Received: 29 March 2022 | Revised: 1 December 2022 | Accepted: 5 December 2022

DOI: 10.1111/rode.12967

REGULAR ARTICLE

WILEY

Budget support to the health sector—The right choice for strong institutions? Evidence from panel data

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Abstract

This article examines the relationship of sector budget support to the health sector and the infant mortality rate for developing countries. Project-type interventions have been widely used in developing countries in the past decades. These smaller-scale interventions often did not bring the results that the donors would have wanted, at least on a macro level. At the beginning of the millennium, forums on aid effectiveness proposed new principles to increase the effectiveness of aid. Many scholars agreed that one of the answers would be budget support. This article tries to answer whether budget support is the efficient aid modality in countries with strong institutions. In the baseline scenario, a panel data analysis is applied, which includes 113 countries between 2010 and 2018. This dynamic linear panel model is estimated by using ordinary least squares (OLS) and system generalized method of moments (GMM). Health sector aid, in general, has a significant and negative effect on the infant mortality rate in the average country. Sector budget support is insignificant in the baseline estimation and when interacted with a governance variable. In contrast, project-type interventions exhibit significant and negative effects on the outcome variable. The results indicate that sector budget support might not be the superior choice among the aid modalities in the health sector, even in countries with good governance.

KEYWORDS
development, development policy, health, mortality, official development assistance

JEL CLASSIFICATION
F35, I15, I18, O15, O20

1 | INTRODUCTION

Ever since the first dollar of development aid has been transferred to developing countries, there has been a debate on the effectiveness of aid and the ideal way how it should be delivered. In the early years, there was still a lack of quantitative analyses (Adelman & Chenery, 1966; Baldwin, 1969), and the focus laid on the relationship between aid, savings, and investments, inspired by the Harrod-Domar model (Arndt, Jones, & Tarp, 2010).

This changed by the end of the 1990s. Starting with a political debate, dominated by Jeffrey Sachs and William Easterly, the question was if and how aid should be delivered.[1] Then, a large number of cross-country empirical evidence was published. These studies mainly examined the effect of aid on gross domestic product (GDP) growth. The ambiguous results did not solve the political debate either. On the one hand, aid was perceived to positively influence growth (e.g., Burnside & Dollar, 2000; Hansen & Tarp, 2001), and on the other hand, no significant relationship between these two variables could be found (e.g., Easterly, Levine, & Roodman, 2004; Rajan & Subramanian, 2008). This debate has not ended yet. While the meta-study by Mekasha and Tarp (2013) finds an overall significant and positive effect of aid on growth, more recent studies of aid on growth and aid on productivity find ambiguous or even negative effects (e.g., Bird & Choi, 2020; Groß & Nowak–Lehmann Danzinger, 2022).

A third strand of literature focuses on aid on a more disaggregated level. This includes experimental approaches or impact evaluations of single development activities (e.g., Banerjee & Duflo, 2012) and studies researching the effect at the sub-national level. One common approach is to use geocoded aid data and the nightlight density to estimate the effect of aid on growth (e.g., Dreher et al., 2021; Khomba & Trew, 2022). Other studies only examine the effect of aid on specific sectors. The idea of these approaches is that the contradicting results regarding aid and GDP growth might be explained by the time it takes until aid flows are translated into economic growth and the complex link between these two variables. Therefore, some authors look at more disaggregated data where potential outcomes are more closely related to the aid flows, and a possible effect can be identified more easily. One example is aid to the health sector. Similarly, some studies use cross-sectional data, while others look at sub-national data only. The advantage of sub-national data and the focus on one country only is that a clear picture of the effect of aid on health outcomes can be drawn. De and Becker (2015), for example, find a positive effect of health-related aid on the decrease of disease severity in Malawi. Kotsadam, Østby, Rustad, Tollefsen, and Urdal (2018) look at the effectiveness of aid on the infant mortality rate in Nigeria. They find that a closer proximity to aid projects leads to lower infant mortality in the area. However, the results from these studies might not necessarily be valid in other countries. Thus, it might be interesting to look at panel data studies as well to get a broader view of aid effectiveness in the health sector. Mishra and Newhouse (2009) find a significant effect of health sector aid on infant mortality. Similarly, Yogo and Mallaye (2015) show that a significant relationship exists between health sector aid and child mortality. Recent studies of health aid on the infant mortality rate support these positive effects on the decrease of the outcome variable (e.g., Woode, Mortimer, & Sweeney, 2021). These results regarding health outcomes[2] are in line with the development of several health indicators that show dramatic improvements over the past 30 years in low- and middle-income countries (World Bank, 2021). For example, life expectancy at birth improved from around 63 years in 1990 to around 71 in 2018. Similarly, the infant mortality rate fell from around 71 in 1990 to around 31 in 2019 (World Bank, 2021). However, apart from the previously cited studies, evidence with respect to the effectiveness of health sector aid compared to official development assistance (ODA) is still relatively rare.

In addition, most researchers look at general aid only. However, to improve policy recommendations, it is essential to further distinguish between different kinds of total aid or even different kinds of health sector aid. The Development Assistance Committee (DAC) of the Organisation for Economic Co-operation and Development (OECD) defines eight different modalities on how aid can be delivered (OECD, 2021b),[3] with the most well-known forms of aid being project-type interventions and budget support, which will be further examined in this study.

To the best of the author's knowledge, no cross-section analysis has yet either tested the effectiveness of budget support in the health sector or compared these two types of delivering aid to recipient countries. This distinction might be the answer to the debate of Easterly and Sachs since different institutional settings might simply require different aid modalities.

This is why, in this article, a panel study is conducted to estimate the effect of health sector aid on infant mortality using 113 countries between 2010 and 2018 in the baseline scenario. Similar to the article by Mishra and Newhouse (2009), the starting point is the aforementioned relationship, to then further disaggregate the aid data into project-type interventions and budget support. Eventually, an interaction term between a governance variable and budget support is used to test if the modality performs any better in the presence of strong institutions.

The main findings of this article are that aid to the health sector does significantly decrease the infant mortality rate. The same applies to project-type interventions where an even stronger effect can be found. Sector budget support has no significant effect on infant mortality for the standard specification. The effect remains the same when budget support is interacted with a governance variable.

The course of this paper is as follows: Section 2 provides an overview of the two aid modalities, project-type interventions and budget support, and discusses their advantages and disadvantages. In Section 3, the empirical specification and identification strategies are introduced, and the data are briefly described. Section 4 presents the results with respect to the hypotheses formulated and tests their robustness. Section 5 summarizes the results and concludes.

2 | AID MODALITIES

Project-type interventions, often simply known as project aid, are the most well-known and most widely used aid modality. They are defined as a “set of inputs, activities and outputs … to reach specific objectives/outcomes within a defined time frame, with a defined budget and a defined geographical area" (OECD, 2018). In 2019, more than US$119 billion in ODA had been transferred to developing countries. Project-type interventions accounted by far for the largest fraction with a volume of around US$62 billion and a share of around 52% (OECD, 2021a). Apart from many advantages[4] and positive evaluation results,[5] there has been a debate about the Micro–Macro paradox (Mosley, 1986) and criticism toward the modality itself. The main problems are that projects are often supply-driven, usually involve high transaction costs, undermine the local administrative capacity, and establish parallel systems for aid resources (Leiderer, 2012).

At the beginning of the new millennium, international summits took place in Rome and Paris to tackle these problems and increase aid effectiveness. There, the international community agreed on five fundamental principles: ownership, alignment, harmonization, managing for results, and mutual accountability. These principles were meant to mitigate the problems of past development cooperation. However, neither the Rome nor the Paris Declaration contains a clear recommendation that aid modality should be used to achieve the goals set, though both implicitly urge for an expansion of budget support (OECD, 2003, 2006).

Aid flows are labeled as budget support if ODA is directly transferred to the recipient's budget and the donor relinquishes a part of the exclusive control over its funds.[6] Two subcategories of budget support exist: general budget support and sector budget support. While the funds are unearmarked with general budget support, sector budget support is narrower. Here, donors and recipients intend to achieve specific targets in different sectors, for example, health and education (OECD, 2018). Koeberle and Stavreski (2012) provide an overview of the characteristics of budget support. Funds are channeled through the recipient country's budgetary process and provided at regular intervals, aligned with the respective budget cycle. The aid flows are intended to support the recipient country's development program, for example, specific actions to improve the healthcare system. In addition, performance assessments and an accountability framework are implemented by the recipient. Before budget support is provided, the donor and the recipient agree on general priorities of government spending.

Koeberle and Stavreski (2012) argue that eventually, budget support will strengthen country ownership and lead to more sustainability. Budget support lowers transaction costs for the recipient country and increases transparency and efficiency in contrast to traditional development aid approaches. Further advantages are the implementation of government-wide policies, increasing accountability to the home country and the recipient, and support of the recipient's budgetary process. However, even though the transaction costs of the implementation decrease with budget support, they could also increase, at least in the short term. This is due to the fact that aid flows are fungible, and the donor cannot observe if the contributions are used productively or if they end up in unintended channels due to rent-seeking or corruption. Other concerns are that the institutions in the recipient countries might not be ready to handle large sums of aid, leading to an inefficient use. Budget support had a much smaller volume with around US$4 billion in 2019 and a share of 3% of overall aid. When distinguishing between general budget support and sector budget support, sector budget support accounts for approximately two-thirds of overall budget support (OECD, 2021a).

Since the formal introduction of budget support at the beginning of the 2000s (Koeberle & Stavreski, 2012), the literature has provided mainly theoretical essays and evaluations with only a few cross-country analyses. In the theoretical literature, Leiderer (2012) highlights the importance of harmonization and coordination between the donors, which could be achieved by budget support, while Cordella and Dell'Ariccia (2007) argue that budget support is preferable to project aid if the preferences of the donor and the recipient are aligned. Country case studies mainly discuss the aspect of conditionality and find, in contrast to the theory, that recipient countries often cannot freely decide how the money is spent. Some donors rather use the modality as leverage over the recipient government with respect to reforms and the direction of the development program (e.g., Faust, Leiderer, & Schmitt, 2012; Swedlund, 2013). This view is supported by Swedlund and Lierl (2020) claiming that budget support did not increase ownership of the recipient countries. Apart from these negative findings, Orth, Schmitt, Krisch, and Oltsch (2017) conduct a systematic review regarding the effectiveness of budget support. They find that budget support positively affects the harmonization between donors and recipients, reduces transaction costs on the recipient side, and increases public spending. However, there is still a lack of evidence in other areas, for example, with respect to corruption. Dijkstra (2018) reviews several recent country evaluations and draws a rather positive picture of budget support, especially with respect to the reduction in poverty.

Fernandes Antunes et al. (2013) conduct a panel study on the effect of general budget support on health spending in lower- and middle-income countries. There, no significant effect for general budget support could be found. Other studies compare project aid and program aid with respect to aid volatility, like the one by Fielding and Mavrotas (2005). Williamson and Dom (2010) focus on sector budget support, in particular. Based on several country case studies, they find that sector budget support leads to an expansion of service delivery, quality, and efficiency.

In general, the effectiveness of budget support should be higher if the recipient country has implemented a sound institutional framework.[7] The modality is seen as especially suitable for countries with high ownership, strong commitment, and the capability to allocate the resources effectively (Koeberle & Stavreski, 2012). The literature on good governance suggests similar results, where aid is typically seen to be more effective in such environments (e.g., Acemoglu, Johnson, & Robinson, 2004; World Bank, 1992). One apparent reason is that transaction costs for donors are lower since the probability of misuse or allocation into the wrong channels decreases. Recent contributions confirm these results. Doucouliagos, Hennessy, and Mallick (2021) show that health aid significantly reduces infant mortality in the presence of good governance. Similarly, Langnel and Buracom (2020) argue that health expenditure seems to be more effective in countries with a higher administrative capacity, and Tarverdi and Rammohan (2017) find that higher levels of governance lead to lower levels of mortality under age 5. However, some authors question the importance of democracy or good governance. Olson (2001) points out that an authoritarian leader may have the incentive to provide some public good to increase his or her personal revenues from taxes. This might be the case for the health sector. Similarly, Prahalad (2006) argues that bureaucrats might have the incentive to let business flourish in some sectors—even though they are corrupt or authoritarian—if they benefit from it.

3 | EMPIRICAL FRAMEWORK

As mentioned earlier, this paper examines the effectiveness of sector budget support to the health sector. Natural candidates for outcome variables would be the life expectancy, mortality rates, or the incidence of a disease. While the life expectancy at birth is based on death probabilities, the incidence of a disease might change quickly but not sustainably in the presence of a shipment of drugs. In addition, global reliable data on the incidence of diseases is scarcely available. Compared to the previous examples, mortality rates are often based on surveys and not probabilities and are widely available from relatively reliable sources. This is why infant mortality is often found as a dependent variable in the literature (e.g., Boone, 1996; Mishra & Newhouse, 2009). Further, infant mortality might also be favorable over child mortality as results can be achieved faster. Boone (1996) argues that infant mortality is a flash indicator of the living conditions of the poor since it quickly reacts to their economic status and access to health services.

In this article, the distinction between sector budget support and project-type interventions[8] is of particular interest. The OECD provides data regarding these aid types only from the beginning of the millennium. Therefore, the panel consists of data from 113 countries between 2010 and 2018. The first identification strategy employed is the pooled ordinary least squares (OLS) estimator. This can be seen as the usual starting point for panel data analysis. The regression equation to be estimated is as follows:

$$logIM_{it} = \alpha logIM_{i,t-1} + \beta logAid_{it} + \gamma logX_{it} + \nu_t + \epsilon_{it} \quad (1)$$

IM_{it} denotes the infant mortality rate per 1,000 live births, Aid_{it} is the volume of health sector aid per capita, and X_{it} is a vector of control variables in country i at time t. The control variables consist of the size of the population, the fertility rate, the real GDP per capita, the regulatory quality, the HIV rate, and the share of the urban population. The model also includes $IM_{i,\ t-1}$, which is the lagged infant mortality rate. Thereby, the model is a dynamic panel model since the lagged dependent variable is included. This is due to the fact that infant mortality is believed to be largely influenced by its past levels. Summary statistics of the variables and an overview of the countries included in the sample can be found in the Appendix in Tables A1 and A2, respectively. Finally, ν_t denotes a vector of time dummies and ϵ_{it} the error term.

Following Nickell (1981), one would expect that the error term is composed of three parts: one country-specific, one time-specific, and one time- and country-specific component. In Equation 1, the time-specific effects are already drawn out of the error term, though the exogenous regressors are likely correlated with the country-specific effect. Therefore, typically, if country fixed effects are introduced, the fixed effects estimator is used to control for this bias. In dynamic environments, however, dynamic panel biases can arise since the lagged dependent variable may be correlated with the fixed effect, especially in a small T environment. The within transformation of the fixed effects estimator does not solve this problem. Roodman (2009a) discusses two solutions of this so-called "dynamic panel bias." The first one is to purge the fixed effects by first-differencing the data. However, this does not completely solve the problem, predetermined variables might still be correlated with the differenced time- and country-specific error term. One possible solution is to instrument the differences with lagged levels of the regressors, as proposed by Anderson and Hsiao (1982) for two-stage least squares and by Arellano and Bond (1991) for the generalized method of moments (GMM) framework. To increase efficiency, especially for random walk-like variables, Blundell and Bond (1998) introduce the system GMM estimator. There, in addition to the proposition by Arellano and Bond (1991), a second equation is estimated. Instead of instrumenting the differences with lagged levels, levels are instrumented with lagged differences.[9] This system of equation approach will be used here, in addition to the OLS estimator.

$$logIM_{it} = \alpha\ logIM_{i,t-1} + \beta\ logAid_{it} + \gamma\ logX_{it} + \nu_t + s_i + \epsilon_{it} \quad (2)$$

$$logIM_{it} = \alpha\left(\Delta logIM_{i,t-1}\right) + \beta(\Delta logAid_{it}) + \gamma(\Delta logX_{it}) + \Delta v_t + \Delta\epsilon_{it} \tag{3}$$

Equation 2 shows the equation for the first-differenced case, where s_i is the fixed effect and levels are instrumented by their respective lagged differences. Equation 3 is the differenced equation where levels are used as instruments. The lagged dependent variable is treated as predetermined, while the aid variables are treated as endogenous leading to the following orthogonality assumptions (Blundell & Bond, 1998):

$$E(s_i) = 0,\ E(\epsilon_{it}) = 0,\ E(s_i\epsilon_{it}) = 0 \tag{4}$$

$$E(IM_{i,t-r}\Delta\epsilon_{it}) = 0 \quad \text{for} \quad t = 2,...,T \quad \text{and} \quad 3 \le r \le T-1 \tag{5}$$

$$E(Aid_{i,t-r}\Delta\epsilon_{it}) = 0 \quad \text{for} \quad t = 2,...,T \quad \text{and} \quad 3 \le r \le T-1 \tag{6}$$

$$E(\Delta IM_{i,t-1}(s_i + \epsilon_{it})) = 0 \quad \text{for} \quad 2 < t \le T \tag{7}$$

$$E(\Delta Aid_{i,t-1}(s_i + \epsilon_{it})) = 0 \quad \text{for} \quad 2 < t \le T \tag{8}$$

The assumptions regarding the error term of the system GMM estimator are presented in Equation 4. Equations 5–8 are the initial conditions for the variables of interest, where *Aid* is treated as endogenous (Baltagi, 2010) and r denotes the number of lags. The estimation is conducted by using the xtabond2 command presented in Roodman (2009a). Following Roodman (2009b) and to avoid a finite sample bias, the amount of instruments is restricted to four lags. Two concerns remain. The first is the problem of weak internal instruments, which is extensively discussed in Kraay (2015) for the case of the system GMM estimator. Second, similar to other estimation techniques, including a fixed effect, the system GMM estimator cannot fully capture cross-country heterogeneity (Wooldridge, 2016).

The data for the dependent variable and for most independent variables originate from the World Bank's database (World Bank, 2021). Even though the data from the World Bank are used in most cross-country empirical studies with respect to population parameters, it is still prone to errors. Since many countries lack complete registration systems for the specific variables, the indicators are often based on sample surveys or are derived by indirect estimation techniques. Errors in the data collection process therefore cannot be completely ruled out (World Bank, 2021). The aid data originate from the OECD DAC's creditor reporting system (CRS), which provides data on net ODA. The CRS includes deflated project-level disbursements by recipient country, aid type, and sector. Therefore, the aid flows can be disaggregated into sector budget support and project-type interventions and filtered by the health sector (OECD, 2021a). The CRS provides data on eight different sectors to which aid may be disbursed. The codes of interest for the health sector are 120 (Health), 121 (Health, General), 122 (Basic Health), and 123 (Non-communicable diseases). With respect to the aid modalities, the aid types A02 (sector budget support) and C01 (project-type interventions) are included (OECD, 2021b). Two limitations of the CRS data remain. First, only ODA data are available, ignoring other aid flows, for example, those from south–south cooperation. Second, even though the data are revised several times per year, the project-level data might still be subject to measurement error or underreporting (Mishra & Newhouse, 2009; OECD, 2021c). Eventually, the governance variable is taken from the worldwide governance indicators (WGIs), which are reported in units of a standard normal distribution.[10] In the main specifications, regulatory quality is taken as the governance variable. According to Kaufmann and Kraay (2021), this variable, together with government effectiveness from the WGI, measures the government's ability to formulate and implement sound policies. As indicated in Section 2, the government's administrative capability and capacities might be critical for the effectiveness of budget support. In a robustness test, government effectiveness and other governance variables are introduced as well.

The overall goal of this work is to identify the relationship between different modalities of health sector aid and infant mortality. Three hypotheses can be derived from the literature discussed earlier and tested using Equations 1–3.

Hypothesis 1. *Health aid has a beneficial effect on infant mortality.*

Hypothesis 2. *Sector budget support has a beneficial effect on infant mortality.*

Hypothesis 3. *Sector budget support, in the presence of good governance, has a beneficial effect on infant mortality.*

These three hypotheses are all alternative hypotheses. One would assume that the aid modalities negatively affect the infant mortality rate. However, since the word "negative" might be misinterpreted, the term beneficial is used. It is expected that aid is indeed effective, and a significant relationship can be found when looking at disaggregated data for the health sector. Therefore, Hypothesis 1 is tested against the null hypothesis that health aid has no effect. Following section 2, if one does not control for the institutions implemented in a country, sector budget support is believed to have no significant effect on infant mortality due to rent-seeking, corruption, and bureaucratic difficulties. Hypothesis 2 will be tested against the null hypothesis that sector budget support has no effect. However, if one controls for the institutional framework in a country, it is expected that sector budget support has a significant effect on countries with strong institutions. This is due to the fact that these countries might be able to handle the resource flows relatively better. Hypothesis 3 will be tested against the null hypothesis that sector budget support in the presence of good governance has no effect on infant mortality.

4 | RESULTS

4.1 | Main results

Table 1 shows the baseline results of the OLS and the system GMM estimations with respect to Hypothesis 1. The first three columns present the effect of health aid on infant mortality, excluding control variables, followed by three columns including regulatory quality and the last two columns including additional control variables. Table A3 in theAppendix shows the full results of the last two columns including control variables. For all eight specifications, we find a significant and negative effect of aid to the health sector on the infant mortality rate at least at the 5% level. The coefficient estimated by system GMM is larger in absolute terms compared to the one estimated by OLS. In column 9, for example, the health aid variable is significant at the

5% level with a coefficient of around −.0366. This means that a 1% increase in health aid reduces the infant mortality rate in the average country by around .0366%. The 95% confidence interval for the health aid coefficient is below zero for all estimations, ranging between −.0658 and −.0074 for the collapsed system GMM specification, including control variables. This indicates a beneficial effect of aid to the health sector. In contrast, the regulatory quality variable is insignificant for all specifications except for one where it is even positively significant at the 10% level. The reason might be that the lagged dependent variable already captures the long-term influence of regulatory quality on infant mortality while no short-term effect can be found.

In the GMM cases, Hansen's test for overidentifying restriction is conducted, which cannot be rejected at the 10% level. To test for serial correlation, the Arellano and Bond test is included as well. While no serial correlation, as expected, can be rejected at lag one at the 1% level, the AR(2) cannot be rejected.

The coefficient of the lagged dependent variable is slightly above one in all regressions, indicating that infant mortality exhibits an accelerating decrease. A value above one also means that infant mortality does not converge to its long-run equilibrium. Similar results have already been found by Mishra and Newhouse (2009).

In section 3, the first null hypothesis (H_0) was that health aid has no effect on infant mortality. This hypothesis can clearly be rejected for all specifications. Yet, the effect of health sector aid on the infant mortality rate is relatively small. Between 2010 and 2018, the average country in the sample received around US$83 million in health aid in total (USD 4.65 per capita) and had an infant mortality rate of around 33. As an example, if the volume of aid in this average country were doubled, the infant mortality rate would decrease by around 1.20 deaths per 1,000 live births.

In the second hypothesis, two types of aid to the health sector are distinguished. Therefore, Equation 1–3 have to be adjusted. The term $\beta logAid_{it}$ will be split into $\beta_1 logProject_{it}$ and $\beta_2 logBudget_{it}$, with all else being equal. Table 2 presents the results with respect to the second hypothesis. The first three columns present the effect of project aid and budget support on infant mortality, excluding control variables, followed by three columns including regulatory quality and the last two columns including additional control variables. Table A4 in the Appendix shows the full results of the last two columns including control variables. For all eight specifications, we find a significant and negative effect of project aid to the health sector on the infant mortality rate. Again, the effect is stronger in the system GMM cases compared to the OLS cases. Contrary, no significant effect can be found when looking at budget support and regulatory quality. Therefore, the second null hypothesis (H_0) of section 3, that sector budget support has no effect on infant mortality, cannot be rejected for all specifications.

Eventually, the third hypothesis is tested using a proxy for the level of governance in the countries in the sample. As previously noted, this variable is taken from the WGI (Kaufmann & Kraay, 2021) and represents the level of regulatory quality in a country. According to Kaufmann, Kraay, and Mastruzzi (2011), the variable describes the ability of a government to formulate and implement sound policies and regulations. As in the previous two cases, the variable enters the model as a continuous variable. Table 3 presents the estimation results, with the OLS results in columns 1 and 3 and the system GMM results in columns 2 and 4. Table A5 in the Appendix shows the full results of the last two columns including control variables. Again, all previously used control variables are included in the last two columns. The project aid variable again has a negative effect, which is significant at least on the 5% level for all specifications. The magnitude of the effect is similar to the one found in Table 2. Turning to the budget

TABLE 1 Health aid and infant mortality

	(1) OLS	(2) SysGMM	(3) SysGMMCL	(4) OLS	(5) SysGMM	(6) SysGMMCL	(7) OLS	(8) SysGMMCL
Dependent variable is *log infant mortality*								
Lagged log infant mortality	1.0093***	1.0548***	1.0798***	1.0085***	1.0505***	1.0689***	1.0126***	1.0903***
	(.0013)	(.0118)	(.0189)	(.0015)	(.0112)	(.0245)	(.0024)	(.0346)
Log health aid	−.0051***	−.0337***	−.0486***	−.0049***	−.0330***	−.0469***	−.0060***	−.0366**
	(.0014)	(.0076)	(.0169)	(.0013)	(.0079)	(.0154)	(.0015)	(.0147)
Log regulatory quality				−.0045	−.0121	−.0210	.0069*	−.0099
				(.0057)	(.0238)	(.0585)	(.0038)	(.0398)
Controls	NO	NO	NO	NO	NO	NO	YES	YES
Time fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	.999			.999			.999	
Number of observations	897	897	897	897	897	897	865	865
Number of countries		113	113		113	113		110
Number of instruments		66	18		95	23		40
Hansen test: *p*-value		.291	.443		.449	.788		.637
AR(1) test: *p*-value		.004	.007		.004	.005		.008
AR(2) test: *p*-value		.528	.676		.510	.641		.839

Note: Standard errors are denoted in parentheses. The pooled ordinary least squares (OLS) regressions use robust standard errors clustered by country. The system generalized method of moments (GMM) regressions use the two-step Windmeijer (2005) finite sample correction for standard errors. SysGMMCL denotes the system GMM estimator with collapsed instruments. All variables of interest are treated as predetermined. *, **, and *** denote significance at the 10%, 5%, and 1% level.

TABLE 2 Project aid, budget support, and infant mortality

	(1) OLS	(2) SysGMM	(3) SysGMMCL	(4) OLS	(5) SysGMM	(6) SysGMMCL	(7) OLS	(8) SysGMMCL
Dependent variable is *log infant mortality*								
Lagged log infant mortality	1.0091***	1.0473***	1.0818***	1.0083***	1.0420***	1.0561***	1.0122***	1.0749***
	(.0013)	(.0103)	(.0199)	(.0015)	(.0090)	(.0341)	(.0024)	(.0330)
Log project aid	−.0050***	−.0165*	−.0419**	−.0048***	−.0182**	−.0394**	−.0056***	−.0276**
	(.0015)	(.0086)	(.0162)	(.0014)	(.0085)	(.0151)	(.0015)	(.0121)
Log budget support	−.0015	.0005	−.0014	−.0010	.0026	.0033	−.0006	−.0032
	(.0019)	(.0084)	(.0129)	(.0020)	(.0074)	(.0129)	(.0018)	(.0110)
Log regulatory quality				−.0048	−.0143	−.0940	.0061	−.0297
				(.0059)	(.0250)	(.1141)	(.0039)	(.0323)
Controls	NO	NO	NO	NO	NO	NO	YES	YES
Time fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	.999			.999			.999	
Number of observations	897	897	897	897	897	897	865	865
Number of countries		113	113		113	113		110
Number of instruments		95	23		124	28		45
Hansen test: *p*-value		.488	.877		.767	.990		.882
AR(1) test: *p*-value		.022	.011		.018	.011		.009
AR(2) test: *p*-value		.482	.672		.470	.598		.873

Note: Standard errors are denoted in parentheses. The pooled ordinary least squares (OLS) regressions use robust standard errors clustered by country. The system generalized method of moments (GMM) regressions use the two-step Windmeijer (2005) finite sample correction for standard errors. SysGMMCL denotes the system GMM estimator with collapsed instruments. All variables of interest are treated as predetermined. *, **, and *** denote significance at the 10%, 5%, and 1% level.

TABLE 3 Interaction term of budget support and governance

	(1) OLS	(2) SysGMMCL	(3) OLS	(4) SysGMMCL
Dependent variable is *log infant mortality*				
Lagged log infant mortality	1.0082***	1.0555***	1.0122***	1.0698***
	(.0015)	(.0323)	(.0024)	(.0275)
Log project aid	−.0048***	−.0438***	−.0056***	−.0303**
	(.0014)	(.0137)	(.0015)	(.0123)
Log budget support	.0021	.0105	.0157	.0327
	(.0129)	(.0343)	(.0124)	(.0347)
Log regulatory quality	−.0047	−.0530	.0068*	−.0230
	(.0060)	(.1002)	(.0040)	(.0218)
Log budget support × log RQ	−.0027	−.0128	−.0139	−.0316
	(.0113)	(.0276)	(.0108)	(.0263)
Controls	NO	NO	YES	YES
Time fixed effects	YES	YES	YES	YES
R-squared	.999		.999	
Number of observations	897	897	865	865
Number of countries		113		110
Number of instruments		33		50
Hansen test: *p*-value		.984		.911
AR(1) test: *p*-value		.006		.008
AR(2) test: *p*-value		.636		.820

Note: Standard errors are denoted in parentheses. The pooled ordinary least squares (OLS) regressions use robust standard errors clustered by country. The system generalized method of moments (GMM) regressions use the two-step Windmeijer (2005) finite sample correction for standard errors. SysGMMCL denotes the system GMM estimator with collapsed instruments. All variables of interest are treated as predetermined. *, **, and *** denote significance at the 10%, 5%, and 1% level.

support variable, it is insignificant for all specifications. Similarly, regulatory quality and the interaction term of budget support and regulatory quality are insignificant. However, the interaction term cannot be interpreted at first glance. For continuous to continuous interactions, it is possible to evaluate the effect of budget support on the infant mortality rate for different levels of regulatory quality. The grey line in Figure 1 shows the average marginal effect, and the grey-shaded area shows the respective 90% confidence interval. For all levels of regulatory quality, the marginal effect of budget support is insignificant. Thus, the third null hypothesis (H_0) of section 3, that sector budget support in the presence of good governance has no effect, cannot be rejected for all specifications.

Overall, the results indicate that health aid has a robust and significant impact on the infant mortality rate. Aid directed to the health sector seems to be an effective way to improve health indicators. Similar results were found for project-type interventions. Since they account for a large fraction of the general health aid term, the results of health aid might be actually driven by project aid. Contrary, budget support seems to be ineffective. Several reasons might be the

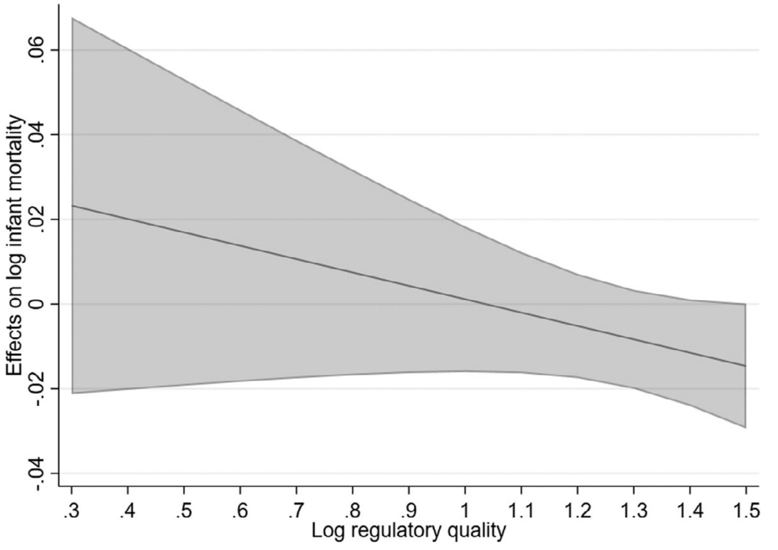

FIGURE 1 Marginal effects for the budget support interaction term

cause that no effect can be found. First, there is a debate in the literature on whether some countries are unable to handle such large amounts of money due to a low absorptive capacity, for example, leading to a dutch disease effect (e.g., Clemens & Radelet, 2003; Renzio, 2005). If budget support is mainly given to such countries, it may explain why no aggregate effect can be found. Second, since money is fungible, this kind of aid might be used for different purposes and not exclusively for improving health-related issues. As the literature on aid fungibility points out, aid might still be effective, even though it is fungible. For example, if aid were directed to any other non-health-related sector, it could still positively affect infant mortality through spillover effects, for example, of education on health (Pettersson, 2007; Rana & Koch, 2020). However, this is out of the scope of this article and might be subject to further research. Third, budget support might be effective but on a rather long time horizon that cannot be measured in this context due to the data availability. This may be due to the fact that budget support rather targets sector- or country-wide purposes, which take longer to translate into a measurable effect (Koch, Leiderer, Faust, & Molenaers, 2017). In contrast, project-type interventions might provide drugs or vaccines that would have an immediate and positive effect on the infant mortality rate. Fourth, at the beginning of this article, the Rome and Paris Declaration on aid effectiveness were briefly mentioned. There, and on the following two high-level forums in Accra and Busan, the international community agreed on several principles to produce better impacts of aid (OECD, 2011). As mentioned earlier, these principles were often interpreted as a call for more budget support that would have many advantages over other aid modalities. However, Keijzer, Klingebiel, and Scholtes (2020), Lundsgaarde and Engberg-Pedersen (2019), and others find that donors did not always adhere to these principles, which led, instead of the expected decrease, to an increase in transaction cost. In addition, they find that some donors started to suspend budget support in response to an increase in corruption. This non-compliance with the originally formulated principles might be another reason for the insignificance of budget support. Lastly, with respect to the effectiveness of budget support, there is still lack of evidence for many areas (Orth et al., 2017). Thus, budget support might just be ineffective in the case of the health sector and not affected by institutional factors. The following section will discuss some of these aspects.

4.2 | Additional tests and robustness

The main results were all estimated with the assumption that there are no differences in the effectiveness of aid across different income groups. However, the aid effectiveness likely differs for countries with different starting points in income. Rahnama, Fawaz, and Gittings (2017) find that aid has a positive effect on economic growth in high-income developing countries and a negative effect in low-income developing countries. Similarly, Azam and Feng (2022) show that aid positively affects aggregate growth. However, when disaggregating the income groups, the effect seems to be driven by lower-middle-income countries. Thus, the sample has been split into three groups as classified by the World Bank (2022): low-income, lower-middle-income, and upper-middle-income.[11] The results are presented in Table 4. Health aid remains significant and negative across all income groups. The results for project aid seem to be driven by lower-middle-income and upper-middle-income countries. For low-income countries, the coefficient is insignificant, while the results remain almost the same for the other two income groups. The split into different groups does not affect sector budget support and the interaction term. Here, the coefficient and joint coefficient remain insignificant. In general, the results seem to be robust to splitting the sample into different income groups and support the previous findings in the literature.

In section 4.1, a continuous variable has been used to test Hypothesis 3. However, governance variables typically only change slowly over time. This might be the reason why no significant effect could be found for the continuous interaction term. To avoid putting too much weight on small changes in the indicator, the variable may also be split at the sample median. Thus, the same regression was repeated using a dummy variable interaction approach. Regulatory quality will be converted and takes a value of one if it is above the sample median and zero otherwise. Table 5 shows the results. A *t* test for the linear combinations of the interaction term and the budget support variable confirms the previous results. Again, no significant effect for the interaction term between budget support and the regulatory quality dummy can be found.

One could also argue that the problem is the institutional variable itself. Thus, as a robustness check, two other variables of the WGI are used to measure institutional quality: corruption and government effectiveness. As previously argued, these two might also be critical mediating factors. However, it is well known in the literature that the WGI, apart from many advantages, also suffer from disadvantages. Most criticism concerns biases in the data collection as well as the comparability of the indicators. Thomas (2010) provides an overview of the most common criticism regarding the WGI. Thus, the Polity5 variable from the Polity project was used as a third variable to test the robustness of the results of the interaction (Center for Systemic Peace, 2020). The results are displayed in Table 6 and confirm those already found for the regulatory quality variable in most instances. For all three governance variables, the interaction term in the system GMM specification is insignificant for all levels of the respective governance variable. The joint marginal effects for the interaction term of sector budget support at different levels of the three governance variables are depicted in Figures A3–A5 in the Appendix. Thus, the system GMM results confirm those of Section 4.1.

Following the insignificant influence of the governance variables on budget support, one may argue that the institutional framework does not matter for the effectiveness of health aid

TABLE 4 Robustness: Split into different income groups

	Low income			Lower-middle-income			Upper-middle-income		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Lagged log infant mortality	1.0117***	1.0121***	1.0134***	1.0061***	1.0059***	1.0060***	1.0139***	1.0131***	1.0138***
	(.0036)	(.0036)	(.0037)	(.0029)	(.0029)	(.0029)	(.0052)	(.0051)	(.0053)
Log health aid	−.0042*			−.0065***			−.0070***		
	(.0024)			(.0025)			(.0021)		
Log project aid		−.0031	−.0043*		−.0063**	−.0063**		−.0066***	−.0063***
		(.0024)	(.0024)		(.0025)	(.0025)		(.0023)	(.0023)
Log budget support		−.0001	.0043		−.0014	−.0038		.0026	−.0020
		(.0023)	(.0033)		(.0036)	(.0051)		(.0029)	(.0017)
Dummy regulatory quality			.0051*			.0001			−.0055
			(.0027)			(.0035)			(.0054)
Log budget support × dummy RQ			−.0089*			.0029			.0067*
			(.0046)			(.0068)			(.0040)
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of observations	213	213	213	307	307	307	345	345	345

Note: Standard errors are denoted in parentheses. The pooled ordinary least squares (OLS) regressions use robust standard errors clustered by country. The first three columns show the results for low-income countries, the following for lower-middle-income countries and the last three for upper-middle and high-income countries. *, **, and *** denote significance at the 10%, 5%, and 1% level.

TABLE 5 Dummy interaction term of budget support and governance

	(1) OLS	(2) SysGMMCL	(3) OLS	(4) SysGMMCL
Dependent variable is *log infant mortality*				
Lagged log infant mortality	1.0087***	1.0744***	1.0116***	1.0824***
	(.0014)	(.0196)	(.0024)	(.0310)
Log project aid	−.0049***	−.0360**	−.0055***	−.0300***
	(.0015)	(.0148)	(.0016)	(.0111)
Log budget support	−.0036	.0003	−.0004	.0069
	(.0034)	(.0093)	(.0027)	(.0108)
Dummy regulatory quality	−.0014	.0085	.0012	−.0119
	(.0021)	(.0144)	(.0017)	(.0144)
Log budget support × dummy RQ	.0034	.0031	.0002	−.0044
	(.0042)	(.0169)	(.0036)	(.0168)
Controls	NO	NO	YES	YES
Time fixed effects	YES	YES	YES	YES
R-squared	.999		.999	
Number of observations	897	897	865	865
Number of countries		113		110
Number of instruments		33		50
Hansen test: *p*-value		.881		.929
AR(1) test: *p*-value		.013		.007
AR(2) test: *p*-value		.629		.827

Note: Standard errors are denoted in parentheses. The pooled ordinary least squares (OLS) regressions use robust standard errors clustered by country. The system generalized method of moments (GMM) regressions use the two-step Windmeijer (2005) finite sample correction for standard errors. SysGMMCL denotes the system GMM estimator with collapsed instruments. All variables of interest are treated as predetermined. *, **, and *** denote significance at the 10%, 5%, and 1% level.

in the recipient country. To test this argument, health aid and project aid were also interacted with the regulatory quality variable. Table A6 in the Appendix shows the results for the health aid variable, regulatory quality, and a continuous to continuous interaction term. Again, due to the continuous nature of both variables, the result cannot be interpreted at first glance. Thus, the effect of health aid and project aid is evaluated at different levels of regulatory quality. The results for the system GMM estimation with collapsed instruments are depicted in Figures 2 and 3. Again, the grey line shows the average marginal effect, and the grey-shaded area shows the respective 90% confidence interval. Overall, a significant and negative effect at least at the 10% level can be found for all levels of regulatory quality except for project aid for countries with low levels of regulatory quality. As depicted in Figure 4, only a small fraction of aid is directed to countries with these low levels of regulatory quality. Both interactions indicate that institutions matter for the effectiveness of aid, however, in a counterintuitive way. In countries with lower levels of governance, aid to the health sector seems to be slightly more effective. The reason might be that good governance leads to a higher provision of public goods (Weiss, 2000)

TABLE 6 Robustness: Other governance variables

	(1) OLS	(2) SysGMMCL	(3) OLS	(4) SysGMMCL	(5) OLS	(6) SysGMMCL
Dependent variable is *log infant mortality*						
Lagged log infant mortality	1.0127***	1.1003***	1.0115***	1.0727***	1.0117***	1.1016***
	(.0024)	(.0368)	(.0024)	(.0316)	(.0023)	(.0369)
Log project aid	−.0052***	−.0177	−.0054***	−.0308***	−.0063***	−.0183
	(.0015)	(.0131)	(.0015)	(.0111)	(.0016)	(.0141)
Log budget support	.0428***	.0896	.0332***	.0403	.0053	−.0197
	(.0152)	(.0814)	(.0111)	(.0319)	(.0119)	(.0384)
Log corruption	.0160***	−.0328				
	(.0047)	(.0503)				
Log budget support × log corruption	−.0398***	−.0873				
	(.0138)	(.0746)				
Log government effectiveness			.0040	−.0260		
			(.0051)	(.0300)		
Log budget support × log GE			−.0304***	−.0418		
			(.0103)	(.0296)		
Log polity					.0052***	−.0067
					(.0015)	(.0155)
Log budget support × log polity					−.0021	.0061
					(.0045)	(.0141)
Constant	−.0968***	−.1930	−.0768***	.0228	−.0851***	−.1466
	(.0217)	(.3259)	(.0209)	(.1902)	(.0213)	(.3802)
Controls	YES	YES	YES	YES	YES	YES
Time fixed effects	YES	YES	YES	YES	YES	YES
R-squared	.999		.999		.999	

(Continues)

TABLE 6 (Continued)

	(1) OLS	(2) SysGMMCL	(3) OLS	(4) SysGMMCL	(5) OLS	(6) SysGMMCL
Number of observations	865	865	865	865	857	857
Number of countries		110		110		109
Number of instruments		50		50		50
Hansen test: *p*-value		.916		.953		.903
AR1 test: *p*-value		.012		.006		.025
AR2 test: *p*-value		.865		.803		.899

Note: Standard errors are denoted in parentheses. The pooled ordinary least squares (OLS) regressions use robust standard errors clustered by country. The system generalized method of moments (GMM) regressions use the two-step Windmeijer (2005) finite sample correction for standard errors. SysGMMCL denotes the system GMM estimator with collapsed instruments. All variables of interest are treated as predetermined. *, **, and *** denote significance at the 10%, 5%, and 1% level.

and it directly influences the effectiveness of health spending (Farag et al., 2013). Thus, in countries with higher levels of governance, the quality of (health-related) public goods is relatively higher. Development cooperation might then have a smaller impact compared to countries with a lower provision of public goods.

Another conspicuousness is that both, health aid and project aid, are insignificant for lower and very high levels of governance. The reason might be that a large fraction of countries in the sample exhibit levels of governance between .9 and 1.3. Within this range, both aid terms are

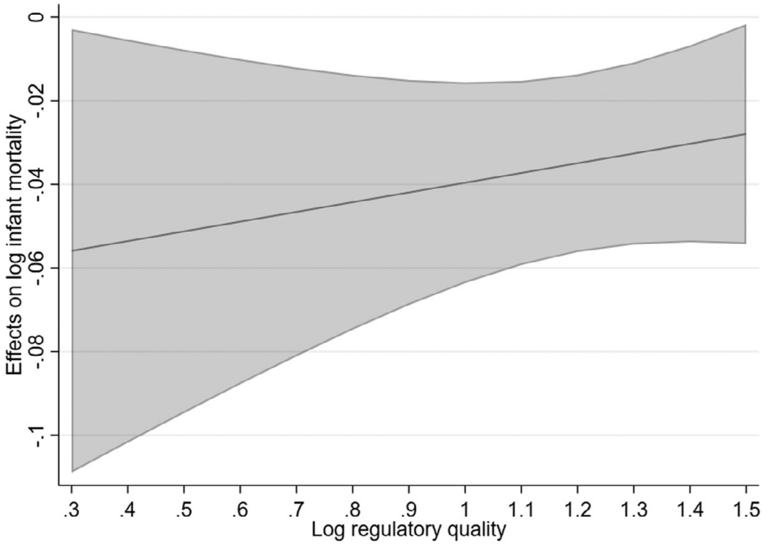

FIGURE 2 Marginal effects for the health aid interaction term

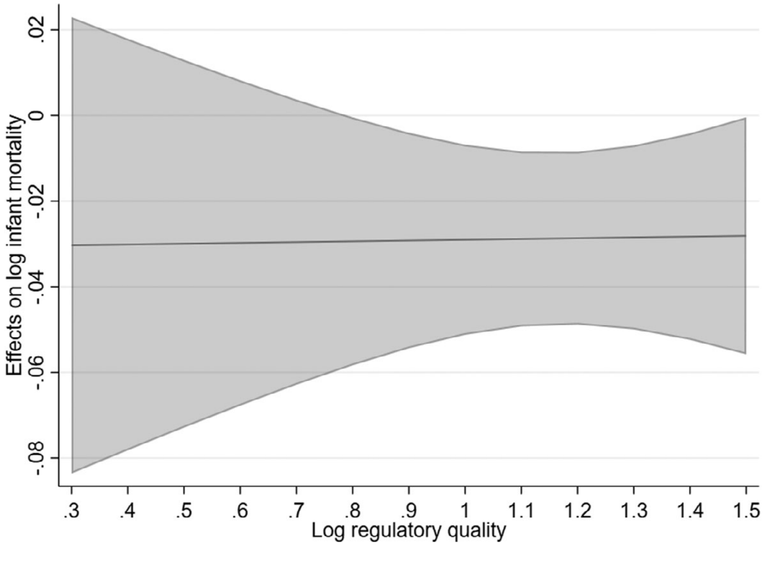

FIGURE 3 Marginal effects for the project aid interaction term

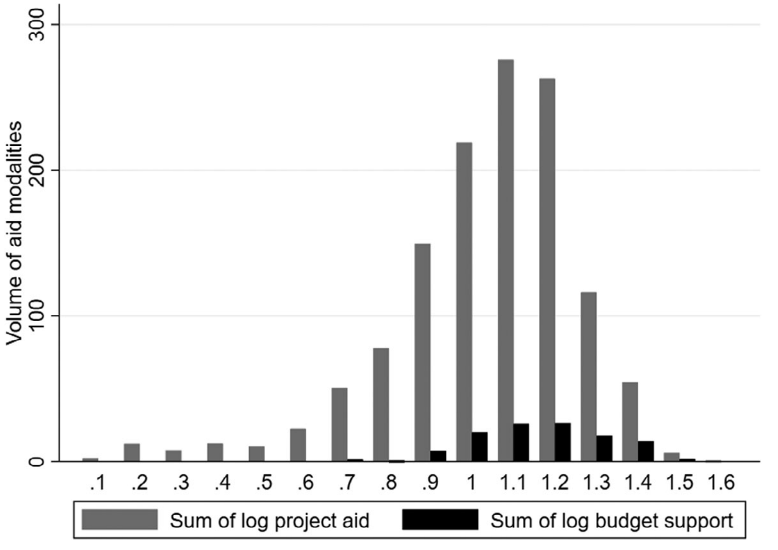

FIGURE 4 Log budget support and log project aid over log regulatory quality

significant. One explanation might be a more precise estimation since more countries are included. Generally, this finding may explain why the interaction term is insignificant for some boundary points. Yet, it is likely not the reason for the superior performance of project aid compared to budget support in this sample.

Another criticism that may arise is that the allocation of budget support might be determined by other factors than that of project aid. One argument would be that budget support is given only to countries with a strong institutional framework, while project aid is given to those countries with a weak framework. This argument can be enfeebled when looking at Figure 4. There, the volume of log project aid (light grey) and log budget support (dark grey) is shown for different levels of log regulatory quality. It can be seen that budget support is directed to similar countries as project aid. Further, the volume is higher for those countries receiving relatively more project aid. The only difference is that project aid is also given to countries with very high and very low levels of regulatory quality. This is not the case for budget support. In addition, one could argue that the use of budget support or project aid depends on the country's health situation or wealth. A similar pattern can be found when looking at the distribution of both modalities over the infant mortality rate and GDP per capita (Figures A1 and A2 in the Appendix). Again, the volume of project aid is much higher, but the distribution of the two modalities is rather similar. However, if budget support is actually directed just to countries with specific characteristics, this could lead to an endogeneity problem. Fortunately, most variables that are likely used to make a decision if a country receives a specific aid modality can be observed and, thus, be included in the equation. The German federal ministry for economic cooperation and development (BMZ), for example, bases its decision for budget support upon three criteria. First, budget support is predominantly given to countries with high levels of good governance. Second, the fiduciary risks are assessed, and third, the macroeconomic stability of the recipient country is analyzed (BMZ, 2008). Since the regulatory quality variable and other governance variables are included in the regression, different levels of good governance are controlled for. In addition, fiduciary risks are already included or likely correlated with the governance variable. The same is likely true for macroeconomic stability. To validate these assumptions, an

TABLE 7 Robustness: Additional control variables

	(1) OLS	(2) SysGMMCL	(3) OLS	(4) SysGMMCL	(5) OLS
Dependent variable is *log infant mortality*					
Lagged log infant mortality	1.0112***	1.0925***	1.0108***	1.0853***	1.0104***
	(.0025)	(.0311)	(.0023)	(.0357)	(.0024)
Log project aid	−.0054***	−.0219*	−.0065***	−.0321**	−.0053***
	(.0017)	(.0112)	(.0015)	(.0149)	(.0015)
Log budget support	−.0018	−.0037	−.0011	.0010	−.0014
	(.0019)	(.0065)	(.0018)	(.0124)	(.0018)
Log regulatory quality	−.0003	.0598	.0064	.0022	.0035
	(.0053)	(.0475)	(.0045)	(.0421)	(.0049)
Controls	YES	YES	YES	YES	YES
Time fixed effects	YES	YES	YES	YES	YES
R-squared	.999		.999		.999
Number of observations	818	818	832	832	832
Number of countries		105		108	
Number of instruments		55		55	
Hansen test: *p*-value		.774		.331	
AR(1) test: *p*-value		.015		.014	
AR(2) test: *p*-value		.809		.754	

Note: Standard errors are denoted in parentheses. The pooled ordinary least squares (OLS) regressions use robust standard errors clustered by country. The system generalized method of moments (GMM) regressions use the two-step Windmeijer (2005) finite sample correction for standard errors. SysGMMCL denotes the system GMM estimator with collapsed instruments. All variables of interest are treated as predetermined. *, **, and *** denote significance at the 10%, 5%, and 1% level.

additional regression will be run with respect to Hypothesis 2. There, the absolute value of the annual change in consumer prices will be included as a proxy for macroeconomic stability as well as corruption as a proxy for fiduciary risks. The former variable is taken from the World Bank (2021) and the latter from the WGI (Kaufmann & Kraay, 2021). Columns 1 and 2 in Table 7 present the results for the OLS and the system GMM cases. When looking at the coefficients of project aid and budget support, one can see that the results did not change considerably. Table 7 also presents the results of additional robustness tests. The access to basic drinking water services and the health expenditure per capita might affect the infant mortality rate through different channels. Thus, both variables were included in columns 3 and 4. Further, column 5 shows the OLS results for the inclusion of regional fixed effects. All extensions do not change the results. Project aid remains significant at least at the 5% level.

Eventually, as in most previous studies (e.g., Mishra & Newhouse, 2009), the initial equations are estimated using averages over time. This is done to smooth any potential fluctuations of aid over time, which might affect the coefficients and especially the significance levels. The problem in this particular setting is that the panel is relatively short due to the previously described limited data availability, so the variables can be averaged only over relatively short periods. Table 8 presents 2- and 3-year averages of the main results, including the previously described control variables. The OLS estimates for the 2-year averages in the first two columns

TABLE 8 Robustness: Averages over time

	2-Year average		3-Year average	
	(1) OLS	(2) OLS	(3) OLS	(4) OLS
Dependent variable is *log infant mortality*				
Lagged log infant mortality	1.0248***	1.0238***	1.0326***	1.0315***
	(.0073)	(.0072)	(.0130)	(.0130)
Log health aid	−.0143***		−.0178*	
	(.0049)		(.0099)	
Log project aid		−.0126**		−.0154
		(.0051)		(.0101)
Log budget support		−.0043		−.0064
		(.0069)		(.0137)
Controls	YES	YES	YES	YES
Time fixed effects	YES	YES	YES	YES
R-squared	.998	.998	.995	.995
Number of observations	325	325	216	216

Note: Standard errors are denoted in parentheses. The pooled ordinary least squares (OLS) regressions use robust standard errors clustered by country. *, **, and *** denote significance at the 10%, 5%, and 1% level.

remain similar to the main results. The significance level drops for the 3-year average estimation in columns 3 and 4. Health aid is significant and negative at the 10% level, while project aid is insignificant. However, in this scenario, the number of observations drops significantly due to the averaging of the data. As a result, the standard errors become roughly twice as large in magnitude. At the same time, the coefficients remain relatively constant in magnitude.

5 | CONCLUSION

To answer the question whether sector budget support is the right choice for countries with strong institutions, three hypotheses have been tested, focusing on health sector aid as the key explanatory and the infant mortality rate as the dependent variable. As health outcomes are believed to react much faster to changes in aid compared to broader measures like GDP growth, the health sector seems to be an ideal candidate. Within the health sector, the infant mortality rate is typically used as a proxy for general improvements with respect to health. Previous political and academic debates and contributions often generated controversial results regarding the effectiveness of aid. One potential reason is the undifferentiated view these analyses took. This article tried to look beneath the surface by using disaggregated aid and outcome variables to identify the effect of two different aid modalities on the health sector.

The first hypothesis considered the general relationship between aid to the health sector and infant mortality. There, a significant and negative effect of aid could be found. If health aid is increased by 1%, the infant mortality rate in the average country decreases by around .037%, in the system GMM case. This supports the assumption that a positive effect of aid can be detected more easily on a disaggregated level. Since the focus of this paper is on the effect of sector budget support compared to other aid modalities, the health aid term was disaggregated. The effect of health sector budget support was then compared to project-type interventions in the health sector for the second hypothesis. In addition, due to the belief that sector budget support is more efficient in countries with a sound institutional framework, it was interacted with a governance variable to test the third hypothesis. The overall findings were that project-type interventions exhibit a significant and negative effect on the infant mortality rate in the average country. Sector budget support is insignificant in the standard equation and when interacted with a governance variable. In contrast, both health aid and project aid show a significant and positive (decreasing) effect when interacted with a governance variable. This effect is slightly stronger for countries with higher levels of governance.

Returning to the question raised at the beginning of this section, no clear answer can be given. Sector budget support has no significant effect on the infant mortality rate in countries with strong institutions. In contrast, project-type interventions show a significant and relatively strong negative effect on infant mortality. The policy recommendation that can be drawn from these estimations is, thus, that for most cases project-type interventions seem to be more effective than sector budget support.

In the beginning, the literature review indicated that the effectiveness of aid in general and health aid, in particular, is still contested. Further, in terms of budget support, many evaluations found positive outcomes. This article supports the positive findings of health aid to the health sector and adds an empirical analysis of budget support. In contrast to many evaluations, no positive effect of budget support could be found.

Besides the well-known criticisms toward budget support, for example, corruption, rent-seeking, or an inefficient bureaucracy, other factors might have driven the results. One explanation might be that the volume of sector budget support is much smaller than the widely used project aid or that both modalities might be spent for different purposes. The effectiveness of sector budget support might also depend on additional factors that were not controlled for in this empirical framework. One example would be the willingness of those in power to base their actions on the institutions formally implemented. As indicated earlier, this can be seen with respect to the implementation of the results of the high-level meetings on aid effectiveness. Apart from these assumptions, sector budget support, in reality, might be simply less effective than project-type interventions. However, to answer this question in its entirety, more research is needed.

The results presented earlier are only valid for the relationship between the two health aid modalities and the infant mortality rate. Even though infant mortality is a good proxy for other health-related outcomes, the effectiveness should also be tested with other dependent variables. In addition, it might be interesting to research the effects of sector budget support in other sectors, for example, the education sector. Possibly, there, other additional modalities are frequently used by donors. It is yet unknown if some of the other existing modalities, for example, general budget support, might be even more effective.

ACKNOWLEDGMENT

I would like to thank Jonathan Bothner, Niklas Gogoll, Martin Leschke, Felix Schlieszus, three anonymus referees, and participants at the internal research seminar at the University of Bayreuth. Open Access funding enabled and organized by Projekt DEAL.

CONFLICT OF INTEREST

The author declares that he has no affiliations with or involvement in any organization or entity with any financial interest, or non-financial interest in the subject matter or materials discussed in this manuscript.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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ENDNOTES

[1] In "The End of Poverty," Sachs (2005) argues that poor countries often find themselves in a poverty trap, which they can escape only by using vast sums of foreign aid. In contrast, according to Easterly (2006) and Moyo (2010), aid might cause corruption, weak institutions and supports an increasing lobby of aid agencies.

[2] For the sake of completeness, there are certainly some studies that could not find a significant effect of aid to the health sector (e.g., Williamson, 2008; Wilson, 2011).

[3] The aid types/co-operation modalities are budget support, core contributions and pooled programmes and funds, project-type interventions, expert and other technical assistance, scholarships and student costs in donor countries, debt relief, administrative costs not included elsewhere, and other in-donor expenditures (OECD, 2021b).

[4] For project-type interventions, the donor can largely influence the goal of the intervention as well as the actions taken. Since the projects are often conducted by western project implementation agencies, preferences between the donor and the agency are potentially largely aligned while the danger of defalcation or corruption is potentially low.

[5] To give only one example, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) presents the evaluation results and milestones of its projects conducted in the name of the German government and other donors on its website. With respect to medical services, 3,889 health facilities have been improved, and 73.2 million people have gained access to better health services (GIZ, 2021).

[6] In this article, the definition of budget support by the OECD DAC is used since the data originate from the same resource. However, other definitions that are presented by Koeberle and Stavreski (2012) exist.

[7] The World Bank (1992) argues that sound economic and political institutions are the basis of good governance. Therefore, this article will use strong institutions and good governance as synonyms.

[8] To keep things simple, project-type interventions and project aid will be used as synonyms in the following. The same applies to sector budget support and budget aid.

[9] In Equation 2, country-specific values (levels) are instrumented by lagged differences of these country-specific values. In Equation 3, country-specific first differences are instrumented by country-specific lagged values (levels).

[10] The aid variables include many zeroes. Since the per capita aid values for the two variables are relatively low and often between 0 and 1, leading to negative values, the results may be biased. Therefore, the three variables have been linearly transformed by $1 + x$ before taking the natural logarithm. This creates a zero lower bound for the aid terms. Similarly, the regulatory quality variable has been transformed.

[11] Six countries were classified as high-income-countries for some periods and another five throughout all periods. Due to the small number, and since these countries are only slightly richer than upper-middle-income countries, they were also included in this group.

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How to cite this article: Röthel, T. (2023). Budget support to the health sector—The right choice for strong institutions? Evidence from panel data. *Review of Development Economics*, *27*(2), 735–770. https://doi.org/10.1111/rode.12967

APPENDIX A

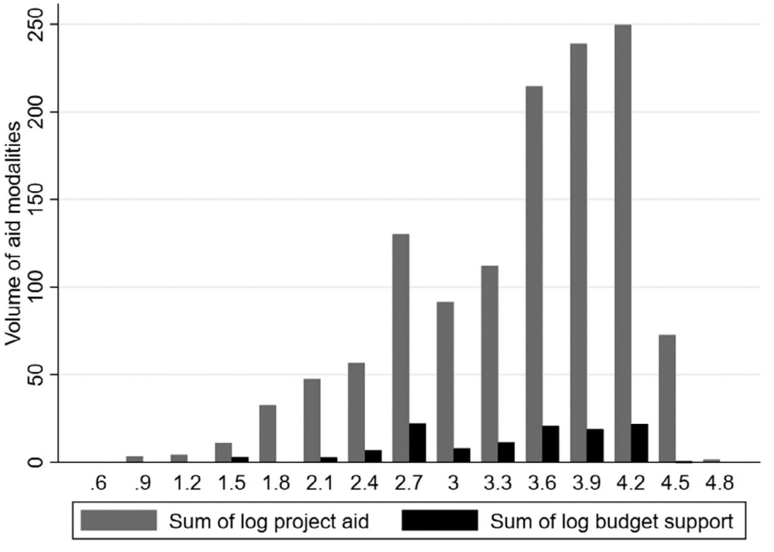

FIGURE A1 Log budget support and log project aid over log infant mortality

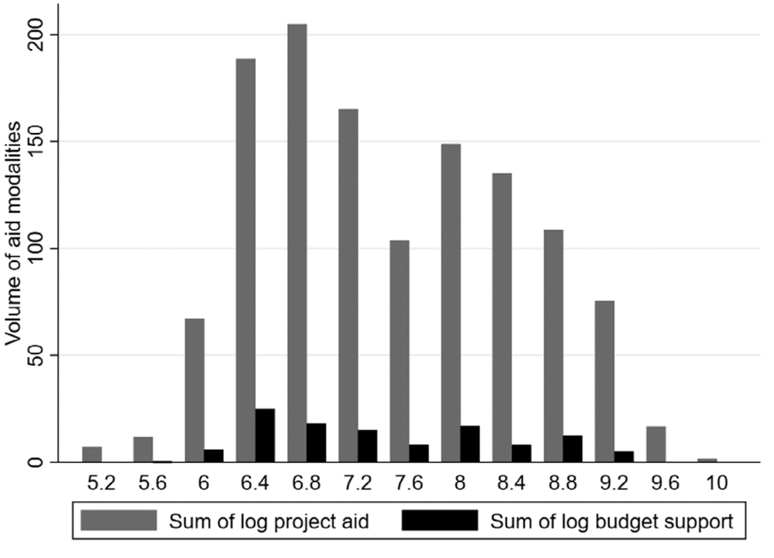

FIGURE A2 Log budget support and log project aid over log gross domestic product (GDP) per capita

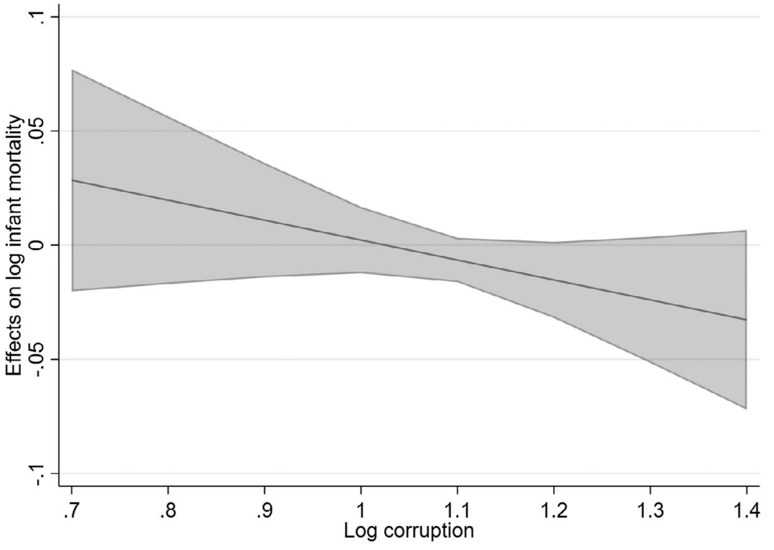

FIGURE A3 Marginal effect of interaction term of budget support and corruption

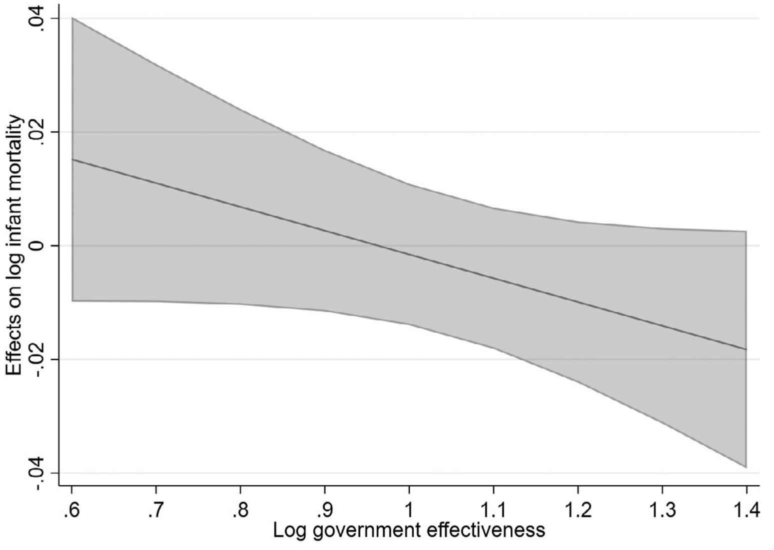

FIGURE A4 Marginal effect of interaction term of budget support and government effectiveness

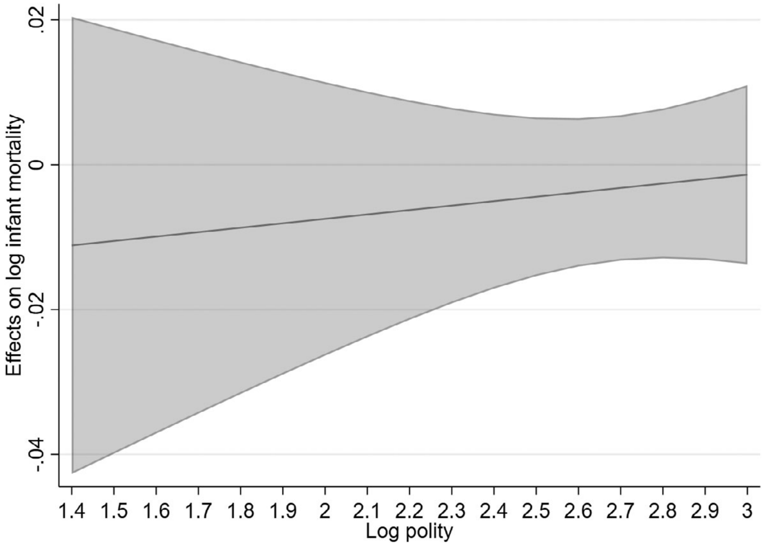

FIGURE A5 Marginal effect of interaction term of budget support and polity

TABLE A1 Summary statistics

	Observations	Mean	Standard dev.
Infant mortality rate (per 1,000 live births)	1,017	32.82	22.99
Aid per capita (health sector; constant USD)	1,019	4.65	4.87
Project aid per capita (health sector; constant USD)	1,019	3.80	4.25
Budget aid per capita (health sector; constant USD)	1,019	.21	.98
GDP per capita (constant 2010 USD)	985	4,599.42	4,875.38
Population	1,019	5.18 + 07	1.77 e+08
Fertility rate (births per woman)	1,026	3.32	1.43
Urban population (% of total population)	1,010	51.51	2.84
Incidence of HIV (per 1,000, ages 15–49)	1,026	1.40	3.41

TABLE A2 Countries in the sample

Country	Obs.	Country	Obs.	Country	Obs.
Afghanistan	8	Ethiopia	8	Nigeria	8
Albania	8	Gabon	8	Oman	8
Algeria	8	Gambia, The	8	Pakistan	8
Angola	8	Georgia	8	Panama	8
Argentina	8	Ghana	8	Paraguay	8
Armenia	8	Guatemala	8	Peru	8
Azerbaijan	8	Guinea	8	Philippines	8
Bahrain	8	Guinea-Bissau	8	Rwanda	8
Bangladesh	8	Guyana	8	Saudi Arabia	8
Belarus	8	Honduras	8	Senegal	8
Belize	8	India	8	Serbia	8
Benin	8	Indonesia	8	Sierra Leone	8
Bhutan	8	Iran, Islamic Rep.	8	Slovenia	8
Bolivia	8	Iraq	8	Somalia	8
Bosnia and Herzegovina	8	Jordan	8	South Africa	8
Botswana	8	Kazakhstan	8	South Sudan	8
Brazil	8	Kenya	8	Sri Lanka	8
Burkina Faso	8	Kyrgyz Republic	8	Sudan	8
Burundi	8	Lao PDR	8	Suriname	8
Cambodia	8	Lebanon	8	Syrian Arab Republic	8
Cameroon	8	Lesotho	8	Tajikistan	8
Central African Republic	8	Liberia	8	Tanzania	8
Chad	8	Libya	8	Thailand	8
Chile	8	Malawi	8	Timor-Leste	8
China	8	Malaysia	8	Togo	8
Colombia	8	Mali	8	Tunisia	8
Congo, Dem. Rep.	8	Mauritania	8	Turkey	8
Congo, Rep.	8	Mexico	8	Turkmenistan	8
Costa Rica	8	Moldova	8	Uganda	8
Côte d'Ivoire	8	Mongolia	8	Ukraine	8
Croatia	8	Montenegro	8	Uruguay	8
Djibouti	8	Morocco	8	Uzbekistan	8
Ecuador	8	Mozambique	8	Venezuela, RB	8
Egypt, Arab Rep.	8	Myanmar	8	Vietnam	8
El Salvador	8	Namibia	8	Yemen, Rep.	8
Equatorial Guinea	8	Nepal	8	Zambia	8
Eritrea	1	Nicaragua	8	Zimbabwe	8
Eswatini	8	Niger	8		

TABLE A3 Health aid and infant mortality incl. control variables

	(1) OLS	(2) SysGMMCL
Dependent variable is *log infant mortality*		
Lagged log infant mortality	1.0126***	1.0903***
	(.0024)	(.0346)
Log health aid	−.0060***	−.0366**
	(.0015)	(.0147)
Log income	−.0005	.0097
	(.0017)	(.0326)
Log population	−.0020***	−.0166*
	(.0006)	(.0090)
Log fertility	−.0015	−.0674*
	(.0031)	(.0363)
Log HIV	.0040**	−.0045
	(.0016)	(.0111)
Log regulatory quality	.0069*	−.0099
	(.0038)	(.0398)
Log urban population	.0083***	.0079
	(.0022)	(.0434)
Constant	−.0744***	−.0318
	(.0209)	(.2748)
Time fixed effects	YES	YES
R-squared	.999	
Number of observations	865	865
Number of countries		110
Number of instruments		40
Hansen test: *p*-value		.637
AR1 test: *p*-value		.008
AR2 test: *p*-value		.839

Note: Standard errors are denoted in parentheses. The pooled ordinary least squares (OLS) regression uses robust standard errors clustered by country. The system generalized method of moments (GMM) regression uses the two-step Windmeijer finite sample correction for the covariance variance. All variables are treated as predetermined. *, **, and *** denote significance at the 10%, 5%, and 1% level.

TABLE A4 Project aid, budget support, and infant mortality including control variables

	(1) OLS	(2) SysGMMCL
Dependent variable is *log infant mortality*		
Lagged log infant mortality	1.0122***	1.0749***
	(.0024)	(.0330)
Log project aid	−.0056***	−.0276**
	(.0015)	(.0121)
Log budget support	−.0006	−.0032
	(.0018)	(.0110)
Log income	−.0002	.0114
	(.0017)	(.0299)
Log population	−.0019***	−.0100
	(.0006)	(.0074)
Log fertility	−.0011	−.0490
	(.0031)	(.0367)
Log HIV	.0040**	.0000
	(.0016)	(.0104)
Log regulatory quality	.0061	−.0297
	(.0039)	(.0323)
Log urban population	.0082***	.0083
	(.0022)	(.0416)
Constant	−.0789***	−.1237
	(.0210)	(.2392)
Time fixed effects	YES	YES
R-squared	.999	
Number of observations	865	865
Number of countries		110
Number of instruments		45
Hansen test: *p*-value		.882
AR1 test: *p*-value		.009
AR2 test: *p*-value		.873

Note: Standard errors are denoted in parentheses. The pooled ordinary least squares (OLS) regression uses robust standard errors clustered by country. The system generalized method of moments (GMM) regression uses the two-step Windmeijer finite sample correction for the covariance variance. All variables are treated as predetermined. *, **, and *** denote significance at the 10%, 5%, and 1% level.

TABLE A5 Interaction term of budget support and governance including control variables

	(1) OLS	(2) SysGMMCL
Dependent variable is *log infant mortality*		
Lagged log infant mortality	1.0122***	1.0698***
	(.0024)	(.0275)
Log project aid	−.0056***	−.0303**
	(.0015)	(.0123)
Log budget support	.0157	.0327
	(.0124)	(.0347)
Log regulatory quality	.0066*	−.0230
	(.0040)	(.0218)
Log budget support × log RQ	−.0139	−.0316
	(.0108)	(.0263)
Log income	−.0002	.0099
	(.0017)	(.0202)
Log population	−.0019***	−.0110
	(.0006)	(.0075)
Log fertility	−.0012	−.0397
	(.0031)	(.0359)
Log HIV	.0040**	.0018
	(.0016)	(.0104)
Log urban population	.0083***	.0088
	(.0022)	(.0306)
Constant	−.0803***	−.0947
	(.0211)	(.1793)
Time fixed effects	YES	YES
R-squared	.999	
Number of observations	865	865
Number of countries		110
Number of instruments		50
Hansen test: *p*-value		.911
AR1 test: *p*-value		.008
AR2 test: *p*-value		.820

Note: Standard errors are denoted in parentheses. The pooled ordinary least squares (OLS) regression uses robust standard errors clustered by country. The system generalized method of moments (GMM) regression uses the two-step Windmeijer finite sample correction for the covariance variance. All variables are treated as predetermined. *, **, and *** denote significance at the 10%, 5%, and 1% level.

TABLE A6 Interaction term of health aid, project aid, and governance

	(1) OLS	(2) SysGMMCL	(3) OLS	(4) SysGMMCL
Dependent variable is *log infant mortality*				
Lagged log infant mortality	1.0126***	1.0919***	1.0122***	1.0795***
	(.0024)	(.0347)	(.0024)	(.0307)
Log health aid	−.0048	−.0629		
	(.0049)	(.0414)		
Log project aid			−.0043	−.0309
			(.0052)	(.0422)
Log budget support			−.0006	−.0030
			(.0019)	(.0089)
Log regulatory quality	.0079	−.0250	.0071	−.0114
	(.0059)	(.0496)	(.0058)	(.0378)
Log health aid × log RQ	−.0010	.0233		
	(.0042)	(.0325)		
Log project aid × log RQ			−.0012	.0019
			(.0045)	(.0347)
Controls	YES	YES	YES	YES
Time fixed effects	YES	YES	YES	YES
R-squared	.999		.999	
Number of observations	865	865	865	865
Number of countries		110		110
Number of instruments		45		50
Hansen test: *p*-value		.659		.781
AR(1) test: *p*-value		.005		.008
AR(2) test: *p*-value		.792		.871

Note: Standard errors are denoted in parentheses. The pooled ordinary least squares (OLS) regressions use robust standard errors clustered by country. The system generalized method of moments (GMM) regressions use the two-step Windmeijer (2005) finite sample correction for standard errors. SysGMMCL denotes the system GMM estimator with collapsed instruments. All variables of interest are treated as predetermined. *, **, and *** denote significance at the 10%, 5%, and 1% level.