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Trust funds and the sub-national effectiveness of development aid: Evidence from the World Bank

Mirko Heinzel [a,b], Bernhard Reinsberg [b,*]

[a] *London School of Economics and Political Science, United Kingdom*
[b] *University of Glasgow, Glasgow*

ABSTRACT

Existing studies imply that multilateral development assistance is more effective than bilateral assistance. However, multilateral assistance is increasingly constrained through earmarked funding where donors restrict the use of their funds. Such funding shifts decision-making power away from multilateral donors and increases transaction costs through more stringent monitoring requirements. We argue that the consequences of these constraints are negative for aid effectiveness. We test this argument by studying the effectiveness of the World Bank in increasing economic growth. Our research design combines novel data on the funding composition of growth-focused development projects between 1995 and 2014 with georeferenced data on their sub-national locations within 50x50km grid cells. Using difference-in-differences estimation, we assess whether local economic development, measured through the Gross Cell Product, increases in areas where core- and trust-funded projects were located in the previous year. We find that while growth-focused projects are generally effective, core-funded projects have a substantially greater impact than trust-funded projects. These findings imply that donors should consider allocating a greater share of their multilateral development assistance as unearmarked contributions if they want to safeguard the development impact of this assistance.

1. Introduction

Whether foreign aid is effective continues to be a controversial debate in development research (Bourguignon & Sundberg, 2007; Doucouliagos & Paldam, 2009; Dreher et al., 2024; Mekasha & Tarp, 2019). Related studies examine how foreign aid affects country-level outcomes, notably economic growth, which is a core goal of many donors. Studies have identified a range of possible determinants of aid effectiveness, including recipient-country context and donor characteristics (Burnside & Dollar, 2000; Dietrich, 2021; Knack et al., 2011). In particular, donor motivations and aid delivery channels may significantly affect aid outcomes (Dietrich, 2021; Dreher & Kilby, 2010; Winters, 2014). Multilateral aid—channeled through international organizations (IOs) with a development mandate—is often portrayed as more effective than bilateral aid, due to its lower politicization (Headey, 2008; Knack et al., 2011; Minoiu & Reddy, 2010).

However, multilateral aid is no longer a uniform funding flow. Over the past two decades, donor contributions to IOs have increasingly become earmarked for specific themes, countries, or projects. Given the rapid growth of earmarked resources—also known by donors as 'multi-bi aid'—the dichotomous distinction between bilateral aid and multilateral aid is no longer valid (Eichenauer & Reinsberg, 2017; Graham, 2023). At the World Bank, as well as other multilateral development banks, earmarked funding is channeled through 'trust funds' (Droesse, 2011; Reinsberg et al., 2017). Across the multilateral system, multi-bi aid has increased tenfold between 2000 and 2019, reaching over US$ 25 billion per year and supporting the bulk of development activities in most multilateral agencies (Baumann & Weinlich, 2020; Graham, 2017a; Reinsberg, 2017a). Contrary to multilateral aid, this type of aid affords donors considerable influence over how multilateral agencies spend their resources. Rather than being just a technical issue, earmarking is deeply political. Earmarked funding fundamentally changes the accountability relationship at multilateral agencies: while core projects are under the control of the collective decision-making body, trust-funded projects are not subject to Executive Board control but establish a direct line of accountability between the multilateral agencies' staff and individual donors. This can affect aid effectiveness in fundamental ways. Mounting qualitative evidence indicates that earmarked funding diminishes organizational capacities to respond to emergent challenges and thus undermines the effectiveness of

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* Corresponding author.
E-mail address: Bernhard.reinsberg@glasgow.ac.uk (B. Reinsberg).

multilateral agencies (Baumann & Weinlich, 2020; Reinsberg, 2016; Schmid et al., 2021). Despite our expanding knowledge about the mechanisms through which earmarked funding affects organizational performance, we do not know its ultimate consequences for aid effectiveness. Therefore, there is an urgent need to substantiate the effect of earmarked funding on aid effectiveness.

We build on recent studies that highlight differences in the autonomy of multilateral agencies due to their funding structures (Heinzel, Cormier, & Reinsberg, 2023; Reinsberg, 2023; Graham, 2015) and test whether the autonomy of the World Bank impacts its ability to increase economic activity in recipient countries. Earmarked funding constrains multilaterals' autonomy as funds are typically managed separately from 'core funding' within special accounts with a direct line of accountability between donors and multilateral agencies. Principal-agent theory expects that such constraints on agent autonomy prevent agency slack and increase effectiveness (Cortell & Peterson, 2022; Hawkins et al., 2006; Nielson & Tierney, 2003; Vaubel, 2006). However, recent scholarship on the performance of multilaterals has increasingly focused on the importance of their autonomy in ensuring successful operations in the field (Campbell, 2018; Honig, 2019; Lall, 2017). To the extent that earmarked funding limits multilaterals' autonomy, we expect that the World Bank is less effective in promoting growth in projects supported with earmarked funding compared to projects in which it uses core funding.

Our empirical strategy relies on identifying projects that have clear growth objectives (Clemens et al., 2012) and using two-way fixed effects (TWFE) estimations to compare 50x50km grid-cells with and without World Bank projects over time. We build on recent advances in the aid effectiveness literature that increasingly estimate the impact of foreign aid at the sub-national level (Brazys et al., 2017; Dreher et al., 2021a; Dreher & Lohmann, 2015; Gehring et al., 2022; Isaksson & Durevall, 2022; Khomba & Trew, 2022). Our results from TWFE estimations show that World Bank projects contribute positively to local economic development. However, funding sources matter: Earmarked funds appear less effective than core funds in stimulating local economic development. Effect magnitudes are sizeable: While core projects increase the gross cell product (the total sum of economic activity in a given cell) by between 3% and 10.3%, economic growth in cells with earmarked projects is only between 1.6% and 5.5%, or approximately half as high. We conduct extensive robustness checks focusing on verifying modelling assumptions, testing alternative modelling approaches, using other dependent and independent variables as well as alternative samples. All these analyses corroborate the finding that core-funded projects are more effective than trust-funded projects.

The paper makes theoretical and empirical contributions. Theoretically, we develop an argument on the link between multilaterals' autonomy—specifically differences in autonomy due to funding structures—and the impact of their aid on key socioeconomic outcomes. Our theoretical argument highlights that earmarked funding may distort aid purposes and increase transaction costs, ultimately undermining its ability to make a difference on the ground. Therefore, we question arguments highlighting that increased accountability and constraints on autonomy should lead to greater multilaterals' performance by decreasing the likelihood of agency slack (Hawkins et al., 2006; Honig et al., 2022; Vaubel, 2006). Instead, we are closer to political economy research which has warned against the perilous effects of undue donor influence on multilaterals (Dreher et al., 2013). We complement this line of work by reifying funding structures as a new mechanism besides (unmeasurable) informal influence tactics through which donors shape the policies of multilateral organizations (Dreher et al., 2009; Kilby, 2013; Stone, 2011).

Empirically, we emphasize project-level funding structures as a neglected determinant of sub-national aid effectiveness. Project-level research has established that aid effectiveness varies more at the project level than at the country level (Bulman et al., 2017; Feeny & Vuong, 2017; Smets et al., 2013), but our understanding of the drivers of this

variation remains incomplete. Conversely, sub-national literature on aid impacts using geocoded data on aid projects has not considered the role of funding structures in aid projects (Brazys et al., 2017, 2022; Dreher et al., 2022; Gehring et al., 2022). In our empirical strategy, we compare trust-funded to core-funded projects that limit the extent to which individual donors can directly control IO funding decisions. We use novel data on the funding sources of World Bank operations at the project level and combine this data with geocoded information on sub-national project locations and estimates of local economic activity (Kummu et al., 2018; Tierney et al., 2011). Third, we contribute to the burgeoning literature on the causes and consequences of earmarked funding (Eichenauer & Reinsberg, 2017; Graham, 2017b; Patz & Goetz, 2019). Going beyond analyses of project success (Heinzel et al., 2023) and multilaterals' performance (Reinsberg & Siauwijaya, 2024), we are the first to examine the impact of earmarked aid projects on the ground.

2. Aid effectiveness, donor influence, and multilateral institutions

Aid effectiveness researchers have long examined when and how foreign aid promotes economic growth in recipient countries (Bourguignon & Sundberg, 2007; Clemens et al., 2012; Doucouliagos & Paldam, 2009; Mekasha & Tarp, 2019). Considering the challenges of cross-country analyses for causal identification, a growing body of scholarship examines aid effectiveness at the sub-national level. For example, Dreher and Lohmann (2015) test whether foreign aid affects economic growth proxied by night-light growth. They find significant correlations but no causal effect of World Bank aid on growth when using an instrumental-variable design that exploits the crossing of the IDA eligibility threshold. Using a grid-cell approach, Bitzer and Gören (2018) find a positive correlation between World Bank aid and night-light growth controlling for grid-cell confounders and country-level context. Isaksson and Kotsadam (2018) report similar findings. Looking beyond economic growth, scholars have also found positive impacts of World Bank aid on human development outcomes such as child malnutrition and infant mortality (Cruzatti et al., 2023; Kotsadam et al., 2018; Rustad et al., 2019).

While studies traditionally highlighted recipient-country characteristics such as low corruption, democratic governance, and pro-growth policies (Alesina & Weder, 2002; Burnside & Dollar, 2000; Svensson, 1999), others consider donor motives and donor governance as important for aid effectiveness (Dreher & Kilby, 2010; Knack et al., 2011; Minasyan et al., 2017). A robust finding in aid effective research is that where donors are driven by political goals, the link between aid and growth suffers. Dreher, Eichenauer, & Gehring (2018) show that the effect of aid on economic growth is reduced by the share of years a country served on the UN Security Council in the period the aid is committed. Some scholars contend that multilateral aid—whereby donors delegate aid allocation decisions to autonomous multilateral agencies—is less prone to donor capture than bilateral aid as it dilutes individual donor influence (Headey, 2008; Mahembe & Odhiambo, 2021; Minoiu & Reddy, 2010). However, multilateral agencies are not free from donor influence, as demonstrated by political economy studies which suggest that powerful donors interfere with their decision-making to ensure favorable treatment of politically aligned recipients (Dreher et al., 2009; Dreher et al., 2021c; Kilby, 2013). Such political meddling can have adverse effects on aid effectiveness. Dreher et al. (2013) find that World Bank projects disbursed during periods of political importance of aid recipients are rated lower compared to when recipients are not politically important.

Sub-national aid research confirms the perilous consequences of political favoritism for aid effectiveness. A marker of such favoritism is that aid goes to districts that are politically aligned with the incumbent elites, rather than targeting communities most in need (Anaxagorou, Efthyvoulou, & Sarantides, 2020; Brazys, Mahmud, & Pillai, 2022; Briggs, 2018; Dreher et al., 2019; Jung, 2023). For example, Min et al.

(2023) find that allocations of World Bank agricultural assistance projects in India favor geographic constituencies where state legislators align with the governing party of higher-level political layers. Nonetheless, studies suggest that World Bank aid is much less susceptible to political favoritism than aid from other donors (Dreher et al., 2019; Song et al., 2021). At the same time, such aid may not target the neediest. Assessing the district-level targeting of World Bank project aid in India, Nunnenkamp et al. (2017) find weak evidence of needs-based allocation choices but some evidence for commercial motives instead. Analysis on Sub-Saharan Africa reveals that aid from the World Bank and the African Development Bank does not favor administrative units in which most poor people live (Briggs, 2018).

Taken together, these results suggest that politically-driven aid is less effective. And yet, even after accounting for political favouritism in aid allocation, significant variation in project success remains. In fact, project features account for more variation in project success than country characteristics (Bulman et al., 2017; Denizer et al., 2013; Heinzel, 2022). However, our understanding of the drivers of this variation remains incomplete. Project-level analyses highlight distinct project-level characteristics such as project size, project duration, and staff experience but so far neglected the role of funding composition in aid projects (Bulman et al., 2017; Denizer et al., 2013). Closest to ours is a study showing that the number of counterpart financiers in World Bank projects has a negative correlation with project success (Winters, 2019). While earmarked projects may have multiple donors, the notion of counterpart financing is different from earmarked project finance, which therefore merits separate analysis. Similarly, a recent study shows that earmarked funding undermines project evaluations (Heinzel et al., 2023). However, they stop short of testing whether these evaluations translate into differences in real-world impact. We focus on economic growth—a key goal of the World Bank and many other donors (World Bank, 2022b). In the next section, we discuss the link between funding-induced constraints to multilaterals' autonomy and reductions in the impact of their development assistance in more detail.

3. Trust funds and aid effectiveness: The case of the World Bank

We study the impact of earmarked funding on the effectiveness of the World Bank. The World Bank is the most important multilateral development bank and the second biggest multilateral agency in terms of its development spending (after the European Union). The World Bank can also be seen as a hard case to test the relationship between funding modalities and development impact (Gerring, 2007). The World Bank is typically seen as fairly autonomous as staff have wide discretion in proposing and implementing development projects. The role of the World Bank's executive board is fairly limited compared to other donors and is often constrained to accepting the development projects proposed by staff (Weaver, 2008). Although powerful donors find ways to impact decision-making, these influences are typically staff-driven—either because staff anticipate the preferences of their principals or because selected staff share important world-views with US policymakers (Clark & Dolan, 2021). Furthermore, while the World Bank has an extensive trust fund portfolio, it retains substantial budget flexibility and a large core budget compared to other IOs. UN agencies have substantially less control over their budget. Some, like the World Food Program, attain

more than 90 % of their funds as earmarked funding. Furthermore, the World Bank tends to receive less-strictly earmarked contributions than the UN entities. Moreover, earmarking *within* trust funds is legally prohibited, and Bank staff may or may not adhere to donor requests to use funding in certain ways.[1] Other multilateral donors tend to have much stricter earmarking modalities where donors can specify very detailed purposes for their funding. If we found that earmarking through trust funds undermines the effectiveness of World Bank assistance, we would assume that the consequences for the effectiveness of assistance by other multilateral donors would be even more grave. Indeed, recent research shows that findings from the World Bank context tend to generalize pretty well to other multilateral donors (Briggs, 2019).

The World Bank receives its earmarked donor contributions in trust funds. The first was created in 1960—when several donors joined forces and pooled their finances for the Indus Basin Project in Pakistan. For the next thirty years, trust funds operated at the margins of World Bank financing and were a scarcely used financing instrument (Reinsberg et al., 2017). Donors rapidly reversed course in the early 1990s as a reaction to a dispute over IDA replenishments. The USA withheld sizeable contributions to the World Bank's budget to pressure for reforms. Other donors responded by creating a trust fund to cover the costs of withheld US funding and ensure that World Bank projects and programs were not in danger due to the donor dispute (Weaver, 2008, p. 54). By the late 1990s, donors had discovered trust funds to increase their influence over how funds were spent (Reinsberg, 2017b).

The World Bank has been actively seeking to expand its financing base since the early 2000s (da Conceição-Heldt & Dörfler, 2021; Reinsberg et al., 2017; Weaver, 2008). It aimed to position itself, with the support of some of its donors, through trust funds as a leader on development assistance to combat climate change (Michaelowa & Michaelowa, 2011). The organization also expanded its role as a financial intermediary for trust funds—like the Global Fund to Fight AIDS, Tuberculosis, and Malaria—where it lacked a reputation for policy-specific expertise but was seen as a reliable partner to act as trustee for the fund (Reinsberg et al., 2015). Through these efforts, the World Bank substantively increased its trust fund portfolio. Fig. 1 displays the average number of trust funds that recipient countries could draw on each year since 1990. The figure shows that the number of such funds has increased more than fifteen-fold since the end of the Cold War. Today, most projects draw on trust fund resources—at least to some extent.

With earmarking, multilateral agencies lose some degree of insulation from parochial donor interests (Sridhar & Woods, 2013). Earmarked funding allows donors to delegate aid implementation to multilateral agencies while retaining control over how their funds are spent (Graham, 2017a; Graham & Serdaru, 2020; Reinsberg, 2017a). Compared to core-funded projects, earmarked projects are at a higher risk of bilateral motives creeping into allocation decisions (Graham, 2023). To the extent that donors pursue self-interested goals, rather than focusing on long-term sustainable development, we would expect earmarked projects to be relatively less effective than core-funded projects.

Earmarked funding introduces competing demands on multilateral donors that curb their autonomy. Graham (2015) argues that earmarked funding leads to a transformation of the principal-agent relationship. Typically, agents face a collective principal made up of different

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[1] Earmarking within trust funds would imply that donors can limit support to specific aspects rather than the entire program of activities that the trust fund supports. World Bank operational policies prohibit such sub-earmarking. However, World Bank staff often try to accommodate related donor requests informally, through a practice called 'notional earmarking'. Importantly, and contrary to some observers, we generally refer to trust funds as 'earmarked funding' because they allow donors to extend support to the World Bank for specific purposes under separate monitoring and reporting requirements (Eichenauer and Reinsberg, 2017).
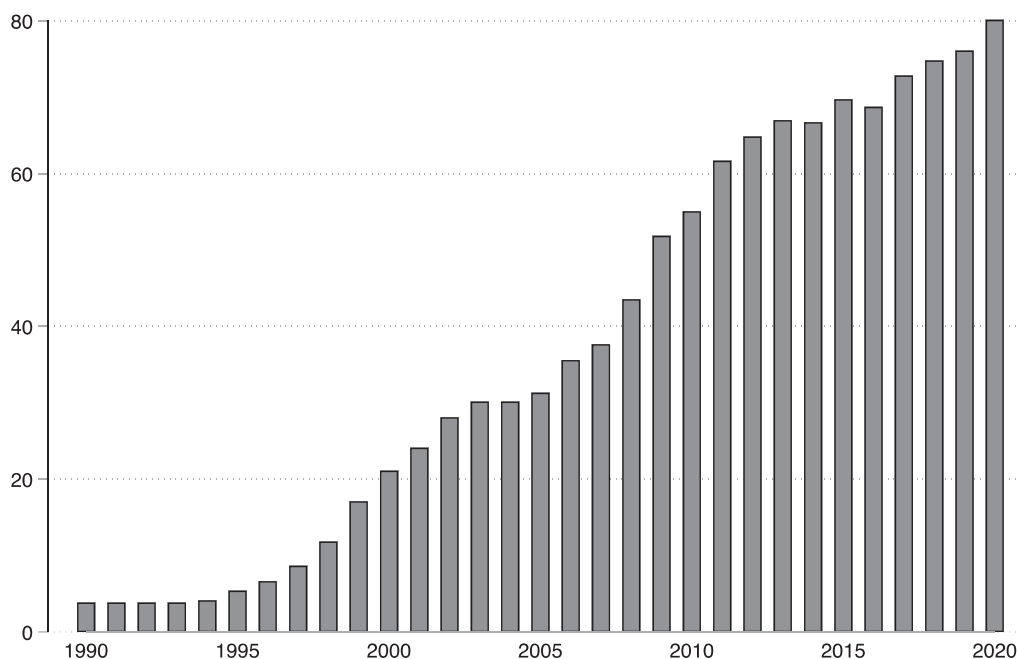
Fig. 1. Available World Bank trust funds every year from 1990 to 2020. Note: Y-axis is the number of trust funds that receive contributions from donors. Calculations based on Eichenauer and Reinsberg (2017), Reinsberg, Heinzel, & Siauwijaya (2024) and OECD (2024).

member states. These member states need to agree on restraining the agent. When they are not able to agree, the agent gains autonomy (Copelovitch, 2010; Schneider & Tobin, 2013). However, earmarked funding introduces multiple principals. Project staff often need to fulfill the demands from different donors through the single and multi-donor trust funds they contribute to (Graham, 2015). Hence, multilateral agencies lose some degree of insulation from parochial donor interests (Sridhar & Woods, 2013). Compared to core-funded projects, earmarked projects are at a higher risk of bilateral motives creeping into allocation decisions (Graham, 2017a; Graham & Serdaru, 2020; Reinsberg, 2017a).

Qualitative evidence from existing work on the effects of earmarked funding for aid effectiveness bolsters this expectation (Baumann & Weinlich, 2020; Reinsberg, 2023; Schmid, Reitzenstein, & Hall, 2021). In the UN context, Baumann and Weinlich (2020, 158) argue that "earmarked funding patterns, over which UN entities have limited influence, tend to reflect donor interests and arguably prevent the UN [from] providing some sort of multilateral corrective to bilateral priorities." As a result, earmarking reinforces patterns of donor darlings and aid orphans, leaving the UN with less effective ways to address cross-country challenges and emergencies. For example, the WHO's response to Ebola in 2014 was ineffective because the organization could not use earmarked resources for the Ebola response (Baumann and Weinlich, 2020, 159). Similar consequences could be expected for the World Bank (Heinzel et al., 2023). Trust funds offer donors the possibility to support specific initiatives in a pick-and-pay manner. Qualitative evidence on the perceived effects of earmarked funding on aid effectiveness at the World Bank confirms that trust funds may not well align with country needs, especially where they support thematic priorities driven by donor headquarters (Independent Evaluation Group, 2011). This could even affect grid-cell outcomes to the extent that a proposed project for a given grid cell may need to cater to specific (sub-)sectoral priorities of the donor, thereby remaining below its growth potential. In such circumstances, there is a risk that trust funds constrain the flexibility of staff to respond to local circumstances, which is widely seen as a necessary condition for making development projects effective (Andrews et al., 2013). While more severe forms of donor interference—such as influence over procurement decisions—are legally prohibited in trust funds, research suggests that donors micro-manage

projects supported by trust funds, for instance by joining supervisory missions alongside World Bank staff and bilateral staff secondments that influence development thinking (Reinsberg, 2016). At the same time, trust-funded projects are relatively under-resourced. Only few trust funds can cover the costs of project supervision (Reinsberg, 2016). Unless the core budget covers this shortfall, projects may have insufficient supervision, which limits the possibility of World Bank staff to steer development outcomes on the ground in collaboration with recipient-country authorities.

Trust-fund supported projects are also faced with increased transaction costs. In the context of aid projects, transaction costs can be defined as the costs spent on activities that do not contribute to development impacts on the ground (Paul & Vandeninden, 2012). Earmarked funding increases transaction costs due to the additional need for fundraising, monitoring and reporting, and fiduciary accountability. While all projects involve internal control mechanisms, trust funds pose additional burdens on operational staff that can come at the expense of aid effectiveness (Schmid et al., 2021). First, staff must raise funds to support activities outside of core funds. Fundraising may be directly with donors, for example for small-scale activities at the country level. It may also occur internally, for instance when staff want to obtain a project grant from a larger thematic trust fund managed by a central unit. In both cases, staff must invest additional time (and resources) to obtain funding (Patz and Goetz, 2019). Evidence from the World Bank supports this claim, showing that staff spent significantly more time relating to donors when their activities are supported by trust funds (Reinsberg, 2016). Second, trust funds often have additional monitoring and reporting requirements that reflect specific donor demands (Graham, 2017a). Many donors want staff to complete results frameworks, which measure the performance of a project against quantitative indicators (Reinsberg, 2016, p. 219). A particular challenge is to aggregate results indicators from different activities at the trust-fund level. While this duty primarily lies with the trust fund secretariat, it may have knock-on effects on project staff who may need to collect additional data or report existing data in a way that is suitable for reporting at trust-fund level. Third, from a donor perspective, a key rationale for the creation of trust funds is to better account for how multilateral implementing organizations spend aid money. While donors can in principle track the

financial flows in their trust funds through World Bank financial systems, some donors also hold verification missions to spot-check whether financial flows match outputs delivered. These missions pose a heavy toll on operational staff across the Bank and block staff time for administrative processes at the expense of substantive project duties (Reinsberg, 2016, p. 216).

To summarize, we expect projects funded by trust funds to be less effective on the ground because they should, on average, be less well designed and more costly to run. We hypothesize: *Trust-fund funded projects increase local economic activity less than core-funded projects.* In formulating our hypothesis, we use core-funded projects as our yardstick. This is useful because we can remain agnostic about whether aid projects are effective on average, which continues to be subject to debate in the literature.

4. Empirical analysis

Our empirical strategy utilizes highly disaggregated data on economic outcomes and World Bank project locations to estimate the impact of World Bank projects financed from core resources and trust funds on sub-national economic activity. We separate the globe into 50x50km grid cells using the PRIO-GRID (Tollefsen et al., 2012). Our unit of analysis is the grid cell-year. We restrict our sample to all grid cells that were part of countries not classified as high-income-economies according to the World Bank for the majority of years under examination. We do so to ensure that our counterfactual only includes grid cells that could have potentially had World Bank projects in most years included in our sample. In the following, we discuss the data and empirical strategy we use to test our hypotheses. We display descriptive statistics for the main variables in the Appendix (Table A1).

Our primary dependent variable are sub-national estimations of gross cell product (GCP) (Kummu et al., 2018). The GCP is the sum of all economic activities in a given cell in a given year. To obtain the gross domestic product (GDP), one would need to add the GCP of all cells contained in the country's area, subject to any corrections due to cells that extend across national borders. Kummu et al. (2018) provide estimates (in 2011 constant USD) of gross cell product between 1990 and 2015 at the level of 5 arc-minutes.[2] We aggregate these estimates to each PRIO-GRID cell (Tollefsen et al., 2012) and take the log value to account for diminishing marginal returns in economic development.

Our main independent variables are binary measures that indicate whether a given grid cell had a disbursing active World Bank project each year. We use two such binary measures: the first independent variable records whether a grid cell had a disbursing active trust-funded project, and the second indicates whether a grid cell had a disbursing active core-funded project. The main independent variables are binary for two reasons. First, we lack reliable data on how disbursements were distributed over the life cycle of a project and data on World Bank projects does not include supplemental financing (Kersting & Kilby, 2019). Second, continuous TWFE models rely on strong assumptions for homogenous effects at different levels of disbursements that we cannot verify but are unlikely to hold as the marginal returns from foreign aid plausibly diminish (Callaway and Goodman-Bacon, 2021).

We identify the location of World Bank projects using data from AidData (2017). Our sample includes all World Bank projects approved between 1995 and 2014. The data record 5,684 projects with a combined value of more than $630 billion USD in 61,243 locations. To identify projects supported through trust funds (TFs), we scrape the World Bank documents and reports page for TF numbers associated with individual World Bank projects (World Bank, 2022a). The data list all trust-fund numbers that were associated with individual projects. We use these data to construct a binary indicator that is coded as one if at

least one trust fund was associated with a project and as zero otherwise.[3] Fig. 2 displays the grid-cell level estimates of gross cell product (grey-colored cells) and the location of World Bank projects (blue dots) in 2014.

In addition to fixed effects, we include three main control variables in all estimations. First, we control for the number of people living in particular grid cells. We do so, as short-term fluctuations in population could impact both the degree to which the World Bank focuses on a sub-national location and its economic activity (Tollefsen et al., 2012). Second, we aim to ensure that spillovers from the economic productivity of a given country do not impact our results. High-growth countries often turn into donor-darlings and growth at the country-level makes growth at the grid-cell level more likely. Therefore, we include a measure of GDP growth that is calculated by aggregating the GCP of all grid cells within a given country at time t-1 and dividing it by the same measure from t-2. Third, we include a measure of the logged GDP of a given country for the same reason. All control variables are lagged by one year to avoid simultaneity bias.

In sum, we estimate the following type of model to assess our key hypothesis:

$$Y_{i(j)t} = \alpha\chi_{i,t-1}^{TF} + \beta\chi_{i,t-1}^{WB} + X_{i,t-1}^{'}\mathrm{I} + X_{j,t-1}^{'}\Delta + \varphi_i + \vartheta_t + \varepsilon_{it} \tag{1}$$

In Eq. (1), $y_{i(j)t}$ is the GCP of cell i (nested in country j) in year t, while χ^{TF} and χ^{WB} are binary indicators respectively denoting active disbursing trust fund projects and core-funded projects. Moreover, $X_{i,t-1}$ is a matrix of grid-cell covariates, $X_{j,t-1}$ collects country covariates, and φ_i and ϑ_t are the fixed effects.

4.1. How does trust-fund assistance differ from core-funded assistance?

Before estimating the local impact of trust-funded development assistance, we aim to understand to which types of activity such assistance is allocated. In the World Bank, donors often set up trust funds to focus on specific issue areas. These issue areas have substantially different implications for countries short-term economic growth. Clemens et al. (2012) show that analyses of the impact of aid on growth can lead to faulty conclusions when studies compare aid primarily targeted at economic growth with aid that focuses on different aims. Therefore, we used their coding scheme to identify whether projects have growth-related objectives by drawing on the CRS codes they designate as growth-focused. These projects are "given for real sector investments for infrastructure or to directly support production in transportation (including roads), communications, energy, banking, agriculture and industry" (Clemens et al., 2012, pp. 598–599).

Table 1 displays the number of grid-cells that have different types of World Bank projects. The data show that the World Bank funded 681 projects targeted at immediate economic growth, which adds up to approximately 11% of their projects in the period under examination. The data also illustrate the anticipated difference between the short-term growth focus of projects funded by TFs and by core resources. While 40% of core-funded projects focus on short-term growth, 31% of trust-funded projects do so. To ensure that we compare projects that target the most similar objectives, we focus our analysis on only those 681 projects that target short-term economic growth. Projects can have multiple locations and are active an average of 5.3 years. Short-term

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[2] An arc-minute is a unit of measurement used in land surveying. It is an angular measure and an arc-minute is roughly equal to 0.017 of one degree.
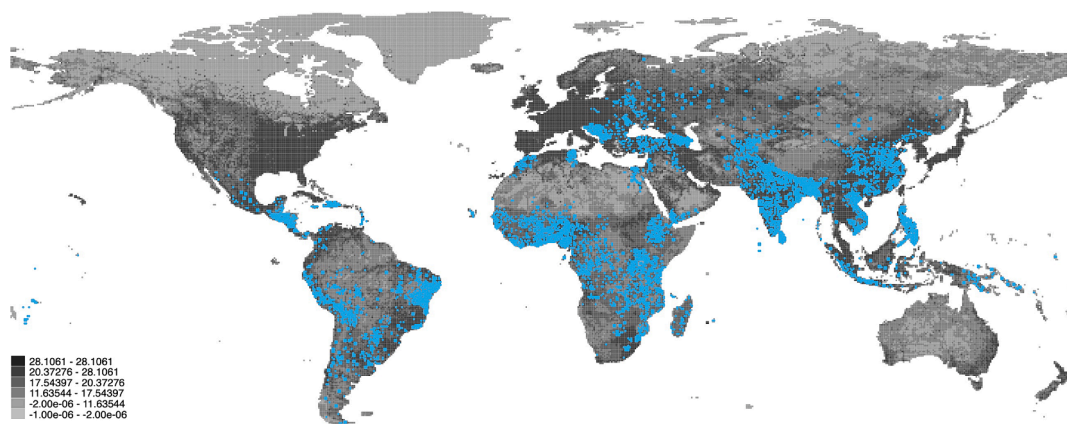
[3] Our attempts to persuade the World Bank to share internal data on financing arrangements with us were unsuccessful and World Bank data experts confirmed in interviews that these data include the most complete information available outside of the Bank. We are confident that our data covers the vast majority or all trust-fund assistance these projects received. However, we are unable to identify the kind of trust-fund assistance or what share of individual projects' financing came from trust funds. We believe that this limitation is acceptable, as many of the transaction costs materialize as soon as trust fund money is used in a project.

Fig. 2. The location of World Bank projects and local economic productivity (2014). Note: (logged) Gross cell product scaled by box plot values, blue dots indicate the location of World Bank projects in 2014. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Table 1
Number of projects by funding type and objectives.

Project type	Growth-focused projects	Other projects	Total number of projects
Trust-funded projects	412 (60%)	3492 (69%)	3904 (68%)
Core-funded projects	269 (40%)	1582 (31%)	1851 (32%)
All projects	681 (100%)	5074 (100%)	5755 (100%)

growth focused World Bank projects target 16,269 of the 907,951 grid cells in our dataset. Since our main dependent variable is economic growth, we restrict our sample to growth-focused projects in our main specifications. To dispel concerns that we only focus on a small subset of World Bank projects, we expand our sample and use alternative dependent variables in robustness checks presented below. We verify our decision to analyze growth-focused projects using regression analysis in the Appendix (Table A4). When taking all World Bank projects as equally focused on growth, we would conclude that areas where World Bank projects disburse do not see a substantial boost in GCP. However, when disaggregating the different types of projects, the models reveal a positive association of short-term growth projects with GCP.

One additional concern is that trust-funded projects are substantially different in their design than core-funded projects, even when restricting the sample only to growth-focused projects. For example, donors could push for more gender, sustainability or social components within growth-focused projects. To probe such differences, we ran a simple text analysis on the objectives the World Bank records for both types of projects in their project database (Tables A2-A3; Fig. A1). Small differences aside, we do not see a greater focus on gender, sustainability or social issues in trust-funded growth-focused projects compared to core-funded growth-focused projects. Furthermore, the term growth is in the top-25% of terms used for both core-funded and trust-funded projects. If anything, the term is relatively more prominent for trust-funded than core-funded projects. Given the descriptive picture of project objectives, we argue that the two types of growth-focused projects are comparable.

4.2. Impact of trust-funded development assistance

We now evaluate our primary hypothesis regarding the impact of the project-funding type on the effectiveness of World Bank development assistance. We present the results from baseline TWFE models, and then proceed with additional estimates using three different identification strategies.

In a first step, we estimate several basic TWFE models that predict the association of World Bank projects with economic productivity within grid cells. Our models include grid-cell fixed effects and year-fixed effects to absorb heterogeneity across grid-cell effects and common time shocks. TWFE models are equivalent to a weighted average of a set of two time period difference-in-difference estimators (Baker et al., 2022; Goodman-Bacon, 2021; Imai & Kim, 2021). The estimator compares differences in the (logged) gross cell product between 50x50km grid cells and within 50x50km grid cells over time. All covariates are lagged by one year to avoid simultaneity bias. We cluster standard errors at the grid-cell level to minimize the bias in standard errors due to serial correlation in all four models and include our three main control variables (log grid-cell population, country-year growth and log country-year GDP).

As discussed, we analyze only growth-focused projects in Table 2. Model 1 shows the overall association of growth-focused World Bank project and GCP. Model 2 estimates the association of core-funded

Table 2
Comparing core-funded and trust-funded projects.

	(1)	(2)	(3)	(4)	(5)
Growth projects	0.0648***				
	(0.0036)				
Core-funded growth projects		0.1004***		0.0976***	0.1058***
		(0.0070)		(0.0070)	(0.0076)
Trust-funded growth projects			0.0539***	0.0524***	0.0540***
			(0.0038)	(0.0038)	(0.0038)
Interaction					−0.0399**
					(0.0138)
Population (log)	0.2132***	0.2156***	0.2143***	0.2131***	0.2131***
	(0.0062)	(0.0062)	(0.0062)	(0.0062)	(0.0062)
Country GDP (log)	0.6200***	0.6199***	0.6205***	0.6198***	0.6198***
	(0.0142)	(0.0142)	(0.0142)	(0.0142)	(0.0142)
Country growth	0.0713***	0.0715***	0.0715***	0.0713***	0.0713***
	(0.0033)	(0.0033)	(0.0033)	(0.0033)	(0.0033)
Grid-cell fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	760,727	760,727	760,727	760,727	760,727
R^2	0.992	0.992	0.992	0.992	0.992

Standard errors clustered on grid-cells in parentheses; All predictors lagged by one year; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

projects with local economic activity. In Model 3, we re-estimate the same model but focusing on trust-funded projects. Model 3 includes both types of projects and Model 8 their interaction. Overall, the models clearly indicate that both types of World Bank projects increase local economic activity. The coefficients for core-funded projects (Models 1 and 3) and trust-funded projects (Models 2 and 8) are positive and statistically significant at conventional thresholds (p<0.001). Following Naaman (2016), the critical value for p<0.05 adjusted for a sample size of up to 1,000,000 is 5.41. The t-statistics (Model 3) for core-funded (14.97) and trust-funded projects (12.31) vastly exceed this critical value. However, the effect sizes differ between funding types. Model 4 indicates that core-funded projects are, on average, associated with a 10.25% increase in local economic activity while local economic activity only increases by 5.3% in areas where trust-funded projects are. The equivalence test shows that core-funded projects have a substantially stronger association with local economic activity than trust-funded projects (F=32.58; p<0.001). The interaction presented in Model 5 further sheds light on the differences between core-funded and trust-funded projects. The negative interaction implies diminishing marginal utility. Cells with only core-funded projects see an increase in local economic activity of around 11%, cells with only trust-funded projects an increase of 5.5% and cells where both are active an increase of 12.7%. Together these findings strongly imply that while World Bank projects are linked to increases in local economic activity in general, the effectiveness of projects focusing on short-term growth depends on the funding type. To verify that selection bias is unlikely, we conducted the validation exercise developed by Oster (2019). The estimates imply that unobserved confounders would need to have 26.2% of the explanatory power of our main control variables to nullify the coefficient for core-funded projects and 23.9% for trust-funded projects (Table A5). Given the lack of theoretical expectations for selection bias and the substantial variation in local economic activity explained by our models, we believe that it is unlikely that such a variable exists. Table 3.

In a second step, we use a spatio-temporal identification strategy based on Isaksson and Kotsadam (2018). Specifically, we compare cells with active disbursing World Bank projects and cells that have approved but not yet disbursing projects. Model 6 focuses on core-funded projects, Model 7 on trust-funded projects, and Model 8 includes both types of projects as well as their placebo variables. Due to the large sample size, coefficient sizes are much more informative than p-values. When projects are approved but are not disbursing funds yet, cells show substantially smaller economic activity than when World Bank projects are active and disbursing. Equivalence tests between the main conditions and the placebo checks are statistically significant (p<0.001) and

substantial. Cells with core-funded projects grow around five times as much compared to cells where core-funded projects are approved but no money is disbursing. Similarly, cells with trust-funded projects grow around three times as much compared to cells where trust-funded projects are approved but not yet disbursing. Finally, core-funded projects outperform trust-funded projects by at least 20% in the most conservative estimates.

The main identifying assumption behind TWFE models is common trends. Our estimates can only be interpreted as causal effects if grid cells with and without each type of World Bank project would have not seen an increase in growth rates in the absence of these projects. The placebo checks imply that the common trends assumption may not hold in our case as cells with core and trust-funded projects appear to differ in their growth trajectory before project start. We show more evidence for differential trends in the Appendix (Fig. A2).

In a third step, we use a re-weighting strategy to address potential inferential threats due to differential pre-treatment trends. Ryan et al. (2019) recommend using matching or weighting approaches to minimize differences in common trends. We utilize weighting techniques that adjust for differences in pre-treatment trends between control and treatment groups (Ahlfeldt, 2018; Ahlfeldt et al., 2019; Ryan et al., 2019). Specifically, we employ entropy balancing and re-weight observations to generalize to a hypothetical population in which control and treatment groups had the same pre-treatment trends (Hainmueller, 2012). Our weighting approach ensures that cells with core-funded and trust-fund-funded projects do not differ in the (logged) gross cell product in the five years before these projects started compared to cells without these projects. To this end, we create indicators that measure the average pre-treatment value for cells with core-funded and trust-funded World Bank projects within each grid cell for each of the five preceding years (t-1, t-2, t-3, t-4, and t-5). This entropy balancing approach means that cells with and without World Bank projects are equivalent in their logged gross cell product in the five pre-treatment years. Therefore, all changes we observe in the dependent variable cannot be due to observed or unobserved factors that create differing pre-treatment trends. Furthermore, we also balance on our three main control variables.

Table 4 displays the estimates from four TWFE models. Model 9 estimates the impact of core-funded projects, and Model 10 of trust-funded projects and Model 11 includes both trust-funded and core-funded projects. The estimates show that the demonstrated pre-treatment differences decreased the coefficients of World Bank projects. In other words, selection bias due to the selection of projects into poorer subnational locations appears to have led to an underestimation of the effects of World Bank projects on local growth rates. The coefficients for World Bank projects are positive and statistically significant at conventional thresholds (p<0.001) in all four models. Growth projects appear to increase local economic activity by approximately 18% on average (Model 9). However, we again demonstrate substantial

Table 3
Comparing core-funded and trust-funded projects.

	(6)	(7)	(8)
Core-funded projects	0.1110*** (0.0071)		0.1090*** (0.0071)
Trust-funded projects		0.0477*** (0.0041)	0.0433*** (0.0040)
Placebo (core-funded)	0.0280*** (0.0029)		0.0271*** (0.0029)
Placebo (trust-funded)		−0.0119*** (0.0029)	−0.0137*** (0.0029)
Population (log)	0.2138*** (0.0062)	0.2153*** (0.0062)	0.2125*** (0.0063)
Country GDP (log)	0.6198*** (0.0142)	0.6204*** (0.0142)	0.6197*** (0.0142)
Country economic growth	0.0714*** (0.0033)	0.0715*** (0.0033)	0.0713*** (0.0033)
Grid-cell fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	760,727	760,727	760,727
R^2	0.992	0.992	0.992

Standard errors clustered on grid-cells in parentheses; All predictors lagged by one year; * p < 0.05, ** p < 0.01, *** p < 0.001.

Table 4
Sub-national effectiveness of core-funded and trust-funded assistance (re-weighting).

	(9)	(10)	(11)
Core-funded projects	0.1662*** (0.0215)		0.2394*** (0.0204)
Trust-funded projects		0.0661*** (0.0104)	0.0679*** (0.0084)
Grid-cell fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	760,727	760,727	760,727
R^2	0.991	0.989	0.988

Standard errors clustered on grid-cells in parentheses; All predictors lagged by one year; * p < 0.05, ** p < 0.01, *** p < 0.001.

heterogeneity across funding types. Model 11 implies that core-funded projects increase local economic activity by 275%, while trust-funded projects increase it by a more modest 7%. Again, equivalence tests confirm the substantial difference between the two estimates (F=74.55; p<0.001). Furthermore, the results are robust to large-sample p-value adjustments: the t-statistics (11.28 for core-funded and 7.42 for trust-funded projects) exceed the critical value of 5.41 for a sample size of up to 1,000,000 and p<0.05 (Naaman, 2016). Since we minimized pre-treatment differences, we are confident that these estimates can be interpreted causally.

Finally, we re-estimate models using an alternative identification strategy that leverages the exogenous distribution of the grid cells in the PRIO-GRID (Table 5). As discussed, the PRIO-GRID separates the globe into equally sized 50x50km grid cells. Since these grid cells are unrelated to administrative boundaries, selection into one grid cell versus neighboring grid cells in the same country is quasi-random. We leverage this assignment by restricting the sample to all grid cells that fulfill two criteria: First, they are in the same country as grid cells that had an active disbursing World Bank project. Second, they border a grid cell that had an active disbursing grid cell in the time period under observation. The coefficient size is substantially smaller than in the previously displayed regression models. However, the substantive interpretation of the results remains consistent. Both core-funded and trust-funded projects are associated with increases in local economic activity. Core-funded projects increase economic activity by approximately 3% and trust-funded projects by approximately 1.6%. Equivalence tests again show that the difference is statistically significant (p<0.05).

The effect sizes of our estimates vary between the models presented throughout. Depending on the estimation approach used, having a core-funded project increases local economic activity by between 3% and 20%. Trust-funded projects increase local economic activity by between 1% and 6%. Some of these effect sizes might seem very large. However, it is important to keep in mind that our estimates are at a much more granular level than most studies of the link between aid and growth. The average country has approximately 340 grid cells and a strong effect in a particular grid cell may still average out to a much smaller impact on the regional or country-level. Our estimates are also consistent with the results of similar studies at the grid-cell level. For example, Bitzer and Gören (2018) estimate a growth effect of approximately 0.95% for a 1% increase in the number of World Bank projects. We use a similar estimation approach in the Appendix (Tables A22 and A23), and attain similar results (0.3% growth for a 1% increase in all projects; 0.7% growth for a 1% increase in growth-funded projects). Furthermore, our goal was not to quantify the exact impact of World Bank projects on economic growth. Many studies have provided important insights into this question (see Doucouliagos and Paldam, 2009, Dreher, Lang,

Reinsberg, 2024). Our goal was to understand whether core-funded projects, where the World Bank has more autonomy, perform better than trust-funded projects, where the World Bank has less autonomy. Irrespective of the estimation approach used, our models imply that core-funded projects increase local economic activity substantially more than trust-funded projects. Given the consistent results throughout this article, we are confident in the main conclusion that projects that afford more autonomy to the World Bank make a bigger impact on economic growth than projects that constrain World Bank autonomy more.

5. Robustness checks

We conduct several additional tests to ensure robustness to alternative modelling choices. In these models, we vary estimation techniques, alter sample restrictions, and change key dependent, independent and control variables. The results are robust to all of these alternative specification choices.

5.1. Verifying model assumptions

Recent debates on two-way fixed effects models have pointed to three main problems of canonical TWFE models: negative weights, the assumption of no feedback, and constant treatment effects (Goodman-Bacon, 2021; Liu et al., 2022). To overcome these limitations, we re-estimate our models using a particular variant of TWFE models, Liu et al.'s (2022) fixed effects counterfactual estimator, which does not rely on these assumptions. We find sustained positive grid-cell effects of World Bank projects during a five-year period after project implementation. The positive effect is substantively larger and always statistically significant for core projects (Fig. A3). For TF-supported projects, it is substantively weaker and statistically significant except in the first year after project start (Figs. A3 and A4). In both cases, we see significantly negative pre-treatment trends, suggesting that the Bank selects project localities that perform poorly. While subsequent growth may reflect 'reversion to the mean', we consider this unlikely because growth increases every year after the project is implemented and is sustained for at least five years. This suggests that substantive project activities are driving the results. Additionally, we address the argument directly by re-weighting observations to be balanced on pre-treatment trends in our main models (Table 4).

We further examine the negative weight problem through decomposition (Goodman-Bacon, 2021). Since decomposition does not allow for reversal in treatment, we recode observations, so that grid cells remain treated after they have been treated once. This changes the substantive interpretation slightly from the impact of projects during implementation to the impact of projects during and after implementation. The decomposition shows that our estimations rely mainly on the unproblematic comparison between treated and non-treated groups, rather than timing groups which often give rise to the negative weight problem (Tables A6 and A7).

5.2. Alternative specification choices

In addition, we employ a host of alternative specification techniques. Specifically, we minimize three-year (Table A8) and ten-year differences (Table A9) in pre-treatment trends between the control and treatment group. We also re-estimate models without entropy balancing and without control variables (Table A10). Furthermore, we re-estimate our main regressions with Poisson-pseudo maximum likelihood models instead of OLS (Table A11). None of these alterations affects our conclusions. Finally, we employ a shift-share instrumental variable design to address endogeneity in the assignment of projects to grid cells. We rely on a compounded instrument that assumes that the overall number of cells that attain core-funded or trust-funded projects affects economic growth in specific cells only through the greater likelihood that these cells attain a project funded by the respective source. The instrument

Table 5
Sub-national effectiveness of core-funded and trust-funded assistance (restricted sample).

	(12)	(13)	(14)
Core-funded projects	0.0297***		0.0297***
	(0.0059)		(0.0059)
Trust-funded projects		0.0167***	0.0167***
		(0.0034)	(0.0034)
Population (log)	−0.0156	−0.0179	−0.0178
	(0.0141)	(0.0141)	(0.0141)
Country GDP (log)	0.6257***	0.6264***	0.6258***
	(0.0123)	(0.0123)	(0.0123)
Country economic growth	0.0466***	0.0468***	0.0466***
	(0.0049)	(0.0049)	(0.0048)
Grid-cell fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	119,546	119,546	119,546
R^2	0.993	0.993	0.993

Standard errors clustered on grid-cells in parentheses; All predictors lagged by one year; * p < 0.05, ** p < 0.01, *** p < 0.001.

does not vary cross-sectionally but we introduce cross-sectional variation through interacting the instrument with the share of projects a given grid cell attains. We believe that this instrument is excludable, conditional on grid cell and year fixed effects. We obtain that core-funded projects stimulate growth, whereas TF-supported projects do not (Table A12).

5.3. Robustness to alternative sample restrictions

In our main specification, we drew on a sample of all projects whose objectives have direct implication on short-term economic growth following Clemens et al. (2012). In the appendix, we conduct a robustness check focusing on sub-national estimates of the Human Development Index (HDI) by Kummu et al. (2018). This indicator allows us to include projects focusing on health and education in addition to the short-term growth projects in our estimates. By doing so, we increase the sample to 41% of all WB projects. Core projects have significantly positive effects on the HDI but TF-supported projects do not (Table A13). Additionally, we also re-estimate models using the full sample of projects and (logged) GCP as a dependent variable. We again find a significant difference in the effectiveness of core projects and TF-supported projects (Table A14).

Another type of sample restriction relates to the choice of countries we include in our estimates. In robustness checks, we use a more stringent criterion and only include grid-cells from countries that had received at least one World Bank project during the period of interest (Table A15). Alternatively, we use cells that had active disbursing World Bank projects at any point of the study period (Table A16). In both tests, our results are qualitatively unaffected. Moreover, we re-estimate the models while excluding each world region at a time to confirm that differential data quality across world regions does not affect our results (Table A17).

5.4. Robustness to altering key variables

We also test robustness to various ways to operationalize our dependent, independent variables and control variables. First, we utilize an alternative measure of gross cell product provided in the PRIO-GRID database (Tollefsen et al., 2012) based on Nordhaus (2006). The variable is only available at five-year intervals between 2000 and 2010 and we use the last available observations for subsequent values (Table A18). Additionally, we test robustness to using the (logged) growth in night light elasticity as an alternative dependent variable following Bitzer and Gören (2018) (Table A19). We also use the first-difference of our dependent variable as dependent variable (Table A20) and estimate error correction models (Table A21). While coefficient estimates are somewhat smaller using these alternative data, we obtain qualitatively similar results: While core-funded projects boost growth by about 4.2%–7.9%, TF-supported projects do so by only 2.5%–3.3%.

Second, we employ alternative measures for our key independent variables. These include project count models for both growth-funded and all projects (Tables A22 and A23), (logged) amount of disbursed aid instead of a binary variable (Table A24), as well as two-year and three-year lags to account for a slower impact of projects on local economic activity (Tables A25 and A26). For example, using a continuous measure of aid, we find that a 10% increase in growth-focused core funding increases growth by 0.27%, whereas a similar increase in TF support decreases growth by 0.22%. When employing project counts as measures, any additional core-funded project (irrespective of its growth focus) increases growth by 0.8%, while an additional trust-funded project does not show a statistically significant association with local economic activity. The magnitude of these estimates is in line with other subnational aid effectiveness research (Dreher et al., 2021b). Third, we also employ additional sub-national control variables. Specifically, we control for differences in local infrastructure by accounting for average

local night lights within a given cell. We also control for agricultural land, urbanization, and forest cover. Furthermore, grid cells differ in their accessibility for development projects. Therefore, we control for the average distance to the next city and the distance to the capital city (Table A27). We also re-estimate models controlling for a lagged dependent variable (Table A28). Given the robustness of our results, we are confident in our main conclusion: trust-funded projects have a consistently smaller impact on economic growth than core-funded projects.

6. Conclusion

What explains differences in the ability of international organizations to deliver effective development projects? Using the case of the World Bank, we examined whether the effectiveness of development projects is determined by their autonomy. Specifically, we compared core-funded projects—where the World Bank has more autonomy—and trust-funded projects—where autonomy is more constrained—with respect to their impact on sub-national economic growth. Using TWFE models, we found that core-funded projects exert significant positive effects on economic growth. In contrast, when accounting for core-funded projects, projects supported by trust funds have smaller tangible impacts on economic growth. These results withstand numerous robustness checks, such as different measurement of grid cell product, model specifications, and an alternative dependent variable. Importantly, the results are unlikely to be explained by selection effects, whereby pre-existing features of a grid cell affect both our outcomes of interest and the likelihood of receiving specific funding types. Our results even hold when balancing for pre-treatment trends in both funding types, which minimizes the confounding impact of differing pre-treatment trends.

We note some limitations of our study. First, while we have examined a range of outcomes at the sub-national level, we have not covered other important positive or negative outcomes, such as environmental degradation or water and sanitation. Arguably, World Bank projects may also seek to improve these outcomes. We encourage future research to probe the generalizability of our results with respect to additional outcomes. Second, our analytical framework has focused on capturing short-term effects, identifying changes in relevant outcomes during the time a project was active. While projects may take more time to generate tangible results, missing the longer-term effects of such projects is not problematic to the extent that there are no systematic differences between projects with different funding sources. In our case, trust-funded projects often have shorter time horizons, given their need to demonstrate 'value for money'. Hence, we would under-estimate the relative benefits of core-funded projects relative to trust-funded projects. Third, our measures of funding sources are necessarily crude. We used a dummy variable for trust fund support to avoid arbitrary coding decisions for distinguishing among different kinds of trust funds. Some trust funds allow more flexibility in the use of funding than others, and the extent to which earmarking within the trust-funded program is possible may vary. While our results indicate that trust fund support increases growth rates less than core-funded assistance, there is considerable heterogeneity in trust funds, and we need to learn more about this heterogeneity to understand when and under which conditions trust fund support is as effective as core funding.

Our results hold important implications for scholars and policy-makers alike. Scholars have become increasingly concerned about the impact of IO autonomy on their performance (Heinzel et al., 2023; Honig, 2019; Lall, 2017). However, they rely mainly on organizational performance evaluations rather than assessing the impact of IO autonomy on the key societal impacts they are meant to bring about. We revisit this debate utilizing differences in project-level autonomy based on funding structures. This approach also allows us to contribute to policy debates on the consequences of earmarked funding. Using novel data on funding sources of World Bank projects and grid-cell data on

local economic growth, we show that core-funded projects are more effective in promoting growth than projects supported by trust funds. While our results focus only on the World Bank, we have reason to believe that they generalize to other international development organizations, such as the United Nations entities, which are even more dependent on earmarked funds and where 'bad practices' in earmarking are more prevalent (Reinsberg, 2023). Overall, we establish that earmarked projects are only 'second-best' projects when it comes to promoting economic development. This does not mean that these projects perform worse than bilateral aid projects. In fact, they may still outperform these projects. While comparative analysis of the subnational effectiveness of multilateral projects and bilateral projects is beyond the scope of our study, it represents a fruitful avenue for future research. In this regard, we welcome efforts to collect systematic data on subnational aid projects beyond only a handful of donors (Bomprezzi et al., 2024).

CRediT authorship contribution statement

Mirko Heinzel: Conceptualization, Data curation, Investigation, Methodology, Project administration, Validation, Visualization, Writing – original draft, Writing – review & editing. **Bernhard Reinsberg:** Conceptualization, Funding acquisition, Investigation, Methodology, Supervision, Validation, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data and code to replicate this article can be found in the supplementary materials.

Acknowledgements

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.worlddev.2024.106609.

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