Journal of Benefit-Cost Analysis (2023), 14: 2, 298–317
doi:10.1017/bca.2023.18

CAMBRIDGE
UNIVERSITY PRESS

ARTICLE

A Test of Hirschman's Hiding Hand Principle in World Bank-Financed Hydropower Projects

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Keywords: Albert O. Hirschman, Hiding Hand principle, hydropower, ignorance, World Bank

JEL classifications: D61, D91, O13

Abstract

This study is an attempt to determine whether the need to get hydropower project appraisals perfectly right during the pre-construction phase, so as to prevent significant overruns along with benefit shortfalls, should supersede the need to deliver projects at the earliest possible time so as to meet the needs of the people. To achieve the study objective, we test whether the Hiding Hand principle is predominantly benevolent or malevolent. We argue that if the Hiding Hand is benevolent, then project stakeholders are better off focusing on the quick delivery of power projects; however, if it is malevolent, then more attention should be given to perfecting project appraisals. It transpires from the statistical analysis that the Benevolent Hiding Hand dominates the Malevolent Hiding Hand in the selected World Bank-financed hydropower projects (33% v. 21%), and that ultimately, 75% of the projects were even more successful than anticipated—while 25% of the projects failed. Our findings further show that while a total loss of 2.335 billion USD in the sampled dams was caused by the Malevolent Hiding Hand, 11.259 billion USD was gained as a result of the Benevolent Hiding Hand. The predominance of the Benevolent Hiding Hand justifies placing some weight on proceeding with hydropower projects that show significant promise even if all the implantation risks are not fully quantified at the appraisal stage, especially in developing countries.

1. Introduction

Countries, especially developing ones, are vulnerable to the effects of delay in the construction of infrastructural projects (Braeckman & Guthrie, 2015). With regard to power infrastructure, these countries are often plagued by an inadequate electricity service coupled with continuously growing demand that worsens the situation. For instance, the lack of access to grid-connected electricity costs the African continent about 2% of its gross domestic product annually (Gil *et al.,* 2019). Consequently, an adequate, reliable power supply has a significantly high economic value. Yet, project financiers, especially in these developing countries, tend to be extremely cautious during the pre-construction phase when project appraisal is being carried out. Project financiers are often worried about the ability of project managers to identify, formulate, prepare, and carry out projects effectively such that cost and time overruns are minimized. The general sentiment is that most developing nations lack the required institutional capacity and manpower to effectively execute infrastructural projects (Rondinelli, 1976; Kacou *et al.,* 2022). To avoid these challenges, project financiers, in an attempt to perfect project planning, apply a lot of caution during the pre-construction phase. This ultimately leads to project delays with vast socio-economic implications, especially for developing countries.

The question this study attempts to answer is whether the need to get project appraisal perfectly right during the pre-construction phase so as to prevent significant overruns and benefit shortfalls supersedes the need to deliver projects at the earliest possible time so as to meet the needs of the people. The objective may alternatively be interpreted as an attempt to determine whether placing some weight on proceeding with hydro-projects with significant promise is a good idea, even if all the implantation risks are not fully quantified at the appraisal stage. According to Hirschman (1967, 2015), if it were possible to identify all the difficulties and costs associated with a project ab initio, then no project would ever be good enough for approval. The author thus suggests that it is preferable for project stakeholders not to know all the possible problems because of the need to get things started. If they knew all the details, they would not be bold enough to start the much-needed projects. The author argues that while decision makers tend to be over-optimistic about project benefits and costs, they also tend to underestimate their own problem-solving abilities during project implementation; this he called the principle of the Hiding Hand. The Hiding Hand principle has a unique way of making risk lovers out of risk averters, and once risky projects are embarked upon, unanticipated challenges that might arise during project implementation are dealt with through human ingenuity. Moreover, as project managers gain experience, they develop improved ability to appraise projects effectively. The Hiding Hand thus provides a transition mechanism through which project managers learn to undertake risky projects, and the faster the transition, the quicker the learning process (Flyvbjerg & Sunstein, 2016). Hirschman (1967, 2015) views this principle of the Hiding Hand as a relatively general occurrence which cuts across project types and geographical locations.

As stated by Flyvbjerg and Sunstein (2016), there are two explanations for the Hiding Hand. The first is the “pseudo-imitation” explanation, which suggests that project planners often present new projects either as perfect replicas of past successful projects or as requiring straightforward application of previously successfully employed techniques. This has been termed a one-size-fits-all approach (Shenhar & Dvir, 2007; Ika, 2012; Ika & Hodgson, 2014; Ika & Söderlund, 2016). Consequently, project handlers underestimate the uniqueness of specific projects. The second explanation is labeled the “pseudo-comprehensive-program,” which attaches equal value to all aspects of a project, considers their interconnectedness, and treats the project as a piece of a larger program. This explanation is associated with the Hiding Hand because it tricks policymakers into assuming that experts know it all, causing all blame of project failure to be placed on failure to adhere to the instructions of experts rather than on the weaknesses of the advice given by experts. Thus, project planners are tricked into executing projects with difficulties that will only become visible over time.

Hirschman (1967, 2015) highlights the ingenuity displayed at the start of operations of the Karnaphuli Paper Mill in Bangladesh as an example of the principle of the Hiding Hand. At the time, 85% of the bamboo forests that were to serve as the source of paper pulp died. While this resulted in extra costs and unexpected difficulties, out of human creativity, alternative sources for paper pulp were found and the raw material base was diversified. According to

Hirschman (1967, 2015), if the project planners had known about the likelihood of this problem, the project would probably not have been approved, and the thousands of jobs created by the project would have been lost. With respect to hydropower projects, another example is the Chukha Hydel dam located in Bhutan. Due to additional engineering costs required to deal with unanticipated geological problems, the project suffered a severe real cost overrun to the tune of 159%. In spite of the huge overrun, the project still generated economic benefits in excess of its cost (Dhakal & Jenkins, 2013; Jenkins *et al.,* 2022). Following the logic of Hirschman (1967, 2015), if project planners suspected that such geological problems would occur, they most likely would not have approved the project. Consequently, the significant economic benefits attached to the dam would have been forgone. A related study by Ika and Feeny (2022) reveals that approximately 60% of a sample of 2800 World Bank-financed projects suffered optimism bias and this lowered the likelihood of satisfactory project performance by 17–20%. The ratio of projects that eventually turned out as unsatisfactory (17–20%) to that of those that experienced optimism bias (60%) suggests to a degree that the Benevolent Hiding Hand exists in World Bank-financed projects. This is because at least 40% of projects that experienced optimism bias eventually ended up being satisfactory.

The principle of Hiding Hand, if true, has far-reaching implications for power projects, especially those being constructed in developing countries. For one, it means that decision makers can afford to prioritize the high economic value associated with the speedy delivery of power projects rather than focus on perfecting project appraisals. It is worthy of mention that this study is not in any way suggesting that the quality of project appraisals should be compromised. The objective is to discourage planners from completely discarding, out of extreme caution, projects with significant numbers of unknowns, particularly in cases where the economic value is potentially very high.

It has however been suggested that the principle of the Hiding Hand enjoys relatively wide acceptance only because of its political convenience and not because of its strength in describing human behavior (Flyvbjerg, 2016). Flyvbjerg and Sunstein (2016) argue that the Hiding Hand of Hirschman (1967, 2015), which is benevolent in nature, has an evil twin which they named the Malevolent Hiding Hand. The authors claim that the Malevolent Hiding Hand hides potential difficulties as well as limitations to human ingenuity from project stakeholders. Three reasons were put forward by Flyvbjerg and Sunstein (2016) for the Malevolent Hiding Hand. The first is ignorance due to limited knowledge about potential difficulties (Hayek, 1945; Dorner, 1997). The second is politico-economic factor. Here, project supporters deliberately downplay potential problems and costs and intentionally exaggerate potential benefits and creativity so as to improve the chances of approval of particular projects (Wachs, 1990; Flyvbjerg *et al.,* 2002; Flyvbjerg, 2005). The third and the most important, according to Flyvbjerg and Sunstein (2016), is the psychological factor. Proponents of the Malevolent Hiding Hand believe the psychological factor explanation on its own is sufficient reason for the occurrence of the Malevolent Hiding Hand (see Kahneman, 2011). As opposed to the case with the Benevolent Hiding Hand, here, project managers tend to be over-optimistic in their assessment of potential difficulties and costs, as well as in their assessment of potential benefits and creativity. This unrealistic optimism at the pre-construction phase eventually results in significant cost overruns, time overruns, benefit underruns, and unexpected hardships along the way. This problem is referred to as the Planning Fallacy (Flyvbjerg & Sunstein, 2016). Thus, the conclusion reached by Flyvbjerg (2016) is that ignorance is not beneficial under any circumstance, as it encourages the execution of bad projects that should not have been approved for implementation. It therefore goes without saying that if the Malevolent Hiding Hand is the more prevalent twin, prioritizing the speedy delivery of power projects at the expense of perfecting project appraisals may be counterproductive.

Despite the fact that support for both the Benevolent and the Malevolent Hiding Hand principles exists (Picciotto, 1994*b*; Sunstein, 2015; Flyvbjerg & Sunstein, 2016), empirical evidence confirming either of the two as the most realistic explanation for how projects work is still limited in extant literature. This study thus contributes to the body of knowledge by empirically examining whether the Hiding Hand is benevolent or malevolent in hydropower projects financed by the World Bank. The rest of this study is structured in the following manner: Section 2 is the literature review, Section 3 describes the data used for statistical analysis, Section 4 describes the methodological approach followed, and the last section is the conclusion.

2. Literature review

2.1. The Benevolent Hiding Hand

Ika (2018) summarizes the Benevolent Hiding Hand from Hirschman's perspective as the ability of project managers to see projects through to the end in spite of problems, difficulties, challenges, or obstacles encountered along the way. As reported by Alacevich (2015), Hirschman's interviews with agrarian officers revealed that it was common to underestimate potential problems as well as problem-solving abilities. Singer (1969), in a similar manner, states that there is always a tendency to underestimate costs, overestimate benefits, and ignore potential difficulties when starting a project. Overall, the Benevolent Hiding Hand is seen as a form of invisible hand that beneficially hides difficulties from project managers (Alacevich, 2015), in which the success of projects evolves from near misses (Gladwell, 2013) or a process of stumbling into success (Adelman, 2013; Ika & Söderlund, 2016, p. 937). According to Sunstein (2015), the Hiding Hand has the ability to lead planners to the achievement of outcomes as good as or even better than what was originally intended when such projects would have probably been discarded if the obstacles that would be encountered had been accurately identified ab initio. The Beneficial Hiding Hand therefore suggests that the lack of foresight often serves as a blessing in disguise when there is uncertainty (Picciotto, 2015). Adelman (2013) thus posits that by the acknowledgement of the existence of the Benevolent Hiding Hand, risk averters could be probed to take on more risks.

Hirschman (1967) further explains that the underestimation of creativity in the face of difficulties is even more pronounced in developing countries due to lack of sufficient confidence in creativity. The Benevolent Hiding Hand was identified in a number of development projects such as the livestock and pasture project in Uruguay, the San Lorenzo irrigation project in Peru, and the Karnaphuli Paper Mill project. The Hoosac Tunnel was cited by Ika (2018) as an example of projects that would probably have been discarded if the planners had known the true extent of problems that lay ahead. Other examples of projects that exhibited the Benevolent Hiding Hand during construction include the Fort Taurus project (see Shenhar & Dvir, 2007), the Rideau Canal project (see Ika & Söderlund, 2016), and the Sydney Opera House project (see Flyvbjerg and Sunstein 2016). According to Picciotto (1994*a*), the Hiding Hand principle lends credence to the daily experiences of project officers. The author observes that the conclusions reached by Hirschman (1967, 2015) have become mainstream and can be regarded as classic.

2.2. The Malevolent Hiding Hand/Planning Fallacy

It has been suggested that the optimistic nature of Hirschman's claim that human ingenuity always succeeds in solving unanticipated problems is simply a product of his personal life experiences; his bias towards hope, rather than empirical evidence, is therefore the foundation of the claims made in his scholarly work (Offe, 2013). Gasper (1986) disagrees with the Benevolent Hiding Hand by claiming that at best, it only occurs in special cases and is therefore not the norm. Cracknell (1984) also questions the reliability of the Benevolent Hiding Hand by stating that it does not align with the experiences of the Overseas Development Office of the United Kingdom. Flyvbjerg (2016) argues that the Benevolent Hiding Hand is only popular because of its political convenience rather than its ability to describe human behavior. There are also claims that the principle of the Benevolent Hiding Hand is a deceptive one because it pushes people to engage in activities they ordinarily would not have involved themselves in, and project promoters are known to take advantage of this (Adelman, 2013; Ika & Söderlund, 2016). Another fundamental criticism of Hirschman's work is on methodological grounds. The very limited sample size of 11 out of 300 projects considered in his analysis has been questioned for not being representative enough; the case study approach and the qualitative analysis preferred in his studies are all regarded as methodological limitations to his work (Adelman, 2013; Flyvbjerg, 2016; Ika & Söderlund, 2016).

The existence of projects which the Benevolent Hiding Hand failed to rescue are well-documented (Hirschman, 2015; Ika, 2018). In such cases, underestimated creativity was not enough to cover underestimated challenges. In cases such as these, the Malevolent Hiding Hand or the Planning Fallacy, which is regarded as the evil twin of Hirschman's Benevolent Hiding Hand, is said to be at play (Sunstein, 2015; Flyvbjerg & Sunstein, 2016). The Malevolent Hiding Hand suggests that the creative ability talked about by Hirschman (1967, 2015) either does not exist, occurs too late to be effective, or is not sufficient to deal with the challenges experienced. As explained by Flyvbjerg and Sunstein (2016), while the Benevolent Hiding Hand is characterized by an optimistic underestimation of possible difficulties as well as a pessimistic underestimation of problem-solving capabilities, the Malevolent Hiding Hand is instead characterized by both an optimistic underestimation of possible difficulties and an optimistic overestimation of problem-solving capabilities. It is assumed that it is this double optimism that eventually results in project failures (Ika, 2018). The Malevolent Hiding Hand has been identified in various forms in literature. For instance, Streeten (1984) discusses it from the perspective of the principle of a hiding fist. Picciotto (1994*b*) suggests the existence of a second kind of Hiding Hand which leads to failure of projects. Flyvbjerg (2009) identifies the presence of a Malevolent Hiding Hand that is driven by ignorance, power, and psychology. Kahneman (2011) aligns with the existence of the Malevolent Hiding Hand that could solely be explained by psychological factors.

More recently, behavioral sciences have shown that people tend to be overly optimistic when managing projects; this is termed the Planning Fallacy caused by optimism bias (Flyvbjerg & Sunstein, 2016). This has been established as another means of viewing the Malevolent Hiding Hand as it reflects the blindness to possible challenges often caused by unrealistic optimism (Flyvbjerg & Sunstein, 2016). The Malevolent Hiding Hand and the Planning Fallacy are therefore often used interchangeably. The Planning Fallacy is however not without its own criticisms. For instance, the absence of sufficient empirical backing for its existence has been pointed out (Love & Ahiaga-Dagbui, 2018). It has also been questioned on methodological grounds as the data used in establishing the Planning Fallacy by Flyvbjerg *et al.* (2002) were cherry-picked (Love & Ahiaga-Dagbui, 2018). Love *et al.* (2019) argue against the Planning Fallacy by pointing out that projects generally suffer from optimism as well as pessimism biases.

2.3. Is the Hiding Hand benevolent or malevolent?

The question a handful of researchers have so far attempted to answer is whether the Hiding Hand is benevolent or malevolent. A major criticism of Hirschman's work is his inability to empirically substantiate his claims, especially with regard to which was the more prevalent of the two Hiding Hands (Krugman, 1994). To the best of the authors' knowledge, only two papers have so far attempted to empirically test the Hiding Hand principle. The study by Flyvbjerg (2016) is the first attempt to statistically test the Hiding Hand principle. The study is conducted on a sample of 2062 infrastructural projects constructed between 1927 and 2013. The conclusion reached by this study is that the principle of the Benevolent Hiding Hand as described by Hirschman (1967, 2015) does not exist, and as a matter of fact, its opposite, the Malevolent Hiding Hand, is what is typically at play. The study by Ika (2018), written as a rejoinder to Flyvbjerg (2016), is the second attempt made to empirically test the Hiding Hand principle. The study considers a sample of 161 World Bank-financed projects across the world and employs a project management approach in which project management performance is compared with deliverable performance. The key finding of the study is that contrary to the conclusion reached by Flyvbjerg (2016), the Benevolent Hiding Hand is more common than the Malevolent Hiding Hand.

3. Data

The hydropower projects financed by the World Bank from 1975 to 2015 were originally selected for this study. However, multipurpose and pumped storage dams were dropped from the sample because of the high degree of complexity required in the determination of their benefits. Thus, the sample size was reduced to 57 World Bank-financed hydropower projects. Moreover, information needed to calculate the ex-ante and ex-post economic net present values (NPVs) were available for only 43 out of these 57 projects. This analysis therefore considers the experience of these 43 World Bank-financed hydro dam projects completed between 1977 and 2015 for which both ex-ante and ex-post evaluation information is available. All the projects as well as their specifications are listed in Table A1 of the Appendix. For each of these projects, cost overruns and benefit overruns are estimated. Geographically, 8 of the projects are located in Sub-Saharan Africa, 12 of the projects are sited in Latin America and the Caribbean, 3 can be found in South Asia, 14 are in East Asia and the Pacific, while 6 are in Europe and Central Asia. As shown in Table 1, 23 of the projects suffered significant cost overruns, while 19 experienced significant benefit overruns. Significant overrun refers to cases where overruns exceed 10% of pre-construction estimates.

To determine the size of each project's real cost overrun, the estimated nominal and real costs as well as the actual nominal and real costs are first calculated. The estimated nominal costs are extracted from the Staff Appraisal Reports (SARs) and Implementation and Completion Reports (ICRs) made available by the World Bank for each of the projects. Following Bacon and Besant-Jones (1998), Awojobi and Jenkins (2015), and Baurzhan *et al.* (2021), the estimated real cost is taken as the difference between the estimated nominal cost and the amount set aside as price contingency. The actual nominal costs are extracted from the ICRs of the World Bank, while the actual real costs are the deflated actual nominal costs. The procedure for extracting the actual real costs from the actual nominal costs is as follows. To begin with, the actual nominal cost is spread across the duration of the project construction in the following manner:

$$\mathrm{Y_i} = \frac{1}{2+\mathrm{p}}\left[(\mathrm{s}+1)\left(\frac{\mathrm{i}}{\mathrm{I}}\right)^{\mathrm{s}}\left(\mathrm{p}+\pi\sin\left(\pi\left(\frac{\mathrm{i}}{\mathrm{I}}\right)^{\mathrm{s+1}}\right)\right)\right] \tag{1}$$

where Y_i refers to the share of project capital expenditure apportioned to the ith construction year. S is the cost lay-out curve skewness. P represents the flatness of the curve.

The foreign and domestic components of the annual nominal costs are then separated. The domestic currency value of the domestic component is obtained by converting from U.S. dollars to the local currency equivalent, using the prevalent exchange rate. The values obtained are further deflated using the prevalent domestic price index. The U.S. dollar equivalent is again recalculated for the project start year. On the other hand, the foreign component is deflated using the prevalent U.S. price index. The total actual real cost is computed as follows:

$$\text{Actual real cost} = \sum\nolimits_{i=0}^{T} \frac{C_i^{n\$} * FCX}{I_{o,i}^{F}} + \frac{1}{E_0^m} \sum\nolimits_{i=0}^{T} \frac{C_i^{n\$} * (1-FCX) * E_i^m}{I_{0,i}^{D}} \tag{2}$$

where C_i^n is the actual nominal cost, FCX is the foreign component, I^F is the foreign price index, and I^D is the domestic price index. Finally, cost overrun is computed as the ratio of actual real costs to the estimated real cost.

$$\text{Cost overrun}\,(\text{CO}) = \frac{C_a}{C_e} \tag{3}$$

The benefits of the hydropower projects are calculated as the value of the avoided generation costs of fossil fuel-powered plants that would be required to be built and operated to supply the same volume of electricity as would be supplied by the hydro dam (Zuker & Jenkins, 1984; Baurzhan *et al.,* 2021; Jenkins *et al.,* 2022). These avoided costs were estimated based on the exact technologies and their degree of displacement specified by the World Bank at the time of appraisal. Although this approach does not capture all the economic benefits associated with hydropower projects, it is regarded as a good proxy for the benefits generated by hydroelectricity generation (Awojobi & Jenkins, 2015). Other benefits associated with hydropower projects such as supply of potable water, irrigation, flood control, and carbon emissions reduction are excluded from our analysis due to the level of complexity required in their computation.

The estimated real economic benefits of the projects are reverse-engineered from the economic internal rate of returns reported in the SARs and ICRs provided by the World Bank for each of the projects. This is the same approach adopted by Jenkins *et al.* (2022) for calculating ex-ante real benefits of hydropower projects. The actual real economic benefits of the projects are calculated as described by Zuker and Jenkins (1984) and Baurzhan *et al.* (2021). Standard thermal plants as specified by the World Bank system planner were identified the next best alternative to hydro dams for electricity supply. We therefore measure project benefits using the construction and operation costs of fossil fuel power plants capable of generating same amount of electricity. This occurs in two steps. First, cost savings from the avoided fixed annual capital cost of the alternative thermal plant are estimated. Second, the marginal running costs avoided by not operating the alternative thermal plant are also estimated.

The actual real benefits produced by each of the projects are calculated as follows:

$$\text{Actual real benefit} = \sum\nolimits_{t=0}^{Z+40} \left\{ \left| k \frac{r(1+r)^N}{(1+r)^N - 1} IC \right| + VOM + (f_t p_t) G_t \right\} (1+r)^{-t} \quad (4)$$

where Z is the actual completion period. 40 years is the project life cycle. k is the capital cost. N is the economic life of the next best alternative source of electricity supply. IC is the installed capacity. VOM is the operating and maintenance cost. f_t is the fuel requirement per time t. P_t is the fuel price per time t. G is the equivalent electricity supply from hydropower source per time t.

Benefit overruns are then measured as the ratio of actual to the estimated benefits.

$$\text{Benefit overrun (BO)} = \frac{B_a}{B_e} \quad (5)$$

Finally, the economic NPV of each dam is calculated by taking the difference between the actual real project benefit and actual real project cost on a yearly basis. This difference is first spread over time as a stream of net economic benefits; it is then discounted to project start year. The economic NPVs obtained from these calculations are all expressed in the 2016 prices to ensure comparability.

4. Methodological approach and statistical findings

4.1. *The Flyvbjerg (2016) approach*

In an attempt to statistically test the Hiding Hand hypothesis, Flyvbjerg (2016) came up with two claims that summarize the hypothesis based on his interpretation of the conclusions reached by Hirschman (1967, 2015). The first claim is that if the Benevolent Hiding Hand principle were true, then benefit overruns associated with the project would outweigh the cost overruns experienced during its construction. This would indicate that although project executors may have initially underestimated potential problems at the start of the project, they must have likewise underestimated skill sets available to them for solving these problems. Moreover, if the Benevolent Hiding Hand principle were true, then the average benefit overrun for the projects sampled would exceed the average cost overrun for the same set of projects. We may thus easily infer from this claim by Flyvbjerg (2016) that the Planning Fallacy or the Malevolent Hiding Hand principle would be more prevalent if benefit overruns were not as widespread as cost overruns and if average benefit overruns were smaller than average cost overruns.

The second claim made by Flyvbjerg (2016) is that if the Benevolent Hiding Hand principle were true, then we would expect to see a significant decline over time in cost risks and benefit risks. These reductions in risks should at least be noticeable in the medium to long run even if not visible in the short run. After all, lessons learnt over time should ordinarily lead to improvements in performance over time (Schön, 1994; Flyvbjerg, 2016). The implication of this second claim is that if there is no visible decline (increase) in cost overruns (benefit overruns) over time, then the Benevolent Hiding Hand principle has no statistical support.

Table 1 reports the results obtained from testing the first claim. The results show that the average weighted/unweighted cost overrun estimates (1.52/1.55) are well below the weighted/unweighted average benefit overrun estimates (1.89/1.81). The conclusion reached using the Flyvbjerg (2016) approach is that the Benevolent Hiding Hand dominates the Malevolent Hiding Hand in the World Bank-financed hydropower projects. This outcome is supported at 10% significance level by the one-sided Welch's test. According to Flyvbjerg (2016), if the Benevolent Hiding Hand principle were true, then cost overruns should decline over time across projects and benefit overruns should increase over time across projects; this is the second claim. For this hypothesis to be true, the correlation between time (proxied by project start date) and cost overrun must be negative and the correlation between time and benefit overrun must be positive. The correlation coefficient of −0.11 reported in the last row of Table 1 confirms the presence of a negative relationship between cost overrun and time, albeit relatively weak. Also, as recorded in the last row of Table 2, the correlation coefficient between time and benefit overrun is 0.22. This indicates that the relationship between time and benefit overrun is positive, although relatively weak.

Our statistical findings on the two claims made by Flyvbjerg (2016) lend credence to the conclusion reached on World Bank-financed projects by Hirschman (1967, 2015), and more recently by Ika and Feeny (2022) who argued that while project stakeholders are often over-optimistic in their assessment of project risks, benefits, and likelihood of success, they also often underestimate their own abilities to solve problems that arise during project construction.

4.2. *The modified Ika (2018) approach*

At first glance, using the Flyvbjerg (2016) approach, one may be tempted to conclude that the Benevolent Hiding Hand principle holds as claimed by Hirschman (1967, 2015) in World Bank-financed hydropower projects. Caution is however required as the Flyvbjerg (2016) approach has been criticized on a number of grounds by Ika (2018). The first criticism of the approach is its failure to take into consideration the differences between developmental and infrastructural projects. The second criticism is the failure of the approach to take into account the centrality of unintended consequences. The third criticism is that the approach narrowly tests the validity of the Hiding Hand Principle only through cost–benefit calculations. The fourth criticism of the approach is its lack of a project management perspective that takes creativity into account. The approach therefore does not provide any information on the innovations that take place during the process of transforming inputs into outputs (Ika, 2015). The final and most relevant limitation of the approach as pointed out by Ika (2018) is on methodological grounds. Ika (2018) argues that as opposed to the unreliable first-year benefits used by Flyvbjerg (2016), ex-post and full life-cycle project costs and benefits should have been used. This would have considered all the unexpected

Table 1. *Higher than estimated costs.*

#	Project name	PV of estimated costs	PV of actual costs	Cost overrun (actual/ estimated)
1	Andekaleka Power, Madagascar	225	303	1.34
2	San Carlos, Colombia	785	982	1.25
3	Fourth Guadalupe, Colombia	298	370	1.24
4	Itumbiara Dam, Brazil	1529	2306	1.51
5	Guavio Hydro Power Project, Colombia	1357	3329	2.45
6	Paulo Afonso IV Complex, Brazil	1502	2590	1.72
7	Aguacapa Power Project, Guatemala	223	426	1.90
8	La Fortuna, Panama	343	948	2.77
9	Chixoy Hydro-power, Guatemala	850	1122	1.32
10	Saguling Dam, Indonesia	969	1240	1.28
11	Yantan Hydroelectric Project, China	471	858	1.82
12	Ertan I, Sichuan, China	1805	2033	1.13
13	Sir Hydropower Project, Turkey	314	388	1.24
14	Sigalda HPP, Iceland	209	267	1.28
15	Yonki Dam, Papua New Guinea	132	173	1.31
16	Afulilo Hydropower project, Western Samoa	23	46	1.99
17	Wailoa Hydroelectric, Fiji	175	208	1.19
18	Rampur Hydropower project, India	448	517	1.15
19	Guangrun hydroelectric power plant, China	31	39	1.26
20	Bujagali, Uganda	661	800	1.21
21	La Higuera, Chile	171	309	1.81
22	Cheves Hydro, Peru	344	526	1.53
23	Allain Duhangan II, India	201	407	2.02
	Weighted/unweighted averages			1.52/1.55
	P*			(0.089)
	Corr(PSD,CO)			−0.11

Note: (1) P*, P-value of the test with null hypothesis that benefit overrun is larger than cost overrun, using Welch's test. (2) corr, correlation; CO, cost overrun; PSD, project start date.

responses caused by setbacks during project construction. This approach would thus be able to correctly test the Hiding Hand principle. We solve this problem by following the methodological approach described by Baurzhan *et al.* (2021) for calculating benefit overruns.

As an alternative to Flyvbjerg (2016), Ika (2018) follows a project management approach. Ika (2018), following De Wit (1988), makes a distinction between projects deemed to be short-term management successes and those deemed to be long-term management successes. While the former is predominantly concerned with a project's management process, the latter is mainly concerned with the project's fitness for use, and consequently, the project's final impact. Ika (2015) refers to the long-term management success as deliverable success. In summary, project management successes on one hand are measures of efficiency while deliverable successes are measures of effectiveness (see Ika, 2009). These successes

Table 2. *Higher than estimated benefits.*

#	Project name	PV of estimated benefits	PV of actual benefits	Benefit overrun (actual/ estimated)
1	Gitaru HPP, Kenya	491	600	1.22
2	Kiambere Hydroelectric, Kenya	440	500	1.14
3	San Carlos, Colombia	1228	2759	2.25
4	Fourth Guadalupe, Colombia	389	667	1.72
5	Playas Hydropower, Colombia	771	861	1.12
6	Pehuenche Hydroelectric Dam, Chile	988	1493	1.51
7	GaziBarotha Hydropower, Pakistan	5101	8766	1.72
8	Yantan Hydroelectric Project, China	561	2104	3.75
9	Ertan I, Sichuan, China	3448	4826	1.40
10	Sir Hydropower Project, Turkey	383	539	1.41
11	Sigalda HPP, Iceland	225	492	2.19
12	Afulilo Hydropower project, Western Samoa	27	32	1.18
13	Wailoa Hydroelectric, Fiji	270	303	1.12
14	Dongping hydroelectric power plant, China	112	331	2.97
15	Najitan hydroelectric power plant, China	48	113	2.34
16	Songshuling hydroelectric power plant, China	48	113	2.34
17	Xiakou hydroelectric power plant, China	37	67	1.84
18	Guangrun hydroelectric power plant, China	42	65	1.54
19	La Higuera, Chile	305	476	1.56
	Weighted/unweighted averages			1.89/1.81
	*P**			(0.089)
	Corr(PSD,BO)			0.22

*Note: P**, *P*-value of the test with null hypothesis that benefit overrun is larger than cost overrun, using Welch's test. (2) BO, benefit overrun; corr, correlation, PSD, project start date.

are regarded as two sides of a coin in which project management successes could either result in deliverable successes or in deliverable failures (see Ika, 2015; Ika & Donnelly, 2017). Against this backdrop, Ika (2018) creates a 2 × 2 matrix within which project management performance is compared with deliverable performance.

We modify this project management approach of Ika (2018) by adopting a cost–benefit approach in our interpretation of deliverable performance. We define deliverable success as the ability to generate net economic benefits (projects with positive economic NPVs). This is because such projects have been able to produce benefits that significantly exceed their associated costs. In cost–benefit analysis, the ability to generate positive economic NPV is a key criterion for deciding whether a project is successful or not. Consequently, the top-left quadrant of the matrix contains projects regarded as all-round successes. These are projects that were not only completed within estimated costs but also generated positive net economic present values. In the top-right quadrant of the matrix are projects that are classified as project management failures with significant deliverable successes. For this study, these projects are those that suffered considerable cost overruns (project management difficulties) but still managed to generate positive economic NPVs over their life cycles (deliverable successes). Projects in this category are those that exhibit the Benevolent Hiding Hand.

The bottom-left quadrant of the matrix contains projects that are termed outright failures. The projects within this category are those that could not be built within estimated costs (project management failure) and also could not generate positive economic NPVs (deliverable failure). These are projects with significant cost overruns and benefit shortfalls. These projects are those that exhibit the Planning Fallacy (the Malevolent Hiding Hand). At the bottom-right quadrant are projects regarded as project management successes but deliverable failures. These projects in our case are those that were delivered within budget but fell short of delivering the expected benefits (projects without significant cost overruns but with negative economic NPVs).

Results reported in Table 3 confirm that the Benevolent Hiding Hand dominates the Malevolent Hiding Hand in World Bank-financed hydropower projects. Fourteen out of the 43 projects examined (33%) fall into the Benevolent Hiding Hand quadrant. On the other hand, 9 of the 43 projects (21%) fall into the Planning Fallacy quadrant. Our study findings based on the modified Ika (2018) approach therefore suggest that the chances that a World Bank-financed dam will experience the Benevolent Hiding Hand is significantly higher than the chances that it will suffer from the Malevolent Hiding Hand. While these results generally align with the conclusion of Ika (2018) that the Benevolent Hiding Hand dominates the Malevolent Hiding Hand, there are a few differences. In our case, the Benevolent Hiding Hand occurred in 33% of the projects as opposed to the 13% recorded by Ika (2018). Also, in our case, the Malevolent Hiding Hand occurred in 21% of the projects as opposed to the 3.1% documented by Ika (2018). This is perhaps due to the more homogeneous nature of the sample used in our analysis, as well as the distinct method of estimating project benefits employed in our study.

Moreover, the results show that due to the Malevolent Hiding Hand, 2.335 billion USD was lost (value of negative economic NPV)[1] by these World Bank-financed dams. However, in addition to the 11.221 billion USD gained (value of positive economic NPV) from projects that were all-round successes, an additional amount of 11.259 billion USD was gained as a result of the ingenuity of the project managers (Benevolent Hiding Hand).

5. Conclusion

Whether the Hiding Hand principle of Hirschman (1967, 2015) is predominantly benevolent or malevolent has been the focus of academic debate in recent times. The keen interest in this topic is as a result of its potential effect on project decision-making. This study extends this debate by analyzing whether the need to get project appraisal perfectly right during the preconstruction phase of power dams so as to prevent significant overruns supersedes the need to deliver power projects at the earliest possible time so as to meet the needs of the people. We posit that if the Hiding Hand is benevolent, then project managers are better off focusing on quick delivery of power projects, but if it is malevolent, then more attention should be given to perfecting project appraisals. Our study is a specific attempt to determine whether the Hiding Hand is benevolent or malevolent in hydropower projects financed by the World Bank, using the approach established by Flyvbjerg (2016) and a modification of the approach introduced by Ika (2018).

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[1] Economic NPVs are calculated as of the date project approval was given but then adjusted to 2016 price level.

Table 3. *Project management performance versus deliverable performance.*

All-round success	CO	NPV	Project management failure but deliverable success	CO	NPV
Kapichira Hydroelectric, Malawi	0.78	33	Itumbiara Dam, Brazil	1.51	2378
Ruzizi Hydroelectric, Burundi-Rwanda-CDR	0.98	37	Paulo Afonso IV Complex, Brazil	1.72	1105
Bersia Hydroelectric project	0.81	43	Saguling Dam, Indonesia	1.28	230
Kenering Hydroelectric project	0.78	104	Rampur Hydropower project, India	1.15	355
Karakaya Hydropower, Turkey	1.00	1275	Bujagali, Uganda	1.21	415
Felou hydroelectric project, Mali, Mauritania, Senegal	0.88	68	San Carlos, Colombia	1.25	1777
Lubuge Hydroelectric, China	1.04	280	Fourth Guadalupe, Colombia	1.24	297
Gitaru HPP, Kenya	0.97	277	Yantan Hydroelectric Project, China	1.82	1246
Kiambere Hydroelectric, Kenya	0.99	62	Ertan I, Sichuan, China	1.13	2792
Pehuenche Hydroelectric Dam, Chile	0.58	1009	Sir Hydropower Project, Turkey	1.24	151
Grabovica hydroelectric power plant, Yugoslavia	1.06	20	Sigalda HPP, Iceland	1.28	225
Salakovac Hydroelectric power plant, Yugoslavia	1.06	25	Wailoa Hydroelectric, Fiji	1.19	95
GaziBarotha Hydropower, Pakistan	0.98	7087	Guangrun hydroelectric power plant, China	1.26	26
Najitan hydroelectric power plant, China	0.94	80	La Higuera, Chile	1.81	167
Songshuling hydroelectric power plant, China	0.84	83			
Xiakou hydroelectric power plant, China	0.88	44			
Playas Hydropower, Colombia	1.06	451			
Dongping hydroelectric power plant, China	1.04	243			
Sum		11221	Sum		11259
Planning Fallacy (Malevolent Hiding Hand)	CO	NPV	Project management success but deliverable failure	CO	NPV
Andekaleka Power, Madagascar	1.34	−88	Mtera Hydroelectric, Tanzania	0.96	−28
Guavio Hydro Power Project, Colombia	2.45	−1731	Mostar Hydroelectric power plant, Yugoslavia	1.07	−97

Table 3. *Continued*

Planning Fallacy (Malevolent Hiding Hand)	CO	NPV	Project management success but deliverable failure	CO	NPV
Aguacapa Power Project, Guatemala	1.90	−96			
La Fortuna, Panama	2.77	−164			
Chixoy Hydro-power, Guatemala	1.32	−57			
Cheves Hydro, Peru	1.53	−64			
Yonki Dam, Papua New Guinea	1.31	−56			
Allain Duhangan II, India	2.02	−64			
Afulilo Hydropower project, Western Samoa	1.99	−15			
Sum		−2335	Sum		−125

Note: (1) CO, cost overrun. (2) NPV is measured in US$M, 2016 price level.

Statistical findings based on the Flyvbjerg (2016) approach lead to the conclusion that the Benevolent Hiding Hand dominates the Malevolent Hiding Hand in the selected World Bank-financed hydropower projects. First, we found that the average weighted/unweighted cost overrun estimates (1.52/1.55) are well below the weighted/unweighted average benefit overrun estimates (1.89/1.81). We also detected the presence of a negative relationship between cost overrun and time, an indication that cost overrun declines with time. Statistical findings based on the modified Ika (2018) approach further confirm the previous outcomes. The Benevolent Hiding Hand occurred in 33% of the cases, while the Malevolent Hiding Hand occurred in 21% of the cases. Our findings further showed that while a total loss of 2.335 billion USD in the sampled dams was caused by the Malevolent Hiding Hand, 11.259 billion USD was gained as a result of the Benevolent Hiding Hand.

It is also worthy of mention that although the Benevolent Hiding Hand is not typical as suggested by Hirschman (1967, 2015) since it occurred in only 33% of the cases, 75% of the cases examined ended up being successful (addition of outright successes and success due to the Benevolent Hiding Hand). The project development and management implication of our finding are clear. The predominance of the Benevolent Hiding Hand justifies placing some weight on proceeding with hydro-projects with significant promise, even if all the implantation risks are not fully quantified at the appraisal stage. This is especially true for developing countries. As stated earlier, most developing countries suffer from inadequate electricity service coupled with continuously growing demand that worsens the situation. Thus, very high economic value is attached to power generation in these countries, whereas project implementation delays impose huge socio-economic costs.

Caution is however advised since sampling on the basis of data availability, as we have done, may lead to the generation of conservative results. There is no doubt that projects financed by organizations such as the World Bank will be appraised at a higher than normal professional standard. It may be because the cost–benefit analysis is done well that the benevolent hand is able to exercise such a relatively strong positive influence in addressing the remaining events that arise due to uncertainties. Poorly appraised projects, or cost–benefit analysis whose outcomes are foreordained, might very well create outcomes where the existence of the Malevolent Hiding Hand dominates. In such cases, the underestimated creativity associated with the Benevolent Hiding Hand may not be large enough to cover the remaining events that arise due to uncertainties. Thus, cost overruns and benefit shortfalls in the project population could be larger than in the sample used for our analysis. However, the solution to this problem is for increased professionalism in the conduct of the cost–benefit analysis of these proposed projects. As it has been discussed by Jenkins *et al.* (2022), a simple rule of increasing the estimation of the costs through reference-based forecasting while ignoring the likely distribution of the benefits is not a solution to this problem. That proposed solution leads to the abandonment of many projects at the appraisal stage that if implemented would have generated significant positive NPVs. Moreover, the fact that other associated benefits of hydropower projects such as supply of potable water, irrigation, flood control, and carbon emissions reduction are excluded from our analysis also indicates that the presence of the Benevolent Hiding Hand might have been underestimated in the sample of projects used in this study.

Acknowledgments. The authors are grateful to Migara Jayawardena for assisting us in launching this project. The authors are grateful to Saule Baurzhan and Owotomiwa Olubamiro for the assistance rendered in the preparation of the databases used for statistical analysis. The authors are also grateful to two anonymous reviewers for very useful insights provided on an earlier draft of this manuscript. The research from which the study data are obtained was funded by the World Bank's independent Evaluation Group. The authors however take full responsibility for all conclusions reached and any errors found in the article. Views reflected and conclusions provided by this article should neither be attributed to the World Bank nor any of its staff.

Competing interest. The authors declare none.

References

Adelman, J. 2013. *Worldly Philosopher: The Odyssey of Albert O. Hirschman*. Princeton and Oxford: Princeton University Press.

Alacevich, M. (2015). "Albert Hirschman Observed. Afterword." In Hirschman, A. O. (Ed.), *Development Projects Observed* (3rd ed.). Washington, DC: Brookings Institution.

Awojobi, O. and G. P. Jenkins. 2015. "Were the Hydro Dams Financed by the World Bank from 1976 to 2005 Worthwhile?" *Energy Policy*, *86*: 222–232.

Bacon, R. W. and J. E. Besant-Jones. 1998. "Estimating Construction Costs and Schedules: Experience with Power Generation Projects in Developing Countries." *Energy Policy*, *26*(4): 317–333.

Baurzhan, S., G. P. Jenkins, and G. O. Olasehinde-Williams. 2021. "The Economic Performance of Hydropower Dams Supported by the World Bank Group, 1975–2015." *Energies*, *14*(9): 2673.

Braeckman, J. P. and Guthrie, P. 2015. "Loss of Value: Effects of Delay on Hydropower Stakeholders." In *Proceedings of the Institution of Civil Engineers-Engineering Sustainability* (Vol. *169*, No. 6): pp. 253–264). London: Thomas Telford Ltd.

Cracknell, B. 1984. "Learning Lessons from Experience: The Role of Evaluation in the Administration of the UK Aid Programme." *Public Administration and Development*, *4*(1): 15–20.

De Wit, A. 1988. "Measurement of Project Success." *International Journal of Project Management*, *6*(3): 164–170.

Dhakal, D. N. S. and G. P. Jenkins. 2013. "Risk Sharing in Hydropower Development: Case Study of the Chukha Hydel Project in Bhutan." *Water Policy*, *15*(S1): 109–125.

Dorner, D. 1997. *The Logic of Failure: Recognizing and Avoiding Error In Complex Situations*. New York: Basic Books.

Flyvbjerg, B. 2005. "Design by Deception: The Politics of Megaproject Approval." *Harvard Design Magazine, Spring/Summer*, *22*: 50–59.

Flyvbjerg, B. 2016. "The Fallacy of Beneficial Ignorance: A Test of Hirschman's Hiding Hand." *World Development*, *84*: 176–189.

Flyvbjerg, B. and C. R. Sunstein. 2016. "The Principle of the Malevolent Hiding Hand; or, the Planning Fallacy Writ Large." *Social Research*, *83*(4): 979–1004.

Flyvbjerg, B., M. S. Holm, and S. Buhl. 2002. "Underestimating Costs in Public Works Projects: Error or Lie?" *Journal of the American Planning Association*, *68*(3): 279–295.

Flyvbjerg, B. (2009). Survival of the unfittest: why the worst infrastructure gets built–and what we can do about it. *Oxford review of economic policy*, *25*(3), 344-367.

Gasper, D. 1986. "Programme Appraisal and Evaluation: The Hiding Hand and Other Stories." *Public Administration and Development*, *6*(4): 467–474.

Gil, N., A. Stafford, and I. Musonda (Eds.). 2019. *Duality by Design: The Global Race to Build Africa's Infrastructure*. Cambridge: Cambridge University Press.

Gladwell, M. 2013. "The Gift of Doubt: Albert O. Hirschman and the Power of Failure." *The New Yorker*, 24.

Hayek, F. A. 1945. "The Use of Knowledge in Society." *The American Economic Review*, *35*(4): 519–530.

Hirschman, A. O. 1967. *Development Projects Observed*. Washington, DC: Brookings Institution.

Hirschman, A. O. 2015. *Development Projects Observed, Third Edition Published as a Brookings Classic with a New Foreword by Cass R. Sunstein and a New Afterword by Michele Alacevich*. Washington, DC: Brookings Institution.

Ika, L. A. (2009). Project success as a topic in project management journals. *Project management journal*, *40*(4), 6-19.

Ika, L. A. 2012. "Project Management for Development in Africa: Why Projects are Failing and What Can Be Done About It." *Project Management Journal*, *43*(4): 27–41.

Ika, L. A. (2015). Opening the black box of project management: Does World Bank project supervision influence project impact?. *International Journal of Project Management*, *33*(5), 1111-1123.

Ika, L. A. 2018. “Beneficial or Detrimental Ignorance: The Straw Man Fallacy of Flyvbjerg’s Test of Hirschman’s Hiding Hand.” *World Development*, *103*: 369–382.

Ika, L. A. and J. Donnelly. 2017. “Success Conditions for International Development Capacity Building Projects.” *International Journal of Project Management*, *35*(1): 44–63.

Ika, L. A. and D. Hodgson. 2014. “Learning from International Development Projects: Blending Critical Project Studies and Critical Development Studies.” *International Journal of Project Management*, *32*(7): 1182–1196.

Ika, L. and S. Feeny 2022. “Optimism Bias and World Bank Project Performance.” *The Journal of Development Studies*, *58*(12): 2604–2623.

Ika, L. A. and J. Söderlund. 2016. “Rethinking Revisited: Insights from an Early Rethinker.” *International Journal of Managing Projects in Business*, *9*(4): 931–954.

Jenkins, G., G. Olasehinde-Williams, and S. Baurzhan. 2022. “Is There a Net Economic Loss from Employing Reference Class Forecasting in the Appraisal of Hydropower Projects?” *Renewable and Sustainable Energy Reviews*, *159*: 112218.

Kahneman, D. 2011. *Thinking, Fast and Slow*. New York: Farrar, Straus and Giroux.

Kacou, K. P., L. A. Ika, and L. T. Munro. 2022. “Fifty Years of Capacity Building: Taking Stock and Moving Research Forward 1.” *Public Administration and Development*, *42*(4): 215–232.

Krugman, P. 1994. *The Fall and Rise of Development Economics. Rethinking the Development Experience: Essays Provoked by the Work of Albert O. Hirschman*: 39–58. Washington, DC: Brookings Institution.

Love, P. E. and D. D. Ahiaga-Dagbui. 2018. “Debunking Fake News in a Post-Truth Era: The Plausible Untruths of Cost Underestimation in Transport Infrastructure Projects.” *Transportation Research Part A: Policy and Practice*, *113*: 357–368.

Love, P. E., L. A. Ika, and D. D. Ahiaga-Dagbui. 2019. “On De-Bunking ‘Fake News’ in a Post Truth Era: Why Does the Planning Fallacy Explanation for Cost Overruns Fall Short?” *Transportation Research Part A: Policy and Practice*, *126*: 397–408.

Offe, C. 2013. “Getting Ahead by Trespassing-Jeremy Adelman, Worldly Philosopher. The Odyssey of Albert O. Hirschman (Princeton, Princeton University Press 2013).” *European Journal of Sociology/Archives Européennes de Sociologie*, *54*(3): 583–591.

Picciotto, R. 1994a. *Visibility and Disappointment: The New Role of Development Evaluation. Rethinking the Development Experience: Essays Provoked by the Work of Albert O. Hirschman*: 210–230. Washington, DC: Brookings Institution.

Picciotto, R. (1994b). “Marseille Discussion: Learning Via the Hiding Hand.” In *Appendix A of* Rodwin, Lloyd and Donald A. Schön (Eds.) *Rethinking the Development Experience: Essays Provoked by the Work of Albert O. Hirschman*: 301–304. Washington, DC: Brookings Institution.

Picciotto, R. 2015. “Hirschman’s Ideas as Evaluation Tools.” *Journal of Multidisciplinary Evaluation*, *11*(24): 1–11.

Rondinelli, D. A. 1976. “Why Development Projects Fail: Problems of Project Management in Developing Countries.” *Project Management Quarterly*, *7*: 10–15.

Schön, D. A. 1994. *Hirschman’s Elusive Theory of Social Learning. Rethinking the Development Experience: Essays Provoked by the Work of Albert O. Hirschman*: 67–95. Washington DC and Cambridge, MA: The Brookings Institution and The Lincoln Institute of Land Policy.

Shenhar, A. J. and D. Dvir. 2007. *Reinventing Project Management: The Diamond Approach to Successful Growth and Innovation*. Brighton, Massachusetts: Harvard Business Review Press.

Singer, H. W. 1969. “Albert O. Hirschman: Development Projects Observed.” *Institute of Development Studies Bulletin*, *1*(3): 22–25.

Streeten, Paul P., 1984, “Comment,” in Gerald M. Meier and Dudley Seers, eds., *Pioneers in Development* (New York: World Bank and Oxford University Press.

Sunstein, C. R. 2015. “Albert Hirschman’s Hiding Hand.” In Foreword to Albert O. Hirschman. *Development Projects Observed* (3rd ed.). Washington, DC: Brookings Institution.

Wachs, M. 1990. “Ethics and Advocacy in Forecasting for Public Policy.” *Business & Professional Ethics Journal*, *9*: 141–157.

Zuker, R. C. and G. P. Jenkins. 1984. *Blue Gold: Hydro-Electric Rent in Canada*. Ottawa: Economic Council of Canada.

Cite this article: Olasehinde-Williams, G., and G. P. Jenkins. 2023. “A Test of Hirschman’s Hiding Hand Principle in World Bank-Financed Hydropower Projects.” *Journal of Benefit-Cost Analysis* 14: 298–317, doi:10.1017/bca.2023.18

Appendix

Table A1. *The 43 hydro dams used for statistical analysis.*

#	Region	Project ID	Projecttype	Start	Complete	Load factor
1	Sub-Saharan Africa	Gitaru HPP, Kenya	WS	1974	1978	59.05%
2	Sub-Saharan Africa	Kapichira Hydroelectric, Malawi	WOS	1992	2000	24.08%
3	Sub-Saharan Africa	Ruzizi Hydroelectric, Burundi-Rwanda-CDR	WOS	1983	1990	53.99%
4	Sub-Saharan Africa	Kiambere Hydroelectric, Kenya	WS	1984	1988	60.12%
5	Sub-Saharan Africa	Andekaleka Power, Madagascar	WS	1979	1982	56.67%
6	Sub-Saharan Africa	Mtera Hydroelectric, Tanzania	WS	1984	1991	48.52%
7	Sub-Saharan Africa	Felou hydroelectric project, Mali, Mauritania, Senegal	WOS	2007	2014	62.79%
8	Sub-Saharan Africa	Bujagali, Uganda	WOS	2007	2012	65.66%
9	Latin American and the Caribbean	San Carlos, Colombia	WS	1980	1987	47.36%
10	Latin American and the Caribbean	Fourth Guadalupe, Colombia	WOS	1981	1986	57.72%
11	Latin American and the Caribbean	Playas Hydropower, Colombia	WS	1983	1988	82.76%
12	Latin American and the Caribbean	Itumbiara Dam, Brazil	WS	1974	1981	35.29%
13	Latin American and the Caribbean	Pehuenche Hydroelectric Dam, Chile	WS	1988	1993	63.13%
14	Latin American and the Caribbean	Guavio Hydro Power Project, Colombia	WS	1983	1993	59.36%
15	Latin American and the Caribbean	Paulo Afonso IV Complex, Brazil	WS	1974	1984	28.74%

Table A1. *Continued*

#	Region	Project ID	Projecttype	Start	Complete	Load factor
16	Latin American and the Caribbean	Aguacapa Power Project, Guatemala	WOS	1978	1981	49.72%
17	Latin American and the Caribbean	La Fortuna, Panama	WS	1978	1984	50.23%
18	Latin American and the Caribbean	Chixoy Hydro-power, Guatemala	WS	1978	1982	55.94%
19	Latin American and the Caribbean	La Higuera, Chile	WOS	2005	2010	61.86%
20	Latin American and the Caribbean	Cheves Hydro, Peru	WOS	2010	2015	57.08%
21	South Asia	GaziBarotha Hydropower, Pakistan	WOS	1995	2003	51.96%
22	South Asia	Rampur Hydropower project, India	WOS	2008	2014	50.84%
23	South Asia	Allain Duhangan II, India	WOS	2005	2012	48.16%
24	East Asia and Pacific	Saguling Dam, Indonesia	WS	1981	1986	35.16%
25	East Asia and Pacific	Bersia Hydroelectric project	WOS	1980	1986	37.73%
26	East Asia and Pacific	Kenering Hydroelectric project	WOS	1980	1986	43.38%
27	East Asia and Pacific	Yantan Hydroelectric Project, China	WS	1987	1994	52.30%
28	East Asia and Pacific	Lubuge Hydroelectric, China	WS	1985	1991	45.53%
29	East Asia and Pacific	Ertan I, Sichuan, China	WS	1992	2000	58.81%
30	East Asia and Pacific	Yonki Dam, Papua New Guinea	WS	1987	1991	62.79%
31	East Asia and Pacific	Afulilo Hydropower project, Western Samoa	WS	1987	1992	43.49%
32	East Asia and Pacific	Wailoa Hydroelectric, Fiji	WS	1977	1981	28.54%
33	East Asia and Pacific	Dongping hydroelectric power plant, China	WS	2003	2008	33.62%
34	East Asia and Pacific	Najitan hydroelectric power plant, China	WOS	2003	2011	33.80%
35	East Asia and Pacific	Songshuling hydroelectric power plant, China	WOS	2003	2011	35.16%
36	East Asia and Pacific	Xiakou hydroelectric power plant, China	WS	2003	2011	28.90%

Table A1. *Continued*

#	Region	Project ID	Projecttype	Start	Complete	Load factor
37	East Asia and Pacific	Guangrun hydroelectric power plant, China	WS	2003	2011	37.79%
38	Europe and Central Asia	Sigalda HPP, Iceland	WS	1973	1977	74.20%
39	Europe and Central Asia	Karakaya Hydropower, Turkey	WS	1980	1988	46.63%
40	Europe and Central Asia	Grabovica hydroelectric power plant, Yugoslavia	WS	1980	1989	34.05%
41	Europe and Central Asia	Salakovac Hydroelectric power plant, Yugoslavia	WS	1980	1989	32.22%
42	Europe and Central Asia	Mostar Hydroelectric power plant, Yugoslavia	WS	1980	1989	51.86%
43	Europe and Central Asia	Sir Hydropower Project, Turkey	WS	1986	1991	28.74%