

Article

Project Risks Influence on Water Supply and Sanitation Sector Financing Opportunities

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Abstract: Private financing mobilized in the water supply and sanitation sector has not been sufficient to cover the sector's needs. Several barriers hinder private financing leveraging, including the risk perception of water supply and sanitation projects. This study analyzed 185 water supply and sanitation projects financed by the World Bank between 2015 and 2021 to understand how perceived project risks can influence the financing of these sectors. This study demonstrates the parallels between different types of project risks, their ratings, and the different lending instruments and amounts committed by the bank. The most prevalent risks in the analyzed WSS projects were identified, namely, fiduciary, institutional capacity for implementation and sustainability, environmental and social, and political and governance. The World Bank appears to have different levels of tolerance for the different types of risks, and this tolerance seems to vary between regions and with time. Risks seem to have different weights when financiers decide which WSS projects to finance. Global and regional risk profiles of the 185 WSS projects financed by the World Bank were developed, which can help borrowers identify risks that they can mitigate to potentially improve their ability to attract private finance for WSS projects.

Keywords: financing; project risk profile; water supply; sanitation; risk tolerance



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1. Introduction

Historically, it has not been easy to mobilize private sector investments in the water supply and sanitation (WSS) sector [1–3]. According to the OECD [2], only 1% of all private finance mobilized by official development finance interventions between 2012 and 2017 occurred in this sector. This means that from the USD 157.2 billion mobilized across sectors, only USD 2.1 billion was raised in the WSS sector.

The achievement of a self-financing WSS sector, which is not as dependent on public budget funding and can attract finance (loan or equity), faces practical barriers [4–7]. According to Rees et al. [4], some examples of these barriers are the lack of administrative capacity, political and social opposition to rate and revenue increases, and low incentives for providers to embark on a financial reform process. Investment decisions can be negatively influenced when there are skewed risk perceptions due to the scarcity of readily available, transparent, and standardized high-quality data on investment projects [8]. In addition, the OECD [9] stated that the gap between current financing and future needs is due to several factors, such as:

- Undervaluation of the water resource;
- Insufficient cost recovery for investments due to water service underpricing;
- Need for high up-front and sunk investment followed by a very long payback period;
- Difficulty in monetizing the water management benefits, which undermines potential revenue flows;
- Lack of analytical tools and data to assess and track investments;

- Small dimension and specificity of WSS projects, which raise the transaction costs and hinder scaling-up;
- Prioritization of bankable projects over the maximization of social and environmental benefits; and
- Failure to support operation and maintenance efficiency.

In addition, it needs to be understood that financiers have diverse needs and expectations when investing in the sector. Different financiers will react differently to different types of barriers, since, according to the OECD [9], they have different mandates, investment objectives, liquidity needs, and risk appetites. Notwithstanding, these financiers (e.g., banks) only invest in projects after analyzing their characteristics, including their risk profiles, and determining the investment's attractiveness and creditworthiness [3]. Thus, similar to any other type of project, in the WSS sectors risks need to be identified and mitigation plans should be drawn to attract commercial lending.

In this context, risks can be simplistically defined as “threats to success”, while risk management aims to remove or reduce potential underperformances [10]. Risks can occur in a variety of forms. They can be political, regulatory, macroeconomic, technical, and so on [11,12]. According to the literature, some of the main risks influencing the WSS sector's financing and hindering the reach of the United Nations Member States' Sustainable Development Goal 6—SDG 6 (whose main goal is to ensure the availability and the sustainable management of water and sanitation for all [13])—are the following:

- Regulatory and political risks usually arise when there is an instability risk in the political and financial status of a country and when there is a possibility that government exploitation of vulnerabilities in contracts, or other types of problems/abuses, will not be mitigated by a well-adjusted regulation system [14,15]. Typically, financiers do not understand the WSS sector and often fear the political nature of tariff setting and the perceived unwillingness of the population to pay for such services [16]. According to Jiang et al. [12] foreign direct investment is sensitive to political risk;
- Construction risk is inherent to any infrastructure project that involves a construction element and is related to the costs of the project [15,17]. Costs escalation can be due to unanticipated events, such as changes in environmental or geotechnical conditions, construction materials' cost increases, an extension of the projected duration, and others [17,18];
- Performance and technical risks arise because of leakage or burst problems, the aging of the infrastructures, and the obsolescence of technologies [16]. The proper functioning of WSS infrastructure is highly dependent on considerable capital investments. To mitigate this risk is necessary to promote periodic rehabilitation and maintenance of the infrastructures (to minimize physical/real and billing water losses) and to update applied technologies when necessary or possible;
- Environmental and social risks are increasingly relevant topics for WSS, with water scarcity as one of the main problems that need to be addressed to ensure that everyone has access to safe and reliable water services. Water scarcity can be a threat to socioeconomic development and to the livelihood of many communities [19]. In addition, environmental and social risks could cause project delays, which can affect the reputation of the borrower and, in turn, generate credit risk [20]. Therefore, in order to attract commercial lending, it is important to incorporate “natural environment risk management strategies”, which are strategies that enable the identification and monitoring of the risk in project financing decisions and activities from an early stage [11];
- Exchange/currency rate risk can occur since the economic situation of developing countries is not usually stable and the exchange rate can suffer variations that were not predicted, thus resulting in variabilities in the value of, or in the interest in, a project [18,21]. Borrowings and investments that are serviced, repaid, or reimbursed in foreign currencies have an associated foreign exchange risk [14];

- Sub-sovereign risk is a problem because in many countries the WSS services are provided by decentralized sub-sovereign bodies such as municipalities or regional agencies, which have deficiencies at the financial, management, regulatory, or governance level [14,16,22];
- The nature and importance of the sub-sovereign risk varies, since there are different types of borrowers (e.g., government bodies, affiliated entities, specific project entities, and utilities) and types of transactions (e.g., general obligations and revenue based on specific cash flow) [23]. Some lenders are concerned with the default risk associated with lending to sub-sovereign bodies [23];
- Contractual risk is prevalent since the life of water investments is long, with contracts that average between 25 and 30 years, while the available financing has a short tenure [14,16]. The willingness of the lenders to provide longer tenures depends on the perceived risk of the project, and since financiers are not familiar with the water sector it is sometimes wrongly labeled as a high-risk investment and financing consistently falls short of the needs [2,16]. According to Akintoye et al. [24], the benefits of investing in WSS projects can only be truly reached if the contractual risks are mitigated, since contracts that do not effectively address risk raise the costs associated with all types of infrastructure services;
- Other macroeconomic and business risks are also worth mentioning because of their impact on WSS projects, namely, the liquidity risk, which arises when there is an inability to exit or sell and is prevalent in infrastructure projects, since they are unique in terms of the services provided resulting in fewer liquid infrastructure investments [2,25]; operating risk, which relates to the potential weak performance of the utilities, including serious problems such as fraud, trading errors, and system failures [2,11]; and market risk, which is associated with price changes, and it is impacted by unpredictable or unexpected factors that affect the amount of WSS services sold or recovered through tariffs and the actual tariff applied [11,17,18].

Risk prevalence and variety make risk mitigation a concern in WSS projects. As noted by Jamison et al. [26], for example, excessive risk limits investments in public service infrastructures, which are extremely important both economically and socially. In addition, according to De Marco and Mangano [27], the determination of the financial leverage of a project financing scheme can be influenced by risk (because of the assessment of the repayment capacity of debt obligations of the predicted project's cash flows). The perception of risk can defer private financing from infrastructure projects. According to Alaerts [28], the infrastructure financing gap, among other factors, is caused by high risks associated with infrastructure (especially in the WSS sector) and is prevalent in countries or regions that financiers perceive as riskier. The WSS financing gap is influenced both by the borrowers' lack of knowledge about available private financing and how to attract it and the requirements to access it and by the financiers' perceptions of risk in the WSS sector [28]. In addition, according to the literature, there is a lack and a need for more project finance-focused research since water infrastructure projects are not being sufficiently financed [3,29]. Therefore, it is important to understand how perceived project risks could be influencing the financing of the WSS sector through the analyses of the risk profiles of WSS projects that were financed by private financiers.

In line with the aforementioned goal, this study's main objective is to identify the risk profile of World Bank-financed projects and present parallels between different types of project risk ratings and the different lending instruments and amounts committed.

We chose to analyze the World Bank's portfolio, since this international financial institution has funded over 12,000 development projects (via traditional loans, interest-free credits, and grants), since 1947 [30]. In addition, it was decided to analyze projects financed by the World Bank because of the quantity and quality of the information made publicly available by the bank. Thus, the risk profiles of all WSS projects that were financed by the World Bank since 2015 were analyzed. The data sample was composed of projects that were initiated between January 2015 and April 2021, seeing that 2015 was the year the

United Nations Member States launched the SDGs, including SDG6 dedicated to the WSS sector [13].

The World Bank Group is composed of several institutions, namely, the International Finance Corporation (IFC), the Multilateral Investment Guarantee Agency (MIGA), the International Centre for Settlement of Investment Disputes (ICSID), the International Development Association (IDA), and the International Bank for Reconstruction and Development (IBRD). The IDA and IBRD are the two institutions that make up the World Bank [31]. The IDA provides zero-to-low interest loans and grants, focusing on the world's poorest countries, while the IBRD provides financial development and policy financing, assisting middle-income and creditworthy poorer countries [30]. These two institutions finance government programs and support policy and institutional reforms through the provision of budget financing and global expertise, and they finance public projects to build physical and social infrastructure [32].

Thus, the IDA and IBRD provide three main types of financing, each with its characteristics and application rules, as described below:

- Investment Project Financing (IPF) provides financing to governments for the creation of physical and/or social infrastructures when they are accessed as “essential to reduce poverty and create sustainable development”. Thus, IPF is focused on the medium-to-long term (around 5 to 10 years) and supports a wide range of activities (e.g., capital-intensive investments, service delivery, and others), by supplying financing and acting as a “vehicle for sustained, global knowledge transfer and technical assistance”;
- Development Policy Financing (DPF) (also known as Development Policy Lending) provides budget support to governments or political subdivisions with a program of policy and institutional actions aimed at addressing bottlenecks to improve service delivery, strengthening public financial management and other endeavors. DPF allows for the provision of rapidly disbursed financing to help borrowers address development financing requirements, which can be current or predicted;
- Program-for-Results (PforR) disburses funds linked to the delivery of results that are defined in advance, to help countries improve their development programs design and implementation and strengthen their institutions and building capacity. PforR's main goal is to enable countries to achieve lasting results. This type of financing instrument uses a “country's own institutions and processes” and links the “disbursement of funds directly to the achievement of specific program results” [32].

In sum, this paper aims to analyze the IDA's and IBRD's WSS projects, focusing on four main characteristics—initial risk profile and rating, type of financing, and amounts committed—to assess whether there is a potential influence of the initial risk assessment on the financing of WSS projects. This paper contributes to the literature because it provides a systematic quantitative review analysis of real WSS-financed projects and assesses the existence of parallels between different types of project risk ratings and the different lending instruments and amounts committed.

Finally, this paper is divided into four sections. Section 1 describes the existing lack of financing and the barriers that influence the involvement of private financiers in the WSS sectors and identifies the need to understand how risk perception could be influencing these sectors' financing. Following this brief introduction, Section 2 contains a description of the research methodology developed and applied, including the methods used to retrieve and analyze the data from 185 World Bank projects. Then, Section 3 presents and discusses the results of the analysis, focusing on risk types, risk ratings, types of financing, and amounts committed by the World Bank. Section 4 provides the concluding remarks and expectations for future research.

2. Materials and Methods

The applied methodology aimed to identify, retrieve, and analyze data from all relevant projects that benefited from commitments from the World Bank within the aforementioned timeframe.

The World Bank has a publicly available database that can be used to retrieve information on all its projects. This database can be explored with the use of World Bank-proposed tags, which help users to select the projects they want to consult. Since this study focused on projects from the water supply and sanitation sector, the tags “Water Supply” and/or “Sanitation” were applied.

More specifically, we retrieved from the World Bank database all the projects specifically from the water supply and/or sanitation sectors that had an active or closed status and were financed by the IBRD and/or IDA and had been approved by the bank’s board between January 2015 and April 2021. This allowed us to obtain data from 185 projects.

To avoid projects highly dependent on non-repayable funding (instead of repayable financing), the tag “Grants” was not selected. Even though there is a tendency for these two concepts to be misinterpreted and confused with each other, even in the literature, they are not the same [33]. Fiscal resources raised through funding do not have to be repaid, while fiscal resources that projects raise through financing need to be repaid [34,35].

The World Bank database allowed the collection of information automatically organized in an Excel spreadsheet for each of the 185 projects, namely, the region and country of the project, board approval date, project closing date, IBRD commitment, IDA commitment, lending instrument, borrower, sectors affected, project status, and other relevant data.

Following the automatic retrieval of the main information of the 185 World Bank-financed projects, it was necessary to manually retrieve information regarding the initial risk assessment of the projects. So, each project’s main documents were analyzed, including consulting the “Project Information Document” (PID) and the “Implementation Status and Results (ISR) Report”, to collect information about the initial risk assessment.

This methodology allowed the identification of the different types of risks that were initially assessed by the World Bank and their ratings. To assess the risk rating of the projects, the World Bank uses a Systematic Operations Risk-rating Tool (SORT), developed to consistently assess and monitor risks and rate them in four categories, namely, high (H), substantial (S), moderate (M), or low (L) [36]. The risks assessed in the SORT are risks to the project’s development results that are associated with the operation or operational engagement, namely, environmental and social; fiduciary; stakeholders; political and governance; macroeconomic; technical design of the project; sector strategies and policies; institutional capacity for implementation and sustainability; and other risks (including mostly geopolitical and regional risks, climate and disaster risks, and security risks). The risk assessment is developed considering the probability of the risk materializing and the severity of the risk impact on achieving the anticipated results. The risk assessment only considers the mitigation measures already in place and not the measures that will be applied in the future. The World Bank’s teams, for each project, use their judgment to determine each rating, and there is no preassigned weighting of the different aspects of risk under each category [36].

In addition, the overall (average) risk profile of each project was determined. The average risk profile of each project was calculated thanks to the identification of the number of categories of risk that were rated high, substantial, moderate, and low. So, a rate was attributed to each project according to its average risk rate (e.g., if a project had 2 categories of risk-rated high, 5 substantial, 0 moderate, and 1 low, a substantial overall risk profile was assigned to it). In addition, in the case of a tie, the highest risk rating was always attributed (e.g., if a project had 2 categories of risk-rated high, 3 substantial, 3 moderate, and 1 low, its attributed overall risk profile was substantial). Because of differences among financiers regarding the weight of risk ratings in their perception of the overall risk of a project, it was not considered appropriate to assign weights to ratings in order to determine the average risk rating in this study.

The collected data were submitted to a systematic quantitative review, which enabled the determination of key aspects of the sample, such as the year of project approval, the number of projects financed per region and country, the amounts committed (in USD) by each entity per project, the different types of risk ratings of the projects, among other

aspects. Furthermore, the data analysis of the collected projects allowed us to draw parallels between the types of financing, the amounts committed, the identified project risks and their ratings, and the overall risk rating of the projects.

Therefore, the number of projects financed by the World Bank from 2015 to 2020 and their commitments in each country (and in total) were first determined. This initial analysis allowed us to observe the projects financed and the commitments from the two financing institutions, the IDA and IBRD. Second, the different types of risks that were identified and rated by the World Bank between 2015 and 2020 were analyzed, identifying regional risk profiles (which present both the types of risks of the projects financed and their ratings) and noteworthy trends. Then, the historical risk appetite of the World Bank was identified through the analysis of the annually identified risks and their ratings and the evolution of the commitments from the IDA and IBRD. The determination of the overall risk profile of each project allowed us to identify the annual amounts committed by the IDA and IBRD for each of the risk ratings and lending instruments, both regionally and in total. Last, the performed analysis allowed us to identify the more prevalent risks in WSS projects financed by the World Bank, both overall and regionally, and present observations regarding this financing institution's tolerance for risk.

3. Results and Discussion

The development of a systematic quantitative review and comparative analysis of the World Bank's WSS projects' main financing characteristics and risk profiles aimed to identify how initial project risks (both in type and rating) influenced the financing of the WSS sector (in total and regionally). Thus, the results of the analysis and a discussion will be presented and organized in five sections, namely, the number of projects and commitments; WSS project risks; historical risk appetite; average project risk ratings, lending instruments, and commitments; and final observations.

3.1. Number of Projects and Commitments

The World Bank (i.e., the IBRD and IDA) financed 185 WSS projects internationally between January 2015 and April 2021. The project status of 167 of these projects was active, while the remaining 18 were already closed. The number of projects that were financed, according to their country, can be seen in a world map in Figure A1. In this figure, it can be seen that the countries with more financed projects were China and India, with 11 WSS projects each, followed by Vietnam and Mozambique, with 10 and 7 projects, respectively. In this sample, more than half of the countries only had 1 or 2 projects financed by the World Bank (41.6% and 28.6%, respectively).

In total, the number of projects that received commitments from the World Bank between the beginning of 2015 and April 2021 approved for financing increased from 24 in 2015 to 37 in 2017 and stayed above 30 until 2020, when it decreased to 27.

In addition, it was found that in the first trimester of 2021, only one WSS project was financed, contrasting with the previous 5 years average of 10 projects approved in the first trimester of each year.

Through the data analysis it was observed that, between 2015 and 2020, the average number of projects financed annually by the IBRD and IDA was, respectively, 11 and 20. In total, the IBRD financed 69 projects and the IDA financed 118 (two of the projects were financed by both institutions).

The amounts committed each year in USD are shown in Figure 1. As it can be observed, coinciding with the launch of SDG6, 2015 was the year with the higher amount committed in a single year, mainly thanks to IBRD financing. So far, the lowest total commitment was recorded in 2020. In 2020, the IBRD's investments were significantly reduced in comparison to previous years, while the IDA's commitment registered within past trends.

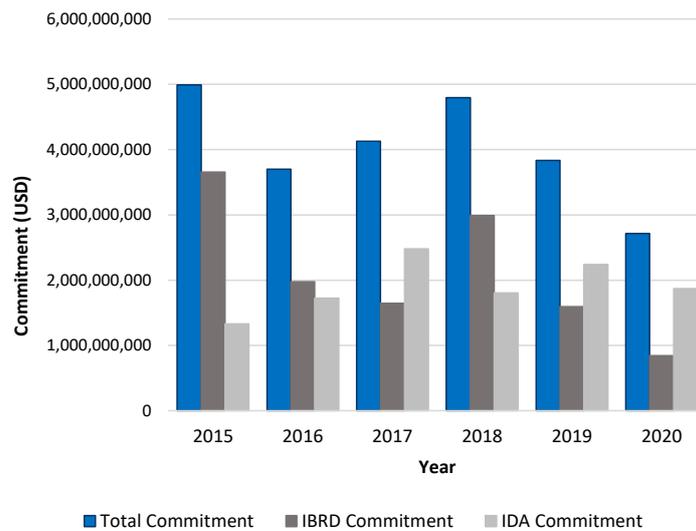


Figure 1. IDA and IBRD commitments from 2015–2020 (in USD).

Thus, the 2020 results, when compared with the previous 5 years, deviated from the norm/trend. However, even though it is tempting to attribute these changes solely to the COVID-19 world pandemic crisis, it should be considered that the commitments from the World Bank are planned and agreed upon prior to their actual application. Thus, since the pandemic was only declared by the World Health Organization on 11 March 2020 [37], it is unwise to establish a direct correlation between the types and amounts of commitment that were allocated in 2020 and the COVID-19 world pandemic.

However, the capacity of the COVID-19 crisis to reduce the availability of different sources of finance and to slow down investments in the water sector worldwide was highlighted by important organizations, such as the OECD and IFC [38,39]. Hence, it could be that the pandemic’s true effects will be more visible in subsequent years and that the observed significant decrease in the number of projects financed by the World Bank in the first trimester of 2021 was a consequence of the pandemic.

3.2. WSS Project Risks

As previously mentioned, the World Bank uses the SORT to assess, monitor, and rate risks. Through this method, for each operational and country engagement, the categories of risk are analyzed individually, according to the likelihood and the severity of the impact of each of the risks in the corresponding categories [36].

Figure 2 shows the different types of risks that were identified and rated by the World Bank between 2015 and 2020 in 184 projects.

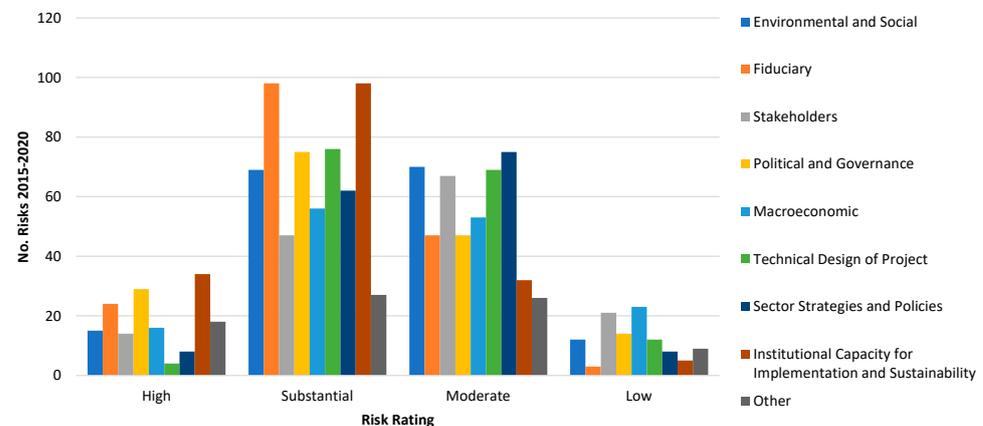


Figure 2. Identified risks per risk rating.

The various types of risks rated by the World Bank were identified in most of the projects; more specifically, between 2015 and 2020, the environmental and social risk was rated in 166 projects; fiduciary risk in 172 projects; stakeholders risk in 149 projects; political and governance risk in 165 projects; macroeconomic risk in 148 projects; technical design of project risk in 161 projects; sector strategies and policies risk in 153 projects; institutional capacity for implementation and sustainability risk in 169 projects; and other risk categories in 80 projects.

In this sample of projects financed by the World Bank, the environmental and social risk was mainly rated moderate, corresponding to 42% of this risk ratings; 57% of the fiduciary risk ratings were substantial; the stakeholders' risk was mostly rated moderate, corresponding to 45% of this risk ratings; the political and governance risk was primarily rated moderate, corresponding to 46% of this risk ratings; the macroeconomic risk was predominantly rated substantial, corresponding to 37% of this risk ratings; the technical design of project risk was mostly rated substantial, corresponding to 47% of this risk ratings; the sector strategies and policies risk was mainly rated moderate, corresponding to 49% of this risk ratings; 58% of the ratings of the institutional capacity for implementation and sustainability risk were substantial; and the other risk category was primarily rated substantial, corresponding to 34% of this risk ratings.

Since excessive risk could be a factor that dissuades private financing in WSS sectors, the analysis of the results shown in Figure 2 could enable the development of initial speculations regarding the World Bank's tolerance for the various risks it evaluates. Through its analysis, for example, it is possible to observe that the World Bank could have a higher tolerance for the "institutional capacity for implementation and sustainability" risk (from all the projects with this risk, 20% rated it high and 3% low) than the "macroeconomic" risk (from all the projects with this risk, only 11% rated it high, while 16% rated it low).

In addition, the risk ratings of the projects (financed between 2015 and 2020) were analyzed according to the region of the projects, as shown in Figures A2–A7. Through this analysis, it was possible to observe that the risk ratings of World Bank's financed projects can vary significantly between regions. Thus, some regional differences were identified, for example:

- The Middle East and North Africa was the only region in which none of the World Bank's financed projects presented low-rated risks. Moreover, this region was the only one with some of the risks predominantly rated high, namely, the political and governance risk was rated high in 50% of the projects that rated it, and the fiduciary risk was rated high in 45% of the projects that rated it;
- The institutional capacity for implementation and sustainability risk was rated high in several of the projects from East Asia and the Pacific and Latin America and the Caribbean regions (representing 31% and 35%, respectively, of the projects that rated this type of risk in each of the two regions), while in the remaining regions this rate was only attributed to a few of the projects (on average, only 12% of the projects that analyzed this risk rated it high);
- In East and West Africa, all the risks were predominantly rated substantial or moderate. Nonetheless, this region had a higher number of projects that rated the political and governance risk high (11 projects in total, representing 18% of the ratings for this risk in this region). However, percentage-wise, both the previously mentioned Middle East and North Africa region and the South Asia region could be highlighted, since 50% and 29% of the respective regional projects that rated the political and governance risk considered it high;
- In the Europe and Central Asia region, none of the financed projects had the following risks rated high—environmental and social, stakeholders, macroeconomic, and technical design and project. In the case of the macroeconomic and stakeholders' risks, this was the only region that never rated them high.

3.3. Historical Risk Appetite

The number of risks identified per rate in each year is shown in Figure 3. It can be observed that, while the amounts committed each year have been decreasing (as previously mentioned), the number of project risks rated as “high” and “substantial” has been increasing since 2015.

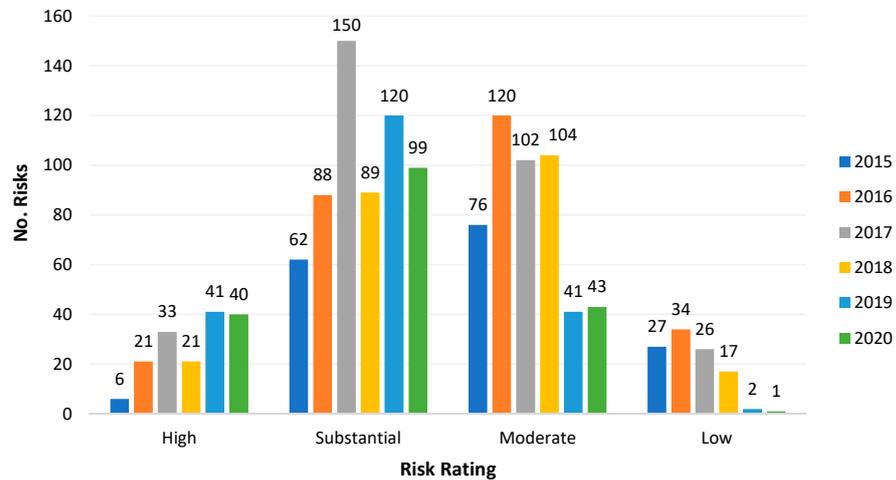


Figure 3. Annually identified risks per risk rating.

When comparing the risk ratings of projects financed by the World Bank in 2015 and 2020, it was found that in 2015 only 4% of the risks were high, contrasting with 22% in 2020 (Figure 4). Note that the IBRD typically helps finance middle-income and creditworthy poorer countries that, in theory, have projects with lower risk ratings, while the IDA assists the poorest countries that, in theory, have projects with higher risk ratings. Thus, a hypothetical explanation for the observed increase in high-risk projects is that in 2020 the amount committed by the IBRD was lower than in previous years and lower than the commitment from the IDA, representing less than a third of the total commitment from the World Bank (i.e., 31% of the total commitment was from the IBRD, while 69% was from the IDA).

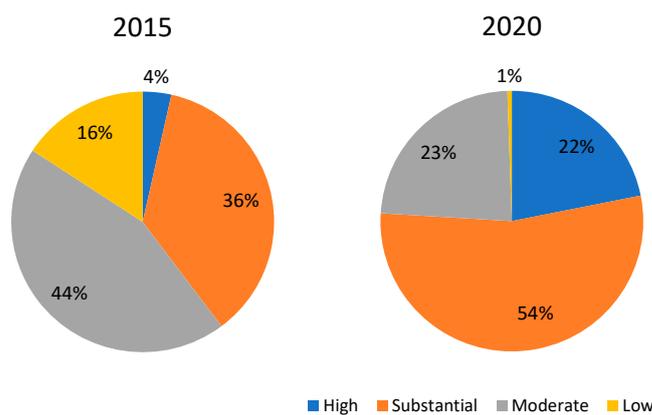


Figure 4. Risk rating of projects financed in 2015 and 2020.

3.4. Average Project Risk Ratings, Lending Instruments, and Commitments

The overall risk profile of each project was also determined (Table A1). As previously mentioned, to execute this calculation, the number of categories of risk that rated high, substantial, moderate, and low were identified to attribute to each project a rate according to its average rate.

The identification of the overall risk profile (i.e., average risk rating) of each project allowed the identification of the annual amounts committed by the IDA and IBRD for each

of the four different types of project risk ratings and according to each of the three types of lending instruments, respectively, DPF, IPF, and PforR financing (Table 1).

Table 1. World Bank commitment to risk rating, lending instruments, and institutions.

Average Risk Rating	Lending Instrument	No. Projects	IBRD Commitment (USD)	IDA Commitment (USD)	TOTAL (USD)
High	DPF	2	-	138,590,000	138,590,000
	IPF	13	210,000,000	1,707,000,000	1,917,000,000
	PforR	1	1,500,000,000	-	1,500,000,000
	High Total	16	1,710,000,000	1,845,590,000	3,555,590,000
Substantial	DPF	2	-	355,000,000	355,000,000
	IPF	95	4,717,870,000	5,728,150,000	10,446,020,000
	PforR	4	1,070,000,000	300,000,000	1,370,000,000
	Substantial Total	101	5,787,870,000	6,383,150,000	12,171,020,000
Moderate	DPF	7	965,000,000	340,000,000	1,305,000,000
	IPF	47	3,549,130,000	1,401,400,000	4,950,530,000
	PforR	5	500,000,000	770,000,000	1,270,000,000
	Moderate Total	59	5,014,130,000	2,511,400,000	7,525,530,000
Low	DPF	0	-	-	-
	IPF	6	300,000,000	540,000,000	840,000,000
	PforR	0	-	-	-
	Low Total	6	300,000,000	540,000,000	840,000,000
NA (Not Attributed)	DPF	0	-	-	-
	IPF	3	-	167,520,000	167,520,000
	PforR	0	-	-	-
	NA Total	3	-	167,520,000	167,520,000
Total		185	12,812,000,000	11,447,660,000	24,259,660,000

The World Bank's commitment to projects with an average low-risk rating and the number of projects that it financed were low, as expected. The World Bank's behavior should be, or is, different from other types of private financiers/partners, since one of its main goals is to help leverage projects that, because of their characteristics and risks, have difficulty in attracting private financing. So, it is expected that the World Bank is less averse to higher risks.

However, since the World Bank is a private financial institution, it should not be assumed that it only finances high-risk projects. Governments and service providers should put effort into lowering project risks and guaranteeing that their projects can attract and repay private financing. For example, a water utility that has a high risk of infrastructure failure could create and apply a maintenance plan to promote infrastructure periodical repair and to reduce the occurrence of costly supply failures.

The analysis of the previous table indicated that the amounts committed to the average high-risk rating group were low, compared with the substantial and moderate rated groups. Yet the amounts committed to projects with a high risk rating (USD 222 million) were high in comparison to the overall average amount committed to projects (USD 131 million) and to the average amounts committed to other risk ratings projects (substantial risk-rated projects—USD 121 million; moderate—USD 128 million; low—USD 140 million).

The analysis of the financed high-risk projects highlighted that the average amount committed to projects was especially high for the PforR lending instrument (USD 1500 million committed by the IBRD), corresponding also to the highest amount committed to a single project (a total of USD 1500 million). In contrast, for the substantial, moderate, and low risk rates, the highest amounts committed to a single project were, respectively, USD 550 million (IBRD commitment through PforR); USD 700 million (IBRD commitment through DPF); and USD 300 million (IBRD commitment through IPF).

Thus, it appeared that even though the World Bank did not finance a high number of high-risk projects in the past, when it decided to finance these types of projects the bank committed large amounts of financing.

The financed project portfolios of the two institutions, the IDA and IBRD, were different concerning project risk ratings. As expected, the IDA mainly financed high and substantial risk-rated projects, corresponding to 16% and 56%, respectively, of the amounts committed by this institution. The remaining commitment was allocated to moderate risk-rated projects (22%) and low risk-rated projects (5%), and the residual 1% was allocated to projects that did not benefit from risk analysis.

The amounts committed by the IBRD revealed that substantial and moderate risk-rated projects were highly financed, corresponding to 45% and 39%, respectively, of the total amounts committed by this institution. The remaining amounts committed by the IBRD benefited high (14%) and low (2%) risk-rated projects.

As noted in the previous table, the amounts committed through the three types of lending instruments varied for each of the average risk ratings groups:

- Most of the DPF commitment went to moderate risk-rated projects (72%), while the remaining commitment financed substantial and high risk-rated projects (20% and 8%, respectively);
- Most of the IPF commitment went to substantial risk-rated projects (57%), while the remaining commitment financed the other groups of risk ratings in the following proportions: moderate—27%, high—10%, low—5%, and NA—1%;
- The PforR commitment was attributed in almost equal proportions to three of the risk-rating groups, respectively, high (36%), substantial (33%), and moderate (31%).

In addition, the differences between the IDA and IBRD became obvious when the previous comparative analysis included not only the amounts committed, the lending instruments, and the average risk ratings, but also these two institutions. Thus, Figure 5 presents the percentage of the total commitment that each of the institutions allocated to the different types of risk-rated projects, according to the applied lending instrument.

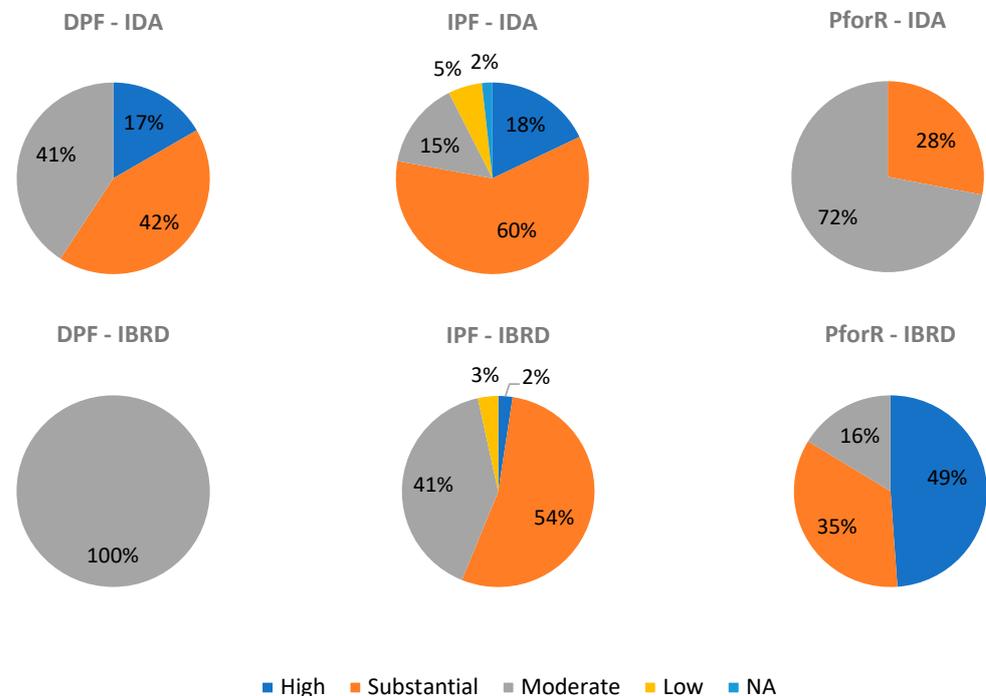


Figure 5. IDA and IBRD commitments by lending instrument and average risk rating (%).

Through the analysis of Figure 5, it was highlighted that for DPF most of the IDA’s commitment went to substantial risk-rated projects (42%), while all of the IBRD’s commitment went to moderate risk-rated projects; for IPF financing the majority of the IDA’s and IBRD’s commitment benefited substantial risk-rated projects (60% and 54%, respectively);

and for PforR most of the IDA's commitment went to moderate risk-rated projects (72%), while a big proportion of the IBRD's commitment benefited high risk-rated projects (49%).

In addition, a regional analysis was also performed aimed at highlighting their differences, thanks to the identification of the amounts committed by institution, lending instrument, and project risk rating (Table A2). Thus, it was found that the highest regional amount committed by the IBRD to a high-risk project was in South Asia through PforR, and the highest amount committed by the IDA in the high-risk project category was also in South Asia, mainly through IPF. For the substantial risk-rated projects, the highest amount committed by the IBRD was in Latin America and the Caribbean, closely followed by East Asia and the Pacific (the first through IPF, and the latter mainly through the same lending instrument), while the highest amount committed by the IDA was in East and West Africa, also mainly through IPF. The highest regional amount committed by the IBRD to moderate risk-rated projects was in East Asia and the Pacific through IPF, followed by Latin America and the Caribbean through both IPF and DPF, and the highest amount committed by IDA in this risk category was in East and West Africa through IPF. East Asia and the Pacific was the only region that received a commitment from the IBRD in the low-risk category (through IPF), while the IDA commitment was more or less evenly distributed between two regions, East and West Africa and East Asia and the Pacific (both through IPF).

The clear differentiation between regions was also made evident when analyzing the projects according to their year of approval. Thus, Figure 6 shows historical regional data by presenting the yearly number of projects financed by the World Bank divided according to their average risk rating and region of application. Its analysis showed, for example, that from 2015 to 2020 the World Bank only financed Latin America and Caribbean projects with an average risk rating of moderate or substantial, while in South Asia several of the financed projects had a high risk rate.

3.5. Final Discussion and Observations

Not all the types of project risks were analyzed in all the projects, meaning that some risks were identified and rated more times than others in the studied time frame. This could be an indicator that some of the risks are more prevalent in WSS projects than others or that their impact is higher, resulting in an increased need to rate them in all the projects that seek financing. However, it should be mentioned that none of the risks were rated in all the World Bank's financed projects. The types of risks that were more frequently identified between 2015 and 2020 were the following: fiduciary (rated in 93% of the projects), institutional capacity for implementation and sustainability (rated in 92% of the projects), environmental and social (rated in 90% of the projects), and political and governance (rated in 90% of the projects).

Some of these risks are identified in the literature as predominant and impactful in infrastructure projects, such as political and environmental risks [40–42]. More specifically in the WSS sector, the political risk has been widely identified as crucial to mitigate [43]; for example, in 1998 Haarmeyer and Mody [44] identified the political risk as one of the main risks affecting WSS project financing, while highlighting lenders' and investors' vulnerability to government opportunism and expropriation; in 2006 Vives et al. [45] stated that the water sector is affected by a wider range of political implications than other infrastructure sectors; in 2011 a MIGA brief [46] highlighted that WSS projects and other types of infrastructure investments are affected by political instability and the regulatory environment.

The difference between the number of times each type of risk was identified and their attributed ratings could highlight the potential predominance and impact factor of the different types of risks in the WSS sector. This could mean that, even though the list of risks analyzed by the World Bank already contains prevalent and relevant risks that can hinder the development of the WSS sector, some of the risks could be more impactful than others.

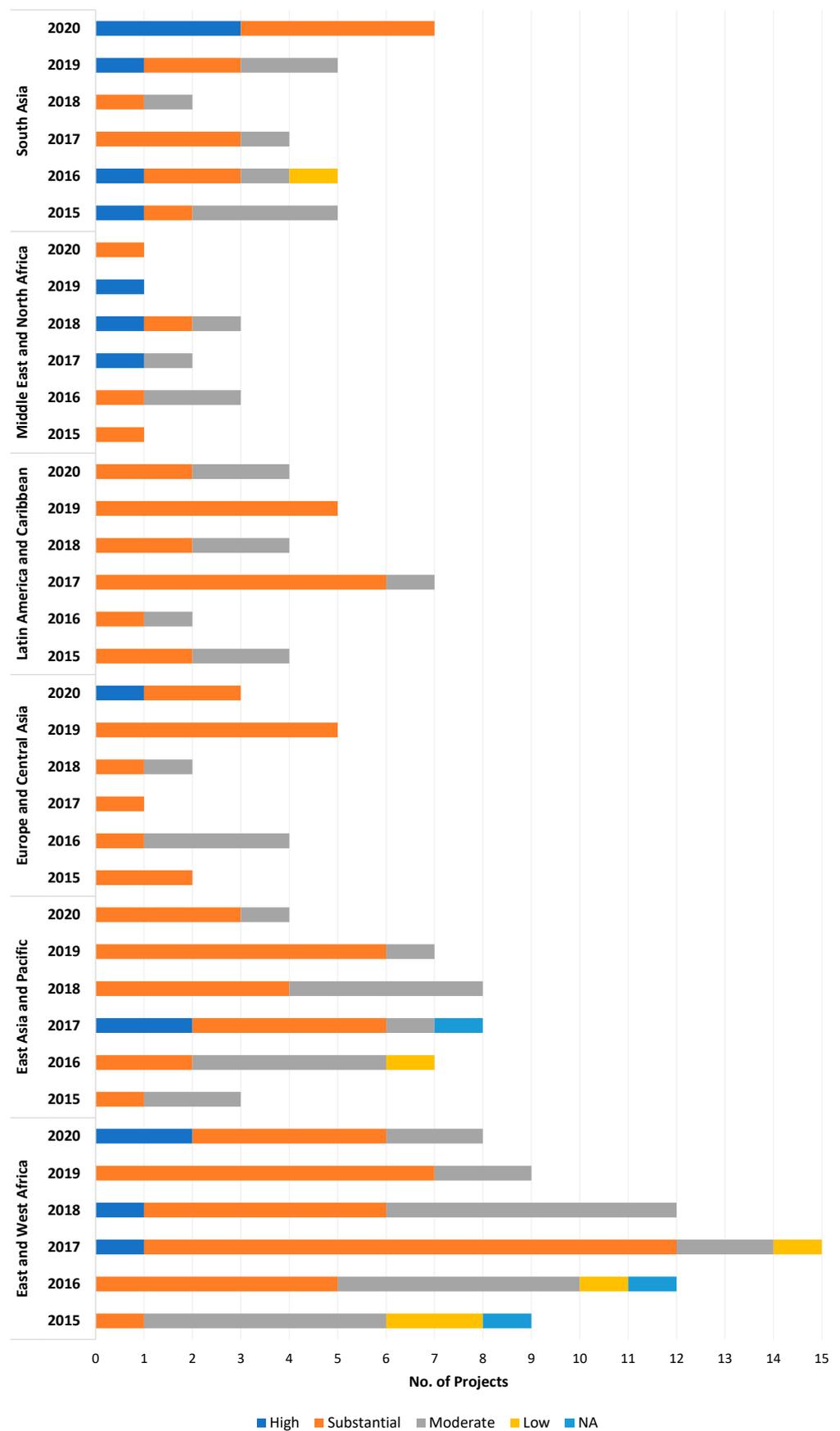


Figure 6. Number of projects financed by region, year, and average risk rating.

The idea that not all types of risks are the same is not new, both in the literature and in practice, as highlighted in the following examples:

- Wang et al. [47] explored the risk factors of infrastructure PPP projects for sustainable delivery and concluded that key risks can form reaction chains; they divided the risk factors into two specific categories: the ones that have a powerful and independent influence and the ones that are highly vulnerable and easily influenced;
- The credit rating agency, Scope Ratings, developed a General Project Finance Rating Methodology that identified areas of risk, which could result in credit losses to investors exposed to a project, and rated them according to the likelihood and severity of all credit impairment events [48];
- Nepal et al. [49] developed a study on the relative importance of risks, specifically in hydropower projects and project finance in Nepal, using indices to determine the importance of each risk item.

Furthermore, it appears that the World Bank has a higher tolerance for risk in certain regions (or countries) than others. This apparent difference between regions could be due to several reasons, such as:

- Different combinations of risk types and respective ratings of the projects that seek financing from the World Bank in the different regions. For example, some developing countries are not able to develop projects with lower risk ratings because of their social–economic situation, while others are in a situation that allows them to better manage project risks. As previously mentioned, thanks to the differences in offered conditions, the first type of country would typically request financing from the IDA, while the latter would tend to work with the IBRD;
- An increased competition for financing in specific regions/countries. Hypothetically, in regions with a large number of requests for financing from the World Bank and a wide variety of projects with different risk ratings, both the IDA and IBRD would be able to choose which to finance based on the project's intended outcome (e.g., the most socially and environmentally advantageous projects) and on the project's apparent sustainability and capacity to generate positive results, including sufficient revenues for transfer of capital repayment (i.e., the less risky projects);
- Competitive financing solutions from other development financing institutions:
- In countries or regions that have other development financing institutions providing private financing with fewer barriers to entry (than the solutions offered by the World Bank), the borrowers with projects with the worst risk ratings would, in theory, tend to apply for financing from these other institutions. Thus, these types of situations could have two main impacts—first, the projects looking for financing from the World Bank would, through natural selection, be less risky (with lower risk ratings); second, the World Bank could choose to focus on financing less risky projects since the development of riskier projects would still be guaranteed in these countries;
- In countries or regions that have other development financing institutions providing private financing with the same type of barriers to entry as the World Bank, this could result in the World Bank accepting riskier projects because of the existing competition.
- Regardless of the reasons for the differences observed in each region, the implications for new projects looking to be financed by the World Bank are the same. It could be reasoned, for example, that projects in countries from Latin America and the Caribbean should not only focus on the desired outcome of the project itself but also on reducing their overall risk rating to ensure that it is not rated high (since the World Bank never financed a high-risk project in this region in the analyzed time frame). In addition, and in accordance with the data presented in Figures A2–A7, it could also be reasoned that, projects in the Latin America and Caribbean region should avoid having the following types of risks rated high if they want to increase their chances of being financed by the IDA (there are only eight countries eligible for IDA support in this region [50]) or the IBRD: environmental and social, technical design and project, and sector strategies and policies (the World Bank never financed a project in this region with these risks

rated high); political and governance (the World Bank only financed one project in this region with this risk rated high); macroeconomic (the World Bank only financed two projects in this region with this risk rated high); fiduciary, and stakeholders (the World Bank only financed three projects in this region with these risks rated high).

This type of reasoning could also be applied when taking into account the type of investment that is intended (i.e., the type of lending instrument provided to the project) and the World Bank institution that would be approached. Hypothetically, for example, a project from a non-creditworthy poor country eligible for financing from the IDA through DPF could, in theory, possess a higher risk rating than a project from the same country that would be financed by PforR (since 59% of the IDA's commitment through DPF was attributed to high and substantial risk-rated projects; while, for PforR, these types of rated projects only received 28% of this lending instrument's IDA commitment).

These observations highlight a potential need to further study and understand the regional differences in risk perception in WSS projects. Studies found in the literature mostly focus on the risks of specific, or types of, infrastructure projects or provide a wider analysis of WSS services risks, for example, at the national level [51–54]. Thus, we identified a lack of studies focused on highlighting potential financiers' perceptions of risk of WSS projects at the regional level and identifying actions that borrowers from each region could perform to attract private financing.

In conclusion, both the global and the regional analyses of the risk profiles of projects financed by the World Bank pointed to the conclusion that not all risks have the same weight when financiers decide which WSS projects to finance and that the risk profiles of the projects can influence their financing opportunities.

Notwithstanding, it should be highlighted one last time that the World Bank is a financing institution that provides development financing (such as concessional financing). So, it is not wise to expect financing institutions that provide commercial financing to also have such a high tolerance for higher risks when choosing to finance a WSS project. In addition, the World Bank typically has a higher tolerance for risk when strategically using development finance to mobilize additional financing (e.g., commercial finance) in developing countries, i.e., when it applies blended finance [2].

Finally, it should be highlighted that these observations are only based on the risk profiles of projects that were accepted for financing (because of data availability), and that it will be interesting to analyze the risk profiles of projects that were not accepted for financing by the World Bank (or other financing institutions) to complement these findings.

4. Concluding Remarks and Next Steps

The objective of this study was to identify the potential influence of project risks on the financing of the WSS sector. Thus, a systematic quantitative review and a comparative analysis of 185 World Bank-financed WSS projects (approved between January 2015 and April 2021 and with active or closed status) were developed considering the following key aspects of the projects: the types of project risks and their ratings; the overall risk rating of the projects; the financing institution (i.e., the IDA or IBRD); the type of lending instrument (i.e., DPF, IPF, or PforR); the amounts committed (in USD); and the projects' regions.

The developed analysis highlighted that the different types of project risks appeared to influence the decision to finance or not a WSS project, and that this influencing power can vary in time or even depending on the project's region of application.

This paper contributes to the financing literature because it provides an in-depth analysis of the World Bank's WSS-financed projects since the launch of the SDGs in 2015, while identifying the risk profile of the projects through the years and presenting parallels between different types of project risk ratings and the different lending instruments and amounts committed. In addition, the developed regional risk profiles and subsequent analysis add to the existing literature and provide helpful information for new projects looking to be financed by the World Bank. The novelty of the comparative analysis and the developed regional profiles are significant for borrowers and academia alike.

This study did not analyze the WSS projects that were not accepted by the World Bank because of lack of data, which resulted in a limitation of the scope of the analysis. Future studies can complement the findings of this paper by collecting and analyzing data regarding the projects that are overturned by financing institutions such as the World Bank and others.

This study's approach can be applied in future studies that analyze projects financed by other financing institutions. In addition, future research can complement the findings of the present study by analyzing both the initial and final risk profiles of WSS projects that are already completed, to understand and identify potential connections between project characteristics and their results.

Moving forward, it will be interesting to assess the influencing power of the various types of risks that are measured in WSS projects through the creation of a ranking according to the capacity of each risk to discourage the financing of these types of projects, with the help of a panel of expert financiers and borrowers.

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Appendix A

The Appendix presents important additional information, namely, the geographical distribution of the projects financed by the World Bank within the analyzed time frame (from 1 January 2015 to 30 April 2021); regional risk profiles (i.e., the identified risks per risk rating in each region); each of the analyzed World Bank's projects average risk rating; and IBRD and IDA commitments (in USD) by region and project average risk rating.

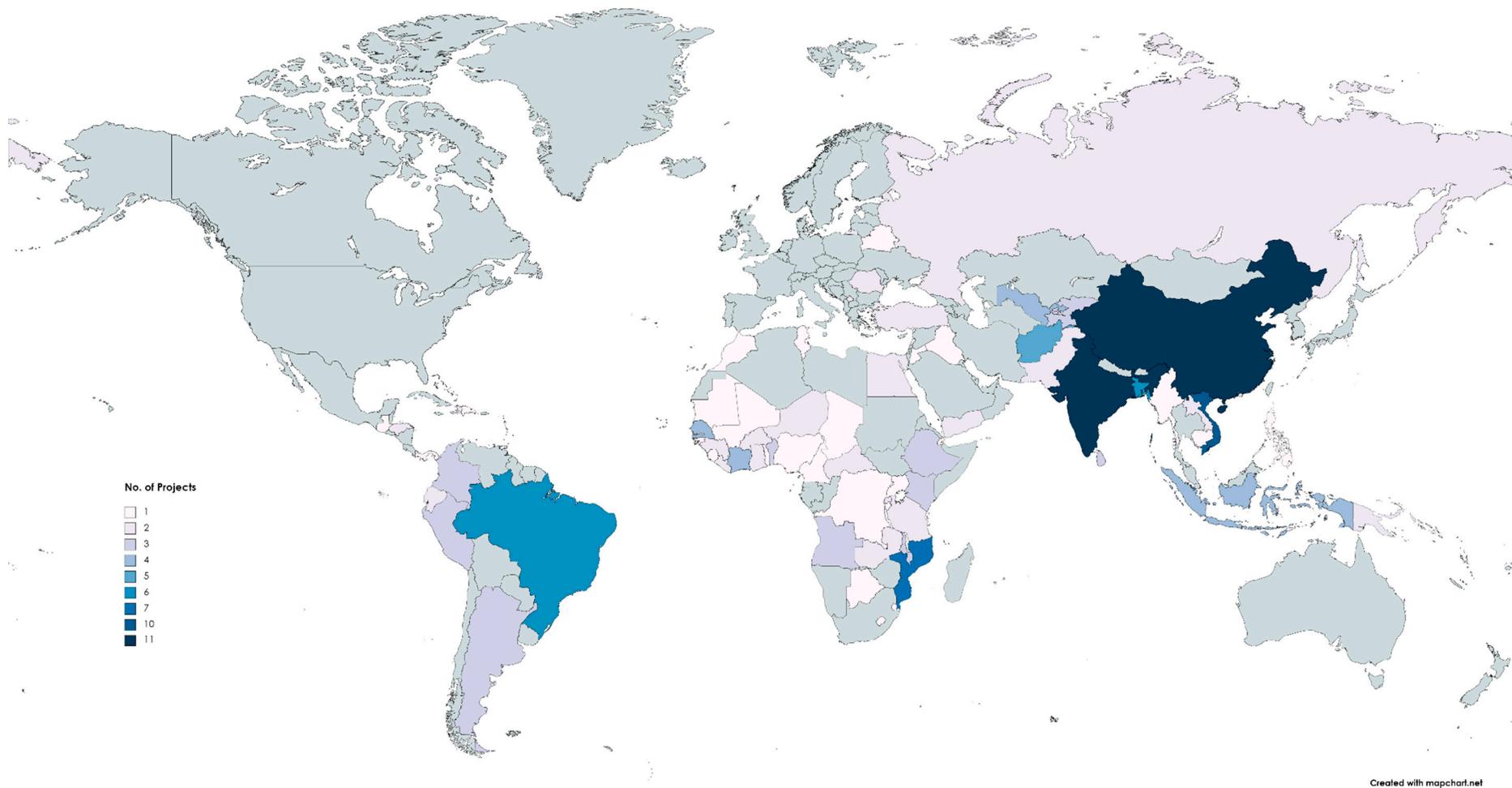


Figure A1. Map of projects financed by the World Bank (from 1 January 2015 to 30 April 2021).

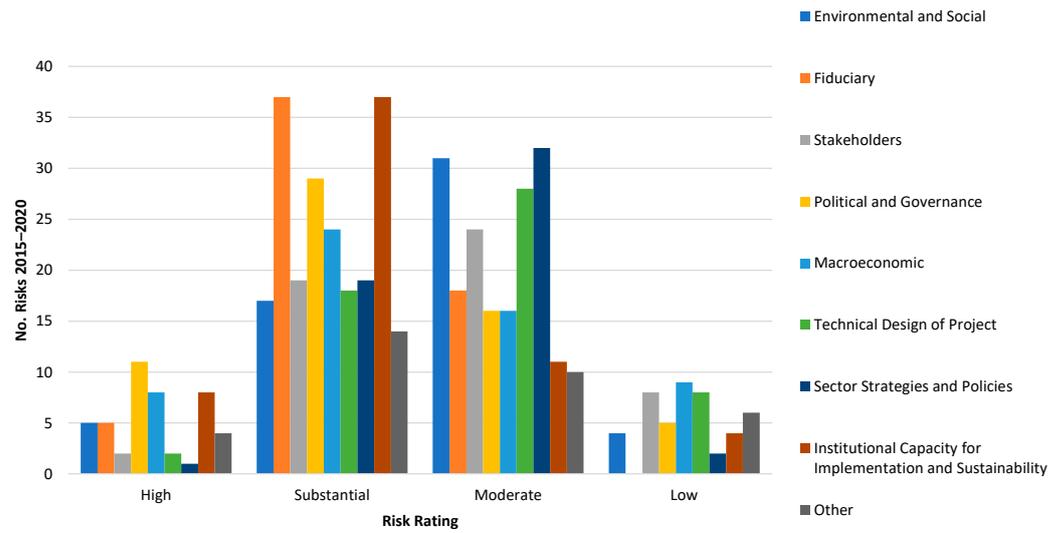


Figure A2. Identified risks per risk rating in East and West Africa (2015–2020).

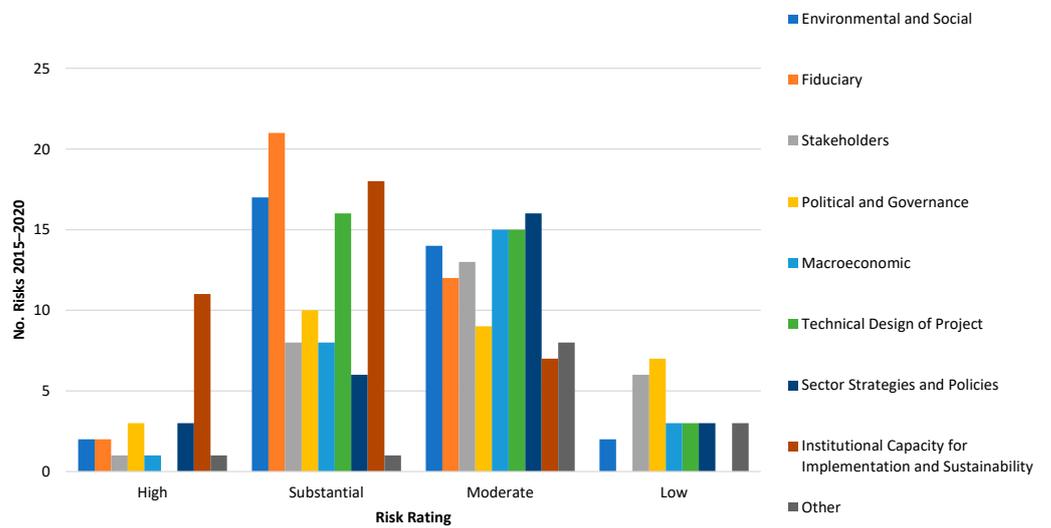


Figure A3. Identified risks per risk rating in East Asia and the Pacific (2015–2020).

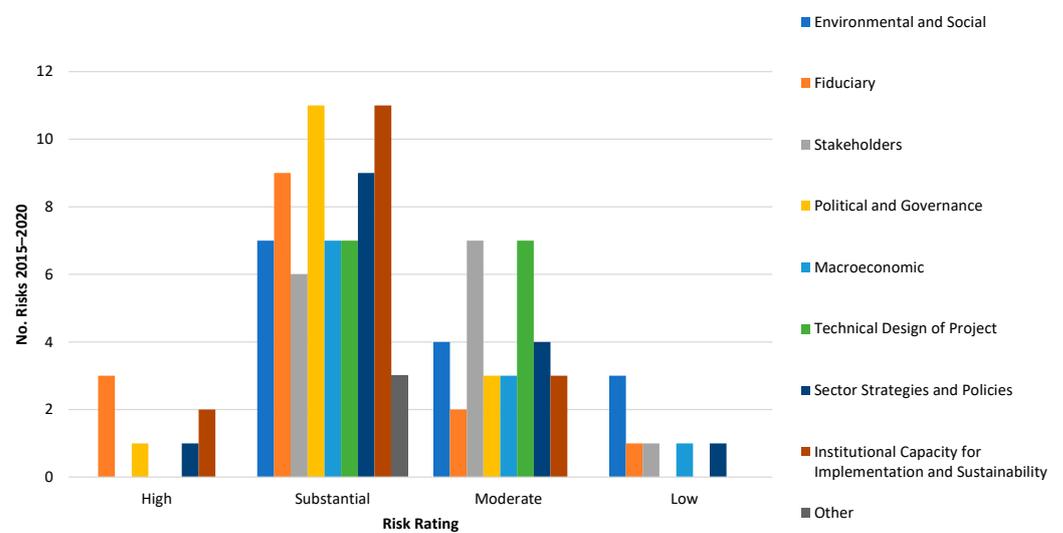


Figure A4. Identified risks per risk rating in Europe and Central Asia (2015–2020).

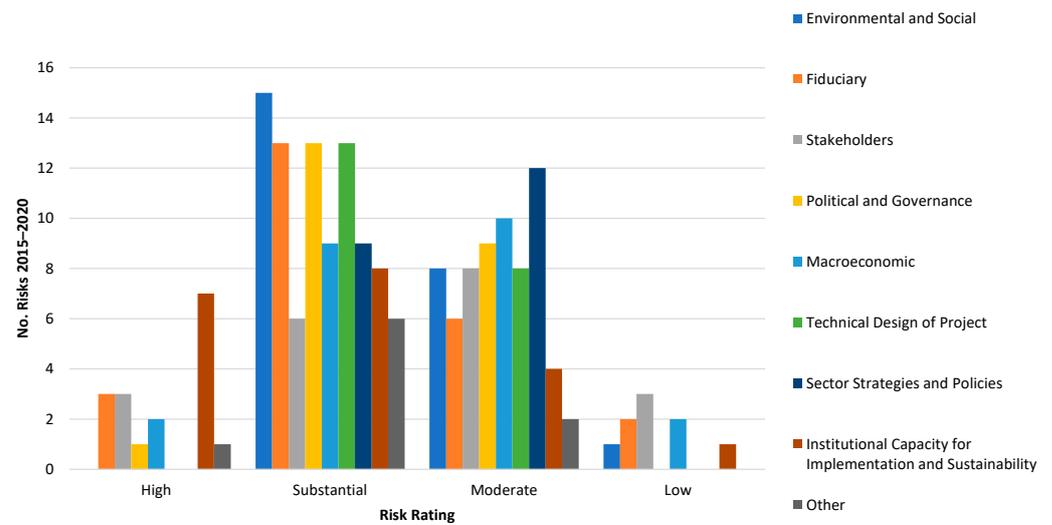


Figure A5. Identified risks per risk rating in Latin America and the Caribbean (2015–2020).

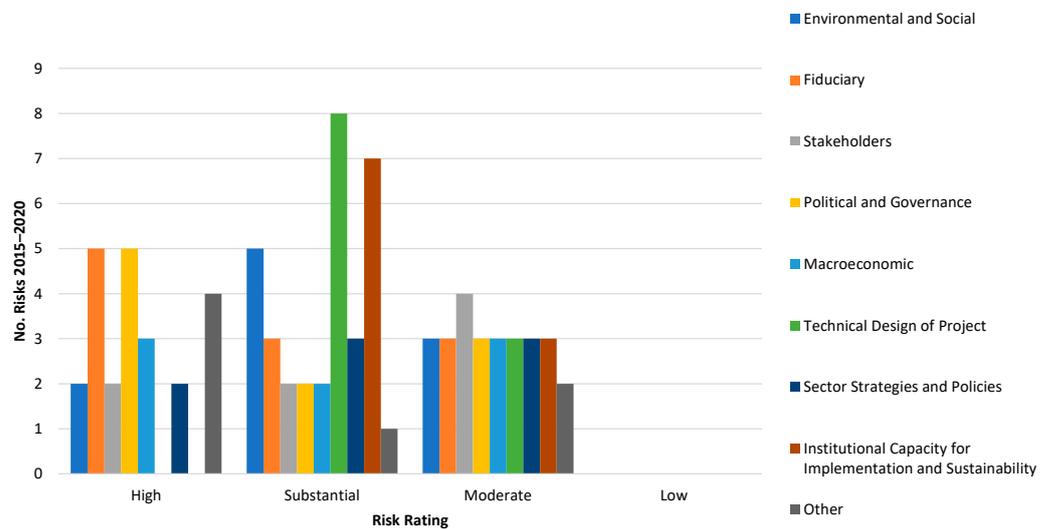


Figure A6. Identified risks per risk rating in the Middle East and North Africa (2015–2020).

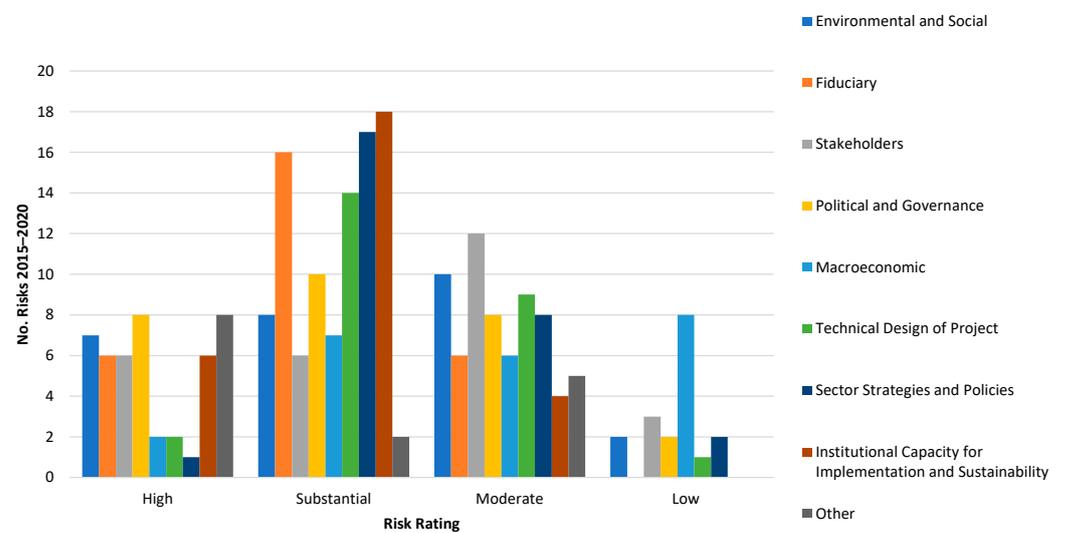


Figure A7. Identified risks per risk rating in South Asia (2015–2020).

Table A1. World Bank's projects average risk ratings (from 1 January 2015 to 30 April 2021).

Project ID	Risk Rating Average						
P170811	Substantial	P168119	Substantial	P147158	Substantial	P154782	Moderate
P169970	High	P161777	Substantial	P153814	Moderate	P159240	Low
P173213	Substantial	P158124	Substantial	P164466	High	P157438	Moderate
P171449	Substantial	P160672	Substantial	P156210	Substantial	P159576	Low
P169179	Moderate	P165872	Substantial	P160009	Substantial	P154255	High
P171620	Moderate	P160480	Moderate	P162537	Low	P156422	Substantial
P174234	High	P167195	High	P163846	Substantial	P157427	Moderate
P171700	Substantial	P163876	Substantial	P157782	Substantial	P156678	Moderate
P174242	Moderate	P164901	Substantial	P161566	Substantial	P152460	Substantial
P173161	High	P167762	High	P162840	Substantial	P130544	Substantial
P169111	Substantial	P165683	Substantial	P163194	Substantial	P147381	Moderate
P172724	High	P162637	Substantial	P163468	Substantial	P149377	Moderate
P173125	Substantial	P167246	Moderate	P158807	Substantial	P150844	Substantial
P171611	Substantial	P165695	Substantial	P159426	Substantial	P155594	Moderate
P168308	Substantial	P163260	Substantial	P159956	High	P152851	Substantial
P169150	Substantial	P158502	Moderate	P161630	Substantial	P155947	Moderate
P171409	Substantial	P167263	Substantial	P159049	NA	P151416	Moderate
P167901	Substantial	P166063	Moderate	P161591	Substantial	P155266	Substantial
P169996	Substantial	P166597	Moderate	P156634	Substantial	P146870	Moderate
P171779	Substantial	P157043	Moderate	P155303	Substantial	P154780	Low
P167328	Substantial	P161772	Substantial	P156433	Substantial	P153251	High
P171877	Moderate	P165716	Moderate	P162712	Substantial	P152693	Moderate
P161432	High	P163732	Moderate	P157891	High	P150475	Moderate
P162263	High	P164345	Substantial	P154275	Substantial	P156559	Moderate
P168025	Substantial	P163138	Substantial	P153604	Substantial	P152623	Moderate
P163957	Substantial	P164262	Moderate	P151224	Substantial	P154680	Moderate
P164389	Moderate	P160162	Moderate	P154947	Substantial	P154112	Substantial
P170595	Substantial	P167201	Substantial	P160911	Moderate	P153113	Substantial
P162938	Substantial	P161562	Moderate	P159843	Moderate	P154729	Substantial
P169830	Substantial	P165711	Substantial	P155087	High	P147827	Substantial
P168233	Substantial	P163782	Substantial	P150361	Substantial	P152801	Substantial
P166697	Substantial	P158622	Substantial	P143495	Substantial	P150351	Low
P171197	Substantial	P158713	Moderate	P161559	Moderate	P154601	Moderate
P165055	Substantial	P158760	Moderate	P160014	Moderate	P152150	NA
P167455	Substantial	P156125	Substantial	P156738	Moderate	P153466	Moderate
P163610	Substantial	P159870	Moderate	P154683	Substantial	P148970	Substantial
P161227	Substantial	P164186	Moderate	P156739	Substantial	P149091	Moderate
P163939	Moderate	P161915	Moderate	P160236	Moderate	P151439	Substantial
P170469	Substantial	P164845	Moderate	P161392	Moderate	P150395	Moderate
P170502	Moderate	P166075	Substantial	P160567	Substantial	P150929	Substantial
P164704	Substantial	P162094	High	P156239	Substantial	P150520	Moderate
P169031	Substantial	P146206	Substantial	P153548	Moderate	P133017	Moderate
P164260	Substantial	P162245	High	P154778	Substantial	P133287	Moderate
P165463	Moderate	P158146	Substantial	P133829	Moderate	P149556	Low
P167794	Substantial	P163794	Substantial	P154713	Substantial		
P168290	Substantial	P156880	Substantial	P156253	NA		
P163734	Substantial	P149995	Moderate	P147854	Moderate		

Table A2. IBRD and IDA commitments by region and project average risk rating, in USD (from 1 January 2015 to 30 April 2021).

Project Risk Rating: High							TOTAL High-IBRD Commitment	TOTAL High-IDA Commitment
Regions	IBRD Commitment			IDA Commitment				
	DPF	IPF	PforR	DPF	IPF	PforR		
East and West Africa	-	-	-	-	413,000,000	-	-	413,000,000
East Asia and the Pacific	-	-	-	38,590,000	70,000,000	-	-	108,590,000
Europe and Central Asia	-	-	-	-	239,000,000	-	-	239,000,000
Latin America and the Caribbean	-	-	-	-	-	-	-	-
Middle East and North Africa	-	210,000,000	-	-	400,000,000	-	210,000,000	400,000,000
South Asia	-	-	1,500,000,000	100,000,000	585,000,000	-	1,500,000,000	685,000,000
Total	0	210,000,000	1,500,000,000	138,590,000	1,707,000,000	0	1,710,000,000	1,845,590,000
Project Risk Rating: Substantial							TOTAL Substantial- IBRD Commitment	TOTAL Substantial- IDA Commitment
Regions	IBRD Commitment			IDA Commitment				
	DPF	IPF	PforR	DPF	IPF	PforR		
East and West Africa	-	895,000,000	0	350,000,000	3,277,300,000	300,000,000	895,000,000	3,927,300,000
East Asia and the Pacific	-	1,075,000,000	400,000,000	5,000,000	1,054,260,000	-	1,475,000,000	1,059,260,000
Europe and Central Asia	-	306,800,000	-	-	529,900,000	-	306,800,000	529,900,000
Latin America and the Caribbean	-	1,590,870,000	-	-	165,000,000	-	1,590,870,000	165,000,000
Middle East and North Africa	-	108,000,000	550,000,000	-	10,000,000	-	658,000,000	10,000,000
South Asia	-	742,200,000	120,000,000	-	691,690,000	-	862,200,000	691,690,000
Total	0	4,717,870,000	1,070,000,000	355,000,000	5,728,150,000	300,000,000	5,787,870,000	6,383,150,000
Project Risk Rating: Moderate							TOTAL Moderate-IBRD Commitment	TOTAL Moderate-IDA Commitment
Regions	IBRD Commitment			IDA Commitment				
	DPF	IPF	PforR	DPF	IPF	PforR		
East and West Africa	-	145,500,000	-	200,000,000	1,112,100,000	570,000,000	145,500,000	1,882,100,000
East Asia and the Pacific	-	1,643,100,000	-	130,000,000	130,000,000	200,000,000	1,643,100,000	460,000,000
Europe and Central Asia	-	143,930,000	-	-	36,500,000	-	143,930,000	36,500,000
Latin America and the Caribbean	700,000,000	766,600,000	-	-	12,800,000	-	1,466,600,000	12,800,000
Middle East and North Africa	225,000,000	55,000,000	500,000,000	-	-	-	780,000,000	-
South Asia	40,000,000	795,000,000	-	10,000,000	110,000,000	-	835,000,000	120,000,000
Total	965,000,000	3,549,130,000	500,000,000	340,000,000	1,401,400,000	770,000,000	5,014,130,000	2,511,400,000

Table A2. Cont.

Project Risk Rating: Low							TOTAL Low-IBRD Commitment	TOTAL Low-IDA Commitment
Regions	IBRD Commitment			IDA Commitment				
	DPF	IPF	PforR	DPF	IPF	PforR		
East and West Africa	-	-	-	-	250,000,000	-	-	250,000,000
East Asia and the Pacific	-	300,000,000	-	-	-	-	300,000,000	-
Europe and Central Asia	-	-	-	-	-	-	-	-
Latin America and the Caribbean	-	-	-	-	-	-	-	-
Middle East and North Africa	-	-	-	-	-	-	-	-
South Asia	-	-	-	-	290,000,000	-	-	290,000,000
Total	0	300,000,000	0	0	540,000,000	0	300,000,000	540,000,000
Project Risk Rating: NA							TOTAL NA-IBRD Commitment	TOTAL NA-IDA Commitment
Regions	IBRD Commitment			IDA Commitment				
	DPF	IPF	PforR	DPF	IPF	PforR		
East and West Africa	-	-	-	-	95,000,000	-	-	95,000,000
East Asia and the Pacific	-	-	-	-	72,520,000	-	-	72,520,000
Europe and Central Asia	-	-	-	-	-	-	-	-
Latin America and the Caribbean	-	-	-	-	-	-	-	-
Middle East and North Africa	-	-	-	-	-	-	-	-
South Asia	-	-	-	-	-	-	-	-
Total	0	0	0	0	167,520,000	0	0	167,520,000

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