MFR

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Final Report

PAYGo PERFORM, Data Collection Pilot

IFC Lighting Global, GOGLA and CGAP

June 2021

DISCLAIMER

Table of Contents

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1. Introduction

The PAYGo Performance, Reporting, and Measurement (PERFORM) initiative comprises investors (equity and debt investors, local and international banks, development finance institutions, etc.), PAYGo executives, and experts in energy and financial inclusion from around the world. Together, we are working to develop a reporting framework and set of key performance indicators for the PAYGo solar industry.

The PAYGo PERFORM initiative is an open and transparent industry process that seeks the active involvement of all stakeholders. It is led jointly by three institutions: Lighting Global, the World Bank Group's platform to support sustainable off-grid solar markets; GOGLA, the global association for the off-grid solar energy industry; and CGAP, a think tank housed at the World Bank that is working to empower poor people through financial services.

More on PAYGo PERFORM can be found here: https://www.findevgateway.org/organization/paygo-perform.

This report presents the findings of the Data Collection Pilot of the PAYGo PERFORM initiative of IFC Lighting Global, GOGLA, and CGAP, implemented by MFR in 2020.

8 off-grid solar companies with PAYGo models active in Sub Saharan Africa joined the pilot and shared their valuable feedback on the calculation of KPIs, challenges and opportunities, as well as the data needed for the KPI calculations. The data and feedback collected is consolidated in this report by area of analysis, aggregating the results and protecting the confidentiality of individual companies' data (minimum of 3 data points used in averages). The data are aggregated from the level of firms, where 1 firm is defined as the operations of 1 company in 1 country or as the operations of the overall group in multiple countries (depending on the availability of data reported). Data of country firms or of the overall group are not included at the same time in calculations to avoid double counting. Some of the 8 off-grid solar companies participating in the pilot are international groups and others are firms operating in one country only. In total, the pilot includes data of 24 firms operating in 15 countries. Additional data to what are presented in this report are available at https://www.atlasdata.org/paygo-perform.

The Data Collection Pilot was conducted over the course of 9 months from February 2020 to October 2020. The initial phase involved in-person discussions with key representatives of individual companies (some of which were eventually conducted remotely due to health safety concerns following the announcement of the COVID-19 pandemic) and collection of historical data for 2018 and 2019. Subsequent waves of data were collected on a monthly basis for 6 months through August 2020. The level of fulfilment for the data requests allowed calculating the large majority of the higher priority KPIs for a number of firms sufficient to display aggregate results of 3 or more firms. In some cases data were not reported due to firms' limited availability of time or challenges in retrieving specific fields from internal company records. Data quality was evaluated through cross-checks against other company documents (e.g. audited financial statements) and comparison to typical ranges for the specific indicators.

MFR is a global rating agency specialized in inclusive and sustainable finance (for more information: https://www.mf-rating.com)

We would like to acknowledge the invaluable contribution of the following companies who, over the course of the pilot exercise, dedicated their time and resources to providing data and insightful feedback that made all this possible.

The next sections present in-depth reviews of each indicator, including recommendations and aggregate data. The last section on challenges and lessons learned shares general and process elements to consider in conjunction with the KPIs themselves, before concluding with elements that may inform the future implementation of the PAYGo PERFORM KPIs 2.0.

2. Executive Summary

The Data Collection Pilot tested the calculation of the beta version of the PAYGo PERFORM KPIs 2.0, their feasibility, and role in the analysis of firms, in order to recommend the final KPIs 2.0 for general release:

- To be integrated in internal management systems, as deemed useful by firms.
- To facilitate the relationship with investors through a common language and realistic expectations anchored in industry-specific benchmarks.

To do so, MFR collected data and feedback from companies, reviewed available documents, and conducted in-depth workshops to integrate and elaborate on firms' views on the KPIs and the elements needed to provide a complete picture of performance that would satisfy both internal management and external investors' needs.

The data collection process (availability and ease of reporting) and consultation with firms regarding the role of KPIs for internal management purposes and reporting to investors informed the following recommendations:

- **Modifications to the list of KPIs 2.0 (beta)**, including clarifying definitions, modifying calculations, replacing or discontinuing some beta KPIs 2.0, and adding new KPIs.
- Identification of the **need of accounting guidelines** to harmonize practices towards prudential standards and calculate KPIs that are as meaningful and comparable as possible.

Please find below some recurring feedback from the consultations with companies that informed the recommended changes:

- Need to consider a complete set of KPIs, instead of one KPI only, to analyze portfolio quality in an accurate manner given the different portfolio ages and policies of companies (e.g. write-off);
- Value-based KPIs are more suitable to be combined in sets of cumulative KPIs and more comparable across companies selling solar systems of different sizes;
- Inconsistency between Cashflow nature and Profit and Loss nature of KPIs using cashflow as a proxy of revenue, when a variety of revenue recognition practices are currently used by firms;
- Both firm and unit level metrics are important to understand the financial performance of a firm and its products;
- Importance for sets of KPIs comprised of components to sum up to the total (e.g. all cost components) in order to communicate the full picture; and
- Importance of solvency and liquidity, in addition to portfolio quality and financial sustainability.

The KPIs are suggested to be organized in three areas, with varying average reporting frequencies (frequency shall be higher or lower respectively for internal or external reporting purposes):

1. **Portfolio quality**: monthly, with the exception of Write-off Ratio, which can be quarterly, and Contractual and Effective Credit Period, which can be quarterly or less frequent;
2. **Financial performance (Unit and Firm-level Economics)**: monthly for Liquidity / Total Cost, if used; quarterly for headline KPIs (EBT margin (cashflow), Contribution Margin (cashflow)); from quarterly to yearly for the other KPIs including costs breakdowns at firm and unit level, depending on reporting capacity; and
3. **Company Indicators and Operational KPIs**: twice a year or yearly in the absence of major business model and sales strategy changes; more frequently otherwise.

The following tables summarize the recommended changes in KPIs by area of analysis. KPIs are assigned a priority based on their cost-benefit profile, i.e. the level of effort to measure (e.g. financial data generally more time consuming to extract than portfolio quality data) and the marginal value that the KPI adds to the other KPIs in the set (this may vary in company or investor perspectives). While the list of priority 1 KPIs is kept as short as possible (12 KPIs) to keep focus, additional indicators of lower priority are also recommended to be calculated. The dashboards that follow the KPI tables are an example of how KPIs can be combined for analysis. A more detailed review by KPI is provided in the main sections of the report.

1. Portfolio Quality KPIs Summary

KPIs 2.0 (Beta)	Change	Recommended KPI	Priority (1 highest; 4 lowest) and comments	
Outstanding Receivables	Rename	**Outstanding Receivables** Outstanding receivables on the balance sheet, incl. all future scheduled follow on payments	1	Renamed from Receivables Portfolio Size and clarified to include the balance of additional credit made in association with units (if any).
Outstanding Receivables Growth	Rename	**Outstanding Receivables Growth** Outstanding receivables [T]) / (Outstanding receivables [T-1])) -1	1	Renamed from Receivables Portfolio Growth Rate.
Collection Rate	Clarify	**Collection Rate** Clarifications on catch-up/advance payments, active contracts before and during period, etc.	1	For headline Collection Rate, recommend measuring over 1 year: sufficient to give a robust view of current portfolio without being too backward looking and avoiding distortion by seasonality.
Receivables at Risk (Consecutive Days Unpaid) RAR30, RAR90, RAR180 RAR120 RAR365 Receivables at Risk (Collection Rate) RAR Collection Rate < 70% RAR Collection Rate < 50% RAR Collection Rate < 90%, < 80%, < 60%	- - - - - Remove	Receivables at Risk (Consecutive Days Unpaid >X) **RAR30, RAR90, RAR180** **RAR120** **RAR365** Receivables at Risk (Collection Rate < X%) **RAR Collection Rate < 70%** **RAR Collection Rate < 50%**	1 3 2 2 2	Use both consecutive days unpaid (RAR CDU) and collection rate (RAR CR) to identify risky nonpayers and slow payers with primary thresholds of RAR30 and RAR CR < 50% taking care to avoid double-counting. While Collection Rate evaluates payments in a fixed time frame (comparable), RAR(CR) considers the collection rate since the unit acquisition date of all active contracts (more indicative of risk). Both methodologies are effective in identifying risk; if calculating joint distributions using both methodologies is challenging for companies, RAR30 is recommended.
Write-off Ratio	Clarify Add Add	**Write-off Ratio** Actual write-offs as per company policy **Write-off Ratio 180** Actual write-offs + contracts late >180 days **RAR30 + Write-off Ratio*** RAR30 + Write-off Ratio	2 3 4	Due to variations in company policy, a composite risk metric (RAR + Write-off) is recommended for comparison while limiting ad hoc adjustments across indicators. A large difference between Write-off Ratio and Write-off Ratio 180 may indicate the need for further adjustments and analysis.
Repossession Ratio	Rename Add	**Repossession Ratio (Unit)** # units repossessed / # units sold **Repossession Ratio (Value)** Outstanding receivables of units repossessed / Average outstanding receivables	4 3	Value-based proved to be manageable and more comparable than unit-based. Still, some companies may wish to use or provide both, so a unit-based measure could be optional.

* This KPI is notably derived from the combination of two aforementioned headline KPIs

KPIs 2.0 (Beta)	Change	Recommended KPI	Priority (1 highest; 4 lowest) and comments	
-	Add	**Restructured Receivables Ratio** Outstanding receivables of units restructured or with promotion / Outstanding receivables	4	Useful KPI to understand the full portfolio quality picture when restructuring is done. Recommend adding if / when restructuring will become a common practice (currently rare).
Contractual Credit Period	Rename	**Contractual Credit Period** Contractual repayment term / # active units	3	Rename from Average Credit Period. Clarify what is included vs. excluded.
Effective Credit Period	Change calc.	**Effective Credit Period** Effective repayment term / # of repaid units	4	Actual is available for more accuracy. Contractual Credit Period / Collection Rate can serve as a useful complement.

2. Financial Performance KPIs Summary

KPIs 2.0 (Beta)	Change	Recommended KPI	Priority (1 highest; 4 lowest) and comments	
Cashflow from PAYGo Customers	Clarify Add Add	**Cashflow from PAYGo Customers** **Cashflow from Cash Customers** **Cashflow from Customers**	4 4 4	Clarify to segregate cashflow from PAYGo customers Add cashflow from cash customers to calculate the total Cashflow from customers, to use in different KPI calculations (e.g. Collection Rate, Contribution Margin).
EBT margin (cashflow)	Clarify	**EBT Margin (Cashflow)** (Cashflow from customers – Total costs) / Cashflow from customers	1	Rename from Total EBT Margin. Clarified to include Cashflow from customers (PAYGo + cash).†
Contribution Margin (Cashflow)	Clarify	**Contribution Margin (Cashflow)** (Cashflow from customers – Total variable and semi-variable costs) / Cashflow from customers	1	Rename from Total Contribution Margin. Clarified to include variable and semi-variable costs.†
-	Add	**Cost of Goods Sold Ratio (Cashflow)** Cost of goods sold / Cashflow from customers	2	Add to complete the firm level KPIs on variable and semi variable cost components.†
-	Add	**Sales and Maintenance Cost Ratio (Cashflow)** (Sales and distribution cost + Servicing and maintenance cost + Other variable and semi variable costs) / Cashflow from customers	2	Add to complete the firm level KPIs on variable and semi variable cost components.† Sales and distribution cost includes PAYGo platform fees.
-	Add	**Provision Expense Ratio (Cashflow)** Provisioning expenses / Cashflow from customers	2	Add to complete the firm level KPIs on variable and semi variable cost components.†
Fixed Cost Ratio (Cashflow)	Clarify	**Fixed Cost Ratio (Cashflow)** (Financial expense + Other fixed costs) / Cashflow from customers	1	Rename from Total Overhead Cost as % of Total Cashflow from Customers. Clarified to include financial expenses and other fixed costs.†
-	Add	**Financial Expense Ratio (Cashflow)** Financial Expenses / Cashflow from customers	2	Add to identify this important fixed cost component at firm level.†
-	Add	**Fixed Operating Cost Ratio (Cashflow)** Other fixed costs / Cashflow from customers	2	Add to complete the firm level KPIs on fixed cost components.†
-	Add	**Liquidity / Total Costs** Cash and liquid assets convertible to cash in the next 90 days / Total costs over the quarter	4	Liquidity is important to measure in models with intrinsically high liquidity needs, especially in times of fast growth.

† KPIs for which sales revenue may substitute cashflow from customers after harmonization of revenue recognition practices (accounting guidelines work related), to resolve the inconsistency of cashflow versus the accrual nature of components of current cashflow-based KPIs.

KPIs 2.0 (Beta)	Change	Recommended KPI	Priority (1 highest; 4 lowest) and comments	
Unit Contribution Margin	Change calc.	**Unit Contribution Margin** (Unit Customer Deposits + Unit Follow-on Payments) * (Number of Units Sold PAYGo / Total Number of Units Sold) + Unit Cash Sales * (Number of Units Sold Cash / Total Number of Units Sold) – Unit Device Cost – Unit Sales and Distribution Cost – Unit Servicing and Maintenance Cost – Unit Provision Cost	2	Use unit level revenue and cost KPIs for a more precise calculation. Unit revenues from both PAYGo and cash sales (weighted) used to complete the Unit revenue side, mirroring the Unit costs incurred for both PAYGo and cash sales.
-	Add	**Unit Customer Deposit** Cashflow from customer deposits / Number of units sold PAYGo during the period	3	Add to complete the components of cashflow from PAYGo sale model.†
Unit Follow On Payments	Change calc.	**Unit Follow On Payments** Receivables generated during the period / Number of units sold PAYGo during the period	3	Change denominator from to Number of units sold to Number of units sold PAYGo for more accuracy in case of firms with both PAYGo and cash sales model.
-	Add	**Unit Cash Sales** Cashflow from non-PAYGo customers during the period / Number of units sold cash during the period	3	Add to complete the unit level components of revenue for firms with both PAYGo and cash sales model.
Unit Device Cost	-	**Unit Device Cost** Cost of goods sold / Number of units sold during the period	3	
Unit Sales and Distribution Cost	-	**Unit Sales And Distribution Cost** Sales and distribution cost / Number of units sold during the period	3	
Unit Servicing and Maintenance Cost	Change calc.	**Unit Servicing and Maintenance Cost** Servicing and maintenance cost expressed as monthly equivalent * effective credit period expressed in months / average active units	3	Change denominator from Total active units to Average active units to reflect more closely the object of servicing and maintenance over the period.
Unit Provision Cost	Change calc.	**Unit Provision Cost** Provisioning expenses / Average active units	3	Rename from Unit credit cost for alignment with firm level KPI. Provision expenses suggested to replace write-off for results smoothen out over time.

† KPIs for which sales revenue may substitute cashflow from customers after harmonization of revenue recognition practices (accounting guidelines work related), to resolve the inconsistency of cashflow versus the accrual nature of components of current cashflow-based KPIs.
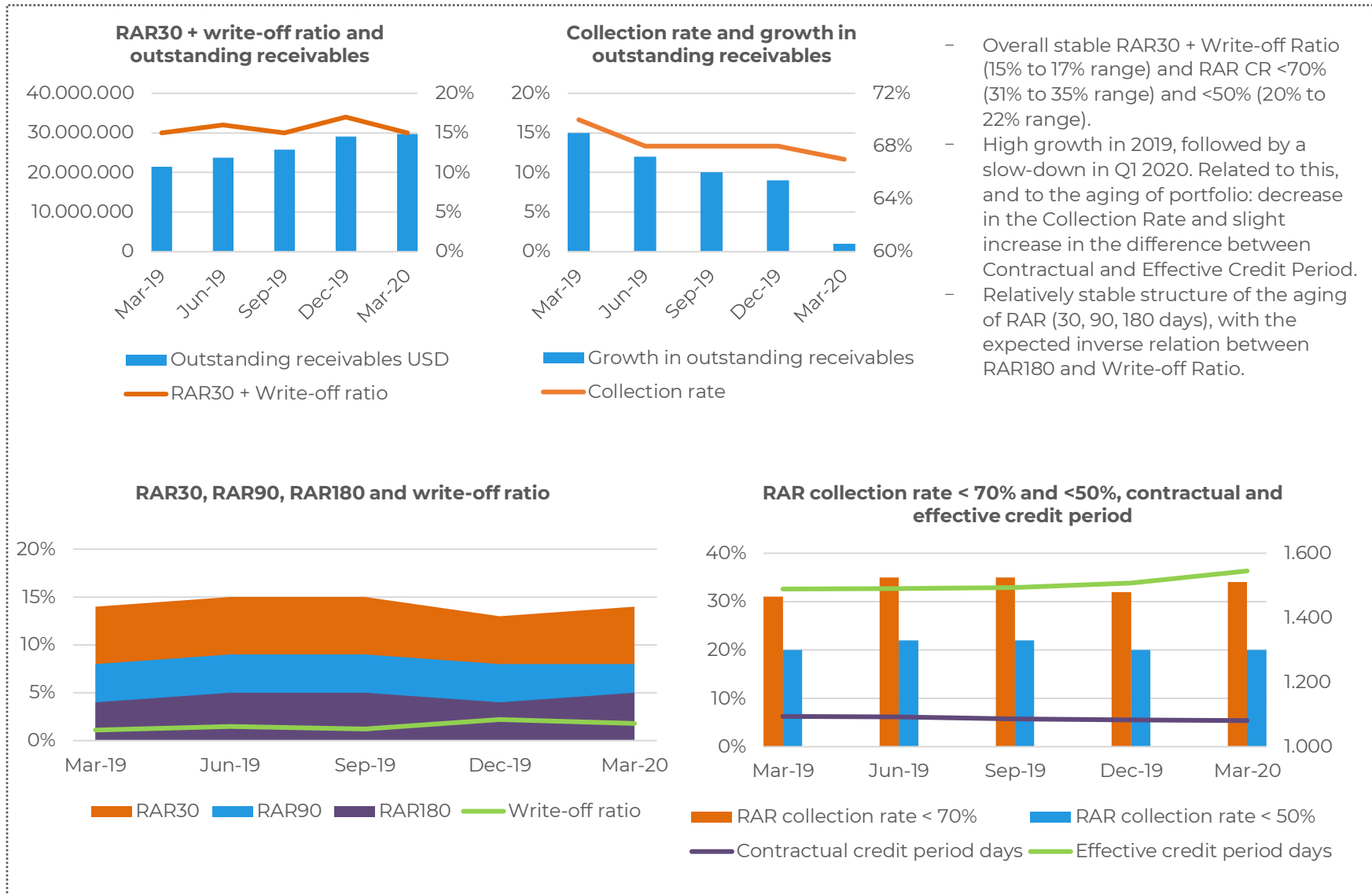
3. Company and Operational KPIs summary

KPIs 2.0 (Beta)	Change	Recommended KPI	Priority (1 highest; 4 lowest) and comments	
Sales Model	Change calc.	**Sales Model** Sales Revenue Generated per Individual Sales Model During the Period / Sales Revenue During the Period	1	Condense initial categories (Rental, Perpetual lease, Lease-to-own, Upfront sales with financing partner, Direct cash sales) into the two most significant families: PAYGo and Cash sales model.
Sales Distribution Model	Change calc.	**Sales Distribution Model** Sales Revenue Generated by Individual Distribution Model During the Period/ Sales Revenue During the Period	1	Add "Other" distribution category to capture B2G, sales to NGO and other sales distribution types.
% Country Sales -	Rename	**% Country Sales** Sales revenue during the period by country / Sales revenue during the period	1	Rename from Geographical Area. KPI applicable in case of international groups with multiple country operations.
Product Sales	-	**Product Sales** Sales revenue during the period by product category / Sales revenue during the period	2	Changing to a panel size-based definition of products may become relevant in the future as companies may diversify towards panels of larger size.
Sales per Distribution Channel	Change calc.	**Sales per Distribution Channel** Sales revenue by distribution channel during the period / Sales revenue during the period	3	Calculate based on sales revenue rather than units sold for alignment with the other operational KPIs.
Repeat Sales	Change calc.	**Repeat Sales** Sales revenue from repeat customers (existing or former) / Sales revenue during the period	3	Calculate based on sales revenue rather than units sold. Including any repeat sale (small or large add-on to current system, new system, spare parts, other) to existing or past customers.
Total Net Sales	-	**Total Net Sales** Number of units sold – Number of units returned and repossessed	4	The alternative Number of units sold * (1- Repossession Ratio) was not preferred by the majority of companies, even if it would remove the need to report Number of units repossessed, if the secondary KPI Repossession Ratio (Unit) is not calculated beside the primary, value-based Repossession Ratio.

KPIs 2.0 (Beta)	Change	Recommended KPI	Priority (1 highest; 4 lowest) and comments	
Average Selling Price	Change calc.	**Average Selling Price** - PAYGo model: (Customer deposits during the period + Receivables generated during the period)/ Number of PAYGo units sold during the period - Cash model: Cash sales revenue during the period / Number of Cash units sold during the period	2	Calculate using numerator and denominator elements specific to each sales model: cash and PAYGo.
Sales Point Rate	-	**Sales Point Rate** Sales Points Inactive Over the Previous 90 Days per Individual Distribution Channel / Total Sales Points	4	Nice to have KPI, generally more meaningful in its definition (90 days) for Agents than for other channels.
Net Promoter Score	Change calc.	**Net Promoter Score** (% of responses which are 9 and 10) - (% of responses which are 0-6 responses).	2	A standardization of the sample size and study design/method would increase the KPI comparability across companies.

4. **Portfolio Quality Dashboard**

Example of KPIs' overview based on the average of 6 firms with data consistently available, not representative of the industry (see more here):

RAR30 + write-off ratio and outstanding receivables

- Outstanding receivables USD
- RAR30 + Write-off ratio

Collection rate and growth in outstanding receivables

- Growth in outstanding receivables
- Collection rate

- Overall stable RAR30 + Write-off Ratio (15% to 17% range) and RAR CR <70% (31% to 35% range) and <50% (20% to 22% range).
- High growth in 2019, followed by a slow-down in Q1 2020. Related to this, and to the aging of portfolio: decrease in the Collection Rate and slight increase in the difference between Contractual and Effective Credit Period.
- Relatively stable structure of the aging of RAR (30, 90, 180 days), with the expected inverse relation between RAR180 and Write-off Ratio.

RAR30, RAR90, RAR180 and write-off ratio

- RAR30
- RAR90
- RAR180
- Write-off ratio

RAR collection rate < 70% and <50%, contractual and effective credit period

- RAR collection rate < 70%
- RAR collection rate < 50%
- Contractual credit period days
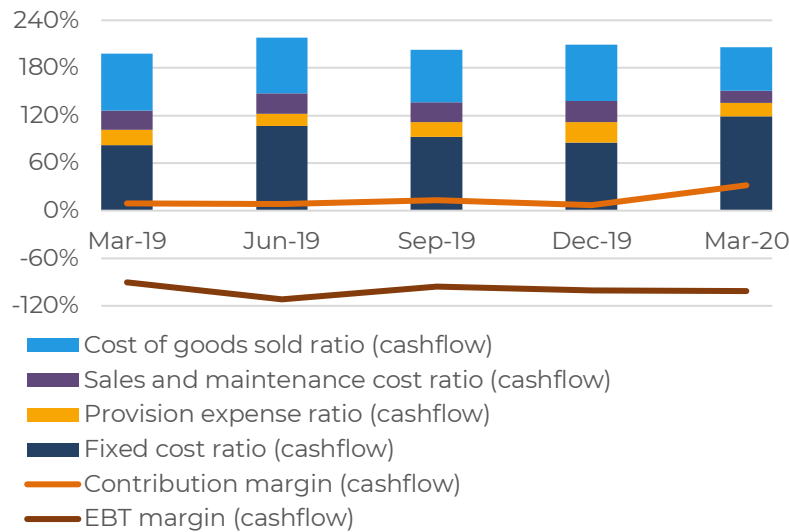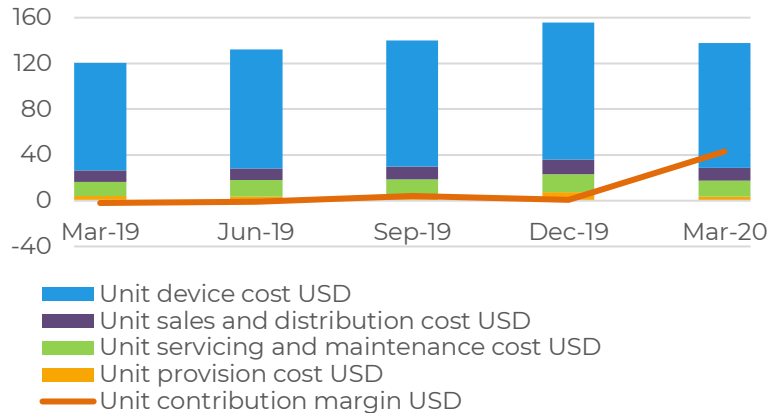- Effective credit period days

13

5. Financial Performance Dashboard

Example of KPIs' overview based on the average of 6 firms with data consistently available, not representative of the industry (see more here):

Contribution, EBT margin and cost breakdown

- Cost of goods sold ratio (cashflow)
- Sales and maintenance cost ratio (cashflow)
- Provision expense ratio (cashflow)
- Fixed cost ratio (cashflow)
- Contribution margin (cashflow)
- EBT margin (cashflow)

- Positive Contribution Margin (cashflow) in the period, with a positive trend in Q1 2020.
- Negative EBT Margin (cashflow), partly due to the high Fixed Cost Ratio (cashflow) in the period (83% to 119% range).
- Fixed Operating Cost Ratio (cashflow) is the largest component (63% to 94% range) of the Fixed Cost Ratio (cashflow), while Financial Expense Ratio (cashflow) ranges from 17% to 31% in the period.
- Within variable costs, Cost of Goods Sold (cashflow) accounts for the largest share (55% to 72% range), followed by Sales and Maintenance Cost Ratio (cashflow) and Provision Expense Ratio (cashflow), similar between them.
- Unit Contribution Margin displays a positive trend in Q1 2020 (from 0 to 43 USD), similar to the firm level ratio Contribution Margin (cashflow), and thanks in part to the decrease in Unit Device Cost, Unit Sales and Distribution Cost, Unit Servicing and Maintenance Cost.

Unit contribution margin and unit cost breakdown

- Unit device cost USD
- Unit sales and distribution cost USD
- Unit servicing and maintenance cost USD
- Unit provision cost USD
- Unit contribution margin USD

Fixed cost ratio and fixed costs breakdown

- Fixed operating cost ratio (cashflow)
- Financial expense ratio (cashflow)
- Fixed cost ratio (cashflow)
- Outstanding receivables USD
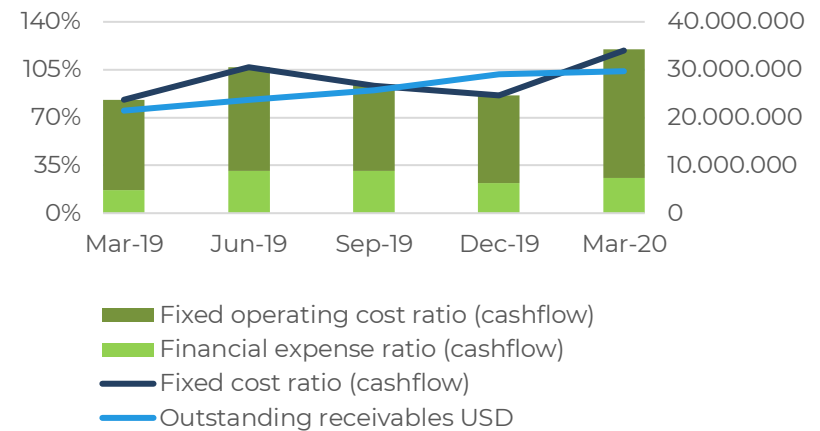
6. Company and Operational Dashboard

Example of KPIs' overview based on the average of 4 firms with data available (2020 annualized), not representative of the industry (more here):

Sales model, 2019

- PAYGo
- Cash sales

Sales distribution model, 2019

- B2C
- B2B
- Other

Product sales, 2019

- Portable lanterns
- Multi-light systems
- Solar home systems
- Off-grid appliances
- Other

– The companies' sales are almost entirely of a PAYGo model, and of Business to Customer (B2C) distribution model.

– Solar home systems and off-grid appliances, followed by Multi-light systems, are the products with the largest share of sales, also due to their higher unitary value.

– Total Net Sales follow a similar trend than Number of units sold, increasing in 2019 and decreasing in 2020 (annualized from period Jan-Aug 2020). The two KPIs display a difference of 8% on average, due to units repossessed.

– The share of Repeat Sales is displaying a positive increase in 2019 and 2020, possibly thanks to longer presence of companies in markets and product upgrades.

Total net sales and Repossession ratio

Legend: Number of units sold · Total net sales · Repossession ratio

Repeat sales

3. Data Guide

This report presents the KPIs calculated based on the data collected during the pilot from **8 off-grid solar PAYGo companies**. The 8 companies include both international groups and national-level companies, accounting in total for **24 country level firms** operating in 15 countries. The companies' cooperation in the effort was high in general; however, not all companies provided data in all periods and for all breakdowns available. As a result, the number of firms for which data are available in each graph varies, as disclosed below in each graph in the **Number of firms**, which include both international groups and country level firm data.[1] This means that the aggregate trends over time of different KPIs are not fully comparable. An example of comparable trends between KPIs is provided in the sample [dashboards](#) of the executive summary, which includes only a sub-set of firms for which data are consistently available in all periods.

The graphs included in this report present the simple, unweighted, median value of indicators (or average, when specified). Provided the minimum 3 data point criterion is respected, data are aggregated in several ways:

- Total, including for breakdowns: median[2] of 2018 (annual), 2019 (annual) and 2020 (Jan-Aug 2020, annualized)
- By period:
    - Yearly (i.e. Jan-Dec 2018, Jan-Dec 2019, Jan-Aug 2020 annualized for flows[3])
    - Quarterly (i.e. 3-month periods with cut-off date March 31st, June 30th, September 30th, December 31st)
    - Monthly (i.e. periods of 1-month duration)
- By sub-region: East Africa and West Africa, as per UN country classification. The sub-region is Not Specified in case of international group level data covering multiple sub-regions.
- By firm size:
    - Small scale: outstanding receivables ≤ 10 M USD
    - Medium scale: outstanding receivables 10-100 M USD
    - Large scale: outstanding receivables > 100 M USD; data not displayed because available for fewer than 3 firms.
- By firm age:
    - Start-up: years in operation <= 2
    - Young: years in operation >2 and <=7
    - Mature: years in operation >7
- By firm outreach:
    - Small outreach: number of active units < 10,000
    - Medium outreach: number of active units 10,000-100,000
    - Large outreach: number of active units > 100,000
- By sales model:
    - 95% sales PAYGo
    - 80%-95% sales PAYGo
    - 60%-80% sales PAYGo; data not displayed because available for fewer than 3 firms.

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[1] Using multiple country level firm data if available, or international group data otherwise, to avoid double counting.

[2] "Total" throughout the report refers to the simple and unweighted median for all companies' data in the period 2019-2020, selecting one datapoint per company, as: the most recent and, for a period of 12 months if available for over-the-period ratios (otherwise 3 months, otherwise 1 month).

[3] Flows are all items that are defined by a beginning of period and an end of period (as opposed to stock items, defined only by end of period), e.g. all items of the Income statements, number of units sold during the period, amount of loans written off, number of units repossessed. Flows are annualized by multiplying the value for the period by 12/8 (8 months being the number of months from January to August).

- By product size:
  - Small size product: average selling price < 300 USD
  - Medium size product: average selling price 300-700 USD
 - Large size product: average selling price > 700 USD

For the breakdowns of sub-region, firm size, firm outreach, % sales model, and product size, the latest data period available is used from each firm to calculate a simple and unweighted median.

Aggregate data are available in this report, accompanied by the narrative description of the pilot exercise, as well as at www.atlas.org/paygo-perform, with benchmarking options available. ATLAS is a data platform on financial inclusion managed by MFR, with a dedicated page for PAYGo PERFORM.

4. Portfolio Quality KPIs

1. Summary of Portfolio Quality KPIs

RAR30, RAR90, RAR180 and write-off ratio

Legend:
- RAR30
- RAR180
- Write-off ratio
- Collection rate
- Growth in outstanding receivables
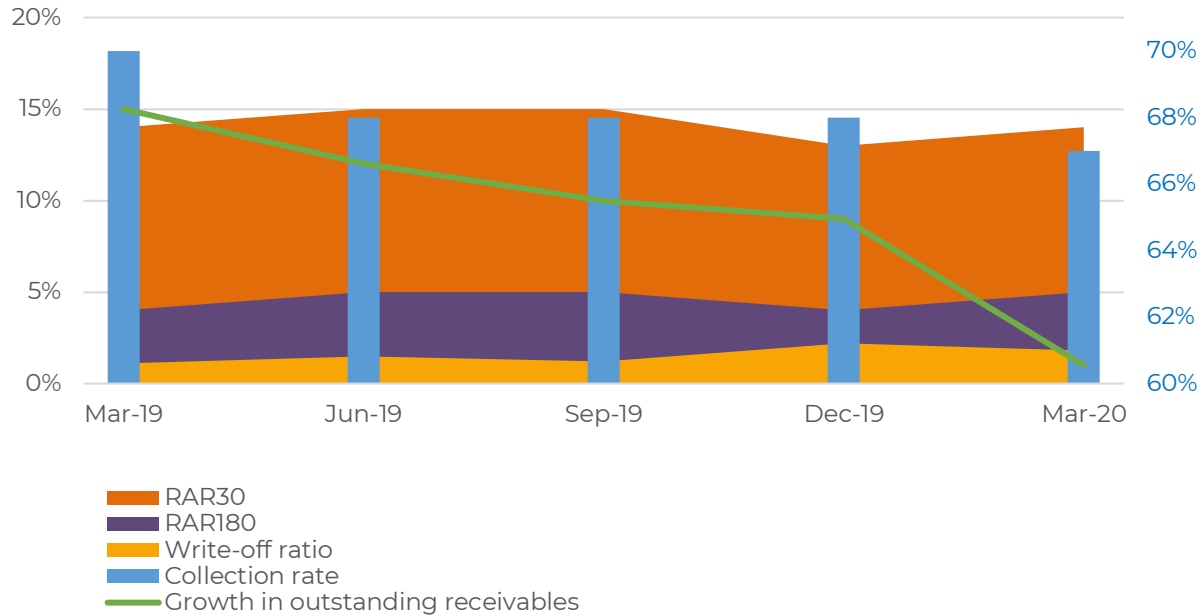
The Portfolio Quality KPIs are designed to measure the credit risk levels at the firm-level. Through the main core sales model of lease-to-own, off-grid solar PAYGo companies are significantly exposed to credit risk from the delayed or non-payment of receivables from customers. The KPI framework for portfolio quality provides a comprehensive picture of credit risk levels, including the speed of collections (i.e. Collection Rate), outstanding receivables at risk (i.e. portion of portfolio placed in risky categories using Consecutive Days Unpaid or Collection Rate), and write-offs (i.e. defaulted portfolio written-off). Outstanding Receivables and its growth are also included as a high priority KPIs, considering their importance as contextualizing factors for portfolio quality. Other ancillary KPIs are recommended as supplements: Repossession Ratio, Contractual Credit Period, and Effective Credit Period. Detailed explanations by KPI are available in the following sections of the report.

The chart above shows the consolidated portfolio quality performance of the pilot dataset, based on high priority Portfolio Quality KPIs for 6 firms that were able to provide data consistently over the period measured (not necessarily representative of the overall industry). RAR30 stayed mostly stable over the analysis period, while RAR180 and Write-off Ratio increased and the Collection Rate decreased. This reflects an overall slightly reduced portfolio quality, part of which is likely due to lower growth in Outstanding Receivables. Please note that the data are presented here as an average from multiple firms to preserve confidentiality, but it is recommended and more informative to conduct the analysis at the level of single firms.

2. Outstanding Receivables

Priority: 1	**Definition**: Value of the company's gross outstanding receivables streams	
Calculation	**Initial**: Receivables portfolio in USD at Time [X]	**Recommended**: Gross outstanding receivables

Statistics
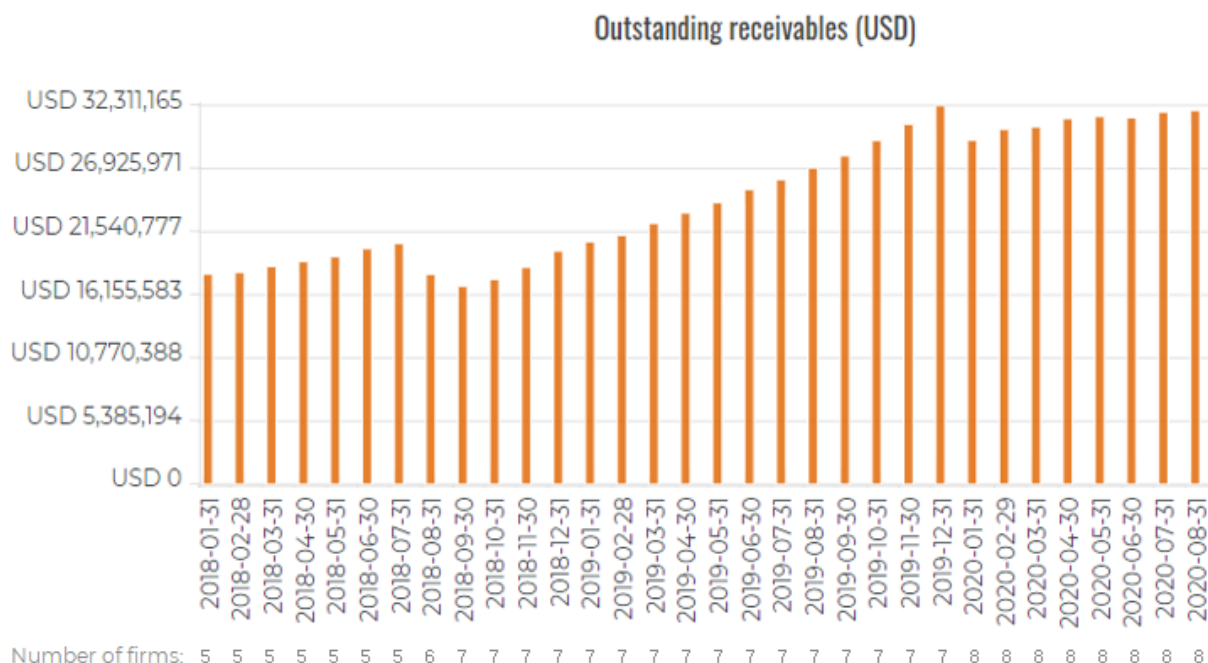
In absolute terms, the Outstanding Receivables are at small to medium levels, reflecting the opportunity of significant room for further growth of balance sheets, with the PAYGo sector being a developing subset of the off-grid solar industry.

Recommendations

Outstanding Receivables sizes the most central asset for PAYGo solar companies, being a primary indicator of the scale of the PAYGo business model within the company. Outstanding Receivables is a driver of revenue and a key component of the Portfolio Quality KPIs.

The suggested accompanying guidance note for Outstanding Receivables is that it should include all future scheduled follow-on payments and the balance of additional credit made in association with units (e.g. school loans made to customers that already have a unit), if any. Outstanding Receivables should match the total outstanding receivables as they appear on the balance sheet (sometimes referred to as trade receivables in financial statements).

A minority of companies participating in the pilot split Outstanding Receivables into principal and interest/finance margin, while for most companies, principal and interest are bundled together into the reported Outstanding Receivables. An important aspect to be further explored in the medium-term is to what extent Outstanding Receivables should include only principal (as is best practice in the microfinance industry) with the interest/finance margin categorized separately. This would involve defining the principal, which would most likely be best captured by the cash sale price (including COGS

+ sales margin mark-up but excluding interest/finance margin). The level-of-effort from companies (majority of which do not separate) may not justify the need for this separation, also given it does not have a notable impact on KPI calculation (e.g. RAR30 including all receivables in both the numerator and denominator Outstanding Receivables).

An emerging but still limited practice of some PAYGo companies is to provide additional credit as a top-up to existing customers with an active unit, for example, top-up loans for school fees or emergencies. It is suggested that these non-PAYGo receivables be included in the Outstanding Receivable calculation. If this becomes a more common and significant business model of the industry, it may be prudent to split these out, however given the limited activity (very small portion of outstanding receivables) it is better to simplify the approach for now, also considering these receivables tend to be contained in the balance sheet lumped together with PAYGo receivables, and are only provided to existing customers with an active unit.

Back to portfolio quality KPIs summary

3. Outstanding Receivables Growth

Priority: 1	**Definition**: Growth in value of the company's gross outstanding receivables streams	
Calculation	**Initial**: ((Receivables Portfolio Size [T]) / (Receivables Portfolio Size [T-1])) -1	**Recommended**: ((Gross outstanding receivables [T]) / (Gross outstanding receivables [T-1])) -1

<u>Statistics</u>

Growth in oustanding receivables (USD)
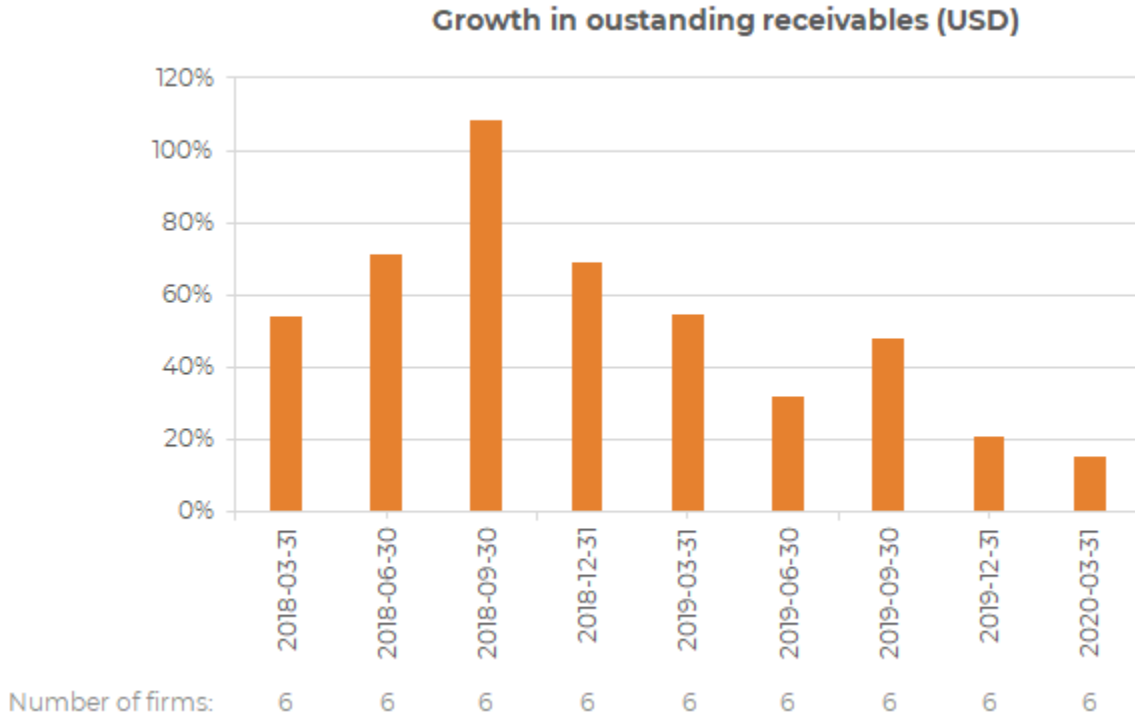
Outstanding Receivables grew rapidly throughout 2018 and 2019 among the pilot participants, an indicator of the overall positive growth trend in the PAYGo sector at large. Even though Outstanding Receivables did grow substantially in 2018 and 2019, the graph (each quarterly growth rate is annualized) above shows that Growth in Outstanding Receivables was lower in 2019 than the previous year, followed by a substantial decrease in the growth rate so far in 2020.

Growth in outstanding receivables
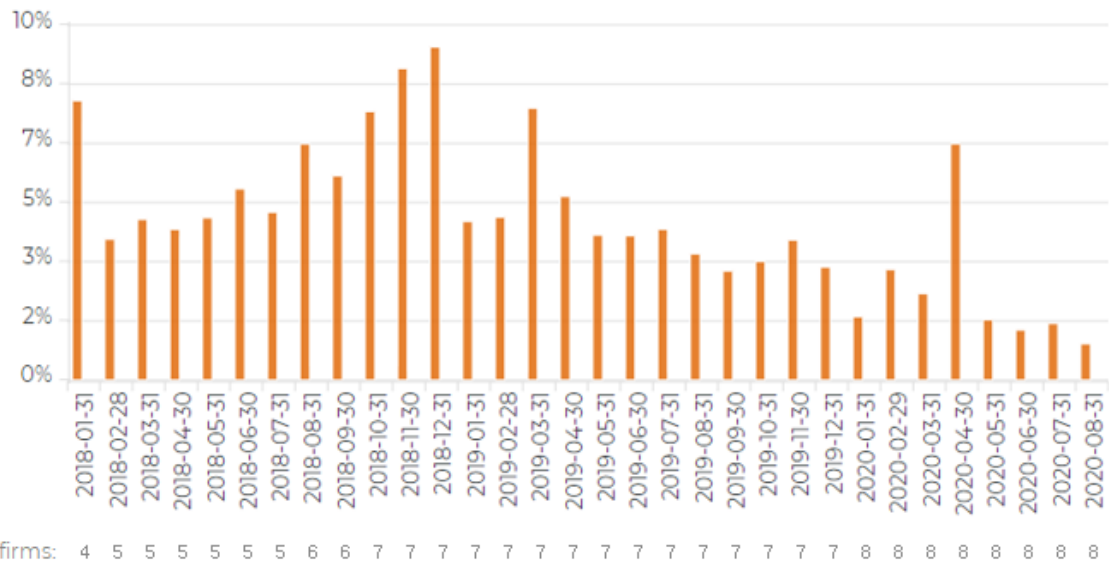
Spilt by firm size, medium-scale firms (Outstanding Receivables 10-100 M USD) experienced higher growth than small-scale firms (Outstanding Receivables ≤ 10 M USD). There were no large-scale firms (defined as Outstanding Receivables >100 M USD) participating in the pilot.

Recommendations

Growth in Outstanding Receivables has been the focus of many PAYGo companies during the past few years, to scale up and reach economies of scale to be able to better absorb fixed costs. This headline indicator is essential to help analyze trends over time that impact the viability of the businesses. Moreover, growth is likely to influence the Portfolio Quality indicators in two ways:

a) high growth may be associated in some cases with lower operational priority dedicated to maintaining and improving credit quality;
b) by increasing the proportion of younger units versus older units and given that the credit risk manifests itself more when the unit is older, growth may have a temporary effect of overestimating portfolio quality. Please see the regression analysis section for more details.

Back to portfolio quality KPIs summary

4. Collection Rate

Priority: 1	**Definition**: Ratio of all collected receivables payments over total receivables payments due for a period (does not include deposits)	
Calculation	**Initial**: Value of Total Receivables Collected Over Period [X]) / Total Customer Payments Due Over Period [X]	**Recommended**: Cashflow from follow-on payments during the period / Scheduled follow-on payments during the period

Statistics

Collection rate
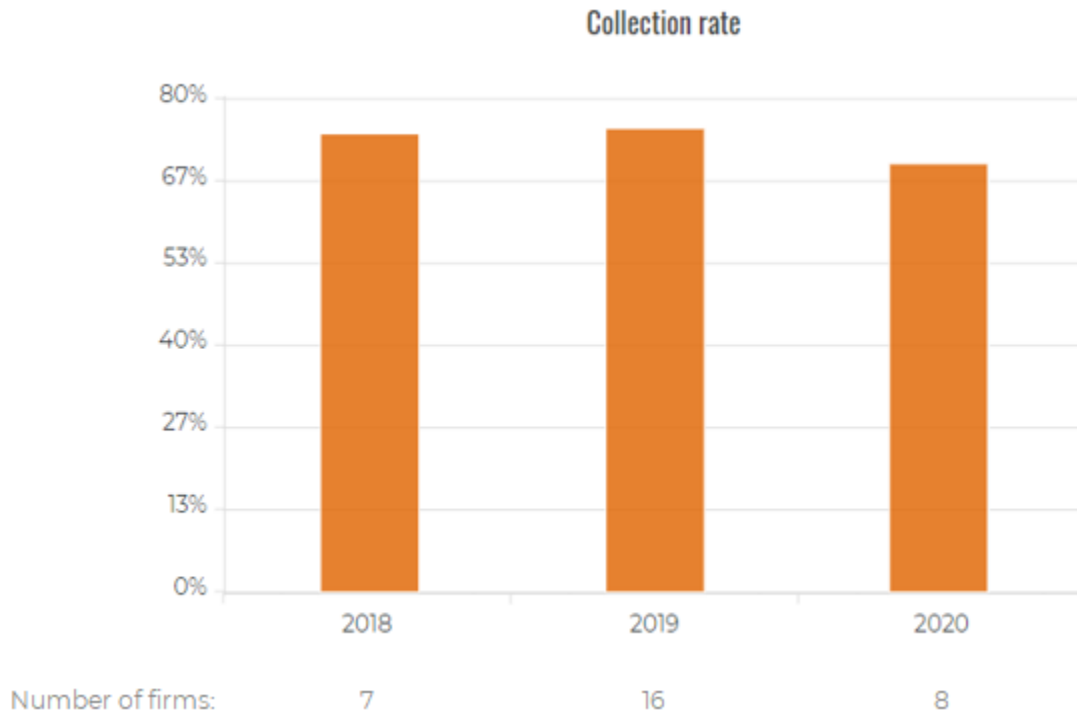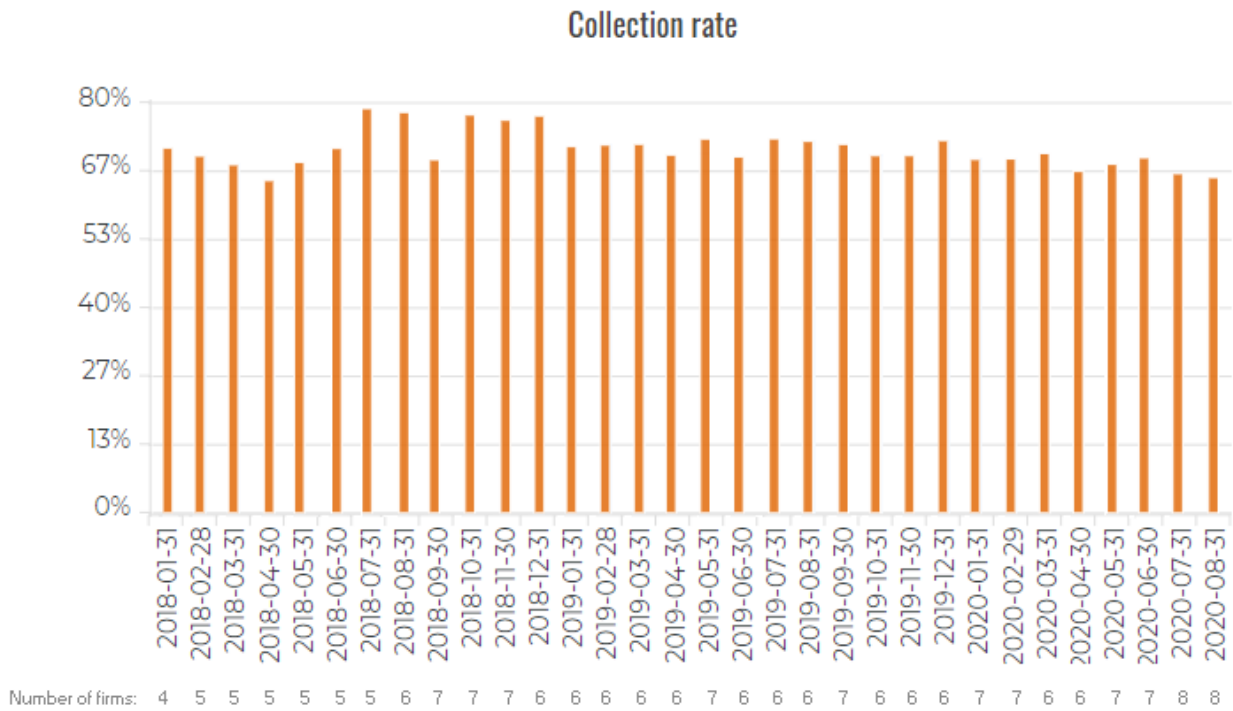
Collection rate

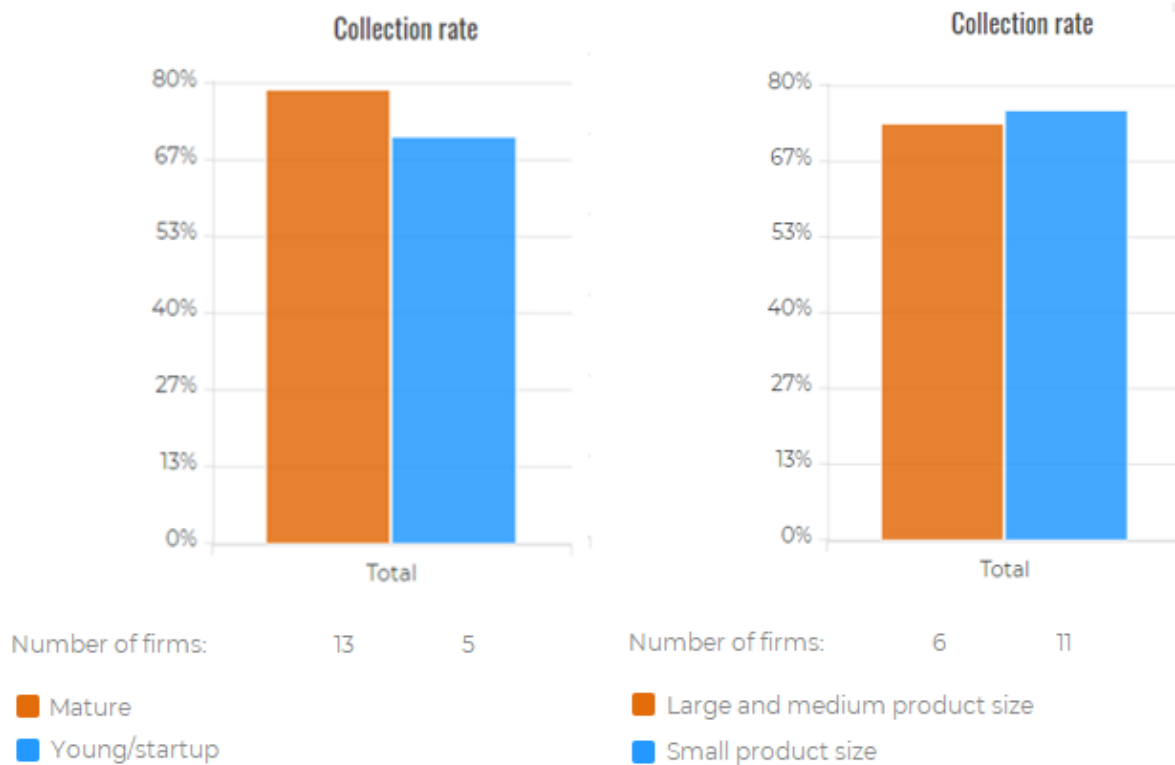Collection Rate averages 74% across the full analysis period. This performance level underscores the flexible and pay-as-you-go model in which collection efficiency is not at high levels. The Collection Rate is mostly stable from 2018-2019, then substantially decreases in Jan-Aug 2020 down to 68%, possibly due to the first impacts of the COVID-19 pandemic.
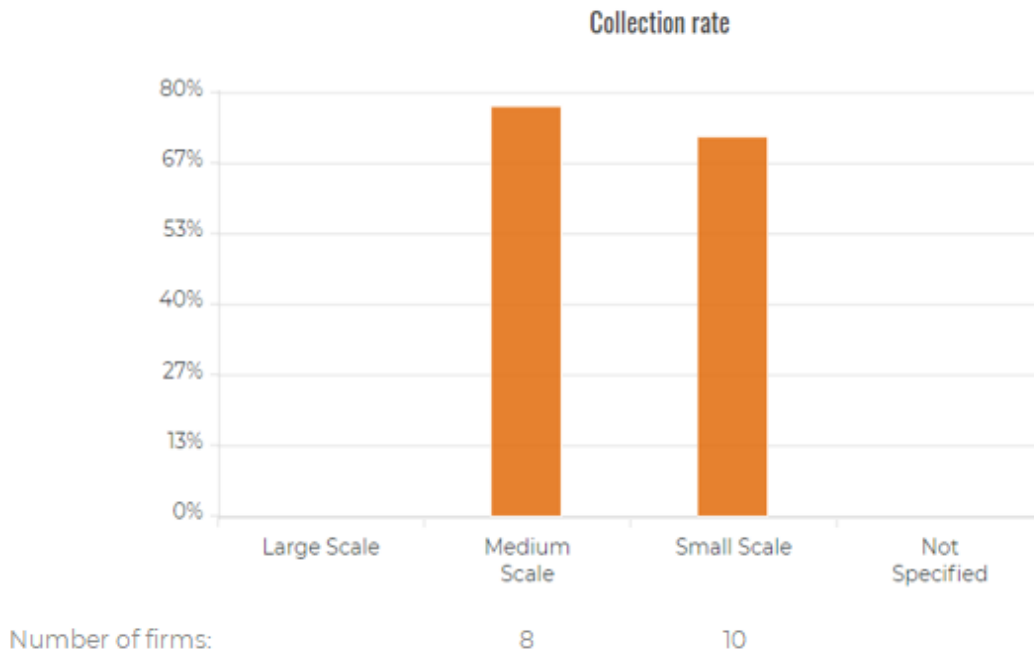
Collection rate

The Collection Rate is marginally higher for medium-scale firms compared to small-scale firms. Breaking down Collection Rate into mature companies versus young/startup companies, the mature companies in the pilot sample posted higher Collection Rates on average. This difference may be due to the smaller sample size for young/startup companies, however it could also be due to mature companies benefiting from their experience to manage credit risk more effectively. Small, large and medium product sizes display similar levels of Collection Rate.

Recommendations

Collection Rate is an effective indicator of portfolio quality, as evidenced by workshops with companies, data analysis, and regression results. Collection Rate is tracked by all companies as a telling measure of the speed of repayments, but with differing internal calculation methods. Nevertheless, the pilot demonstrated that standardization of the KPI is feasible with clear building blocks and guidance notes.

It is suggested to rephrase the denominator from "Total customer payments due over period" to "Scheduled follow-on payments", being the sum of all follow-on payments that fell due within the period.

In order to clear up potential ambiguities or differing interpretations of the building blocks, a comprehensive guidance note is important to include in data requests to companies, to emphasize that the scheduled follow-on payments (i.e., the denominator):

- Include:
    - follow-on payments for all active contracts that fell due within the period (both signed before and during the period);
    - follow-on payments for customers past their initial contractual term;[4]

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[4] For example, a unit with a Contractual Credit Period of 2 years but taking 3 years to receive all payments (3-year Effective Credit Period) should have 3 years of total scheduled follow-on payments in the system over that timeframe.

- o the regular payment scheduled for the period even if a larger prepayment (i.e. advance payment) is made in the period or if a larger prepayment was made in the past, covering future payments (e.g. the scheduled payment should be $10 in September and $10 in October, even if the customer pays $20 in September and $0 in October);
  - o credit risk promotions during the contract, targeted at low repayment customers (e.g. buy one week of light, get one week free; three days of free light to COVID-affected customers): include as scheduled payments the amounts corresponding to the free days of light; and
  - o follow-on payments for formally rescheduled portfolio: ensure to include the correct scheduled payments reflecting the rescheduled terms

- · Do not include:
  - o any scheduled payments in the period covered by the initial deposit given that the customer makes no follow-on payments (no follow-on cashflow received) in that timeframe;
  - o receivables/units that have been written-off (in an accounting sense, meaning that the receivable does not appear as a receivable on the balance sheet anymore. If the customer is late without a formal write-off, even if >180 days late, follow-on payments should still be included); and
  - o non-targeted promotions done for marketing purposes during the contract (e.g. buy 1 week light get 3 days free light): ideally, does not include as scheduled payments the amounts corresponding to the free days of light.

The reason for the note to include customers past their contractual term is that, especially with the most common PAYGo model which frequently continues to collect payments beyond the contractual term (effectively rescheduling), there is a need to include due payments even after the contractual term (in the denominator of the Collection Rate), to avoid overestimation of the Collection Rate since the numerator will include cashflow received from these receivables. For past-due expectations, it is suggested that the scheduled follow-on payment be considered as the usual/standard repayment frequency (e.g. 30 daily payments if daily repayment frequency and looking at Collection Rate for 1 month), rather than the full outstanding amount. The reason for this suggested approach is that including the entire outstanding amount would underestimate the Collection Rate, given that in the most common PAYGo model the customer is not expected to pay the entire unpaid amount immediately after the contractual term passes, but to continue paying according to the usual repayment frequency to access light as needed, until the unit is permanently unlocked.

For the sake of the goals of PAYGo PERFORM, Collection Rate over a longer period of time or since inception is preferable. This is because Collection Rate is a more stable and effective indicator of portfolio quality for a firm when calculated over longer periods (e.g. over past 90 days, 180 days, 360 days, or since inception). 360 days is deemed a good ideal headline period for Collection Rate, as it is long enough to avoid seasonality distortions while not being too backward-looking (like since inception). That said, Collection Rate tends to evolve/change slowly and Collection Rate in shorter periods (e.g. monthly) is more effective as an indicator of trends and concentrations (rather than as an absolute level), to take management actions. For operational management of credit risk to respond quickly to emerging risk, vintage analysis is common (e.g. quality of units sold in March 2019 versus units sold in April 2019) as well as frequent monitoring of various Collection Rate periods especially shorter periods.

Collection Rate helps to identify slow payers (unlike RAR by consecutive days unpaid), who have an impact on the firm's profitability due to the cost of funds. The total amount of the repayment due does not increase if the customer takes more time to pay – this follows the pay as you go model, but there are customers that pay too slowly to be sustainable, which in some companies' view is <70% or <50% Collection Rate. Slow customer payments negatively affect sustainability because of higher cost of funds and management, in addition to the issue of the unit having a higher likelihood of becoming faulty.

Some companies were concerned about the potential loopholes through which Collection Rate could be misrepresented. Although a few additional parameters were suggested (e.g. excluding scheduled follow-on payments for receivables of contracts that were signed within the period, to measure only receivables that are beyond an early stage given that better repayment is typically observed in earlier stages), it is deemed that they would complicate the data extraction process and that the suggested guidance notes would be sufficient to result in a standardized KPI.

Receivable accounts within the collection grace period (days of free light immediately after unit acquisition date, during which the first follow-on installment is not due) are considered to have 100% Collection Rate, so that the aggregation of the outstanding receivables by Collection Rate interval matches Outstanding Receivables, and given that grace period is an element of product design that does not directly elevate credit risk (similar to the down-payment design) even if it can indeed indirectly influence credit risk levels; pilot companies had the view that larger down-payment requirements are associated with better performing receivables (lower credit risk), however this comes at the cost of lower outreach/growth resulting from fewer customers having the means to pay larger down-payments (see KPI: Unit Customer Deposit for more details).

Regression analysis results of portfolio quality KPIs as predictors of eventual default for three PAYGo companies indicate that Collection Rate can be an effective predictor for any customer. "Honeymoon" customers (customers in possession of units for fewer than 75 days) who start showing early signs of missed payments tend to have a higher increase in default likelihood than customers in possession of units for more longer time periods (it is a general pattern that customers repay faster at the beginning of the relationship, when the unit is new, though in some cases companies shared that there is an uptick in repayments towards the very end of the term as the customer gets closer to the point of asset ownership).
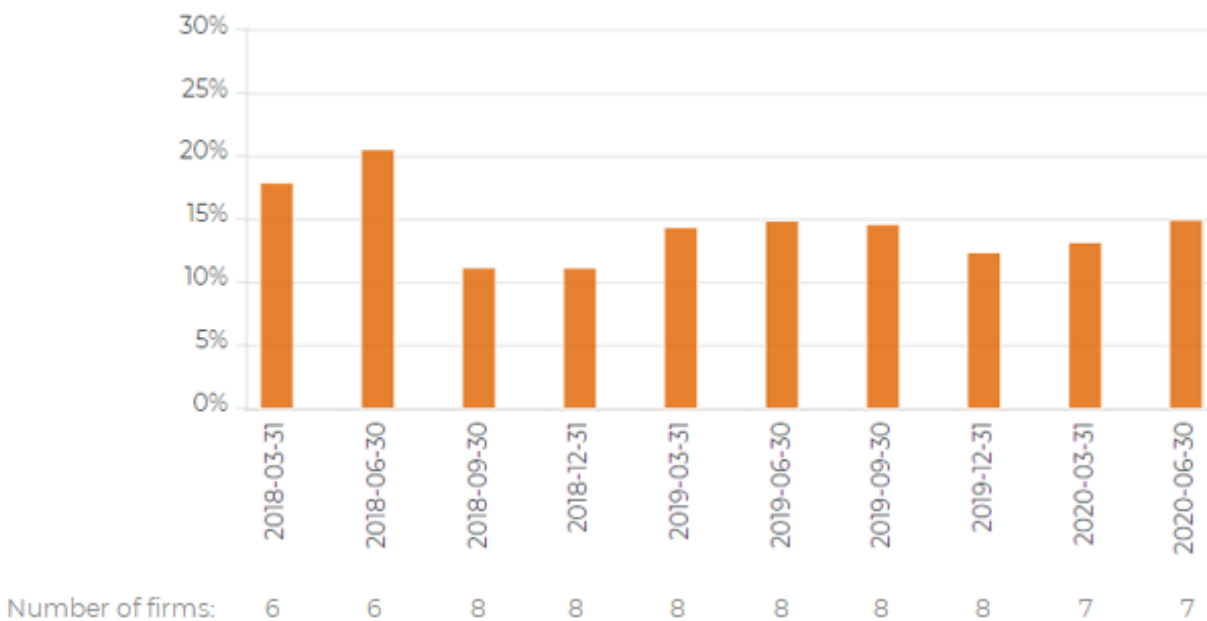
Restructured receivables and promotions during the term (especially those that do not require any payment from the customer) are important to track, being a contributor to credit risk, and should be captured in a separate indicator if their impact is not observed in the Collection Rate (see KPI: Restructured Receivables Ratio for more details), to complement other Portfolio Quality KPIs. In cases of informal restructuring in which the scheduled follow-on payment in the system remains the same as the initial contractual follow-on payments, then the related credit risk is captured in Collection Rate rather than Restructured Receivables Ratio.
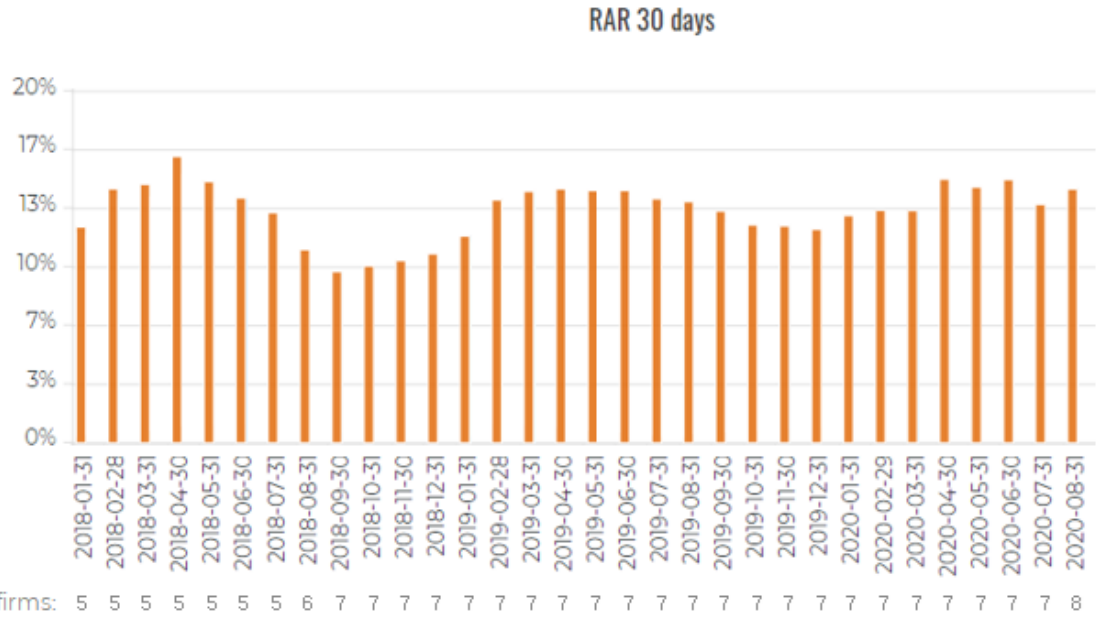
Back to portfolio quality KPIs summary

5. Receivables at Risk (Consecutive Days Unpaid) – RAR(CDU)

Priority 1: RAR30,90,180 2: RAR365 3: RAR120	**Definition**: Identifies risky proportion of receivables portfolio by consecutive days unpaid	
Calculation	**Initial**: Remaining Value of Outstanding Receivables Streams Which Have Not Paid Over Period [X] / Value of Total Future Receivables Due	**Recommended**: Outstanding receivables > [X] Consecutive days unpaid / Outstanding receivables

RAR 30 days

	2018-03-31	2018-06-30	2018-09-30	2018-12-31	2019-03-31	2019-06-30	2019-09-30	2019-12-31	2020-03-31	2020-06-30
Number of firms:	6	6	8	8	8	8	8	8	7	7

RAR 30 days

| Number of firms:	5	5	5	5	5	5	5	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	8

The graphs above show RAR30 averaging 13% across the full analysis period. There is a potential seasonality effect with RAR30 deteriorating to its highest annual level in April in each of the three years observed. RAR30 levels have remained elevated as of August 2020.

RAR 30 days

Number of firms:	14	5	3

RAR 30 days

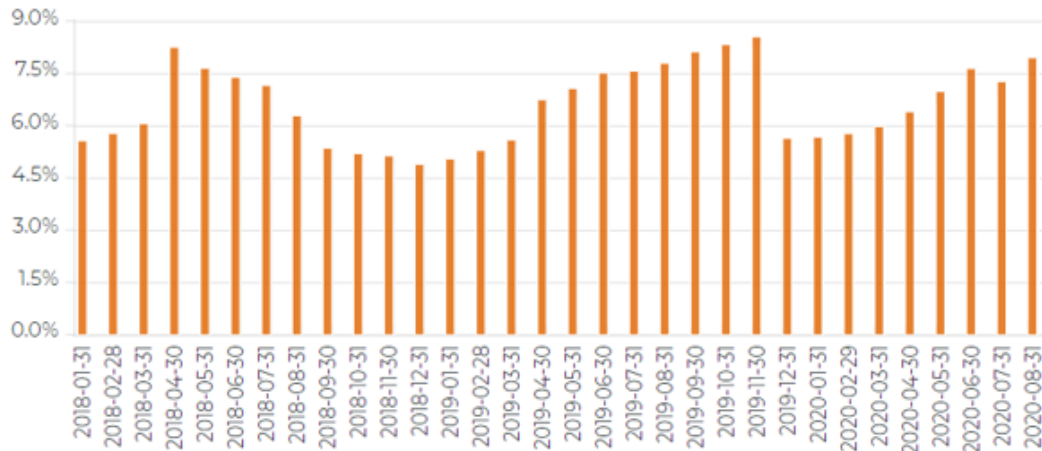| Number of firms:		10	15	
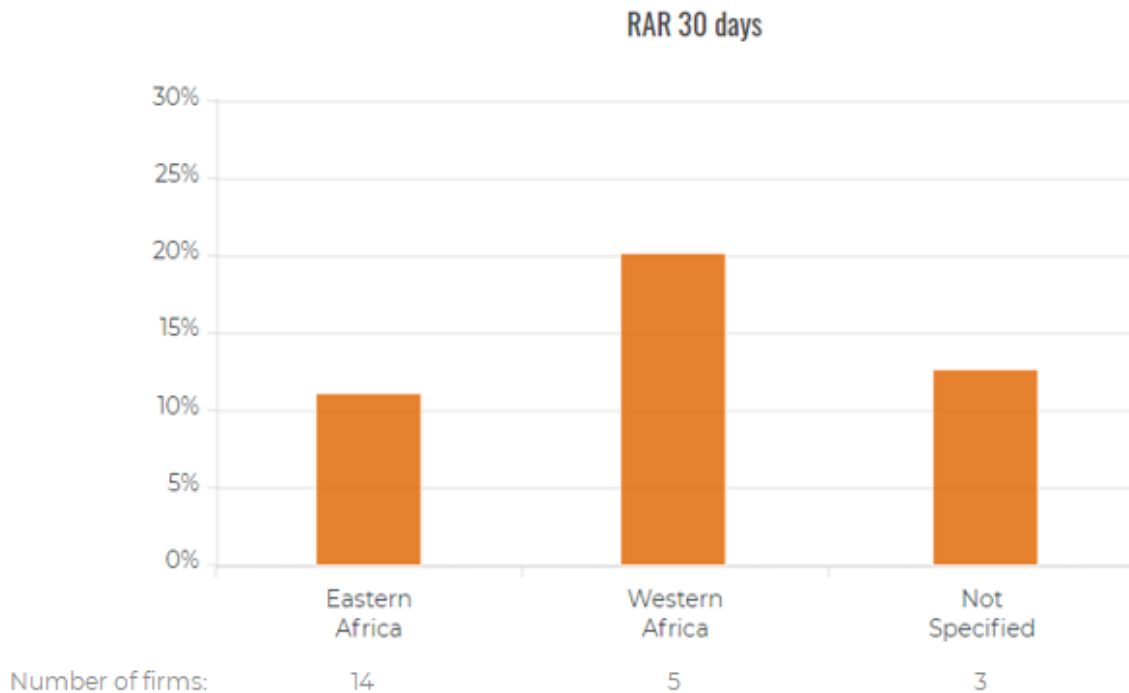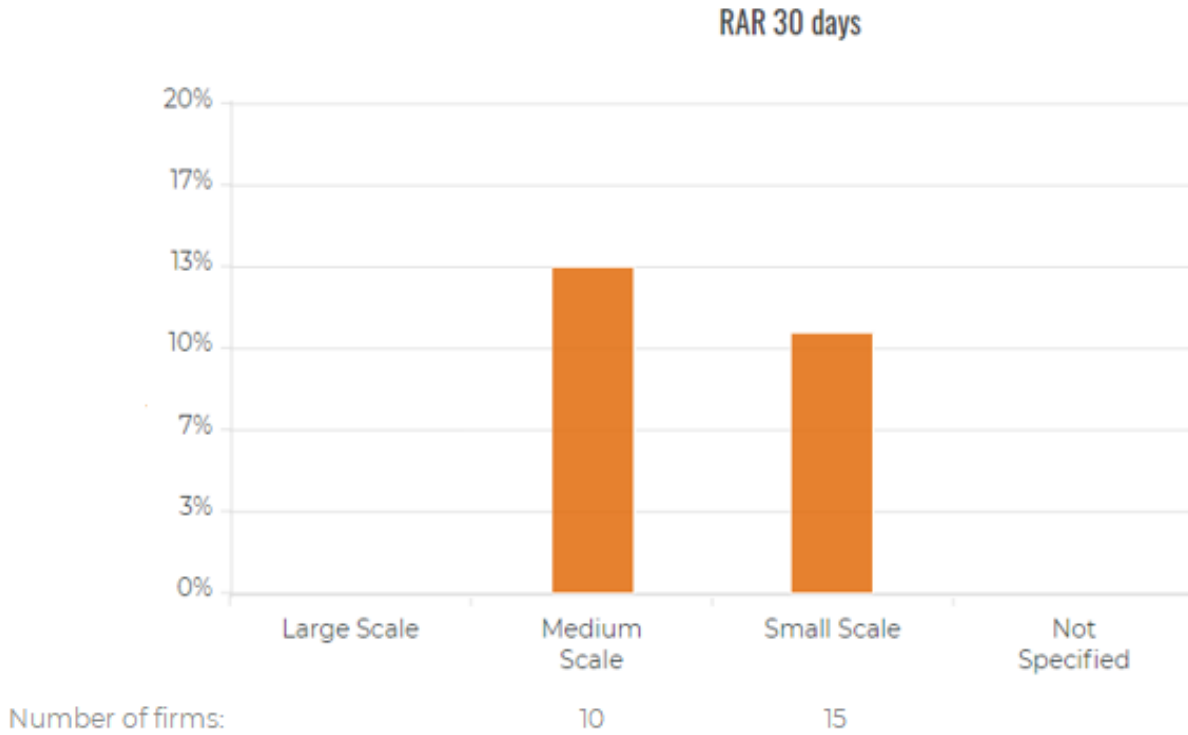
In West Africa, RAR30 averages are nearly double the levels in East Africa. There is no major difference in RAR30 between small scale and medium scale PAYGo companies.

RAR 30 days

Number of firms:	10	13
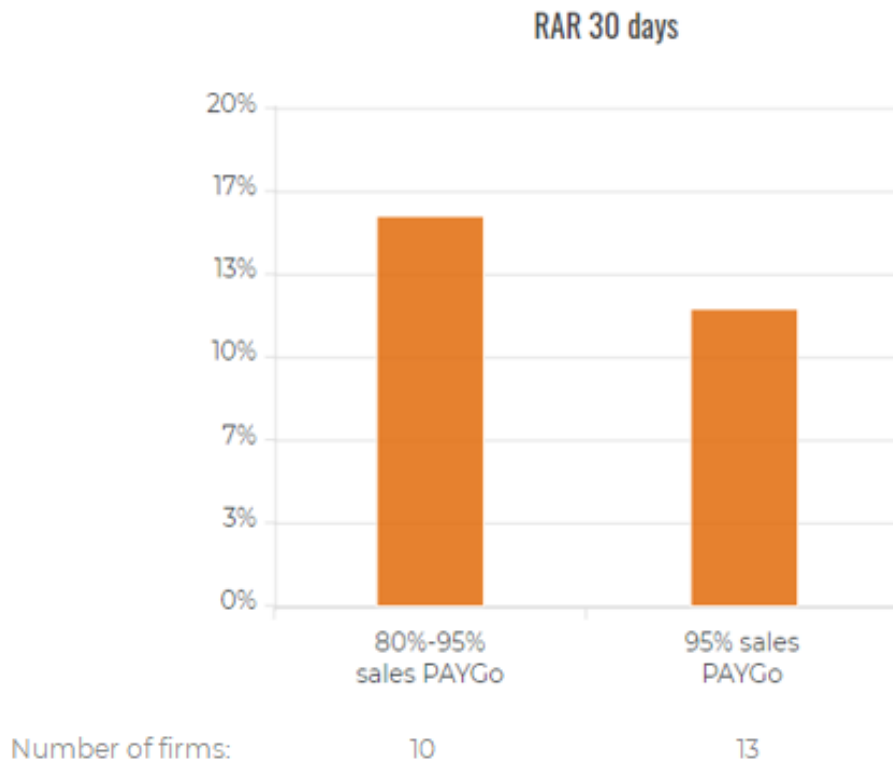
Business models focused more heavily on PAYGo (>95% PAYGo sales) display lower RAR30 percentages. This may suggest that business models almost entirely comprised of PAYGo sales are more specialized in the PAYGo model and manage the unique credit risks of PAYGo in a more effective way. However, it should also be noted that Write-off Ratio is higher for companies with >95% PAYGo sales.

RAR 90 days

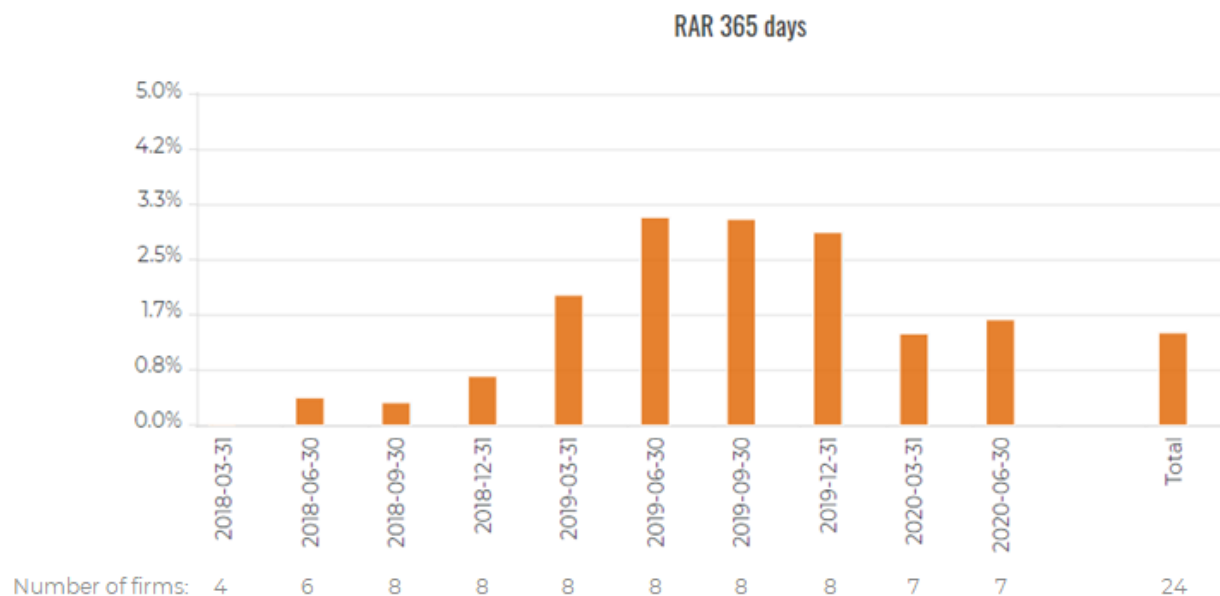Number of firms: 4 3 3 5 5 5 5 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 8

RAR90 averaged 7% across the full analysis period, such that about half of receivables in RAR30 are also contained in RAR90.

RAR 180 days

Number of firms: 4 6 8 8 8 8 8 8 7 7 24

RAR 365 days
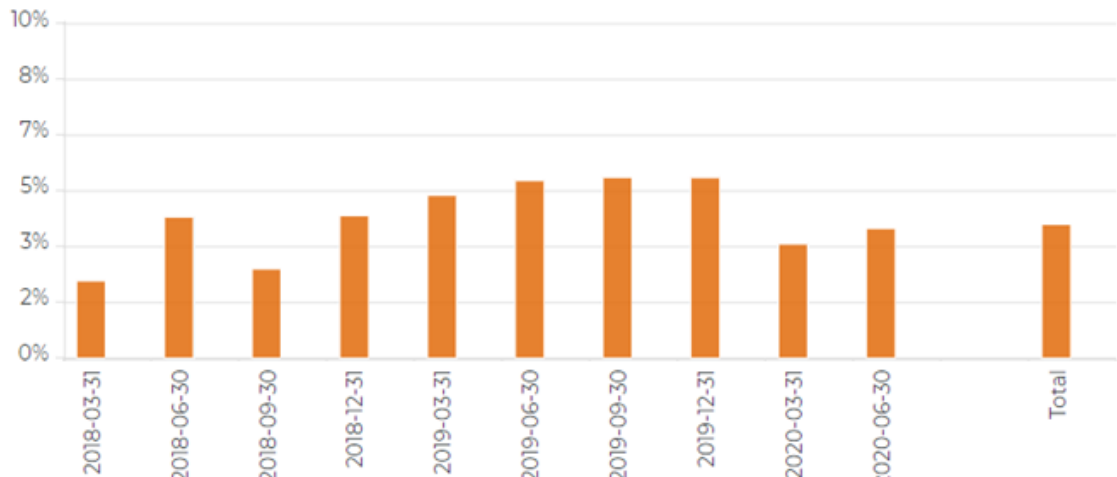
| Number of firms: | 4 | 6 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 7 | 24 |

For RAR of longer numbers of days which take a longer time to exhibit deterioration (i.e. 180, 365), the ratios averaged 4% RAR180 and 1.4% RAR365. Both RAR180 and RAR365 improved from 2019 to 2020.

Recommendations

RAR by Consecutive Days Unpaid (CDU) is an effective way for companies to track portfolio quality, as evidenced by workshops with companies, data analysis, and regression results. RAR(CDU) showed to be an effective predictor of default, and its effectiveness is more pronounced in early contract stages. In particular, RAR30 appears to be a reasonable threshold to trigger additional credit risk monitoring at company-level and could potentially be adopted as an industry standard.

RAR(CDU) is a KPI tracked by all companies albeit with varying degrees of granularity and the working group definition was in line with the internal definition for the majority of companies participating in the pilot. Companies with the business model to provide light after a repayment regardless if the customer has outstanding late payments, categorize a receivable as current/performing after one payment is received. The estimated small portion of companies who instead require the customer to clear all existing arrears from prior missed payments in order to reactivate the unit categorize a receivable as non-performing from the date of the first missed payment until the full arrears amount is paid off. One pilot company used a more conservative approach. To some extent this differing in approach is understandable, as in the more flexible model the payment obligation to the customer is weaker (customer may pay only when they need light) and there are no penalties for non-payment (other than potential repossession after a sufficiently long period of non-payment). However, it is suggested to align the calculation method to the most common approach in the industry to categorize customers according to their most recent payment, taking into consideration the pay-as-you-go model.

The RAR aging categories suggested are RAR30, 90, 120, 180, and 365. RAR30, 90, and 180 are expected to be the most useful headline RAR aging categories. This is also informed by the regression analysis which demonstrated RAR30 as a reasonable threshold to trigger portfolio quality monitoring[5]. Perception of when RAR starts to be concerning varies across companies, but is typically RAR7, 15, 30 or 60. The categories RAR30, 90, and 180 are meant to signal touch points of significant credit risk at the company-level. This may differ from internal operational processes to follow-up with customers at very early stages of non-payment, which could require certain actions to be taken (e.g. follow-up call to customer) at RAR7 or 15 for example.

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[5] RAR30 is also an important component of best practice IFRS-9 provisioning for credit losses: the requirements include a presumption that credit risk has increased significantly when contractual payments are more than 30 days past due.

Some investors' expectations of portfolio quality do not seem to be fully aligned yet to the current reality of the majority of companies. The use of the receivables as a guarantee may be an additional incentive for prioritizing high growth (given the structurally high funding need of the industry), potentially with less focus on quality. While PAR and RAR of the same amount of days late may not signal the exact same level of credit risk in microfinance and in PAYGo respectively (because the option not to pay is built in and because the unit can be repossessed), the KPI is an important signal for company-level credit risk. This is also supported by a regression analysis that demonstrates RAR30 as an effective predictor of default (see the Regression Analysis section for more details).

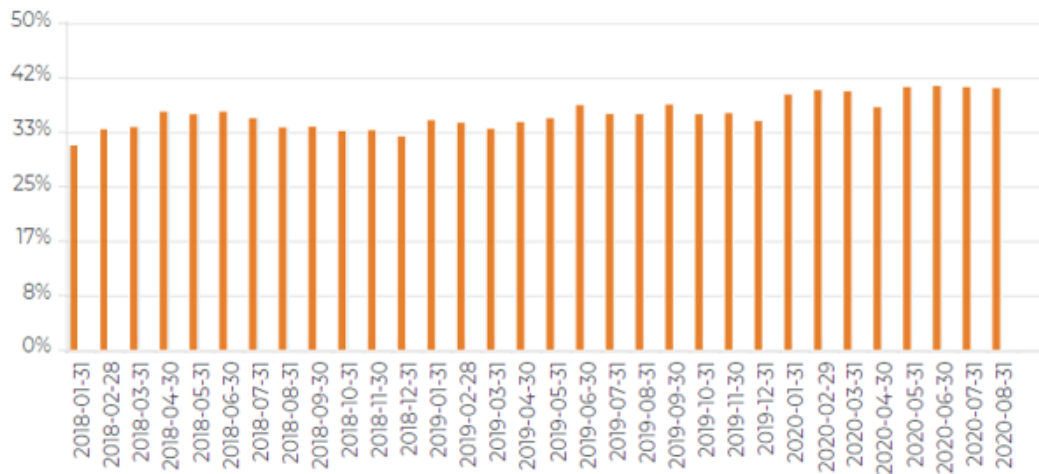For companies that formally restructure receivables, the restructured receivables should be tracked separately, and either remain in a restructured status (captured in Restructured Receivables Ratio) until the unit if fully repaid, or not return to a current (RAR0) status until a sufficiently conservative threshold of payments is met (e.g. after 3 months, CR >70%).

Back to portfolio quality KPIs summary

6. Receivables at Risk (Collection Rate) – RAR(CR)

Priority: 2 RAR CR <70%, <50%	**Definition**: Identifies risk proportion of receivables portfolio by collection rate	
Calculation	**Initial**: Remaining Value of Outstanding Receivables Streams for Which Collection Rate is Less than [Y]% Over Period [X]) / Value of Total Future Receivables Due	**Recommended**: Outstanding Receivables by Collection rate [X] / Outstanding Receivables

RAR CR<70%

Number of firms: 5 5 5 5 5 5 5 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 8 8 8 8

RAR CR<70%

	East Africa	Not Specified	West Africa	Total
Number of firms:	12	3	5	24

RAR collection rate <50%

Number of firms: 5 5 5 5 5 5 5 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 8 8 8 7 8 8 8 8

RAR CR <70% averaged 37% over the full analysis period, meaning that 37% of Outstanding Receivables had a Collection Rate since unit acquisition of less than 70%. An increase (deterioration) in RAR CR <70% was observed from 2019 to 2020. The observed RAR CR <70% performance is similar in East Africa and West Africa.

RAR CR <50% shows a similar trend, deteriorating in 2020 compared to 2019.

Recommendations

By segmenting the outstanding receivables into Collection Rate intervals, RAR Collection Rate (CR) is a valuable indicator, supplementing RAR(CDU), which uses consecutive days unpaid categories.

Similar to Collection Rate, RAR(CR) helps to identify slow payers (unlike RAR CDU), who have a negative impact on the firm profitability due to the cost of funds and other fixed and semi-variable costs, and who are likely to graduate to non-performing status.

An added value of RAR(CR) when compared to the headline Collection Rate is that while Collection Rate is expected to be most commonly analyzed over a specific time period (e.g. 360 days), RAR(CR) factors in the cumulative Collection Rate since inception of all customers who currently have an outstanding receivable balance, to gain an understanding of the cumulative picture. However, this also means that customers who paid off receivables in the past (or had their receivables written-off) are not factored into the RAR(CR) calculation. This is an acceptable limitation to any KPI which assesses the risk of outstanding receivables given that the goal is to understand the risk of the receivables currently on the book.

RAR(CR) was one of the KPIs that took a higher level of effort for some PAYGo companies to provide the building block data points, due to not reporting on the KPI prior to the pilot and differing system/staff capacity/familiarity to segment receivables into various cumulative Collection Rate intervals. However, the level of effort for the majority of companies is deemed to be reasonable (also given the reduction in intervals mentioned in the next paragraph) and this is an expected part of the process towards industry standardization of KPIs.

Collection Rate intervals for outstanding receivables were initially split into >90%, 80-89%, 70-79%, 65-69%, 60-64%, 55-59%, 50-54%, <50%, also taking into consideration PAYGo companies suggesting that the Collection Rate for the industry ranges between 50% and 70% and it would be better to have more granularity within this interval. However, our recommendation is to limit the output of this KPI into two intervals that are most important to monitor risk: <70% and <50%. While there could be some advantages

to collecting across intervals which together comprise the total receivables (for example, quality control cross-checking), the need to limit the data request in this indicator is seen as a primary consideration. Regression results and workshops with companies suggest that there is not much variation in credit risk when the RAR (CR) is <50%, which is a highly risky interval. RAR (CR) is suggested to be tracked on a monthly basis, being an important portfolio quality KPI.

RAR(CR), as well as the headline Collection Rate, serves an important role in identifying risky receivables/trends that may be masked in RAR(CDU), in cases of customers making single/few payments achieving a low RAR(CDU), but not making consistent payments, which represents a risk that can be closely captured in RAR(CR). This is also informed by the Regression Analysis which demonstrated CR <50% as a reasonable threshold to trigger portfolio quality monitoring

Both RAR(CDU) and RAR(CR) are suggested as KPIs to track, with RAR(CDU) as priority 1 (30, 90, 180) and RAR(CR) as priority 2 (<70%, <50%). Both RAR(CDU) and RAR(CR) were effective predictors of default observed during the pilot process, however RAR(CR) was more time-consuming in some cases for companies to produce. The methodology of Collection Rate is however captured as priority 1 in the headline Collection Rate. This is also informed by the regression and cohort analysis (see Regression Analysis section for more details).

Back to portfolio quality KPIs summary

7. Write-off Ratio

Priority: 2	**Definition**: The sum of the remaining payments of receivables streams that have been terminated in a given period divided by the sum of the remaining payments of the receivable streams for the entire portfolio	
Calculation	**Initial**: Value of Receivables Payments Outstanding for Contracts Written-off Over Period [X] / Average Value of Total Receivables Outstanding Over Period [X]	**Recommended**: Outstanding receivables for Written-off contracts during the period / Average outstanding receivables during the period

Statistics
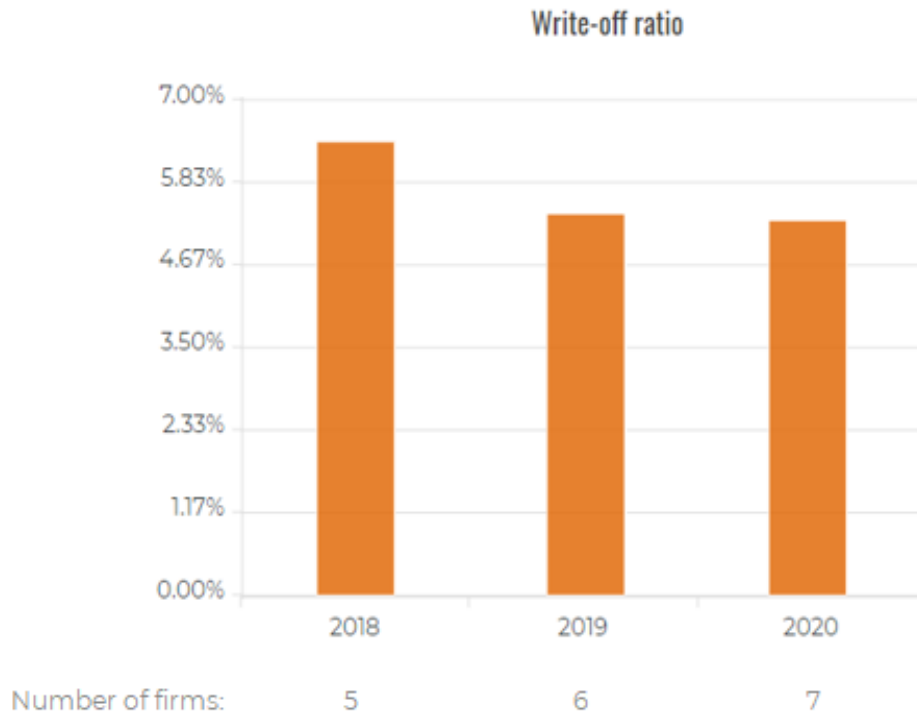
Write-off ratio

The Write-off Ratio averaged (simple unweighted average) 6% over the full analysis period. Write-off Ratio is dependent on individual company policies and in general is a lagging indicator of credit risk, being related to receivables at an advanced stage of risk. The Write-off Ratio steadily decreased over the past three years. However, it should be noted that the 2020 period consists of annualized Jan-Jun data, and hence may appear lower for companies who write-off infrequently or who write-off more towards the end of the year rather than the beginning of the year.

Write-off ratio

The Write-off Ratio is higher for companies with >95% PAYGo sales. Note: the above statistics are calculated using a simple unweighted average.

Recommendations

While write-off policies can widely vary from one company to the next, outstanding receivables for written-off contracts is a data point relatively straightforward for companies to populate, and the Write-Off Ratio is important to have a complete picture of the portfolio quality especially in firms who regularly write-off. Among the pilot participants, half of companies performed write-offs on a frequent basis (i.e. monthly), whereas the others either applied less frequent write-offs (i.e. quarterly/annual) or very infrequent write-offs (i.e. > annual). Reasons for varying approaches include internal credit risk management strategy, risk appetite, profit & loss impact, and tax considerations (see section Challenges and lessons learned: Varying accounting policies).

Companies utilized two different types of write-off: write-off of the outstanding receivable amount and write-off of the unit. As the Write-off Ratio is intended to capture portfolio quality, it is suggested to maintain the original definition to calculate according to outstanding receivables written off (future payments that will not be received from the customer) rather than unit value written off, with the latter being an administrative cost to decrease the value of the inventory. This should correspond to the write-off amount in financial statements for outstanding receivables.

In regard to repossessed units, it is recommended that the full value of outstanding receivables at the point of repossession is written-off. However, in the case that a unit is repossessed without a write-off in the same value taking place, the differing value can be excluded from the Write-off Ratio, but should be added to the numerator building block of the Repossession Ratio (outstanding receivables of units repossessed during the period). Please see the Repossession Ratio section for further recommendations on comparability between Write-off Ratio and Repossession Ratio.

A minor adjustment to the building block wording is suggested to streamline and align with wording in other building blocks, to focus on "outstanding receivables".

As the figures on write-off most frequently are produced by the company's Finance function and it is a figure impacting financial statements, it is suggested for the information request for write-offs to be included with other financial figures in the building blocks, rather than in the portfolio quality section.

Back to portfolio quality KPIs summary

8. Write-off Ratio 180

Priority: 3	**Definition**: Actual write-offs + contracts unpaid >180 days	
Calculation	**Initial** -	**Recommended**: (Outstanding receivables for Written-off contracts during the period + Outstanding receivables >180 Consecutive days unpaid at end of period) / Average outstanding receivables during the period

Statistics

Write-off ratio 180

| Number of firms: | 2018: 5 | 2019: 5 | 2020: 5 |
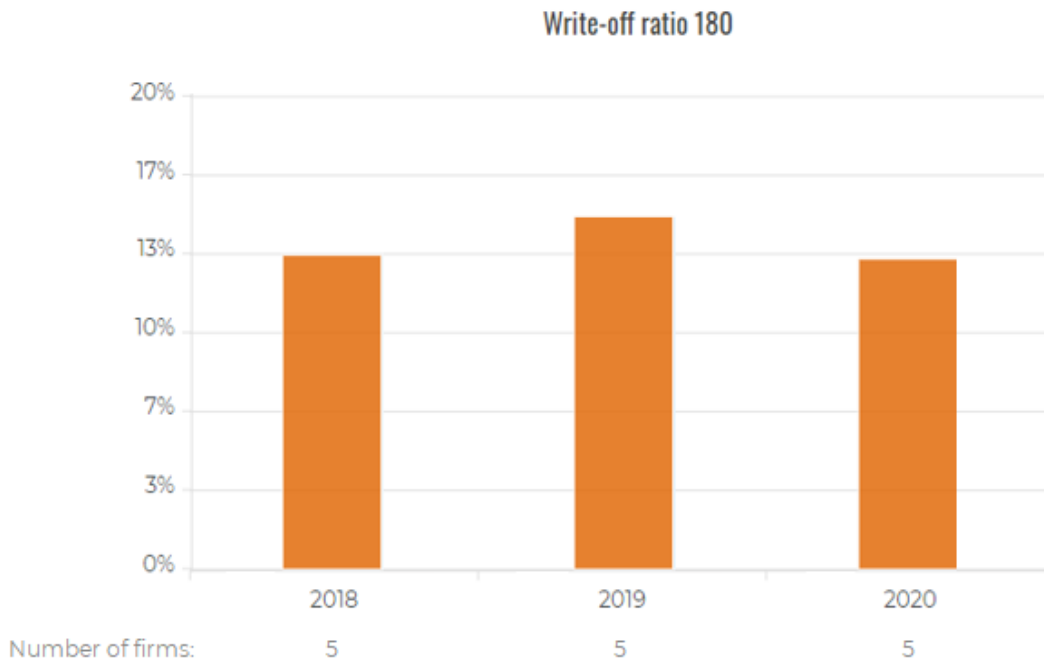
Write-off Ratio 180 stood at overall stable levels from 2018-2020, about twice as high as the Write-off Ratio alone. This suggests that many companies have significant receivables in a RAR180 risk category which have not been written-off yet.

Recommendations

Taking into consideration the challenges of misaligned write-off policies across companies highlighted in the Write-off Ratio section above, it is suggested that a complementary adjusted KPI would add value to the portfolio quality KPIs: Write-off Ratio 180.

This KPI has the same denominator as the Write-off Ratio, with the numerator including the actual write-off amount in accounting terms, then adjusted to add all outstanding receivables that are >180 consecutive days unpaid. The implication of this is that regardless of the individual company's internal write-off policy, receivables which remain on the books (i.e. not written off) but are still highly risky and unlikely to be repaid (>180 days unpaid) are factored in to one combined metric, enhancing comparability as a standalone metric. 180 days was chosen as the specific cut-off, being a common threshold for write-off and based on data analysis that receivables in RAR180 had only 11% of scheduled follow-on payments collected in the next 180 days.

The Write-off Ratio 180 will not be necessarily aligned with financial statements and internal policies (the balance of the receivables included here that are not included as write-offs (in accounting terms) remain in Outstanding Receivables). A large difference between the Write-off Ratio and Write-off Ratio 180 may indicate the need for further adjustments and analysis.

Back to portfolio quality KPIs summary

9. RAR30 + Write-off Ratio

Priority: 4	**Definition**: Receivables at Risk >30 consecutive days unpaid + Write-off Ratio	
Calculation	**Initial** -	**Recommended**: (Outstanding receivables > 30 Consecutive days unpaid / Outstanding receivables) + (Outstanding receivables for Written-off contracts during the period / Average outstanding receivables during the period)

Statistics

RAR 30 + write-off ratio
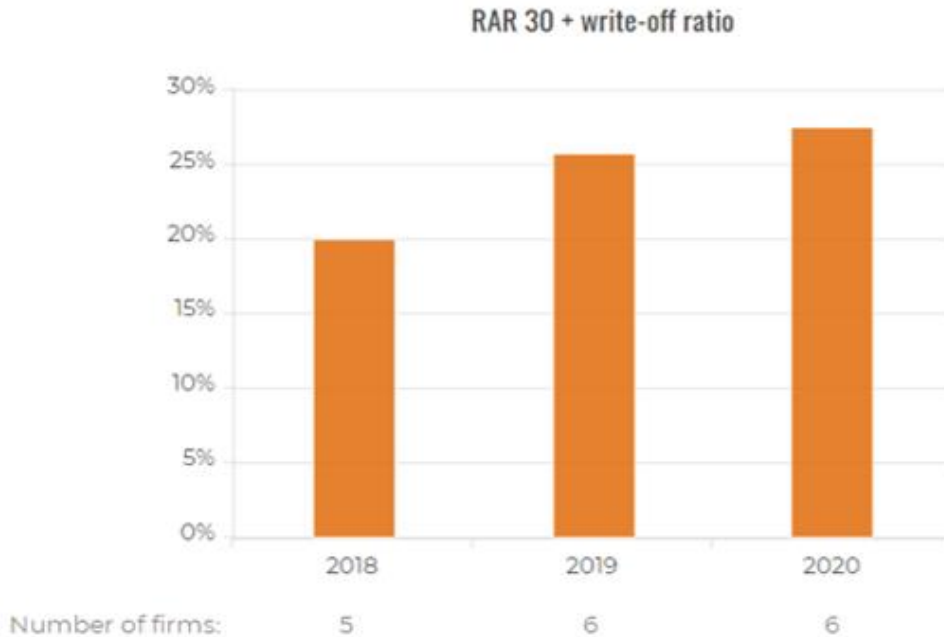
Combining RAR30 with the Write-off Ratio in the graphs above shows an increasing trend in 2019 and 2020. The average across the full analysis period is 25%.

Recommendations

In order to understand a complete picture of portfolio quality, multiple KPIs must be analyzed. It is not possible for one KPI to communicate all the credit risk of a company, however KPIs can be not only analyzed together, but also combined for enhanced comparability and to get closer to a ratio of "total" credit risk.

A suggested example of this is RAR30 + Write-off Ratio. This captures both risky receivables currently on the book (i.e., projected risk) and those receivables which were written-off due to non-payment (i.e., realized loss). Taking an extreme example, companies that do not write-off at all would accumulate large receivable amounts in the RAR30 metric, whereas companies that write-off frequently may have small receivables amounts contained in RAR30, but post a high write-off ratio accordingly for all the defaulted receivables which are no longer on the book. RAR30 + Write-off Ratio allows for these two scenarios to be measured on a more comparable basis.

A key difference between RAR30 + Write-off Ratio and the Write-off Ratio 180 is that the focus on this combined metric goes beyond an adjustment for a more comparable Write-off Ratio, to include risky receivables that are >30 days consecutively repaid (rather than 180 days which is a proxy for write-off), using the earliest number of days (30) for which RAR(CDU) is recommended as a headline KPI.

Firms with >95% PAYGo sales model have an average RAR 30 + Write-off Ratio of 32%, and firms with 80-95% PAYGo sales have a lower ratio at 19%. This is mostly driven by firms with >95% PAYGo having higher Write-off Ratios.

10. Repossession Ratio

Priority: 2	**Definition**: The sum of the remaining payments of receivables streams of repossessed units over the sum of the remaining payments of the receivable streams for the entire portfolio	
Calculation	**Initial**: Units Repossessed Over Period [X] / Average Total Installed Units Outstanding Over Period [X]	**Recommended**: Outstanding receivables of units repossessed during the period / Average outstanding receivables during the period

Statistics

The graphs below contain statistics representing both the unit-based (first graphs below) and value-based version of the Repossession Ratio (second graph below).

Repossession ratio (units)

Number of firms:	8	8	9

The Repossession Ratio (unit-based) averages 7.6% over the full analysis period, with the Repossession Ratio (value-based) averaging 7.2% over the full analysis period.

Both the unit-based and value-based ratio slightly increased over the timeframe of analysis, however the value-based KPI increased at a higher rate (note: some comparability limitations due to a slightly different composition of firms). This suggests that larger receivable sizes per unit were repossessed in the more recent quarters than quarters further in the past.

Repossession ratio

| Number of firms: | 8 | 8 | 8 |

Companies who are at a young/startup stage posted Repossession Ratios higher than mature companies. Companies with a large/medium product size display a higher Repossession Ratio, with a possible explanation being that the underlying units are of higher value and hence repossession is more likely to be a net gain for the company.

Repossession ratio

| Number of firms: | 5 | 4 |

■ Mature   ■ Young/startup

Repossession ratio

| Number of firms: | 4 | 4 |

■ Large and medium product size   ■ Small product size

Repossession ratio (units)

Repossession ratio
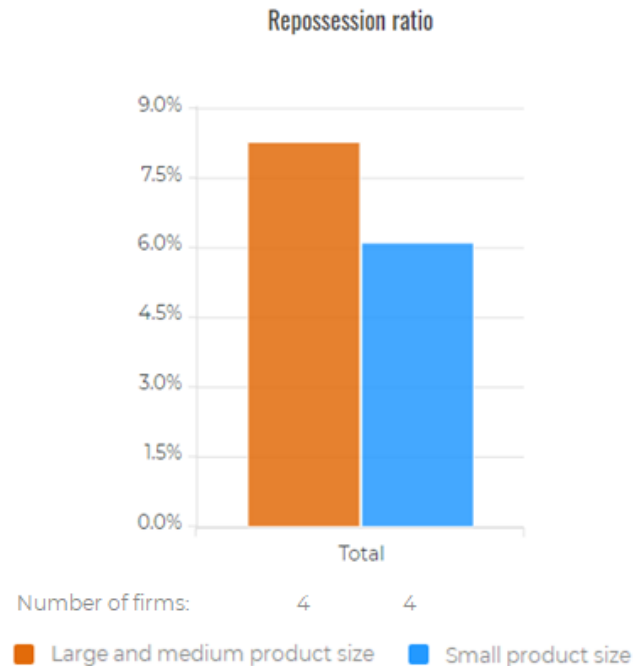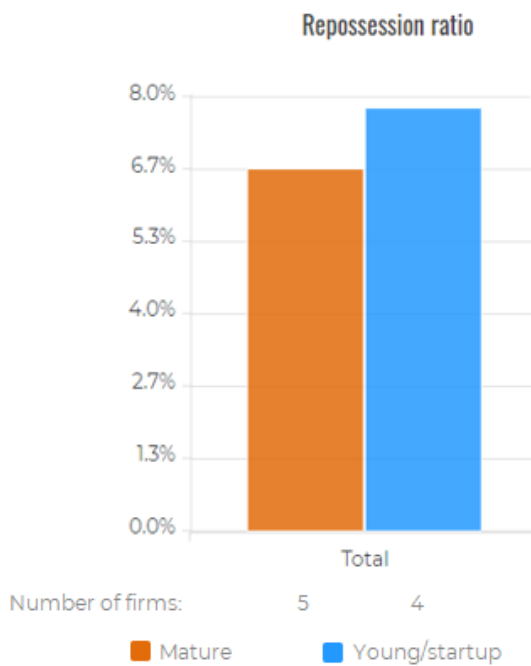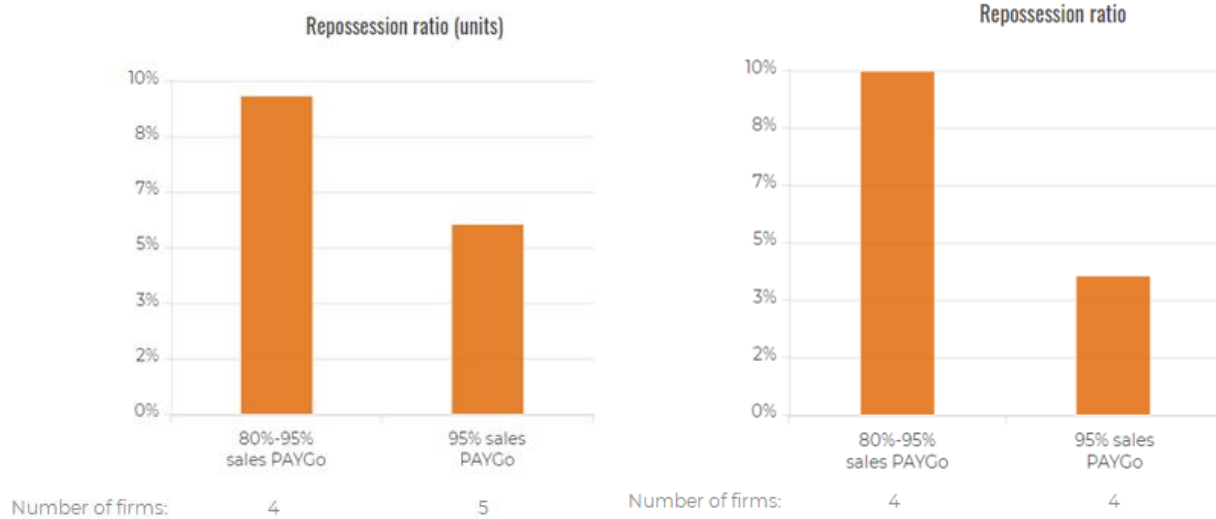
Split by payment model, the Repossession Ratio (using both calculation methods) is higher for companies with less than 95% PAYGo sales.

Recommendations

It is recommended to replace a unit-based Repossession Ratio with a value-based Repossession Ratio. The main reason for this is that a value-based Repossession Ratio is more meaningful for portfolio quality analysis, being more directly comparable to Write-off Ratio given that the value impact of larger units and contracts in earlier stages are captured. It is also more comparable given the wide variety of product types in the industry (e.g. simple lighting kit, solar home system, refrigerator). The pilot also demonstrated that a value-based ratio is sufficiently straightforward for companies to track. While a unit-based ratio could supplement the value-based one, it is suggested to focus on one method to maintain a condensed list of KPIs which are not too numerous. The potential added value of a unit-based complementary metric does not seem to justify the added level of effort for companies and a longer list of KPIs.

This opinion also takes into account that the Repossession Ratio's strength as a standalone portfolio quality KPI is limited by different business models, approaches, and HR deployment capability (time consuming, remote nature of operations, and complex to implement). A low rate is not necessarily a positive indicator as it could be that repossession efficiency is low, and companies that re-sell repossessed units vs only using for spare parts have differing levels of prioritization of repossession.

Repossession may be a net gain for the company if the value of the repossessed unit is still high, and the customer has already made some payments (because there is no compensation due back to the customer). However, repossession may be a net loss if the residual value is low and the operating cost of deploying agents to repossess is relatively high. In other terms, there is a minimum residual value of the unit and a maximum operational cost of repossession implementation beyond which it makes no economic sense to repossess an individual case. A high repossession rate may be good or bad for the firm profitability, depending on costs and margins of the value recovered. In some cases, shops prioritize units late for the highest number of days (with extremely low chance of being repaid).

The timing starting from which the customer has a very low likelihood to get back on track is an ideal timing for repossession in some companies' view. Still, the net cost of repossession may be lower than the net cost of writing off the unit (it is worse to lose a customer and the unit – i.e. write-off of outstanding amount and write-off of unit; than to lose a customer – i.e. write-off of outstanding amount only). In all cases, repossession has a value for repayment culture, but it also puts an end to the relationship of that customer with the company.

For the value-based metric, the value of repossessed units is defined as the value of outstanding receivables at the point of repossession, which avoids subjectivity entailed in valuation of repossessed

units and enhances comparability with the Write-Off Ratio. No value related to redeployed units should be deducted from the outstanding receivables of units repossessed during the period for the purposes of calculating Repossession Ratio. The next best alternative calculation method for repossession value may be the realized loss from the repossession, being the difference between the reduction in outstanding receivables and increase in inventory that happens after repossession, however this realized loss calculation is not fully objective nor is there an aligned approach across companies thus it is likely to be challenging to standardize and ensure consistency.

In terms of comparability with Write-Off Ratio, it is worth noting that while it is recommended for companies to track both Write-Off Ratio and Repossession Ratio, that simply combining the two into one combined metric is not advisable for now, due to differing company policies and the potential for double counting with some companies (i.e. a repossessed unit with a receivable amount contained in both Repossession Ratio and Write-Off Ratio) but not others (i.e. a repossessed unit with receivable amount contained only in Repossession Ratio because of differing write-off policies). Nevertheless, it is recommended as a best practice that at the point of repossession, the outstanding receivable amount should be written-off.

Back to portfolio quality KPIs summary

11. Restructured Receivables Ratio

Priority: 4	**Definition**: The sum of the remaining payments of receivables streams of units restructured or with promotion over the sum of the remaining payments of the receivable streams for the entire portfolio	
Calculation	**Initial** -	**Recommended**: Outstanding receivables of units restructured or with promotion / Outstanding receivables

Statistics are not available because the KPI is proposed as a result of the pilot exercise, and the data to calculate it were not included in the initial collection exercise.

Recommendations

For companies that formally restructure, Restructured Receivables Ratio is a useful KPI to understand the full portfolio quality picture, because the scheduled follow-on payment is reduced and/or the duration of the contract is extended, and the total balance is sometimes reduced as well. These restructured units have a credit risk higher than healthy receivables, and they should be tracked separately (because they appear as performing in RAR(CDU) and are not reflected in an otherwise lower Collection Rate as a result of restructuring).

The KPI can be calculated as the outstanding receivables of rescheduled loans divided by the total outstanding receivables, as of one point in time. For a more thorough understanding, the restructured portfolio can be split between 1) the current rescheduled portfolio 2) restructured portfolio 1-30 days late 3) restructured portfolio >30 days late. This is to avoid double-counting of the unpaid restructured portfolio in RAR (Consecutive Days Unpaid).

The information collected so far indicates that formal restructuring is a relatively rare practice in companies (only 1 of 8 companies participating in the pilot), and it may not be cost-beneficial to include the Restructured receivables ratio among the standard high priority KPIs in systematic reporting. However, this decision may be revised in the medium-term in case restructuring becomes a more usual practice.

Notably, this indicator also includes the impact of some types of payment waivers and promotions offered to customers, as promotions that do not require a payment to trigger access to the promotional benefits may mimic a restructured receivable and increase credit risk. For promotions, if a promotion is given due to COVID-19 impact or anticipated repayment challenges, without customers paying (e.g. giving 3 days free light), and if the scheduled follow-on payment is decreased in the system, then Collection Rate is artificially improved and the outstanding receivables of the units on promotion should be captured in the Restructured Receivables Ratio to reflect the credit risk. In this example, 100% of the customer's outstanding receivables should be included in the numerator of the Restructured Receivables Ratio.

However, if a promotion is given to performing units to incentivize good payment behavior, and a payment is required to receive the benefit (e.g. buy 3 days of light, get 3 days free), the outstanding receivable is not deemed to resemble a restructuring and does not represent an increased credit risk. In this example, the customer's outstanding receivables can be excluded from the numerator of the Restructured receivables ratio.

Back to portfolio quality KPIs summary

12. Contractual Credit Period

Priority: 3	**Definition**: (formerly Average Credit Period) Average nominal number of days between system acquisition and expected final payment	
Calculation	**Initial**: Sum Over Units of (Expected Final Payment Date – System Acquisition Date [Days]) / (Total # of Active Units)	**Recommended**: Contractual repayment term (days) / Number of active units

Statistics
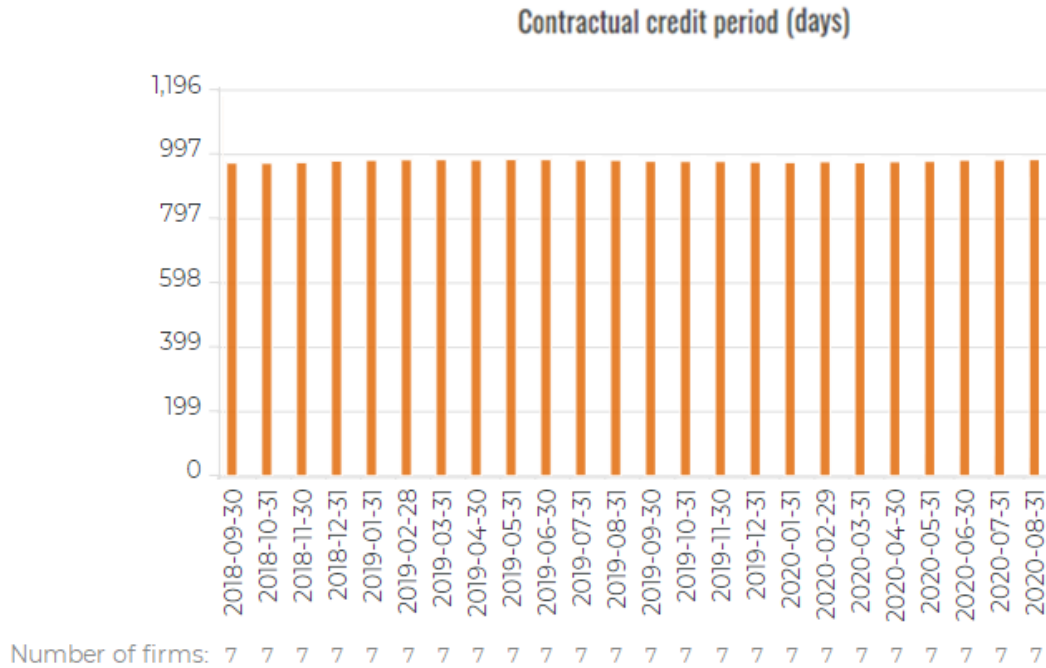
Statistics show that the Contractual Credit Period remained stable over the entire period of analysis.
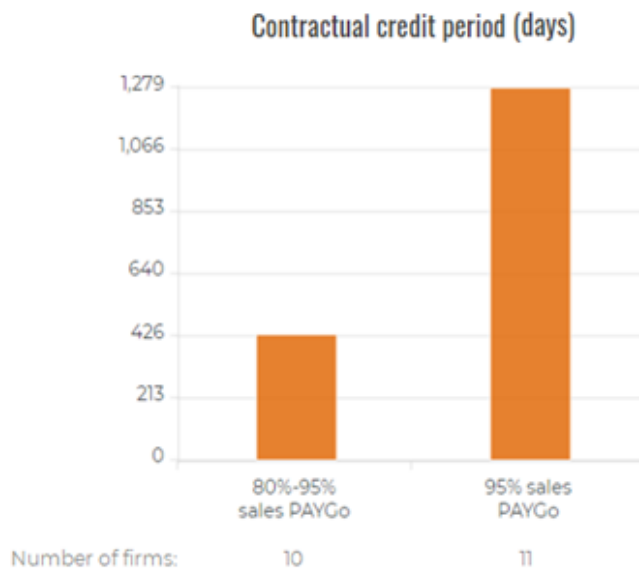
There is a major difference between the credit period of firms with >95% PAYGo sales models (about 3.5 years) compared to firms with 80-95% PAYGo sales models (slightly over 1 year).

<u>Recommendations</u>

A minor adjustment to the KPI wording is suggested to further differentiate from the Effective Credit Period and following MFR's suggested naming approach to only use "Average" wording when the calculation uses an average over multiple periods (e.g. average outstanding receivables for Write-off Ratio).

The following guidance note is needed to ensure the correct entry of the numerator, to clarify contractual repayment term (days): for active units as of end of period, the sum of the total initial contractual days of credit (contractual final payment date – unit acquisition date).

Number of active units should be entered as per the following definition: Units in possession of active customers. Does not include written-off units, new units not deployed yet, repossessed units not yet redeployed, or permanently unlocked units. Includes locked units prior to repossession or write-off.

The above definition means that it is recommended that active units should include even those active units without payment for a prolonged time (if not written off or repossessed) because they should be counted to calculate Contractual credit period, and for ease of reporting. In the case of non-PAYGo receivables (e.g. a top up loan in parallel with an existing loan for the device), only one unit should be counted, with "unit" referring to the physical device (solar panel and control/battery system). The numerator should also exclude non-PAYGo receivables to limit skewing of the metric, as these types of receivables are not unit-based PAYGo receivables. Non-PAYGo receivables are a very small portion of total receivables among the pilot companies (estimated at <1% of outstanding receivables), and this approach may need to be re-considered if they become more significant in the future. Non-solar power generating devices under a PAYGo payment model (also a small portion of total receivables) should also not be counted as an additional "unit".

In order to streamline the calculation, eventually a simpler approach could be considered as a secondary/alternative method, by collecting one direct data point (average contractual credit period (days) of active units) rather than two data points as building blocks. The reason for this recommendation is that companies tend to have that one direct data point readily available as a standard system indicator.

<u>Back to portfolio quality KPIs summary</u>

13. Effective Credit Period

| Priority: 4	**Definition**: Effective length of time taken for an average customer to pay off their solar device	
Calculation	**Initial**: Average Credit Period / Collection Rate	**Recommended**: Effective repayment term (days) / Number of repaid units

Statistics

Statistics are available using the initial calculation (see above) and not the recommended calculation, because the recommended calculation is proposed as a result of the pilot exercise, and the data to calculate it were not included in the initial data collection exercise. Statistics of the initial calculation method are shown below:

Effective credit period (days)
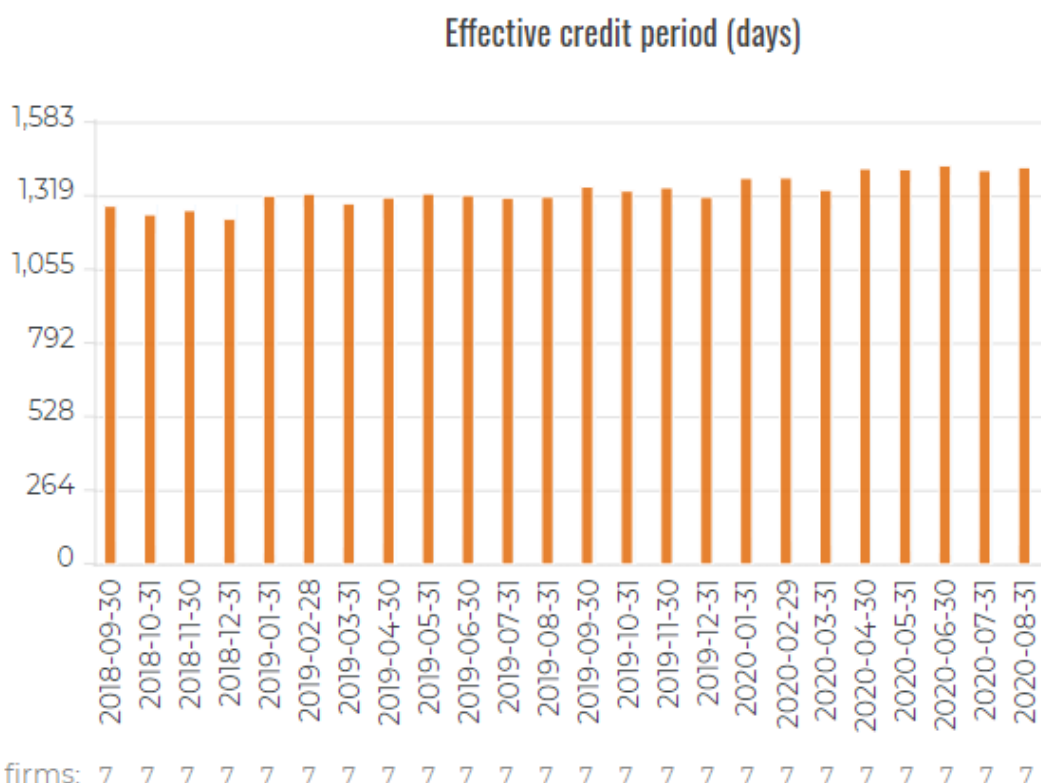
While Contractual Credit Period remained similar from 2018-2020, the graph above shows that the Effective Credit Period increased, with the pace of customer payments slowing down (as demonstrated by a lower Collection Rate). This suggests progressively higher credit risk.

Breaking down the analysis by payment model, a similar difference to Contractual Credit Period is observed in Effective Credit Period.

Effective credit period (days)
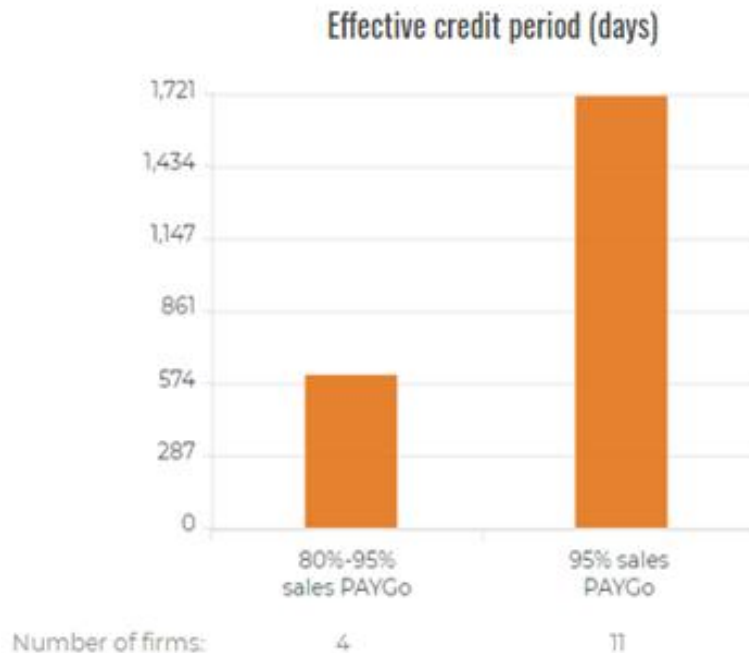
Recommendations

It is recommended to modify the calculation of Effective Credit Period to gain more accuracy in the calculation and to reflect the current practice of companies and availability of data, while keeping the calculation straightforward. The suggested calculation method is Effective repayment term (days) / Number of fully repaid units.

The original KPI definition is an approximation, however companies have data readily available on the number of days from unit acquisition date to full payment for actual/historical receivables, so that the calculation method could be to ask one data point: average days from unit acquisition to full payment, for all units fully repaid (recommended for simplicity) or for the units paid off in a given period.

Companies were of the opinion that the working group definition to use Collection Rate in the calculation had some limitations, being an approximation and given that the Collection Rate is less representative over shorter periods.

As a complement or when the building blocks of this actual Effective Credit Period are not available, the approximation Contractual Credit Period / Collection Rate can be used and arrived at from other existing KPIs. This method has the advantage of factoring in customers that were eventually written-off or customers still active with delayed payments, though it should be noted that this approach may overestimate the effective credit period if the objective is to understand how long it takes customers to fully pay off a device, given that the Collection Rate includes some receivables that will eventually default and which technically do not have an effective credit period at all, never reaching a fully repaid status.

Back to portfolio quality KPIs summary

14. Regression analysis

To deepen the portfolio quality analysis beyond the headline indicator level, regression, cohort, and descriptive statistical analysis was conducted on customer data sets provided by 3 PAYGo companies. Each of the data sets contained more than 50,000 active customers. The goal of this analysis was to determine the strength and character of the relationship between two key KPIs of portfolio quality (RAR Collection Rate – CR, and RAR Consecutive Days Unpaid - CDU) and the likelihood of eventual default.

Methodology

The KPIs were calculated for individual customers at one point in time (T1) and the same set of customers were analyzed again at time (T2) to evaluate whether they were in default or still active. Certain assumptions were made in the formulation of this methodology, as follows:

Data set: Companies shared two sets of customer data. Each of these sets contained a snapshot of customer information at a specific date; T1, the date of the first data set (where the KPIs were calculated), and T2, the date of the second data set (where default was determined). The dates for the data were recent (no later than 2018) and exactly 6 months apart.[6]

KPIs: Each data set had the KPIs pre-calculated or at least had sufficient building blocks to calculate the KPIs using the standard definitions below:

- *Collection Rate:* for each customer, the cashflow from follow-on payments during the period divided by the scheduled follow-on payments during the period.
- *CDU:* for each customer, the number of days since a customer made their last payment.

Time interval: The time period between the two data sets. An interval of 6 months was used for uniformity. It was assumed that 180 days is a sufficient period after which default would be apparent, judging by a customer's payment pattern over the period.

Default*:* Given that companies have varying approaches to determining default, a standardizing approach was used where a customer would be classified to be in default if they failed to make at least one payment within the 6-month time interval (RAR CDU of >180 days); additionally, customers who had made some payments within the period but maintained a CR of below 30% were also regarded to be in default.

To determine how well the two KPIs can predict a customer's chances of defaulting, a regression analysis was conducted using a logistic regression[7] model. The aim of this model is to measure the strength and direction of correlation between the KPIs and probability of default as well as the statistical significance of this relationship. While the default definition of RAR180 or CR <30% has the limitation of potential self-fulfilling autocorrelation of the KPIs to default, this approach is how PAYGo companies define default in practice, mainly through CDU[8] and a smaller subset through CR.[9] The regression is complemented with other statistical analysis.

The regression analysis evaluated the following:

a) Joint relationship: looking at both KPIs simultaneously and analyzing their combined effect on the probability of eventual default i.e., what is the expected likelihood of default for a customer with a CR of *x* while also being *y* days late in payment.
b) Simple relationship: evaluating each KPI and its correlation with eventual default with all other factors held constant i.e., what is the expected likelihood of default for a customer with a CR of x regardless of the number days late in payment, and vice versa. This includes comparison of the nature of the two relationships to establish which KPI is a stronger indicator and whether default can be predicted early enough and with reasonable accuracy.

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[6] While this analysis could in theory be subject to impacts of seasonality, the exact periods analyzed are different for each company and cumulatively cover all months throughout the year, hence seasonality impacts are expected to be minimal and the periods are also deemed to be indicative of normal (and pre-pandemic) periods.

[7] Logistic regression: a statistical model used to model the probability of a certain event occurring such as pass/fail, win/lose, or default/non-default.

[8] Most commonly RAR 180 among participating companies.

[9] Most commonly <30% CR. However the threshold for when CR is low enough to be uneconomical for the PAYGo company ranges from <70% to <50% according to the participating companies.

c) Cohort analysis using contract age[10] as a differentiating factor, to see how the KPIs are interpreted for the various cohort groups.

Multiple Regression Relationship

For each company data set, the regression analysis determined the joint predictive power of the two methodologies on the expected likelihood of eventual default on a 6-month time horizon. The overall trend indicated that an increase in CDU had a positive correlation with likelihood of default and a decrease in CR also has a positive correlation with likelihood of default.[11]

The matrix below highlights the aggregated trend for the three companies showing the various combinations of CR and CDU ranges and their corresponding 6-month default probability. Combinations that are rare in practice have been greyed out.

Aggregate Regression Results Matrix

	CDU 0-7	CDU 8-30	CDU 31-45	CDU 46-60	CDU 61-90	CDU 91-120	CDU 121-180	CDU >180
CR >90%	1%	3%	6%	9%	12%	18%	15%	35%
CR 80-89%	1%	4%	10%	13%	17%	24%	14%	33%
CR 70-79%	2%	6%	14%	18%	23%	31%	21%	46%
CR 65-69%	3%	7%	15%	20%	24%	33%	27%	54%
CR 60-64%	3%	8%	19%	24%	29%	38%	31%	58%
CR 55-59%	4%	11%	23%	29%	35%	44%	35%	63%
CR 50-54%	5%	12%	26%	33%	38%	47%	39%	67%
CR 30-49%	13%	27%	48%	56%	62%	70%	70%	88%
CR <30%	69%	86%	93%	95%	96%	97%	96%	99%

The below matrix summarizes the aggregate regression results table to show default probability for the following key KPIs (see the Portfolio Quality report section for more details on these KPIs[12]): RAR(CDU) of >30 days and >90 days, and RAR(CR) of <70% and <50%:

Aggregate Default Probability Matrix

	CDU >30	CDU >90
CR ≥70%	20%	26%
CR <70%	51%	59%
CR <50%	81%	87%

The matrix above displays "and" relationships, for example a combination of "CDU >30 and CR <50%". The default probabilities were also analyzed on an "or" basis to assess the relevance of combining KPIs in this way[13], for instance "CDU >30 or CR <50%" showed a default probability of 41%.

The multiple regression analysis was complemented by descriptive statistical analysis, analyzing actual defaults observed in the datasets. In terms of actual default, 64%[14] of actual defaults could be identified through the customer initially having a CR <50%, and 54%[15] of actual defaults could be identified through the customer initially having a CDU >30 days. This suggests the threshold of CR <50% may contain more of the identified defaults than the threshold of CDU >30 days. However, analysis within these indicators

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[10] Contract age: the number of days since a customer first acquired their unit.
[11] In all the regressions carried out, p-values demonstrated strong statistical significance in null hypothesis significance testing.
[12] Multiple other thresholds for these KPIs were considered in this determination vis-à-vis their added value. For example, CDU >60 days was also considered, however it is deemed to be too late to identify an issue early enough (compared to 30 days) and 30 days already shows a promising result.
[13] This approach captures customers who are only in a risky category for one KPI but not the other, for example CDU of zero days but CR <50%.
[14] Weighted by company, meaning that each company has an equal contribution to the results.
[15] Weighted by company.

suggests there is clear information gain when combining both CDU and CR together. When including customers with "CDU >30 or CR <50%" (the third column in the below table), 80%[16] of actual defaults were identified, supporting that both of these KPIs show promise as indicators of tracking credit risk.

			Aggregate Actual Default					
	CDU >30	CR <50	CDU >30 or CR <50	CDU >30 & CR <50	CDU >30 & CR >50	CDU <30 & CR <50	CDU <30 & CR >50	Total
Observations	52,273	125,969	138,646	39,596	12,677	86,373	329,642	468,288
Defaults	38,275	68,537	72,948	33,864	4,411	34,673	6,914	79,862
Default % (wt. by observations)	73%	54%	53%	86%	35%	40%	2%	17%
Default % (wt. by company)	58%	49%	45%	72%	32%	33%	2%	14%
Default % of total (observations)	48%	86%	91%	42%	6%	43%	9%	-
Default % of total (company)	54%	64%	80%	38%	16%	26%	20%	-

The actual default (weighted by company) for clients with an initial CDU >30 days (58%) or CR <50% (49%) increases to 72% when looking at clients that initially had both "CDU >30 and CR <50%" (the fourth column in the above table).

The "CDU>30 or CR <50%" category (which identified 80% of defaults) also includes a sizeable number of customers who did not default, however the actual default rate of the category (45%) is high enough to be a worthwhile indicator, signaling significant credit risk, and the category is not too wide to be ineffective (less than one-third of total observations: 29%).

Overall, this suggests the usefulness of the combined use of both predictors as well as the application of the thresholds, which represent higher or lower risk of default depending on the combination of CDU and CR the client has initially. Please note that averages weighted by company have been preferred to averages weighted by observations in this analysis, to mitigate sampling bias (i.e. the firms with more data) and to ensure representativeness for the range of firms in the sample.

Given that the above analysis was carried out over a 6-month time interval, it is possible for some customers designated as defaulted to come out of default at a later stage, after the period of analysis. However, a transition analysis of customers who started in a default category showed that few customers recovered after 6 months. Nearly all (97%) of customers who started in the CR <30% category ended up in the same CR <30% category, and 85% of customers in CDU >180 stayed in CDU >180 after 6 months. The full transition matrix is contained later in the cohort analysis section.

Simple Regression Relationship

The simple regression analysis evaluated the individual KPI's correlation with eventual default, with all other factors held constant. Similarly, the overall trend indicated that an increase in CDU had a positive correlation with likelihood of default and a decrease in CR also has a positive correlation with likelihood of default (both relationships measured independently).

The below matrix displays default probability for the key KPIs from the univariate analysis, with the chosen CDU thresholds having a higher aggregate default probability. Also notable is that CDU >30 and CR <50% have similar default probabilities and are both above >60% default probability, suggesting the relevance of both KPI thresholds individually:

Aggregate Default Probability

CDU >30	CDU >90	CR <70%	CR <50%
60%	73%	27%	61%

In the illustrations below, the first figure plots the relationship between CR and the likelihood of default corresponding to each range and the second figure plots the relationship between CDU and the
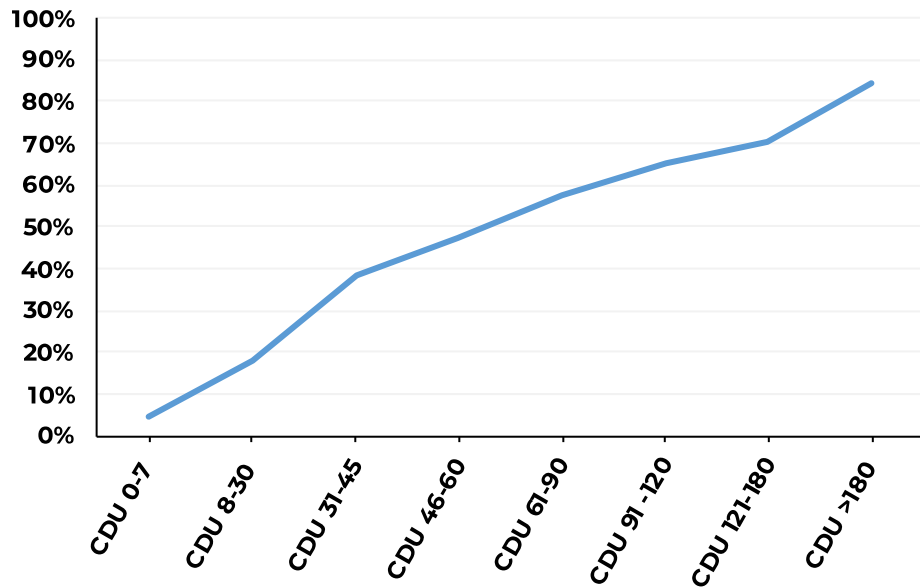
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[16] Weighted by company.

likelihood of default corresponding to each range. Both graphs are aggregated results from the three companies.

Probability of Default for Collection Rate Groups
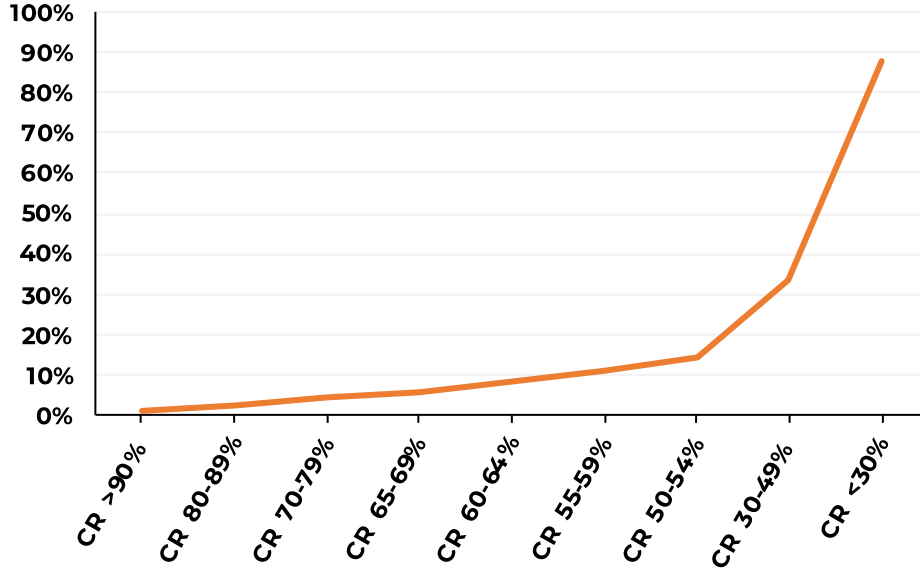

Probability of Default for CDU Groups

The model shows a significant increase in likelihood of default for groups as early as CDU >7 days and particularly, CDU >30 days. Changes in CR signal a significant increase in likelihood of default when Collection Rates decline to levels below 50%.

Cohort Analysis

The third part of the analysis evaluates differences in payment patterns for customers at various stages of their contracts and if the KPIs should be interpreted differently depending on the age of the unit/contract. In this context, the customer data sets were split into cohorts according to the number of days they have been active. There were four main cohorts, as below:

–   Customers who have had their units for 31-75 days[17]
–   Customers who have had their units for 75-180 days
–   Customers who have had their units for 181-365 days
–   Customers who have had their units for more than 1 year

Probability of Default for CDU Groups - Cohorts
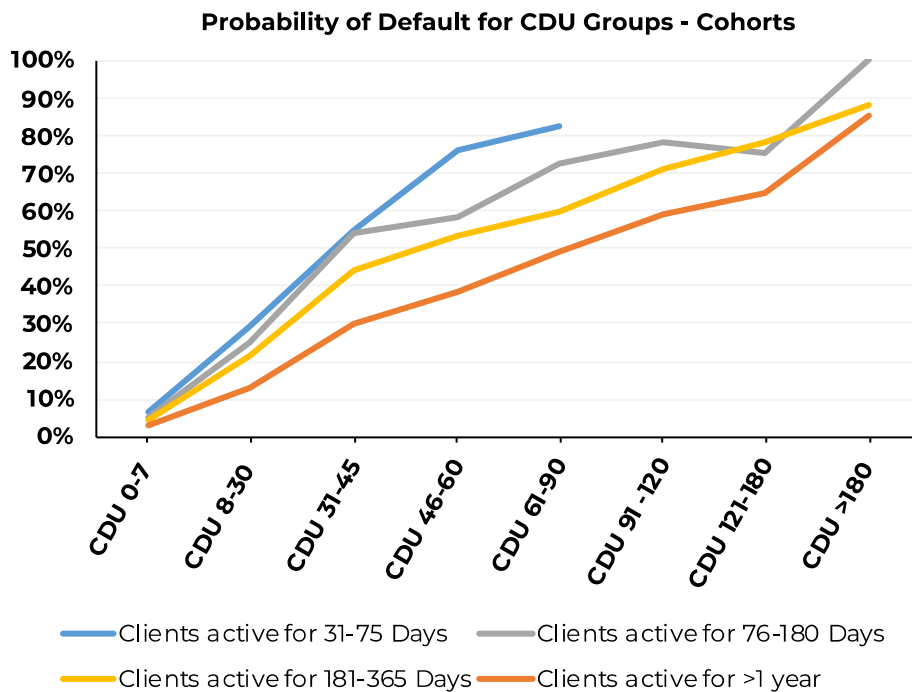
A key takeaway from this comparison is the varying degree of sensitivity to the KPIs. For customers in early stages of their contracts, there was a steeper increase in the likelihood of default with gradual deterioration of the KPIs as compared to older cohorts. To better highlight this contrast, the plot above shows the relationship between CDU and the likelihood of default for customers who have had their units for 31-75 days, 76-180 days, 181-365 days, and for more than 1 year.

These results suggest that customers have higher chances of default if they fall into late payment categories during their early contract days than older contract days.

Similar results were observed when comparing the effect of CR on the two groups. The plot below shows the relationship between CR and the likelihood of default for customers who have had their units for fewer than 75 days and customers who have had their units for more than 1 year.

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[17] Not including customers who have had their units for less than 30 days, to exclude contracts in their very early stages, during which clients often tend to make prepayments, leading to a volatile Collection Rate.

Probability of Default for Collection Rate Groups - Cohorts

— Clients active for 31-75 Days   — Clients active for 76-180 Days
— Clients active for 181-365 Days   — Clients active for >1 year
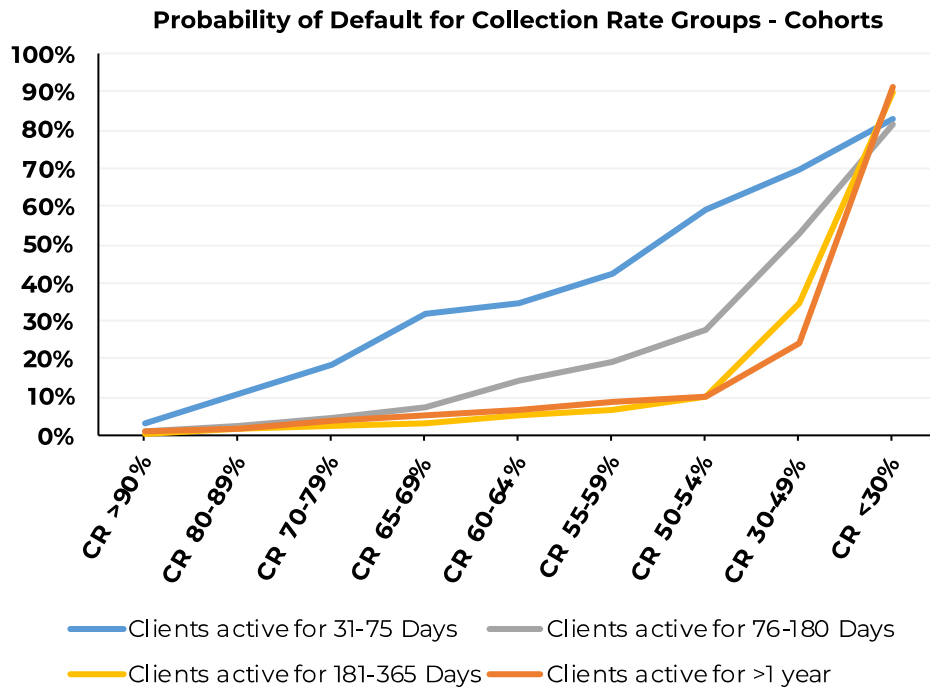
As highlighted, customers are more likely to default if they fall into low CR categories during their early contract days than older contract days. New customers tend to show good payment patterns and signs of delinquency at such an early stage (<75 days from unit acquisition) are generally good precursors of eventual default.

A transition analysis can be helpful to better understand the movement from KPI groups to other KPI groups in terms of actual default observations. The following matrices analyze sample customers and how they transitioned from their initial KPI groups at the beginning of the period (T1) to their status six months later at T2.[18] For example, in the first matrix below, the first row contains the proportion of customers who were initially in CDU 0-7 days that remained in CDU 0-7 (55%) as well as those who transitioned into riskier categories, such as CDU 8-30 (22%). The bolded figures refer to when the customer started and ended in the same category.

The two transition matrices below suggest that Collection Rate is better than CDU at tracking portfolio in the long-term, and is an overall more stable indicator of default. This is likely due to the fact that it is easier for a customer to make a significant jump in CDU category (i.e., by making one payment) than a CR category (i.e. consistent change in repayment behavior, with the exception of early-stage contracts):

CDU Transition Matrix

	CDU 0-7	CDU 8-30	CDU 31-45	CDU 46-60	CDU 61-90	CDU 91-120	CDU 121-180	CDU >180
CDU 0-7	**55%**	22%	5%	3%	4%	3%	6%	1%
CDU 8-30	40%	**27%**	7%	4%	5%	4%	7%	5%
CDU 31-45	27%	21%	**8%**	5%	7%	5%	10%	18%
CDU 46-60	23%	16%	7%	**6%**	6%	5%	9%	28%
CDU 61-90	17%	15%	7%	3%	**6%**	5%	9%	39%
CDU 91-120	13%	11%	5%	3%	6%	**4%**	8%	51%
CDU 121-180	10%	8%	4%	3%	5%	3%	**7%**	61%
CDU >180	4%	3%	1%	1%	2%	1%	3%	**85%**

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[18] The CDU and CR transition matrices represent the dataset of one sample company. All receivables are captured in this analysis, including customers who had their receivables written-off during the period.

CR Transition Matrix

	CR >90%	CR 80-89%	CR 70-79%	CR 65-59%	CR 60-64%	CR 55-59%	CR 50-54%	CR 30-49%	CR <30%
CR >90%	**58%**	21%	12%	2%	2%	1%	1%	2%	1%
CR 80-89%	6%	**30%**	35%	10%	6%	4%	3%	5%	1%
CR 70-79%	0%	6%	**29%**	20%	17%	9%	7%	10%	2%
CR 65-59%	0%	1%	9%	**15%**	21%	22%	12%	18%	3%
CR 60-64%	0%	0%	3%	6%	**15%**	23%	21%	27%	4%
CR 55-59%	0%	0%	1%	3%	6%	**16%**	23%	44%	6%
CR 50-54%	0%	0%	0%	1%	2%	7%	**16%**	66%	8%
CR 30-49%	0%	0%	0%	0%	0%	1%	2%	**62%**	34%
CR <30%	0%	0%	0%	0%	0%	0%	0%	3%	**97%**

Analysis of transitions by cohorts below indicates lower stability for both KPIs for customers active 31-75 days. However, Collection Rate still presents a more discernible pattern, while the transition across CDU groups remains erratic even at early stages of the contract:

CDU Transition Matrix - Customers having units 31-75 days

	CDU 0-7	CDU 8-30	CDU 31-45	CDU 46-60	CDU 61-90	CDU 91-120	CDU 121-180	CDU >180
CDU 0-7	**57%**	23%	5%	2%	4%	3%	4%	1%
CDU 8-30	40%	**29%**	6%	2%	5%	4%	7%	6%
CDU 31-45	22%	18%	**3%**	4%	8%	6%	12%	27%
CDU 46-60	11%	9%	11%	**5%**	5%	4%	14%	43%
CDU 61-90	17%	9%	1%	3%	**1%**	4%	5%	59%

CR Transition Matrix - Customers having units 31-75 days

	CR >90%	CR 80-89%	CR 70-79%	CR 65-59%	CR 60-64%	CR 55-59%	CR 50-54%	CR 30-49%	CR <30%
CR >90%	**37%**	13%	12%	6%	6%	5%	4%	12%	5%
CR 80-89%	3%	**7%**	11%	4%	7%	8%	13%	32%	16%
CR 70-79%	1%	3%	**5%**	6%	6%	8%	7%	39%	27%
CR 65-59%	0%	2%	2%	**4%**	7%	2%	6%	34%	42%
CR 60-64%	0%	2%	2%	2%	**2%**	3%	9%	34%	46%
CR 55-59%	0%	0%	1%	0%	4%	**4%**	2%	33%	56%
CR 50-54%	0%	0%	0%	3%	0%	3%	**3%**	10%	82%
CR 30-49%	0%	0%	2%	0%	1%	2%	2%	**19%**	73%
CR <30%	0%	0%	0%	4%	0%	0%	4%	8%	**83%**

Recommendation

Regression analysis complemented by descriptive statistical analysis shows that RAR(CR) and RAR(CDU) are both relevant for the industry and provide key insight into credit risk.

Both RAR(CR) and RAR(CDU) demonstrated to be effective predicators of default, and even more so in early contract stages. For RAR(CDU), RAR30 appears to be a reasonable threshold to trigger additional credit risk monitoring and could potentially be adopted as an industry standard. For RAR(CR), <50% is deemed a reasonable threshold. Both KPIs are considered important, considering the regression analysis complemented by other descriptive analysis of actual defaults and the relative contribution of RAR(CR) and RAR(CDU).

The KPIs may need to be interpreted differently depending on the age of the unit. Missed payments during the early stages of a contract signify higher credit risk than would be associated with more mature customers.

A goodness-of-fit using McFadden's pseudo r-squared was also used for fitting the overall model. For all datasets analyzed, the multiple regression model (using both CDU and CR) has a higher pseudo r-

squared value than any of the simple regression models (using either CDU alone or CR alone). For some datasets, the addition of CR added more value than CDU in pseudo r-squared terms, whereas for other datasets it was the opposite, suggesting some variability between various companies and suggesting that it is important to track both KPI as indicators of credit risk.
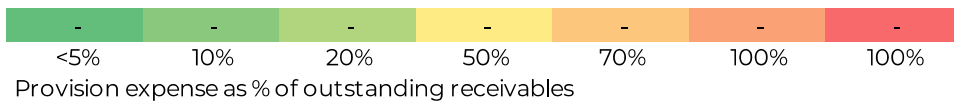
RAR(CR) is a more stable indicator overall, though it typically deteriorates over time and on average, being at high levels for new customers and lower levels for mature customers. As such, the indicator may present some shortcomings in terms of comparability; recently established companies with a larger proportion of new customers may perform better than companies with a larger proportion of older customers. However, RAR(CR) is less reactive to deteriorating payment behavior for later stage clients which can be best captured by RAR(CDU); for example, a receivable having 30 days without a single payment is risky, even if the customer was paying well before and still maintains a high cumulative CR since unit acquisition. That said, RAR(CDU) KPI thresholds are best complemented together with RAR(CR) KPI thresholds because it is enough to make only one payment today for a customer to come out of RAR(CDU), even if the historical payments and CR are very low, representing substantial credit risk.

The significant correlation between default risk on one end and RAR(CR) and RAR(CDU) on the other end may offer opportunities to provision for the credit risk in a data driven manner. Companies that may find this useful can define a tailored provisioning policy based on their own data and the expected loss associated with each combination of RAR(CR) and RAR(CDU). Please find below an illustrative example (not prescriptive). Unlikely combinations of RAR(CR) and RAR(CDU) are greyed out:

Provisioning Matrix

	CDU 0-7	CDU 8-30	CDU 31-45	CDU 46-60	CDU 61-90	CDU 91-120	CDU 121-180	CDU >180
CR >90%	-	-	-	-	-	-	-	-
CR 80-89%	-	-	-	-	-	-	-	-
CR 70-79%	-	-	-	-	-	-	-	-
CR 65-69%	-	-	-	-	-	-	-	-
CR 60-64%	-	-	-	-	-	-	-	-
CR 55-59%	-	-	-	-	-	-	-	-
CR 50-54%	-	-	-	-	-	-	-	-
CR 30-49%	-	-	-	-	-	-	-	-
CR <30%	-	-	-	-	-	-	-	-

Legend

-	-	-	-	-	-	-
<5%	10%	20%	50%	70%	100%	100%

Provision expense as % of outstanding receivables

Back to portfolio quality KPIs summary

5. Financial Performance KPIs

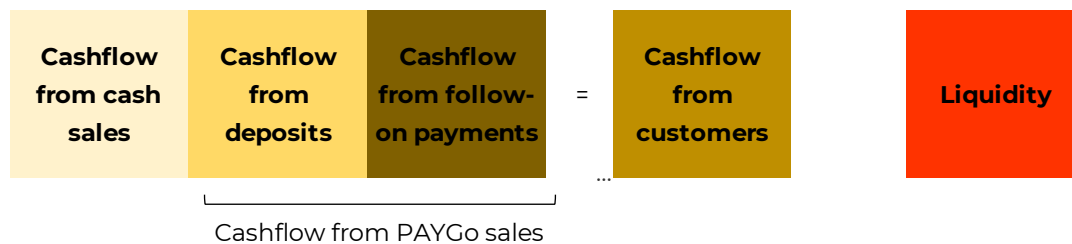**1. Summary of financial performance KPIs**

Financial performance depends on several factors, including the risk management and profile of portfolio quality, productivity and efficiency (including scale), operations, technology and systems, financial profile, market positioning and context. Sustainability through profitability is a vital goal for the long-term success of the off-grid solar PAYGo industry. This section describes useful KPIs to measure, monitor and manage some key quantitative aspects of financial performance.

Financial performance KPIs belong to two families:
1. <u>Firm level KPIs</u>, analyzing a firm's costs, margins and liquidity;
2. <u>Unit level KPIs</u>, focusing on the amounts of cashflow, variable and semi-variable cost, per unit.

Both levels are important to inform effective management. Unit economics is useful at product level if the underlying data are available (some cost items are challenging to break down by product). Please find below the key components of the financial performance KPIs and a simplified illustration of how they fit together. Detailed explanations by KPI are available in the following sections of the report.

Cashflow (i.e. proxy for revenue) **components:**   **Liquidity:**
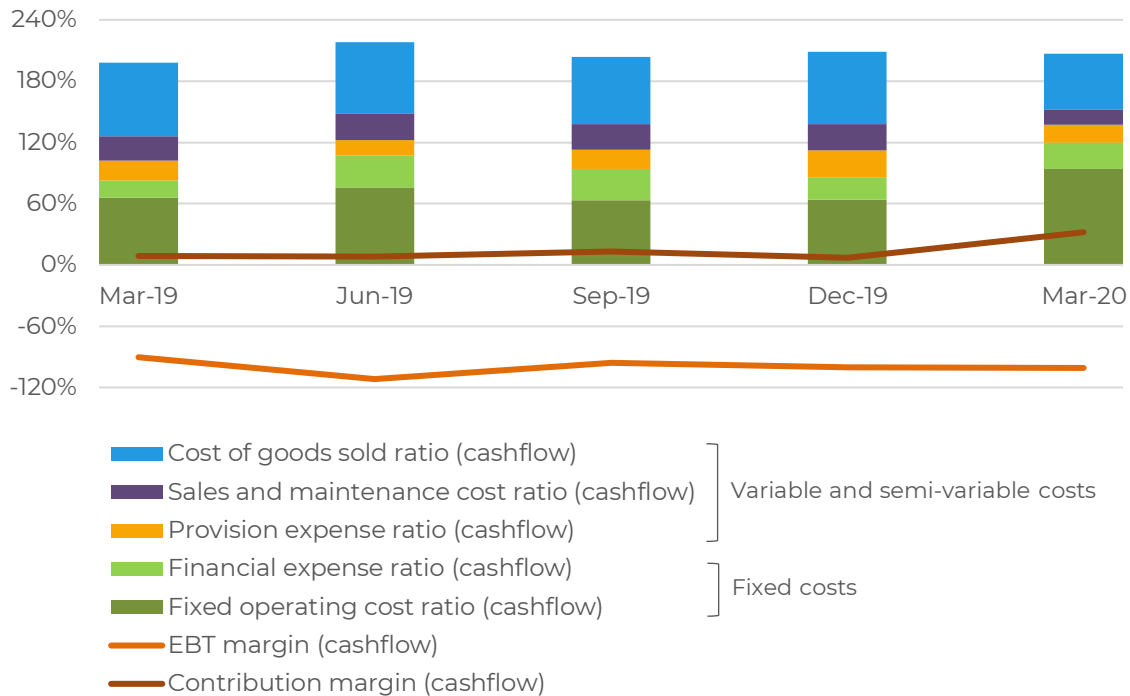
| Cashflow from cash sales | Cashflow from deposits | Cashflow from follow-on payments | = | Cashflow from customers | | Liquidity |

Cashflow from PAYGo sales

Cost components:

| Cost of goods sold | Sales and distribution cost | Servicing and maintenance cost | Provision expense | Financial expense | Fixed operating cost |

Variable and semi-variable costs   Fixed costs

Units:

| Number of cash units sold | Number of PAYGo units sold | = | Number of units sold | | Number of active units |

Firm level KPI	Numerator	Denominator
Cost of Goods sold ratio (cashflow)	CoGS	
Sales and maintenance cost ratio (cashflow)	Sales & distr. + Ser. & maint.	
Provision expense ratio (cashflow)	CoGS	
Contribution margin (cashflow)	Cashflow - CoGS - Sales & distr. - Ser. & maint. - Provision	
Fixed cost ratio (cashflow)	Financial + Fixed operat.	Cashflow
Financial expense ratio (cashflow)	Financial	
Fixed operating cost ratio (cashflow)	Fixed operat.	
EBT margin (cashflow)	____ - CoGS - Sales & distr. - Ser. & maint. - Financial - Fixed operat. - CoGS	
Liquidity / Total cost	Liquidity	CoGS + Sales & distr. + Ser. & maint. + CoGS + Financial + Fixed operat.

Unit level KPI	Numerator	Denominator
Unit customer deposits	Deposits	PAYGo units
Unit follow-on payments	Follow-on p.	PAYGo units
Unit cash sales	Cash sales	Cash units
Unit device cost	CoGS	Units sold
Unit sales and distribution cost	Sales & distr.	Units sold
Unit servicing and maintenance cost	Ser. & maint. Adj. for effective credit period	Active units
Unit provision cost	CoGS	Active units
Unit contribution margin	$\dfrac{\text{Cashflow} - \text{CoGS} - \text{Sales \& distr.}}{\text{Units sold}} - \dfrac{\text{Ser. \& maint.} + \text{CoGS}}{\text{Active units}}$	

Please find in the two graphs below (Firm level and Unit level) an example of how financial KPIs can be analyzed jointly, based on the average data for a sub-sample of 6 firms included in the pilot (not necessarily representative of the industry), for which data are consistently available over the periods considered. Due to confidentiality reasons, the data presented here below are an average from multiple firms; however, it is recommended to conduct the financial analysis at the level of single country firms for more meaningful insights.

Firm level: cost components and margins

- ■ Cost of goods sold ratio (cashflow) ⎤
- ■ Sales and maintenance cost ratio (cashflow) ⎥ Variable and semi-variable costs
- ■ Provision expense ratio (cashflow) ⎦
- ■ Financial expense ratio (cashflow) ⎤ Fixed costs
- ■ Fixed operating cost ratio (cashflow) ⎦
- — EBT margin (cashflow)
- — Contribution margin (cashflow)

The firm level graph presents the margins after variable and semi-variable costs, i.e. Contribution margin (cashflow), and after total costs, i.e. EBT margin (cashflow). The evolution of margins over time can be partly explained by the evolution of the level of total costs relative to cashflow, and the composition of total costs by cost of goods sold, sales and maintenance cost, provision expenses, financial expenses and fixed operating costs. The analysis can link the level of margins to the level of fixed costs (financial expenses and fixed operating cost) relative to the total costs. Market positioning (size of devices, tenure and warranty period), financial strategy, investments, growth and portfolio quality are among the factors that can be related to the financial KPIs presented in this graph.

The unit level is different than the firm level graph in that the costs and margins are not divided by cashflow but by number of units, to provide the unitary amounts in currency value (USD in this case). Moreover, unlike the firm level analysis, the unit economics analysis focuses on variable and semi-variable costs only, adopting a marginal perspective beyond fixed costs. The unit level graph illustrates the evolution of variable and semi-variable costs, as an aggregate and broken down by key unitary cost components, including: sales and distribution cost, servicing and maintenance cost, and provision cost. These are helpful to consider when analyzing the evolution of the Unit contribution margin, expressing the cashflow after variable and semi-variable costs in unitary terms. Unit sales and distribution costs are analyzed separately from unit servicing and maintenance costs due to the unit economics focus on variable and semi-variable costs (while they are combined in the Sales and maintenance cost ratio in the firm level analysis).

Unit level: cost components and margins

Legend:
- Unit provision cost
- Unit servicing and maintenance cost
- Unit sales and distribution cost
- Unit device cost

Variable and semi-variable costs

- Unit contribution margin
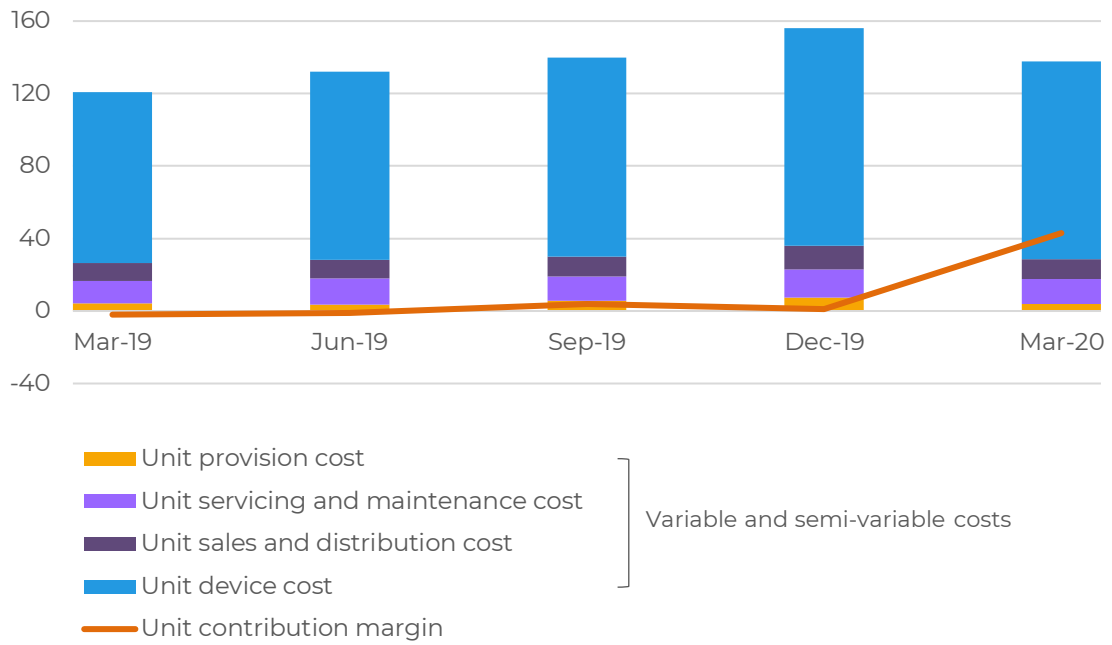
2. Cashflow versus revenue-based financial performance KPIs

Cashflow-based KPIs are useful for now because they are currently more comparable across firms given the variety of revenue recognition approaches now in use. However, as progress is made in harmonizing the revenue recognition policies, it is recommended to replace revenue with cashflow in the calculation of the following KPIs in the medium term:

- EBT margin = (Sales revenue – Total costs) / Sales revenue;
- Contribution margin: (Sales revenue – Total variable & semi-variable costs) / Sales revenue;
- Cost of goods sold ratio = (Cost of goods sold) / Sales revenue;
- Sales and maintenance cost ratio = (Sales and distribution cost + Servicing and maintenance cost + Other variable and semi variable costs) / Sales revenue;
- Provision expense ratio = Provisioning expenses / Sales revenue;
- Fixed cost ratio = (Financial expense + Other fixed costs) / Sales revenue;
- Financial expense ratio = Financial expenses / Sales revenue;
- Fixed operating cost ratio = Other fixed costs / Sales revenue.

The development of accounting guidelines planned in the short term may contribute to progressing towards harmonized standards for revenue recognition. As revenue recognition practices converge towards good practice standards, it will be preferable to calculate the KPIs based on revenue, given that the cashflow-based ratios are somewhat mismatched, comparing a cashflow statement item (cashflow) to an income statement, accrual basis item (costs). The medium-term nature of the business is reflected in cashflow being generally lower than revenue. This, along with the variety of current revenue recognition practices (see section 7.1), is illustrated by the following differences from the pilot data in headline KPIs between cashflow and revenue calculation:

EBT margin	Cashflow	Revenue
Calculation	(Cashflow from Customers – Total Costs) / Cashflow from Customers	(Sales revenue – Total costs) / Sales revenue
Average	-296%	-68%
Standard deviation	382%	69%
Relative difference between revenue version and cashflow version: average 40%; min 80%; max 102%		
Firms where the revenue version yields higher results than the cashflow version: 8/11		
Number of firms: 11		

Contribution margin	Cashflow	Revenue
Calculation	(Cashflow from Customers – Total Variable & Semi-variable Costs) / Cashflow from Customers	(Sales revenue – Total variable & semi-variable costs) / Sales revenue
Average	-34%	31%
Standard deviation	67%	36%
Relative difference between revenue version and cashflow version: average 100%; min -153%; max 334%		
Firms where the revenue version yields higher results than the cashflow version: 8/11		
Number of firms: 11		

3. Cost of Goods Sold Ratio (cashflow)

Priority: 2	Definition: Cost of goods sold as a proportion of the total cashflow from customers	
Calculation	Initial -	Recommended Cost of goods sold / Cashflow from customers

Cost of goods sold ratio (cashflow)

| Number of firms: | 3 | 7 | 7 | 7 | 7 | 7 | 6 |

Cost of goods sold ratio (cashflow)

| Number of firms: | | 7 | 8 | |
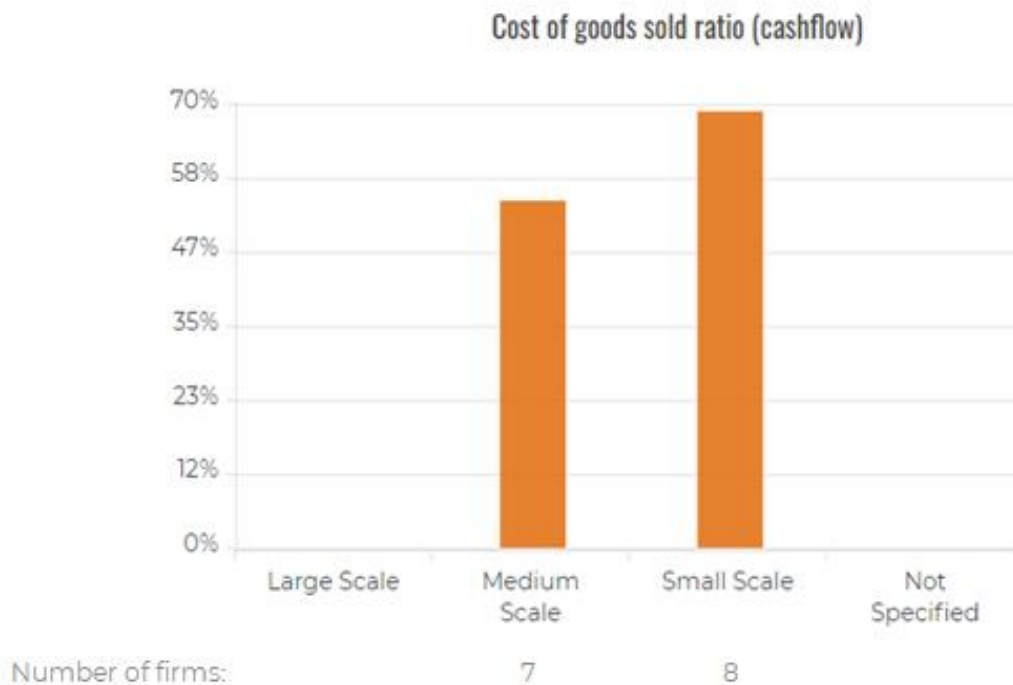
With a median of 69% in total for the period 2018-2020, the Cost of goods sold ratio (cashflow) is the most important component of companies' variable and semi-variable costs in the sample. Similar to other financial performance KPIs, growing from small to medium size appears to benefit companies' results.

Recommendations

This is a newly proposed KPI to define key expense ratios that together cover all the main expenses incurred by PAYGo companies: cost of goods sold, sales and maintenance cost, provision expenses, financial expenses, and fixed operating costs.

The expense ratios are compared against cashflow from customers. Cashflow is used instead of revenue due to widely divergent revenue recognition policies. The asset base (e.g. assets, outstanding receivables) is also not used, as a retail accounting approach is to compare expenses to sales. However, PAYGo companies combine elements of multiple company types including a financial institution such that asset base can be considered as a lower priority alternative approach.

The denominator is formulated as cashflow from all customers, including both PAYGo and cash sales cashflows. While there would be value in understanding the PAYGo-specific picture in this KPI and other expense ratios, it is not easily feasible for companies to split firm expenses into PAYGo and cash, as expenses appear together in one line item in financial statements for both sales models.

As discussed in section 5.2, substituting cashflow for revenue in the calculation of the KPI is not ideal and is recommended to be discontinued as soon as revenue recognition policies will be harmonized across the industry.

Back to financial performance KPIs summary

4. **Sales and Maintenance Cost Ratio (cashflow)**

Priority: 2	**Definition**: Sales and maintenance cost as a proportion of the total cashflow from customers	
Calculation	**Initial** -	**Recommended** (Sales and distribution cost + Servicing and maintenance cost + Other variable and semi-variable costs) / Cashflow from customers

Sales and maintenance cost ratio (cashflow)

| Number of firms: | 6 | 6 | 6 | 6 | 6 | 5 |

Sales and maintenance cost ratio (cashflow)
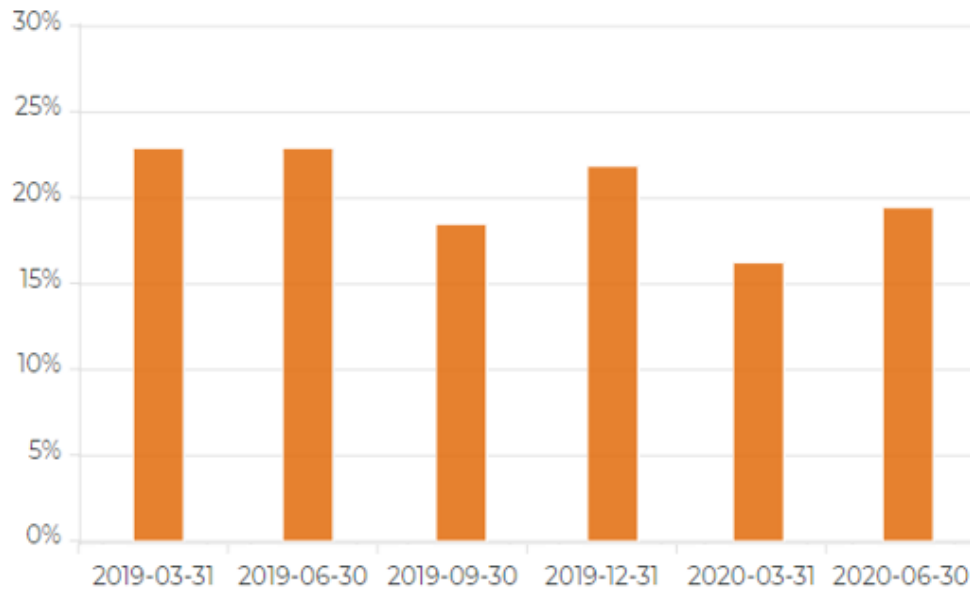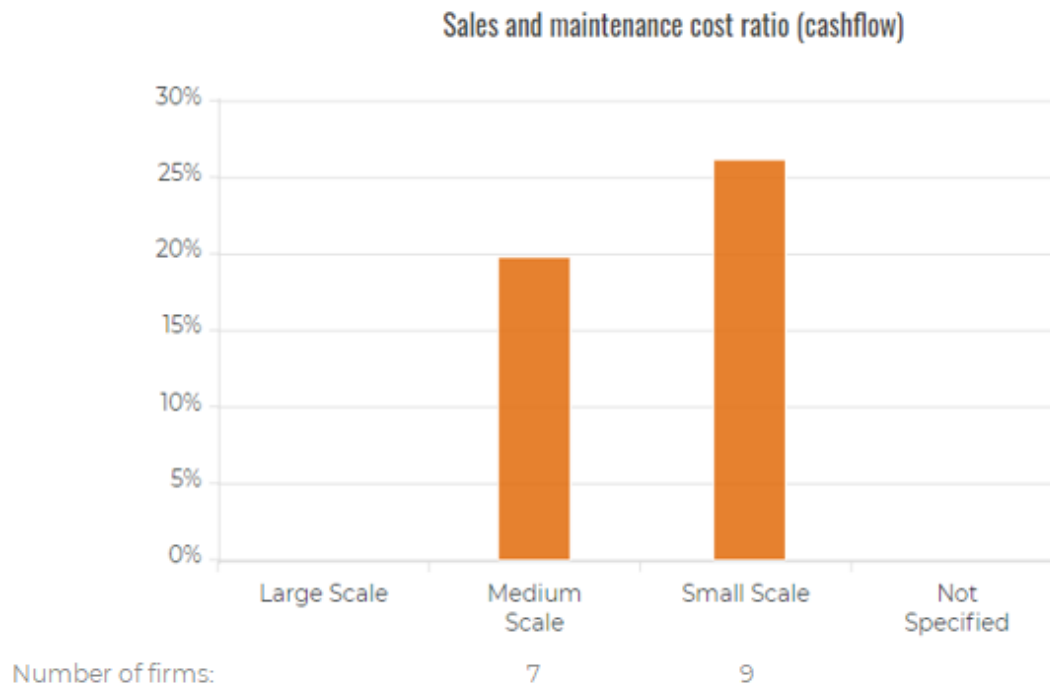
The Sales and Maintenance Cost Ratio (cashflow) displays a median of 23% in total for the period 2018-2020, indicating the significant costs of this business, which is not only employing technology, but is also labor intensive due to the low unitary values of the devices sold and rural outreach. Multiple factors determine the maintenance cost beside the product itself, including the device itself, warranty duration, and cost control strategies. Cost control strategies may include for instance a minimum number of customers needed for the company to provide maintenance in remote locations. Economies of scale appear to be important to optimize this cost ratio.

Recommendations

This is a newly proposed KPI, in order to define key expense ratios that together cover all the main expenses incurred by PAYGo companies.

The proposed KPI includes all variable and semi-variable costs with the exception of cost of goods sold. Sales and distribution cost, servicing and maintenance cost, and other variable costs are all included. A guidance note has been added to Sales and distribution cost to emphasize that in addition to the cost of installing the device at the customer site and transportation cost (from warehouse to customer), that the PAYGo platform fee (if any) should also be included in this KPI.

The reason for combining sales/distribution and servicing/maintenance into the same expense ratio is to limit the total number of expense ratio KPIs. Moreover, the breakdown of sales/distribution separate from servicing/maintenance is not always straightforward (e.g. separating costs for customer service staff who are involved in both sales and servicing).

A guidance note is suggested to provide clarity to the type of expenses which should be categorized as sales/maintenance: cost of servicing a customer (i.e. call center, collection of payments, mobile money fee, customer service), providing maintenance/repair of installed units, and follow-up for repossession. Includes the salaries for all customer service employees. This guidance note is intended to address the challenge some companies experience in separating variable and semi-variable from fixed costs.

As discussed in section 5.2, substituting cashflow for revenue in the calculation of the KPI is not ideal and is recommended to be discontinued as soon as revenue recognition policies will be harmonized across the industry.

Back to financial performance KPIs summary
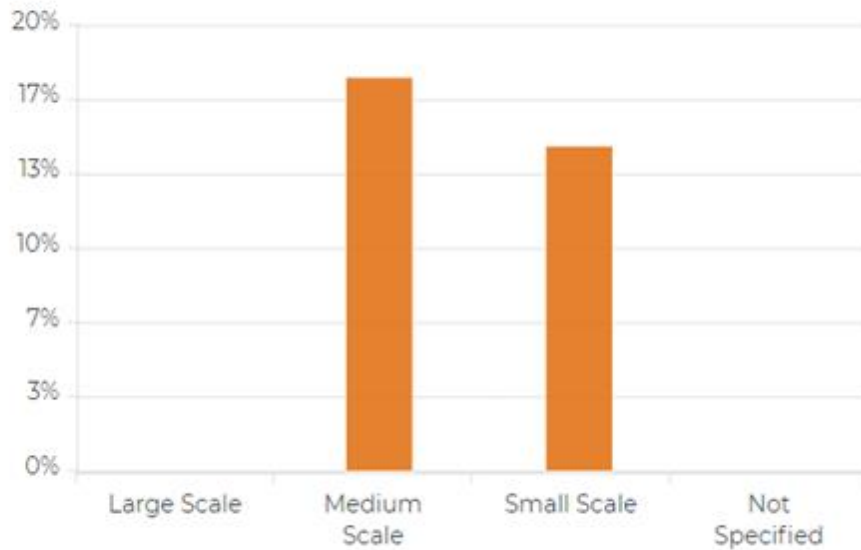
5. Provision Expense Ratio (cashflow)

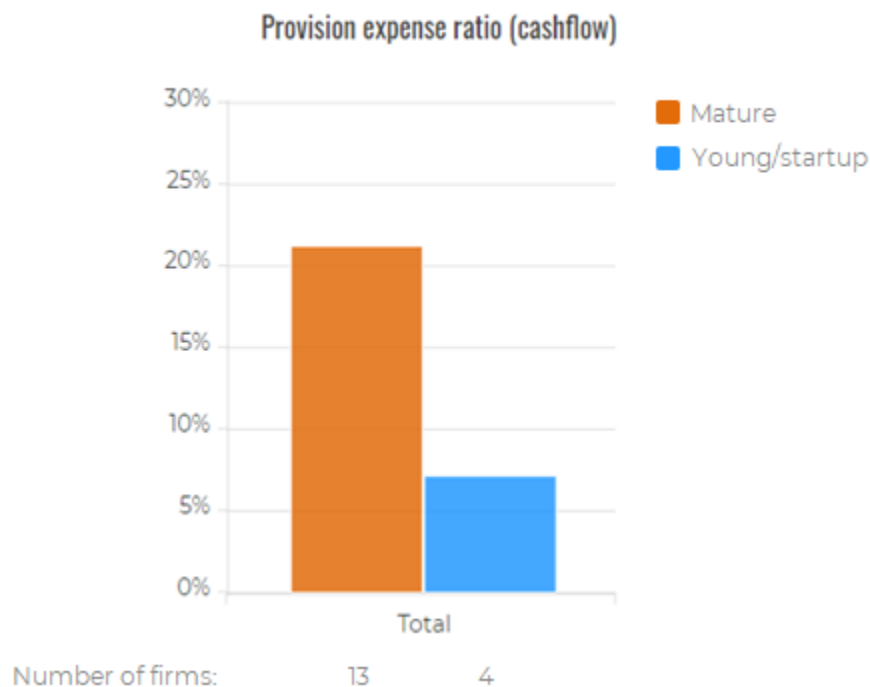| Priority: 2	**Definition**: Loan loss provisioning expenses as a proportion of the total cashflow from customers	
Calculation	**Initial** -	**Recommended** Provisioning expenses / Cashflow from customers

Provision expense ratio (cashflow)
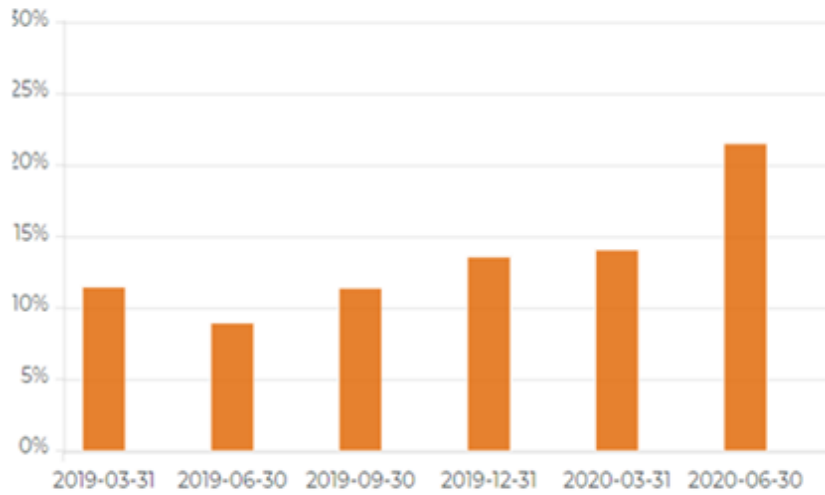
| Number of firms: | 6 | 6 | 6 | 6 | 7 | 6 |

Provision expense ratio (cashflow)

| Number of firms: | | 6 | 9 | |

Provision expense ratio (cashflow)

The Provision Expense Ratio (Cashflow) displays a median of 16% for the total period 2018-2020, with high variability due to the different approaches to provisioning and risk appetites of companies. The higher value for medium size compared to small size companies is consistent with the higher credit risk ratios observed in medium size companies. This is possibly related to the higher ability of mature portfolios to show portfolio quality issues compared to young portfolios, which simply did not have enough time to have issues manifest (please see RAR30 for more details). In fact, mature companies display a higher Provision Expense Ratio (Cashflow) than young, and start-up companies.

The increase in the Provision Expense Ratio (Cashflow) in the second quarter of 2020 appears to be more due to the decrease in cashflow amounts than to the increase in provision expenses. The decrease in cashflow amounts in the second quarter of 2020 may be also related to the impact of COVID19.

Recommendations

This is another newly proposed KPI in the form of an additional semi-variable expense ratio.

The proposed KPI seeks to cover the expenses related to the loan loss reserve that companies record due to expected credit losses from projected doubtful receivables. Currently, some companies provision according to a policy directly based on portfolio quality, while for others it is a general estimation based on a percentage of receivables generated and a rough estimate of historical performance. Some companies have a loan loss reserve on the balance sheet (deducted from the gross outstanding receivables), while others do not constitute a reserve (or allowance) on the balance sheet. When a loan loss reserve is available, the related provisioning cost to feed the reserve in each period is recorded as a specific expense on the income statement and, more rarely, as a negative amount that is deducted from gross sales, to obtain net sales. When a loan loss reserve is available, the amounts written-off do not constitute a cost (the cost is the provision expense) but are off-set against the loan loss reserve (i.e. the gross loan portfolio is reduced and the loan loss reserve is reduced by the amount of write-off). When a loan loss reserve is not available, write-off of doubtful loans can't be absorbed by a reserve and it is registered as a direct cost in the income statement (leading to potentially high write-off amounts concentrated in specific periods).

It is important to clarify that the numerator of the Provision Expense Ratio (Cashflow) is the provisioning expenses (cost in Profit and Loss statement) and not the cumulated loan loss reserve (negative asset in balance sheet).

The loan loss reserve or allowance method allows displaying in a transparent manner both the gross portfolio amount and the reserve built to protect from credit risk, avoiding the risk of displaying an inflated net portfolio amount. Provisioning for incremental credit risk over time through a loan loss reserve is considered as a more prudent approach because the cost of risk is recognized as it matures (even before default), and it is not concentrated in specific periods (when the company decides to write-off). This method is recommended for fair reporting of the value of assets and the cost of risk.

Provisioning expenses not related to credit risk are part of other fixed costs and are not included in the numerator of this KPI.

Companies are encouraged to gradually implement IFRS-9 provisioning guidelines, even if this may not be the case for the majority for now. The convergence towards these practices is very important for prudent risk management, before any consideration related to this specific KPI. When the provisioning policy is set at a level that adequately covers the credit risk of receivables, the amounts written off are deducted from both the gross outstanding receivables and the loan loss reserve (when there is one) on the balance sheet and have no impact on the net income. What is systematically included in the profit and loss statement is the provision expense, which contributes in each period to bring the loan loss reserve to the level needed to cover risks. Provisioning for future credit losses is useful to smooth out the cost of credit risk over time (avoiding over-representing or under-representing net results) and to represent the value of net assets in a prudent manner (i.e. net outstanding receivables = gross outstanding receivables – loan loss reserve)

With respect to the specific KPI Provision Expense Ratio (Cashflow), this shall be regarded as an important expense that any PAYGo company should incur, rather than a comparable portfolio quality metric (due to current variety of provisioning approaches). When looking at Provision Expense Ratio (Cashflow) as a portfolio quality KPI, it is important to remember that this measures the extent to which the existing loan loss reserve was insufficient at the beginning of the year to cover the potential credit loss that arose during the current year, rather than a direct measure of the portfolio quality status. For instance, a high level of Provision Expense Ratio (Cashflow) may be observed when the risk increases over a period (regardless of the starting level of risk) or when more prudent rules re introduced in the provisioning policy. Similarly, the Provision Expense Ratio (Cashflow) can be low even if the level of risk is high, if the risk decreased over the period.

As discussed in section 5.2, substituting cashflow for revenue in the calculation of the KPI is not ideal and is recommended to be discontinued as soon as revenue recognition policies will be harmonized across the industry.

Back to financial performance KPIs summary

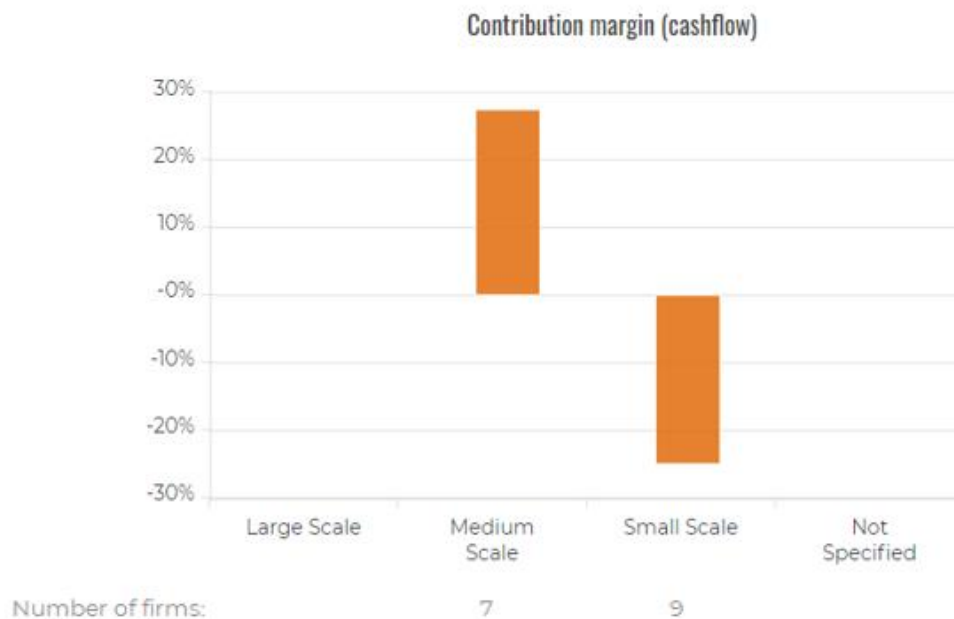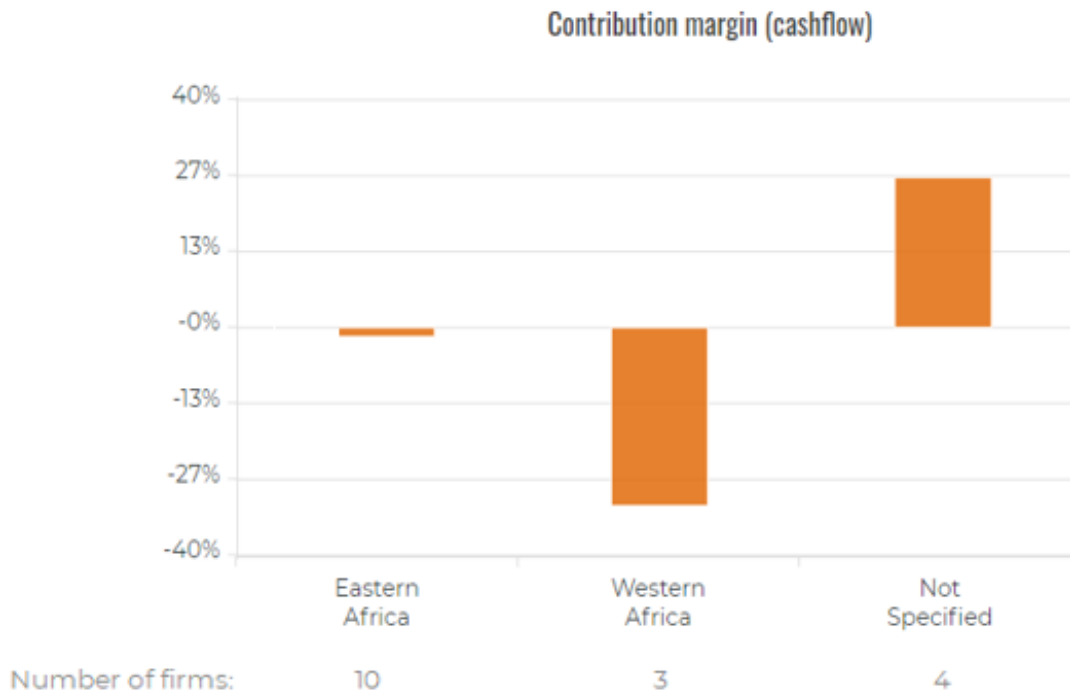**6. Contribution Margin (Cashflow)**

| Priority: 1	**Definition**: The total profit based on variable costs for the PAYGo firm as a proportion of the total cashflow from customers	
Calculation	**Initial** ((Total Cashflow from Customers – Variable Costs) / Total Cashflow from Customers	**Recommended** (Cashflow from customers – Total variable and semi-variable costs) / Cashflow from customers

Contribution margin (cashflow)
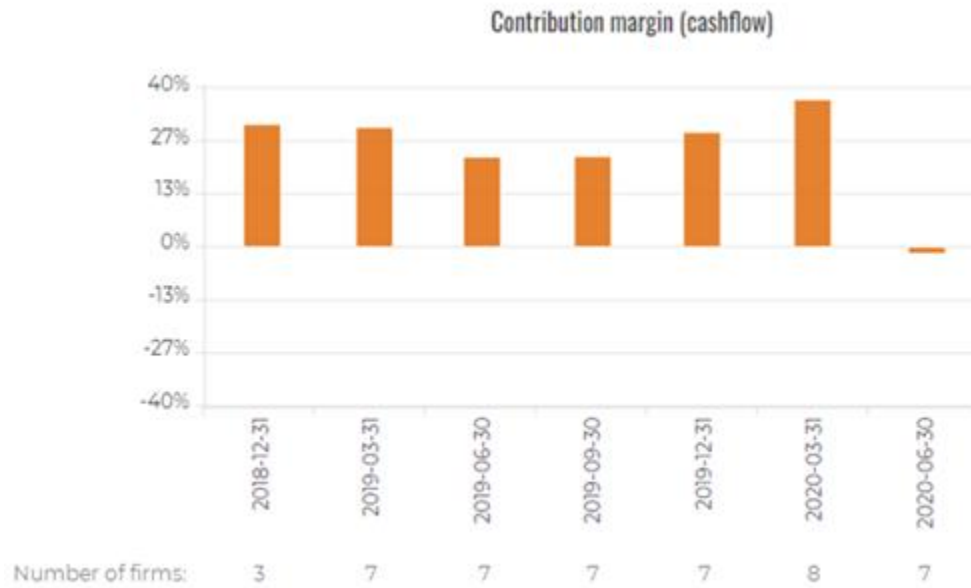
Contribution Margin (Cashflow) displays positive values in total (median of 8% in the period 2018-2020), as it includes variable and semi-variable costs only, as opposed to all costs as the EBT Margin (Cashflow). The increase in Contribution Margin (Cashflow) in the first quarter of 2020 followed by a decrease in the second quarter reflects the evolution of the Cost of Goods Sold Ratio (Cashflow), Sales and Maintenance Cost Ratio (Cashflow) and Provision Expense Ratio (Cashflow). The KPIs worsening in the second quarter of 2020 seems to be more due to a decrease in cashflow from customers (observed in several, even if not all firms), possibly related to COVID-19, rather than to an increase in cost amounts. However, Contribution Margin (Cashflow) recovers starting from June 2020 for a sub-sample of 3 companies with monthly data available. Similarly, the average Collection Rate displays lower levels in April, May, and June 2020, to increase again in July 2020. It is also important to note the caveat about the different firms for which data are available in different periods and the consequent limits of comparability between the trend of aggregate Contribution Margin (Cashflow) and the trend of aggregate Cost of Goods Sold Ratio (Cashflow), Sales and Maintenance Cost (Cashflow) and Provision Expense Ratio (Cashflow).

The better performance in East Africa compared to West Africa, and of medium scale compared to small scale firms, is also observed in this KPI (please note that Not specified indicated groups of firms operating across multiple sub-regions) due to the different weighing of fixed costs by size (see Fixed Cost Ratio (Cashflow)).

Contribution margin (cashflow)

Number of firms:	Eastern Africa	Western Africa	Not Specified
	10	3	4

Contribution margin (cashflow)

Number of firms:	Large Scale	Medium Scale	Small Scale	Not Specified
		7	9	

Contribution Margin (Cashflow) is positive in firms selling products of large and medium size, and negative in firms selling small size products.

Contribution margin (cashflow)

Number of firms: 6   11
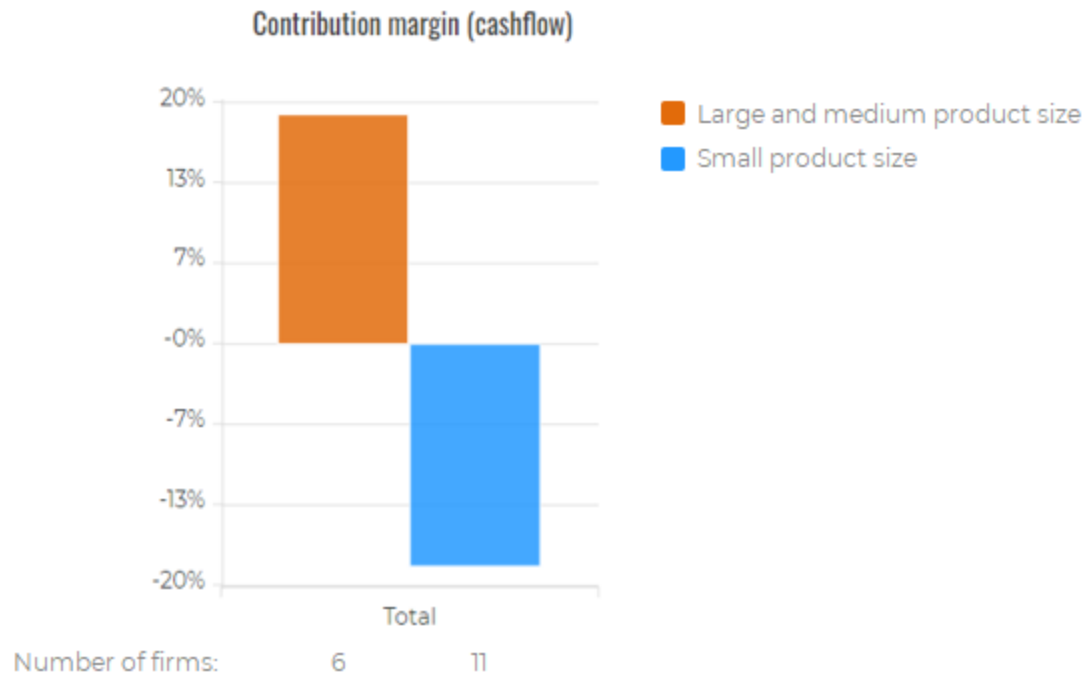
Recommendations

This KPI appears as useful in effectively communicating the portion of cashflow that is absorbed by variable costs, and in turn reflects the margin available for fixed costs and profit (if any). The difference between the positive quarterly result of this KPI in the quarters 2019 and 2020 (first graph) and the negative result in the year 2019 is due to the fact that the former uses group-level data (where the negative results of small country operations weigh little in the average) while the latter uses country firm level data (where the unweighted average is decreased by the negative results of small country operations).

One change in the calculation method is suggested, to include both costs defined as variable and semi-variable in the calculation. There are some companies who include semi-variable costs as a third expense categorization together with variable and fixed. In those cases, semi-variable is a cost which has a relationship with sales even if the relationship is not a fully linear relationship. It is better to include these semi-variable costs in the calculation, to not underestimate the variable / sales-linked costs that companies incur.

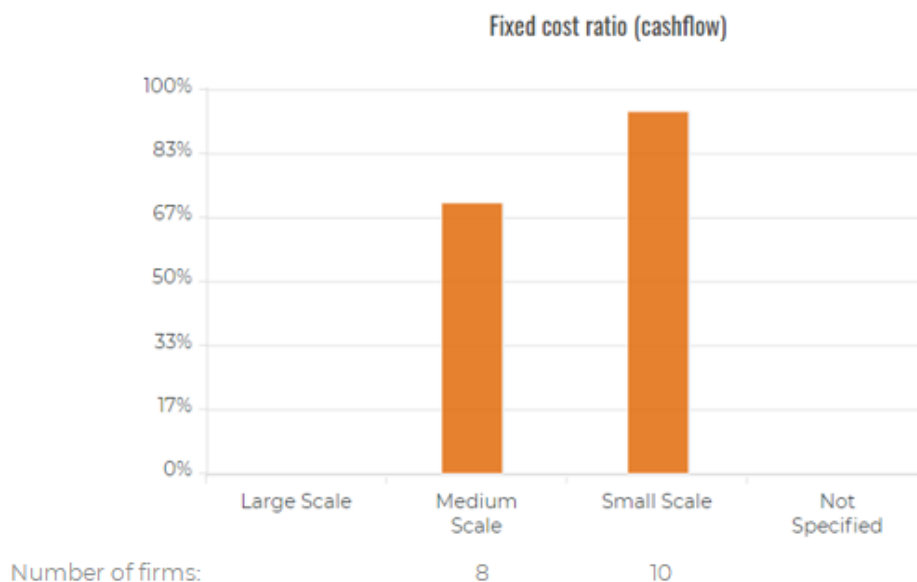Variable and semi-variable costs include:

- Cost of goods sold: The total cost of the device inclusive of hardware, transportation (to the warehouse), import taxes & duties, and stock insurance;
- Sales and distribution cost: The total cost of installing the device at the customer site, transportation cost (from warehouse to customer), PAYGo platform fee (if any), cost of sales agents;
- Servicing and maintenance cost: cost of servicing customers (i.e. call center, collection of payments, mobile money fee, customer service), providing maintenance/repair of installed units, follow-up for repossession. Includes all customer service employees' compensation.
- Other variable costs: including any other variable or semi-variable costs; excluding fixed costs.

As discussed in section 5.2, substituting cashflow for revenue in the calculation of the KPI is not ideal and is recommended to be discontinued as soon as revenue recognition policies will be harmonized across the industry.

7. Fixed Cost Ratio (Cashflow)

Priority: 1	Definition: All fixed costs as a proportion of the total cashflow from customers	
Calculation	Initial -	Recommended (Financial expense + Fixed operating costs) / Cashflow from customers

Fixed cost ratio (cashflow)

	2018-12-31	2019-03-31	2019-06-30	2019-09-30	2019-12-31	2020-03-31	2020-06-30
Number of firms:	3	7	7	7	7	8	7

Fixed cost ratio (cashflow)

	Large Scale	Medium Scale	Small Scale	Not Specified
Number of firms:		8	10	

The Fixed Cost Ratio (Cashflow) displays a high median of 90% for the total period 2018-2020. Fixed costs include financial expenses and fixed operating costs. While economies of scale help reduce the weight of fixed operating costs on the cashflow (see Fixed Operating Cost Ratio (Cashflow) by scale), scale requires funding and leverage, which in turn increases the incidence of financial expenses on cashflow (see Financial Expense Ratio (Cashflow) by scale). The opposite dynamics result in a net decrease in the

Fixed Cost Ratio (Cashflow) when the firms' size grows from small to medium. This is consistent with the higher value of other fixed costs compared to financial expenses in the period of analysis.
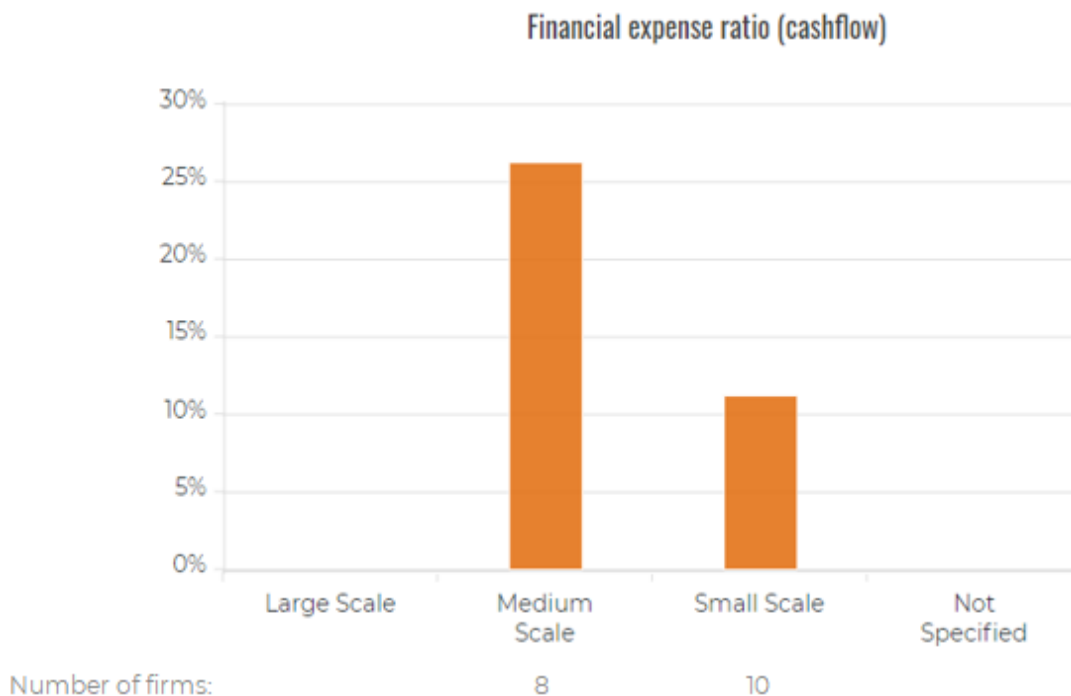
Recommendations

This KPI is suggested to be renamed from Total Overhead Cost as % of Total Cashflow from Customers for consistency with the other KPIs. This indicator represents the impact of fixed costs on cashflow, an important factor to analyze the cost structure and the effect of economies of scale on sustainability.

As discussed in section 5.2, substituting cashflow for revenue in the calculation of the KPI is not ideal and is recommended to be discontinued as soon as revenue recognition policies will be harmonized across the industry.

Back to financial performance KPIs summary

8. Financial Expense Ratio (Cashflow)

Priority: 2	**Definition**: Financial expenses as a proportion of the total cashflow from customers	
Calculation	**Initial** -	**Recommended** Financial expense / Cashflow from customers

Financial expense ratio (cashflow)

| Number of firms: | 3 | 7 | 7 | 7 | 7 | 8 | 7 |

Financial expense ratio (cashflow)

| Number of firms: | | 8 | 10 | |

Financial expenses represent a median of 17% of cashflows over the total period 2018-2020. This reflects the high financing need due to cash flowing out in the short term (majority of costs to run the business) and cash flowing in in the short and medium term (customer payments). Leverage and Financial Expense Ratio (Cashflow) are expected to grow as companies expand to serve the large unmet demand.

While the financial expenses do not display from April to August 2020 significantly different trends than in previous periods, they may be increased in the future by the foreign currency risk of unhedged hard currency loans in some countries.

<u>Recommendations</u>

This is another new proposed KPI as an additional expense ratio.

The proposed KPI contains the expense related to interest and fees that the company pays on borrowed loans. This KPI also covers FX gains/losses, given that FX losses can be a result of unhedged funding of which part of the funding cost is captured in FX losses. The KPI gives an idea of whether funding is maintained at affordable terms.

This KPI does not include financing cost due to equity. Another KPI worth considering is the Cost of Funds Ratio, with a denominator that is borrowings rather than cashflows. In this case, the outcome is the average cost of debt. However, the benefits of using the same denominator for all expense ratios to enhance cumulative analysis may outweigh the upsides of using this variation.

The high funding needs of the industry underscore the importance of liquidity and solvency KPIs. The PAYGo PERFORM working group agreed on integrating one liquidity KPI (see Liquidity / Total cost), while an agreement was not reached to include solvency KPIs.

As discussed in section 5.2, substituting cashflow for revenue in the calculation of the KPI is not ideal and is recommended to be discontinued as soon as revenue recognition policies will be harmonized across the industry.

Back to financial performance KPIs summary

9. Fixed Operating Cost Ratio (Cashflow)

Priority: 2	**Definition**: Fixed operating costs as a proportion of the total cashflow from customers	
Calculation	**Initial** -	**Recommended** Fixed operating costs / Cashflow from customers

Fixed operating cost ratio (cashflow)

| Number of firms: | 3 | 7 | 7 | 7 | 7 | 7 | 6 |

Fixed operating cost ratio (cashflow)

| Number of firms: | | 7 | 8 | |
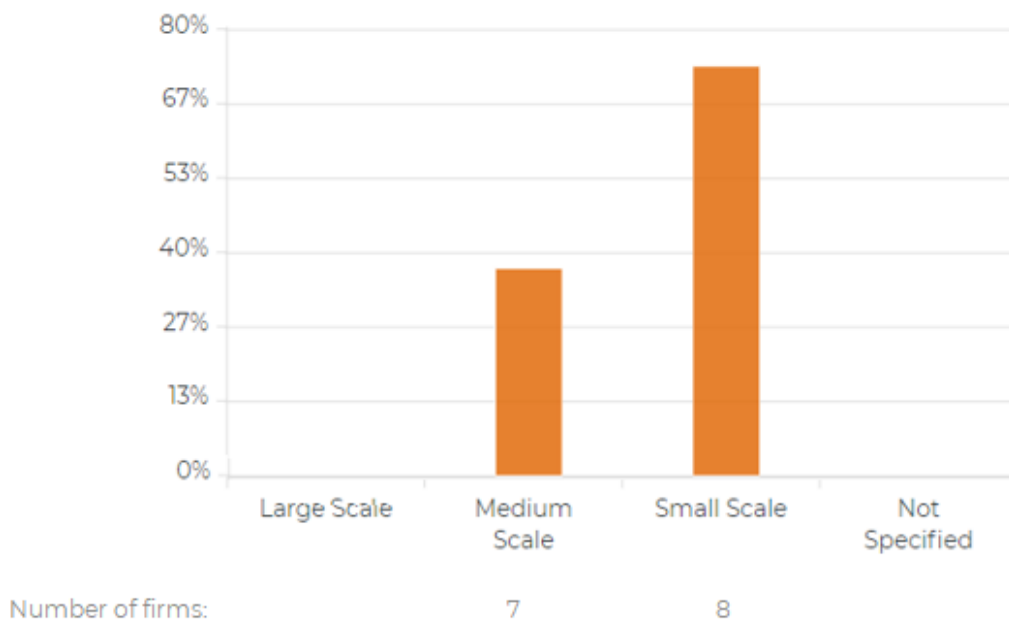
Fixed Operating Cost Ratio (Cashflow) shows a median value of 65% over the period 2018-2020. The high level is due to the significant cost items included in the numerator (e.g. general personnel expenses, administrative expenses and depreciation). However, important improvements in this ratio can be expected from economies of scale, as illustrated by the significantly lower value of this KPI in medium scale compared to small scale firms.

Recommendations

This is another newly proposed expense ratio KPI.

The proposed KPI seeks to cover all operating expenses which are fixed, as opposed to variable / semi-variable. Fixed operating costs include personnel expenses, administrative expenses (including marketing, shops), depreciation and provisioning expenses not related to loan losses. Fixed operating costs do not include financial expenses and taxes.

This KPI is notably similar to the original KPI "Total overhead cost as % of total cashflow from customers" which was set up with a numerator including all fixed costs. The proposed change is for financial expenses to be separated into its own standalone KPI, with fixed operating costs contained in the Fixed Operating Cost Ratio. The original KPI (renamed as Fixed Cost Ratio (Cashflow)) is therefore complemented with two more granular fixed cost ratios: Financial Expense Ratio (Cashflow) and Fixed Operating Cost Ratio (Cashflow).
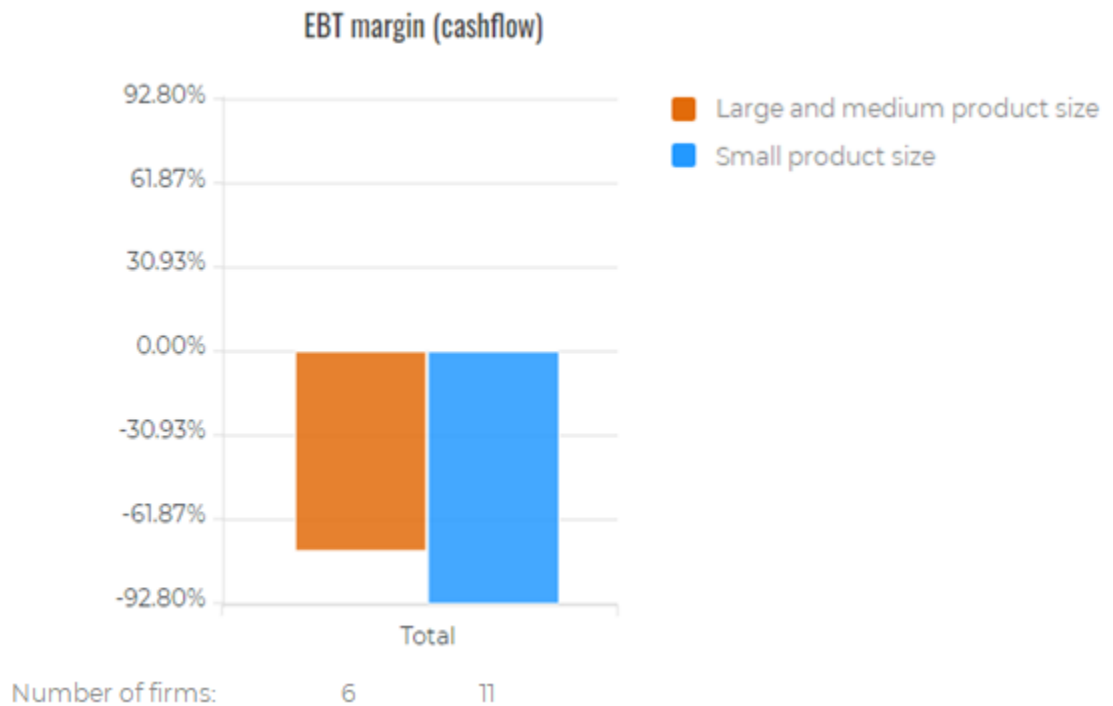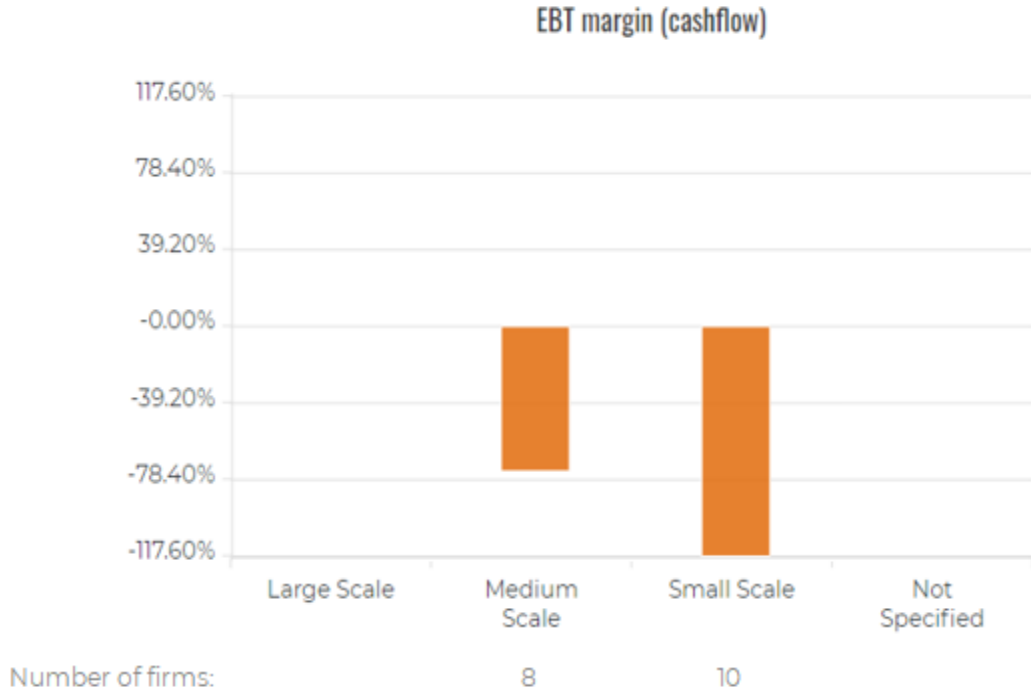
As discussed in section 5.2, substituting cashflow for revenue in the calculation of the KPI is not ideal and is recommended to be discontinued as soon as revenue recognition policies will be harmonized across the industry.

Back to financial performance KPIs summary

10. EBT Margin (Cashflow)

Priority: 1	Definition: The total profit after taking into account all costs (variable and fixed) for the PAYGo firm as a proportion of the total cashflow from customers	
Calculation	Initial (Total Cashflow from Customers – Variable Costs – Fixed Costs) / Total Cashflow from Customers	Recommended (Cashflow from customers – Total costs) / Cashflow from customers

EBT margin (cashflow)

EBT margin (cashflow)

EBT margin (cashflow)

	117.60%			
	78.40%			
	39.20%			
	-0.00%			
	-39.20%			
	-78.40%			
	-117.60%			
	Large Scale	Medium Scale	Small Scale	Not Specified
Number of firms:		8	10	

EBT margin (cashflow)

Legend:
- Large and medium product size
- Small product size

	92.80%	
	61.87%	
	30.93%	
	0.00%	
	-30.93%	
	-61.87%	
	-92.80%	
	Total	
Number of firms:	6	11
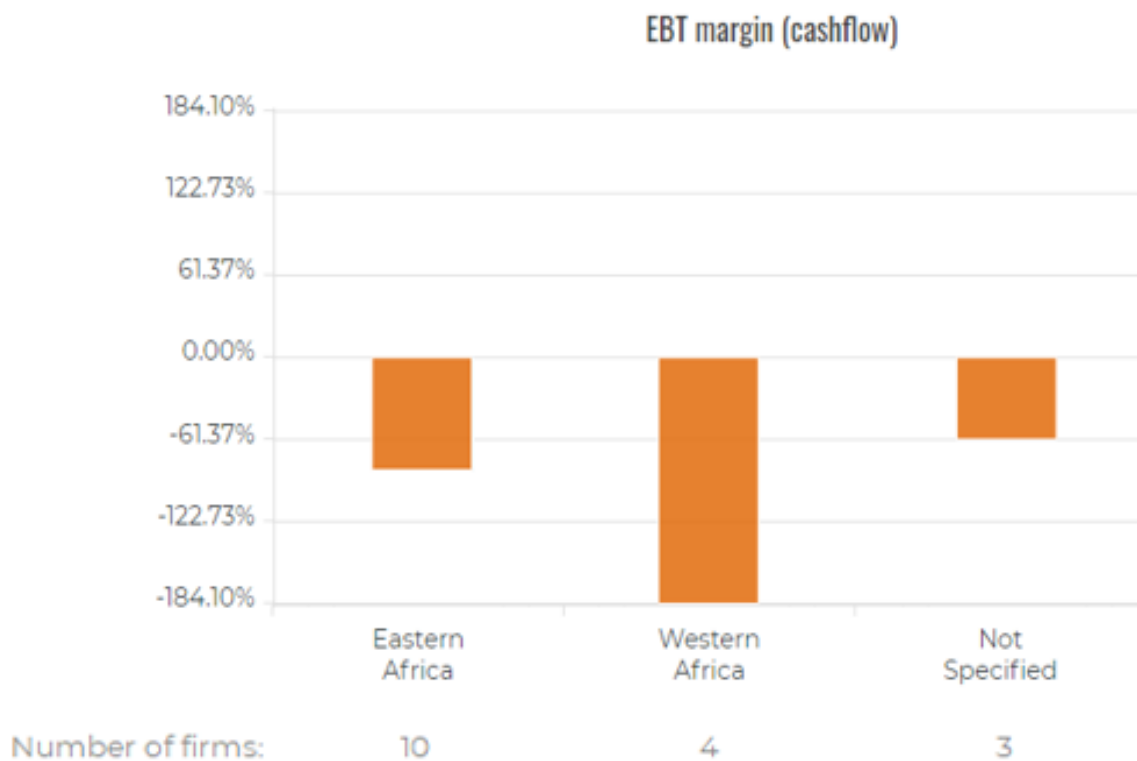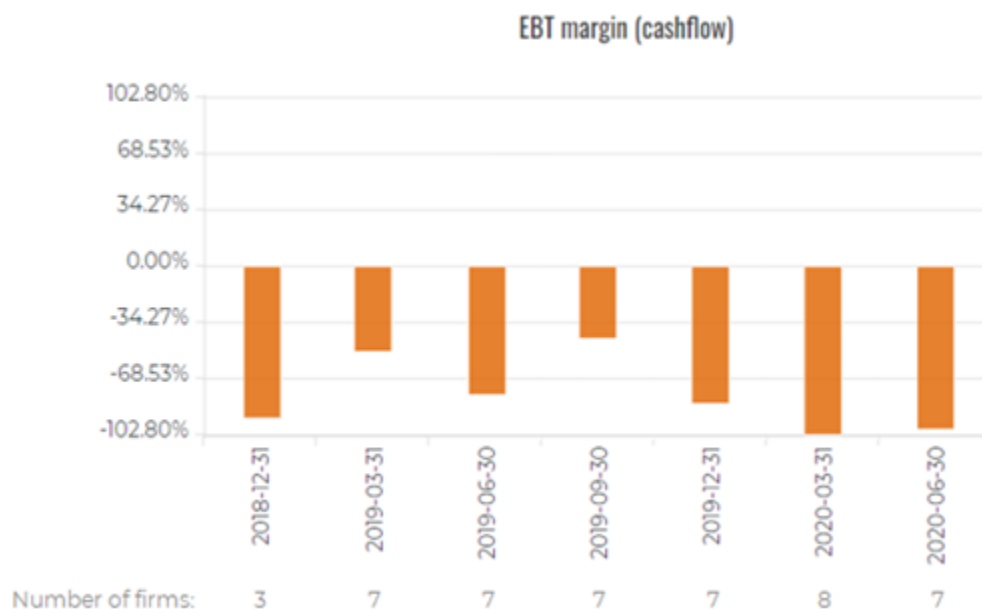
EBT Margin (Cashflow) is negative for the majority of companies, with a median value of -75% for the total period (2018-2020). This may be largely explained by the young age of companies and the ongoing progress towards achieving economies of scale (medium scale firms display significantly better results than small scale firms). The fluctuations observed in 2019 are due to significant variations in the values for some of the firms in the sample, in turn due to seasonality and the high impact on small firms of any event concentrated in specific periods. East Africa displays less negative results than West Africa, possibly

related to the stage of development of this market and its enabling environment (e.g. mobile money services coverage). Firms selling products of medium or large size display better EBT Margin (Cashflow) on average than firm selling small size products.

Recommendations

The EBT Margin (Cashflow) factors in total costs, which refers to all costs with the sole exception of taxes. Total costs are also equivalent to the sum of variable, semi-variable, and fixed costs, used in the different financial performance KPIs presented earlier in this section (please see the breakdown of costs in section 5.1). Total costs must equal the total expenses on the company's income statement (with the sole exception of taxes), to ensure that no expenses are being left out of the calculation.

Similar to Contribution Margin (Cashflow), a change to the calculation method is suggested, to include both costs defined as variable and semi-variable, in addition to fixed costs, in the calculation.

As discussed in section 5.2, substituting cashflow for revenue in the calculation of the KPI is not ideal and is recommended to be discontinued as soon as revenue recognition policies will be harmonized across the industry.

Back to financial performance KPIs summary

11. Liquidity / Total Costs

Priority: 4	Definition: Liquidity (90 days) as a proportion of total costs in a quarter	
Calculation	Initial -	**Recommended** Cash and liquid assets convertible to cash in the next 90 days at end of period / Total costs over the quarter

Recommendations

A new KPI is suggested to be added as a secondary-level priority, to include KPIs on liquidity risk. Liquidity <90 Days / Total Costs uses cash and liquid assets which are easily convertible to cash in the next 3 months, compared to total quarterly costs.

Given the current high growth in the industry, it is recommended to approximate quarterly costs as the costs of the most recent quarter available. In cases where costs are available on a monthly basis (as opposed to only quarterly), and the cut-off date is different than quarterly (e.g. February instead of March), quarterly costs can be obtained as the sum of the previous 3 months costs. In low growth environments, more representative alternatives of the costs that will be incurred in next quarter are possible, including: average of the past 4 quarters, or next quarter year -1 (i.e. 3 quarters ago), which is appropriate when seasonality is high. The result is an estimation of the runway of liquidity that the company has at its disposal in relation to costs. A ratio with a result of 1 would mean that the company has liquidity to cover 3 months of costs. The reality of the operating environment is of course that revenues would be coming in during this timeframe as well, such that this KPI is meant as more of a worst-case scenario approximation.

Statistics are not available because the KPI is proposed as a result of the pilot exercise, and the data to calculate it was not included in the initial collection exercise.

12. Unit Customer Deposit

Priority: 3	**Definition**: Average customer deposits received per unit sold PAYGo	
Calculation	**Initial**	**Recommended**
	Total contractual deposits / Total units sold	Customer deposits / Number of PAYGo units sold

Unit customer deposit (USD)

Unit customer deposit (USD)
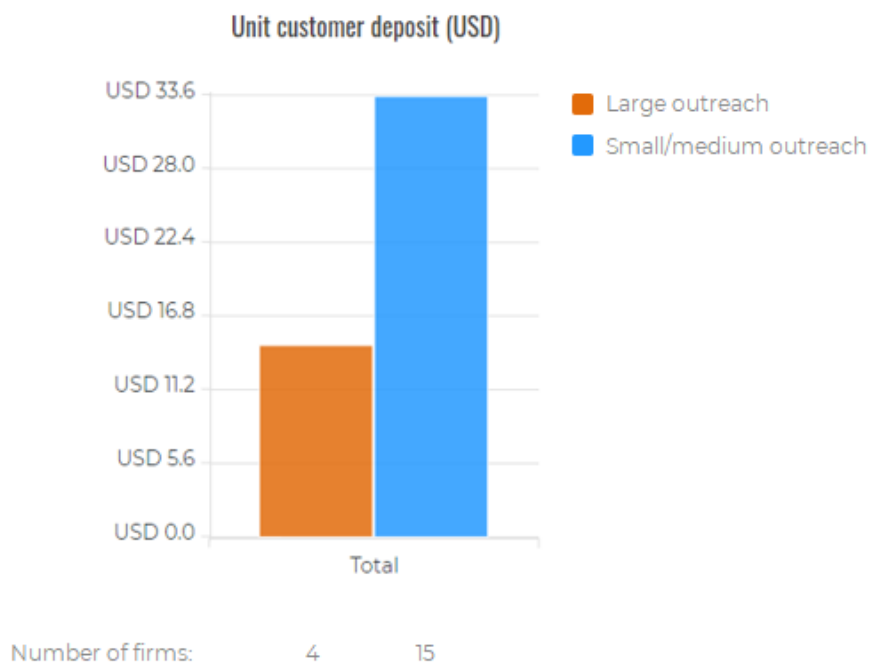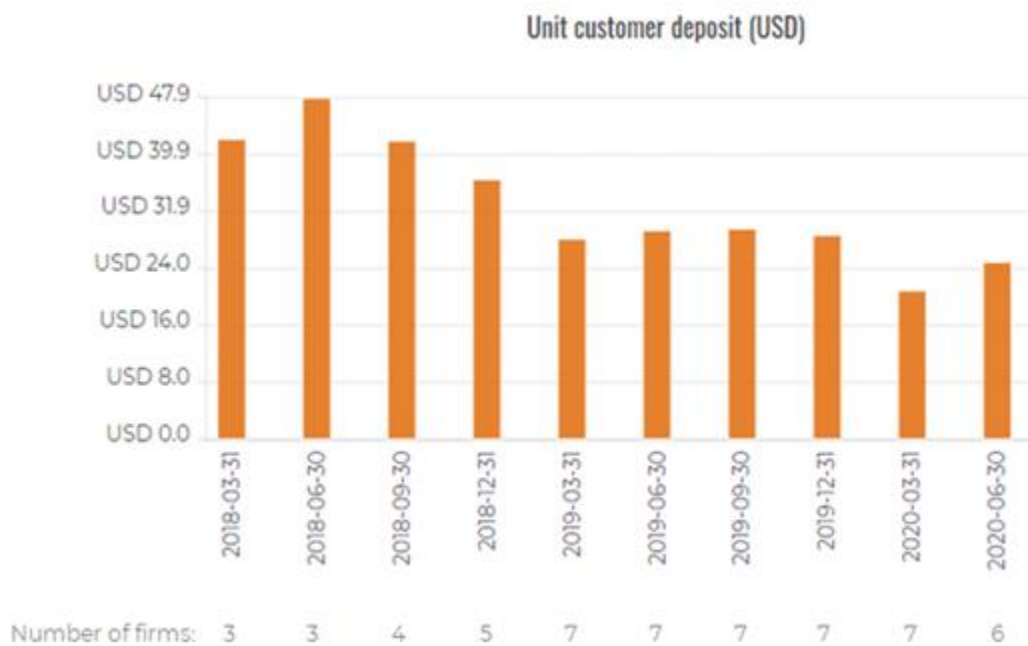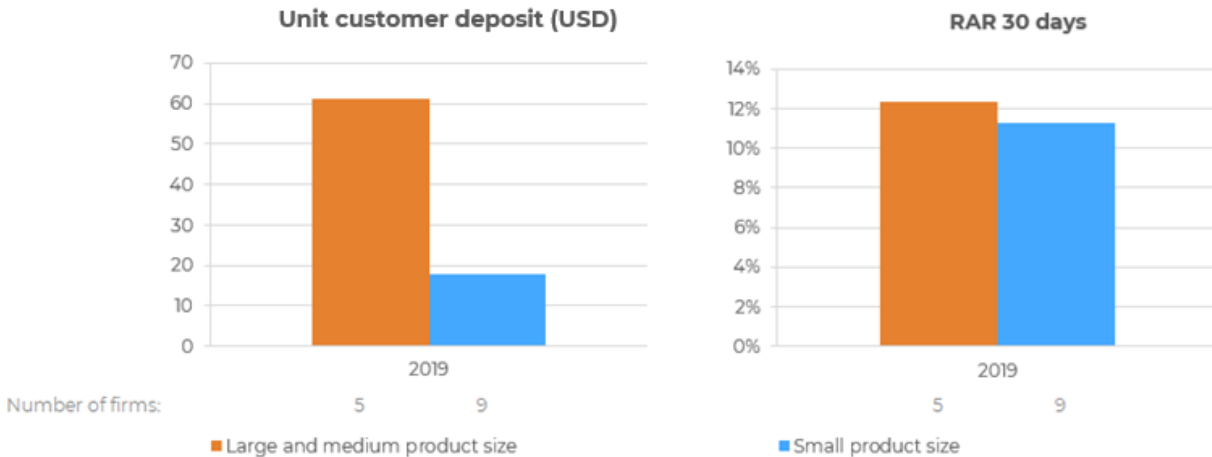
While the previous firm-level KPIs describe financial performance in relative terms, the unit economics KPIs describe the components of the business on a unit basis, including the effects of the different sizes of solar panels sold and entailing large variance in the amounts across companies and products.

Unit customer deposit is 32 USD on average in the period 2018-2020. Companies adopt different strategies in seeking the balance between maintaining a level low enough to be accessible but high enough to screen out lower creditworthiness likelihoods. The deposit amount also constitutes a significant incentive for customers to complete payments because the deposit is not refundable in case of repossession due to poor payment.

The Unit Customer Deposit value represents less than 10% of the average Unit Follow On Payments in the same period but it is still 27% of the average monthly GNI per capita in Kenya for instance. The need for low-income customers to gather the initial deposit is often reported as the reason for extended sales cycles, requiring several follow-ups before the deposit can be collected. Firms with large outreach display, on average, a lower Unit Customer Deposit value (please see definitions in section 3, Data guide).

By definition, the Unit Customer Deposit (USD) amount is larger in firms mainly selling large and medium products, as opposed to firms selling mainly small products (please see definitions in section 3, Data Guide), while no significant difference is observed in RAR 30 days between these two groups of firms.

Initial findings suggest that at the client level, PAYGo contracts with a high initial customer deposit relative to the total follow-on payments have higher collection rates and lower consecutive days unpaid.

Recommendations

The emerging data show that the majority of firms display a substantial share of PAYGo activity, e.g. in pilot: 11 of the 13 country operations have PAYGo sales >90%; 2 of the 13 have PAYGo sales about 60%. However, recognizing the variety in PAYGo versus cash sales shares in different firms, it is recommended to use 3 Unit-level revenue KPIs:

- 2 specific for the PAYGo sales model: Unit Customer Deposit and Unit Follow On Payments, both using the number of PAYGo units sold as denominator
- 1 specific to the cash sales model: Unit Cash Sales, using the number of Cash units sold as denominator.

This KPI is suggested to be complemented by Unit Follow On Payments to complete the picture of Unit Cashflow from the PAYGo sales model.

The calculation method uses cashflow from PAYGo customer deposits (building block collected for other KPIs) and number of PAYGo units sold. The cashflow will match contractual deposits during the period given the model that the deposit must be paid in order for the contract to be active. This indicator uses specifically Number of PAYGo units sold as denominator for more accuracy.

Back to financial performance KPIs summary

13. Unit Follow On Payments

Priority: 3	**Definition**: Average contractual follow-on payments until system is permanently unlocked, net of customer deposits, per unit sold PAYGo	
Calculation	**Initial**	**Recommended**
	Sum of contractual follow on payments / Total units sold	Receivables generated during the period / Number of PAYGo units sold

Unit follow on payments (USD)

Unit follow on payments (USD)
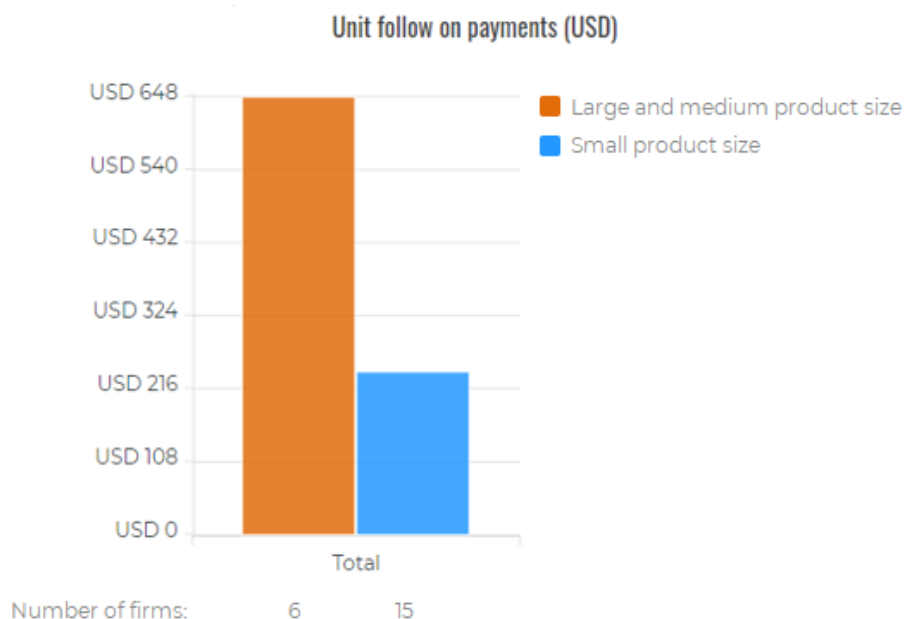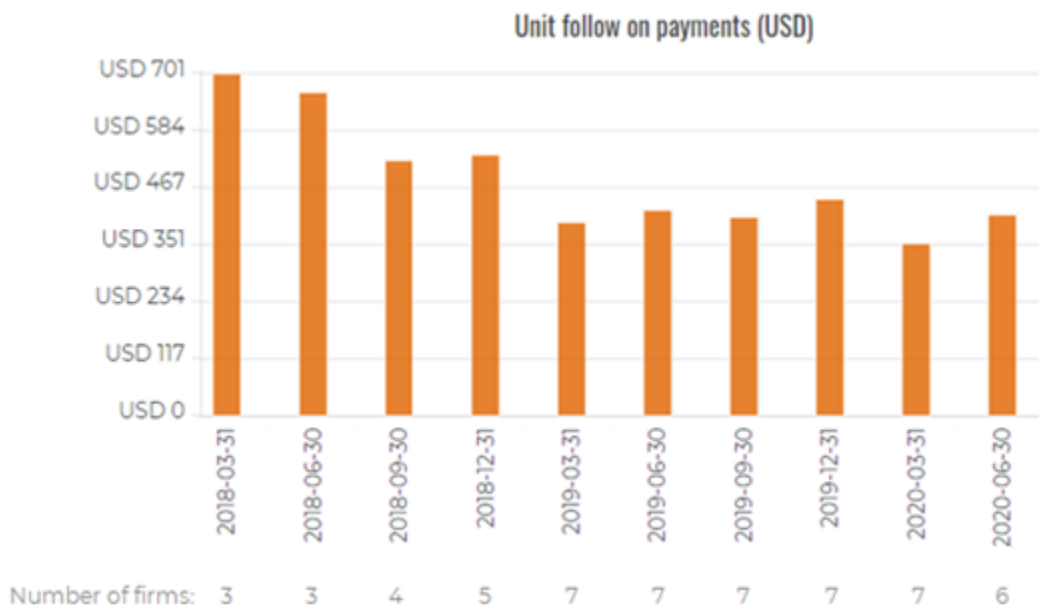
The Unit Follow On Payments displays an average of 365 USD in the period 2018-2020, with large differences between large and medium size products on one side and small size products on the other side (please see definitions in section 3, Data Guide). Interestingly, the ratio of Unit Customer Deposits to Unit Follow On Payments is not very different in firms selling mainly large and medium size products (8.2%) and small size products (7.7%).

<u>Recommendations</u>

The calculation method suggested is to use the receivables generated indicator in the numerator, comparing it to the number of PAYGo units sold during the period to arrive at the unit-level indicator. Receivables generated does not include customer deposits because deposits paid in cash by customers do not generate a receivable. Similar to Unit customer deposit, this indicator uses specifically Number of PAYGo units sold as denominator for more accuracy.

It is recommended to use this calculation method as opposed to a discount rate and PV calculation, to reduce complexity and subjectivity in the calculation. In the simpler calculation method, the resulting KPI serves the purpose needed for integration as a building block into the Unit contribution margin.

14. Unit Cash Sales

| Priority: 3	**Definition**: Average cashflow from cash sales per unit sold cash	
Calculation	**Initial**	**Recommended**
	-	Cashflow from cash customers / Number of cash units sold

<u>Recommendations</u>

It is suggested to add this KPI to complete the revenue picture of companies with different payment models, for use as a building block in the Unit Contribution Margin. This is from the perspective that the Unit Contribution Margin includes expenses of both the PAYGo and non-PAYGo model, such that the cashflows included should also be from both models.

Statistics are not available because the KPI is proposed as a result of the pilot exercise, and the data to calculate it was not included in the initial collection exercise.

15. Unit Device Cost

Priority: 3	**Definition**: Average cost of the device inclusive of hardware, transportation to the warehouse, import taxes & duties, and stock insurance per unit sold	
Calculation	**Initial**	**Recommended**
	(Sum of Cost of hardware, transportation cost (to the warehouse), import taxes and duties, stock insurance) / Total Units Sold	Cost of goods sold / Number of units sold

Unit device cost (USD)

Unit device cost (USD)
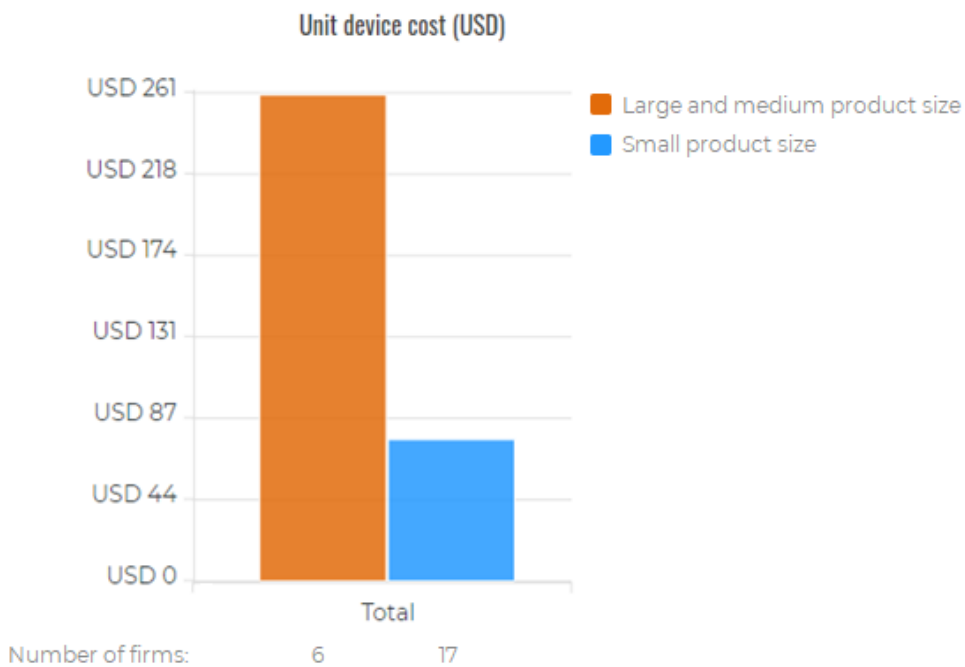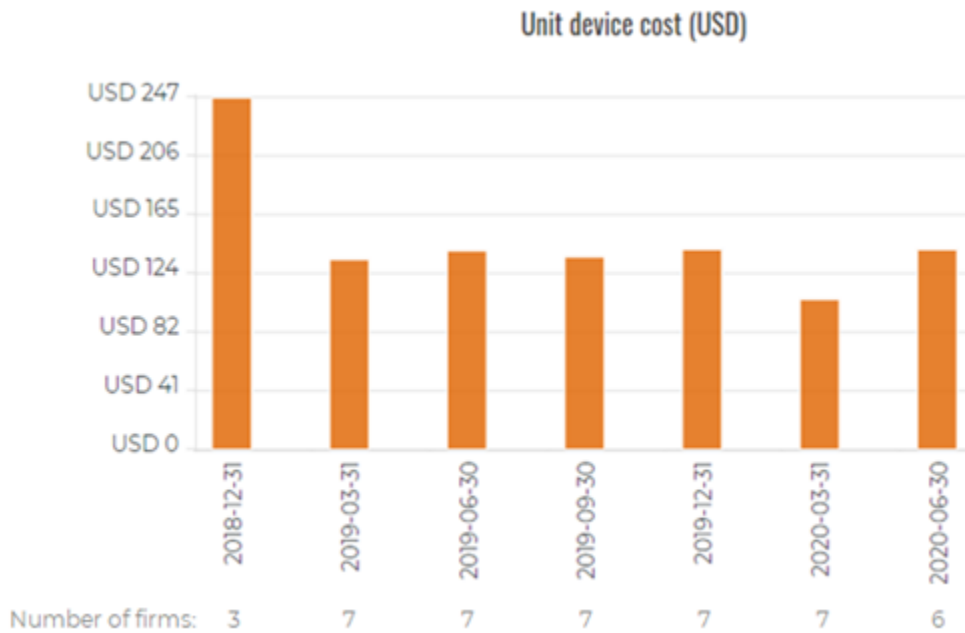
The Unit Device Cost is on average 132 USD in the period 2018-2020, constituting the highest cost in unit economics. The Unit Device Cost is higher in firms selling mainly large and medium size products (250 USD) than in firms selling small products (73 USD), by definition (see section 3 - Data Guide). The ratio of Unit Device Cost to Unit Follow On Payments appears to be smaller in firms selling mainly small size products (32%), than in firms selling mainly large and medium size products (42%), possibly reflecting the lower capacity of customers buying small size products to pay higher interest rates (the contractual credit period is not shorter in small product size firms than in medium and large product size firms).

Recommendations

The proposed calculation method uses cost of goods sold, to utilize a building block already collected for other KPIs.

Back to financial performance KPIs summary

16. Unit Sales and Distribution Cost

Priority: 3	**Definition**: Average cost of installing the device at the customer site and transportation from warehouse to customer per unit sold	
Calculation	**Initial**	**Recommended**
	Sum of installation cost, commission for sales agent and transportation cost to the customer site / Total units sold	Sales and distribution cost / Number of units sold

Unit sales & distribution cost (USD)
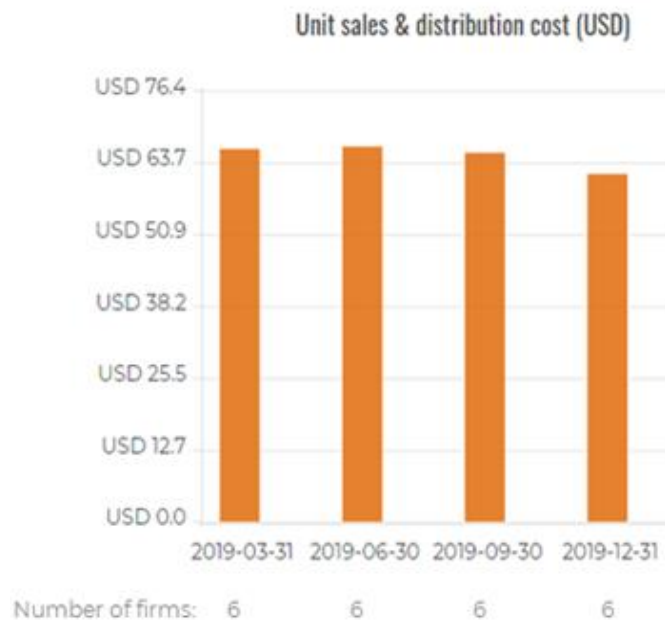
Unit Sales and Distribution Cost is on average 66.50 USD in the period 2018-2020, the second most important unitary cost after Unit device cost. Data from 2020 has been excluded from this analysis due to the availability of data break-down for 2019 but not for 2020 for some firms.

Recommendations

No changes are proposed to the calculation method.

For this unit-level indicator, given the trade-off between usefulness for management purposes to see sales & distribution cost separate from servicing and maintenance cost, and the complexity of separating the two costs in some cases, it is recommended to continue testing the collection of the two ratios Unit Sales and Distribution Cost and Unit Servicing and Maintenance Cost separately. It may be useful, in the medium-term, to assess again the cost-benefit of this approach versus simplifying with a combined ratio Unit Sales and Maintenance Cost, as suggested for the firm-level indicator Sales and Maintenance Cost.

Back to financial performance KPIs summary

17. Unit Servicing and Maintenance Cost

Priority: 3	**Definition**: Average cost of servicing a customer (collection of payments, customer service) and providing maintenance per active unit	
Calculation	**Initial**	**Recommended**
	(Sum of total servicing costs and maintenance costs per month * Effective Credit Period) / Total Active Units	(Servicing and maintenance cost expressed as monthly equivalent * Effective credit period expressed in months) / Average active units
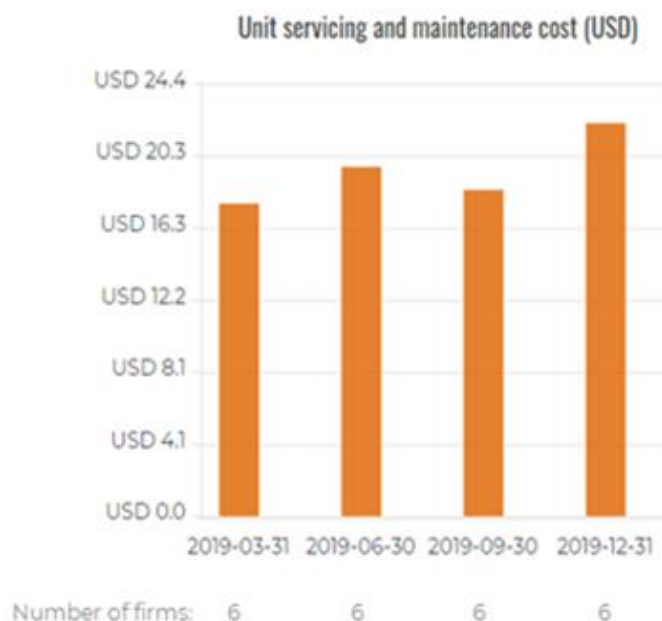
Unit Servicing and Maintenance Cost is on average 24 USD in the period 2018-2020. While this is a significantly lower level than the Unit Sales and Distribution cost, it is important to remember the caveat about the difficulty in some cases to allocate costs of mixed nature to the two categories of sales and distribution on one side, and servicing and maintenance on the other side. Similar to Unit Sales & Distribution Costs, data from 2020 has been excluded from this analysis due to the availability of data break-down for 2019 but not for 2020 for some firms.

Recommendations

The numerator of the calculation method has been slightly adjusted in order to be able to use the already existing building block on servicing and maintenance costs and to convert the Effective Credit Period KPI into daily terms. The denominator has also been adjusted to use average active units, being the average of active units at the beginning and end of the period, to improve accuracy by more closely reflecting the average active units over the period rather than solely the end of period.

Back to financial performance KPIs summary

18. Unit Provision Cost

Priority: 3	**Definition**: Average loan loss provisioning cost per active unit	
Calculation	**Initial** (Unit Follow On Payments) * (Write-off Ratio)	**Recommended** Provisioning expenses / Average active units

Unit provision cost (USD)
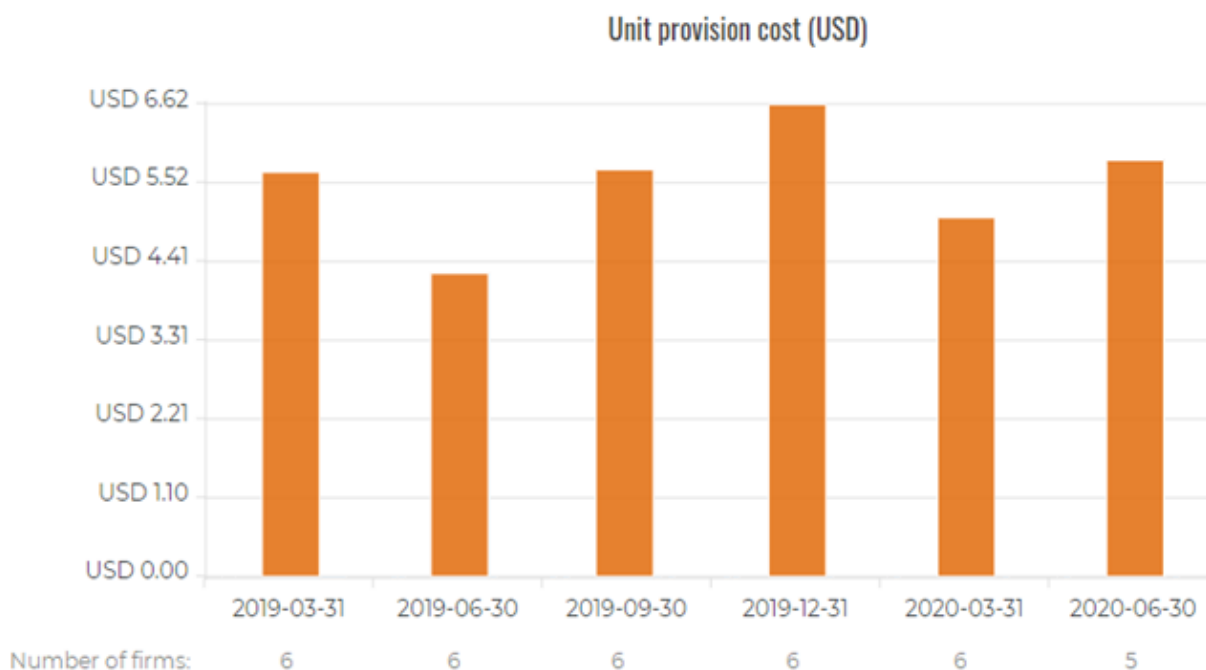
The Unit Provisioning Cost displays an average value of 27 USD in the period 2018-2020, similar to the Unit Servicing and Maintenance Cost. As for the Provision Expense Ratio (Cashflow), this KPI depends on how conservative the provision policy of each firm is.

Recommendations

It is recommended to calculate the indicator as Provisioning expenses / Average number of units, and to rename from Unit Credit Cost to Unit Provision Cost to align with the firm level KPI (Provision Expense Ratio). The suggested calculation provides a better indication of the cost of credit risk compared to write-off, because provisioning, unlike write-off, is done:

- At the level of the entire portfolio, as opposed to only the very high-risk segment of portfolio, with degrees of intensity depending on level of risk of different segments of the portfolio;
- In all periods precisely to smooth-out the effects of credit losses (absorbed by loss provision), while write-off may be more concentrated in some periods of the year.

Back to financial performance KPIs summary

19. Unit Contribution Margin

Priority: 2	**Definition**: Average margin after variable and semi-variable costs per unit	
Calculation	**Initial**	**Recommended**
	(Sum of Customer Deposits and Follow On Contractual Payments – Sum of Credit Cost, Device Cost, Sales & Distribution Cost, and Servicing & Maintenance Cost) / Total Units Sold	(Unit Customer Deposits + Unit Follow-on Payments) * (Number of Units Sold PAYGo / Total Number of Units Sold) + Unit Cash Sales * (Number of Units Sold Cash / Total Number of Units Sold) – Unit Device Cost – Unit Sales and Distribution Cost – Unit Servicing and Maintenance Cost – Unit Provision Cost

Unit contribution margin (USD)

Unit contribution margin (USD)
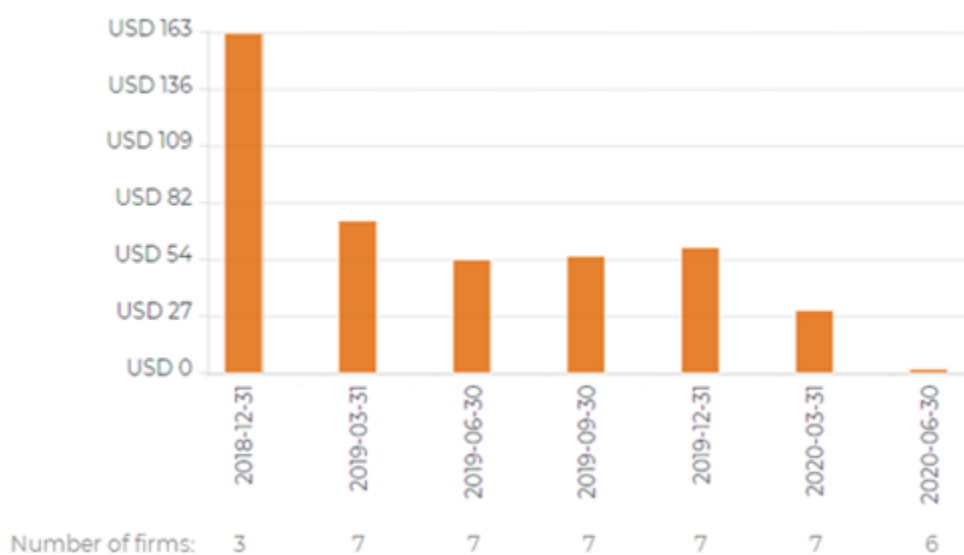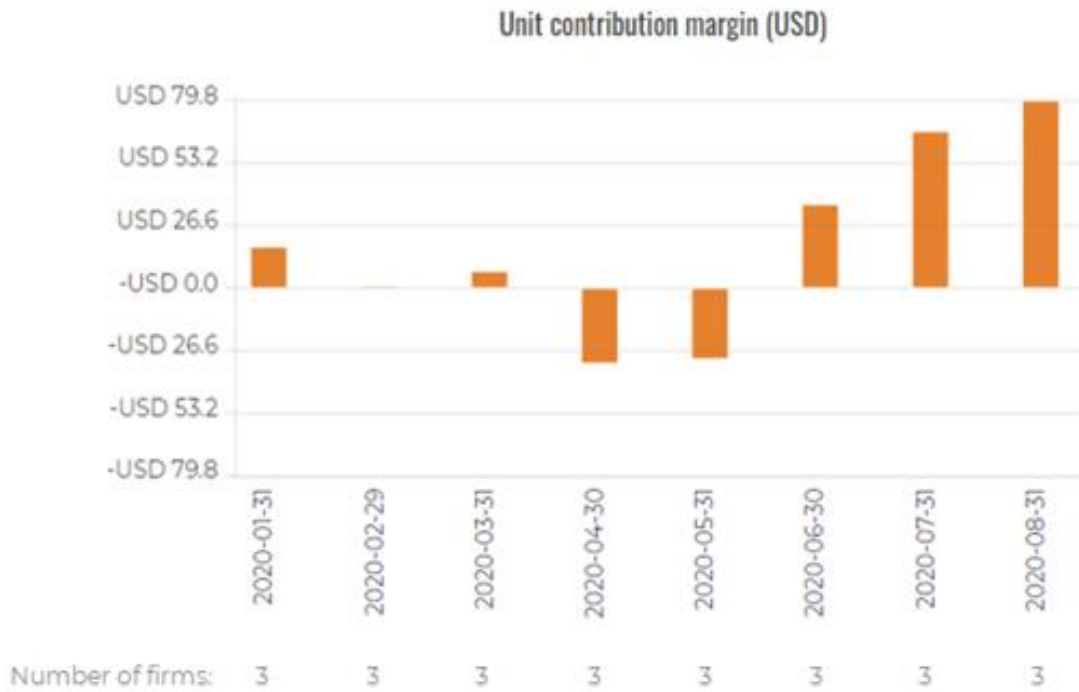
The average Unit Contribution Margin is 20 USD in the period 2018-2020. The KPI drops in the second quarter of 2020, but promptly recovers afterwards based on the data available (the sample of companies with monthly data available is smaller).

Unit contribution margin (USD)
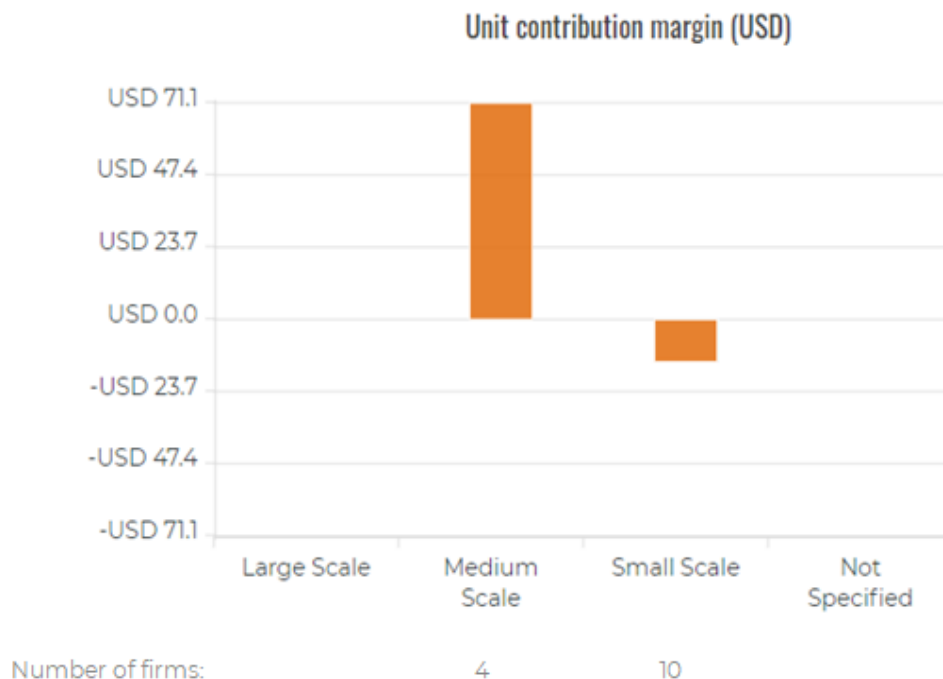
As with the KPI Contribution Margin (Cashflow), scale appears to matter for this KPI to be in the positive zone (medium scale firms) or negative zone (small scale firms). Similarly, firms selling mainly large and medium size products display a positive Unit Contribution Margin, while firms selling mainly small size products tend to show negative Unit Contribution Margins, possibly due to the less favorable difference between cashflow and costs in smaller than larger tickets.

Unit contribution margin (USD)

Legend:
- Large and medium product size
- Small product size

Number of firms: 6, 9
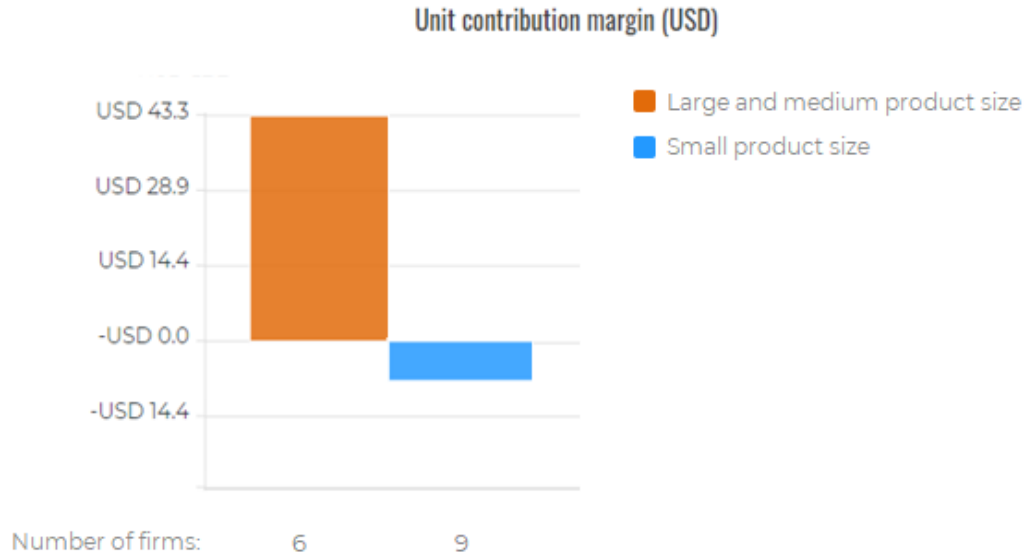
Recommendations

The spirit of the KPI remains the same as the beta version, with a proposed suggestion to revise the calculation method. Given that other constituent unit-level KPIs are calculated already, the calculation can use those KPIs as building blocks for the Unit Contribution Margin, for more precision.

The KPI integrates Unit Cash Sales as well, to complete the revenue picture of companies with different sales models. The Unit Contribution Margin includes expenses of both the PAYGo and non-PAYGo model, such that the cashflows included should also be from both models. Both PAYGo and cash sales are included as unit revenue components, to mirror the fact that some of the costs are incurred for both PAYGo and cash sales (e.g. Unit Device Cost, Unit Sales and Distribution Cost). The cash and PAYGo Unit revenue components are weighted for their prevalence in each firm sales model.

Statistics are available using the initial calculation (see table above) and not the recommended calculation, because the recommended calculation is proposed as a result of the pilot exercise, and the data to calculate it were not included of the initial collection exercise.
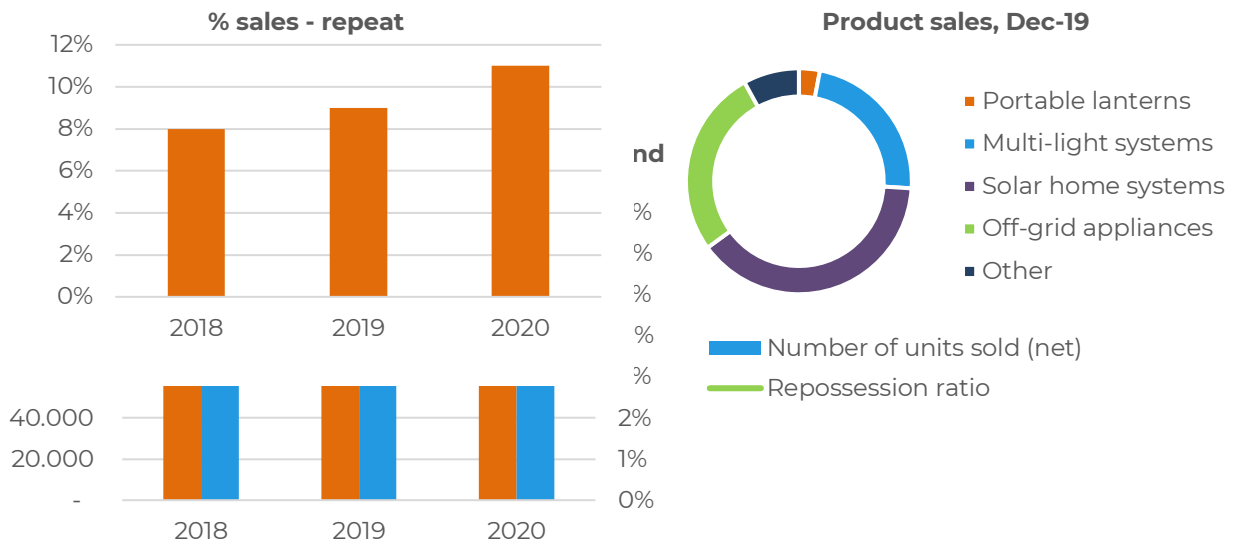
6. Company and Operational KPIs

1. Summary of Company and Operational KPIs

The Company and Operational KPIs are very important to understand the business model and market positioning of a company within the broad spectrum of different ways in which off-grid solar PAYGo companies operate. To do so, some of the KPIs in this section break down the operations by several criteria (payment model, distribution model, products, distribution channel), using the amount of sales revenue as base metric.

In case of international holding companies with investments in affiliate companies in multiple countries, the share of sales in a given country over the total sales revenue of all affiliate in all countries is interesting to monitor the business evolution.

Sales performance analysis can be further supported by indicators of number of units sold discounted by repossessions (Total Net Sales), sales to repeat customers (Repeat Sales), customer satisfaction (Net Promoter Score), productivity of sale points (Sales Point Rate) and market positioning in terms of Average Selling Price.

Please find here below an example of how Company indicators and Operational KPIs can be analyzed, based on the average data for a sub-sample of 4 firms included in the pilot, for which data are available in the period (2020 is annualized), but not necessarily representative of the industry. Please note the data are presented here as an average from multiple firms for confidentiality reasons, but it is recommended and more powerful at the level of single firms. Detailed explanations by KPI are available in the following sections of the report.
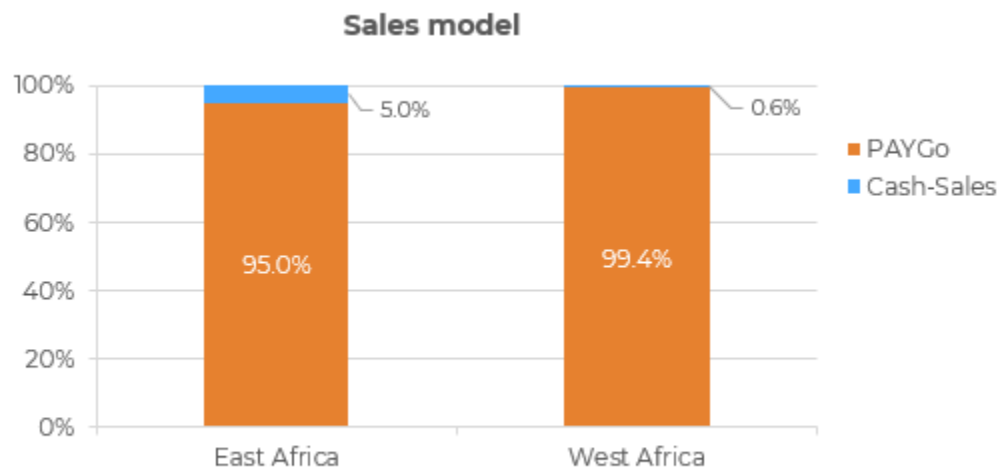
2. Sales Model

Priority: 1	Definition: Percentage of revenue by sales model: PAYGo, cash sales.	
Calculation	**Initial** Revenue Generated per Individual Sales Model / Total Revenue	**Recommended** Sales Revenue Generated per Individual Sales Model During the Period / Sales Revenue During the Period
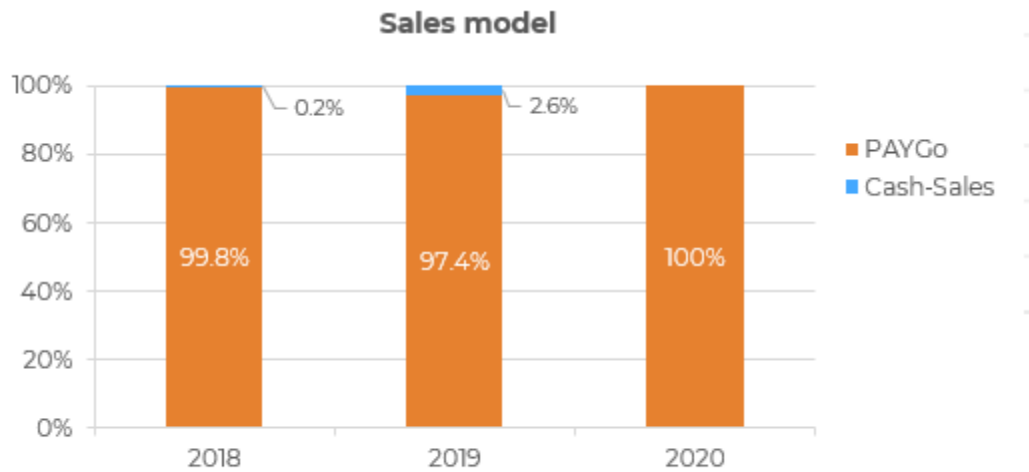
Sales model

Number of firms:	5	20	5

Sales model

Number of firms:	9	5
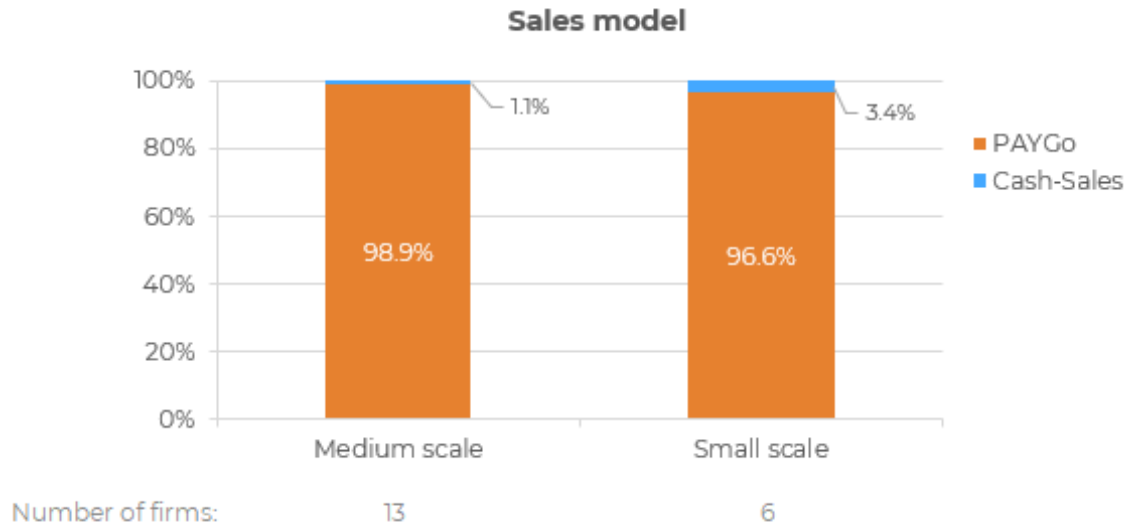
Sales model

The PAYGo sales model is markedly predominant among the pilot companies, accounting for 95% to 100% in different breakdowns. The cash sales represent a small share of sales in the sample, slightly higher in East Africa and in Small firms.

Recommendations

It is suggested to condense the initial breakdown into two main sales models: PAYGo and cash sales, according to GOGLA definitions:

- PAYGo: the customer pays for the product in instalments over time or pays for use of the product as a service. This includes products sold by distributed energy service companies (DESCOs), as well as those sold as lease-to-own.

- Cash sales: the customer pays for the product in a single transaction. This includes products purchased as a tender by governments and humanitarian agencies.

The intention here is to bring simplicity to the KPI as the split between PAYGo and Cash should be sufficient for an understanding of the sales model.

As illustrated in the financial performance section, the revenue recognition practices currently differ significantly among companies. Thus, given that this KPI utilizes sales revenue, it is impacted by the different revenue recognition approaches of companies. For example, a company with a conservative revenue recognition policy may appear to have a lower % sales through the PAYGo sales model than a different company with a more aggressive revenue recognition policy.
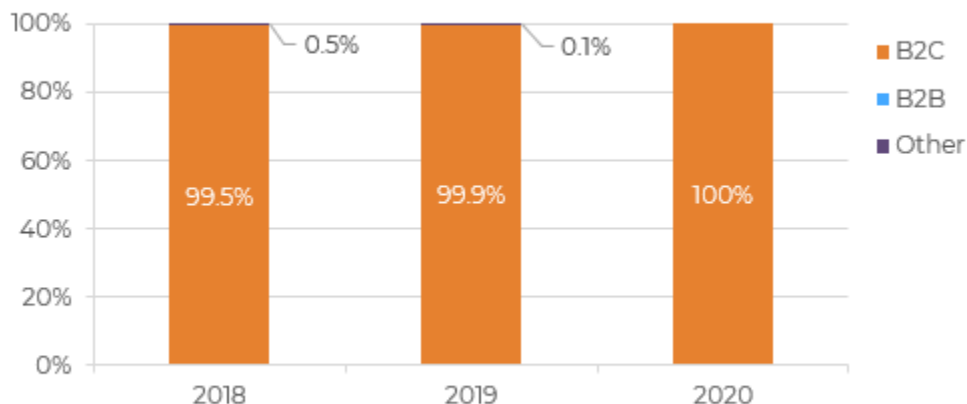
The process of harmonizing revenue recognition policies towards prudential standards is key for the healthy development of the industry. As revenue recognition are harmonized, many KPIs will benefit in increased relevance and comparability, including all the revenue-based KPIs in the Company Indicators and Operational KPIs and Financial Performance areas. Until the industry achieves the adoption of common practices, it is recommended to still calculate the Company Indicators and Operational KPIs based on revenue: the differences in the results due to revenue recognition shall be considered, but may be tolerated during the transition phase. It is not recommended to adjust revenues in order to calculate comparable results just for these, because the benefit may not justify the risk of reduced accountability (complex process affecting all the financial statements and lower ability to verify against other sources). It is thus recommended for now to calculate the revenue-based Operational KPIs using the revenue figures as registered in the company accounts, according to their own recognition policy. Companies are also recommended to disclose the revenue recognition policy adopted as important accompanying information for all company indicators and operational KPIs described in this section.

Back to Company and Operational KPIs summary

3. Sales Distribution Model

Priority: 1	**Definition**: Percentage of revenue by distribution model: B2C, B2B, other	
Calculation	**Initial** Revenue Generated per Individual Sales Distribution Model / Total Revenue	**Recommended** Sales Revenue Generated by Individual Distribution Model During the Period/ Sales Revenue During the Period

Sales distribution model

Sales distribution model

B2C is the main Sales Distribution Model employed by the firms in the sample, ranging from 78% to 100% depending on periods, sub-regions and firm size. B2B follows in importance and other distribution model accounts for a small share of sales on average (even if it can be significant in some firms).

Sales distribution model

Number of firms: Medium scale: 16 Small scale: 6
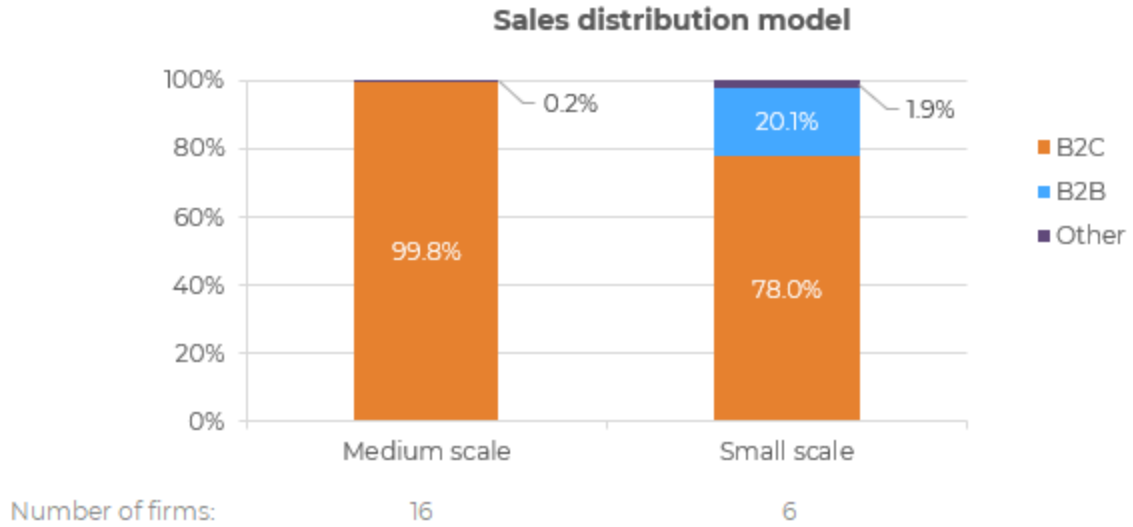
Recommendations

It is suggested to add to B2C and B2B a third category other, including B2G, sales to NGOs, and institutional sales, which emerged as meaningful in size during the pilot.

Back to Company and Operational KPIs summary

4.   % Country Sales

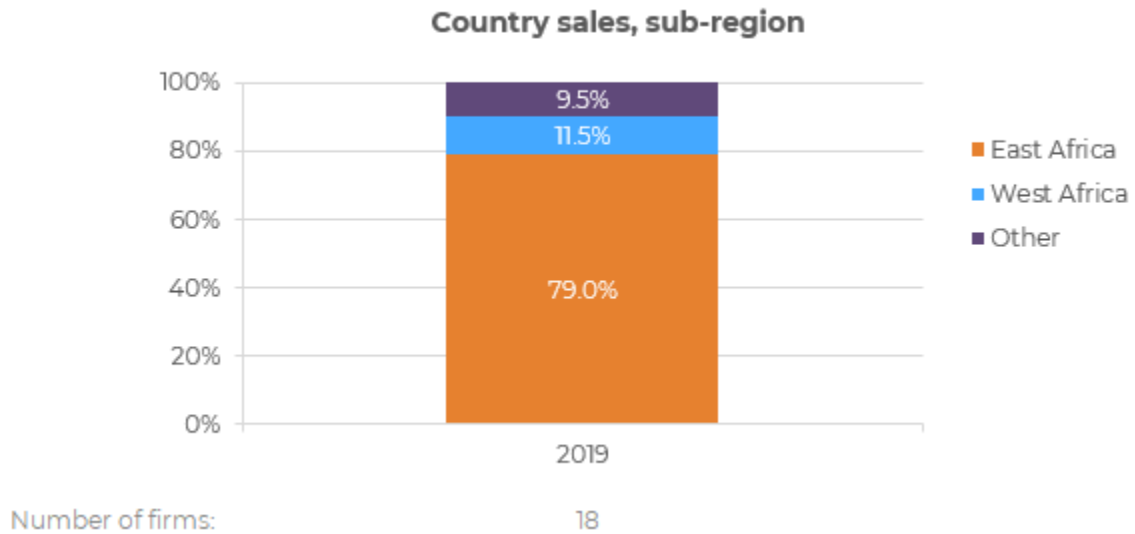| Priority: 1	**Definition**: Percentage of revenue by country (applicable to companies operating in multiple countries)	
Calculation	**Initial**	**Recommended**
	Sales revenue by country during the period / Sales revenue during the period	Sales revenue during the period by country / Sales revenue during the period

Country sales, sub-region

East Africa accounts for a higher share than West Africa and other sub-regions in the sample available (international groups with operations in multiple sub-regions).

Recommendations

It is suggested for the KPI initially named "Geographical Area" to be renamed to % Country Sales. No other changes are suggested for this KPI. This KPI is applicable to companies that have multiple country operations.

Back to Company and Operational KPIs summary

5. Product Sales

Priority: 2	**Definition**: Percentage of revenue (0-100%) by product category	
Calculation	**Initial**	**Recommended**
	Revenue per Product Category / Total Revenue	Sales revenue during the period by product category / Sales revenue during the period.
		Product categories:
		– Portable lanterns 0 – 1.499 Wp
		– Portable lanterns 1.5 – 2.999 Wp
		– Multiple-light Systems 3 – 10.999 Wp
		– Solar Home Systems 11 – 20.999 Wp
		– Solar Home Systems 21 – 49.999 Wp
		– Solar Home Systems 50 – 99.999 Wp
		– Solar Home Systems 100 Wp +
		– Off-grid appliances: Household appliances and productive equipment (e.g. TVs, fans, refrigerators, water pumps, mills, clippers, etc).
		Other: phones, other products

Product sales
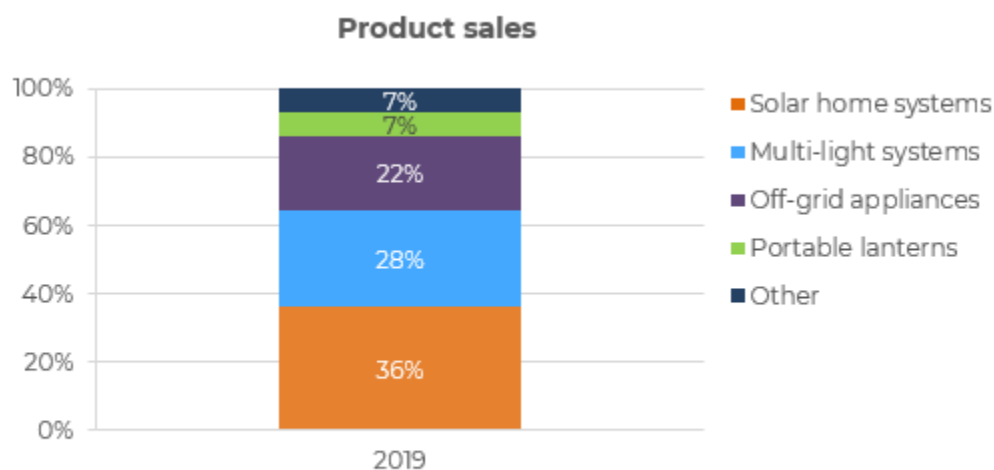
Number of firms: 5

Solar home systems, Multi-light systems and Off-grid appliances account cumulatively for 86% of the total sales based on the data available. The small share of portable lanterns is also due to their low unitary value compared to the other product, while the high share of off-grid appliances is also due to their relatively high unitary value.

Recommendations

The following product categories are suggested, in line with GOGLA sales data categories:

- Portable lanterns 0 – 1.499 Wp
- Portable lanterns 1.5 – 2.999 Wp
- Multiple-light Systems 3 – 10.999 Wp
- Solar Home Systems 11 – 20.999 Wp

- Solar Home Systems 21 – 49.999 Wp
- Solar Home Systems 50 – 99.999 Wp
- Solar Home Systems 100 Wp +
- Off-grid appliances: Household appliances and productive equipment (e.g. TVs, fans, refrigerators, water pumps, mills, clippers, etc).
- Other: phones, other products

Including the panel size as a factor in products definition was expressed as a preference by some companies and may become even more relevant in the future, as companies may diversify towards panels of larger size. The distinction between household and productive-use appliances was regarded as subjective or unknown in some cases, and the two items are suggested to be included in the same product category.

Back to Company and Operational KPIs summary

6. Sales per Distribution Channel

Priority: 3	**Definition**: Percentage of revenue (0-100%) by distribution channel: agents, wholesalers, shops, financial institutions, e-platforms, governmental projects.	
Calculation	**Initial**	**Recommended**
	Number of units sold of individual distribution channel / Total number of units sold	Sales revenue by distribution channel during the period / Sales revenue during the period
		Distribution channel: agents, wholesalers, shops, financial institutions, e-platforms, governmental projects

Unfortunately, the data shared are not sufficient to display aggregate statistics on this KPI. Anecdotally, shops and agents are often mentioned as significant channels, while financial institutions, still not very common, may increase their weight in future.

Recommendations

It is suggested to calculate the metric based on sales revenue rather than units sold, to align with the approach for other sales-oriented KPIs in the operational KPI indicator grouping.

Back to Company and Operational KPIs summary

7. Repeat Sales

Priority: 3	**Definition**: Percentage of revenue (0-100%) from repeat customers (current or former).	
Calculation	**Initial** Sales to an existing customer (repeat sales) during calendar year / Total Net Sales	**Recommended** Sales revenue from repeat customers (existing or former) / Sales revenue during the period

Repeat sales

	2018	2019	2020
Number of firms:	3	3	3

The % repeat sales displays relatively high values on average, considering the downward effect of the share of new customers in growth times, with a positive trend over the periods of analysis.
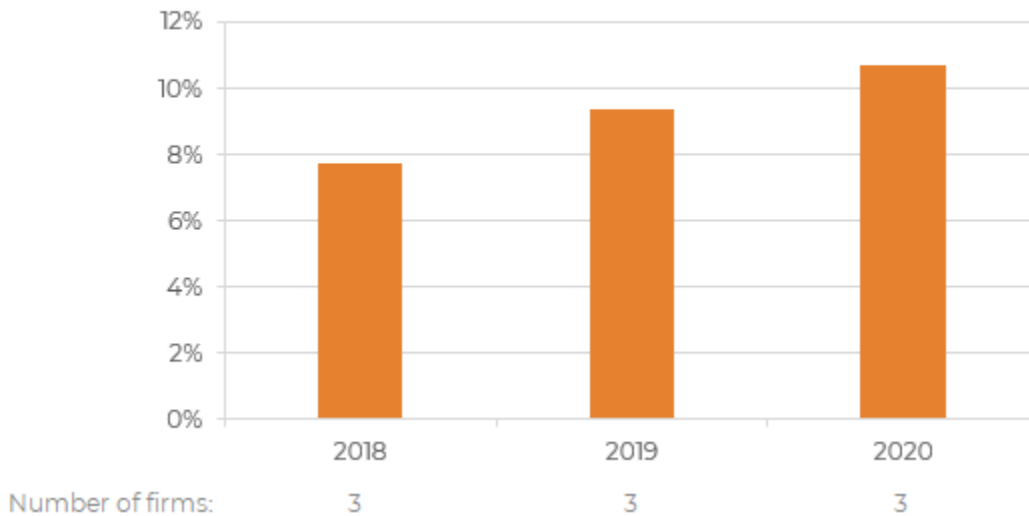
Recommendations

It is suggested to calculate the metric based on sales revenue rather than units sold, to align with the approach for other sales-oriented KPIs in the operational KPI indicator grouping. The revenue focus of this KPI allows including items of very different sizes without a risk of distortion, as small value and large value sales will automatically weigh accordingly in the result. Any repeat sale to current or former customers can be included in the numerator, e.g., small or large add-on to the current system, new system (upgrade), spare parts, or other. This KPI provides an important indication of the extent to which previous commercial relationships transform into future opportunities. However, the share of % Repeat Sales is expected to be low in times of high growth, simply because of the high share of new customers.

In relation to the initial definition and associated data collection, data on number of units sold to existing versus new customers was straightforward to extract for some companies while others were not able to precisely split their sold units by these parameters. This mostly depended on the unique customer identifier used during registration; for companies using national ID, it was easy to identify a repeat customer; for companies using the mobile phone number, identification was less accurate (since a repeat customer using a new/different mobile number was not readily identified as a repeat customer).

Statistics are available using the initial calculation (i.e. Sales to an existing customer (repeat sales) during calendar year / Total Net Sales, expressed in number of units as opposed to amount of sale revenue) and not the recommended calculation, because the recommended calculation is proposed as a result of the pilot exercise, and the data to calculate it (i.e. Sales revenue from repeat customers) were not included in the initial collection exercise.

Back to Company and Operational KPIs summary

8. Total Net Sales

Priority: 4	**Definition**: Number of units sold during the period, net of returns and repossessions.	
Calculation	**Initial**	**Recommended**
	Number of units sold – number of returned and repossessed units	Number of units sold – Number of units returned and repossessed

Total net sales

Number of firms:	4	4	4
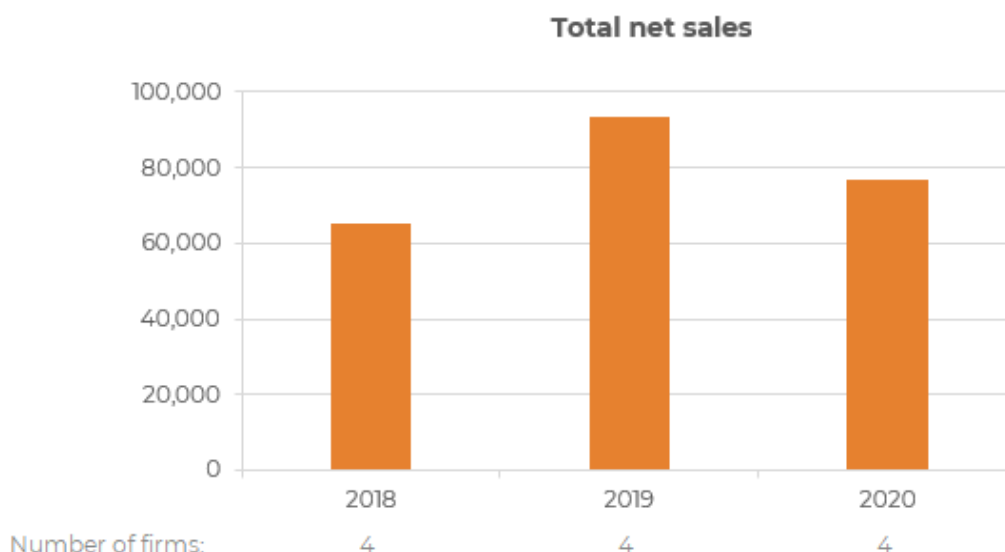
The average Total Net Sales displays a high growth in 2019 and a decrease in 2020 (annualized for the year 2020 from the partial period Jan-Aug 2020), due to the impact of COVID-19 on Number of Units sold rather than to the effect of repossession. The Total Net Sales in 2020 may improve in case of high sales during the period Sep-Dec 2020.

Recommendations

One suggestion may be to change the calculation to Number of units sold * (1- Repossession Ratio), to reduce the data collection effort while maintaining the spirit of measuring the number of units sold net of the effect of repossession. In this case, the slightly less accurate option of using Repossession Ratio compared to the more accurate Repossession Ratio (Unit) is deemed to be acceptable given the efficiency gain.[19] However, some companies expressed a preference to keep the calculation as in its initial version, which requires the additional data on Number of units repossessed. In this case, it is suggested to change the second element of the formula from Number of units returned and repossessed to Number of units repossessed, since the Number of units sold is clarified as not to include the units returned. If the calculation Number of units sold – Number of units repossessed is preferred by companies, then in addition to Number of units sold (net), the portfolio quality KPI Repossession Ratio (Unit) could be calculated.

The possibility to modify the calculation to Number of units sold * (1-Repossession Ratio) may be reconsidered in the future in relation to how the preferences for the Repossession Ratio calculation will evolve. In the meanwhile, it is suggested to keep the calculation as per its initial version.

Back to Company and Operational KPIs summary

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[19] Repossession ratio is suggested with higher priority than Repossession ratio (unit) because of its capacity to capture the effect of repossession in a more comparable way to Write-off ratio – i.e. in value (please see Repossession ratio for more details).

9. Average Selling Price

Priority: 2	**Definition**: Average price of units sold, by sales model: PAYGo and Cash sales.	
Calculation	**Initial**	**Recommended**
	Sum of sales revenue per individual sales model / Number of systems sold per individual sales model	• PAYGo model: (Customer deposits during the period + Receivables generated during the period)/ Number of PAYGo units sold during the period • Cash model: Cash sales revenue during the period / Number of Cash units sold during the period

Average selling price (USD)

Number of firms: 8
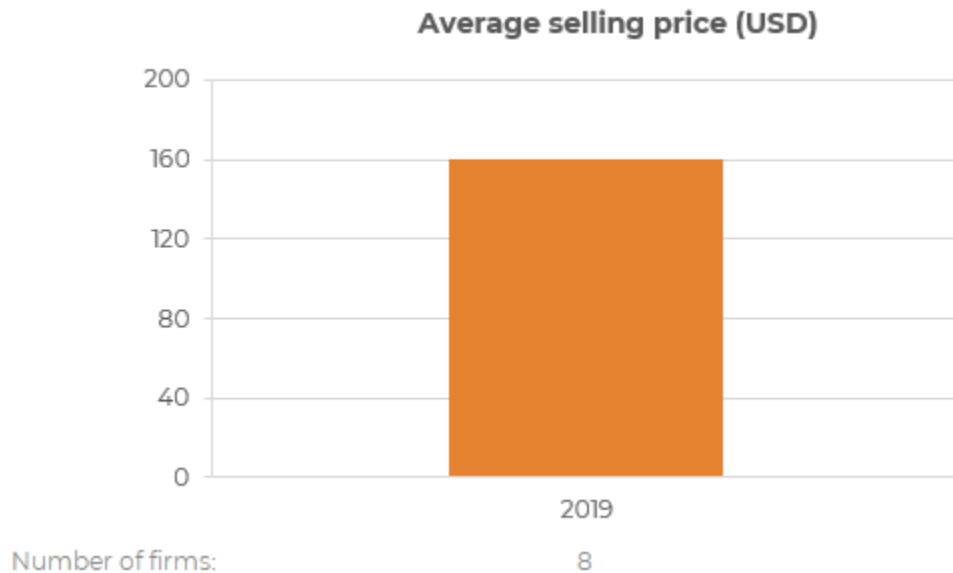
The Average Selling Price is USD 159 on average for the PAYGo sales model. The KPI clearly depends on the type of product sold, and also on the revenue recognition policy adopted. The Average Selling Price is smaller than the Unit Customer Deposit + Unit Follow On Payments because the sales revenue used in the Average Selling Price in its initial calculation refers only to one period (e.g. 1 year), while the Unit Follow On Payments refers to the full credit life of the unit.

Recommendations

Average Selling Price (including segmented into sales models) is an important contextual point that should be taken into consideration when comparing performance across companies.

It is recommended to calculate the Average Selling Price in two different ways, specific to the sales model: while the numerator is straightforward for cash sales (revenue from cash sales), the same shall consider customer deposits and receivables generated (i.e. the follow-on payments of the units sold in the period) in the case of PAYGo sales. The denominator can be specific for the number of units sold through both cash and PAYGo sales models: the same building blocks are used to calculate Unit Cash Sales, Unit Customer Deposit and Unit Follow On Payments. For units sold with a PAYGo model, the unit is considered sold at the time of receiving the initial deposit.

Statistics are available using the initial calculation (see table above) and not the recommended calculation, because the recommended calculation is proposed as a result of the pilot exercise, and the data to calculate it were not included in the initial collection exercise.

Back to Company and Operational KPIs summary

10. Sales Point Rate

Priority: 4	**Definition**: Fraction of sales points that have gone inactive over the previous 90 days, grouped by distribution channel – Agents (%), Wholesalers (%), Shops (%) and/or Other (%).	
Calculation	**Initial** Sales Points Inactive Over the Previous 90 Days Per Individual Distribution Channel / Total Sales Points	**Recommended** Sales Points Inactive Over the Previous 90 Days per Individual Distribution Channel / Total Sales Points

Unfortunately, the data shared are not sufficient to display aggregate statistics on this KPI.

Recommendations

No change is suggested to the calculation method; however, it is suggested that this indicator fits in more of a nice-to-have category and is not a fundamental indicator to include in the final list of KPIs. The reasons for this are that companies do not often track when a sales point becomes inactive, and from the perspective of reducing level of effort from companies because the KPI requires two building blocks which are not used in any other KPI. A trend in sales point inactivity would likely also be visible in other KPIs as well (e.g. other Sales-oriented indicators).

If the KPI were to be adopted, the 90-day timeframe as a definition of inactivity seems reasonable, although 90 days of inactivity may identify more of a performance issue for some distribution channels (e.g. agents) than others which are often less regular/frequent (e.g. governmental projects). Focusing on agent turnover rate could be a way to focus this ratio on a key sales point, however the challenge of lack of comparable tracking across companies remains.

Back to Company and Operational KPIs summary

11. Net Promoter Score

Priority: 2	**Definition**: Percentage of customers who would highly recommend the service, net of the percentage of customers who would not recommend the service to others. The NPSs score should be calculated based upon customers' responses to the question 'how likely is it that you would recommend our product/service to your networks?' The scoring for this answer is most often based on a 0 to 10 scale.
Calculation	**Initial** Total scores of participated customers / Total participated customers **Recommended** (% of responses which are 9 and 10) - (% of responses which are 0-6 responses). This will result in a score between 100 and -100.

Unfortunately, the data shared was not sufficient to display aggregate statistics on this KPI.

Recommendations

It is recommended to change the calculation to: % of responses which are 9 and 10 - % of responses which are 0-6 responses, resulting in a score between 100% and –100%.

It is suggested to converge towards a standardization of the sample size and study design/method employed so that Net Promoter Scores are comparable across companies (or, at a minimum, disclosure of sample size, sample characteristics and representativeness of the population). This process could include randomly selecting customers based on parameters that make the sample size representative, having a minimum surveyed number of customers (e.g. 100), and clarifying what the 0 and 10 of the scale refer to participants

The collection of customers' satisfaction scores is often managed at country firm level. The exercise requires some management time and may be prompted by specific needs sometimes, as opposed to being systematic and regular in frequency.

Customer satisfaction is key not only to consumer protection and to growth, but also to portfolio quality, given that customers can stop paying when a unit is not perceived as functioning properly and does not receive prompt maintenance (see section Challenges and lessons learned, Credit risk).

Back to Company and Operational KPIs summary

7. Challenges and lessons learned

1. Varying accounting policies

Accounting policies are not aligned and vary considerably by company, country, etc. There is a need for industry standardization around the concepts of revenue recognition, provisioning, repossession, and write-off, among others. In the context of the Data Collection Pilot, this meant that some KPIs which would be preferably formulated in a certain way (e.g. profitability indicators purely using income statement figures) must be designed in another way, to enhance comparability and effectiveness of the KPI in understanding company performance. This challenge represents a broader issue in the PAYGo solar industry, which is still developing in terms of alignment across industry standards of accounting and financial reporting. This is also influenced by the reality that PAYGo companies combine elements of multiple business models, with characteristics of an energy company (providing access to clean energy services), retail company (selling and distributing goods to customers), and financial institution (units provided on credit to customers).

An example of these varying accounting topics is revenue recognition on the company's income statement. Outlined below is an accumulation of revenue recognition methods observed during the pilot, which underscores the importance of financial performance KPIs using cashflow instead of revenue for now, to allow for optimal comparability in the current reporting environment:

- recognizing 100% of principal and finance margin upon sale
- recognizing 60% of revenue upfront, and 40% over the years of lifetime of the system – where 60% is in line with the price that would have been paid in a cash sale (resulting in revenue > cash)
- recognizing 100% of revenue (even if cash will be paid over next 2-3 years), decreased by a credit risk provision cost added to the income statement (provision of 35% of portfolio 90 days late, 50% of portfolio >180 days late), resulting in about 40% of receivables that will not be earned
- recognizing only the deposit upon sale with all other payments recognized on a cash basis in the month of actual receipt
- recognizing the amount billed in the period, decreased by a credit risk provision, calculated monthly on historical performance (resulting in revenue similar to cash, with current high growth – while in absence of growth, revenue would be < cash)

Differing write-off polices are another example, which are in the process of being adopted in companies and harmonized across countries. Write-off can be done only occasionally (e.g. every 6, 12, or 18 months) rather than systematically. It may be case by case and manual (e.g. look at 100% portfolio and isolate units with very low likelihood of being repaid) rather than automatic. In some cases there is no write-off, to maintain tracking of the unit in the system (otherwise it does not appear anymore). Some reluctance of write-off may be due in some cases to the direct impact on profit and loss (for some, there is no reserve that can be used for this effect). The Write-off Ratio is important in order to provide a complete picture of the portfolio quality in one company, but it may not yet be fully comparable across companies. Companies in the pilot utilized two different types of write-offs: write-off of the outstanding receivable amount and write-off of the unit. As the Write-Off Ratio is intended to capture portfolio quality, it is suggested to maintain the original definition to calculate according to outstanding receivables written-off (future payments that will not be received from the customer) rather than unit value written off, with the latter being an administrative cost to decrease the value of the inventory. While this difference in write-off policies poses a challenge for standalone comparisons of Write-off Ratio across companies, it does not raise a major challenge in aggregate across the recommended KPIs given that a company with high credit risk but a low Write-off Ratio will likely have a low Collection Rate and a low RAR (consecutive days paid).

2. System quality/integration

For some companies, there is limited integration between accounting/financial and portfolio tracking systems, and also differences between operational data and audited financial statements, sometimes without clear (or readily available) reasons for the differences. This represents a challenge for investors who would hope to validate the reported figures against the audited financial statements as part of their due diligence.

Here are some examples of differences between audited and internal financial statements:

- outstanding portfolio is all follow-on payments in internal financial statements, and amount billed in the period minus provision for losses in the audited financial statements
- gross revenue and provision expenses displayed separately in internal financial statements, net sales (gross revenue – provision expense) displayed in the audited financial statements

3. Data availability

The vast majority of companies participating in the Data Collection Pilot provided nearly all of the requested data, which covered both global/group (consolidated) level, country firm level, and product level. For a small subset of companies, data was not available given that the system did not historically track the needed figures, but the system could produce the figures moving forward for months in 2020 during ongoing data collection. In other cases, a company could produce an approximation of a KPI but not the exact building blocks to achieve a fully accurate KPI, and in some cases it would take considerable time to gather the needed building blocks. While the data collection process and tools were designed to minimize the level of effort of companies reporting KPIs, this was also an opportunity to expose the company to the best practice KPIs' calculation methods and gather companies' feedback on whether they could track them with relative ease moving forward, which was the case for all the KPIs suggested in our KPI recommendations. Some KPIs required meaningful time from PAYGo companies to generate the needed building blocks, due to not reporting on the KPI prior to the pilot. This is an expected part of the process towards industry standardization of KPIs.

At product-level, for a couple companies the data was not easily available for financial performance indicators, as the finance function bulks all costs together which are not recorded to any particular product. Also at product-level, a couple companies preferred to provide the data in different categories (based on solar panel size) that were used by the system. It is suggested to re-consider the breakdowns to limit required data and reduce level of effort, with global/group level and country firm level the most useful breakdowns in our view (which are also more readily available). The product level may be a lower priority for separate KPI calculation, even if the most common product types should be taken into consideration when analyzing KPI performance.

4. Staff commitment and availability

The Data Collection Pilot represented a time commitment for participating companies and their staff. Most commonly, the data requests were fulfilled by staff from a credit/portfolio management function (for the portfolio quality KPIs) and a finance function (for the financial performance and operational KPIs). In general, a staff from the credit/portfolio team tended to be the lead point person for the company, and also tended to be more available throughout the data collection pilot process, whereas Finance personnel tended to be less available for follow ups (e.g., for updated data and for feedback on quality control observations) which delayed data collection. Mainly due to the more time-consuming nature of financial figures to be produced, the periodicity of financial performance KPIs is suggested to be quarterly and annual, rather than monthly. While there is additional time required for companies to familiarize and adapt to the KPI framework, on an ongoing basis MFR estimates that companies would need to dedicate no more than 2-3 hours per month (for priority 1 KPIs assuming reasonably efficient information systems) to update the building blocks for monthly KPIs.

Institutional buy-in and organized communication within the company on the benefits to participating and the importance of the initiative is crucial to ensure a smooth and timely process. The vast majority of participating companies/staff were adequately collaborative and supportive of PAYGo PERFORM's goals. For some particular KPIs, some individual staff shared opinions that it is not easily possible to design the metric to be comparable across all industry players, however participants were generally supportive of discussions and working towards achieving the proper formulation, and this provided good opportunities to distinguish between a standardized KPI calculation (which is feasible) vs. analysis complemented by contextual points that do not change the definition/calculation of KPIs (to ensure standardization) but should be taken into consideration when comparing across companies: company age, company size, growth rate, region/country, % deposit required, product type (e.g. selling price, term), vertical integration level, % PAYGo sales model, and % non-PAYGo receivables (e.g. top up loans).

5. Definition/calculation revisions

Companies found the indicator grouping naming to be clear for Portfolio Quality and mostly clear for Unit Economics. The Company and Operational KPIs name was initially perceived as less clear, even if the firms participating to the working group eventually expressed a preference not to modify the name. It is suggested to group all KPIs into three categories: Portfolio Quality, Financial Performance (including both firm-level and unit-level KPIs), and Company and Operational.

A key task of the Data Collection Pilot was to convert the definitions/calculations agreed by the PAYGo PERFORM working groups into a streamlined data request to collect the necessary building blocks in the most efficient way possible and to adjust it with MFR and company feedback during the pilot process. The first few companies received an original version of the tool which was replaced shortly after the start of the pilot with a revised version. These first few companies provided highly valuable feedback that led to revisions of calculation methods and guidance notes to ensure an apples-to-apples comparison of KPI calculations. In a way this posed a challenge as it required to make clarifications to each of these first companies, however it was an expected and necessary part of the pilot process.

6. Credit risk

Portfolio quality data confirms that credit risk is a major risk of PAYGo companies and underscores the importance of portfolio quality KPIs. Below are observations from the pilot process of the various operational elements that influence portfolio quality:

Credit risk assessment:

– Room for improvement in repayment capacity analysis: initial deposit (e.g., 2 months instalment) used as proxy, to discriminate households with ability to pay (excluding some customers who may not have the lump sum, but who may be creditworthy for small payments diluted over time). In some companies the initial deposit amount may be higher for customers with a low credit score. Some data is collected but may not be reliable enough to be used yet. Some plan to test credit scoring systems, with data collected in the past by the firm or with transactional data from mobile network operators; credit scoring may be the basis for risk-based pricing in the future. In some companies a repayment capacity analysis is performed, based on proxies (size of house, of field, animals, network coverage, distance to mobile money, type of activity) or calculation of disposable income through standardized algorithm using demographic variables and selling price (receivable amount) to determine a customer's credit risk, partially verified over a phone call with the customer prior to unit acquisition.

– Credit bureaus not yet utilized. In some countries, regulation may not be supportive of this, given that companies are not regulated, being either not required or unable to report to the credit bureau, or to access it for use to check the credit bureau during the customer's application.

Agent risks:

- Incentive system to agents (e.g., based on sales and on credit performance of the units sold; also based on repossessions; repossessions "clean" the quality of the portfolio of an agent remunerated based on portfolio quality)
- Potential fraudulent agents' behavior and lack of agent misconduct common reporting system.
- Ability to ensure the inventory needed for agents to sell: since agents are remunerated based on sales, a disruption in the supply chain (provider or customs delay or other issue) results in no remuneration for agents, who may move to a competitor.
- Agent turnover: agents build a relationship with customers, and when moving from a firm to another firm, may encourage customers to stop paying the unit of the previous firm and get a new one from the second firm.
- Agent presence in the village: when the agent is not present in the village of the existing units (for instance because there are no new units to install), it increases the likelihood of non-payment because existing customers receive less assistance.

Operational and technical risks:

- Quality and reliability of the unit: besides repossession due to non-payment of performing units, customers returning units which are not working properly / stopping to pay units that do not function properly (or do not receive maintenance to function properly) seems to be a frequent scenario (seen more frequently in competitive markets). A faulty system that is not replaced or repaired quickly will likely lead to non-payment.
- Product and target market: repayment speed for lighting system is slower than for TV systems. Differences in the mix of products over time or across companies shall be taken into account in the analysis of portfolio quality. On average, PAYGo customers may be of a lower segment in the pyramid than microfinance customers (e.g., travelling several hours before reaching a branch).
- Distance from the customer to the closest mobile money kiosk: if travelling cost is significant, this could deter a customer from charging her e-wallet to make the PAYGo payment, even if she has the capacity to repay.
- Mobile money fees: Customers may opt to make bulk payments for multiple days of light at a time to reduce mobile money fees if the PAYGo company does not offer a free mobile money payment channel. This can encourage bulk payments, but also may lead to late payments while the customer waits to save enough funds for a bulk payment to reduce transaction costs.
- External reasons: person is travelling or moved to another place.

Portfolio growth and aging:

- Growth: young accounts, numerous when growth is high, display the best portfolio quality, resulting in very positive portfolio quality ratios in new countries, as opposed to when operations stabilize over time. This is especially true for Collection Rate calculated since inception, since the indicator takes time to decrease from the high initial level (due to initial deposit covering the initial payment period). Also, a new deployment in a country with low competition could allow for picking the low hanging fruit (with better repayment capacity) at the beginning, while the credit risk of customers joining in later cohorts is potentially higher.

7. Future reporting and transparency

Investors' trust can be strengthened by scaling up performance measurement and benchmarking, to increase transparency. An ideal set-up for the measurement and reporting of KPIs balances the benefits for companies, for investors, and a long term and sustainable infrastructure.

Benefits to companies:

- Confidentiality: i.e. access to data reserved to investors and not to the public.
- Efficiency: agile tools and processes, reporting KPIs once through a common channel for multiple investors, as opposed to reporting to multiple investors through multiple excel files every quarter.

- Benchmark: access for reporting companies to some high level, aggregate benchmark reference.
- Tailored content: the solution should be tailored to the KPIs, guidelines and assistance specifically useful for the industry.

<u>Benefits to investors:</u>

- Access to companies' data for origination, due diligence and monitoring purposes.
- Benchmarking solutions to compare a company to peers, taking into account comparability factors such as geography, size and market positioning.
- Portfolio consolidation solutions, to analyze the KPIs of an aggregate portfolio of companies and observe the consolidated performance in case of multiple investments.
- Reliability: in addition to minimum reliability standards, the solution should ideally offer deeper validation services on demand.
- Data coverage of a sizable share of the investable companies.

<u>Sustainable and long-term infrastructure:</u>

- Sustainable business model: the reporting platform and systems should be designed with a sustainability goal from the beginning, to ensure that the solutions will remain available in the long term and maximize the effectiveness of the initial investments. While initial development costs are expected, the business model should be designed in such a way that the ongoing costs to run the platform are covered with the revenues generated by the users of the platform (as opposed to an indefinitely donor subsidized model). Revenues can be generated through a subscription model where investors pay subscription fees to access data of companies, as part of their origination and portfolio management cost. Alternative models where companies pay to sustain the platform risk discouraging companies, which are rather encouraged to contribute to the common system by reporting data. The investments in building and maintaining the infrastructure should always be anchored in market reality: be commensurate to the willingness to pay of contributing users, so that users can rely on a long term solution.
- Scalable: technology and processes should ensure scalability for a fast-growing industry.
- Independent: an independent entity managing the platform makes companies and investors comfortable sharing their business and portfolio data, because the independent entity managing the platform would not be related to operators in the industry and would not engage in investment activities.
- Professional: skills relevant for the industry should ideally be available with the platform manager, to be able to provide informed and professional assistance and trouble-shooting.
- Accountable: the platform manager should ensure governance and accountability systems so that key industry stakeholders, standard setters and independent professionals participate to the strategy and are informed about the execution of the platform. The systems should be agile to maintain this cost low, but are important for coordination and alignment with the industry evolving needs and standards.
- Transparency path: ideally, the platform may be integrated in a bigger picture where the theory of change of increased access to energy through higher investments enabled by better transparency is supported by a transparency pathway. Recognizing that companies may be at different stages of readiness to disclose their performance to third parties, a transparency pathway may be conceived with gradual milestones, so that the pathway remains accessible to all companies, but at the same time the more advanced companies are recognized with higher visibility. For instance, a transparency pathway may start with simple voluntary reporting, to then graduate to higher levels of validation, and achieve the highest credibility level with third party ratings or certifications.
- Finance and impact: to the extent this is feasible and efficient, it may be considered to house different data initiatives on different topics relevant for the industry (e.g. financial and risk; impact; etc) in order for the industry to be more compelling in its communication.

8. Conclusion

The Data Collection Pilot provided a valuable practical opportunity to test the PAYGo PERFORM KPIs 2.0 (beta) for PAYGo solar companies. This is a necessary step towards a globally standardized KPI framework, through recommending KPIs 2.0 industry reporting standards which are well-adapted to PAYGo business models in a comparable way, and likely to be used by a wide range of industry stakeholders, having been tested in the field and adjusted based on the experience.

The consultative process with PAYGo companies who participated in the pilot allowed for constructive feedback gathering to shape the final suggested KPI framework. During the pilot, companies expressed a clear willingness to use the KPIs to facilitate their interactions with investors. The main driver for pilot companies to devote time to the Data Collection Pilot was the opportunity to play a role in getting to a set of KPIs that can serve as common language with investors, adapted to the PAYGo industry and its different models. Companies also shared that some KPIs may also be implemented for internal management purposes, substituting or in addition to the existing KPIs used internally. The higher clarity of KPI definitions and the considerations of multiple factors that contribute to quality and performance was observed to make companies more willing to implement the KPIs, thanks to higher comparability across companies and facilitating a fair picture to investors.

Now that a recommended KPI framework is in place, it can be used by companies, investors, and other industry actors to align the way that company performance is measured in the key risk areas of portfolio quality and financial/operational performance. We would like to once again thank all the participating companies for their commitment to achieve the benefits of this important process together.

Additional steps to scale up data collection to more companies include industry initiatives to recognize companies who report according to this best practice KPI framework, investor use and encouragement of company use of the framework to inform deal sourcing, and the design of standardized accounting guidelines to further improve KPI formulation as the industry matures.

The adoption of these standards throughout the PAYGo solar industry has the potential to promote increased investment into responsible companies, enhancing the sustainability of the sector and ultimately benefiting end customers through expanded outreach of both clean energy access and financial inclusion.

For more information on PAYGo PERFORM, an initiative of IFC Lightning Global, CGAP, and GOGLA, please visit: https://www.findevgateway.org/organization/paygo-perform. Additional data to the ones presented in this report are available at https://www.atlasdata.org/paygo-perform, a data platform managed by MFR.

Annex 1 – Definition of building blocks used to calculate KPIs

The table below presents the definition of the building blocks used to calculate the KPIs, when not already specified in the main body of the report.

Key Performance Indicators (KPIs)	Definition
Portfolio quality	
Outstanding receivables	Total gross outstanding receivables on the balance sheet, including all future scheduled follow on payments
Scheduled follow-on payments	Sum of all follow-on payments from all contracts that fell due within the period.
	Include:
	- follow-on payments for all active contracts that fell due within the period (both signed before and during the period)
	- follow-on payments for customers past their initial contractual term (standard repayment frequency rather than full outstanding amount)
	- the regular payment scheduled for the period even if a larger prepayment is made in the period or if a larger prepayment was made in the past, covering future payments (e.g. the scheduled payment should be $10 in September and $10 in October, even if the customer pays $20 in September and $0 in October)
	- credit risk promotions during the contract, targeted at low repayment customers (e.g. buy one week of light, get one week free; three days of free light to COVID-affected customers): include as scheduled payments the amounts corresponding to the free days of light; and
	- follow-on payments for formally rescheduled portfolio: ensure to include the correct scheduled payments reflecting the rescheduled terms
	Do not include:
	- any scheduled payments in the period covered by the initial deposit given that the customer makes no follow-on payments (no follow-on cashflow received) in that timeframe
	- receivables/units that have been written-off (in an accounting sense, meaning that the receivable does not appear as a receivable on the balance sheet anymore. If the customer is late without a formal write-off, even if >180 days late, follow-on payments should still be included)
	- non-targeted promotions done for marketing purposes during the contract (e.g. buy 1 week light get 3 days free light): ideally, does not include as scheduled payments the amounts corresponding to the free days of light
Receivables generated	Total value of new PAYGo receivables generated/booked in the balance sheet during the period
Outstanding receivables of units repossessed	Value of outstanding receivables at point of repossession

Key Performance Indicators (KPIs)	Definition
Portfolio Quality KPIs	
Outstanding receivables of units restructured or with promotion	Value of outstanding receivables for all units whose payments have been restructured/rescheduled or have benefited from payment waivers or promotions. For restructured units (units with low repayment performance that are removed from RAR CDU and increase Collection rate as a result of restructuring), the scheduled follow-on payment is reduced and/or the duration of the contract is extended. These restructured units have a credit risk higher than healthy receivables, and they should be tracked separately and entered here (because they appear as performing in RAR CDU and are not reflected in a lower Collection rate anymore). For promotions, if a promotion is given due to COVID-19 impact or anticipated repayment challenges, without clients paying (e.g. giving 3 days free light), and if the scheduled follow-on payment is decreased in the system, then Collection rate is artificially improved and the outstanding receivables of the units on promotion should be entered here to reflect the credit risk. However if a promotion is given to performing units to incentivize good payment behavior, and a payment is required to receive the benefit (e.g. buy 3 days of light, get 3 days free), the outstanding receivable does not need to be entered here.
Outstanding receivables by ageing categories	Value of outstanding receivables streams which are overdue by x consecutive days. Customer becomes current when making a payment (regardless of past missed payments).
Outstanding receivables by collection rate	Value of outstanding receivables for which collection rate is within the indicated ranges. Collection rate: cumulative collection rate since each customer's unit acquisition date, counting daily payments paid divided by days since inception, including after initial contractual term.
Outstanding receivables for written-off contracts	Value of outstanding payments for units/contracts written off during the period
Contractual repayment term (days)	For active units as of end of period: Sum of the total initial contractual days of credit (Contractual Final Payment Date - Unit Acquisition Date).
Effective repayment term (days)	For units fully paid off and permanently unlocked in the period: sum of the total effective days of credit (Actual final payment date - Unit acquisition date).

Key Performance Indicators (KPIs)	Definition
Financial Performance KPIs	
Cash and liquid assets convertible to cash in the next 90 days	Cash, bank deposits and any other unencumbered liquid asset
Cashflow from customers	Cashflow from PAYGo customers + Cashflow from non-PAYGo customers
Cashflow from cash customers	Cashflow received from cash sales customers
Cashflow from PAYGo customers	Cashflow received from PAYGo customers, including customer deposits and follow-on payments
Customer deposits	Cashflow received from customer deposits of PAYGo customers
Follow-on payments	The sum of follow-on payments (Cash) received from all customers for the period
Sales revenue	Sale revenue recorded as per company revenue recognition policy
PAYGo sales	Sales revenue from PAYGo sales, i.e. when the customer pays in instalments over time or pays for use of the product as a service, including products sold lease-to-own as well as product distributed by energy service companies (DESCOs).
Non-PAYGo sales	Sales revenue from cash sales, i.e. when the customer pays for the product in a single transaction.
Total costs	The sum of variable, semi-variable and fixed costs must equal the total expenses in the financial statements
Cost of goods sold	The total cost of the device inclusive of hardware, transportation (to the warehouse), import taxes & duties, and stock insurance.
Sales and distribution cost	The total cost of installing the device at the customer site, transportation cost (from warehouse to customer), PAYGo platform fee (if any), cost of sales agents.
Servicing and maintenance cost	Cost of servicing a customer (i.e. call center, collection of payments, mobile money fee, customer service), providing maintenance/repair of installed units, follow-up for repossession. Includes all customer service employees.
Provision expenses	Cost of provisioning for doubtful receivables, as recoded in the income statement.
Other variable costs	Including any other variable, semi-variable costs (non-fixed)
Total fixed costs	All non-variable and non-semi-variable costs, such as personnel expenses (except customer service employees), administrative expenses, and financial expenses
Financial expenses	Interest and fees paid on borrowed loans, FX (gain) or losses
Fixed operating costs	All non-variable operating costs, such as personnel expenses, administrative expenses (including marketing, shops) and depreciation, and any other non-variable cost different than financial expenses (excluding taxes)

Key Performance Indicators (KPIs)	Definition
Company and Operational KPIs	
Number of active units	Units in possession of active clients, including locked units prior to repossession or write-off. Not including written-off units, new units not deployed yet, repossessed units not redeployed yet, or permanently unlocked units.
Number of fully repaid units	Number of units fully paid off and permanently unlocked in the period (PAYGo only), regardless of unit acquisition date. Includes units rescheduled in the past and eventually paid off in the period. Not including written-off units.
Number of units sold	Number of units sold cash + Number of Units sold PAYG. Does not include the units returned.
Number of PAYGo units sold	Number of units sold under the PAYGo sale model, intended as all units for which customers paid the initial deposit in the period. Does not include the units returned.
Number of cash units sold	Number of units sold under the cash sale model. Does not include the units returned.