FMO
Entrepreneuria
Development
Bank

Joint Impact Model

Application by FMO

Impact Measurement and Integrated Reporting

March 2023

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1. Introduction

1.1 Objective

The objective of this document is to describe the way FMO has implemented the Joint Impact Model (JIM) and on how we estimate and report the indirect impacts of our investments. Although many institutions are now using the same Joint Impact Model methodology, the application thereof can lead to different outcomes.

With the help of this document and related documentation, the readers of our Annual Report 2022 are informed on the indicators that are reported with the JIM (chapter 1), a summary of the JIM and its limitations (chapter 2), how we report in the Annual Report (chapter 3) and how we gather the inputs of the JIM (chapter 4).

This document is an explanation of the "JIM application by FMO" while the methodology of the JIM itself is described in full detail in the JIM Methodology document written by Steward Redqueen.

1.2 Indicators

At FMO, the JIM is used for **reporting purposes** at **portfolio level,** meaning it is based on clients that are in our portfolio at the time or reporting (December 31st, 2022) and have an outstanding amount or economic ownership percentage in our balance sheet. It estimates the effects of these investments on *Jobs supported* and *Financed absolute GHG emissions*:

- *Jobs supported –* The number jobs supported provides a proxy of the employment impact of investing in the private sector. As businesses survive and grow, their outputs require direct employment and intermediary inputs. This in turn leads to activity among existing and new suppliers, thereby supporting and creating jobs. Some products and services – notably electricity, infrastructure and finance – remove constraints for other businesses, enabling them to succeed and hopefully to expand.
- *Financed absolute GHG emissions –* The JIM also provides the carbon footprint of our clients. Based on macro-economic statistics, the JIM estimate absolute emissions from our clients in case primary client emission data is not available.

1.3 Related documentation

As stated, the current document is narrowed to the JIM application by FMO. The following documentation is also available on the JIM website (www.jointimpactmodel.org):

- *JIM Methodology* - This document includes a detailed overview of the methodology, data sources and calculations used in the JIM. The document describes the methodologies applied for each impact – i.e. supply chain and induced, direct, financing enabling and power enabling impacts as well as key assumptions and limitations.
- *JIM User Guide* - The purpose of the User Guide is to assist users to run the JIM on their portfolio of investments. It provides guidance on how to use the input template. Moreover, you will find instructions on how to access the online Interface, read the input error messages and use the Results Excel file.
- *JIM Input Sheet* - Template for the JIM with inputs for different clients and optional inputs.

Other information such as the Frequently Asked Questions (FAQs) and webinars that were recorded are also available on the JIM website. FMO also makes available the JIM Methodology written by Steward Redqueen under "how we measure impact" on its website.

2. Application

2.1 High-level summary of the JIM application by FMO

The theory of change behind the indirect jobs (JIM Methodology) is as follows: a financial investment allows a business to grow. The additional output requires more **jobs supported**. The same applies for **Financed absolute GHG emissions**. This in turn leads to expansion among existing and new suppliers, thereby supporting and/or creating jobs, as well as producing emissions. Some products and services – notably electricity and finance - remove constraints for other businesses, enabling them also to expand and again support and/or create jobs. In emerging markets, firm expansion the JIM assumes not to displace employment in competing businesses to a significant extent.

The JIM application by FMO splits the results of **jobs supported** in the following categories:

- *Backward Temporary –* Temporary projects are operating for a limited period of time and do not have annual sales. An example are power projects that are in the construction phase and temporary public sector projects. To estimate the impacts in one particular year, the project value should be an annualised amount, equal to the project spending in the fiscal year provided. If the full project amount is inserted, the impacts quantified reflect the impact over the project's lifetime, assuming constant labour productivity, and no changes to the production structure of suppliers.

- *Supply chain jobs –* Jobs that are created within the investee's direct and indirect suppliers following the investments are called supply chain jobs. Supply chain expenditure is based on procurement. The domestic procurement is routed through the Social Accounting Matrix (SAM) to calculate the output generated at its direct suppliers and their suppliers. These outputs are multiplied by the relevant sector-specific employment intensities to estimate the jobs in the supply chain.

- *Induced jobs –* Induced jobs arise due to the spending of wages earned by employees of the investee and its direct and indirect suppliers. The JIM takes client data on actual wages paid in the business and prevailing wages earned in the relevant sectors of the supply chain and routes these through the SAM to determine where wages are spent. Multiplying the output by the applicable sector-specific employment multipliers gives an estimate of the jobs resulting from the spending of wages.

- *Finance Enabling -* Economy-wide jobs via financial services. Any employment that takes place at the client level of a financial intermediary (e.g. a bank in Nigeria) is estimated by the JIM. Finance enabling jobs arise due to lending to businesses and individuals of the financial intermediary. There is strong evidence of the relationship between bank credit and employment in borrowing firms from natural experiments resulting from the financial crisis.

- *Power Enabling -* Economy-wide jobs via power generation. Indirect jobs can also arise due to the economic activity generated by the supply of electricity to businesses. The JIM calculates the amount of GDP attributable to an increase in gigawatt hours (GWh) of electricity supplied to the national system. The resulting additional GDP is then allocated by sector according to the prevailing economic structure of the host country. Because power generators tend to operate at maximum efficiency, the model tends to show large numbers of jobs supported at the start but little incremental change between years until new capacity is added.

The JIM application by FMO splits the results of **Financed absolute GHG emissions** in the following categories:

- *Scope 1 –* direct emissions from owned or controlled sources. This is related to direct emissions from the client.

- *Scope 2 –* indirect emissions from the generation of purchased energy. This is Supply chain GHG emissions related to the client's direct electricity supplier.

- *Scope 3 –* indirect emissions (not included in Scope 2) that occur in the value chain of the reporting company. This includes two main GHG Protocol Scope 3 categories, namely Category 1 - Purchased

goods and services and Category 15 - Investments. The Scope 3 category 'Purchased goods and services' contains all supply chain GHG emissions other than the emissions related to the client's direct electricity supplier. The Scope 3 category 'Investments' relates to emissions in the portfolios of our customers, which are particularly relevant for the FI department.

2.2 Assumptions and limitations

JIM allows quantifying the wider impact of investing in various economic regions and sectors, both directly and through financial institutions and funds. The JIM is an economic input-output model, which is a widely recognized academic method to depict inter-linkages between sectors, which enables the model to trace product and money flows through an economy. However, it is also important to point out the assumptions and limitations of the JIM. FMO encourages its readers to take these into account when reading and interpreting the results.

At FMO the JIM is used ex-post meaning running the model at portfolio level and taking a snapshot of all clients of FMO at the time of reporting. Our focus is on what is in our current portfolio; what has already been built, and who the investees of our funds are. Another important assumption is the application of attribution. At FMO we have always believed in taking the same share of financing (attribution) for positive (jobs supported) and negative (absolute financed GHG emissions) impacts. In November 2021, the JIM 2.0 was launched that aligns with the PCAF Global Standard so that the attribution calculation in JIM is now PCAF-aligned.

Supply chain and induced impact -

IO modelling has several advantages. First, it captures direct and indirect effects in an industry-specific manner, which means the scope covers an entire economy. Second, it requires little data on the studied intervention. This makes it particularly useful in regions where data is scarce or unavailable. For regions with limited data availability, such as many developing countries, IO tables are typically the best data that is available. Lastly, the number of interventions that can be included scales up easily. However, IO modelling also has clear limitations as it depends on simplistic assumptions:

- No supply and capacity constraints: the model assumes additional output is generated regardless of the availability of resources (e.g. labour, raw materials, production capacity), which may be tied up in other activities;
- Fixed production structures: IO modelling assumes production structures are "frozen" in time. This implies no change in returns to scale and a fixed production structure with no substitution of inputs. However, business growth is likely to impact the inter-relationships between sectors within an economy (for example, through competitive changes and displacement). Because of this, results describe average, not marginal, effects;
- Fixed prices: price changes in the local economy, which could result from policy or crowding out effects, are not considered. Thus, prices do not constrain input availability. The model is therefore most accurate for projecting the impact of relatively small and short-term changes in demand. For example, increased demand for a product is assumed to imply an equal increase in production for that product. In reality, however, it may be more efficient to increase imports or divert some exports to local consumption rather than increasing local production by the full amount;
- Sector averages: IO modelling assumes that all companies in a certain sector have the same production structure. In reality, each business has a unique way of procuring its goods and services, and businesses backed by DFIs are likely to be atypical of their sectors (they may be more capital intensive, for example);
- Overstated employment intensities: imported intermediates are not separated out, which means that the backward linkages and thus the employment multipliers are not confined to the domestic economy, and may be overstated (with this being uneven across sectors depending on how much of a sector's intermediate inputs are imported); and

- No diversification of spending patterns: the model assumes that all households have the same spending pattern. However, consumption patterns of low-income households are likely to deviate from those of households with a higher income level.

Due to these assumptions the method risks some over overestimation. On the other hand, other firm level development impacts (e.g. from tax contributions, product innovations, foreign exchange savings from exports, knowledge spill overs, imports) are not accounted for, even though they likely create further impacts.

Computable General Equilibrium (CGE) modelling is theoretically more sound than IO modelling as it relies on fewer assumptions allowing it to mitigate some of the drawbacks of IO modelling: it accounts for supply side adjustments and it considers responses in investment, land supply, population and (commodity and factor) prices. This makes CGE models, in principle, capable of capturing both positive gross multiplier and negative displacement effects from external influences. As a result, CGE modelling is theoretically superior to IO modelling.

Nevertheless, there are disadvantages of using this approach. It is comparatively data intensive. To run the model, many price elasticities must be specified, which is challenging in contexts with low data availability. Moreover, CGE modelling requires intensive calibration of the model and its variables, because the number of variables in a CGE model tends to (far) outstrip the number of equations. This makes it a costly and time-consuming approach. Finally, the complexity of the interactions between variables makes interpreting, explaining and/or communicating results difficult.

Given these trade-offs, IO modelling is more appropriate for use in the JIM. CGE modelling could arguably be impracticable for investors backing multiple businesses in multiple (developing) countries. However, CGE models are available or under development in a range of developing countries, such as South Africa and India. We will explore the feasibility of implementing (elements of) CGE modelling in the future.

Direct impacts

Preferably, direct impacts are based on observed data only. Investors could use their direct relationship with clients to convince them to track and share these data points. This significantly increases the confidence level of results. Only when necessary, economic modelling (i.e. data filling) of direct impacts will be used. A key limitation of modelling the direct impact of clients is that the model assumes all companies in a certain sector and country have the same production structure. In reality, each business has a unique way of producing its goods and services, and businesses backed by DFIs are likely unrepresentative of their sectors (they may be more capital intensive, for example). It is recommended that investors increase the observed datapoints over time.

Finance enabling impacts

The limitations of I-O modelling also apply to the finance enabling impacts. The FI enabling approach however uses additional assumptions, which further reduces the confidence level of results. Instead of using observed company data as input (which is the case for the direct, supply chain and induced impacts), the FI enabling impacts are based on modelled company data (using the constant capital-to-output ratio). The current approach – using a constant capital-to-output ratio for all sectors and countries to calculate changes in firm output in response to an increase in capital – was used to align assumptions with the PCAF Global Standard.

Power enabling impacts

There are several significant assumptions built into the power enabling impact calculations in the JIM, which reduces the confidence level of results. Instead of using observed company data as input (which is the case for the direct, supply chain and induced impacts), the power enabling impacts are based on modelled company data (using the constant power-to-output translation factor). The current approach – using a constant power-to-output translation factor for all sectors and countries to calculate changes in firm output in response to an increase in power – was based on a straight average of four detailed case studies, following discussions on alignment of assumptions with IFC and others.

Attribution

Unlike the methodological aspects of the model - which are the same for all users of the model - institutions can opt whether or not to apply **attribution**.

Many impact investors recognise relatively straightforward rules of attribution. However, the simplicity of the rule is also a weakness as it omits several relevant factors, such as the catalysing role of investors, the financial instrument, and other value adding services. Impact investors point out that attributing at best paints a simplified picture of their role, while most note that attributing alone does not adequately reflect the benefits of their intervention.

One would ideally compare the situation with an intervention to what would have happened in the absence of the intervention (the counterfactual). However, such a comparison of the situation with and without the intervention is challenging because it is not possible to observe the counterfactual situation. It needs to be constructed by the researcher, which can be a complicated and costly exercise. An example of such studies are randomised control trials (RCTs). Although these can provide detailed insights into attribution factors for a particular intervention, it is simply not feasible to conduct RCTs for a full portfolio of investments. IFIs are working on simplified approaches to counterfactuals.

Despite its limitations, attributing seems to be a useful approach to take a share impact from an intervention. In the JIM it is included as an option that can be switched on and off, depending on user preferences. In the future, we will explore further refinements of the attribution approach.

Historically FMO has championed the importance of attribution and we continue to take our “fair share” of impact by multiplying the jobs and emissions with our investments share in the company. We are still able to compare with other institutions internally and in other reports, but we believe that standing firm on attribution would help to steer the industry towards that direction. At the same, we also acknowledge that there is still a debate in the industry regarding attribution and how to implement this. For example, it is unclear how to accommodate for the impact of off-balance sheet activities (e.g. guarantees).

2.2.1 Assumptions and limitations of Data Sources

Over and above the assumptions and limitations of the model, the results of any model also depend on the **macro-economic statistics** that are used by the model. The JIM combines national statistics and client financials to derive results.

National statistics are derived from internationally recognised sources to ensure the reproducibility of results. However, statistics can still be poor in the sense that they are incomplete or lacking validity and reliability. This is a well-known problem, especially in Africa. Although the JIM uses best-available statistics, there is no guarantee that statistics are of sufficient quality. Users should be aware of these limitations and only use the JIM when no observable data is available.

GTAP

The Global Trade Analysis Project (GTAP) is a global database of bilateral trade patterns, production, consumption and intermediate use of commodities and services. The database uses input from a global network of institutes, researchers and policy makers conducting quantitative analysis of international policy issues. It is coordinated by the Center for Global Trade Analysis in Purdue University's Department of Agricultural Economics. Underlying the database there are several data sources that are heterogeneous in sources, methodology, base years and sectoral detail. GTAP has made major efforts since the mid-1980s to make the disparate sources comparable and present users with a consistent set of economic facts.

GTAP releases an updated dataset every 2-4 years. Once updated data is available, this will be included in the JIM. The JIM version 2.0 uses the GTAP 10a database.

On the one hand, the significant geographical and sectoral scope of the GTAP database and harmonisation efforts of GTAP make the database well-suited for economic simulation models like the JIM. Compared to other databases for IO tables such as WIOD and EORA, GTAP has the best coverage of geographies and sectors. On the other hand, GTAP also has a few disadvantages:

- Outdated data: the reference year of GTAP is a few years off, and the original datasets in GTAP are often even further behind.

- Limited scope of environmental data: GTAP does not have datasets on water and land use for example.
- Missing individual country tables: some countries are part of a GTAP 'rest' table, which limits the reliability of results for these countries.

We keep on exploring other datasets to complement and/or replace GTAP data if they have better data available.

For more information, please check page 40 of the JIM methodology written by SRQ.

ILOSTAT

ILOSTAT is the world's leading source on labour statistics. Hosted by the International Labour Organisation's Department of Statistics ILOSTAT database contains national labour force statistics as well as modelled estimates of labour market indicators worldwide. The latter are produced for countries and years for which country-reported data are unavailable using econometric models. This has resulted in a balanced panel dataset of aggregates for every year, with consistent country coverage. The JIM uses these ILO's modelled estimates.

The JIM will update the employment reference year annually.

On the one hand, the efforts of the ILO to produce harmonised indicators from country-reported microdata has greatly increased the comparability of the data, which makes the dataset well-suited for the JIM. On the other hand, the modelling reduced the reliability of the data. The quality of data may be improved by accessing microdata directly. We will further explore this (together with ILO) in the future.

For more information, please check page 41 of the JIM Methodology.

World Bank Development Indicators Databank

The WBDI databank is the primary World Bank collection of development indicators. They are compiled from officially recognised international sources. The data are the most current and accurate global development data available, and include national, regional and global estimates. The JIM will update the reference year of WBDI data annually. The wide coverage of the database in terms of indicators, geographies and years, makes WBDI a useful data source to complement the other JIM data sources.

For more information, please check page 42 of the JIM Methodology.

International Energy Agency

The IEA is an autonomous inter-governmental organisation within the OECD that provides data and analyses on energy related issues surrounding economics and international policy. It has an Energy Data Centre which provides an authoritative and comprehensive source of global energy data. The IEA collects, assesses, and disseminates energy statistics on supply and demand, compiled into energy balances. The JIM will update the reference year of IEA data annually. Whenever IEA data is unavailable, we use Energy Information Administration (EIA).

For more information, please check page 43 of the JIM Methodology.

Academic papers, reports, and other data

In the JIM model a few assumptions are added based on academic research, and some other miscellaneous sources.

In the Annex of this document, we have furthermore provided a list of generic **sensitivities** related to the model and how FMO accepts or mitigates these.

3. How we report

3.1 Annual Report 2022

As described in the first chapter, the JIM is used by FMO for reporting purposes at portfolio level and estimates the effects of our investments on **jobs** supported and **financed absolute GHG emissions**. Below we explain how these indicators are presented in the FMO Annual Report 2022.

On-Balance Sheet - The indicators are reported for FMO's outstanding loan and equity portfolio, all type of clients (projects, companies and financial intermediaries) and regions, excluding clients that are exempted from Impact Cards. It does not include off-balance sheet exposures, such as guarantees. The JIM indicators are presented separately for FMO-A outstanding loan and equity portfolio and the public funds.

Portfolio level - An important additional capability of this model is its ability to run at **portfolio level** instead of only at commitment, which has been the scope of the former impact model. After careful consideration and discussion with the members of the JIM initiative, it is recommended that the best application of the model is to do portfolio analysis looking backwards (ex-post). In other words, the use of the JIM provides the opportunity for FMO to no longer estimate the expected effects in the future, instead our focus is on what is in our current portfolio. For example, no results are reported for indirect impacts for power plants built in the future, or the future expected impact of an investment in a fund. Instead, we focus on what has already been built, and the underlying investee companies of the funds we invest in.

Split per department - In line with the other indicators in our Annual Report, we split the results for our portfolio between our (Agribusiness, Food and Water, Energy, Financial Institutions, Private Equity and Other). Others include our indirect effects for Treasury and Partnership for Impact (P4i). If two or more departments invest in the same clients, we apply the impact figures proportional to the amount invested from each department.

Split per category - It is recommended by the members of the JIM that the jobs outputs of the model be split by the following categories: Finance Enabling, Power Enabling, Temporary, Supply chain, Induced jobs, and Direct. This is due to the different assumptions that are used in calculating each category, therefore each category should be treated separately. Following the GHG protocol we have split scopes 1, 2, and 3 for emissions, and distinguished two main Scope 3 categories 'Purchased goods and services' and 'Investments'.

Application per category - For the advanced users of the JIM, we wanted to share our application per category in more detail here. For Employment we apply the following: (1) In our results we only consider the total figures, currently we do not disaggregate per female or youth employment. (2) Our **direct** employment only concerns corporates, operational projects, construction workers, banks or investees through funds. It does not include third party hires, people working directly at a fund, or direct employment from companies financed by banks. (3) Our **induced** employment only concerns re-spending of wages from corporates, operational projects, banks, construction projects or investees through funds. It does not include funds themselves. (4) Our **supply chain** employment only concerns spending of procurement into local economy from corporates, operational projects, banks, construction projects or investees through funds. It does not include funds themselves. (5) Our **temporary** employment only concerns spending of construction projects into local economy. (6) Our **finance enabling** employment effects (direct, induced and supply chain) come from companies financed by banks. (7) Our **power enabling** employment effects only concern operational power projects.

Financed absolute GHG emissions - For GHG absolute emissions we apply the same rule for splitting per department as described above. The scope definitions are in line with the GHG Protocol. We have applied the following rules: (1) for all results we merge CO_2 and Non-CO_2. (2) For **Scope 1 & 2** we include emissions from corporates, operational phase projects, scope 1 and 2 of investees through funds. We exclude Finance Enabling, Induced, Power Enabling, emissions at the fund itself. (3) For **Scope 3** we include all Finance Enabling emissions and all Supply Chain emissions, as well as all emissions for construction projects and imported emissions. We exclude Power Enabling and Induced Emissions.

Attribution - FMO applies **attribution** to the indicators that follow from the JIM. The number of supported jobs, Financed absolute GHG emissions and the amount of avoided GHG emissions are attributed with FMO's

outstanding amount as part of the enterprise value in line with the PCAF Global Standard. We match the latest available data of the client to our current outstanding amount per client.

Further information on the assumptions we have made where our data was insufficient to use all the functionalities of the JIM are described under section 4.3 Rules and exceptions.

3.2 Changes compared to Annual Report 2021

There have been no changes compared to the Annual Report of 2021. To estimate the impacts of our investments on **jobs** supported and **financed absolute GHG emissions** for the Annual Report 2022 FMO is using the same version of the JIM model (2.01) as was used for the Annual Report 2021.

4. About our inputs

4.1 Impact Cards

An important input into the JIM is the data that is being collected via **Sustainability Information System (SIS)** which contains Impact Cards for each client. Within FMO, Impact Cards is the data collection of impact-related indicators for an investment and a client. Our Deal Teams fill-in the Impact Cards after contracting and update them annually at review according to the credit client review (CCR) calendar. The IMIR (Impact Measurement and Integrated Reporting) team reviews and approves all submitted Impact Card. There are several types of Impact Cards, including common indicators but also a specific set of indicators depending on the sector's, the investment type (corporate finance, project finance, PE Fund, FI), and government funds requirements. Generally, the values in the Impact Cards should be based on reliable source documents, for example audited annual reports. In addition, FMO requests its clients to populate dedicated impact templates.

FMO does not establish Impact Cards for all its clients. Here we describe the main **exemptions** that FMO applies. In case FMO is not the **lead arranger** of a transaction an Impact Card is not mandatory. **Convertible grants** are typically used in the exploration phase of a project. In this phase, there is no reliable information about impact. Therefore, no Impact Card is required. Investments for clients that are **exempted from reviews** according to the credit client review calendar, are also exempted from the submission of an impact card at review. An exception of the above mentioned exemptions are the investments for government funds, such as MASSIF, BP, AEF in which case the Impact Card still needs to be populated. Impact Cards for clients at which FMO has a total committed amount **lower than 500** thousand Euro's are exempted from making an Impact Card (both contracting and review).

Together with other data sources, the data that is available in Impact Cards is then used for running the JIM. As for the other impact indicators that we report in our Annual Report, we hereby use the following rules:

Mapping to year – Impact data are recorded per year i.e. if the reporting date of the client is March 31,2022, the data is reported for the year 2022, alike clients for which the reporting data is 31 December 2022.

Most recent data available – Impact indicators are reported for the entire portfolio based on the actual results of the investments using the most recent data available. For the Annual Report 2022, this means that numbers reflect annual results of investments for 2022 to the extent that information is available, and otherwise 2021 (or 2020) numbers. When investments are no longer in the portfolio as of December 31, 2022, we no longer include impact results of these clients.

EUR reporting – Many of our financing and investing activities take place in foreign currencies, mostly US dollars. Unless explicitly stated in specific cases, all new commitments, mobilized funds and green investments mentioned throughout the report have been translated into our functional currency, the Euro, based on the foreign exchange rates at the date of reporting of the Impact Card. Figures referring to the year-end committed portfolio have been translated into euros using the year-end foreign exchange rates.

4.2 Data quality controls

The quality of this set of client indicators is important for the data quality of the model's output. Therefore, a robust process with well roles and responsibilities is in place. Every Impact Card is independently verified by the Finance, Impact and Data Department. Over and above this four-eye principle, we perform **portfolio** data quality controls are on the Impact Cards (input-check) and the results of the JIM (output-check). These latter portfolio data quality controls are performed before we publish as part of the Semi- and Annual Report.

4.3 Rules and exceptions

The FMO application of the JIM is the same as the other users of the JIM. However, rules and exceptions take place in the gathering of the input data as not all information is (yet) readily available in our data and information systems. These are summarized below:

Project Finance:

Third party contractors - This data point is currently not in use, as it is currently removed from direct jobs in the JIM output. We find that these are mostly compensated in the supply chain numbers. In the future we hope to adjust the JIM so these are taken into account in the supply chain.

Project Finance - Impacts for projects in construction were calculated based on the total project size assuming an average construction phase of three years.

Financial Institutions:

Net interest Income - We are currently not collecting net interest income of financial institutions, therefore in these cases we are estimating the revenues using a asset to turn over ratio from developing countries in GTAP for Financial institutions.

Estimate direct impacts - for FI clients, we estimated the revenues using total assets and an asset turnover ratio specific for the financial service sector.

Private Equity Funds:

Results at investee level - We are collecting impact data at investee level as we run at portfolio level. We are estimating revenues for equity fund investees based on Cost Price and equity ownership percentage.

Debt Funds – We have manually entered information for debt funds, as the JIM does not easily allow for calculation of these. For debt funds that have greater than 25 investees, the system (SIS) groups these investees into a *total portfolio* line which hinders the calculation of individual investee level impact/attribution. The solution for this was to disregard the total portfolio impact and use portfolio sector breakdowns on a fund level to capture the finance enabling impact.

Use of funds – When FMO provides a to a financial institution that has a use of proceeds (e.g. Green or SME fund clause) the indirect effects are calculated for the entire bank, not solely for the use of proceeds.

5. Open Access

5.1 About the JIM initiative

Since 2015, FMO uses the Impact Model to measure the indirect effects of its investments for indirect jobs. The model was originally developed to quantify FMO's doubling and halving strategy. Over the years other development finance institutions (DFIs) started to use similar methodologies. In January 2019, Proparco, BII (former CDC) and FMO informally agreed with Steward Redqueen to harmonize their methodologies on indirect jobs measurement. Steward Redqueen had assisted these EDFIs to quantify the indirect impact associated with their investments. Although the fundamental methodology used in these impact models was the same for all parties (input-output modelling), decisions on assumptions and the implementation of the model differed significantly, making results incomparable.

The initiative accelerated as part of the EDFI harmonization where a working group was established for indirect jobs. FMO and BII, together with Proparco, BIO, AfDB, and FinDev took the lead to harmonize the methodologies for direct and indirect jobs under the EDFI harmonisation. For indirect jobs, this required the alignment of methodologies used, of underlying macro data used and of client data used for running the model. Almost a year later, the model will soon be made open access, which means that it will be accessible for all development banks and impact investors who wish to use the JIM.

From May of 2022, the JIM Foundation was established and manages the JIM creating credible oversight for its development. The foundation strives for an inclusive, aligned, and actionable financial sector that is geared towards impactful investments in sustainable economic development while decarbonizing portfolios.

The JIM is a response to FMO's endeavours to works towards harmonized models, methodologies and indicators at a global level. Measuring and reporting on impact in a consistent and comparable way is essential to evaluate global development needs and priorities, assess effectiveness of investments, and drive impactful actions. Together with our partners in the JIM, FMO has now established a solid cooperation where we can add future modules like quality of jobs to support impact measurement globally – this infrastructure is much needed if we truly want to become transparent and be able to compare results with others.

5.2 Join the JIM

As per January 2021, the model has become open access to institutions, and it has over 100 institutions with an account and 20 institutions that have reported using the JIM.

If you are also interested in using the model, further information is available on the website.

Annex: List of sensitivities

Below we provide an updated list of the sensitivities that we also included in our former Impact Model description.

Data sensitivity			
Applicability	Issue	Consequences for FMO impact	Mitigation
Revision of GDP	Increase or decrease of total GDP	An upward revision of a country's GDP is an indication of higher productivity. This could mean that by using the 'old' data, FMO's employment impact is overestimated (and vice versa).	Use of most recent GDP data available to calculate labour productivity, base year of latest GDP data is 2018.
	Increase or decrease in GDP/ output ratio	A current underestimation of GDP related to output would mean an overestimation of FMO's employment and GHG impact, and an underestimation of value-added effects (and vice versa).	Update the model once every couple of years when more recent GTAP data is available
Agriculture consumption	Agriculture consumption is minimal	Tracing own consumption of agriculture would mean an overestimation of all FMO's impacts on agriculture and an overestimation of induced effects.	Adapt input-output tables in a way that private consumption of agricultural products and agricultural sourcing from agriculture is zero.
Allocation of countries to regional input-output tables	Country is poorer or richer than average of regional table	As productivity in poorer countries is lower and energy use is less efficient, FMO's employment and GHG impact is underestimated, and value-added impact overestimated (and vice versa).	Careful selection of regions based on country income classification.
	Country's electricity generation is cleaner or dirtier than the average of regional table	This means that FMO's GHG impact is overestimated (and vice versa).	As this applies in two directions, the over and underestimations of impact of investments in various regions levels out.
	Country is allocated to region where capital productivity is higher or lower	This would mean an overestimation of directly related economic output to FMO and thus an overestimation of all impacts related to FMO (and vice versa).	Countries are allocated to regions based on their income classification which is often more or less in line with their capital productivity.
	Country is allocated to region where labour productivity is higher or lower	This would mean an underestimation of FMO's employment impact (and vice versa).	Countries are allocated to regions based on their income classification which is often more or less in line with their labour productivity.
Capital data	Incomplete capital data	Incomplete capital data can implicate an over or underestimation of capital. This would mean an over or underestimation of directly related economic output when output/ capital ratios are used. Hence, impact results would be over or under estimated.	We use the best available data, supplementing GTAP information by private sector gross fixed capital formation of the World Bank Development Indicators.
Revenues	FX-rate on effective date	Used to calculate capital to output ratio (revenues/non-current assets). FX rate should be consistent with (non-current) assets.	We apply consistent FX rates for revenues and assets.
Employment data	Limited availability	Insufficient data could lead to an over or underestimation estimation of FMO's employment impact.	We use the best available national data. We apply the employment intensities of countries of which more detailed data is available to the aggregate regions for which insufficient data is available. Employment proxies have been selected based on data availability and proximity of country GDP per capita to regional GDP per capita.

Data per end-beneficiary type	Limited data available on labour productivity per end-beneficiary	Applying the general employment intensities (average of formal and informal sector) to FMO's end-beneficiaries, could lead to an over or underestimation of FMO's employment effects.	We calculated formal employment intensities and applied these to all FMO's direct end-beneficiaries to avoid an overestimation of FMO's impact. To do this we used best available national data on productivity of the formal sector versus the informal sector from the International Labour Organization (ILO). We assume Small and Medium Enterprises (SMEs) are responsible for about 45% of formal employment, while contributing about 33% to formal GDP[1]. We apply this to all regions and sectors. That means SMEs require 1.36 times (45/33) the people to produce the output, and corporates need 0.82 times (55/67) the people to produce the output.
Sector electricity intensity	Expenses on electricity per sector are used as indicator for the amount of kWhs consumed per sector	Electricity use of sectors that have gained a discount on electricity costs is underestimated. This could change the power enabling impact per sector of FMO.	Accept

Data sensitivity - Converting FMO investments into directly related economic output			
Applicability	Issue	Consequences for FMO impact	Mitigation
Equity/ debt	Investments in equity facilitate attraction of additional capital	Not distinguishing equity and debt might underestimate FMO's impact as impact linked to the attraction of additional capital is not considered.	Accept until better literature is available on the average leverage effect per sector and country.
Capital productivity per end-beneficiary type	No data available on capital productivity per end-beneficiary type	The average asset to turnover ratio (ATR) generated from GTAP data applies across all firm sizes. However, smaller firms (i.e. micro enterprises and SMEs) are expected to be more capital-scarce than bigger firms (i.e. large enterprises). Relieving this capital constraint by providing access to capital is therefore expected to have a bigger effect on smaller firms than on large enterprises.	The JIM adjusts the asset to turn over ratio for firm size, based on ratios from a study from Bas et al (2010)[2] . The numbers show that micro enterprises and SMEs produce 1.2 times more output with one unit of capital than the economy average, and corporates only 0.73

Data sensitivity - Calculating related money flows of directly related economic output			
Applicability	Issue	Consequences for FMO impact	Mitigation
Imports excluded for jobs	-	By not tracing money flows to imports any further, FMO's impact on a global level is underestimated.	The impact related to FMO should be communicated as local impact.

Data sensitivity - Calculating directly enabled economic output by FMO energy investments			
Applicability	Issue	Consequences for FMO impact	Mitigation
Power production related to FMO	Not all power produced might	By tracing all power production related to FMO, FMO's forward linkage impact	Accept

[1] International Finance Corporation. (2010). Scaling-Up SME Access to Financial services in the Developing World. http://documents.worldbank.org/curated/en/669161468140035907/pdf/948300WP0Box385443B00PUBLIC00ScalingUp.pdf

[2] These adjustments are based on leverage estimates that include short- and long-term debt as well as equity share of capital. See Bas, T. Muradoglu, G & Phylaktis, K. (2010). *Determinants of Capital Structure in Developing Countries.* https://www.researchgate.net/publication/228465937_Determinants_of_Capital_Structure_in_Developing_Countries

	be domestically consumed	might be overestimated, as some power might be lost or exported.	
Causality electricity consumption-GDP growth	Limited data availability	The relationship between energy and GDP has been a topic of research, with mixed results: many studies confirm a cointegration of economic growth and energy or electricity consumption, but the direction and causality differ. Despite this, it is generally accepted that adequate supply of reliable energy is essential for economic growth and past values of electricity consumption do have a predictive ability for economic growth. The relation between electricity consumption and GDP growth is crucial for calculations of FMO's power enabling impact related to energy. Over and underestimations are possible.	To account for enabling effects of electricity investments, the JIM combines two main factors to model the effects of power: the share of energy in a country contributed by the generation of the company/project invested in, and a fixed power-to-output translation factor of 0.02 for all countries and sectors. This is a straight average of the sector multipliers of four out of the 11 case studies (i.e. Uganda, Nigeria, Uruguay and Turkey). This selection of four case studies excludes outliers, and countries for which only high-level data was available. The power-to-output translation factor of 0.02 is in line with the ratios used in other models (e.g. IFC). Combining the power-to-output translation factor with the share of power contributed in a country determines the percentage output increase supported. This is combined with SAM output data to estimate the total output enabled. Total output enabled is subsequently used to estimate value added, employment and GHG emissions impacts.

Data sensitivity – Data collection/mapping			
Applicability	Issue	Consequences for FMO impact	Mitigation
Attribution of client data to FMO	Attribution	Attributing all impact related to an FMO client to FMO would mean an overestimation of FMO's impact.	We use a PCAF-aligned attribution
FMO NACE sector allocation	Not specific enough for FMO clients	In case an FMO investment doesn't adequately fit its corresponding NACE sector in the model, this can to incorrect calculations of FMO's impact.	Add granularity where possible for example firm size in the sector allocation, and energy technology type.

Data sensitivity - Calculating employment related to FMO investments			
Applicability	Issue	Consequences for FMO impact	Mitigation
Non-energy project finance	No/ limited data available on causality between non-energy infrastructure and GDP growth	Not taking into account forward linkage impact of non-energy project finance would lead to an underestimation of FMO's impact.	Accept. Work in 2020 on improving infrastructure effects of our investments.