, Aart. 2014. "Government Spending Multipliers in Developing Countries: Evidence from Lending by Official Creditors." *American Economic Journal: Macroeconomics* 6(4), p. 170 – 208.

Laeven, Luc and Fabián Valencia. 2012. "Systemic Banking Crises Database: An Update." IMF Working Paper WP/12/163, International Monetary Fund.

Lane, Philip R. and Gian Maria Milesi-Ferretti. 2007. "The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970–2004." *Journal of International Economics* 73, p. 223 – 250.

Londoño-Vélez, Juliana and Javier Ávila-Mahecha. 2021. "Enforcing Wealth Taxes in the Developing World: Quasi-Experimental Evidence from Colombia. " *American Economic Review: Insights*, forthcoming.

Menkhoff, Lukas and Jakob Miethe, 2019. "Tax evasion in new disguise? Examining tax havens' international bank deposits." *Journal of Public Economics* 176, p.53-78.

OECD, 2017. "The Yaoundé Declaration." 17 November 2017. Available at `https://www.oecd.org/tax/transparency/what-we-do/technical-assistance/the-yaounde-declaration.htm`.

Olken, Benjamin A. and Rohini Pande. 2012. "Corruption in Developing Countries." *Annual Review of Economics* (4), p. 479 – 509.

Omartian, James D.. 2017. "Do Banks Aid and Abet Asset Concealment: Evidence from the Panama Papers.". Working Paper.

Pack, H. and Pack, J.R., 1993. "Foreign aid and the question of fungibility." *Review of Economics and Statistics*, p. 258-265.

Powell, Jonathan M. and Clayton L. Thyne. 2011. "Global Instances of Coups from 1950 to 2010: A New Dataset". *Journal of Peace Research* 48(2), p. 249 – 259.

Sachs, Jeffrey. 2005. "The End of Poverty: Economic Possibilities for Our Time". New York: Penguin Press.

Sharman, J.C., 2010. "Shopping for anonymous shell companies: An audit study of anonymity and crime in the international financial system." *Journal of Economic Perspectives* 24(4), p. 127-40.

Svensson, Jakob. 2000. "Foreign Aid and Rent-Seeking." *Journal of International Economics* 51, p. 437 – 461.

Temple, Jonathan and Nicolas Van de Sijpe. 2017. "Foreign Aid and Domestic Absorption." *Journal of International Economics* 108, p. 431 – 443.

Werker, Erik, Faizal Z. Ahmed, and Charles Cohen. 2009. "How Is Foreign Aid Spent? Evidence From a Natural Experiment." *American Economic Journal: Macroeconomics* 1(2), p. 225 – 244.

Zucman, Gabriel. 2013. "The Missing Wealth of Nations. " *Quarterly Journal of Economics* 128(3), p. 1321 – 1364.

Zucman, Gabriel. 2017. "The Hidden Wealth of Nations. "University of Chicago Press, Second edition.

Table 1: Descriptive statistics. The table shows the 22 countries in our main sample and presents summary statistics for the main variables in our analysis. The sample includes all countries for which annual disbursements from the World Bank are equivalent to at least 2% of annual GDP on average. Columns (1) and (3) show foreign deposits held in the countries classified as havens and non-havens respectively. Columns (2) and (4) show the annual growth rates in deposits held in countries classified as havens and non-havens respectively. Columns (5) and (6) show annual aid disbursements from the World Bank and annual Official Development Assistance from all sources respectively as a fraction of annual GDP. Column (7) shows the number of offshore corporations in the leaked data in 2015. Column (8) shows the annual growth rates in the number of offshore corporations in the leaked data. Column (9) shows annual growth rates in GDP. All growth rates are approximated with the change in log-levels.

	(1) Haven deposits ($million)	(2) Haven deposits (growth rate)	(3) Non-haven deposits ($million)	(4) Non-haven deposits (growth rate)	(5) World Bank aid (%GDP)	(6) ODA aid (%GDP)	(7) Offshore Corporations (in 2015)	(8) Offshore Corporations (growth rate)	(9) GDP (growth rate)
Afghanistan	35	13.1%	73	-0.9%	2.5%	33.4%	6	1.6%	16.8%
Armenia	38	27.5%	18	22.1%	2.3%	4.3%	186	16.2%	11.1%
Burkina Faso	33	6.0%	89	7.7%	2.3%	8.2%	13	13.2%	5.9%
Burundi	104	1.9%	19	6.8%	3.8%	11.8%	1	0.0%	2.7%
Eritrea	9	9.2%	11	15.9%	3.2%	12.9%	0		8.6%
Ethiopia	65	6.4%	157	1.1%	2.2%	6.1%	7	33.3%	4.7%
Ghana	77	8.5%	452	4.1%	2.7%	5.3%	343	7.2%	8.5%
Guinea-Bissau	8	12.6%	16	7.1%	3.2%	18.6%	0	0.0%	6.6%
Guyana	33	14.4%	104	3.5%	2.5%	6.5%	14	5.8%	8.5%
Kyrgyz Republic	11	16.4%	12	10.1%	2.1%	4.9%	48	16.3%	4.8%
Madagascar	195	1.3%	235	7.0%	2.7%	6.6%	62	13.0%	6.0%
Malawi	32	15.9%	83	2.7%	3.9%	10.6%	48	11.4%	7.0%
Mali	28	3.1%	134	6.3%	2.1%	7.9%	20	10.6%	7.6%
Mauritania	32	8.6%	152	10.7%	2.1%	6.9%	103	13.1%	7.0%
Mozambique	41	12.8%	162	7.4%	3.3%	19.0%	47	13.0%	7.2%
Niger	30	-1.0%	80	7.3%	2.0%	8.5%	29	33.4%	4.6%
Rwanda	151	0.2%	42	-3.9%	2.7%	13.7%	2	-1.3%	4.1%
Sao Tome and Prin	4	-4.5%	8	15.8%	2.3%	18.4%	0		10.8%
Sierra Leone	33	-1.5%	83	-0.4%	3.2%	10.3%	19	8.7%	4.8%
Tanzania	147	9.8%	442	4.1%	2.4%	8.9%	114	13.5%	9.4%
Uganda	74	9.4%	190	2.6%	3.3%	7.6%	25	11.1%	6.3%
Zambia	118	10.7%	309	2.1%	2.9%	10.3%	53	19.1%	7.5%
Sample mean	**62**	**8.1%**	**138**	**5.9%**	**2.7%**	**10.2%**	**52**	**11.9%**	**6.9%**

Table 2: Main results. The table shows our main results. The sample comprises 22 countries with average annual disbursements from the World Bank exceeding 2% of GDP. The sample period is 1990-2010 and the frequency is quarterly. In columns (1) and (4), the dependent variable is the percentage change in haven deposits; in columns (2) and (5) it is the percentage change in non-haven deposits; in columns (3) and (6) it is the difference between the percentage change in haven and non-haven deposits. The explanatory variables are: *Aid disbursement* is quarterly disbursements from the World Bank as a fraction of annual GDP. *High aid disbursement* is an indicator for quarterly disbursements from the World Bank exceeding 2% of annual GDP. *GDP)* is the quarterly percentage change in GDP (measured as one quarter of the annual percentage change). *Country FE* is a vector of country fixed effects. *Time FE* is a vector of time fixed effects. All percentage changes are approximated with the change in log-levels. The deposit and aid variables are winsorized at the 1st and 99th percentile. Standard errors clustered at the country-level are presented in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

	(1)	(2)	(3)	(4)	(5)	(6)
	Continuous aid indicator			**Binary aid indicator**		
	Haven	Non-haven	Difference	Haven	Non-haven	Difference
Aid disbursement (%GDP)	3.391***	-1.511	4.973***			
	(1.154)	(1.035)	(1.715)			
High aid disbursement (Aid >2% GDP)				0.101***	-0.028	0.138***
				(0.032)	(0.029)	(0.043)
GDP (% growth)	0.122	0.147**	-0.001	0.107	0.155**	-0.024
	(0.141)	(0.063)	(0.150)	(0.142)	(0.064)	(0.150)
Observations	1,648	1,652	1,645	1,648	1,652	1,645
R-squared	0.101	0.092	0.076	0.101	0.091	0.076
Country FE	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES

Table 3: Robustness. The table shows results from regressions with varying samples and specifications. Across all regressions, the dependent variable is the quarterly percentage change in haven deposits; the explanatory variable of interest is quarterly disbursements from the World Bank as a fraction of annual GDP; and the sample period is 1990-2010. All regressions control for the quarterly percentage change in GDP (not reported) and include country and time fixed effects. Column (1) shows the baseline regression (equivalent to Table 2, Column 1); Columns (2) and (3) present the results of IV regressions where aid is instrumented with predicted aid based on project-level aid commitments and the average sector-region-specific temporal disbursement patterns. The predicted aid measure excludes the approval quarter (Column 2) as well as the first and second quarter after the approval quarter (Column 3). Columns (4)-(7) exclude country-quarters with wars, coups, natural disasters and financial crises respectively. Column (8) excludes country-quarters with any of these events. Column (9) includes country-year fixed effects; Column (10) includes a variable that expresses the mechanical increase in haven deposits following from exchange rate movements (not reported); Column (11) adds the interaction between time fixed effects and an indicator for being an oil producing country; Column (12) shows results using as dependent variable the non-winsorized percentage change in haven deposits. Percentage changes are approximated with the difference in log-levels. Unless stated otherwise, the deposit and aid variables are winsorized at the 1st and 99th percentile. Standard errors clustered at the country-level are in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Instrument aid		**Omit periods with other events**					**Other specifications**			
	Baseline result	1 quarter excluded	3 quarters excluded	No war	No coup	No disaster	No financial crisis	None of these events	Country-year fixed effects	Exchange rate controls	Oil production controls	No winsorization
Aid disbursement (%GDP)	3.391***	3.153**	4.177*	2.754**	3.420***	3.601***	3.559***	2.930*	3.290*	3.310***	3.424**	3.591**
	(1.146)	(1.534)	(2.340)	(1.296)	(1.197)	(1.237)	(1.190)	(1.547)	(1.895)	(1.126)	(1.296)	(1.500)
Observations	1,648	1,648	1,648	1,386	1,535	1,586	1,511	1,151	1,648	1,648	1,648	1,648
R-squared	0.101	0.011	0.011	0.107	0.102	0.104	0.102	0.123	0.242	0.103	0.144	0.100
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Table 4: Heterogeneity by country characteristics. The table shows how the results vary by country characteristics. The dependent variable is the quarterly percentage change in haven deposits. In each column we interact quarterly aid disbursements from the World Bank, expressed as a share of GDP, with indicators for being above and below the sample median in some dimension of heterogeneity. Column 1 splits countries by *control of corruption* based on Worldwide Governance Indicators. Column 2 splits countries on *democratic instutions* based on the variable polity2 from the Polity IV Project. Column 3 splits countries by the presence of *disclosure requirements* based on Djankov et al. (2010). Column 4 splits countries by *domestic credit* from the financial sector relative to GDP based on the World Development Indicators. Column 5 splits countries by *expropriation risk* based on the International Country Risk Guide (ICRG). Column 6 splits countries by the fraction of procurement contracts allocated to *domestic firms* based on the World Bank's Major Contract Awards database. Depending on data coverage, we split the sample by time-varying measures (Columns 2,4) or time-invariant measure (Columns 1,3,5,6). At the bottom of the table we show the p-value for a test that the two estimated coefficients are identical. All regressions control for the quarterly percentage change in GDP (not reported) and include country and time fixed effects. Percentage changes are approximated with the difference in log-levels. The deposit and aid variables are winsorized at the 1st and 99th percentile. Standard errors clustered at the country-level are in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

	(1) Control of corruption	(2) Democratic institutions	(3) Disclosure rules	(4) Domestic Credit	(5) Expropriation risk	(6) Local procurement
Aid × (Control of corruption=low)	4.448**					
	(1.748)					
Aid × (Control of corruption=high)	2.163*					
	(1.051)					
Aid × (Institutional quality=low)		3.381**				
		(1.494)				
Aid × (Institutional quality=high)		1.854				
		(1.822)				
Aid × (Disclosure required=0)			2.757**			
			(1.061)			
Aid × (Disclosure required=1)			4.435*			
			(2.360)			
Aid × (Domestic credit=low)				3.657*		
				(2.079)		
Aid × (Domestic credit=high)				2.144*		
				(1.149)		
Aid × (Expropriation risk=low)					5.059***	
					(1.432)	
Aid × (Expropriation risk=high)					1.489	
					(1.415)	
Aid × (Local procurement=low)						4.094**
						(1.530)
Aid × (Local procurement=high)						2.637*
						(1.521)
Observations	1,648	1,648	1,648	1,225	1,582	1,435
R-squared	0.101	0.101	0.101	0.157	0.113	0.096
P-value (same coefficients)	.247	.497	.48	.047	0.554	.513
Country FE	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES

Table 5: Heterogeneity by project characteristics. The table shows how the results vary by project characteristics. Across all regressions, the dependent variable is the quarterly percentage change in haven deposits and the sample period is 1990-2010. All regressions control for the quarterly percentage change in GDP (not reported) and include country and time fixed effects. The explanatory variables of interest is quarterly aid disbursements, with specific characteristics, from the World Bank as a fraction of annual GDP. Column (1) distinguishes *aid instruments*: Investment Project Financing (IPF) and Development Policy Financing (DPF). Column (2) distinguishes projects by *outcomes*: "Satisfactory" includes scores between highly and moderately satisfactory whereas "Unsatisfactory" includes scores between highly and moderately unsatisfactory. Column (3) distinguishes *industries*: "Sustainable Development" includes agriculture and water; "Infrastructure" includes energy, transport, information and communication; "Human development" includes education, health and social protection; "Equitable Growth, Finance and Institutions" includes financial and private sector development and governance. Percentage changes are approximated with the difference in log-levels. The deposit and aid variables are winsorized at the 1st and 99th percentile. Standard errors clustered at the country-level are in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

	(1) Instrument	(2) Outcome	(3) Industry
Aid × (Aid instrument=IPF)	5.122***		
	(1.708)		
Aid × (Aid instrument=DPF)	2.697*		
	(1.348)		
Aid × (Project outcome=Unsatisfactory)		5.374***	
		(1.645)	
Aid × (Project outcome=Satisfactory)		2.707	
		(1.605)	
Aid × (Industry=Sustainable development)			12.336**
			(5.442)
Aid × (Industry=Infrastructure)			6.333**
			(2.588)
Aid × (Industry=Equitable finance and institutions)			3.288**
			(1.572)
Aid × (Industry=Human development)			-2.268
			(3.588)
Observations	1,648	1,648	1,648
R-squared	0.100	0.100	0.103
P-value (same coefficients)	.279	.251	.048
Country FE	YES	YES	YES
Time FE	YES	YES	YES

Table 6: Offshore shell corporations. The table shows our results for offshore shell corporations. In all specifications, the dependent variable is the percentage change in the number of offshore corporations with links to the country. The sample of countries is the same as in the main analysis and the frequency is quarterly, but the sample period is 1986-2015. All regressions control for the quarterly percentage change in GDP (not reported) and include country and time fixed effects. The robustness tests include country-year fixed effects (Column 2), excludes country-years with coups, wars, natural disasters and financial crisis (Column 3) and instruments aid disbursements with predicted disbursements (Column 4). The heterogeneity analysis interacts aid disbursements with indicators for control of corruption (Column 5), share of local contractors in procurement (Column 6) and domestic credit (Column 7) and distinguishes between aid disbursements to projects by the rating of the outcome (Column 8) and by the instrument (Column 9). Percentage changes are approximated with the difference in log-levels. The deposit and aid variables are winsorized at the 1st and 99th percentile. Standard errors clustered at the country-level are in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Baseline	**Robustness**			**Country heterogeneity**			**Project heterogeneity**	
		Country-year fixed effects	No events	Instrument aid	Control over corruption	Domestic Credit	Local Procurement	Project outcome	Aid instrument
Aid disbursement (%GDP)	1.086**	1.125*	0.996*	2.190					
	(0.480)	(0.590)	(0.513)	(2.364)					
Aid × (Control of corruption=low)					1.949**				
					(0.806)				
Aid × (Control of corruption=high)					0.341				
					(0.373)				
Aid × (Domestic credit=low)						2.091***			
						(0.682)			
Aid × (Domestic credit=high)						-0.357			
						(0.581)			
Aid × (Local procurement=low)							1.907**		
							(0.724)		
Aid × (Local procurement=high)							0.502		
							(0.472)		
Aid × (Outcome=unsatisfactory)								2.299*	
								(1.287)	
Aid × (Outcome=satisfactory)								0.748	
								(0.460)	
Aid × (Aid instrument=IPF)									1.259
									(1.146)
Aid × (Aid instrument=DPF)									1.268**
									(0.592)
Observations	1,542	1,542	1,220	1,542	1,542	1,326	1,542	1,542	1,542
R-squared	0.114	0.337	0.143	0.027	0.115	0.127	0.115	0.115	0.115
P-value (same coefficients)	-	-	-	-	.074	.014	.09	.274	.994
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

Table 7: Public data. The table shows results obtained with publicly available deposit data. The dependent variable is the quarterly percentage change in deposits in all havens with publicly available data (Columns 1,2 and 7) and in individual banking centers with publicly available data (Columns 3-6). The sample periods are 1990-2010 (Column 1) and 1990-2018 (Columns 2-7). Across all the regressions, the explanatory variable of interest is quarterly disbursements from the World Bank as a fraction of annual GDP. All regressions control for the quarterly percentage change in GDP (not reported) and include country and time fixed effects. Percentage changes are approximated with the difference in log-levels. The deposit and aid variables are winsorized at the 1st and 99th percentile (*** p<0.01, ** p<0.05, * p<0.1).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Validation	**Longer period**	**Individual havens**				**Subperiods**
	(1990-2010)	(1990-2018)	Switzerland	Luxembourg	Belgium	Jersey etc	
Aid disbursement (%GDP)	2.437*	2.382*	2.872*	2.717**	-1.035	-2.068	2.414*
	(1.322)	(1.329)	(1.563)	(1.197)	(0.726)	(2.026)	(1.370)
Aid × (year: 2010-2018)							-0.195
							(1.848)
Observations	1,647	2,345	2,334	1,796	2,075	1,304	2,345
R-squared	0.114	0.102	0.081	0.087	0.083	0.081	0.102
Country FE	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES

Figure 1: Haven deposits - dynamic results. The figure shows the results from the baseline specification (equivalent to Table 2, Column 1) augmented with four leads and four lags of the disbursement variable. The dependent variable is the percentage change in haven deposits and the explanatory variable of interest is quarterly disbursements from the World Bank as a fraction of annual GDP. The regression controls for the quarterly percentage change in GDP and include country and time fixed effects. Percentage changes are approximated with the difference in log-levels. The deposit and aid variables are winsorized at the 1st and 99th percentile. The dark blue dots indicate the point estimates on the aid disbursement variables and the light blue lines indicate 95%-level confidence intervals (clustering at the country-level).

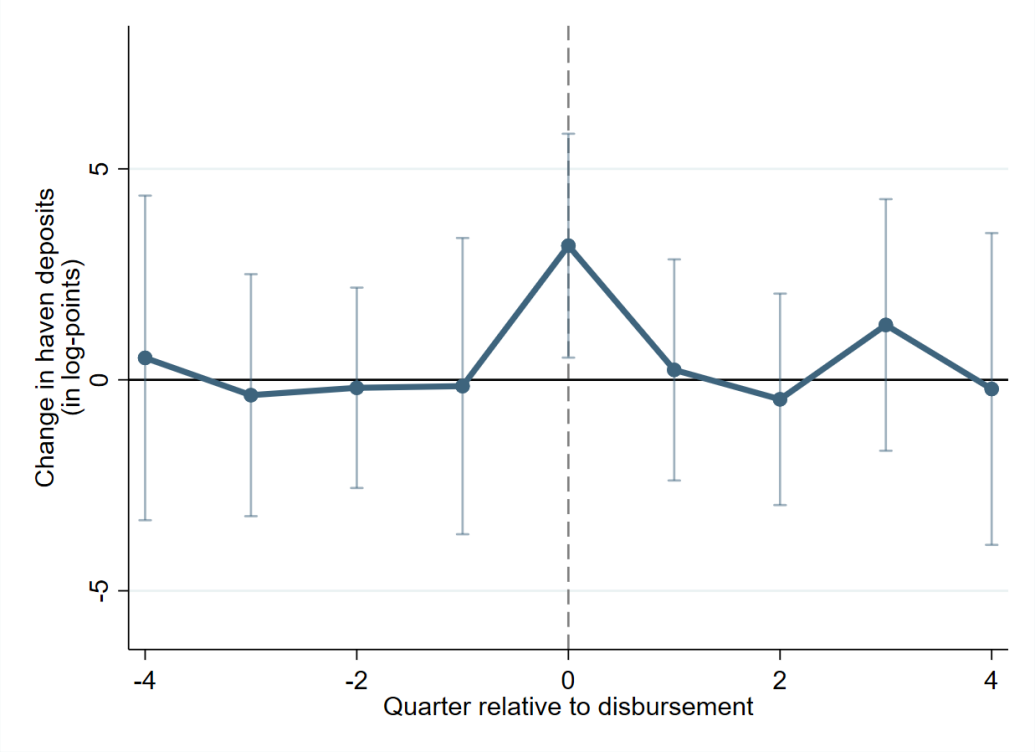


Figure 2: Non-haven deposits - dynamic results. The figure shows the results from the baseline specification (equivalent to Table 2, Column 2) augmented with four leads and four lags of the disbursement variable. The dependent variable is the percentage change in non-haven deposits and the explanatory variable of interest is quarterly disbursements from the World Bank as a fraction of annual GDP. The regression controls for the quarterly percentage change in GDP and include country and time fixed effects. Percentage changes are approximated with the difference in log-levels. The deposit and aid variables are winsorized at the 1st and 99th percentile. The dark blue dots indicate the point estimates on the aid disbursement variables and the light blue lines indicate 95%-level confidence intervals (clustering at the country-level).

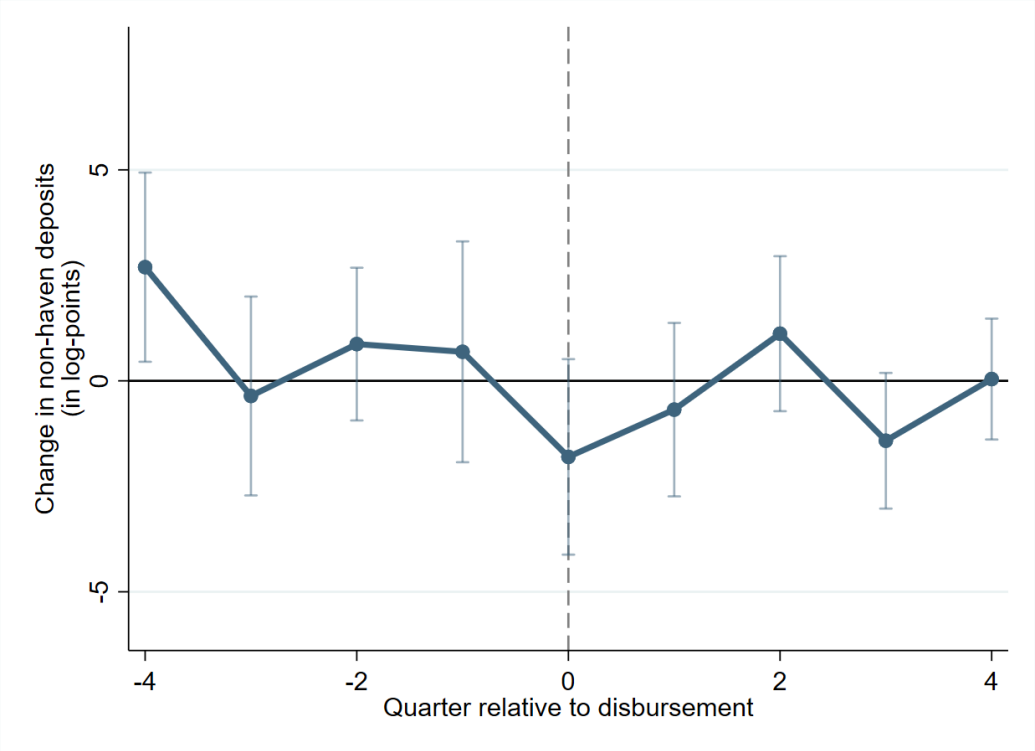


Figure 3: Haven vs non-haven difference - dynamic results. The figure shows the results from the baseline specification (equivalent to Table 2, Column 3) augmented with four leads and four lags of the disbursement variable. The dependent variable is the percentage change in haven deposits over and above the percentage change in non-haven deposits and the explanatory variable of interest is quarterly disbursements from the World Bank as a fraction of annual GDP. The regression controls for the quarterly percentage change in GDP and include country and time fixed effects. Percentage changes are approximated with the difference in log-levels. The deposit and aid variables are winsorized at the 1st and 99th percentile. The dark blue dots indicate the point estimates on the aid disbursement variables and the light blue lines indicate 95%-level confidence intervals (clustering at the country-level).

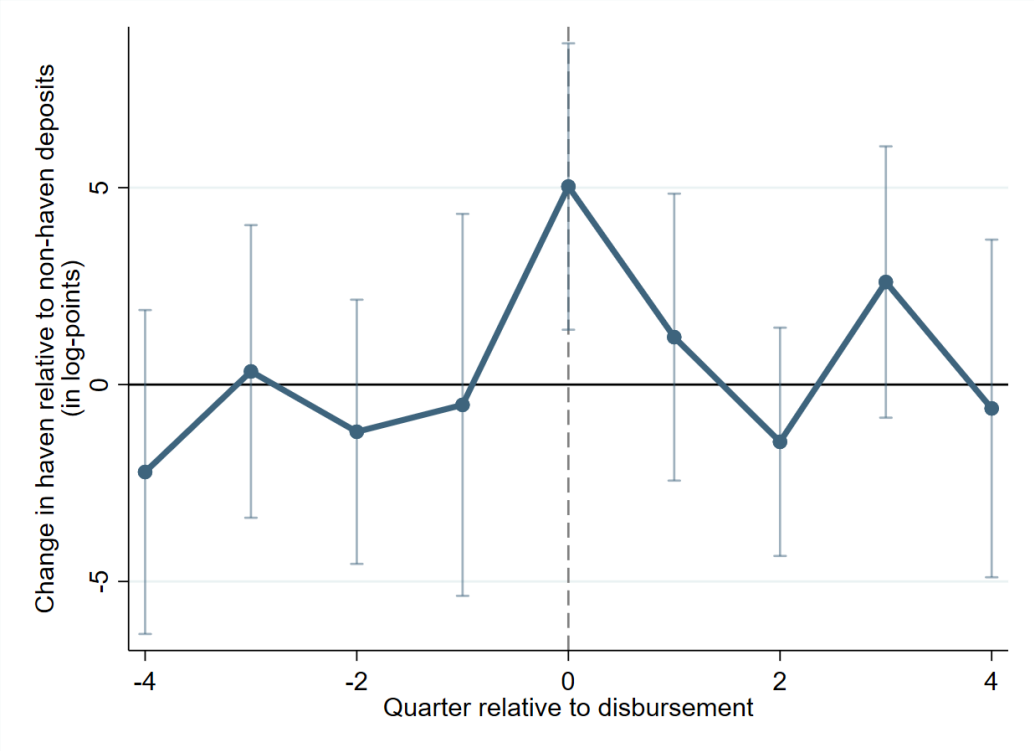


Figure 4: Heterogeneity by aid dependence. The figure shows how our main results vary with aid dependence proxied by the ratio of average annual aid over GDP as we increase the threshhold for inclusion in the sample from from 1% of GDP, to 1.25% of GDP, to 1.50% of GDP and so on. The blue bars show the coefficient estimate on the aid variables with 95%-level confidence intervals shown as vertical lines (clustering at the country-level). The red line shows the implied leakage rate for each of the coefficient estimates, calculated by multiplying the coefficient estimate on aid with the average ratio of haven deposits to GDP over the sample period. The regressions controls for the quarterly percentage change in GDP and include country and time fixed effects. Percentage changes are approximated with the difference in log-levels. The deposit and aid variables are winsorized at the 1st and 99th percentile.

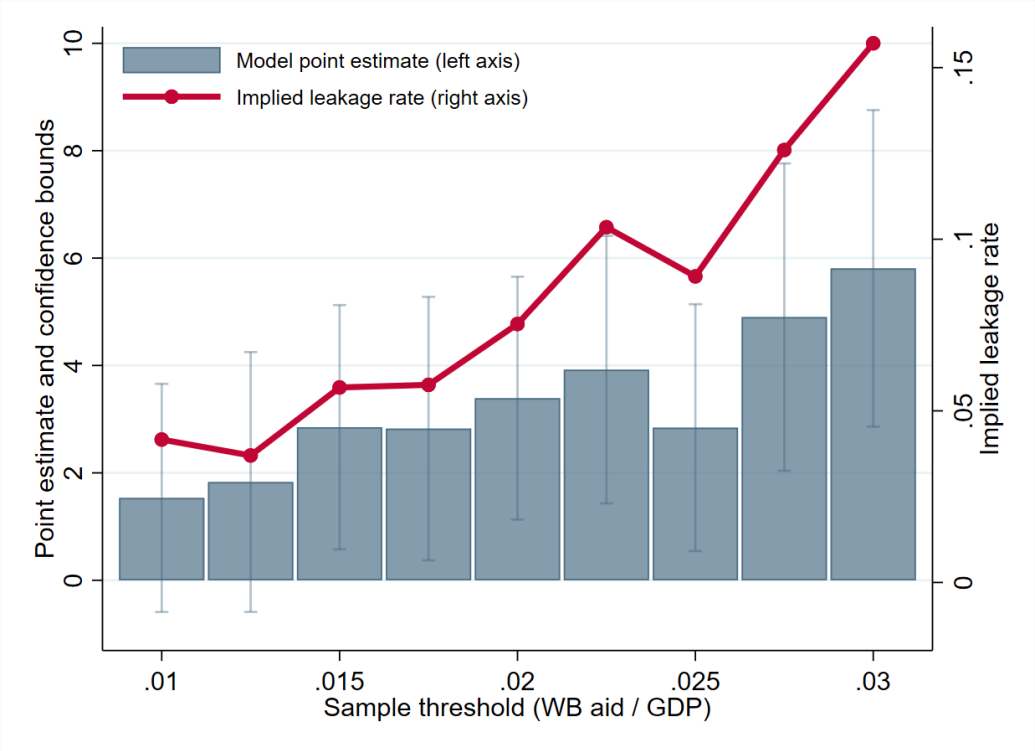
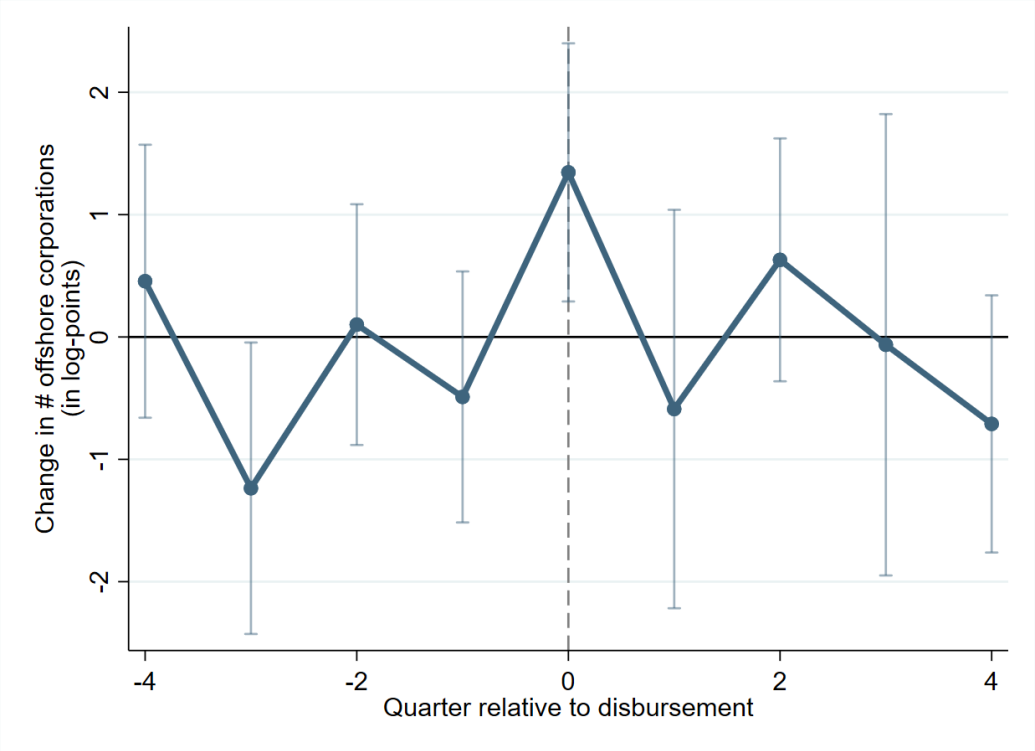


Figure 5: Offshore shell corporations - dynamic results. The figure shows the results from the baseline specification (equivalent to Table 6, Column 1) augmented with four leads and four lags of the disbursement variable. The dependent variable is the percentage change in the number of offshore corporations and the explanatory variable of interest is quarterly disbursements from the World Bank as a fraction of annual GDP. The regression controls for the quarterly percentage change in GDP and include country and time fixed effects. Percentage changes are approximated with the difference in log-levels. The corporation and aid variables are winsorized at the 1st and 99th percentile. The dark blue dots indicate the point estimates on the aid disbursement variables and the light blue lines indicate 95%-level confidence intervals (clustering at the country-level).



ONLINE APPENDIX

Table A1: International banking centers. The table lists the banking centers reporting to the BIS Locational Banking Statistics by our classification of havens (left panel) and non-havens (right panel) and shows total liabilities vis-a-vis foreign non-banks (our measure of deposits) in 2010 (averaged over 4 quarterly observations) as well as the first quarter for which bilateral data is publicly available. Banks in Liechtenstein report together with banks in Switzerland. Source: Bank for International Settlements, Locational Banking Statistics.

Havens			Non-havens		
	Foreign-owned deposits ($millions)	First quarter with public data		Foreign-owned deposits ($millions)	First quarter with public data
Cayman Islands	872,806	-	United Kingdom	1,524,828	1977q4
Switzerland	455,553	1977q4	United States	878,825	1978q4
Belgium	295,765	1977q4	Germany	319,358	-
Singapore	224,886	-	Japan	279,772	1977q4
Hong Kong	178,285	2014q4	Netherlands	277,691	1977q4
Bahamas	145,693	-	Ireland	157,042	1977q4
Luxembourg	142,579	1977q4	France	137,018	1977q4
Jersey	89,602	2001q4	Spain	129,310	2014q1
Bahrain	62,906	-	India	69,431	-
Austria	61,471	2007q3	Canada	61,982	2007q3
Guernsey	57,404	2001q4	Italy	60,046	2014q4
Isle Of Man	42,717	2001q4	Taiwan	52,780	2000q4
Panama	15,969	-	Australia	45,709	1997q4
Macao	9,280	2013q4	Denmark	40,972	1977q4
Netherlands Antilles	8,018	-	Sweden	32,094	1977q4
Bermuda	1,873	-	Greece	31,988	2003q4
			Cyprus	29,147	-
			Portugal	29,094	-
			Finland	20,908	1983q4
			Norway	18,962	-
			Malaysia	12,255	-
			Chile	6,731	2002q4
			South Africa	5,404	2009q3
			South Korea	4,749	2005q1
			Indonesia	3,477	-
			Brazil	1,927	2002q4
			Turkey	1,889	-
			Mexico	859	2003q4

Table A2: Country characteristics. The table shows descriptive statistics for country-level variables that enter our analysis. *War* indicates whether at least one war between the government of a state and at least one other party has resulted in least 1000 battle-related deaths within a calendar year (source: PRIO Armed Conflict Dataset). *Coup* indicates whether at least one coup attempt (either failed or successful) has taken place in a given quarter (source: Powell and Thyne, 2011). *Disaster* indicates whether a natural disaster with total damages exceeding 1% of GDP has taken place within the calendar year (source: EM-DAT). *Financial crisis* indicates whether one of the following types of financial crises have taken place within the calendar year: systemic banking crisis, currency crisis, sovereign debt crisis and sovereign debt restructuring (source: Laeven and Valencia, 2012). *Oil producer* indicates whether the country is producing oil in the sense that oil rents are positive in any year in the sample period (source: World Development Indicators). *Control of corruption* comes from the Worldwide Governance Indicators. *Disclosure rules* is a binary indicator as to whether members of parliament are required to disclose their assets (from Djankov et al., 2010). *Capital controls* measure de jure capital account openness (Chin and Ito, 2006). *Domestic credit* is measured as domestic credit over GDP from the World Development Indicators. *Democratic institutions* is a measure of democracy taken from the Polity IV project. *Local procurement* is the share of domestic firm in total disbursements based on data from World Bank's Major Contract Awards database.

	War	Coup	Disaster	Financial Crisis	Oil producer	Control of corruption	Disclosure rules	Capital controls	Domestic credit	Democratic institutions	Local procurement
Afghanistan	100%	0%	0%	0%	1	-1.60	0		0.08		0.73
Armenia	0%	0%	11%	5%	0	-0.62	1	2.10	0.12	4.04	0.67
Burkina Faso	0%	0%	5%	10%	0	-0.19	0	-0.89	0.12	-2.51	0.49
Burundi	58%	6%	0%	5%	0	-1.06	0	-1.40	0.15	0.70	0.23
Eritrea	12%	0%	1%	1%	0	-0.03	0	-1.24	0.28	-6.57	0.42
Ethiopia	39%		0%	5%	0	-0.71	0	-1.27	0.18	-0.64	0.08
Ghana	0%	0%	0%	14%	1	-0.12	1	-1.27	0.11	3.23	0.39
Guinea-Bissau	5%	7%	0%	10%	0	-1.06	0	-1.28	0.06	2.14	0.33
Guyana	0%	0%	14%	10%	0	-0.50	1	1.22	0.43	4.75	0.57
Kyrgyz Republic	0%	0%	7%	11%	1	-0.97	1	1.36	0.08	-1.10	0.32
Madagascar	0%	2%	19%	14%	0	-0.10	1	-0.52	0.11	6.07	0.39
Malawi	0%	0%	5%	5%	0	-0.52	0	-1.31	0.08	2.92	0.45
Mali	10%	2%	0%	5%	0	-0.52	0	-0.89	0.14	5.75	0.27
Mauritania	0%	4%	0%	5%	1	-0.33	0	-1.19	0.23	-4.99	0.42
Mozambique	14%	0%	14%	5%	1	-0.48	0	-1.30	0.12	2.83	0.32
Niger	0%	4%	0%	10%	0	-0.87	0	-0.83	0.07	3.00	0.50
Rwanda	43%	1%	0%	5%	0	-0.34	1	-1.09	0.10	-4.82	0.27
Sao Tome and Principe	0%	3%	0%	0%	0	-0.45	1	0.77	0.00		0.30
Sierra Leone	43%	6%	0%	14%	0	-0.90	0	-1.25	0.03	0.78	0.31
Tanzania	0%	0%	0%	10%	0	-0.66	1	-1.16	0.07	-2.06	0.26
Uganda	58%	0%	5%	10%	0	-0.83	1	1.06	0.08	-3.60	0.22
Zambia	0%	2%	0%	19%	0	-0.73	0	1.00	0.08	3.87	0.37
Sample mean	**16%**	**2%**	**4%**	**8%**	**0.21**	**-0.60**	**0.40**	**-0.53**	**0.12**	**0.75**	**0.37**

Table A3: Greenfield FDI. The table shows estimates from the baseline model where the dependent variable is outward greenfield foreign direct investment (FDI) as a share of GDP. The quarterly FDI dataset is built from the database *fDi Markets* by calculating the sum of all greenfield FDI projects abroad financed by companies of a given country in a given quarter. The sample period is 2003-2015. The regression controls for the quarterly percentage change in GDP (not reported) and include country and time fixed effects. The FDI and aid variables are winsorized at the 1st and 99th percentile. Standard errors clustered at the country-level are reported in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

	(1) FDI
Aid disbursement (%GDP)	0.016
	(0.017)
Observations	553
R-squared	0.245
Country FE	YES
Time FE	YES

Table A4: Alternative high aid disbursement measures. The table shows how our main results with discrete measures of high aid disbursements (presented in columns 4-6 in Table 2) change when using alternative threshholds to measure high aid disbursements. The sample comprises 22 countries with average annual disbursements from the World Bank exceeding 2% of GDP. The sample period is 1990-2010 and the frequency is quarterly. In columns 1-4 the dependent variable is the percentage change in haven deposits; in columns 5-8 it is the difference between the percentage change in haven and non-haven deposits. All regressions control for quarterly GDP growth (not included in the table). *Country FE* is a vector of country fixed effects. *Time FE* is a vector of time fixed effects. All percentage changes are approximated with the difference in log-levels. The deposit variables are winsorized at the 1st and 99th percentile. Standard errors clustered at the country-level are reported in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Haven				**Haven - Non-haven difference**			
High aid disbursement (Aid >1% GDP)	0.018				0.053**			
	(0.016)				(0.020)			
High aid disbursement (Aid >1.5% GDP)		0.058**				0.103***		
		(0.023)				(0.035)		
High aid disbursement (Aid >2% GDP)			0.101***				0.138***	
			(0.032)				(0.043)	
High aid disbursement (Aid >2.5% GDP)				0.155**				0.156*
				(0.055)				(0.076)
Observations	1,648	1,648	1,648	1,648	1,645	1,645	1,645	1,645
R-squared	0.096	0.099	0.101	0.102	0.072	0.077	0.076	0.073
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES	YES
# events	751	354	178	97	751	354	178	97

Table A5: Uniform sample size. The table shows the results from the baseline specifications reported in Table 2 with a uniform sample size, i.e. conditioning on all three outcomes being non-missing. The regressions control for the annual percentage change in GDP and include country and time fixed effects. Standard errors clustered at the country-level are reported in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

	(1)	(2)	(3)	(4)	(5)	(6)
	Continuous aid indicator			**Binary aid indicator**		
	Haven	Non-haven	Difference	Haven	Non-haven	Difference
Aid disbursement (%GDP)	3.386***	-1.445	4.973***			
	(1.147)	(0.986)	(1.704)			
High aid disbursement (Aid >2% GDP)				0.101***	-0.028	0.138***
				(0.032)	(0.029)	(0.043)
Observations	1,645	1,645	1,645	1,645	1,645	1,645
R-squared	0.101	0.090	0.076	0.102	0.090	0.076
Country FE	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES

Table A6: First stage and other outcomes. The table documents the first stage of the instrumental variable regressions presented in columns 2 and 3 of Table 3. The dependent variable is quarterly aid disbursements from the World Bank as a share of GDP, winsorized at the 1% level. The main explanatory variable is predicted aid which is calculated based on project-level aid commitments and the average sector-region specific temporal disbursement patterns as described in the main text. In Column 1, predicted aid excludes the approval quarter while in column 2 it also excludes the first and second quarter after the approval quarter. Columns 3-6 show second-stage results for the growth rate in non-haven deposits and the differential growth rate in haven deposits over and above non-haven deposits. All regressions control for the annual percentage change in GDP and include country and time fixed effects. Standard errors clustered at the country-level are in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

	(1)	(2)	(3)	(4)	(5)	(6)
	First stage		**Second stage**			
	Aid disbursement (%GDP)		Non-haven		Haven - Non-haven difference	
	1 quarter excluded	3 quarters excluded	1 quarter excluded	3 quarters excluded	1 quarter excluded	3 quarters excluded
Predicted Aid (% GDP)	0.867***	0.767***				
	(0.080)	(0.086)				
Aid disbursement (%GDP)			-0.309	0.808	3.783	3.356
			(1.764)	(1.745)	(2.722)	(2.266)
Observations	1,648	1,648	1,652	1,652	1,645	1,645
R-squared	0.290	0.232	0.007	0.003	0.011	0.011
Country FE	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES
K-P test for weak instruments			121.420	84.835	117.819	84.951

Table A7: Sensitivity of IV results to excluded quarters. The table shows the sensitivity of the IV results to the number of quarters excluded from the instrument. The first stage results are reported in columns 1-4 and second stage results are reported in columns 5-8. Columns 1 and 5 exclude only disbursements occurring in the same quarter as the commitment; Columns 2 and 6 additionally exclude disbursements occuring in the quarter following the commitment; and so on. All regressions control for the annual percentage change in GDP (not reported) and include country and time fixed effects. Standard errors clustered at the country-level are in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	First stage				Second stage			
	1 period omitted	2 periods omitted	3 periods omitted	4 periods omitted	1 period omitted	2 periods omitted	3 periods omitted	4 periods omitted
Predicted Aid (% GDP)	0.866***	0.774***	0.767***	0.720***				
	(0.080)	(0.073)	(0.086)	(0.086)				
Aid disbursement (%GDP)					3.153**	6.084***	4.177*	6.004**
					(1.534)	(1.850)	(2.340)	(2.877)
Observations	1,648	1,648	1,648	1,648	1,648	1,648	1,648	1,648
R-squared	0.290	0.241	0.232	0.220	0.006	0.002	0.006	0.003
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES	YES
K-P test for weak instruments					118.773	112.992	79.911	70.763

Table A8: Heterogeneity by country characteristics. The table shows how the results vary by project characteristics (in addition to the results shown in Table 5). Across all regressions, the dependent variable is the quarterly percentage change in haven deposits. All regressions control for the quarterly percentage change in GDP (not reported) and include country and time fixed effects. The explanatory variables of interest is quarterly aid disbursements, with specific project characteristics, from the World Bank as a fraction of annual GDP. Column (1) distinguishes projects by *speed of disbursement*: projects where disbursements are made within 2 years, 3-5 years or over more than 6 years. Column (2) distinguishes projects by *size*: projects where the sum of all disbursements is smaller than \$50 million, between \$50 and \$100 million and larger than \$100 million. Column (3) distinguishes projects by *cost overrun*: projects where the sum of all disbursements is smaller than the initial commitment, between 0% and 10% larger than the initial commitment and more than 10% larger than the initial commitment. Percentage changes are approximated with the difference in log-levels. The deposit and aid variables are winsorized at the 1st and 99th percentile. Standard errors clustered at the country-level are in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

	(1) **Speed of disbursement**	(2) **Size of project**	(3) **Cost overrun**
Aid × (Speed: 0-2 years)	2.990		
	(2.083)		
Aid × (Speed: 3-5 years)	4.207**		
	(1.693)		
Aid × (Speed: >6 years)	2.525		
	(2.674)		
Aid × (Size: <\$50 million)		4.492*	
		(2.325)	
Aid × (Size: \$50-100 million)		2.145	
		(1.558)	
Aid × (Size: >\$100 million)		4.045**	
		(1.861)	
Aid × (Cost overrun: < 0%)			3.670**
			(1.500)
Aid × (Cost overrun: 0-10%)			3.495*
			(1.988)
Aid × (Cost overrun: > 10%)			3.087
			(2.377)
Observations	1,648	1,648	1,648
R-squared	0.099	0.100	0.099
Country FE	YES	YES	YES
Time FE	YES	YES	YES

Table A9: Capital controls. The table shows how aid disbursements affect capital controls (columns 1-3) and how the results from the baseline are affected by excluding periods with changes in the capital controls. In the left panel, the dependent variable is an indicator for any change in capital controls (column 1), a positive change in capital account openness (column 2) and a negative change in capital account openness (column 3). In the right panel, the dependent variable is the percentage change in haven deposits and the sample excludes any country-years with a change in capital controls (column 4), country-years with a positive change in capital account openness (column 5) and country-years with a negative change in capital account openness (column 6). Percentage changes are approximated with the difference in log-levels. The deposit and aid variables are winsorized at the 1st and 99th percentile. Standard errors clustered at the country-level are reported in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

	(1)	(2)	(3)	(4)	(5)	(6)
	Change in capital controls as dependent variable			**Main regression excluding periods with change in capital controls**		
	Any change	Positive change	Negative change	Any change	Positive change	Negative change
Aid disbursement (%GDP)	4.123*	2.548*	1.575	3.948***	3.671***	3.557***
	(2.292)	(1.466)	(1.798)	(1.160)	(1.199)	(1.147)
Observations	1,680	1,680	1,680	1,316	1,450	1,514
R-squared	0.255	0.225	0.180	0.125	0.115	0.107
Country FE	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES

Table A10: Direct leakage estimates. The table shows the results from regressions that produce estimated leakage rates directly. In columns 1-2, the dependent variable is the change in haven deposits scaled by GDP; in columns 3-4, it is the change in haven deposits unscaled; in columns 5-6, it is the excess net flows to havens (defined in the main text) scaled by GDP. The dependent variables are the same as in the baseline model except in columns 3-4 where aid disbursements are not scaled by GDP and in columns 2, 4 and 6 where the specification includes country-year fixed effects. Percentage changes are approximated with the difference in log-levels. The deposit and aid variables are winsorized at the 1st and 99th percentile. Standard errors clustered at the country-level are in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

	(1)	(2)	(3)	(4)	(5)	(6)
	Scaling by GDP		**No scaling**		**Account for normal flows**	
	Baseline specification	Country-year fixed effects	Baseline specification	Country-year fixed effects	Baseline specification	Country-year fixed effects
Aid disbursement	0.088	0.077	0.071	0.091	0.082	0.063
	(0.064)	(0.067)	(0.072)	(0.120)	(0.061)	(0.060)
Observations	1,648	1,648	1,648	1,648	1,648	1,648
R-squared	0.075	0.293	0.075	0.143	0.074	0.284
Country FE	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES

Table A11: Crowding-in of non-WB foreign aid. The table documents how aid disbursements from the World Bank correlates with aid from other sources. The results are the estimated coefficients from a panel regression for the sample period 1990-2010 at the annual frequency. The main explanatory variable is annual disbursements from the World Bank (measured as the sum of the quarterly disbursements that enter our main regressions). The dependent variable is aid from other sources than the World Bank (measured as Official Development Assistance net of disbursements from the World Bank) as a fraction of GDP. Both aid variables are winsorized at the 1st and 99th percentile. Both regressions control for the annual percentage change in GDP and include country and time fixed effects. The sample includes all countries with annual disbursements from the World Bank exceeding 2% in Column 1 and exceeding 1% in Column 2. Standard errors clustered at the country-level are in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

	(1) Countries with WB aid >2% of GDP	(2) Countries with WB aid >1% of GDP
	All Aid (%GDP)	All Aid (%GDP)
WB Aid (%GDP)	-0.036	-0.114
	(0.369)	(0.255)
GDP (% growth)	-0.047*	-0.015
	(0.023)	(0.015)
Observations	425	902
R-squared	0.609	0.561
Country FE	YES	YES
Time FE	YES	YES

Table A12: Sample of modestly aid-dependent countries. The table shows the 24 countries for which annual disbursements from the World Bank are between 1% and 2% of annual GDP on average. Columns (1) and (3) show foreign deposits held in the countries classified as havens and non-havens respectively. Columns (2) and (4) show the annual growth rates in deposits held in countries classified as havens and non-havens respectively. Columns (5) and (6) show annual aid disbursements from the World Bank and annual Official Development Assistance from all sources respectively as a fraction of annual GDP. Column (7) shows the number of offshore corporations in the leaked data in 2015. Column (8) shows the annual growth rates in the number of offshore corporations in the leaked data. Column (9) shows annual growth rates in GDP. All growth rates are approximated with the change in log-levels.

	(1) Haven deposits ($million)	(2) Haven deposits (growth rate)	(3) Non-haven deposits ($million)	(4) Non-haven deposits (growth rate)	(5) World Bank aid (%GDP)	(6) ODA aid (%GDP)	(7) Offshore Corporations (in 2015)	(8) Offshore Corporations (growth rate)	(9) GDP (growth rate)
Albania	30	16.2%	67	9.2%	1.2%	4.1%	71	19.4%	14.5%
Benin	59	5.7%	157	7.7%	1.3%	6.0%	9	9.4%	7.4%
Bosnia and Herzegovina	162	10.5%	284	26.6%	1.0%	9.9%	90	13.4%	16.6%
Cape Verde	30	12.4%	36	13.2%	1.8%	14.1%	38	15.2%	8.8%
Central African Republic	10	-0.9%	68	2.2%	1.4%	6.6%	32	13.2%	2.6%
Chad	19	8.9%	187	10.8%	2.0%	5.3%	27	14.5%	9.5%
Comoros	13	-0.7%	36	4.9%	1.0%	4.0%	0		4.7%
Congo, Dem. Rep.	909	-1.0%	169	-0.6%	1.1%	6.8%	0		4.0%
Cote d'Ivoire	263	-3.2%	891	1.6%	1.2%	3.6%	78	18.8%	4.5%
Gambia, The	48	10.0%	73	0.6%	1.6%	4.2%	13	21.8%	5.8%
Georgia	167	14.0%	213	21.7%	1.4%	3.4%	255	21.1%	7.5%
Guinea	57	4.4%	175	7.5%	1.5%	4.1%	35	19.2%	5.0%
Honduras	317	14.5%	737	10.8%	1.2%	3.9%	31	4.0%	5.0%
Jordan	3,802	5.7%	1,362	0.5%	1.1%	4.8%	890	15.0%	8.7%
Kenya	2,321	7.9%	2,095	1.6%	1.1%	3.8%	4,879	18.0%	7.5%
Lao PDR	44	11.4%	46	14.9%	1.9%	8.0%	40	13.6%	10.8%
Lesotho	7	4.3%	116	10.0%	1.7%	5.0%	39	18.3%	7.2%
Moldova	69	15.5%	130	29.1%	1.6%	3.0%	137	24.6%	8.9%
Mongolia	14	13.0%	26	17.1%	1.2%	8.3%	59	22.1%	5.3%
Nepal	195	12.1%	76	6.2%	1.2%	5.0%	35	15.4%	7.0%
Nicaragua	580	12.8%	57	18.0%	1.5%	12.7%	61	8.0%	10.3%
Senegal	317	2.7%	782	4.6%	1.2%	5.1%	25	12.9%	4.6%
Tajikistan	16	10.0%	16	44.0%	1.6%	4.0%	11	11.0%	7.4%
Togo	107	-0.5%	183	3.3%	1.4%	5.2%	5	13.2%	4.5%
Sample mean	**253**	**7.4%**	**243**	**9.6%**	**1.4%**	**5.9%**	**286**	**15.0%**	**7.3%**

Table A13 : Heterogeneous effect on offshore corporations. The table shows how the results on on offshore corporations vary by country characteristics. The dependent variable is the quarterly percentage change in the number of offshore corporations. In each column we interact quarterly aid disbursements from the World Bank, expressed as a share of GDP, with indicators for being above and below the sample median in some dimension of heterogeneity. Column 1 splits countries by *control of corruption* based on Worldwide Governance Indicators. Column 2 splits countries on *democratic instutions* based on the variable polity2 from the Polity IV Project. Column 3 splits countries by the presence of *disclosure requirements* based on Djankov et al. (2010). Column 4 splits countries by *domestic credit* from the financial sector relative to GDP based on the World Development Indicators. Column 5 splits countries by *expropriation risk* based on the International Country Risk Guide (ICRG). Column 6 splits countries by the fraction of procurement contracts allocated to *domestic firms* based on the World Bank's Major Contract Awards Database. Depending on data coverage, we split the sample by time-varying measures (Columns 2,4) or time-invariant measure (Columns 1,3,5,6). At the bottom of the table we show the p-value for a test that the two estimated coefficients are identical. All regressions control for the quarterly percentage change in GDP (not reported) and include country and time fixed effects. Percentage changes are approximated with the difference in log-levels. The deposit and aid variables are winsorized at the 1st and 99th percentile. Standard errors clustered at the country-level are in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

	(1) Control of corruption	(2) Democratic institutions	(3) Disclosure rules	(4) Domestic Credit	(5) Expropriation risk	(6) Local procurement
Aid × (Control of corruption=low)	1.949**					
	(0.806)					
Aid × (Control of corruption=high)	0.341					
	(0.373)					
Aid × (Institutional quality=low)		1.676				
		(0.992)				
Aid × (Institutional quality=high)		0.685				
		(0.621)				
Aid × (Disclosure required=0)			1.134*			
			(0.609)			
Aid × (Disclosure required=1)			1.027			
			(0.878)			
Aid × (Domestic credit=low)				2.091***		
				(0.682)		
Aid × (Domestic credit=high)				-0.357		
				(0.581)		
Aid × (Expropriation risk=low)					0.649*	
					(0.328)	
Aid × (Expropriation risk=high)					1.505	
					(1.311)	
Aid × (Local procurement=low)						1.907**
						(0.724)
Aid × (Local procurement=high)						0.502
						(0.472)
Observations	1,542	1,503	1,542	1,326	1,227	1,542
R-squared	0.115	0.114	0.114	0.127	0.124	0.115
P-value (same coefficients)	.074	.451	0.926	.014	0.57	.09
Country FE	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES

Table A14: Coverage of public deposit data. The table shows the extent to which total foreign deposits can be allocated to individual banking centers based on publicly available data from the BIS Locational Banking Statistics. The first column shows our main sample of 22 highly aid-dependent countries while the second column shows all other countries in the world for which relevant data are available. The first line shows the publicly available statistics on total deposits by counterpart country. The next lines show the fraction of this total can be allocated to specific banking centers. The category "Switzerland" includes Switzerland and Liechtenstein. The category "Jersey" includes Jersey, Guernsey and the Isle of Man. The category "Non-havens" includes Australia, Brazil, Denmark, Finland, Ireland, Japan, Netherlands, Sweden and the U.S. The category "Unallocated" is the difference between 100% and the sum of the percentages above. Source: Bank for International Settlements, Locational Banking Statistics.

	(1) Highly aid-dependent countries	(2) All other countries
Foreign deposits ($ million)	196	16,872
Haven deposits (% of Total)	30%	22%
- Switzerland	14%	9%
- Luxembourg	3%	5%
- Belgium	8%	5%
- Jersey etc.	5%	3%
Non-haven deposits (% of Total)	57%	43%
Unallocated	13%	35%

Figure A1: Distribution of haven deposit growth rates. The figure shows the distribution of quarterly percentage changes in haven deposits (approximated with the difference in log-levels). The figure covers the period 1990-2010 and includes the 22 countries for which annual disbursements from the World Bank are equivalent to at least 2% of annual GDP on average. The variable is winsorized at the 1st and 99th percentile.

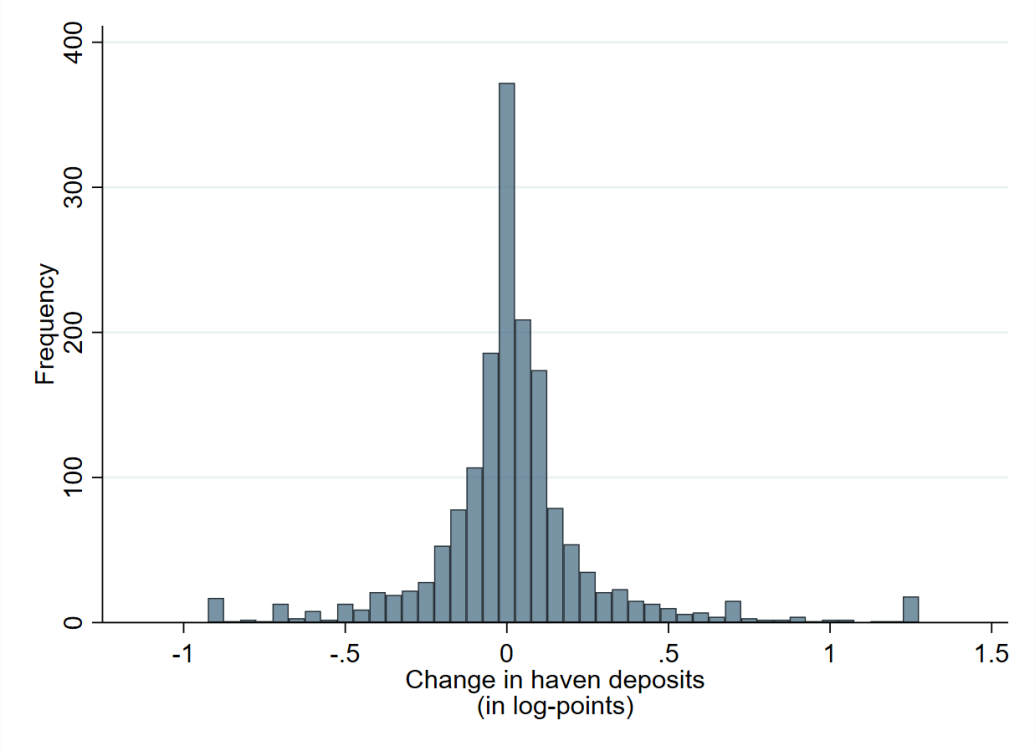


Figure A2: Distribution of aid disbursements. The figure shows the distribution of quarterly aid disbursements measured relative to annual GDP. The figure covers the period 1990-2010 and includes the 22 countries for which annual disbursements from the World Bank are equivalent to at least 2% of annual GDP on average. The variable is winsorized at the 1st and 99th percentile.

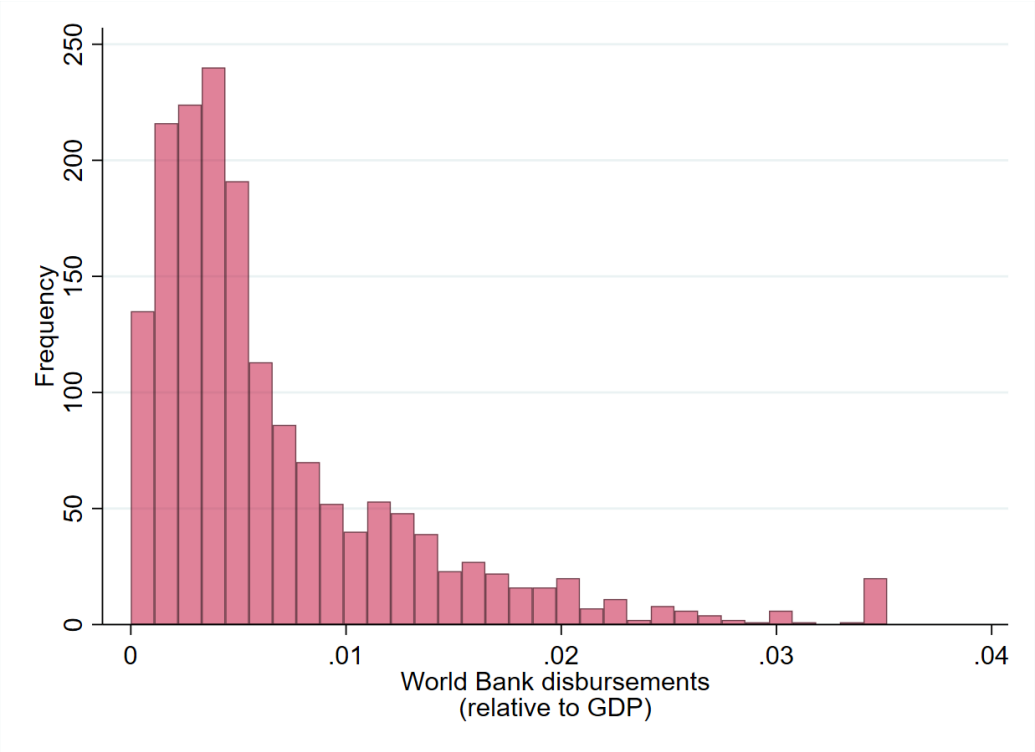


Figure A3: Offshore corporations. The figure shows the number of offshore corporations aggregated over the 22 countries in the main sample (blue line) and the annual growth rate in this number approximated with the difference in log-levels (red bars).

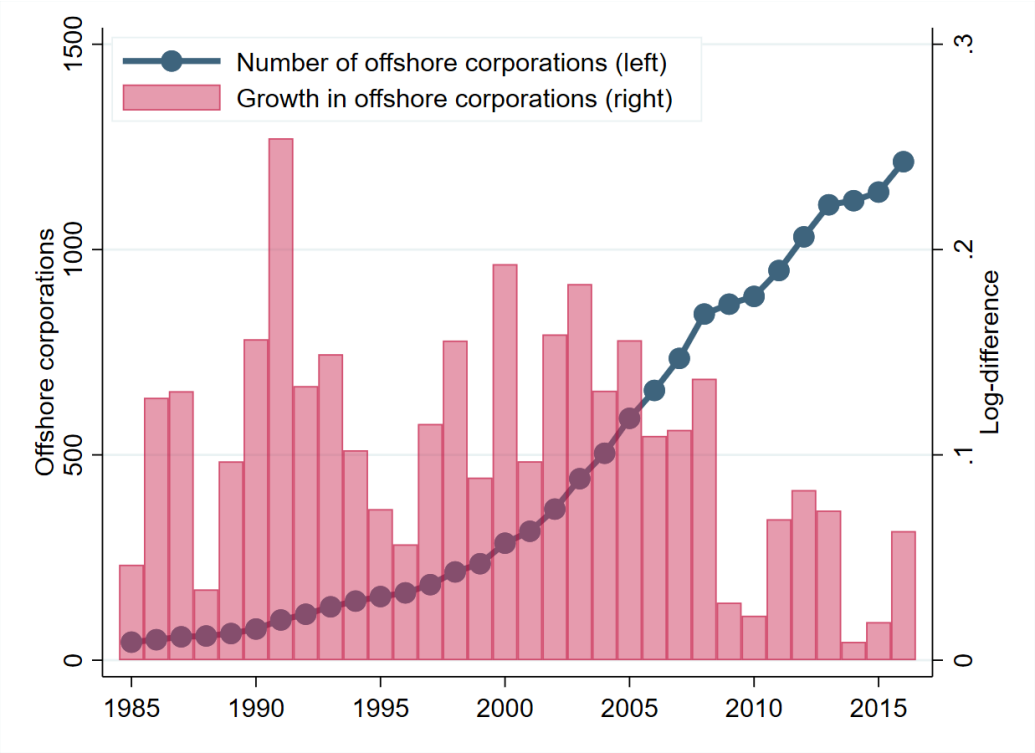


Figure A4: Distribution of offshore corporation growth rates. The figure shows the distribution of quarterly percentage changes in the number of offshore corporations. The figure covers the period 1990-2010 and includes the 22 countries for which annual disbursements from the World Bank are equivalent to at least 2% of annual GDP on average. The variable is winsorized at the 1st and 99th percentile.

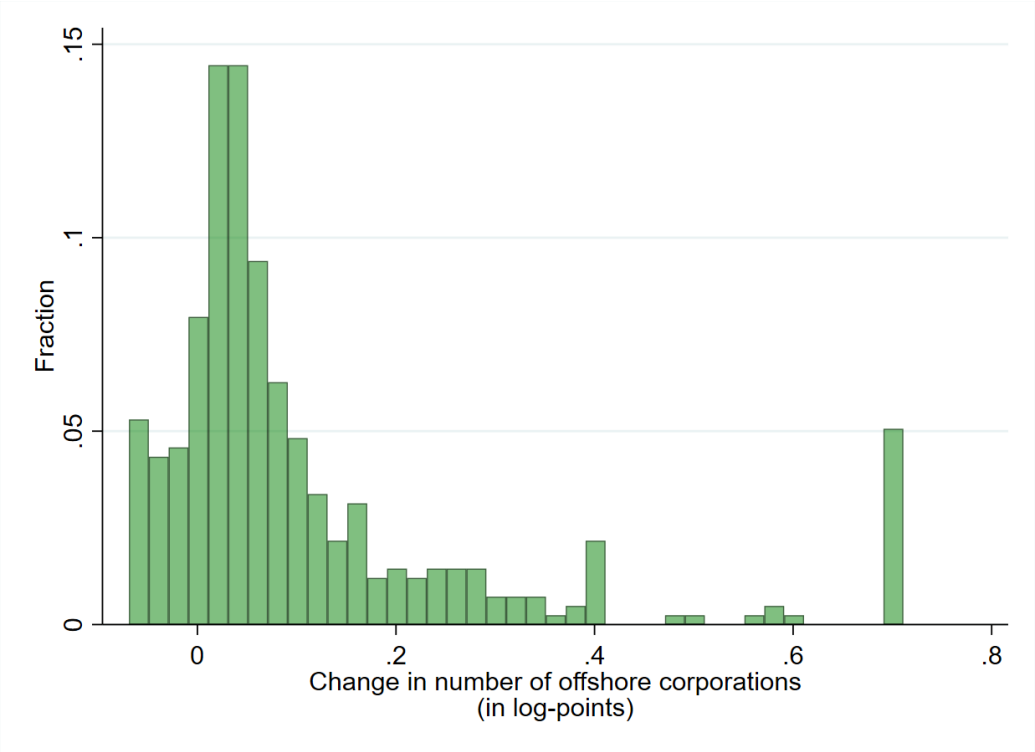


Figure A5: Scatterplot of main result. The figure shows a scatterplot corresponding to the main regression result (Table 2, column 1): aid disbursements (scaled by GDP) plotted against the change in haven deposits (in log-points), both residualized with the other explanatory variables in the baseline model (GDP growth as well as country and time fixed effects).

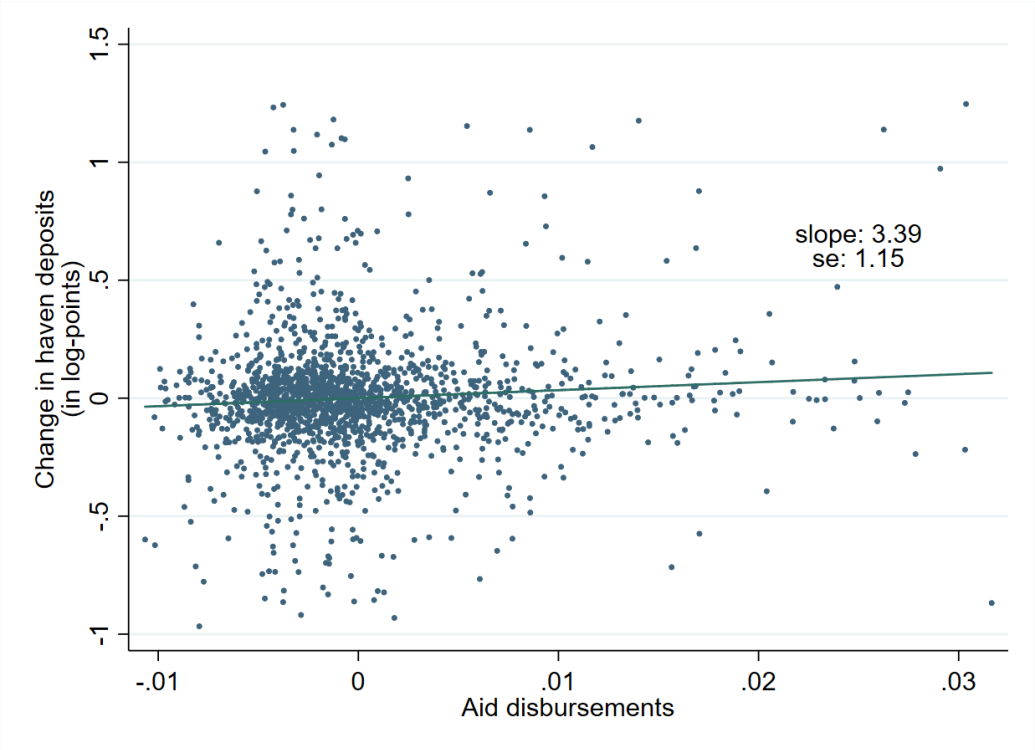


Figure A6: Dynamic results with alternative disbursement measure. The figure shows the results from the baseline specification where the disbursement variable is an indicator of quarterly disbursements exceeding 2% of annual GDP. (equivalent to Table 2, Columns 4-6) augmented with four leads and four lags of the disbursement variable. The dependent variable is the percentage change in haven deposits (Panel A) the percentage change in non-haven deposits (Panel B) the percentage change in haven deposits over and above the percentage change in non-haven deposits (Panel C). The regressions control for the quarterly percentage change in GDP and include country and time fixed effects. Percentage changes are approximated with the difference in log-levels. The deposit and aid variables are winsorized at the 1st and 99th percentile. The dark blue dots indicate the point estimates on the aid disbursement variables and the light blue lines indicate 95%-level confidence intervals (clustering at the country-level)

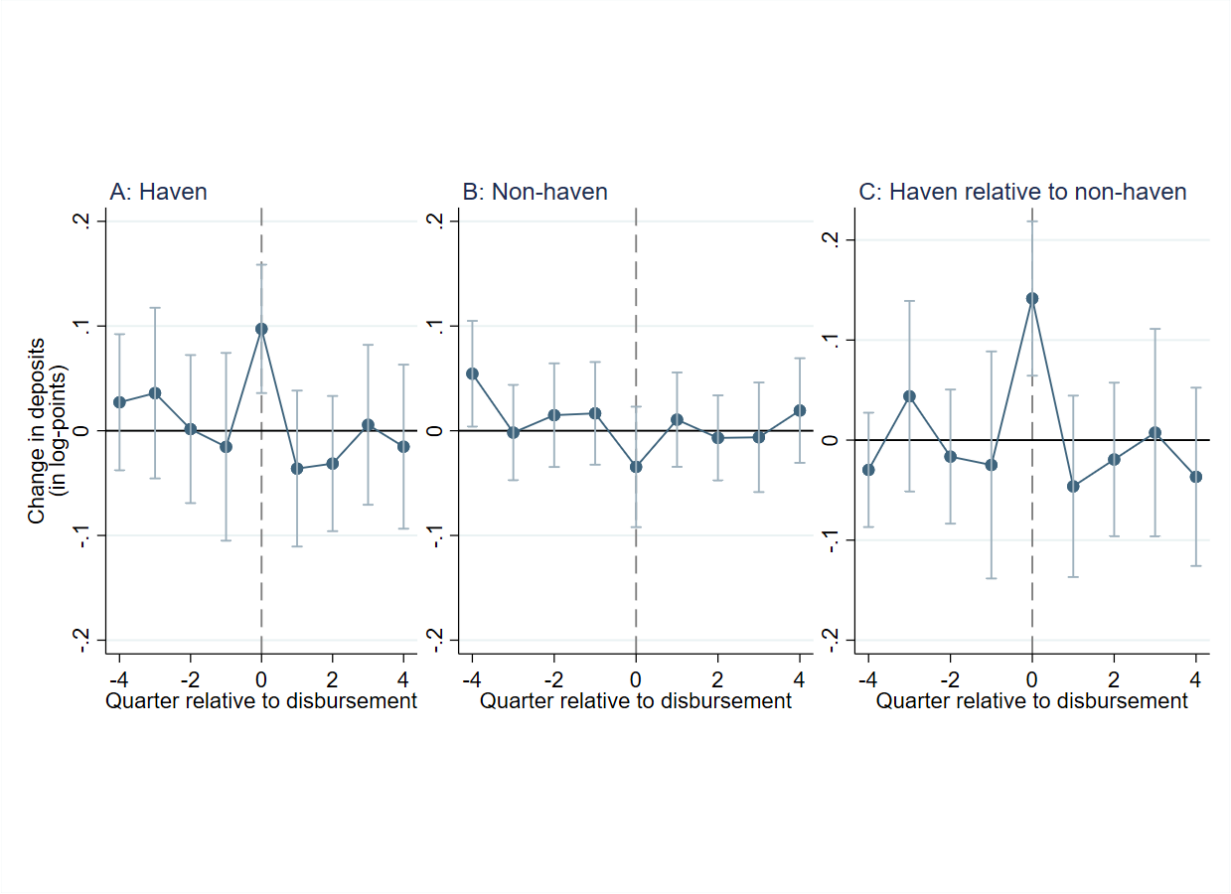


Figure A7: First stage of the IV estimation. The figure shows scatterplots corresponding to the first stage of the IV estimation (Table 3, columns 2-3): predicted aid disbursements (scaled by GDP) plotted against aid disbursements (scaled by GDP), both residualized with the other explanatory variables in the baseline model (GDP growth as well as country and time fixed effects). Panel A excludes disbursements made in the approval quarter from the instrument whereas Panel B also excludes disbursements made in the first two quarters after project approval.