Limestone analytics

Evaluation-Based CBA Final Report

Morocco Financial Services Project

Prepared for: Millennium Challenge Corporation
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Authors and Acknowledgements

Limestone Analytics LLC (Limestone) is a consulting firm specializing in the evaluation of international development projects and social programs. The firm is recognized for combining academic rigor, state-of-the-art methods, and international development experience to provide customized evaluation and economic analysis services and to help their clients incorporate evidence to improve the design, financing, and implementation of their projects. Information about our current and past projects can be found at: limestone-analytics.com.

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The authors are responsible for any remaining errors.

Disclaimer

The views and opinions expressed herein are those of the author(s) and do not necessarily represent those of MCC or any other U.S. Government entity.

This report was prepared independently by Sarah Carello, Kemal Bagzibagli, and Bahman Kashi, who had no conflicts of interest.

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Acronyms

AMF	Access to Microfinance Funds
APP	Agency of Partnership for Progress
CBA	Cost-Benefit Analysis
CPI	Consumer Price Index
DFI	Development Finance Institution
DH	Moroccan Dirham
ECBA	Evaluation-Based Cost-Benefit Analysis
EIF	Entry into Force
ENPV	Economic Net Present Value
ERR	Economic Rate of Return
FSP	Financial Services Project
IFC	International Finance Corporation
IRR	Internal Rate of Return
MA	Microcredit Association
MCC	Millennium Challenge Corporation
M&E	Monitoring and Evaluation
NSCE	North South Consultants Exchange
PAO	Program Administration and Oversight
PV	Present Value
SD	Standard Deviation
SE	Standard Error
USD	United States Dollar

Executive Summary

This Evaluation-based Cost-Benefit Analysis (ECBA) Final Report focuses on the Morocco Financial Services Project (FSP) under the Millennium Challenge Corporation's (MCC's) Morocco Compact. The report aims to conduct an ECBA of the FSP, compare the latest MCC Cost-Benefit Analysis (CBA) and the ECBA models, document the parametric and methodological adjustments in the new model, and provide potential learnings for MCC. The report focuses on the Morocco FSP ECBA Design Report prepared by Limestone Analytics.[1] MCC approved the ECBA Design Report's recommendation to proceed to an ECBA on May 2, 2023.

As illustrated in Figure ES.1, MCC's USD 697.5 million Morocco Compact (2008-2013) funded a range of multi-sector projects through the Agency of Partnership for Progress (APP)[2], including the Morocco FSP, the Enterprise Support Project, the Artizan and Fez Medina Project, the Small Scale Fisheries Project, and the Fruit Tree Productivity Project. At the end of the Compact, USD 650.1 million was spent on the Compact projects (93 percent of the original available funds). The Morocco FSP included three Activities: Access to Microfinance Funds, Development of New Financial Products, and Improvement of Operational Efficiency and Transparency.

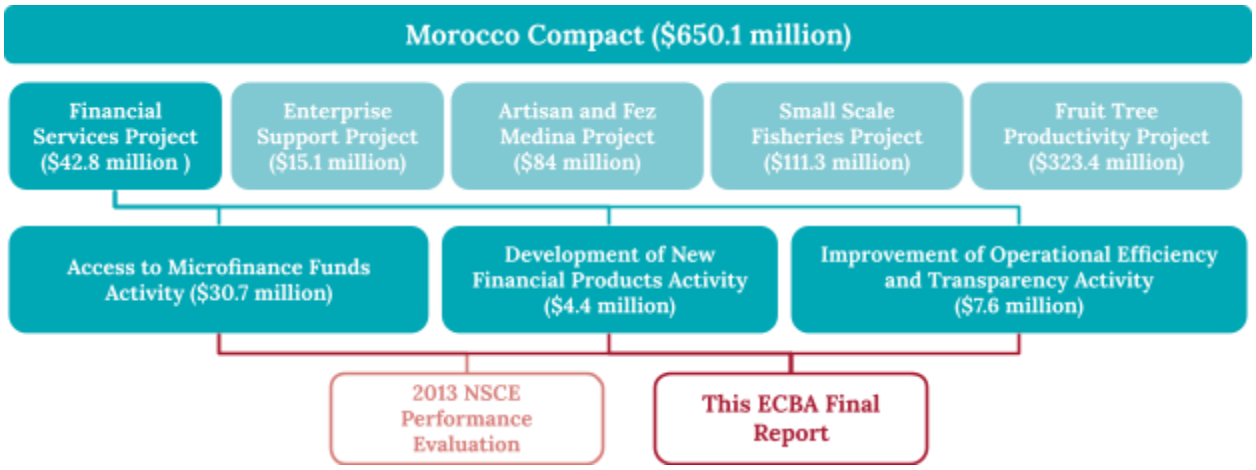

Figure ES.1: Morocco Compact Projects and Activities[3]

The Morocco FSP aimed to improve the financial services available to Moroccan microenterprises by improving market stability and overcoming constraints inhibiting the microfinance sector's expansion.[4] The Access to Microfinance Funds Activity (USD 30.7 million) financed the Moroccan microcredit sector via loans to Jaida.[5] The Development of

[1] Bagzibagli & Kashi (2022).
[2] Also called Millennium Challenge Account – Morocco.
[3] The project and activity financial amounts depend on the total disbursement figures on the MCC Compact Website.
[4] Monitoring and Evaluation (M&E) Plan (MCC, 2013).
[5] Jaida is a non-bank financial institution initiated in April 2007 and provides social and environmental responsibility training.

New Financial Products Activity (USD 4.4 million) provided technical assistance for transforming microcredit associations into higher-order financial institutions. The Improvement of Operational Efficiency and Transparency Activity (USD 7.6 million) provided technical assistance to financial institutions to improve efficiency and transparency in the financial sector and lower borrowing costs for micro-enterprises.

The USD 30.7 million Access to Microfinance Funds Activity injected more capital for microcredit lending through existing microcredit associations (MAs). APP provided a loan to Jaida, and Jaida passed the funds through loans to MAs. The loan of USD 25 million from the APP allowed Jaïda to increase its loan portfolio to MAs, obtain leverage in facilitating its loans from donors, and focus on its mission. The loan also allowed Jaida to offer loans of a longer duration, to grant subordinated loans to certain MCAs, and to increase competition in the market for MA financing. The loan was to be repaid to the Ministry of Economy and Finance by Jaïda on September 15, 2017, since the APP was to be dissolved. Figure ES.2 presents FSP's funding channels from MCC to the micro borrowers in rural and remote areas of Morocco.

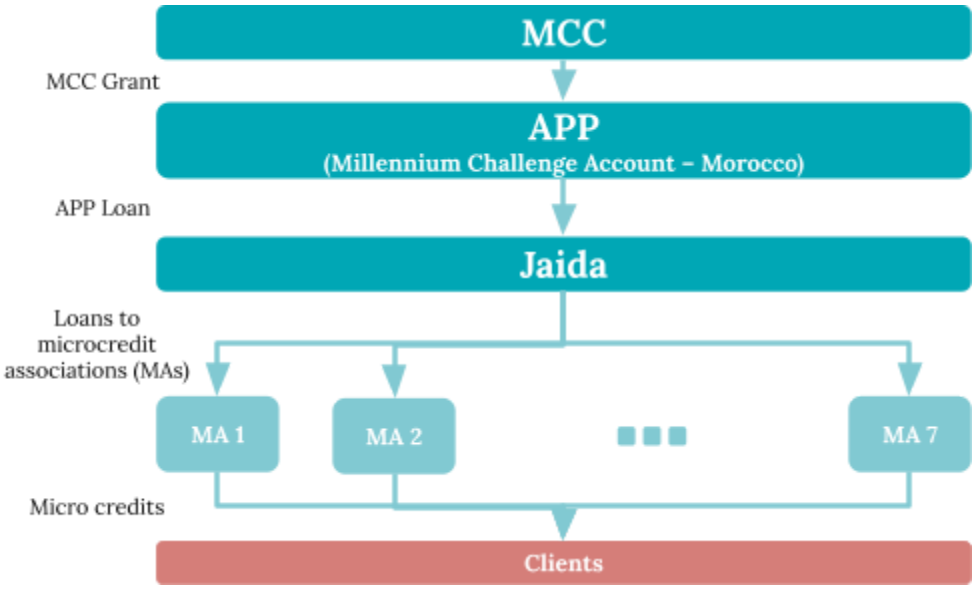

Figure ES.2: Morocco Access to Microfinance Funds Funding Channels

MCC conducted a Closeout CBA in 2014. The Closeout CBA suggested that the FSP's economic rate of return (ERR) was 11.4 percent (over 20 years of benefit accrual), higher than MCC's 10 percent cost-effectiveness threshold. The main benefit of the Closeout CBA was the return on capital from microfinance loans. Due to the lack of data available to estimate this benefit, the Closeout CBA assumed that the return on the funds would be at least equal to the interest rate since most beneficiaries (who were not in default) would have increased their income enough to repay the interest. This estimate was a lower bound of the expected benefits. The Closeout CBA model included MCC project costs, monitoring and evaluation (M&E), and Program Administration and Oversight (PAO) costs.

MCC commissioned North South Consultants Exchange (NSCE) to lead an independent performance evaluation of the Morocco FSP. The 2013 Performance Evaluation Final Report presented the aggregated difference in net annual income of microcredit clients before and after the credits were granted.[6] They found that the annual net income of borrowers after the intervention was 52 percent (approximately USD 804) higher than their income before the intervention (statistically significant at the 1 percent level), and the average credit duration was 13.62 months.[7]

The 2013 Performance Evaluation Final Report also found that while the Morocco FSP interventions did not specifically target women in their programming, many of the microcredit associations' customers were women. According to the Final Report, the percentage of women entrepreneurs borrowing from microcredit associations varied between 40.9 percent and 73 percent.[8] The evaluation findings showed that the average loans obtained by male and female clients were USD 668 and USD 558, respectively.[9]

The ECBA team identified an impact evaluation (Crépon et al., 2015) assessing the impact of microfinance on income in Morocco during the same timeframe. This paper is highly relevant to the ECBA since the Moroccan microfinance institution Al Amana[10] was assessed in the evaluation and also received a significant amount of funding through the FSP, and the evaluation occurred within the same time frame as the Compact. Crépon et al. (2015) completed a randomized experiment looking at the impact of a microcredit intervention on self-employment income, employment income, consumption, and asset accumulation in Morocco. This study found that after receiving credit from a microfinance association, borrowers increased their self-employment profits by DH 2,005 (approximately USD 237)[11]. This increase in profit translates to a 140 percent return on the amount borrowed based on the authors' calculations.

Limestone Analytics (Limestone) completed the ECBA Design Report of the Morocco FSP in September 2022.[12] The suggested methodological adjustments from the ECBA Design Report included:

- Replace the return on capital estimate with better estimates from observations;
- Disaggregate the benefit stream by sex;
- Parametric adjustments to the loan default rate;

[6] See Table A1.1 for the survey details with the mobile agency clients.
[7] The median credit duration was 15 months, with a minimum of one month and a maximum of 24 months for the sample of 48 credits granted before May 2013.
[8] See Table A1.2 for sex statistics by microcredit associations.
[9] See Table A1.3 for more details on the borrowings by mobile agency clients.
[10] Al Amana was established in 1997 and operates under the supervision of the Ministry of Economy and Finance in Morocco. Al Amana received a large portion of funds from Jaida through the Morocco FSP.
[11] To ensure the comparability of the estimates of the studies, we converted the Crépon et al. (2015) finding to USD using the exchange rate of 8.47581 DH per USD cited in the 2013 Performance Evaluation Final Report for May 2013. Converting the Crépon et al. (2015) estimate to USD using the exchange rate of 8.7955 DH per USD, i.e., the rate in 2006 when the survey was conducted, provides an average profit estimate of USD 228.
[12] Bagzibagli & Kashi (2022).

- Account for the residual funds that will remain in circulation after the CBA timeframe;
- Correct the Closeout CBA figures by accounting for inflation.

The ECBA model incorporated these suggestions using data from the 2013 Performance Evaluation Final Report and secondary literature, including the impact evaluation of a relevant microcredit intervention in Morocco (Crépon et al., 2015).

The ECBA model, similar to the Closeout CBA, assessed all the Activities of the Morocco FSP. The estimated benefits were mainly derived from the Access to Microfinance Funds (AMF) Activity. The model indirectly estimated the impact of the other two Activities, which aimed to improve operational efficiency and lower interest rates for the funds spent in microfinance. The primary source of benefits for the Morocco FSP was the increased income of microfinance borrowers (beneficiaries) supported by the MCC grants.

The ECBA assumed the MCC funding provided to Jaida generated similar impacts reported by Crépon et al. (2015). The ECBA adjusted the return on total funding with an average default rate using updated evidence from the International Finance Corporation (IFC, 2013). Because the model assumed that all MCC-Jaida funding was fully lent to beneficiaries, it did not estimate microfinance institutions' return on reserves. Finally, the ECBA disaggregated the benefits by sex using data from the 2013 Performance Evaluation Final Report.

The ECBA model also considered the residual value of funds disbursed as a benefit. The costs included in the model were MCC's project costs, M&E costs, and PAO costs.

Table ES.1 summarizes the Morocco FSP ECBA's benefits, costs, and ERR estimate.

Table ES.1: Summary of the Morocco FSP ECBA Model

Activities	Benefits	Costs	ECBA ERR
• Access to Funds for Microfinance • New Financial Product Development • Improvement of Operating Efficiency and Transparency	• Increased Income from Access to Microcredit • Residual Value of Funds	• Project Costs • M&E and PAO Costs	**44.7%**[13] **(over 10 years of benefit accrual)**

The model also included transfer streams for the funding to the microcredit associations and beneficiaries and the repayment of loans. Since the amount of money disbursed by Jaida to microcredit associations was higher than the funds granted by MCC, the ECBA focused only on the amount disbursed by MCC. The ECBA team considered that including all Jaida funding to microcredit associations presented by the independent evaluation and the Jaida annual reports would overestimate the impact attributable to the MCC

[13] The ERR is calculated with the modified internal rate of return (MIRR) function at a 10 percent discount rate (Bowen, 2024).

intervention. The ECBA model, therefore, assumed that the grants disbursed from MCC are all passed through to microcredit associations and then to the beneficiaries.

ECBA Results

Overall, the analysis suggested that the FSP had an ERR of **44.7 percent (over 10 years of benefit accrual)** and an economic net present value (ENPV) of **USD 172,572,748 (2008 USD)** at a 10 percent discount rate. Figure ES.3 demonstrates the present value (PV, at 10 percent) of benefits and costs of the Morocco FSP in 2008 USD. The main benefit was the increased income from access to microfinance for the beneficiaries.

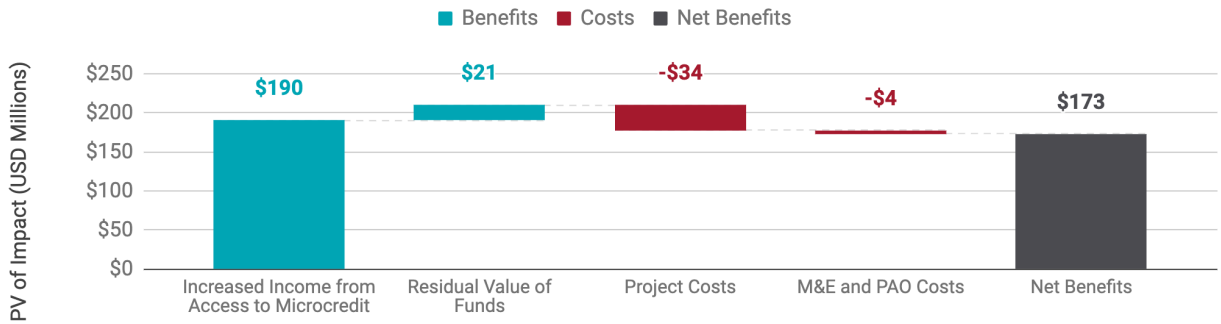

Figure ES.3: PV of Benefits and Costs of Morocco FSP (at 10 percent, 2008 USD millions)

Beneficiary and Stakeholder Analysis

The stakeholder analysis included beneficiaries by sex (women and men), MCC, Jaida, and microcredit associations in Morocco. A total of 51,000 microenterprises received loans through Jaida-supported microcredit associations. The beneficiaries were significantly better off due to this intervention, with men receiving a slightly larger share of the benefits due to the higher average amount of funds disbursed to men relative to women. Jaida also showed a positive overall impact from the program due to the grant and the impact of interest payments on the loans granted. Microcredit associations showed a slight negative impact. However, the assumptions around these transfers were not informed by administrative data from microcredit associations, so the ECBA could not comment with certainty on the financial sustainability of microcredit associations. Figure ES.4 displays the breakdown of impacts by beneficiaries and stakeholders.

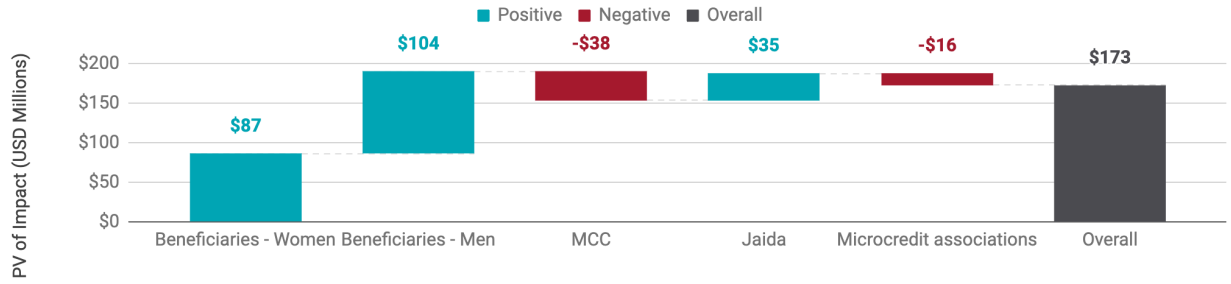

Figure ES.4: PV of Net Impacts by Beneficiary/Stakeholder (at 10 percent, 2008 USD millions)

Sensitivity and Probabilistic Analysis

The assumed critical inputs for the sensitivity analysis were:

- Increased annual net income from receiving access to credit,
- Average default rate,
- Average annual interest rate, and
- Years of benefit accrual.

The main parameter of interest for sensitivity analysis was the increased income from receiving access to credit, which was also the focus of the Monte Carlo simulations. ECBA used the 95 percent confidence interval suggested by the Crépon et al. (2015) study to test the parameter in the sensitivity analysis. The team also used the study's mean and standard deviation estimates for the parameters in Monte Carlo simulations.

The remaining critical inputs, i.e., interest and default rates, were tested using one-way sensitivity analysis. The ranges for these parameters were informed by the sources of the base case parameters (Crépon et al., 2015; IFC, 2014, respectively). The Monte Carlo analysis did not include the parameters as the required statistical details were unavailable.

Lastly, the ECBA model had a conservative view of 10 years for the benefit accrual period attributable to the MCC investment. The analysis considered the 2013 Performance Evaluation Final Report findings on the intervention sustainability and the additional funding provided to Jaida by other donors in 2015. The results were tested in the sensitivity analysis with 20 years of accrual, as was considered by the Closeout CBA.

Figure ES.5 displays the findings of the one-way sensitivity analysis in terms of the deviation from the base-case ENPV estimate. The analysis showed that the most influential parameter was increased income, which drives the benefits. Increasing the benefit accrual period to 20 years also increased the ENPV by USD 73 million in PVs. The alternative average default and annual interest rates also had a minor impact on the program.

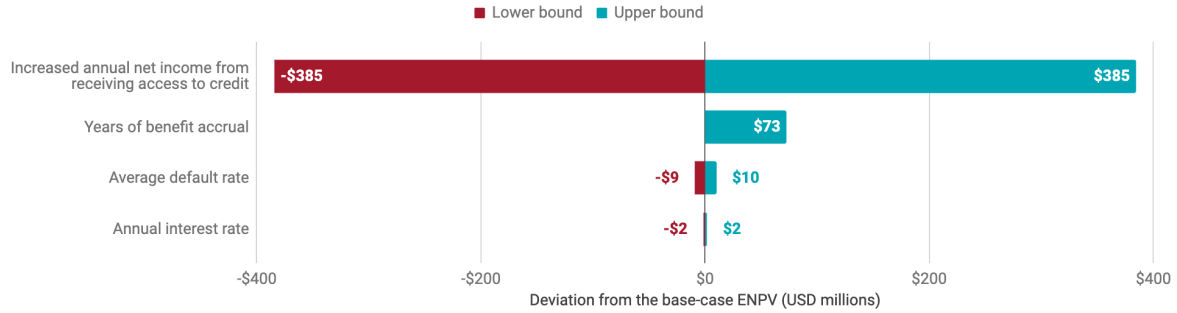

Figure ES.5: One-way Sensitivity Analysis on the Critical Model Inputs

In addition to the one-way sensitivity analysis, the ECBA team conducted Monte Carlo simulations on the increased income from access to microcredit. The probabilistic analysis used Crépon et al.'s (2015) average net income increase estimate and the parameter's standard error to conduct 50,000 simulations for the ECBA findings. The Monte Carlo simulations displayed a minimum of 49,753 (99 percent) trials. Figure ES.6 displays the simulated probability distribution of the ENPV, suggesting that the probability of a positive ENPV, i.e., ERR higher than the 10 percent threshold, was around 81 percent (over 10 years of benefit accrual). The simulations also suggested that the 80 percent confidence interval of the Morocco FSP ENPV was between USD -78 million (ERR of 1 percent) and USD 423 million (ERR of 35 percent).

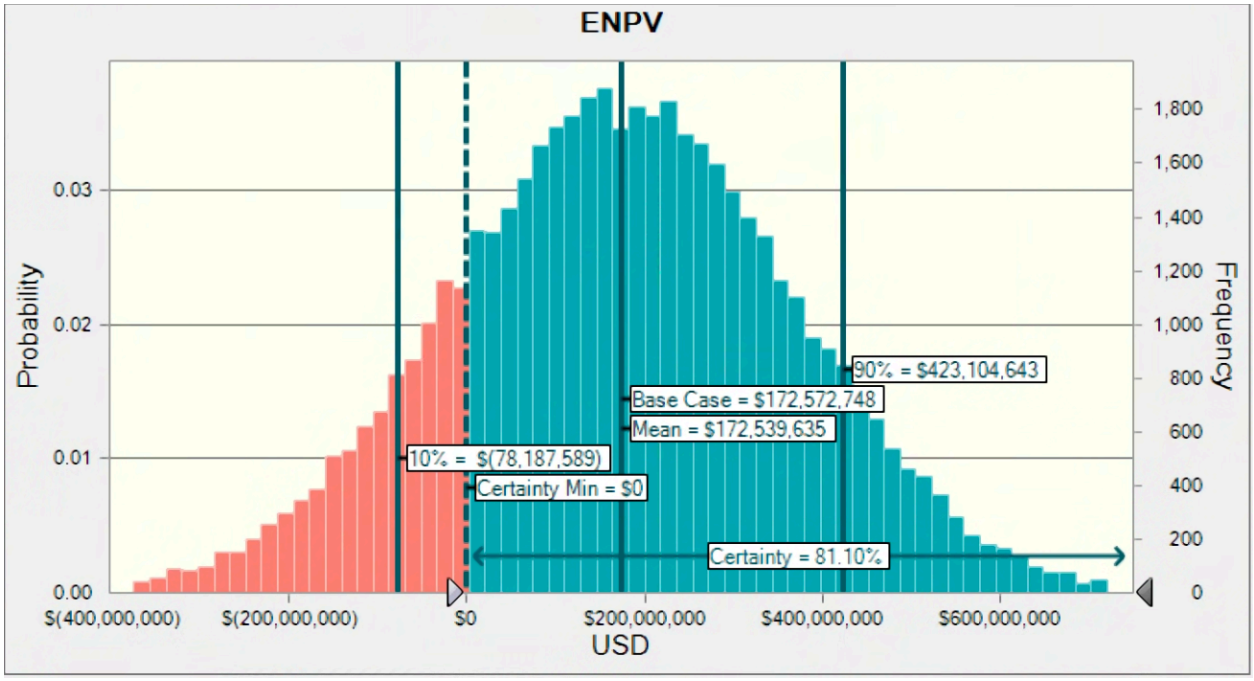

Figure ES.6: Simulated Probability Distribution of the ENPV

Comparing the Closeout CBA and ECBA

The ECBA introduced several parameter and methodological changes compared to the Closeout CBA. The most considerable change to the results came from the increase in the return on capital for microfinance from 20 percent to 140 percent. The ECBA team considered the significant parametric update reliable due to the robustness and relevance of the secondary evidence (Crépon et al., 2015) used to inform the updated return on capital. The Closeout CBA model notes also acknowledged that the 20 percent return was "a significant underestimate of the total benefits":

> The benefits are estimated as the total amount of interest paid by loan recipients. This is a significant underestimate of the total benefits, which is the private return on investment made by loan recipients. Some attempts have been made to estimate this, but the data was not available for this ERR. But we do know that for all loans not in default, the private return is at least equal to the interest rate (since they earned enough to pay it back), so we can use the interest rate as a lower bound for the benefits.[14]

The ECBA also added a new benefit stream of the residual value of funds. The stream aimed to capture the benefits of the funds remaining in Jaida accounts at the end of the analysis period that will continue to circulate beyond the analysis period. Other significant changes to the ECBA included reducing the benefits accrual time to 10 years based on the sustainability findings of the 2013 Performance Evaluation Final Report and deflating cost streams to 2008 USD values.

Table ES.2 summarizes the parametric and methodological changes of the ECBA compared to the Closeout CBA model and their impacts on the outcomes.

Table ES.2: Summary of Parameter vs. Methodological Changes (PV at 10 percent, in 2008 USD)

Benefit/Cost	Closeout CBA	ECBA	Change Due To		Notes
			Parameters	Methodology	
Benefit 1 - Increased Income from Access to Microcredit	$46,151,321	$189,899,787	$163,862,572	-$20,114,106	**Parameter** - Increased the return on capital using the secondary evidence published after the Closeout CBA model. **Methodology** -Reduced the analysis period to ten years following the 2013 Performance Evaluation Final Report sustainability findings.
Benefit 2 - Residual Value of Funds	$0	$20,764,329	$0	$20,764,329	**New Benefit**

[14] Closeout CBA model notes.

Cost 1 - Project Costs	$34,769,757	$33,892,554	$0	-$877,203	**Methodology** - Deflated costs to 2008 USD values.
Cost 2 - M&E and PAO Costs	$4,318,702	$4,198,814	$0	-$119,888	**Methodology** - Deflated costs to 2008 USD values.
Total NPV	$ 11,381,564	$172,572,748	$ 163,862,572	$ 1,647,313	
ERR	11.4%	44.7%			

Key Takeaways

Financial Services Project

- The parametric and methodological updates in the ECBA suggested an ERR of 44.7 percent over 10 years of benefit accrual.
- The most significant change to the results came from the increase in the return on capital for microfinance beneficiaries from the Closeout CBA's 20 percent proxy assumption to 140 percent, as suggested by secondary evidence published after the Closeout CBA.
- The increased income earned by beneficiaries from the loans provided by microfinance institutions greatly outweighed the program's cost.
- Monte Carlo simulations suggested that the probability of the Project generating ERR above MCC's threshold level of 10 percent was around 81 percent (over 10 years of benefit accrual). The simulations suggested that the 80 percent confidence interval of the Morocco FSP ENPV was between USD -79 million (ERR of 1 percent) and USD 423 million (ERR of 35 percent). The simulations also showed that the probability of a positive impact on beneficiaries was around 83 percent for both women and men.

Conducting CBA at MCC

- One of the updates in this ECBA was to deflate project costs and transfers. Since the Closeout CBA did not clarify whether cost values were in constant or current dollars, it was assumed that they were in current dollars and that the Closeout CBA did not account for the inflation on the cost side. We recommend that future CBAs describe the units of parameters (in case of using constant dollars) or explicitly deflate the benefits and costs to the base year values.

Future Data Collection

- The 2013 Performance Evaluation Final Report provided relevant data to disaggregate benefits by sex. ECBA benefited from the evidence and estimated the FSP's impact on women and men beneficiaries. Including sex, age, sector, region, and other relevant disaggregation in independent evaluations provides critical evidence for a detailed assessment of the interventions.
- Due to limited evidence (primary or secondary), the ECBA did not include any direct benefits for the technical assistance provided under the MCC's investments. The impact evaluation of technical assistance on Jaida and microcredit associations could provide evidence to conduct a policy and institutional reform analysis and account for additional benefits of the intervention related to the gains in operational efficiency and the screening of borrowers.

Introduction and Background

Purpose of ECBA

At MCC, cost-benefit analysis (CBA) informs investment design, approval, modification, and evaluation. CBA models rely on a range of assumptions related to the socio-economic status of the beneficiaries, program logic, timing of the activity, and potential economic benefits. Independent evaluations rely on data collected before, during, and after implementation and, in most cases, some years after the end of the investment, providing an opportunity to update the CBA models and their assumptions. The possible evaluation-based updates to the CBA models can range from changes to parameter values and methodological adjustments,[15] to the addition of new costs and benefits.[16] The result of these updates is called the **Evaluation-Based CBA (ECBA)**.

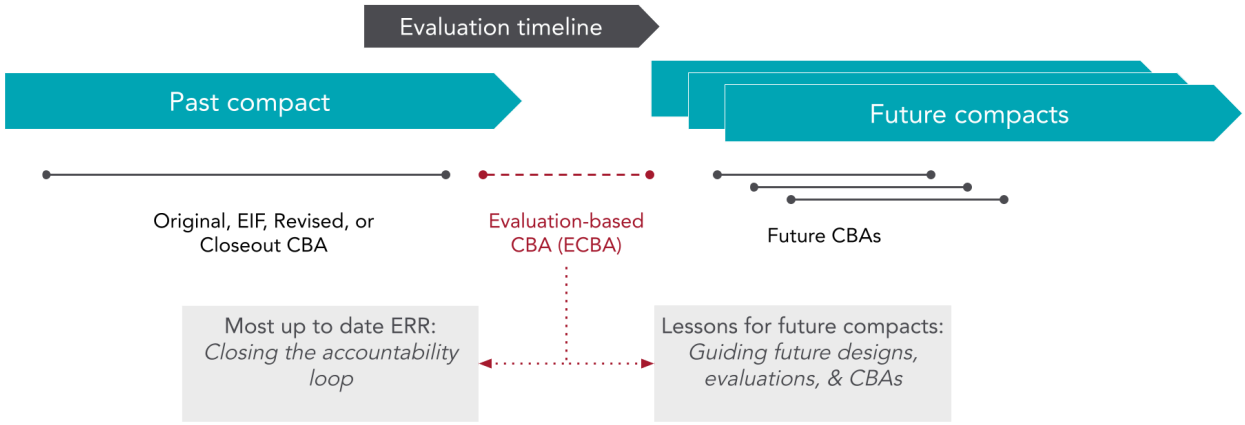

Figure 1.1: The Role of Evaluation-Based CBA

ECBAs can be produced as part of MCC's independent evaluations. When an independent evaluation does not include an ECBA, an independent CBA expert can assess the feasibility and usefulness of applying the independent evaluation results to performing an ECBA as a separate task and the likely effort required to do so as a separate activity. The assessment is documented as an **ECBA Design Report**, which includes a recommendation on whether or not to proceed to an ECBA.

MCC reviews all ECBA Design Reports and approves the decision to proceed to an ECBA when appropriate.[17] If approved, the independent CBA expert updates the most recent CBA

[15] Changes to the approach to estimating costs and benefits.
[16] Where an investment's theory of change was altered.
[17] Considerations include cost of producing an ECBA, extent to which the ECBA ERR is likely to differ from the Closeout ERR (due to data or methodological adjustment) and potential learning for MCC (particularly where learning is relevant to MCC investments in development).

model in line with the recommendations made in the ECBA Design Report and submits an **ECBA Final Report** documenting the changes applied along with the new ECBA model.

The report focuses on the Morocco FSP ECBA Design Report prepared by Limestone Analytics.[18] MCC approved the ECBA Design Report's recommendation to proceed to an ECBA on May 2, 2023.

Project, CBA, and Evaluation Overview

As illustrated in Figure 1.2, MCC's USD 697.5 million Morocco Compact (2008-2013) funded a range of multi-sector projects through the Agency of Partnership for Progress (APP)[19], including the Morocco FSP, the Enterprise Support Project, the Artizan and Fez Medina Project, the Small Scale Fisheries Project, and the Fruit Tree Productivity Project. At the end of the Compact, USD 650.1 million was spent on the Compact projects (93 percent of the original available funds). The Morocco FSP included three Activities: Access to Microfinance Funds, Development of New Financial Products, and Improvement in the Operational Efficiency and Transparency of Microcredit Associations.

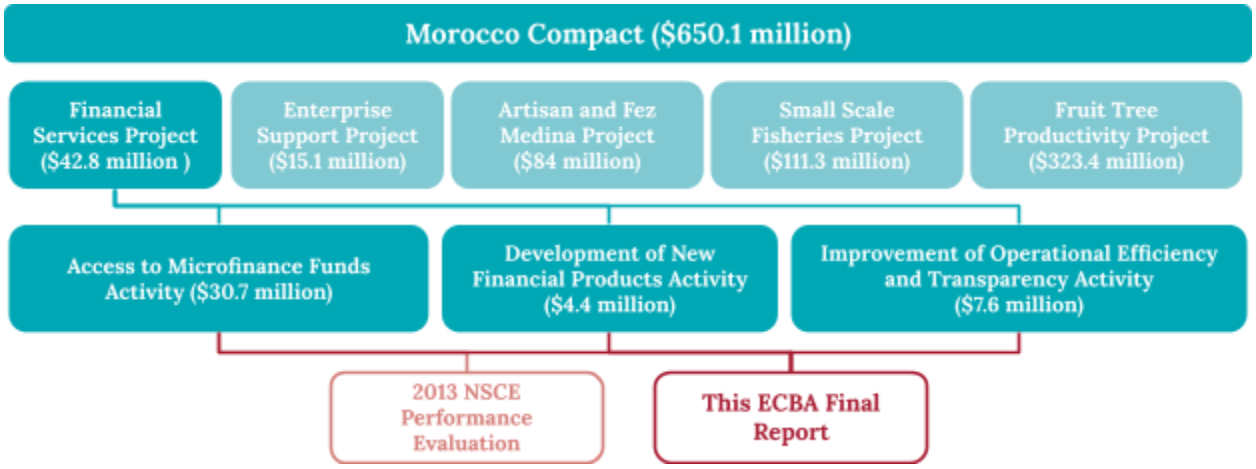

Figure 1.2: Morocco Compact Projects and Activities[20]

The goal of the Morocco FSP was to improve the financial services available to Moroccan microenterprises by improving market stability and overcoming constraints inhibiting the microfinance sector's expansion (M&E Plan). The Access to Microfinance Funds Activity (USD 30.7 million) provided financing to the Moroccan microcredit sector via loans to Jaida, a non-bank financial institution initiated in April 2007 and providing social and environmental responsibility training. The Development of New Financial Products Activity (USD 4.4 million) provided technical assistance for transforming microcredit associations into higher-order financial institutions. The Improvement of Operational Efficiency and

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Transparency Activity (USD 7.6 million) provided technical assistance to financial institutions to improve efficiency and transparency in the financial sector and lower borrowing costs for micro-enterprises.

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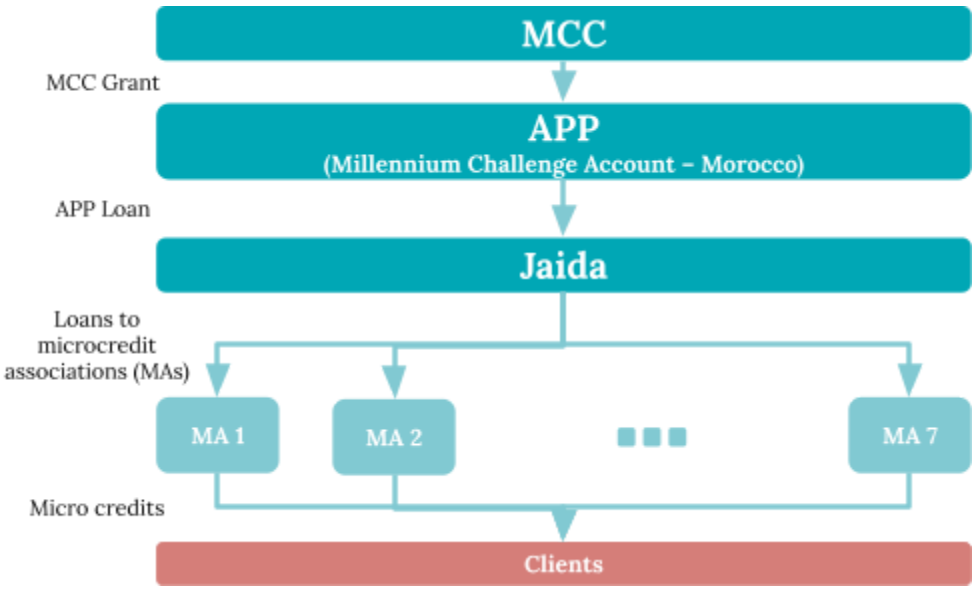

Figure 1.3: Morocco Access to Microfinance Funds Funding Channels

Jaida is a fund for financing microfinance institutions (MFIs) in Morocco. It was established as a limited company of Moroccan law and authorized by the Central Bank of Morocco (Bank Al-Maghrib), as a finance institution.

The Fund's main objectives are:

- To facilitate the financing of all MFIs to improve access to credit for micro-entrepreneurs in Morocco
- To raise funding from private sources and invest in the microfinance sector
- To promote institutional development of MFIs.

Jaida also acts as a platform to harmonize the efforts of international donors for the microfinance sector. The loan of USD 25 million from the APP allowed Jaïda to increase its loan portfolio to MAs, obtain leverage in facilitating its loans from donors, and focus on its mission. The loan also allowed Jaida to offer loans of a longer duration, to grant subordinated loans to certain MCAs, and to increase competition in the market for MA financing. The loan was to be repaid to the Ministry of Economy and Finance by Jaïda on September 15, 2017, since the APP was to be dissolved.

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The ECBA team identified an impact evaluation of microfinance on income in Morocco during the same timeframe. This paper has a high level of relevance to the ECBA since the studied microfinance association, Al Amana,[23] received a significant amount of funding through the FSP, and the paper studied the same country within the same time frame as the Compact. Crépon et al. (2015) completed a randomized experiment looking at the impact of a microcredit intervention on self-employment income, employment income, consumption, and asset accumulation in Morocco. The study used the expansion of Al Amana into new communities and designed and implemented a sampling strategy with sufficient power to estimate the impact on borrowers and capture impacts representative

[21] See Table A1.1 for the details of the survey with the mobile agency clients.
[22] See Table A1.3 for more details on the borrowings by mobile agency clients.
[23] Al Amana is a microfinance institution established in 1997 and operates under the supervision of the Ministry of Economy and Finance in Morocco. Al Amana received a large portion of funds from Jaida through the Morocco FSP.

of the village level. The evaluation was implemented in 162 villages, divided into 81 pairs of similar villages, and analyzed the 2006 survey data. This study found that after receiving credit from a microfinance association, borrowers increased their self-employment profits by 2005 DH, providing a return on microfinance funds of 140 percent.

Limestone Analytics (Limestone) completed the ECBA Design Report of the Morocco FSP in September 2022.[24] The suggested methodological adjustments from the ECBA Design Report included:

- Replace the return on capital estimate with better estimates from observations;
- Disaggregate the benefit stream by sex;
- Parametric adjustments to the loan default rate;
- Account for the residual funds that will remain in circulation after the CBA timeframe;
- Correct Closeout cost projections by accounting for inflation.

Table 1.1: Summary of the Morocco FSP ECBA

Activities	Benefits	Costs	ECBA ERR
• Access to Funds for Microfinance • New Financial Product Development • Improvement of Operating Efficiency and Transparency	• Increased Income from Access to Microcredit • Residual Value of Funds	• Project Costs • M&E and PAO Costs	**44.7%**[25] **(over 10 years of benefit accrual)**

Documents Reviewed for the ECBA Final Report

Table 1.2: Key Documents Reviewed to Inform the ECBA Final Report[26]

Document type	Reference	In-text citation
Final Evaluation Report	NSCE. (2013). *Final Evaluation of the "Financial Services" Project - Agency of Partnership for Progress – MCA Morocco*. NSCE: November 2013.	2013 Performance Evaluation Final Report
Cba Model	MCC. (2014). *Morocco: Financial Services Project, Closeout CBA*. MCC: January 30, 2014.	Closeout CBA
Other Relevant Documents	MCC. (2016). *Measuring Results of the Financial Services Project in Morocco*. MCC.	MCC (2016)
	Crépon, B., Devoto, F., Duflo, E., & Parienté, W. (2015). Estimating the Impact of Microcredit on Those Who Take It Up: Evidence from a Randomized Experiment in Morocco. *American Economic Journal: Applied Economics*, 7(1), 123–150.	Crépon et al. (2015)

[24] Bagzibagli & Kashi (2022).
[25] The ERR is calculated with the modified internal rate of return (MIRR) function at a 10 percent discount rate (Bowen, 2024)..Greater than the Closeout ERR of 11.4 percent, over 20 years of benefit accrual.
[26] A complete list of references is available at the end of this document.

Document type	Reference	In-text citation
	MCC. (2013). *Monitoring and Evaluation Plan – Morocco Compact*. Financed by the Millennium Challenge Corporation.	M&E Plan
	MCC. (n.d.). *Morocco Compact Website*. MCC.	Compact Website

Comparison with Closeout CBA

General Description

Table 2.1: Comparison of the Closeout CBA and Evaluation-Based CBA

Item	Closeout CBA	Evaluation-Based CBA
Activities included	• Access to Funds for Microfinance • New Financial Product Development • Improvement of Operating Efficiency and Transparency	• Access to Funds for Microfinance • New Financial Product Development • Improvement of Operating Efficiency and Transparency
Benefits	• Value added of supported investments (Interest payments)	• Increased Income from Access to Microcredit • Residual Value of Funds
Costs	• Project costs • M&E and PAO costs	• Project costs • M&E and PAO costs
Transfers	N/A	• Loans granted to Jaida • Loans granted to customers
Timeframe	2008-2027	2008-2018
Periods	• Investment (2008-2012, Y1 to Y5) • Benefit of Value Added of Supported Investments (2008-2027, Y1 to Y20)	• Investment (2008-2012, Y1 to Y5) • Years of benefit accrual (2008-2017, Y1 to Y10)
Shared costs	• Microcredit associations' M&E and PAO costs	• Microcredit associations' M&E and PAO costs
Results	ERR: 11.4 percent (over 20 years of benefit accrual) ENPV at 10 percent: USD $7,062,862 (2008 USD)	ERR: 44.7 percent (over 10 years of benefit accrual) ENPV at 10 percent: $172,572,748 (2008 USD)
Number of people benefitting	51,000 microenterprises received loans through Jaida-supported microcredit associations	51,000 microenterprises received loans through Jaida-supported microcredit associations
Currency	Nominal USD	Constant USD

For a complete specification of the Closeout CBA, see the Evaluation-Based CBA Design Report: Morocco Financial Services Project (Bagzibagli & Kashi, 2022).

Adjustments to Methodology and Assumptions

Methodological Changes

Disaggregating benefit stream by sex

The Jaida administrative data showed that microcredit agencies provided around 51 percent of loans to women over the evaluation period. The 2013 Performance Evaluation Final Report provided estimates of the amount of credit granted by sex. The ECBA used the data in Table 2.2 to estimate the benefits of microfinance and the loans granted by sex by estimating the weighted average of funds disbursed to men and women.

Table 2.2: Parameters used to Estimate Weighted Average of Funds by Sex[27]

Indicator	Men	Women	Source
Average credit granted	DH 5000	DH 4000	2013 Performance Evaluation Final Report
Percentage of microcredit clients	49%	51%	Jaida Administrative Data
Percentage of funds disbursed	55%	45%	Authors' Calculation

Correcting the Closeout CBA figures by accounting for inflation

The Closeout CBA did not clarify whether cost values were in constant or current dollars; it was assumed that they were in current dollars and that the Closeout CBA did not account for the inflation on the cost side. The team deflated the cost and transfer streams to 2008 USD using US consumer price indices.

Including the residual value of the funds as an additional benefit for the final period

The Closeout CBA assumed that the money disbursed to Jaida remains in distribution beyond the analysis period. The ECBA model considered the residual value of funds as a benefit to Jaida in the last year of the analysis. The model estimated the residual value as the remaining amount of the original funds after accounting for the impact of the interest rate, inflation, and default rate over the analysis period.

Limiting the analysis period to ten years

The Closeout CBA evaluated the project over 20 years of benefit accrual. The 2013 Performance Evaluation Final Report conducted a sustainability analysis, suggesting that "the positive effects of the Jaida loan agreement may extend to a minimal period of 10 years."[28] Based on this finding from the performance evaluation and that Jaida received

[27] The model specification of the first benefit stream in the following section describes the calculation of the percentage of funds disbursed to men and women borrowers.
[28] 2013 Performance Evaluation Final Report, p.11.

more funding in 2015 from other donors[29], the ECBA used a conservative assumption of 10 years of benefits due to this intervention. The analysis also tested the impact of 20 years of benefits on the results in the sensitivity analysis.

Justification for Changes to Parameter Values

Table 2.3 summarizes key parameters of the Closeout CBA updated in the ECBA. New inputs (for example, due to a methodological adjustment) are summarized in the specification tables in the next section.

Table 2.3: Summary of Adjusted Parameters Used in the ECBA

Inputs	Closeout Value	ECBA Value	ECBA Source
Return on capital invested in microcredit	20%	140%	Authors' calculation based on Crépon et al. (2015)
Average default rate	10%	6.5%	IFC (2014)
Interest rate	20%	13.5%	Crépon et al. (2015)

As described in the model specifications of the first benefit stream in the following section, the ECBA team estimated the return on capital investment in microcredit using Crépon et al.'s (2015) "increased annual net income from receiving access to credit" and "average loan amount" estimates. Then the team tested the estimated rate of return in the sensitivity and Monte Carlo probabilistic analyses using the study's confidence interval and standard deviation statistics.

The most significant parameter change is the change in the return on capital for microfinance beneficiaries. The Closeout CBA used a lower bound estimate of the interest rate, stating:

> The benefits are estimated as the total amount of interest paid by loan recipients. This is a significant underestimate of the total benefits, which is the private return on investment made by loan recipients. Some attempts have been made to estimate this, but the data was not available for this ERR. But we do know that for all loans not in default, the private return is at least equal to the interest rate (since they earned enough to pay it back), so we can use the interest rate as a lower bound for the benefits.[30]

Crépon et al. (2015) conducted a randomized evaluation of microfinance's impact on beneficiaries' income. The evaluation provided an updated return on capital invested in microfinance based on the average increases in net annual income. The estimate of the return on capital for microfinance was increased from 20 percent to 140 percent from the

[29] Jaida annual report (2015).
[30] Closeout CBA model notes.

Closeout CBA to the ECBA. This is a considerable change from the Closeout CBA estimate; however, this estimate is considered reliable due to the robustness and relevance of the study used to inform the updated return on capital. The other updated parameters in the ECBA include the default rate and the loan interest rate. These parameters were updated using an IFC (2014) study of microfinance in Morocco and Crépon et al. (2015), respectively.

Evaluation-Based CBA

Summary of Impacts (Benefits, Costs, and Transfers)

Table 3.1: Benefits, Costs, Beneficiaries and Stakeholders

Impact	Stakeholders			
	Beneficiaries	MCC	Jaida	Microcredit associations
Benefits 1 - Return on Capital from Increased Access to Microcredit	✔			
Benefit 2 - Value of Residual Funds				
Cost 1 - Project Costs		✔		
Cost 2 - M&E and Administration Costs		✔		
Transfer 1 - JAIDA Loans to Microcredit Associations			-✔	+✔
Transfer 2 - Microcredit Associations Repayment of Principal and Interest to JAIDA			+✔	-✔
Transfer 3 - Microcredit Agencies Disbursement to Beneficiaries	+✔		-✔	
Transfer 4 - Beneficiary Repayment of Loans to Microcredit Associations	-✔		+✔	

Methodology

Benefit 1 - Increased Income from Access to Microcredit

Narrative

The Morocco FSP's primary benefit was the increased income for clients who have gained access to credit. The 2013 Performance Evaluation Final Report suggested that the surveyed microcredit association clients gained an additional annual net income of approximately USD 804 (median of USD 454). This finding was not relative to a control group but was measured against net income before receiving credit from a microcredit association. Table A1.1 presents the independent evaluation findings.

Crépon et al. (2015), i.e., an experimental study looking at the impact of access to credit in rural communities in Morocco, found positive impacts on income, especially for self-employment activities. This study tracked the expansion of a microcredit association (Al Amana) into non-densely populated areas between 2006 and 2007. The benefits of receiving access to microcredit included improved profits from self-employment, salaried employment, consumption, accumulation of assets, and spillover impacts. Crépon et al. (2015) considered the benefits and estimated microfinance's individual and community-level impacts.

Crépon et al. (2015) found that households with access to microcredit expanded their self-employment activity (primarily agriculture or animal husbandry, in this context), and their profits increased. The estimates demonstrated relatively considerable average impacts on those who borrowed, with an estimated average return to capital of 140 percent before repayment of interest. The ECBA team estimated the return on capital investment in microcredit using Crépon et al.'s (2015) "increased annual net income from receiving access to credit" (DH 2,005) and "average loan amount" (DH 834) estimates. Then the team tested the estimated rate of return in the sensitivity and Monte Carlo probabilistic analyses using the study's confidence interval and standard deviation statistics. This number was calculated using the same methods described by Crépon et al. (2015) and was tested in the sensitivity and Monte Carlo probabilistic analyses.

ECBA applied Crépon et al. (2015) evidence of the private return rate to the MCC funding provided to Jaida. Like the Closeout CBA model, ECBA adjusted the total funding with an average default rate. ECBA updated the parameter with the International Finance Corporation (IFC, 2013) evidence which showed the default rate in the Morocco microcredit sector ranging from 9 percent to 4 percent across the Compact period. The model took the average of these figures as the default rate for the ECBA.

Using the 2013 Performance Evaluation Final Report's evidence of average credits granted to women and men borrowers, ECBA estimated increased income attributable to access to microcredit disaggregated by sex. The model estimated sex weights by calculating the share of average credits disaggregated by sex in the average credit amount.

MCC's grant was assumed to support JAIDA for ten years based on the sustainability assessment in the 2013 Performance Evaluation Final Report. A year delay in the benefits was assumed to disburse funds through microcredit associations to beneficiaries and for beneficiaries to make investments leading to increased income.

ECBA estimated the benefits in constant (2008) USD terms by adjusting the MCC fundings in nominal USD for the US inflation.

Period(s)

2008 - 2018

Inputs		Value	Unit	Source
π	*Average increase in profit for microcredit beneficiaries*	2,005	DH	*Crépon et al. (2015)*
L	*Average loan borrowed by beneficiaries*	834	DH	*Crépon et al. (2015)*

g	*Percentage of Jaida final clients that are women*	51	%	*Jaida Annual Report (2021)*
c_g	*Average credit granted to men or women g*	*Women:* 4,000 *Men:* 5,000	DH	2013 *Performance Evaluation Final Report*
d	*Average default rate*	6.5	%	IFC (2014)
p_t	*The period number of year t*	See Annex 2	#	Authors' Assumption
Y	*Years of benefit accrual*	10	#	Authors' Assumption
F_t	*Value of funds disbursed to Jaida in year t*	See Annex 2	USD	Closeout CBA
CPI_t^{US}	*Consumer price index (CPI) for the US in year t*	See Annex 2	#	World Bank

Calculation (per period)

B1: $B_t = B_t^{Men} + B_t^{Women}$

$B_t^{Men} = R_t \times (1 - W)$ $\quad$ $B_t^{Women} = R_t \times W$

Percentage of funds disbursed to women

$W = \frac{c_{women}}{F^{Avg}} \times g$

Weighted average of funds disbursed

$F^{Avg} = \left(c_{women} \times g\right) + \left(c_{men} \times (1 - g)\right)$

Return on capital on loans disbursed

Where:

$R_t = 0$ $\quad t = 2008$

$R_t = \left[V_{t-1} \times (1 - d)\right] \times r \times f_t$ $\quad t > 2008$

Benefit accrual flag

$f_t = if\left(p_t \leq Y, 1, 0\right)$

Rate of return on capital through microcredit

$r = \frac{\pi}{L}$

Value of funds available for loans

$V_t = F_t \times \frac{CPI_{2008}^{US}}{CPI_t^{US}}$ $\quad t \leq 2013$

$V_t = F_{2013} \times \frac{CPI_{2008}^{US}}{CPI_t^{US}}$ $\quad t > 2013$

Benefit 2 - Residual Value of Funds

Narrative

The Closeout CBA assumed that the money disbursed to Jaida remains in distribution beyond the analysis period. The ECBA model considered the residual value of funds as a benefit to Jaida in the last year of the analysis. The model estimated the residual value as the remaining amount of the original funds after accounting for the impact of the interest rate, inflation, and default rate over the analysis period.

Period(s)

2018

Inputs		Value	Unit	Source
F_t	*Value of funds disbursed to Jaida in year t*	See Annex 2	USD	Closeout CBA
i	*Average annual interest rate*	13.5	%	Crépon et al. (2015)
d	*Average default rate*	6.5	%	IFC (2014)
p_t	*The period number of year t*	See Annex 2	#	Authors' Assumption
Y	*Years of benefit accrual*	10	#	Authors' Assumption
π_t^{US}	*Annual inflation rate - consumer prices - US*	See Annex 2	#	World Bank

Calculation (per period)

B2: $B_t = V_t \times f_t$

Where:

Value of Funds Remaining

$$V_t = \left(V_{t-1} + F_t\right) \times \left(1 + i - d - \pi_t^{US}\right)$$

Flag for residual funds

$$f_t = if\left(p_t > Y, 1, 0\right)$$

Cost 1 - Project Costs

Narrative
The project costs were estimated using the Closeout CBA figures. The ECBA model deflated the expenditures to 2008 USD using the US CPI.

Period(s)
2008-2012

Inputs		Value	Unit	Source
FSP_t	MCC total cost of the Morocco FSP in year t	See Annex 2	USD	Closeout CBA
CPI_t^{US}	CPI for the US in year t	See Annex 2	#	World Bank

Calculation (per period)	
C1:	$C_t = FSP_t \times \frac{CPI_{2008}^{US}}{CPI_t^{US}}$

Cost 2 - M&E and Administration Costs

Narrative

The cost items were estimated as a constant share of the Morocco Compact's grand M&E and PAO expenditures. The FSP's proportion in the aggregate M&E and PAO costs was measured as a ratio of the forecasted cash disbursements of FSP to the Compact's total investment cost, net of the Compact's aggregate forecasted cash disbursements and non-disbursed fundings. The ECBA model deflated the expenditures to 2008 USD using the US CPI.

Period(s)

2008-2012

Inputs		Value	Unit	Source
M_t	*Aggregate M&E and PAO costs of the Morocco Compact in year t*	*See Annex 2*	USD	*Closeout CBA*
δ	*Forecasted cash disbursements of FSP*	42,778,621	USD	*Closeout CBA*
Δ	*Compact's aggregate forecasted cash disbursements for M&E and PAO*	73,754,723	USD	*Closeout CBA*
U	*Undisbursed Compact fundings*	39,838,371	USD	*Closeout CBA*
I	*Total investment cost of the Compact*	693,797,181	USD	*Closeout CBA*
CPI_t^{US}	*CPI for the US in year t*	*See Annex 2*	#	World Bank

Calculation (per period)

C2:

$$C_t = M_t \times \mu \times \frac{CPI_{2008}^{US}}{CPI_t^{US}}$$

Where:

FSP as a percent of total Compact costs

$$\mu = \frac{\delta}{I-U-\Delta}$$

Transfer 1 - JAIDA Loans to Microcredit Associations

Narrative
Jaida was established in 2007 and, with the financial support of MCC, released funds to microcredit associations. The 2013 Performance Evaluation Final Report showed that Jaida disbursed more funds to microcredit associations than was granted from MCC. This data suggested that Jaida had multiple funding sources over the Compact period. This ECBA focused on the impact of the MCC intervention on the beneficiaries/stakeholders. Therefore, the team limited the estimated transfer stream to the amount of MCC funding and assumed that all of the funds were passed through to the microcredit associations.

Period(s)
2008 - 2017

Inputs		Value	Unit	Source
LD_t	*Value of loan disbursements to Jaida*	*See Annex 2*	USD	*Closeout CBA*
CPI_t^{US}	*CPI for the US in year t*	*See Annex 2*	#	World Bank

Calculation (per period)	
T1:	$T_t = LD_t \times \frac{CPI_{2008}^{US}}{CPI_t^{US}}$

Transfer 2 - Microcredit Associations Repayment of Loans

Narrative

The repayment of the principal loans and the interest was estimated based on the funds disbursed to Jaida. The average length of the loans was estimated using the administrative data from the 2013 Performance Evaluation Final Report. The average loan interest rate was estimated using data from Crépon et al. (2015). The amount of loans disbursed each year was considered a cohort, and repayments were then divided across the years of repayment and adjusted for the average annual interest rate.

Period(s)

2008 - 2017

Inputs		Value	Unit	Source
LD_t	*Value of loan disbursements to Jaida*	*See Annex 2*	USD	*Closeout CBA*
i	*Average interest rate*	13.5	%	*Crépon et al. (2015)*
y	*Average maturity of loans to microcredit agencies*	5	*Years*	*2013 Performance Evaluation Final Report*
CPI_t^{US}	*CPI for the US in year t*	*See Annex 2*	#	World Bank

Calculation (per period)

T2: $$T_t = \sum_{j=1}^{6} C_{j,t} \times \frac{CPI_{2008}^{US}}{CPI_t^{US}}$$

Repayment in year t for loans disbursed in year j

Where: $$C_{j,t} = \frac{LD_{t=j}}{y} \times (1 + i)^y \qquad i < t < (i + y)$$

Transfer 3 - Microcredit Associations Loans to Beneficiaries

Narrative

Similar to the loans from Jaida to microcredit associations, there was no data on how much MCC funding passed through to the final beneficiaries. For these reasons, the ECBA team assumed all the Jaida funds were passed through to beneficiaries. The disaggregation of credits by sex was estimated using the percentage of women who were active Jaida clients and the average credit granted to each sex suggested by the 2013 Performance Evaluation Final Report. Using the US CPI, ECBA adjusted the funds disbursed to the beneficiaries for inflation.

Period(s)

2008 - 2017

Inputs		Value	Unit	Source
LD_t	*Value of loan disbursements to Jaida*	*See Annex 2*	USD	*Closeout CBA*
c_g	*Average credit granted to men or women g*	*Women:* 4,000 *Men:* 5,000	DH	*2013 Performance Evaluation Final Report*
g	*Percentage of Jaida final clients that are women*	51	%	*Jaida Annual Report (2021)*
CPI_t^{US}	*CPI for the US in year t*	*See Annex 2*	#	World Bank

Calculation (per period)

T3: $T_t = F_{Women,t} + F_{Men,t}$

Funds disbursed to men or women g

$$F_{Women,t} = LD_t \times W \times \frac{CPI_{2008}^{US}}{CPI_t^{US}}$$

$$F_{Men,t} = LD_t \times (1 - W) \times \frac{CPI_{2008}^{US}}{CPI_t^{US}}$$

Where:

Percentage of funds disbursed to women

$$W = \frac{c_{women}}{F^{Avg}} \times g$$

Weighted average of funds disbursed

$$F^{Avg} = \left(c_{women} \times g\right) + \left(c_{men} \times (1 - g)\right)$$

Transfer 4 - Beneficiaries Loan Repayments

Narrative

The ECBA model estimated the loan repayments by beneficiaries using the average repayment period of beneficiaries estimated in the 2013 Performance Evaluation Final Report. The model also adjusted the average credit granted to women and men borrowers by the interest rate and the average default rate. Using the US CPI, ECBA adjusted the funds disbursed to the beneficiaries for inflation.

Period(s)

2008 - 2017

Inputs		Value	Unit	Source
LD_t	*Value of loan disbursements to Jaida*	*See Annex 2*	USD	*Closeout CBA*
c_g	*Average credit granted to men or women g*	*Women: 4,000* *Men: 5,000*	DH	*2013 Performance Evaluation Final Report*
g	*Percentage of Jaida final clients that are women*	51	%	*Jaida Annual Report (2021)*
i	*Average interest rate*	13.5	%	*Crépon et al. (2015)*
d	*Average default rate*	6.5	%	IFC (2014)
y^b	*Average repayment period for beneficiaries*	1	Year	*2013 Performance Evaluation Final Report*
CPI_t^{US}	CPI for the US in year t	*See Annex 2*	#	World Bank

Calculation (per period)

T4: $T_t = R_{Women,\,t} + R_{Men,\,t}$

Where:

Repayment in year t for sex g: $R_{g,\,t} = F_{g,\,t-1} \times (1 + i) \times (1 - d)$

Funds disbursed to sex g

$$F_{Women,\,t} = LD_t \times W \times \frac{CPI_{2008}^{US}}{CPI_t^{US}}$$

$$F_{Men,\,t} = LD_t \times (1 - W) \times \frac{CPI_{2008}^{US}}{CPI_t^{US}}$$

Percentage of funds disbursed to women: $W = \frac{c_{women}}{F^{Avg}} \times g$

Weighted average of funds disbursed

$$F^{Avg} = \left(c_{women} \times g\right) + \left(c_{men} \times (1 - g)\right)$$

Sensitivity and Probabilistic Analysis

The assumed critical inputs for the sensitivity analysis were:

- Increased annual net income from receiving access to credit,
- Average default rate,
- Average annual interest rate, and
- Years of benefit accrual.

The main parameter of interest for sensitivity analysis was the increased income from receiving access to credit, which was also the only critical input tested in Monte Carlo simulations. ECBA used the 95 percent confidence interval suggested by the Crépon et al. (2015) study to test the parameter in the sensitivity analysis. The team also used the study's mean and standard deviation estimates for the parameter in Monte Carlo simulations. Table 3.2 presents the assumptions used in the sensitivity and probabilistic analyses.

The interest and default rates were the other critical inputs tested in the sensitivity analysis. The Monte Carlo analysis did not include these parameters as the required statistical details were unavailable. The range that informed the average default rate in the sensitivity analysis was the IFC (2014) study of the microfinance sector in Morocco around the Compact period. The sensitivity analysis also employed the parameter and range estimates for the annual interest rate suggested by Crépon et al. (2015) based on typical Al Amana client statistics.

Lastly, the ECBA model had a conservative view of 10 years for the benefit accrual period attributable to the MCC investment. The analysis considered the 2013 Performance Evaluation Final Report findings on the intervention sustainability and the additional funding provided to Jaida by other donors in 2015. The results were tested in the sensitivity analysis with 20 years of accrual, as was considered by the Closeout CBA.

Table 3.2: Assumptions for the Sensitivity and Probabilistic Analyses

Inputs	Impacts Sensitive to the Inputs				Range & Distribution		Distribution
	B1	B2	C1	C2	Range	Distribution	
Increased income from receiving access to credit	✓				DH -366 to DH 4,377	Normal μ: DH 2,005 SD: DH 1,201	Crépon et al. (2015)
Average default rate	✓	✓			4% to 9%	Not included in Monte Carlo	IFC (2014)
Annual interest rate		✓			10% to 20%	Not included in Monte Carlo	Crépon et al. (2015)
Years of Benefits	✓	✓			10 and 20	Not included in Monte Carlo	Authors' Assumption

Results

Overall, the analysis found that the FSP had an ERR of **44.7 percent (over 10 years of benefit accrual)** and an economic net present value (ENPV) of **USD 172,572,748 (2008 USD)** at a 10 percent discount rate. Figure 4.1 demonstrates the present value (PV) of benefits and costs of the Morocco FSP at 10 percent in 2008 USD. The main benefit was the increased income from access to microfinance for the beneficiaries.

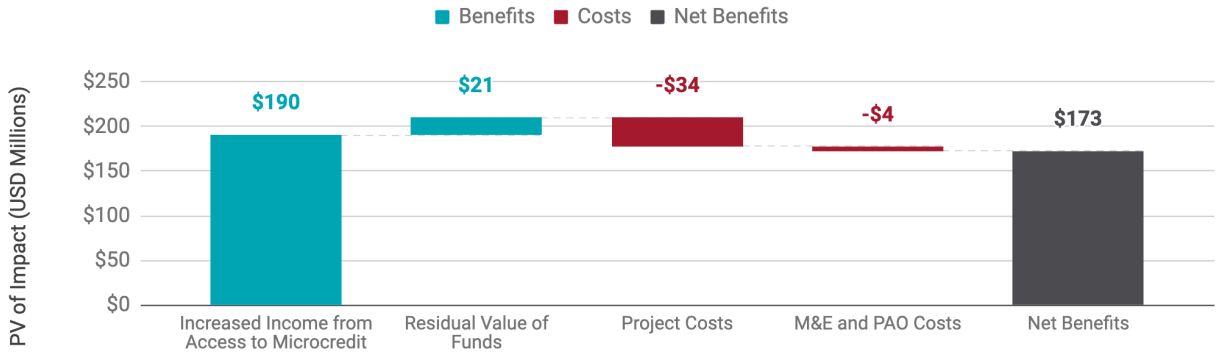

Figure 4.1: PV of Impacts from FSP (at 10 percent, 2008 USD Millions)

Beneficiary and Stakeholder Analysis

The stakeholder analysis included beneficiaries by sex (women and men), MCC, Jaida, and microcredit associations in Morocco. 51,000 microenterprises received loans through Jaida-supported microcredit associations. The beneficiaries were significantly better off due to this intervention, with men receiving a slightly larger share of the benefits due to the higher average amount of funds disbursed to men relative to women.

Jaida also showed a positive overall impact from the program due to the grant and the impact of interest payments on the loans granted. Microcredit associations showed a slight negative impact. However, the assumptions around these transfers were not informed by administrative data from microcredit associations, so the ECBA could not comment with certainty on the financial sustainability of microcredit associations.

Figure 4.2 and Table 4.1 display the breakdown of impacts by beneficiaries and stakeholders.

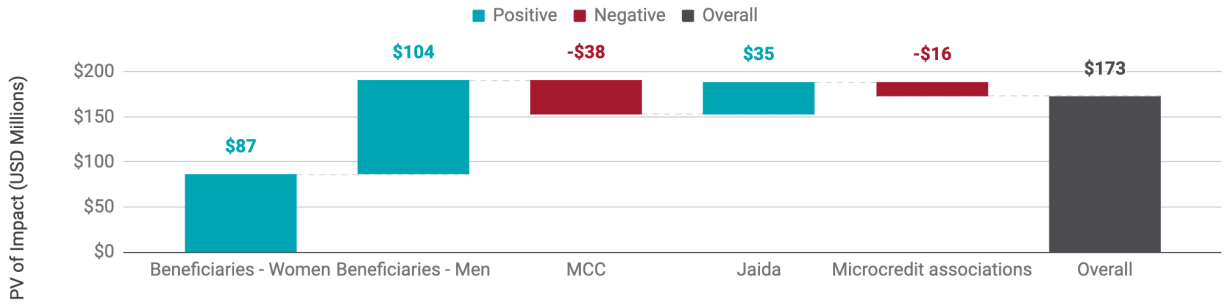

Figure 4.2: Present Value of Impacts by Beneficiary/Stakeholder (at 10 percent, 2008 USD millions)

Table 4.1: Results of the FSP by Beneficiary/Stakeholder

Impact	Beneficiaries - Women	Beneficiaries - Men	MCC	Jaida	Microcredit associations	Overall
Benefit 1 - Increased Income from Access to Microcredit	$86,279,636	$103,620,151				**$189,899,787**
Benefit 2 - Residual Value of Funds				$20,764,329		**$20,764,329**
Cost 1 - Project Costs			-$33,892,554			**-$33,892,554**
Cost 2 - M&E and PAO Costs			-$4,198,814			**-$4,198,814**
Transfer 1 - JAIDA Loans to Microcredit Associations				-$27,855,944	$27,855,944	**$0**
Transfer 2 - Microcredit Association Repayment of Principal and Interest to JAIDA				$42,393,856	-$42,393,856	**$0**
Transfer 3 - Microcredit Association Disbursements to Beneficiaries	$12,656,153	$15,199,791			-$27,855,944	**$0**
Transfer 4 - Beneficiary Repayment of Loans	-$12,210,023	-$14,663,999			$26,874,022	**$0**
Net impact by stakeholder	**$86,725,765**	**$104,155,944**	**-$38,091,368**	**$35,302,241**	**-$15,519,834**	**$172,572,748**

Sensitivity and Probabilistic Analysis

Table 5.1 presents the alternative inputs and outputs of the sensitivity analysis. Figure 5.1 displays the findings of the one-way sensitivity analysis in terms of the deviation from the base-case ENPV estimate. The analysis showed that the most influential parameter was increased income, which drives the benefits. Increasing the benefit accrual period to 20 years did not change the ERR. However, the ENPV showed that extending the benefit accrual period increased the ENPV by USD 76 million (Figure 5.1), a 42.2 percent increase in the ENPV. The ERR estimate slightly changed because at a very high rate of return (or discount rate), extending the benefits into the future would have negligible impacts on the results. For this reason, the ENPV demonstrated in Figure 5.1 should be considered when assessing the impact of changing the benefit accrual period. The alternative average default and annual interest rates also had a minor impact on the program results.

Table 5.1: One-way Sensitivity Analysis on the Critical Model Inputs

Input	Base case value	Unit	Alternate value	Alternate ERR
1. Increased annual net income from receiving access to credit	DH 2,005	DH	-366	-23.7%
			4,377	71.0%
2. Average default rate	6.5%	%	9%	43.8%
			4%	45.8%
3. Average annual interest rate	13.5%	%	13%	44.6%
			15%	44.9%
4. Years of benefit accrual	10	Years	20	28.3%

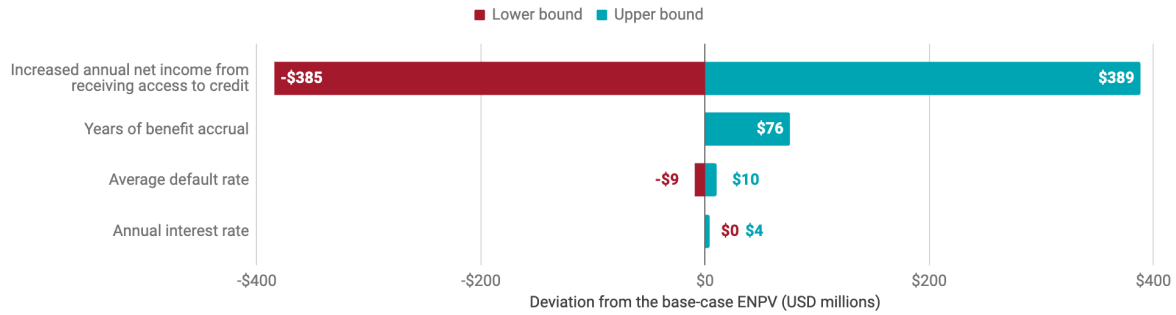

Figure 5.1: One-way Sensitivity Analysis on the Critical Model Inputs

In addition to the one-way sensitivity analysis, the ECBA team conducted Monte Carlo simulations on the increased income from access to microcredit. The probabilistic analysis used Crépon et al.'s (2015) average net income increase estimate and the parameter's standard error to conduct 50,000 simulations for the ECBA findings. The Monte Carlo simulations displayed a minimum of 49,514 (99 percent) trials. The forecasted outputs are the ENPV, the ERR, and the impact on beneficiaries. The MIRR function (used to calculate

the ERR) uses a discount rate to move values around and construct a regular cash flow. In this case, we use a discount rate of 10 percent in the MIRR function that is in line with MCC guidance.

Figure 5.2 displays the simulated probability distribution of the ENPV, suggesting that the probability of a positive ENPV, i.e., ERR higher than the 10 percent threshold, was 81 percent (over 10 years of benefit accrual). The simulations also suggested that the 80 percent confidence interval of the Morocco FSP ENPV was between USD -78 million (ERR of 1 percent) and USD 423 million (ERR of 35 percent).

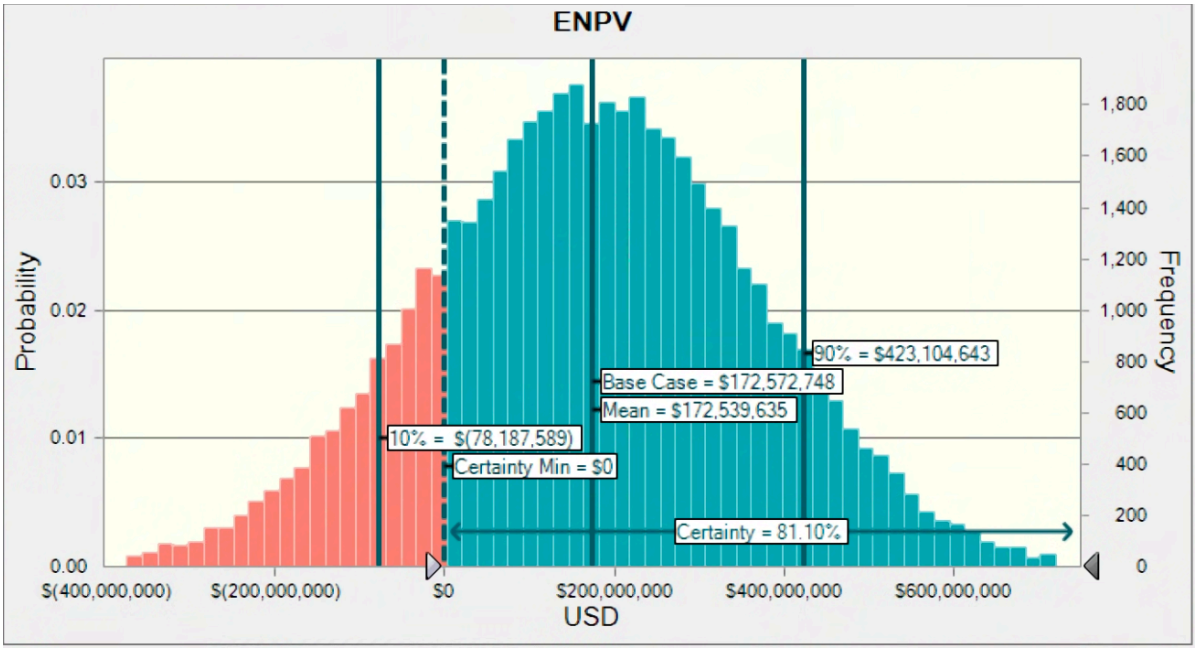

Figure 5.2: Simulated Probability Distribution of the ENPV

Figure 5.3 displays the simulated probability distribution of the ERR. The ERR simulation suggests a certainty of 81 percent (over 10 years of benefit accrual), similar to the ENPV simulations.

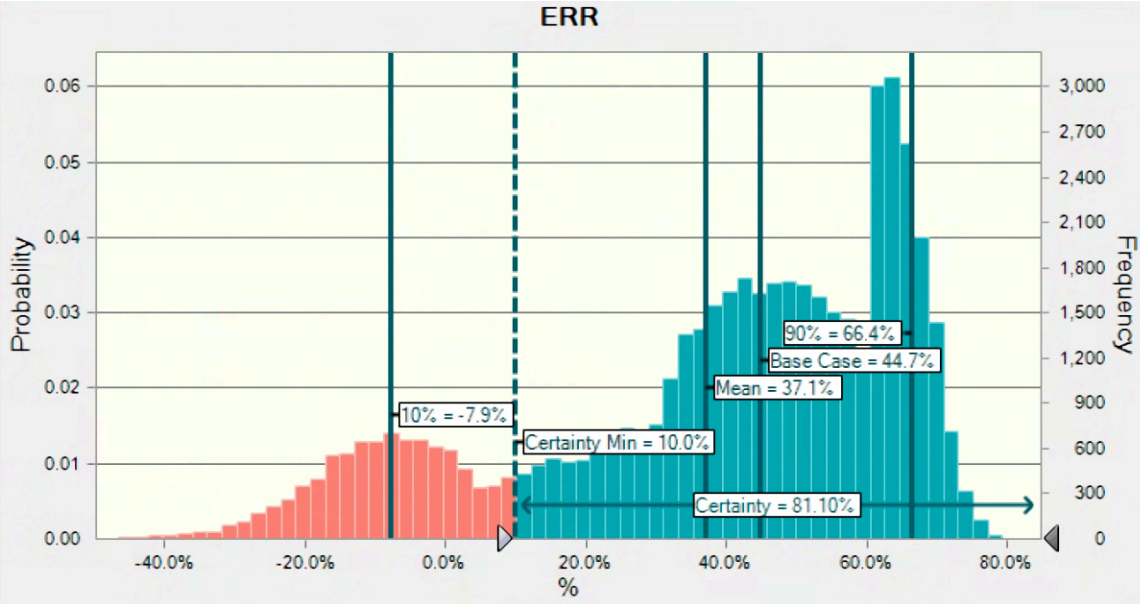

Figure 5.3: Simulated Probability Distribution of the ERR

The increased income from access to microcredit was also critical in estimating the impact on women and men beneficiaries. The simulations in Figures 5.4 and 5.5 show that the probability of a positive impact on beneficiaries was around 83 percent for both women and men. The simulations also showed that the Project's net impact on women beneficiaries had an 80 percent confidence interval of USD -27.6 million and USD 200.5 million, while the range for men was USD -33.1 and USD 240.9 million.

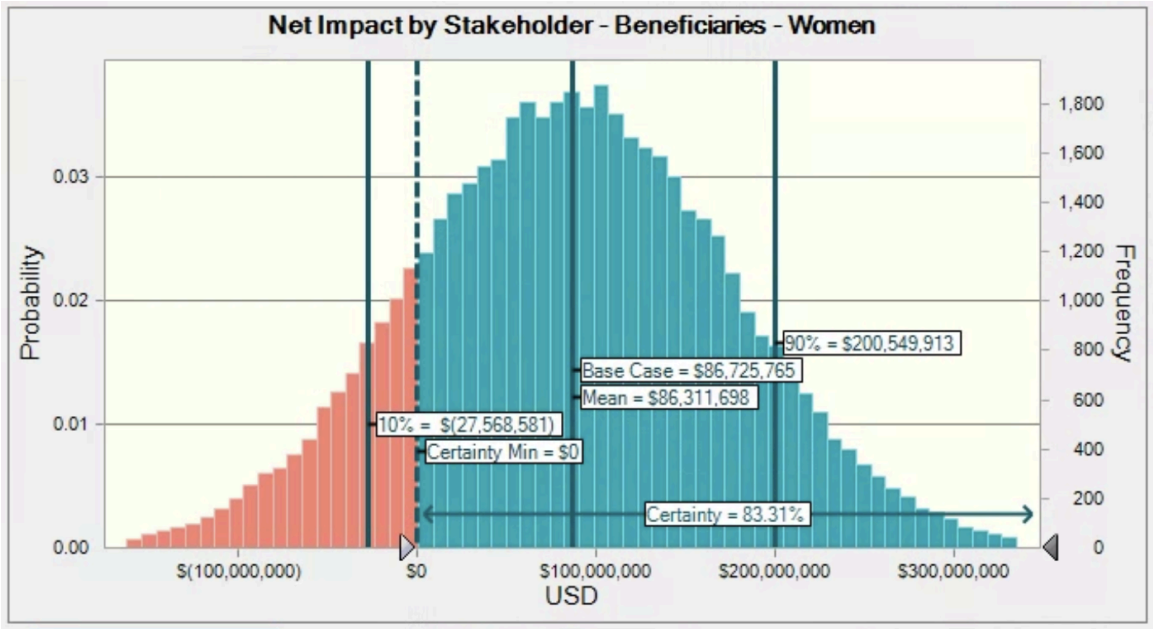

Figure 5.4: Simulated Probability Distribution for Beneficiaries - Women

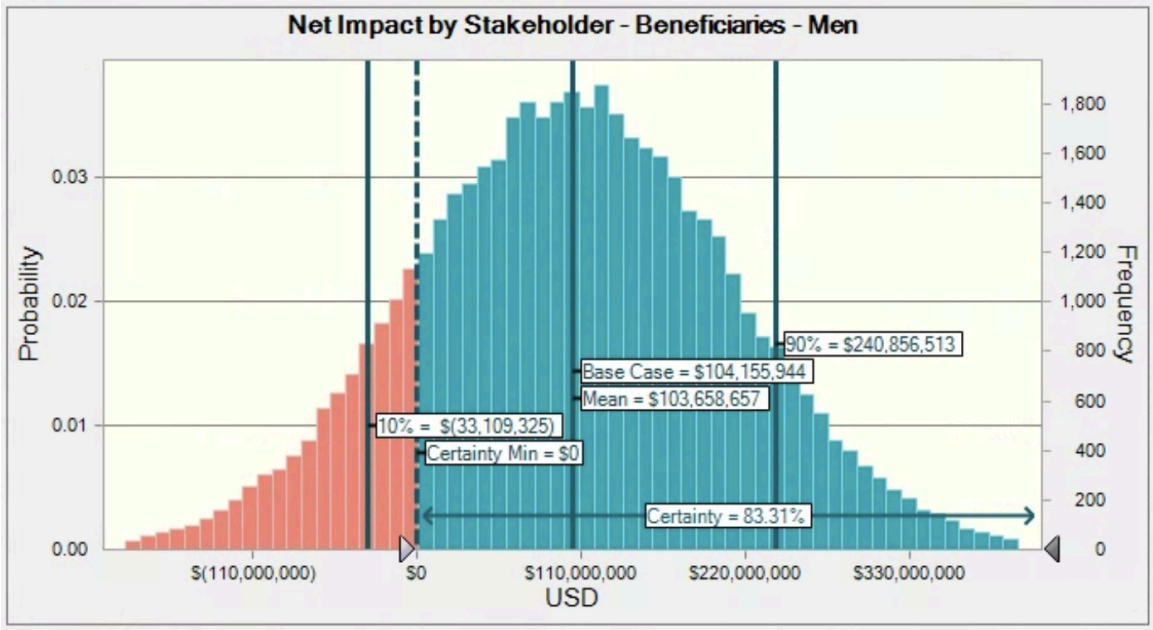

Figure 5.5: Simulated Probability Distribution for Beneficiaries - Men

Comparing the Closeout CBA & ECBA

The ECBA introduced several parameter and methodological changes compared to the Closeout CBA. The most considerable change to the results came from the increase in the return on capital for microfinance from 20 percent to 140 percent. The ECBA team considered the significant parametric update reliable due to the robustness and relevance of the secondary evidence (Crépon et al., 2015) used to inform the updated return on capital. As discussed in the Justification for Changes to Parameter Values subsection earlier in this report, the Closeout CBA model notes also acknowledged that the 20 percent return was "a significant underestimate of the total benefits".

Moreover, the ECBA added a new benefit stream of the residual value of funds to Jaida. The stream aimed to capture the benefits of the funds remaining in Jaida accounts at the end of the analysis period. Other significant changes to the ECBA included reducing the benefits accrual time to 10 years and deflating cost streams to 2008 USD values.

One factor considered for the timeline adjustment to 10 years (2009 - 2018) was the sustainability evaluation of the 2013 Performance Evaluation Final Report, stating that "the positive effects of the Jaida loan agreement may extend to a minimal period of 10 years" (p. 11). ECBA also considered the additional funding provided to Jaida by other donors in 2015 to limit the benefit accrual period to 10 years. The 2015 Jaida annual report noted that Jaida signed a partnership within the framework of the support program for small and medium-sized enterprises between the governments of Morocco and Italy. The partnership included:

- a credit line of six million euros,
- a donation of one million euros for technical assistance allocated to five microcredit associations, and
- a loan that falls within the framework of the MCA-Morocco Compact financial service project.

Six microcredit associations benefited from the financial envelope for a total commitment of 5.2 million euros at the end of 2015.

Table 6.1 summarizes the parametric and methodological changes of the ECBA compared to the Closeout CBA model and their impacts on the outcomes.

Table 6.1: Summary of Parameter vs. Methodological Changes (PV at 10 percent, in 2008 USD)

Benefit/Cost	Closeout CBA	ECBA	Change Due To		Notes
			Parameters	Methodology	
Benefit 1 - Increased Income from Access to Microcredit	$46,151,321	$189,899,787	$163,862,572	-$20,114,106	**Parameter** - Increased the return on capital using the secondary evidence published after the Closeout CBA model. **Methodology** -Reduced the analysis period to ten years following the 2013 Performance Evaluation Final Report sustainability findings.
Benefit 2 - Residual Value of Funds	$0	$20,764,329	$0	$20,764,329	**New Benefit**
Cost 1 - Project Costs	$34,769,757	$33,892,554	$0	-$877,203	**Methodology** - Deflated costs to 2008 USD values.
Cost 2 - M&E and PAO Costs	$4,318,702	$4,198,814	$0	-$119,888	**Methodology** - Deflated costs to 2008 USD values.
Total NPV	$ 11,381,564	$172,572,748	$ 163,862,572	$ 1,647,313	
ERR	11.4%	44.7%			

Lessons Learned

On the Morocco FSP

From an economic point of view, the Morocco FSP was a cost-effective intervention. The parametric and methodological updates in the ECBA suggested an ERR of 44.7 percent over 10 years of benefit accrual.

The most significant change to the results came from the increase in the return on capital for microfinance from the Closeout CBA's 20 percent proxy assumption to 140 percent, as suggested by secondary evidence published after the Closeout CBA. The increased income earned by beneficiaries from the loans provided by microfinance institutions greatly outweighed the program's cost.

Monte Carlo simulations suggested that the probability of the Project generating ERR above MCC's threshold level of 10 percent was 81 percent (over 10 years of benefit accrual). The simulations suggested that the 80 percent confidence interval of the Morocco FSP ENPV was between USD -79 million (ERR of 1 percent) and USD 423 million (ERR of 35 percent). The simulations also showed that the probability of a positive impact on beneficiaries was around 83 percent for both women and men.

On Conducting CBA at MCC

One of the updates in this ECBA was to deflate project costs and transfers. Since the Closeout CBA did not clarify whether cost values were in constant or current dollars, it was assumed that they were in current dollars and that the Closeout CBA did not account for the inflation on the cost side. We recommend that future CBAs describe the units of parameters (in case of using constant dollars) or explicitly deflate the benefits and costs to the base year values.

For Future Evaluations

The 2013 Performance Evaluation Final Report provided relevant data to disaggregate benefits by sex. ECBA benefited from the evidence and estimated the FSP's impact on women and men beneficiaries. Including sex, age, sector, region, and other relevant disaggregation to independent evaluations provides critical evidence for a detailed assessment of the interventions.

Due to limited evidence (primary or secondary), the ECBA did not include any direct benefits for the technical assistance provided under the MCC's investments. The impact evaluation of technical assistance on Jaida and microcredit associations could provide evidence to conduct a policy and institutional reform analysis and account for additional

benefits of the intervention related to the gains in operational efficiency and the screening of borrowers.

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Annex 1: Evaluation Survey Findings

Table A1.1: Difference in Net Annual Income Before and After the Credits Granted in March and April 2013 - Results from the Survey with 48 Mobile Agency Clients

Indicator	Annual Net Income Before Credit (USD)	Annual Net Income After Credit (USD)	Difference in Annual Net Income (USD)
Average	1,560	2,365	804
Median	1,337	1,734	454
Minimum	0	437	0
Maximum	5,380	6,312	4,483
Deviation	1,232	1,691	883

Source: Adapted from the 2013 Performance Evaluation Final Report.
Note: The 2013 Performance Evaluation Final Report did not specify the time difference between the annual net income measures before and after the credit. Therefore, we used the exchange rate of 8.47581 DH per USD cited in the Final Report for May 2013 to present the figures in USD.

Table A1.2: Statistics for Women - MAs

	Percentage Women				
MCA	Entrepreneurs	Members of the Council	Credit Agents	Managers	Employees
Al AMANA (2011)	41%	38%	40%	No data	50%
AL KARAMA (2011)	63%	29%	60%	58%	60%
ATTAWFIQ (2012)	57%	100%	44%	100%	46%
FONDEP (2012)	57%	17%	34%	27%	45%
AMSSF (2011)	73%	44%	57%	25%	50%
INMAA (2011)	51%	No data	89%	62%	46%
ARDI (2010)	49%	17%	42%	40%	41%

Source: Adapted from the 2013 Performance Evaluation Final Report.

Table A1.3: Amount of Loan Obtained for the Credits Granted Before May 2013 – Results of the Survey with the Mobile Agency Clients

Indicator	Men	Women	Total
Average	$668	$558	$652
Median	$590	$472	$590
Minimum	$212	$330	$212
Maximum	$2,360	$944	$2,360

Source: Adapted from the 2013 Performance Evaluation Final Report.

Annex 2: Time-Varying Inputs

Table A2.1: Time-Varying Inputs

	Unit	2008	2009	2010	2011	2012	2013
Periods	#	1	2	3	4	5	6
Value of funds disbursed to Jaida	USD	$6,432,618	$12,304,629	$6,262,753	$0	$5,000,000	$3,300,000
Aggregate M&E and PAO costs of the Compact	USD	$4,652,222	$13,207,207	$18,033,234	$15,642,879	$22,341,168	
Total cost of Financial Services Project (FSP)	USD	$6,505,570	$12,927,232	$276,387	$7,715,902	$15,353,531	
Annual inflation rate - Consumer prices - US	%	3.84%	-0.36%	1.64%	3.16%	2.07%	1.46%
Consumer price index - US	#	98.70	98.40	100.00	103.20	105.30	106.80